Annex A: Incremental Cost Analysis

Types of Incremental Costs. This Project involves three distinct types of incremental costs to be met by GEF funds:

(i) the costs associated with the technical assistance programs – start-up and operations of the guarantee facility and utility-based CSC's, and the utility outreach program – additional to IFC, project partner and donor contributions.

(ii) the amount of guarantee funds required to support local FIs to lend to EE projects, in the aggregate amounts budgeted for the Project, which are expended in guarantee claims;

(iii) that portion of the Project's operations and management costs additional to IFC, project partner and donor contributions.

Justification for GEF Funding. The first and last are typical incremental costs. The second is related to the perceived incremental risk facing FIs; addressing this cost is necessary to persuade them to move into the EE finance business, provide loans for the EE projects which the Project will prepare, and assume the associated credit risks. The need for credit enhancement is driven by the extremely risk adverse posture of China's FIs in current financial market conditions, the lack of financing available for small and medium-size term loans, especially for SMEs, and other market barriers, discussed in Section 3.6.

IFC will use a portion of its TA funds to ensure that prudent and creditworthy loans are structured for the utility-based EE market to be developed by the Project. In addition to the Guarantee Facility, other important credit enhancement features are being considered and developed in the Project design:

- integrating utility bill collections with loan payment collections,
- limited recourse from equipment supplier and the utilities vendors,
- use of solid engineering/technical analysis to prepare projects,
- use of proven EE technologies which generate energy cost savings that enhance end-users' ability to pay,
- selection of projects that provide essential energy services to end-users, which enhances their willingness to pay,
- application of project-based lending and underwriting methods, where the project savings/revenues and assets provide a primary source of loan repayment and security, and
- proper credit screening and analysis of end-users/borrowers,
- competitive bidding process by EE Suppliers to ensure that end-users receive the best pricing on equipment and services.

The Guarantee Facility will only support loans for viable projects with capable end-users where business judgments are made that the loan is prudent, creditworthy and will be repaid. Thus, the Guarantee Facility will help bridge the gap between (A) perceived credit risks, which as current practiced represent a barrier to lending, versus (B) real credit risks, as assessed based on the credit structures and business models to be applied by the Project.

The major justification for GEF's involvement is that in the current condition there is lack of effective, readily scalable marketing methods for EE equipment, including for gas-using end-use

equipment. The use of GEF funds is justified to test and support this Project's methods for overcoming the marketing barriers to EE equipment described in Section 3.7. The specific use of GEF funds in the Project is limited to those areas where the Project co-funders and private sector parties are unable to pay the costs. The GEF contribution is thus truly incremental and additional, and catalyzes EE project investment at a 5:1 guarantee ratio, while effectively leveraging TA and operational costs with donor funding..

In addition, financial guarantees have been shown to be a very effective tool for overcoming financial barriers. Previous IFC/GEF projects, such as the Hungary Energy-Efficiency Co-finance Program (HEECP) or Commercializing Energy Efficiency Finance (CEEF) have shown that GEF support, in the form in of financial guarantees, has allowed FIs to gain experience and confidence with loans for EE investments, and as a result, has catalyzed the creation of an EE lending market.

Methodology for Calculating GHG Emissions Reductions Attributable to the Project

Baseline. For the purposes of calculating GHG emissions reductions achieved by the Project, our baseline will be defined at the sub-project (individual EE project installations) level. EE sub-project baselines will be the end-user's existing system and energy consumption for a given level of delivered energy services *prior* to installation of the sub-project directly supported by the Project. Energy savings will be calculated based on the site- and application-specific energy consumption for delivering the same level of energy services *after* sub-project is installed.

GHG emissions reductions resulting from the lower carbon intensity of natural gas fuel directly substituting for other fuels, e.g., coal, in EE sub-projects will be monitored by the Project's M&E plan because they are expected to be significant but they *are not and will not be counted for GEF purposes or for determining GEF cost-effectiveness.* GHG emissions reductions resulting from energy efficiency gains achieved by the EE sub-projects supported directly by the Project will be counted. When EE sub-projects supported directly by the Project result in electricity savings, the GHG emissions reductions associated with these electricity savings will be counted based on China's power system average carbon intensity value.

Defining the baseline strictly with respect to sub-projects supported is a ready and direct method for measuring Project impacts. IFC will engage in further consultations with the GEF Evaluation Unit to further refine this methodology.

For example, one can consider a typical project in a food processing facility, in which an 88% efficient gas-fired boiler replaces a 70% efficient coal-fired boiler. In order to increase the financial appeal of the project, variable speed drives for electric motors are also incorporated into the EE package. The project would take credit for CO2 emissions reductions associated with (i) the increased efficiency of the gas-fired equipment (88% vs. 70%), and (ii) the decrease in electricity use due to efficiency gains from the variable speed drives. This analysis assumes that the project would not take credit for the lower greenhouse gas emissions resulting from the lower carbon intensity of the gas, although the GEF Evaluation Unit might ultimately advise otherwise.

Preliminary Estimates. Preliminary estimates of Project GHG emissions reductions are based on the total volume of EE sub-projects the Project will support and their estimated economics, in aggregate. On this basis, IFC estimates a range of 4.81-9.63 million tons carbon equivalent emissions reductions to be achieved. Key assumptions for one preliminary calculation are indicated in Table A-1, below, for a "base case" estimate. These assumptions are estimated to be reasonably conservative.

Table A-1: Preliminary GHG Emissions Reductions Calculations, Key Assumptions

Key Assumption:	Value:	Comment:
Total investment in EE projects	$120,000,000	key variable to test
Simple payback, average in years, on EE gains only	6.00	SPP on EE gains only est. to be ~3-4 yrs
Annual energy cost savings, attributable to EE gains	$20,000,000	
Useful life of projects, average, in years	10.00	10-15 year useful life actual
Energy cost, per ton, all tons coal equivalent (TCE)	$40.00	actual price in the $25-30 range
Annual TCE savings	500,000	
Life cycle TCE	5,000,000	
tons CO2 per TCE	2.75	discounted below with co-efficient
total tons emissions reductions, CO2	13,750,000	
co-efficient, to discount	70.00%	reflecting lower carbon of energy saved, on average
adjusted value, tons CO2 emissions reductions	9,625,000	

Based on these estimates, and the Project GEF budget, GEF cost-effectiveness calculations (GEF cost per ton CO2 GHG emissions reductions achieved) can be made and are summarized below in Table A-2. Two key variables are tested: (1) the volume of sub-projects financed, ($120 million is the target case and $60 million the reduced volume case), and (2) the level of loan defaults which directly effects expenditures of GEF guarantee reserves (5% is the estimated case and 20%, reflecting complete expenditure of GEF guarantee reserve funds, is the worst case). Thus, four cases (2 X 2) are provided, below, with the volume of sub-projects varying in the first row, and loan default rate varying in the third row.

Table A-2: GEF Cost-effectiveness Calculations

	Case #1	Case #2	Case #3	Case #4
Total EE Sub-projects implemented	$120,000,000	$120,000,000	$60,000,000	$60,000,000
GEF expenditures, excluding Guarantee Reserves	$4,350,000	$4,350,000	$4,350,000	$4,350,000
Actual default rate	5.00%	20.00%	5.00%	20.00%
GEF Guarantee Reserve expenditures	$3,037,500	$12,150,000	$1,518,750	$6,075,000
Total GEF Expenditures	$7,387,500	$16,500,000	$5,868,750	$10,425,000
Tons CO2 emissions avoided by Project, est.	9,625,000	9,625,000	4,812,500	4,812,500
GEF cost per metric ton CO2	$0.77	$1.71	$1.22	$2.17

Refinement of these Estimates Using Sub-Project Data. Through its work with prospective partner utilities and EE suppliers, IFC is identifying and collecting information on initial EE sub-projects. In Project appraisal, IFC will refine its estimate of Project GHG emissions reductions further based on specific values for a representative set of EE sub-projects.

Calculation GHG Emissions Reductions during Project Operations. In Project operations, actual energy savings from sub-projects will be calculated project-by-project during sub-project preparation, and will be verified with one post-implementation verification. For sets of common types of smaller sub-projects, representative sample information will be gathered, and the results extrapolated for the portfolio.

Indirect Impacts from EE Market Development. The Project has additional market development objectives, described in Section 10. The Project is expected to significantly expand and deepen the market for EE and gas equipment and commercial FIs' engagement in EE finance while also strengthening local EE firms. This Project Brief attempts only to estimate the "direct benefits" generated through EE projects directly supported by the Project. In practice, additional GHG emissions reductions will be achieved *indirectly* to the extent the Project's market development objectives are met. Methodology for calculating these will be further developed during Appraisal and in Project operations by the M&E consultant.

Summary Incremental Cost Matrix. A summary incremental cost matrix is provided in Table A-3.

Table A-3: Incremental Cost Matrix

	Baseline	Alternative	Increment
Global Environmental Benefit	0 tons CO2 avoided	4.81 million – 9.63 million tons CO2 avoided	4.81 million – 9.63 million tons CO2 avoided
Domestic Benefit	None	Lifetime energy cost savings of $100-200 million	Lifetime energy cost savings of $100-200 million
Expenditure items:			
EE Investments(3)	None	US$60-120 million	US$60-120 million
GEF TA/Ops costs	None	US$4.35 million	US$4.35 million
Losses from Guarantee Facility (5)	0	US$1.52-12.125 million	US$1.52-12.125 million
Total GEF Costs	None	US$5.89-16.5 million	US$5.89-16.5 million

Annex B: Project Logical Framework

A more detailed list of performance indicators can be found in Section **Error! Reference source not found.**, Monitoring and Evaluation.

Hierarchy of Objectives	**Key Performance Indicators**	M&E / Data Collection Methodology	**Critical Assumptions**
GEF Strategic Priorities: CC1 – Transformation of markets for high volume products and processes CC2 – Increased access to local sources of financing for renewable energy and energy efficiency	Volume of EE business undertaken through utility partners, and by participating suppliers of EE products and services Volume of lending by financial institutions for EE projects.	Project staff will compile data on sub-projects supported by the Project; External evaluator will verify the data. External evaluator will conduct impact and process evaluation.	Assumes: • Stable or growing Chinese economy (including moderate interest rates and continued liquidity in FI sector). • Dynamic and capable utility partners. • Full use of Guarantee Facility by participant FIs. • Active EE equipment and service suppliers. • Active FI participation.
Global Objective:	**Outcome/ Impact indicators :**	**Project Reports:**	**(from Objectives to GEF Strategic Priorities)**
Accelerate the development of the industrial, commercial, and multi-family residential EE market. Catalyze a market for EE finance products.	• Number of EE projects arranged through partner utilities, including • number and amount of EE deals financed through the Project, and • number and size of sales for participating EE equipment and service providers, and finally, • Energy saved and GHG emissions avoided due to EE projects directly supported In order to assess the Project's market transformation impacts, these indicators will also be tracked, to the extent possible, for EE sub-projects not supported by the Project.	Baseline assessments of EE market activities. Mid-term, final and post Project evaluations by external evaluator. Reports on energy savings from EE project developers.	The Project's inputs and timeframe are sufficient to achieve its objectives.
Output from each Project component:	**Output Indicators[1]:**	**Project Reports:**	**(from Outputs to Objective:)**

[1] For some activities, more specific performance indicators with timelines for their achievement will be developed during Project appraisal.

Hierarchy of Objectives	Key Performance Indicators	M&E / Data Collection Methodology	Critical Assumptions
Project Outputs (i) substantially increased volume of EE investment generated through utility partnership. (ii) local capacity built among local suppliers of EE products and services, partner utilities, and local FIs. (iii) Guarantee Facility supports lending from FIs for EE projects.	• Up to four utilities become full Project partners. • Increase in EE project financing for participating FIs (target of 180 transactions and $90 million of loans) • Portfolio of EE transactions has a satisfactory repayment rate • At least 20 EE product and service supplier receiving TA or training. • At least 10 credit officers trained at partner FI	. Same as above, and: Surveys of and interviews with a sample of EE utility partners, suppliers, and FIs received support from the Program.	Same as above.
Project components/ Subcomponents • Support to utility partners in the creation of a Customer Service Center • Creation of a Network of supplier of EE products and services. • Capacity building among project partners. • Establishment of a Guarantee Facility.	**Inputs** : GEF resources: • $4.35 million for Start-up, TA, Utility Outreach, Project Admin, and M&E • $12.15 million for financial guarantees **Total: $16.5 million** Total Project Resources: • $10.7 million for Start-up, TA, Utility Outreach, Project Admin., and M&E • $16.2 million for Guarantee Facility • $120 million for implementation of EE sub-projects **Total: $146.9 million**	Same as above.	• TA is effective in building capacity to market and develop EE projects; • Utility Customer Service Center is effective at generating deal flow. • Guarantee instrument is effective in overcoming barriers to FIs lending for EE Projects.

Annex C: Response to Project Reviews

a) Convention Secretariat comments and IFC response

GEF Review Sheet for CHUEE Concept Note:
Guide to IFC Responses in the Project Brief

For ease of reference, key points from the GEF's review of the CHUEE Concept Note are repeated below in ***bold italics*** and the location of IFC's response within the Project Brief is then identified.

1) Discuss Project's fit within national communications as well as sectoral and regional development plans.

See Project Brief, Section 3.3 and 3.5.

2) Describe NG sector issues, regulatory structure, and barriers, and how this project will contribute to removing the barriers.

See Project Brief, Section 3.5.

3) Present an overview of the gas-using equipment market and barriers to promoting EE equipment.

See Project Brief, Sections 3.5, 3.6 and 3.7.

4) Provide detailed analysis of the baseline efficiency of gas-using equipment and incremental improvements supported by the Project.

See Project Brief Annex A on Incremental Cost Analysis for explanation of Project baseline.

5) Describe how energy efficiency of gas using equipment will be measured and what objective means of verification will be used.

See Project Brief Annex A on Incremental Cost Analysis for explanation of methods for calculating energy savings and GHG emissions reductions for EE sub-projects and Section 10 and Annex E on Monitoring & Evaluation plans.

6) Explain Project management and execution arrangement for each component and clearly describe the role the initial pilot gas utility.

See Project Brief Sections 4 and 6; for description of utility roles, please see Sections 4.5, 4.8.1, 4.8.3, 5.2 and 6.6.

7) Present an exit strategy of the credit enhancement guarantee and explain whether/how/when the remaining funds will be returned to GEF.

See Project Brief Section 6.5.

8) Explain how the Project will transform the energy-efficient gas-using equipment market in China.

See Project Brief, Section 3.5 and Section 4.

9) Explain how the outreach program and other Project activities will lead to replication.

See Project Brief Section 4.8, and Section 8.

10) Describe the involvement of the key Project partners, including equipment suppliers, end-users, financial institutions, gas companies, and governments, in Project development and implementation, and market transformation.

See Project Brief Section 4.

11) Describe the composition and role of the Project Advisory Committee.

See Project Brief Section 5.8.and Figure 2

12) Describe how the project will develop a broad network of gas utility partners and an extensive outreach program for Project replication.

See Project Brief Sections 4.8, 8.5 and 8.6.

13) Explain the source of co-financing for each component and specify whether co-financing is in-kind or cash contribution.

See Project Brief Section 7 and related Project budget tables in Annex D for amounts and characterization of all co-financing sources.

14) Explain the flow of the GEF resources and how they will be used for each component. Provide justification for the extent of GEF resources requested for each of the components.

See Project Brief Section 7 and related Project budget tables in Annex D for amounts and uses of all GEF resources; see Annex A, Incremental Cost Analysis, for summary justification for use of GEF resources.

15) Describe in detail how the proposed Project will coordinate and synergize with WB-GEF (Energy Conservation) and UNDP-GEF (EUEEP) activities.

See Project Brief Section 6.7.

b) STAP expert review and IFC response

March 15, 2005

Igor Bashmakov

STAP Review

China Utility-Based Energy Efficiency Finance Program (CHUEE)

GEF Project Document

1. General conclusion

This proposal is sound, reasonable, well-planned, and based on solid economic and technical experience and country knowledge. The proposed approach is a thoughtful implementation of a set of instruments that are and have been recommended by many environmental and economic sources. The reviewer strongly endorses this proposal with some small general and specific reservations and comments (presented below).

2. Detailed comments

2.1. Scientific and technical soundness of the project

There are at least three reasons why this project is urgent and important to implement. China ranks second both in the lists of world's largest energy consumers and largest GHG emitters. It also ranks first in terms of additional energy consumption and additional GHG emissions since 1990. According to many projections, China is going to be the major contributor to the GHG emission growth in the years to come. Such projections were made despite fantastic progress achieved by China in improving its energy efficiency and decoupling energy and GDP growth. New statistical data for 2002-2003 shows expiration of decoupling potential. So with fast economic growth energy-related GHG emissions may grow even faster, than it was expected by recent projections.

Coal dominates China's energy supply, but it is not sustainable any more either environmentally or as the energy basis for transition from industrial era to informational society. In many Chinese cities, additional coal-fired installations are prohibited. So both China's ability to proceed with its economic growth and to slow down its GHG emissions growth depends on its ability to sustain economic reform towards more market-oriented economy, promote energy efficiency, and diversify energy mix in favor of cleaner fuels and renewable energy.

Highly centralized power and heat supply systems in Chinese cities against the background of power shortages and large transmission and distribution losses make many businesses very vulnerable and unable to manage energy shortage risks. Distributed power generation brings supply much closer to demand (so all losses resulting from the failure to meet exactly supply-demand balance are excluded) and improve energy

reliability along with efficiency and quality. That makes distributed power attractive even in heavily populated areas with high energy loads density.

The CHUEE project addresses all above mentioned three energy problems by accelerating the use of natural gas packed in the project scope together with energy efficiency in smaller consumer oriented installations.

This Project's design is based on a number of scientific findings listed below which look solid and sound:

1. To make gas competitive, gas suppliers must promote efficiency; otherwise high gas price makes it uncompetitive with coal. The combination of replacing coal and carbon intensive fuels with less CO2 emitting natural gas *and* simultaneously promoting the accelerated use of highly energy efficient equipment has a major potential for GHG emissions reduction in China;
2. The investment process needed to retrofit end-users' energy systems to use gas simultaneously provides a significant opportunity for developing and implementing comprehensive end-use EE projects with the same consumers;
3. Utilities can be effective agents for marketing and delivering EE equipment and projects. By consolidating the equipment, design, service and finance as a single offering, the Project may achieve a systematic market transformation for energy efficiency and fuel switch equipment finance;
4. China's strategy and actions to develop its gas markets have been mainly "supply-push". Combining it with EE improvements allows for a new angle of market penetration oriented at distributed energy generation, and consumer needs oriented offers. So "demand-pull" marketing strategy would supplement the "supply-push" and thus enlarge significantly a market niche for natural gas in China;
5. Marketing capacities for EE equipment are underdeveloped in China (as well as in many other countries). Energy efficiency industry is fragmented and not very well-organized. It lacks energy supply companies' regular wire or pipe connections and monthly or more frequent payment contacts with their customers. Packaging efficiency with gas supply allows EE service companies or EE vendors to use the infrastructure of gas companies / clients relationships. So at the initial stage, EE companies will assist gas utilities in getting their clients, while later regular gas utilities contacts with clients will help EE companies to maintain strong contacts with clients and propose additional EE improvements. So further gas clients connections and EE success can build on the initial success of the project. Such scheme allows EE companies to keep longer relationships with their clients, and that would provide more sustainability to the project positive results;
6. Using standard project and loan documentation will significantly reduce transaction costs. From the very beginning it is important to set up a special advisory center(s) which will be responsible for the project initiation and development for a given client. As some projects show, setting up such centers helps increase the participation rate up to 10 times by building much more confidence and trust among all parties involved. Costs associated with such center

operation are paid back quickly just by reducing transaction costs for all partners and by escalating the effective participation rate. This is proven at the World Bank project to improve energy efficiency in residential housing. Due to such center operations the participation rate went up by 10 times. Consumer centers are developed at many European cities ("Copenhagen Energy" have established it in the city of Copenhagen, "Stadtwerke Leipzig" in the city of Leipzig;

7. SME need substantial assistance from gas utilities, service companies, and FIs to make a fuel switch decision and get it financed against the background of lacking medium and long-term financing;
8. Packaging gas supply, equipment procurement, and equipment service activities with financial packages allows it to reduce risk perception by any single party involved in the process, so integrated risk perception declines substantially;
9. Successfully implemented gasification projects, especially when combined with energy efficiency, produce multiple ancillary benefits.

Many market imperfections leave a large part of GHG emission reduction potential unrealized. Many such imperfections are rooted in the lack of information available for investment decision-makers when investment options are under consideration. The project proposes one window-shopping approach, which bridges informational gaps by bringing together gas utilities, cooperating network of qualified EE equipment and service suppliers, and FIs to provide loan financing to end-users. That is particularly important for SME clients, who have very limited knowledge of, and no previous experience in, running gas consuming equipment, so they are more inclined to continue operation of well-familiar old-fashioned systems.

When municipal gasification systems are considered, the economics of gas distribution to a large degree depends on the gas consumers' loads density. So municipal energy planning with the identification of zones to be supplied predominantly by natural gas is a key for the success of gasification process. Such decisions are made in many European cities. This component may be also incorporated in the project design.

Involvement of some retrofitting and new construction designers in the marketing network is another possible consideration. If switching to natural gas becomes an option at the design stage, is allows it to avoid locking in for a long time ineffective coal-based centralized energy consuming systems in newly designed facilities.

2.2. Global environmental benefits and/or drawbacks of the project

China's increase in energy related GHG emissions contributes significantly to the global GHG emissions growth. So any effort to stop or at least to slow down China's GHG emissions has a substantial global effect. For China to take on some formal responsibilities under any international regime for the second or following commitment periods, it is important to demonstrate that in the long run economic growth is not necessarily accompanied by GHG emission growth.

Transition from the industrial type of economic development to more service-oriented development in China would escalate service sector energy consumption. So bringing

natural gas together with EE to this sector will serve decoupling of GHG emissions from GDP growth function.

Conservative estimates of CO2 emission reductions potentially directly generated by this project are in the range of 4.81 to 9.63 million t. So the project costs range between $0.77 and $2.17 per ton of CO2, which is competitive at the GHG markets today. Indirect effects are difficult to measure, but if proposed project technologies prove to be sustainable and replicable, indirect effect can be significant. Every energy unit saved at the final consumer facility generates additional 0.2-0.5 units reductions at the energy supply system. So there is a visible multiplier.

The project effectively addresses the CC-2 (Increased access to local sources of financing for renewable energy and energy efficiency) and CC1 (Transformation of markets for high volume products and processes) GEF strategic priorities.

2.3. Replicability of the project

Replicability of CHUEE goes along several lines: from initially selected gas utility to others in many China's cities; from China to other countries with the ongoing process of gasification; from gas distribution sector to other energy supply and distribution sectors, where effective packaging of supply, EE equipment and serves with FI financing technologies especially for SME can mitigate power shortages or high energy costs, or large GHG emissions.

The replication potential will be a function of the degree of stakeholders' involvement in the project. Clear guidelines and "comprehensive menu of actions" allowing to launch effective schemes will enhance the replication potential.

2.4. Sustainability of the project

A program is sustainable when the risks are minimized. Risk minimization strategies are considered in the proposal. Project risks are properly identified and addressed in the proposal by corresponding risk mitigation strategies. To reduce the risk of failure, the proposed approach builds on already tested approaches in other countries. One comment here deals with the creation of a consulting consumer-oriented center. It can be created as a part of gas utility or as a separate entity. Such center would be responsible for dealing with all stakeholders, with all potential customers, and will be responsible for loans preparation for SME. The main function of such center will be trust building and resulting risk perception reduction. That would significantly improve the marketing capacity of a gas utility.

2.5. Evaluation of CHUEE driven GHG emissions reduction

The proposal clearly describes the methodology for CO2 emission reductions evaluation and incremental costs analysis. Presented results are well justified and as solid as it can be done at the project preparation stage. The real costs and emission reduction would be monitored at the project implementation stage. So it would be important to have a clear procedure and procedure for aggregating results of multiple sub-projects. Such monitoring results are to be reported at regular basis as project implantations progresses.

IFC Response to STAP Review by Igor Bashmakov

1. The STAP Reviewer's comments reflect a deep understanding of the Project design and approach. The comments are clearly stated and positive towards the Project. The Reviewer's comments are very constructive and useful to IFC. The Reviewer makes several key points on aspects of the Project which IFC must develop further and act on effectively in Project execution to assure Project success.

2. The Reviewer in his comments has helped IFC further refine our thinking about the role of the utility. IFC is now referring to the utility "hub" as the "Customer Service Center" (CSC) in response to the Reviewer's comments. The importance of the utility role, to help the customer *integrate* the various components of EE project development -- marketing, engineering, customer decision making, equipment procurement, finance -- and "bridge information gaps" between all parties involved, has been recognized by the Reviewer as a means to significantly increase customer participation rates and market penetration. The Reviewer emphasizes the role that the utility CSC plays in building *trust* with the customer and *reducing the customer's perception of risk*. These aspects are all critical to effective marketing. IFC must incorporate them into its planning and training and capacity building programs for creating effective utility CSCs. The Reviewer's point that the integrative utility role can lower transaction costs for all parties (and has in other cases), is well-taken and can be better emphasized by IFC in its presentation of the Project's methods and in recruiting partners.

3. The Reviewer has pointed out other examples of utility-based EE project development and finance programs of which IFC was not aware, in Copenhagen and Leipzig, (section 2.1.6). IFC believes that further research into the experience in other countries with utility-based EE finance programs would be useful for the Project; this research will be continued in Project appraisal. Relevant utilities include district heating as well as gas and electricity distribution utilities. Perhaps district heating utilities in China could be considered as a type of utility for Project replication. This could be an important addition to the Project's replication strategy. IFC will research this possibility. IFC has experience in investing in district heating cogeneration projects in China.

4. The Reviewer also emphasizes the role of municipal energy planning in the "gasification" process (which refers to the overall process of planning and investment in gas distribution and end-use systems). This is especially true in the China context, where city governments play an important role in local energy planning. IFC must further take this point into consideration and practice and further develop relationships with city governments, in cooperation with partner utilities, in the cities where the Project will operate.

5. The Reviewer states (section 2.3):

   > "The replication potential will be a function of the degree of stakeholders' involvement in the project. Clear guidelines and "comprehensive menu of actions" allowing to launch effective schemes will enhance the replication potential."

   The need for prescriptive plans and guidelines for applying Project methods, detailed for each type of stakeholder, and their usefulness in promoting effective replication, is very important. IFC appreciates this point and it will be acted on during Project operations.

6. Regarding measurement of GHG emissions reductions achieved by EE sub-projects, the Reviewer states (section 2.3):

> "[I]t would be important to have a clear procedure for aggregating results of multiple sub-projects. Such monitoring results are to be reported at regular basis as project implantations progresses.

This is IFC's plan, as described in the Monitoring and Evaluation sections (section 10 and Annex E) of the Project Brief.

Annex D - Project Budget & Financial Plan Tables

Table D-1: Budget for Use of GEF Funds

Table D-2: Estimated Number of Utility Operating Years

Table D-3: Table D-3: Total Project Budget Including Co-finance: Uses & Sources of Funds

Table D-4: Total Budget for Marketing & Development of EE Sub-Projects (including GEF funds and Co-finance)

Table D-5: Hypothetical EE Sub-Project Portfolio

Table D-6: Guarantee Mechanism Budget Plan

Table D-1: Budget for Use of GEF Funds

	GEF Budget Category	Amount	Breakdown
1	**Start-up & Incremental Operations Costs**	**$1,400,000**	
	CSC operations & supplier Network, Utility 1		$400,000
	CSC operations & supplier Network, Utility 2		$100,000
	CSC operations & supplier Network, Utility 3		$100,000
	CSC operations & supplier Network, Utility 4		$100,000
	Guarantee Facility, Utility 1		$400,000
	Guarantee Facility, Utility 2		$100,000
	Guarantee Facility, Utility 3		$100,000
	Guarantee Facility, Utility 4		$100,000
2	**TA - Developing EE projects with customers**	**$600,000**	
	TA - Developing EE projects with Customers, Utility 1		$300,000
	TA - Developing EE projects with Customers, Utility 2		$100,000
	TA - Developing EE projects with Customers, Utility 3		$100,000
	TA - Developing EE projects with Customers, Utility 4		$100,000
3	**Outreach to Utilities**	**$500,000**	
	Electric utility cost/benefit analysis of EE/DSM		$200,000
	Promotion activities, promoting Project methods		$150,000
	Training activities, training on Project methods		$150,000
4	**Project Management Office costs***	**$1,500,000**	$250,000 per year X 6 yrs
5	**Guarantee Reserves**	**$12,150,000**	
6	**Monitoring & Evaluation**	**$350,000**	
	Total GEF Funds Budget	**$16,500,000**	

* Includes estimates of staffing costs, non-rent office costs, staff travel and other direct costs. IFC will provide office space and support. This budget is calculated based on the current $/RMB exchange rate, which is subject to change in event of dollar devaluation.

Table D- 2:Estimated Number of Utility Operating Years

	# Years
Utility 1	6
Utility 2	4
Utility 3	3
Utility 4	3
Total Utility Operating Years	**16**

Table D-3: Total Project Budget Including Co-finance: Uses & Sources of Funds

Uses of Funds:	******Sources of Funds**	**:** GEF	IFC	Donor***** Co-Financing	Utilities	Equipment Suppliers	End-users/ Customers	Commercial Lender(s)
1. Start-up of Utility CSC, Suppliers Network & Guarantee Facility	$3,600,000	$1,400,000	$0	$600,000	*$1,600,000	$0	$0	$0
2. TA – Developing EE projects with customers	$3,800,000	$600,000	$0	$1,600,000	*$1,600,000	$0	$0	$0
3. Outreach to Utilities	$700,000	$500,000	$0	$200,000	$0	$0	$0	$0
4. Project Management & Implementation	$2,250,000	$1,500,000	$750,000	$0	$0	$0	$0	$0
5. Monitoring & Evaluation	$350,000	$350,000	$0	$0	$0	$0	$0	$0
6. Guarantee Reserves	$16,200,000	$12,150,000	$0	$0	$1,215,000	$1,620,000	$1,215,000	$0
7. Implementation of EE Projects	***$120,000,000	$0	$0	$0	$0	$0	**$30,000,000	***$90,000,000
Total Uses & Sources of Funds	**$146,900,000**	**$16,500,000**	**$750,000**	**$2,400,000**	**$4,415,000**	**$1,620,000**	**$31,215,000**	**$90,000,000**

* Utility costs are estimated at $200,000 per operating year, $100,000 each (i) for CSC operations and marketing, and (ii) for customer project development activities. A total of 16 utility CSC operating years is assumed for the Project (see Table D-2, above). This valuation will be refined during Project development and operations; actual expenditure may prove to be higher as the Project replicates across multiple utility service areas.

** Customer down-payments equal to 25% of total sub-project capital costs are assumed. This value is subject to change. A lower value, if acceptable to lenders, may make the EE projects more affordable for end-users.

*** Total value of EE project loans that can be supported by the Project is critically sensitive to the "guarantee ratio", which is the amount of lending that can be supported for every dollar equivalent of guarantee reserves. A mid-range guarantee ratio of 5:1 is assumed; a lower guarantee ratio would reduce the amount of project loans that can be supported.

****The co-financing targeted from the Equipment Suppliers, End-users/Customers, Utilities, and Commercial Lenders will be generated on a project-by-project basis. IFC believes these are conservative targets that can be achieved over the duration of the Project. IFC is confident that it will be able to raise US $ 2.4 million through IFC's Trust Funds department, Private Enterprise Partnership program and other donor sources.

*****Estimated uses of donor funds are indicated but donor funds may also be used for other purposes.

Table D-4: Total Budget for Marketing & Development of EE Sub-projects (including GEF funds and co-finance)

Table D-4a: Estimation of number of contacts at each stage of the project development cycle.

	"Hit" rate	Small	Medium	Large	Very Large
Initial number of marketing contacts for sub-projects		370	222	74	37
Number of marketing contacts leading to audits	60%	222	133	44	22
Number of audits leading to project development	60%	133	80	27	13
Number of developed projects with financial closure	75%	100	60	20	10

Table D-4b: Total Budget for Marketing & Development of EE Sub-Projects (including GEF funds and Co-finance)

		Costs per sub-project					
Type of Sub-Projects:	# of sub-projects	Marketing	Audits	Engineering	Investment Plan	Project final cost share**	**Total expenditure for sub-project development (*)**
Small ($250,000 average size)	100	$500	$3,000	$5,000	$3,500	75%	**$1,488,889**
Medium ($1 million average size)	60	$750	$5,000	$15,000	$5,000	50%	**$1,216,667**
Large ($2 million average size)	20	$1,000	$15,000	$20,000	$10,000	50%	**$770,370**
Very Large (>$4 million)	10	$2,000	$25,000	$50,000	$25,000	20%	**$324,074**
Totals	190						**$3,800,000**

(*) The total of $3.8 million expenditure represents the sum of GEF and non-GEF expenditure for project development, and corresponds to line 2 in table D3.
(**) The balance of costs will be paid for by Customer and EE Suppliers; some funds may be reimbursed to Project upon sub-project financial closing.

Table D-5: Hypothetical EE Sub-project Portfolio

			Capital Costs (100%)		**Avg. Loan Size**		**Total Loan Amount**	
Sub-Project Type	#	%	RMB millions	USD millions	RMB millions	USD millions	RMB millions	USD millions
Very Large (e.g., Factory retrofit) (*)	0	0%	40.00	4.84	30.00	3.63		
Large (e.g., cogen & EE retrofit)	20	11%	16.00	1.93	12.00	1.45	240	29.02
Medium (e.g., commercial AC)	60	33%	8.00	0.97	6.00	0.73	360	43.53
Small (e.g., small boiler or AC)	100	56%	2.00	0.24	1.50	0.18	150	18.14
Total number of projects	**180**						750	90.69
Average Loan Size					**4.167**	**0.504**		

(*) Very large projects will receive Project TA, but are not eligible for Project Financial Guarantees because of caps on the maximum single guarantee exposure; partial guarantees may be considered.

Table D-6: Budget Plan for Guarantee Mechanism

		RMB	$
$/RMB exchange rate		8.27	1.00
Average Size EE Project Loan (*)		4,135,000	$500,000
Expected number of loans	180		
Total loan portfolio expected		744,300,000	$90,000,000
Loan as a percentage of total project/equipment cost	75.00%		
Total value of projects supported		**992,400,000**	**$120,000,000**
"Planned default" rate (for sizing guarantee reserves)	20.00%	Note: Estimated default rate = ~5%.	
Implied guarantee ratio (reserves to guarantee liabilities)	5.00		
Guarantee percentage (balance is lender risk)	90.00%		
Total Guarantee Reserves required for loan portfolio			**$16,200,000**
Contributions to Guarantee Reserves, % of each loan			
GEF Funds for Guarantee Reserves	15.00%	100,480,500	$12,150,000
Utility	1.50%	10,048,050	$1,215,000
Equipment Suppliers	2.00%	13,397,400	$1,620,000
Customer Fees (charged over loan term)	1.50%	10,048,050	$1,215,000
Total Guarantee Reserves for portfolio	20.00%	133,974,000	$16,200,000
Percentage of guarantee reserves paid from GEF funds	**75%**		
Percentage of guarantee reserves paid from other sources	**25%**		

(*) Table D5 calculates an average loan size of $504,000, which is rounded here to $500,000.

Annex E: Preliminary Monitoring and Evaluation Plan

Management of Monitoring and Evaluation Activities

The monitoring and evaluation activities will be incorporated into the Project's ongoing activities, so that data will be gathered and reviewed on an ongoing basis.

Monitoring and evaluation will be carried out by a combined team comprising:

- an independent M&E contractor, responsible for designing data gathering instruments (using as a model similar instruments designed for other IFC/GEF projects), reviewing annual data surveys, and conducting the midpoint and final process and impact evaluations;
- staff members in the implementation team, responsible for gathering and tracking all available data on a regular basis, and maintaining all the files necessary for data verification and analysis;
- independent engineering contractors responsible for estimating GHG emission reductions at the project level, and for verifying data gathered by the Project staff.

This team will obtain information from:

- members of the EE Suppliers' Network, on sales development and how it has been affected by the Project;
- partner FIs and Guarantee Facility staff, on lending flows within and outside the Project;
- partner utilities, on engineering and economic aspects of sub-projects conducted within the Project, as well as on similar projects conducted outside the Project (for example, in service territories not covered by the Project).

Impact evaluation: assessing the Project's direct and indirect impacts on greenhouse gas emissions.

Direct impacts

The Project will define mechanisms for collecting and verifying data to track emissions reductions. Monitoring tasks will include:

- review the files and calculations of energy savings estimates that were made before the EE projects were approved for financing (and which will form a part of the loan documentation);
- define the methodology to confirm actual energy savings and GHG emissions reductions achieved by projects once they are implemented;
- train an independent engineer on how to calculate the GHG emissions reductions achieved by the sub-projects and provide them with any necessary templates and tools;
- use this post-implementation methodology to check all large or complex projects and a sample of smaller EE installations to see whether the expected savings were actually achieved; and,
- summarize results in periodic reports to IFC and maintain project files for ready access and review for GEF monitoring and evaluation purposes.

Key variables may include: combustion efficiency of new boiler systems, customer energy loads, generation output of boiler systems, efficiency of end-use equipment, production data, etc. Pre-installation calculations of the baseline, i.e., energy use of the existing system prior to the project, will be used and established in the pre-installation reviews. In the case of new installations, a proxy baseline will be used based on 'business as usual' practices.

The methods used will be drawn from other IFC/GEF projects such as HEECP, CEEF, or the Russia Sustainable Energy Finance Program.

In order to ensure that data is properly compiled, data collection requirements will be integrated into a sub-project's financing agreement (agreement between the FI, the Guarantee Facility, and the client). The FI and Guarantee Facility have a natural interest in gathering equipment performance data, as part of the basis for the loan is the stream of energy savings provided by the EE equipment.

Independent site visits to randomly selected sub-projects will take place on an annual basis, to verify the data gathered.

Indirect impacts

The Project's objective is to accelerate the development of the Chinese EE market among industrial, commercial, and multi-family residential customers, by using a utility partner as a delivery mechanism and to introduce marketing and transactional efficiencies into the market. While the Project can work with only a limited number of partners, it has been designed so as to be easily replicated among non-participants: the EE sub-projects CHUEE supports will have a demonstration effect in the market. TA and outreach activities will further build the capacity and interest of market players to implement EE projects.

In order to gauge the extent of market transformations brought about by the Project, the M&E program will specifically examine the Project's impact among non-participants, both during and after the Project's life[2]. It will review EE projects undertaken by partner utilities in service territories not targeted by the Project; it will track EE lending flow by FIs not participating in the project, and/or that are not supported by the Project's Guarantee Facility; and will also track EE deal flows where the supplier was not directly involved with the Project. Each of these elements will be tracked over time, so as to clearly establish the impact of CHUEE on the development of the market. The Project will continue to build its M&E tracking capabilities to measure the indirect benefits throughout the duration of the Project. IFC recognizes the challenges of quantifying these. We have made a conservative estimate of "leveraged resources" and post-Project impacts; total leveraged resources may actually be much larger than our current estimate of US $ 60 million.

Process evaluation: assessing the effectiveness of the Project's design and implementation.

CHUEE will conduct a mid-term process evaluation that involves a review of, and an opportunity to update, the key assumptions underlying the Project design and structure.

Some key questions are: Is the Project effective in achieving its desired market impact and how is it doing it? Are the partner utilities understanding and performing their role as expected? Is the EE Suppliers Network functioning as expected? Is the Project's guarantee product effective in motivating FIs to increase their EE finance activity? Are the TA products well defined and effective in achieving their stated purpose? Are there changes to the Project's structure that would make it more effective? What lessons for EE finance and EE project and business development are being gained? Is the Project effective in communicating and making available these lessons and experience to non-participants? What strategies should the Project be considering to maximize its indirect impacts and demonstration value? Are the Project's environmental, economic, and social benefits likely to continue post-Project?

[2] The resources leveraged in the market by actors not directly benefiting from GEF funds will comprise the "leveraged resources" identified in the Executive Summary, Financing Plan. See Annex C: Co-financing Policy for GEF Projects, found at: http://thegef.org/Operational_Policies/Eligibility_Criteria/templates.html

The mid-term process evaluation will also review management, administration, budget status and cost control in order to assess their effectiveness and, if necessary, make mid-course improvements.

As part of the mid-term process evaluation, an external evaluator will conduct structured interviews with:

- Project staff and management;
- Staff from utility partners
- Staff from members of the EE Suppliers Network
- Staff from selected end-users who have implemented EE sub-projects,
- Staff from participating FIs, and from the Guarantee Facility.
- Relevant Government officials and EE NGOs, including those participating in each country's Project Advisory Committee;
- Interviews with any prospective Project participants who have investigated the Project but for whatever reason, failed or declined to participate; and
- Interviews with any other stakeholders who are identified.

A summary process evaluation will also be conducted at the end of the Project. Whereas the mid-term process evaluation will primarily serve to identify any difficulties and suggest mid-course corrections, the final process evaluation will emphasize lessons learned. Its conclusions on which Project elements were most effective will be widely disseminated in China and abroad.

Annex F: Summary Database of Suppliers of EE Equipment and Services

Beijing LeNi Gas Equipment Limited	Boilers
Beijing HongGuang Environmental Equipment (Beijing Qinghua Guanglengnuan Co.)	Boilers
Dongfang Boilers	Boilers
Shanghai Boilers	Boilers
Beijing Boiler Works	Boilers
Jinan Boiler	Boilers
Hangzhuo Tefu Boiler	Boilers
Harbin Power Equipment	Boilers and Turbines
Dalian Sanyo Refrigeration Co. Ltd	Boilers-Chillers
Chongqing Haitai Boilers	Boilers-Chillers
CCH	Compressors
Enric (Bengbu) Compressor Co., Ltd	Compressors
Chongqing Gas Compressor Factory Co., Ltd.	Compressors
Liuzhou General Compressor Works	Compressors
Siemens Automation and Drives Group (A&D)	General
Mitsubishi Machinery Group	General Turbine
GE	General- Power Generation, Turbines
York	HVAC
Jiangsu Shuangliang Air Conditioning Equipment Co., Ltd	HVAC
Broad (Yuan Da) Air Conditioning Co., Ltd.	HVAC
Yantai Ebara(RenYuan) Air-conditioning Equipment Co., Ltd.	HVAC
Shenyang Liming Aero-Engine Group Corporation	Power Generation
Shenyang Blowing Machine Factory	Power Generation
Bowman Power Systems Ltd	Power Generation-Turbines
Caterpillar (Solar Turbines)	Power Generation-Cogen
Cummins Inc.	Power Generation-Cogen
Kawasaki	Power Generation-Cogen
Wartsila	Consultant
Teesen	Turbines
Ophra	Turbines
Beijing Poweru Technology Co.	EMC
Beijing Yuanshen Energy Saving Technology Ltd.	EMC
Liao Ning Neng Fa Wei Ye Group	EMC
Shandong Energy Conservation Engineering Co.	EMC
Beijing Shenwu Thermal Energy Technology Co. Ltd.	EMC
Dalian Huineng Technology Service Co.Ltd.	EMC
Shanghai Shenagliao Nengfa Energy Conservation Science & Tech. Co. Ltd.	EMC
Beijing Zhongtie Chuangye Energy Conservation Technology Co. Ltd.	EMC
Beijing Xindian Chuangtuo Science & Technololgy Co. Ltd.	EMC
Chengdu Science & Technology Development Co. Ltd.	EMC

Beijing Euro-Asia Shichuan Energy & Environmental Technology Development Co. Ltd.	EMC
Beijing Zhonghua Hongda Energy Equipment Co. Ltd.	EMC
Beijing Shuoren Haitai Energy Science Co. Ltd.	EMC
Beijing Ningqi Power Technology Co. Ltd.	EMC
Beijing Annouqi Energy Conservation Technology Co. Ltd.	EMC
Tianjing Nengfa Weiye Evironmental Protection & Energy Conservation Techonolgy Co.Ltd.	EMC
Shanghai Shikang Jidian Technology & Engineering Co.Ltd.	EMC
Xingjiang Kelamayi Diweinuo Energy Conservation Co.Ltd.	EMC
Zhengzhou Bairui Energy Conservation Technology Co.Ltd.	EMC
Wuhan Hualin Eco-science Development Co.Ltd.	EMC
Ningbo Suotu Environmental Engineering Co.Ltd.	EMC
Sina-invest Jietian Development Co. Ltd.	EMC
Shanghai Asia-Pacific Energy Science & Technology Co. Ltd.	EMC
Inner-Mongolia Chifeng Golden Peak Thermal Co. Ltd.	EMC
Nanjing Sustainable Technology Service Co. Ltd.	EMC
Beijing Luzhou Dehan Environmental Protection Center	EMC
Guizhou Huitong Huacheng Building Science & Technology Co. Ltd.	EMC
Shenzhen Jialida Industrial Co.Ltd.	EMC
Beijing Fuerda Air-con Equipment Co.Ltd.	EMC
Beijing Ruiyu Hongmao Refrigeration Equipment Co.Ltd.	EMC
Hubei Sanhuan Development Joint Stock Co.Ltd.	EMC
Hubeijing Xiangfan Dali Industrial Control Co. Ltd.	EMC
Hangzhou Huadian Huayuan Environmental Engineering Co. Ltd.	EMC
Shandong Dongying Shengdong Mechanic Co.Ltd.	EMC
Jiangsen Auto-Control Co.Ltd.	EMC
Beijing Weier Aiya Science & Technology Co.Ltd.	EMC
Beijing Zehngfengkai Environmental Protection Tech. Development Co.Ltd.	EMC
Ningxia Equipment & Engineering Co. Ltd.	EMC
Guangzhou Zhi Feng Yuan Electronic Engineer Equip. Installation Co. Ltd.	EMC
China Energy Conservation Investment Co.	EMC & Investment Co.
Shangdong Jianheng Investment & Management Co.Ltd.	EMC
Shenzhen Zhongcai Energy Conservation Equipment Leasing Co. Ltd.	EMC
Qinghua Science & Technology Venture Capital Investment Co. Ltd.	EMC
Beijing Energy Conservation Service Center	EMC
Shanghai Energy Conservation Technology Service Co. Ltd.	EMC
Shanxi Provincial Energy Conservation Technology Service Center	EMC
Jiangsu Provincial Energy Conservation Technology Service Center	EMC
Yunnan Energy Conservation Industry Co. Ltd.	EMC
Henan Energy Conservation Equipment & Technology Co. Ltd.	EMC
Guangdong Provincial Energy Conservation Service Center	EMC
Sichuan Provincial Energy Conservation Service Center	EMC
Chongqing Energy Conservation Service Center	EMC
Guizhou Provincial Energy Conservation Service Center	EMC
National Energy Conservation Quality Control Center	EMC
Wuhan High Pressure Institute	EMC

Annex G: Detailed Project Scheme

Figure G 1: Detailed Project Scheme