United Nations Development Programme

People's Republic of China

Final Evaluation of UNDP/GEF Project: China: End Use Energy Efficiency Project

(PIMS#2003)

Final Evaluation Report

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ABBREVIATIONS

APR	Annual Progress Report
APR/PIR	Annual Project Report/Project Implementation Review
BEE	Building energy efficiency
BES	Building Energy Standards
CEEP	China Energy Efficiency Programme
CTA	Chief Technical Advisor
DEC	Department of Energy Conservation
DERC	Department of Environment and Resources
DRC	Department of Resource Conservation and Comprehensive Utilization
DRCEP	Department of Resource Conservation and Environmental Protection
EC&EE	Energy conservation and energy efficiency
ECA	Energy Conservation Association
ECCs	energy conservation centers
ECL	Energy Conservation Law
EE	Energy Efficiency
EMC	Energy Management Company
EMISRP	Energy Management Information System Reporting Program
EOP	end of project
ERI	Energy Research Institute (under NDRC)
EUEEP	End-Use Energy Efficiency Project
FE	Final Evaluation
FYP	Five-Year Plan
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	greenhouse gas
GoC	Government of the China
JECC	Jiangsu Energy Conservation Center
LFA	Logical Framework Analysis
M&E	Monitoring and evaluation
MoC	Ministry of Construction
MoF	Ministry of Finance
MoHURD	Ministry of Housing Urban and Rural Development
MoIIT	Ministry of Industry and Information Technology
MoNREP	Ministry of Natural Resources and Environmental Protection
Mtce	Million tons of coal equivalent
MTR	Mid-Term Review
NDRC	National Development and Reform Commission
NECC	Nanjing Energy Conservation Center
NEX	nationally-executed

NGO	Non-governmental organization
NPCC	National Project Coordinating Committee
NPD	National Programme Director
NPD	National Project Director
PDF-A/B	Project Development Fund (Block A or B)
PMO	Programme Management Office
PRODOC	Project Document
PSC	Programme Steering Committee
QPR	Quarterly progress report
S&L	Standards & Labelling
SDPC	State Development Planning Commission
SETC	State Economic and Trade Commission
tC, MtC	Ton Carbon, million ton Carbon
tce, Mtce	Ton of coal equivalent, million ton coal equivalent
tCO_2 , Mt CO_2	Ton carbon dioxide, million ton CO_2
UNDP	United Nation Development Programme
VA	Voluntary Agreement

EXECUTIVE SUMMARY

Background

China is the second largest energy user and emitter of greenhouse gases (GHGs) in the world. In 2007, nearly 87% of China's primary energy supplies were based on fossil fuels (i.e. coal, oil, gas and peat). Energy consumption in China has increased 6.0 percent annually between 1990 and 2007, more than three times faster than the world's average annual growth, rising from 990 million tons of coal equivalent (Mtce) in 1990 to 2,650 Mtce in 2007. Despite the high growth, China's per capita energy consumption is still less than one fifth of the average for the Organization for Economic Cooperation and Development (OECD). However, if left unchecked, China's energy consumption that is primarily met by coal will accelerate the country's significant contribution to the deterioration of local air quality and the increase of GHG emissions. Improving energy efficiency is one of the keys to sustaining China's economic growth with reduced energy needs and lessened local and global environmental impacts.

China's energy efficiency lags far behind the world's most efficient economies, especially in its industrial sectors. Its energy-intensive manufacturing industries account for about 50% of total final energy consumption and operate at significantly higher levels of energy intensity (energy use per unit of physical output) than international best practices. The significant potential for improving energy efficiency and reducing GHG emissions in the industrial sector is largely unrealized.

The Government of China (GoC) has stepped up its efforts to improve energy efficiency. In 2000, the Chinese government set an energy supply target of only increasing energy consumption, 1,300 Mtce in 2000 to 1,830 Mtce in 2020. Unfortunately, statistical data indicated energy use was growing much faster than planned due to its spectacular GDP growth between 2002 and 2005. At these rates, China would need at least 5,240 Mtce of final energy supply by 2020, 100% more than planned to achieve its economic development targets. In 2004, the National Development and Reform Commission (NDRC) issued "The Medium and Long-Term Special Plan for Energy Conservation" (Energy Conservation Plan), highlighting 10 energy conservation programs targeting the country's major energy consuming sectors. This plan outlined specific targets to reduce energy intensities for various sectors by 2020, such as the industrial sector by 14%. In China's Eleventh Five-Year Plan (FYP) (2006-2010) for Economic and Social Development, the GoC pledged to reduce the energy intensity as a function of the gross domestic product (GDP) by 20% from 2005 to 2010 equivalent to avoided energy consumption of over 560 Mtce annually by 2010.

Prior to EUEEP in 2004, regulatory oversight to energy efficiency directives in China was deemed ineffective. Furthermore, to strengthen the GoC's transition to market-driven policies that support the economic growth of China, the GoC has made clear through its reform efforts and its efforts to accession to the WTO that governmental energy efficiency activities must be decentralized to energy service companies, market-driven fuel pricing, activities undertaken under the Kyoto Protocol's Clean Development Mechanism, and other similar modalities. The scenario faced by the GoC prior to EUEEP in 2005 included:

- Energy efficiency targets of the 10th Five-Year Plan (2001-05) were not being met. The EE targets for the 11th Five-Year Plan were being reviewed to ensure a

continual decreasing trend in energy intensity for industries and the building sector. Notwithstanding GoC's efforts to promote energy conservation, there was a lack of incentives for enterprise managers to become energy efficient as energy prices in 2002 did not provide them sufficient operational cost savings. Government directives to use energy efficient equipment or adopt practices were not well enforced; enterprise managers would often pursue least cost options irrespective of the energy consumption of that option;

- Regulations empowering the local entities to promulgate energy efficiency standards and codes were not developed. This is partly due to the fact that an Energy Conservation Law had not yet been promulgated. Delegation of this regulatory function to local entities would have enabled new financing options for energy efficiency to be developed in the country with adequate promotion and support;

- Lack of a developed market for foreign technologies that were viewed as being more efficient; and

- Lack of knowledge within industrial and commercial enterprises on the benefits and implementation of energy efficiency projects. Enabling environment for promoting building energy efficiency was poor including a lack of unified codes and certification, insufficient state policy support, lack of awareness of building energy efficiency amongst property owners and building development practioners (i.e. architects, real estate developers).

Energy efficiency initiatives are strongly stated in the 11th FYP (2006 to 2010), the highlights of which include:

1. Making use of exhaust heat and pressure: Iron and steel enterprises will apply coke dry quenching (CDQ) and power generation through the pressure differences in blast furnaces; renovating all blast furnaces and implementing converter gas recovery; and annually installing 30 sets of medium-and-low-temperature exhaust-heat power generation equipment in concrete production lines;

2. Reducing and displacing petroleum use that includes replacing fuel oil (light oil) with clean coal, petroleum coke and natural gas in targeted industries (such as the chemical industry), replace small oil-burning units; implement regulations on fuel use and associated policies and rules;

3. Energy conservation in electrical motors where programs will be in place to improve efficiency of China's 420-million-kw electrical motors (comprising 60% of the country's total that are running with efficiencies 10 to 30% lower than their foreign counterparts). This will include promotion of highly efficient electrical motors; launching systematic optimization and renovation of high-efficiency pumps and compressors; and promotion of variable-speed, frequency conversion and automated system controls;

4. Optimization of energy systems in major industries mainly in the metallurgical, petrochemical, and chemical industrial sectors for lower energy use and higher competitiveness in enterprises;

5. Energy conservation in residential and public buildings through accelerated reform in heat supply systems; strengthened efforts in promoting building energy efficiency technology and related products; and renovation of existing building in the northern regions and hotels that need heating systems;

6. Environment-friendly lighting involving the replacement of incandescent lamps with high-efficiency energy-saving fluorescent lamps and replacement of electromagnetic ballast with electronic ballasts;

7. Energy conservation in governmental buildings (including those supported by public finance) that will be reconstructed for EE heating, air-conditioning and lighting systems, regulating reconstruction to comply to building energy efficiency standards; and adoption of high-efficiency products;

8. Build capacities of the energy saving monitoring centers at the provincial level or associated with major energy-consuming industries, and introduce and popularize contractual energy management; and monitor and manage compliance to an energy conservation law.

The China long-term strategic plan for end-use energy efficiency is a 4-phased, 12-year initiative for which the GEF has been a financial partner for the first phase of EUEEP. EUEEP activities were aimed at dramatically improving the efficiency of China's major energy consuming sectors: industry and buildings.

The UNDP-GEF Project "China: End Use Energy Efficiency Project" was commenced in 2005 with the **development goal** *to reduce GHG emissions of China by removing barriers to the widespread application and practice of energy conservation and energy efficiency in the major energy consuming sectors (buildings and industrial) in China.*

To achieve this goal, the Project was designed with the **objective** of removing barriers to the effective application and practice of energy efficiency in the industry and building sectors of the Chinese economy.

The expected **outcomes** for the Project include:

- Outcome A: Removal of barriers to the effective application and practice of energy efficiency in the industrial and residential sectors of the Chinese economy;
- Outcome B: Removal of barriers to effective application and practice of energy efficiency in the building sector of the Chinese economy; and
- Outcome C: Increased human capacity in China amongst business, technical and financial organizations to realizing energy conservation in China.

Context and Purpose of the Evaluation

For all UNDP projects funded by GEF, a final evaluation (FE) is required after completion of a project to *provide a comprehensive and systematic account of the performance of the completed project by evaluating its design, process of implementation and achievements vis-à-vis GEF project objectives and any agreed changes during project implementation.* As such, the FE for this Project will serve to:

- promote accountability and transparency, and to assess and disclose levels of project accomplishments;
- synthesize lessons that may help improve the selection, design and implementation of future GEF activities;
- provide feedback on issues that are recurrent across the portfolio and need attention, and on improvements regarding previously identified issues; and,
- contribute to the GEF Evaluation Office databases for aggregation, analysis and reporting on effectiveness of GEF operations in achieving global environmental benefits and on the quality of monitoring and evaluation across the GEF system.

Assessment of Project Outcomes and Sustainability

The overall rating of the Project results is S (satisfactory). This is based on the Project achieving most of its intended outcomes including reduction of GHG emissions from selected industrial sub-sectors and the buildings sector; removal of knowledge, regulatory and financial barriers to EE in the industrial and building sectors; and the strengthening of local capacity to train and support the promotion and implementation of EE&EC projects in China.

The overall Project sustainability rating is ML. Notwithstanding the strong drivenness of the GoC to meet its energy efficiency targets of the Five-Year Plans, this rating is primarily based on:

- financial resources and the human capacity not fully in place for various EE barrier removal activities for the post-Phase I EUEEP period;
- the need to continue developing financial incentives for implementing EE retrofits within existing buildings in China; and
- the need to continue building capacity of all stakeholders involved with EC&EE activities in China. This would include government officials, industrial personnel, real estate developers and architects, ECCs, ESCOs and stakeholders from the financial sector.

Assessment of specific Project outcomes and sustainability ratings are summarized in Table A.

Table A: Summary Assessment of Project Outcomes and Sustainability

Project Objectives	Intended Outcomes (from re-constructed project planning matrix from August 26, 2009)	Outcome Assessment (Rel=Relevance, Eff=Effectiveness Efy=Efficiency Ov=Overall Rating)	Sustainability Assessment[13]	Actual Outcomes (as of June 2010)
Goal: Reduction in carbon emissions from the major energy-consuming sectors in China	Intended GHG Outcome: CO_2 emissions are reduced by an accumulated total of 42.4 million tonnes at the end of Phase I EUEEP or "Project".	**Rel - HS Eff - S Efy - S Ov - S**	**Likely**	*Actual GHG Outcome: CO_2 reductions are 44.8 million tonnes (31.6 million direct and 13.2 indirect) to June 2010 and forecast to be 841 million tonnes to the Year 2020, 10 years after the end of EUEEP:* • The impact of this outcome is positive and provides an excellent basis for further and sustained decreases in GHG emissions and fossil fuel consumption in China • Project delivery was intended to be over a 3-year period (June 2006 to June 2008) but was extended another 2 years due to one year being required for project mobilization and establishing relationships with stakeholders.
Objective: Removal of barriers to effective application and practice of energy efficiency in the industrial and building sectors of the Chinese economy	Intended Energy Savings Outcome: Cumulative energy savings from EUEEP project activities should be 19.9 Mtce where: • 7.9 Mtce is from the industrial sector; • 6.8 Mtce is from the building	**Rel – HS Eff – HS Efy – S Ov - HS**	**Likely**	*Actual Energy Savings Outcome: Cumulative energy savings from EUEEP activities were estimated to be 21.85 Mtce (includes direct and indirect savings) where:* • *8.6 Mtce was reduced in the industrial sector;* • *6.9 Mtce was reduced in the building*

[13] *Likely (L):* very likely to continue and resources in place; *Moderately Likely (ML):* model is viable, but funding or resources may not be in place; *Moderately Unlikely (MU):* model is not viable or needs changing; and/or resources not in place; and *Unlikely (U):* model is not viable and resources are not in place.

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	sector; and • 5.3 Mtce is from cross cutting activities			*sector; and* • *6.3 Mtce was reduced from cross cutting activities*
Component A: To remove barriers to energy efficiency in the industrial sector	Intended Outcome A.1: Energy conservation agreements are being implemented in three industries with: 1. 998 enterprises with ECAs signed and implemented; 2. 10 enterprises where benchmarking methodology piloting has been implemented 3. USD 35 million invested by companies as a result of ECA implementation 4. 2.5 million Mtce of energy saved under EC&EE investment capital under the ECA program	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Likely**	*Actual Outcome A.1: Actual ECA agreements are being implemented in the cement, petro-chemical and the iron and steel industries with:* 1. 998 enterprises with signed and implemented ECAs; 2. 10 enterprises that have conducted benchmarking methodology piloting 3. USD 255 million invested by companies that are implementing ECA. This includes USD 8.6 million in the chemical industry (3 enterprises), USD 43.7million in the cement industry (4 enterprises), and USD 210 million in the iron and steel industry (3 enterprises) 4. 2.55 Mtce of energy saved under EC&EE investment capital under the ECA program (54,300 tce in the chemical industry, 770,000 tce in the cement industry, 1,730,000 tce in the iron and steel industry)
	Intended Outcome A.2: Energy efficiency design codes for new	**Rel – HS** **Eff – HS**	**Moderately Likely**	*Actual Outcome A.2: EE design codes for new and existing facilities and equipment*

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	and existing facilities and equipment are established and implemented with: 1. One energy efficiency design code for an industry established and enforced 2. 145 cement enterprises employing these design codes on their EC&EE projects 3. 145 registered EC&EE plan designs based on EE design codes 4. 2 EE catalogues on new EE codes prepared and published 5. 80% of all enterprises satisfied with the new EE design codes	**Efy – HS** **Ov - HS**		*were established and implemented resulting in:* 1. One EE design code for cement industry established and enforced 2. 800 cement enterprises employing these design codes for EC&EE projects 3. 400 registered EC&EE plan designs based on EE design codes 4. 2 EE catalogues on new EE codes prepared and published 5. 100% of all enterprises are satisfied with the new EE design codes.
	Intended Outcome A.3.1: China's motor systems market is transformed through: 1. One EE design criteria for motor systems established and used by design institutes 2. One new and updated EE label and standard for electric motors approved for implementation 3. A 3% improvement in the market share of locally developed EE motors	**Rel – HS** **Eff – S** **Efy – S** **Ov - S**	**Likely**	*Actual Outcome A.3.1: China's motor systems market has been transformed as indicated by:* 1. One EE design criteria for motor systems established and used by design institutes 2. One new and updated EE label and standard for electric motors approved and implemented at demonstration sites 3. A 10% improvement in the market share of locally developed EE motors

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	4. 10 motor system service organizations with trained staff to provide assistance to industry users 5. 80% of all EUEEP-trained personnel providing technical services to electric motor users in industries 6. A minimum of 8 EE motor system demonstration sites setup 7. Cumulative energy savings from EE motor system demonstrations of 4 Mtce			4. 12 motor system service organizations now have trained staff to provide assistance to industry users 5. More than 90% of all EUEEP-trained personnel are now providing technical services to electric motor users in industries 6. 16 EE motor system demonstrations setup and implemented 7. Cumulative energy savings from EE motor system demonstrations was 1.58 Mtce over 3 years.
	Intended Outcome A.3.2: Industry adopts energy efficiency standards and labelling to promote use of major energy saving equipment resulting in: 1. a minimum of 4 EE standards for industrial equipment being developed and established 2. government setting 4 guidelines on standards for EE industrial equipment 3. government setting 4 guidelines for certification and labelling for EE industrial equipment nationally	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome A.3.2: Industry has adopted EE standards and labelling that has resulted in*: 1. 4 EE standards for industrial equipment developed and established 2. government setting 4 guidelines on standards for EE industrial equipment 3. government setting 5 guidelines for certification and labelling for EE industrial equipment nationally 4. 75% of all equipment complying with

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	4. 50% of all equipment comply with established EE labels and standards (at par with imported equipment)			established EE labels and standards at par with imported equipment
	Intended Outcome A.3.3: EE standards and labelling has been established for equipment in the residential and service sectors resulting in: 1. a minimum of 5 appliances that have developed and implemented 2. market penetration of new EE appliances of 10% for commercial refrigerators, 50% for electric water heaters, 30% for microwave ovens and 50% for duplicating machines 3. the average annual energy saved from the use of EE appliances being 60 GWh	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome A.3.3: EE standards and labelling has been established for equipment in the residential and service sector resulting in*: 1. EE standards for 8 appliances used in the residential and services sectors developed and implemented EE standards 2. 18% market penetration for commercial refrigerators, 30% for electric water heaters, 32% for microwave ovens, and 97% for copy machines 3. The average annual energy saved from the use of these EE appliances is estimated from surveys to be 33,700 GWh

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	Intended Outcome A.4: Energy management information system and reporting program (EMISRP) has been developed for key energy intensive industries with: 1. EMISRP developed by Year 4; 2. a minimum of 3,500 energy intensive enterprises reporting under EMISRP 3. 80% of reporting establishments finding that EMIRSP is useful in their EC&EE initiatives and projects	**Rel – HS Eff – MS Efy – S Ov - S**	**Likely**	*Actual Outcome A.4: EMISPR established for 9 industrial sub-sectors with*: 1. NPCC made a decision not to duplicate the information system work done by ERI and NDRC. However, EUEEP resources were used to build capacity to evaluate the existing NDRC systems and the means of upgrading the system to meet the needs of both NDRC and EUEEP's program 2. 998 energy intensive enterprises reporting under the ERI/NDRC system 3. 100% of reporting establishments found ERI/NDRC information system to be useful in their EC&EE initiatives.
Component B: To remove barriers to energy efficiency in the building sector	Intended Outcome B.1: Data on building energy use has been collected and used as a basis for setting and assessing the impact of standards. This includes by the EOP: 1. 4 pilot cities with systems to collect data on building energy	**Rel - HS Eff - HS Efy - HS Ov - HS**	**Moderately Likely**	*Actual Outcome B.1: Data collection and analysis systems developed for a "statistical indicator system" for energy consumption in buildings. This has resulted in:* 1. 4 pilot cities with systems for collecting data on building energy consumption;

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	consumption 2. 4 completed surveys in the pilot cities 3. 12 annual reports produced and published based on data collected and its analysis 4. 19 cities that replicate or modify the data gathering and analysis of trends 5. 0.6 million Mtce energy savings in the pilot cities based on the data collection and analysis system			2. 4 completed surveys in the pilot cities 3. 12 annual reports produced and published based on data collected and its analysis 4. 23 cities that replicate or modify the data gathering and analysis of trends 5. sufficient data collection and analysis from the system to conclude that there was 0.6 million Mtce energy savings in the pilot cities
	Intended Outcome B.2: Policies and standards for building energy efficiency have been developed resulting in: 1. 6 policies and instruments being developed for building energy efficiency 2. 1 standard developed and approved for new residential building in a hot summer warm winter region 3. 1 standard developed and approved for retrofitting existing commercial buildings 4. 2 heating standards updated for residential buildings in a	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Likely**	*Actual Outcome B.2: Policies and standards for building energy efficiency developed resulting in:* 1. 6 policies and instruments developed for building energy efficiency 2. 1 standard developed and enforced for new residential building in a hot summer warm winter region 3. 1 standard developed and enforced for retrofitting existing commercial buildings 4. 2 heating standards updated for residential buildings in a cold winter

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	cold winter region 5. 10 buildings participating in building energy rating system 6. 80% of all new buildings complying to new building energy standards by EOP 7. 1.03 Mtce of energy saved from buildings that comply with new energy standards.			region 5. 12 buildings participating in building energy rating system 6. 90% of all new buildings complying to new building energy standards by EOP Phase I 7. 1.0 Mtce of energy saved mainly from new buildings that comply to new energy standards
	Intended Outcome B.3: Standards for building EE have been implemented with incentives for buildings to exceed the standards resulting in: 1. 20 kWh savings per m^2 of the demonstration building program 2. 4 building performance standards, policy guidelines and other instruments having been implemented in the four pilot cities 3. 8 courses delivered for senior government officials and professional designers in building code implementation and related regulations and systems 4. 85% of the trainees rating the	**Rel - HS** **Eff - HS** **Efy - HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome B.3: BEE standards implemented with incentives to exceed the standards resulting in:* 1. 40 kWh savings per m^2 of the demonstration building program 2. 8 building performance standards, policy guidelines and other instruments implemented in the four pilot cities 3. 13 courses delivered for senior government officials and professional designers in building code implementation and related regulations and systems 4. 90% of the trainees rating the courses

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	courses as satisfactory and useful 5. 75% of the trainees being engaged in building EE code regulations (e.g. building construction permitting) and code applications (e.g. building design and construction) 6. 4 guidelines for planning, design and construction of low energy buildings 7. 30% of building practioners apply the guidelines 8. 50% of these practitioners find the guidelines useful in their projects for building EE 9. 1 computer-aided BEE management system being established and operational			as satisfactory and useful 5. 75% of the trainees engaged in building EE code regulations (e.g. building construction permitting) and code applications (e.g. building design and construction) 6. 4 guidelines for planning, design and construction of low energy buildings prepared, published and disseminated. 7. 50% of the building practioners who were trained by EUEEP apply the guidelines 8. 90% of these practitioners find the guidelines useful in their projects for building EE 9. 1 computer-aided BEE management system established and operational
	Intended Outcome B.4: Building energy efficiency information has been disseminated resulting in: 1. 10% of government and commercial buildings in pilot cities that are investing in and implementing EE measures 2. 2 BEE video presentations	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Likely**	*Actual Outcome B.4: BEE information disseminated resulting in:* 1. 15% of government and commercial buildings in pilot cities that are investing in and implementing EE measures 2. 3 BEE video presentations developed

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	that have been developed and disseminated 3. 3 BEE brochures having been developed and disseminated 4. 700 building owners, architectural research institutes and real estate agents being influenced by BEE advertisement			and disseminated 3. 4 BEE brochures developed and disseminated 4. 1,855 building owners, architectural research institutes and real estate agents being influenced by BEE advertisement.
	Intended Outcome B.5: Innovative building technologies have been promoted resulting in: 1. Surveys indicating that 1% of respondents are using or planning to use EE building materials in their buildings or in their building designs 2. 1 building employing and investing on locally developed innovative building technologies 3. 3% of building practitioners that are interested in using or are committed to using the innovative product	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome B.5: Innovative building technologies promoted resulting in:* 1. Surveys indicating that 1% of respondents are using or planning to use EE building materials in their buildings or in their building designs 2. 1 building employing and investing on locally developed innovative building technology 3. 5% of building practitioners trained under EUEEP that are interested in using or are committed to using the innovative product
Objective C: Strengthening local capacity and the development of supporting for promoting and implementing EC&EE projects in	Intended Outcome C.1.1: Energy Conservation Centers (ECCs) strengthened for energy auditing and inspections of new building	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome C.1.1: ECC capacity in energy auditing and inspection of new building designs strengthened as manifested by:*

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the industrial and building sectors	designs through: 1. 8 ECCs receiving technical assistance to build their capacity 2. 80 projects annually implemented by strengthened ECCs starting in Year 2 3. 140 high quality energy audits and new building design inspection conducted by ECCs 4. 110 companies that annually applied recommendations from energy audits and realized savings			1. 10 ECCs that received technical assistance to build their capacity 2. An average of 90 projects annually implemented by the strengthened ECCs starting in 2007 (Year 2) 3. ECCs completed 393 high quality energy audits and new building design inspection (from the 998 enterprises) 4. 359 companies that annually apply recommendations from energy audits and realized savings
	Intended Outcome C.1.2: ECC capacity to conduct EE training has been strengthened resulting in: 1. 48 energy efficiency training courses designed and conducted by ECCs annually 2. 40 trained ECC personnel that are delivering EE training 3. 1,440 industrial and commercial enterprise clients of the ECCs employing and	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome C.1.2: ECC capacity to conduct EE training strengthened as evidenced by*: 1. 48 EE courses designed with 158 courses delivered to 8 different in 2007 and 2008 2. 157 trained ECC personnel providing EE training 3. 1,692 industrial and commercial enterprise clients of the ECCs employing and implementing EE

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	implementing EE practices and projects.			practices and projects.
	Intended Outcome C.1.3: Capacity to disseminate BEE information has been strengthened resulting in: 1. 19,650 survey respondents that are using or are planning to use information disseminated to them by, or received by them from, the EUEEP 2. 2 websites on EE information established 3. 6,000 EE information packages/materials disseminated annually; 4. 80% of users of information that are satisfied or find service provided useful	**Rel - HS** **Eff - HS** **Efy - HS** **Ov - HS**	**Likely**	*Actual Outcome C.1.3: Capacity to disseminate BEE information strengthened as indicated by:* 1. 322,000 hits on websites. The assumption is that these persons will be using the information on the EUEEP website 2. 2 websites supported by EUEEP 3. More than 16,000 EE packages delivered by ECCs annually 4. Surveys conducted by the ECCs indicate that more than 90% of users find the information useful.
	Intended Outcome C.2: The Energy Conservation Law (ECL) is being implemented as a result of: 1. the ECL being promulgated by 2008	**Rel – HS** **Eff – HS** **Efy – HS** **Ov - HS**	**Moderately Likely**	*Actual Outcome C.2: The Energy Conservation Law (ECL) is implemented as a result of:* 1. The ECL being promulgated on April 1, 2008 on which EUEEP contributed to the revisions of the ECL using EUEEP-hired experts and dissemination of the new ECL

Table A: Summary Assessment of Project Outcomes and Sustainability

Project Objectives	Intended Outcomes (from re-constructed project planning matrix from August 26, 2009)	Outcome Assessment (Rel=Relevance, Eff=Effectiveness Efy=Efficiency Ov=Overall Rating)	Sustainability Assessment[13]	Actual Outcomes (as of June 2010)
	2. 350 local government buildings and 200 state-owned factories applying EC&EE annually in accordance to the ECL 3. 500 private sector buildings and 500 private industries applying EC&EE each year in accordance with the ECL			2. 460 local government buildings and 500 state owned factories applying EC&EE annually in accordance with the ECL. EUEEP contributed to the capacity building of ECCs and local government officials in 8 cities who disseminated the requirements of the new ECL 3. 750 private sector buildings and 750 private industries applying EC&EE each year in accordance with the ECL. EUEEP contributed to this outcome through 8 workshops to enhance the understanding of the new ECL and compliance requirements
	Intended Outcome C.3: Policies and options developed for financing energy efficiency resulting in: 1. the study proposing of 6 EE financing options by Year 1; 2. completion of 4 proposals on available financing models in China by Year 2 3. 6 financing schemes having been designed and implemented on a	**Rel - HS** **Eff - HS** **Efy - S** **Ov - HS**	**Moderately Likely**	*Actual Outcome C.3: Policies and options for financing EE developed resulting in:* 1. ERI study providing 4 financing options available in China in 2007 (Year 3) 2. completion of 4 proposals on available financing models in China by 2007 (Year 2) 3. 6 financing schemes designed and implemented on a demonstration basis in Shandong and Zhejiang Province in

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	demonstration basis in 2 regions by Year 3 4. One EC&EE project being assisted through the demonstration financing schemes 5. The investment of USD 260,000 through the demonstration financing scheme (inclusive of reflows) 6. 1,100 tce of energy savings from EC&EE projects that were financed through these schemes 7. The allocation of funds for new financing schemes totalling USD 137,000 8. One new financing option for the increased availability of EE investment financing in a local area; 9. 10 financing institutions are providing financing assistance for EC&EE projects;			2008 (Year 3) 4. One EC&EE project assisted through the demonstration financing schemes in Zhejiang province 5. The investment of USD 257,430 through the demonstration financing scheme (inclusive of reflows) 6. 3,200 tce of energy savings for 1 year from EC&EE projects that were financed through these schemes. This is based on EE lighting scheme for households 40 to 12 w IL to CFL replacement. There were 300,000 CFLs disseminated, 3 times more than planned and hence the higher ES 7. The allocation of funds for new financing schemes totalling USD 772,000 8. One new financing option available in Zhejian demonstration area 9. 10 financing institutions are providing financing assistance for EC&EE projects

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	10. Cumulative energy savings of 5.3 million Mtce.			10. Cumulative energy savings of 6.33 million Mtce measured by 11 subcontractors and 9 ECCs (with trained auditors) at EE sites in buildings and industries (e.g. iron & steel, cement, non-ferrous) with EE measures focused on variable speed drives, EE lighting, and boilers.
Monitoring and Evaluation		**Rel - HS Eff - MS Efy - S Ov - S**	**Moderately Likely**	
Overall Project Rating		***S***	**Moderately Likely**	

Replicability or Catalytic Role of Project

Phase I EUEEP deserves significant credit for catalyzing the replication of energy efficiency projects in the industrial and building sectors by:

- providing critical inputs to strengthening the GoC's regulatory framework under the Energy Conservation Law in 2008 as well as setting of EE standards for equipment such as fans, air conditioners, boiler, and transformers that could be utilized by industrial and building sector stakeholders;

- setting up effective demonstrations and benchmarking activities under the "Top 1000 Enterprises" program. This included the provision of technical support for industrial stakeholders and the necessary confidence to invest on EE equipment and projects;

- setting up of standards and labelling programs that facilitated the purchase of EE equipment by industrial enterprises as well as the commercial and residential sectors;

- providing training for ECCs to train other energy specialists and auditors. This accelerated the development and adoption of EE initiatives by other industrial stakeholders.

- effectively disseminating regulatory and EE&EC information on best approaches to implementing EE projects to a wide range of stakeholders including the general public, industrial enterprises and energy specialists; and

- providing advice to government on fiscal incentives that can further accelerate adoption of energy conservation by industrial stakeholders and stakeholders in the buildings sector;

EE replication in the building sector, however, has not been as extensive as the industrial sector. This is mostly due to the project focus on new building construction which account for less than 3% of all buildings in China, and piloting of BEE standards on a small scale in 4 pilot cities. EUEEP has provided a good foundation based on EE demonstrations and policy strengthening on which BEE standards compliance can be catalyzed for existing buildings; for this to occur, external assistance will be required to:

- increase BEE retrofit demonstrations to convince building owners that BEE financially benefits are significant through energy savings;
- strengthen BEE policy that defines EE standards for existing buildings in all climatic zones of China;
- strengthen BEE financing schemes that should include improved support for ESCOs; and
- increase capacity of institutions for building inspections, specifically on BEE issues.

M&E During Project Implementation

Notwithstanding the excellent achievements of EUEEP, the Project needed to revise its log-frame for M&E to conform to changing GEF M&E requirements:

- Prior to 2007, APRs and PIRs provided reports on Project progress, impacts and issues though the reporting was mainly qualitative in nature;
- In 2007, GEF projects were required to report quantitative impacts based on "Project Impact Metrics for Climate Change Indicators" [14] in a manner complementary to the qualitative achievement descriptions of the APR and PIR reporting processes;
- A new Project log-frame was approved on August 26, 2009 due to the need to harmonize and simplify the number of indicators, and to retrofit the log-frame to GEF changes to "outcome" reporting. The 2009 log-frame is contained in Appendix E.

Ratings of the Project's Monitoring and Evaluation system[15] are as follows:

- *Quality of M&E design – MS*. This is mainly due to the fact that the M&E system for EUEEP has evolved from its original 2002 design;
- *Quality of M&E implementation – S*.

In the context of monitoring long term changes from EUEEP activities, an issue of the EUEEP M&E system revolves around *the absence of systematic collection of quantitative information related to energy savings*. The measurement of energy savings for each EE project investment is cumbersome requiring the enterprise to recruit an ECC or energy specialist. The current system of reporting energy savings only involves the discrete reporting of energy savings, usually at the time of completion of the EE project. A system for monitoring energy usage in subsequent years is not in place. Eventually, energy savings information from ECCs, consultants and subcontractors are reported to the PMO in their reports. A database should be designed to provide a systematic means of collecting energy use data to determine provincial or national energy savings.

Monitoring larger EC programs will require surveys and statistical sampling methodologies to provide aggregated energy savings data for industries and buildings within certain jurisdictions. At this time, the PMO is not equipped to undertake an M&E role for a larger EE&EC program; in a post Phase I EUEEP period, either the capacity of the PMO will need to be strengthened for such a role (through the recruitment of a dedicated M&E officer) or an independent professional firm should be subcontracted to perform M&E tasks within a prescribed system that meets NDRC's approval. The long term outcome of the EUEEP M&E system should be its migration to a monitoring cell within the NDRC after Phase 1 EUEEP is completed.

[14] From page 34 of EUEEP PIR

[15] HS or Highly Satisfactory: There were no shortcomings in the project M&E system;
S or Satisfactory: There were minor shortcomings in the project M&E system,
MS or Moderately Satisfactory: There were moderate shortcomings in the project M&E system;
MU or Moderately Unsatisfactory: There were significant shortcomings in the project M&E system;
U or Unsatisfactory: There were major shortcomings in the project M&E system; HU or Highly Unsatisfactory: The Project had no M&E system

Assessment of Processes Affecting Attainment of Project Outcomes and Sustainability

Preparation and Readiness:

The Project designs from the PDF A and PDF B Phases were well prepared, comprehensive and easy to execute. The roles and responsibilities of all government institutions were clear with counterpart funding and enabling legislation to meet project objectives. The quality of these preparations has definitely had a positive effect on the implementation of the project.

One issue on the EUEEP designs, however, was the Project schedule which did not provide realistic time allocations for project mobilization and preparing stakeholders (industrial and building sector as well as ECCs) for EUEEP activities. Given that the original EUEEP design was for 3 years, the impact of this oversight was an increase of 24 months for Project duration of which 12 additional months were required to setup the Project's financial system that required harmonization between accounting systems of UNDP and the GoC. Time was also required to strengthen the existing working relationships between Project staff and the various project beneficiaries including industrial enterprises in cement, iron & steel and chemicals, ECCs, industrial associations, building owners, architects and local government officials that oversee building inspections and new building construction.

Country Ownership and Drivenness:

To a significant extent, Project results have been attained with strong ownership and drivenness of the Chinese government. Evidence supporting this statement includes:

- Clear directives from NDRC on government targets and policies on EE objectives;
- The 2008 promulgation of the ECL;
- High levels of co-financing of ECCs (~USD 5.0 million) to deliver training to other trainers and energy consuming enterprises.

Stakeholder Involvement:

With China moving from a centrally planned to a market-based economy, stakeholder involvement of appropriate government and private sector personnel has been a key to the success of the Project. This included MoC, MoHURD, MoNREP and MoF and a number of stakeholders from private enterprises and relevant technical institutes throughout China who were consulted throughout the development and implementation of the Project. Stakeholder involvement was expanded to ECCs, emerging energy professionals, architects, real estate developers, and financing institutions.

Awareness raising activities also provided the Project with the necessary outreach to project proponents in various provinces and cities such as Guangdong, Shanghai, Beijing, Tianjin, Jiangsu, Shandong, Hebei and Fujian on the Project's available mechanisms to provide technical expertise and facilitate financial assistance.

The strong coordination arrangements of the Project have also contributed its success. The coordinating forum within the NPCC structure encourages a wide range of stakeholder participation that includes local government agencies in the event they want to table policy and directional changes; this facilitates promotion of effective multi-agency policy coordination, decision making and resolution of issues. This coordinating structure can be sustained after the end of EUEEP Phase I.

Financial Planning:

Overall financial controls of the Project were adequate. Expenditures until the end of April 30, 2010 were an estimated USD 15.5 million out of a total budget of USD 17 million.

Management of the original budget allocations of 2005 has been satisfactory in achieving the Project objectives. With more than USD 10.8 million or 63.5% of EUEEP's budget expended on technical assistance from subcontractors, the PMO expends a significant portion of its resources in contracting, monitoring and managing these subcontracts.

Supervision and Backstopping by UNDP:

Supervision and backstopping efforts by UNDP China and the UNDP-GEF Regional office in Bangkok were satisfactory. Considering the size of EUEEP, project management under the UNDP-funded PMO structure has also been effective and efficient. The roles of the various component managers in the PMO have been to execute directives from NDRC and within the framework of the Prodoc, and to manage and administer the numerous subcontracts. The only issue with the PMO was the need to have recruited a dedicated M&E officer to systematically monitor project progress and energy savings from the various project activities.

Co-Financing and Delays:

The Project slightly exceeded its co-financing targets by garnering USD 75.26 million, USD 12 million over the 2004 co-financing budget of USD 63.35 million. The additional finance was mainly government grants and industrial stakeholder equity finance for the benchmarking activities and demonstrations.

The project completion date of 2008 was extended to June 2010. Although the Prodoc did not allocate sufficient time and resources for the completion of the Year 1 mobilization activities, the delays in EUEEP's completion date did not affect the outcomes and sustainability rating of the Project.

Lessons Learned

Project Design:

- Investment in a good project design during the preparatory phase will increase the probabilities of successful implementation. The preparatory phase should include sufficient time and effort to design a project that government has the capacity to fully support. EUEEP implementation has only slightly deviated from its original design, and the outcomes were satisfactory;

- Equally important during project design is identification of stakeholders crucial to the success of the project and the development of collaborative and sustainable working relationships with them. In the case of EUEEP, its success has been founded on an excellent and close working relationship between the NDRC and UNDP;

Project Implementation:

- A clear and well-designed project logical framework with both quantitative output and impact indicators is crucial to improved and efficient project implementation as well as a means for the host government to measure project impacts. In the case of EUEEP, the log-frame has evolved from a qualitative format to the current format of qualitative and quantitative project indicators. While there are strong indications that the Project appears to have had a positive impact on energy efficiency with industrial stakeholders, the Project needs to improve its reporting based on quantitative impacts. This is particularly true if the next phases of EUEEP are scaled-up and more complex, with more energy efficiency projects being implemented in the industrial and building sectors as well as other sectors in the 12th FYP such as transport and the power sector;

- Delegating project technical work to subcontractors can be effective provided the subcontracted works are well defined and contracts are easily manageable. EUEEP subcontracts appear to be not only well defined but clear to the subcontractors on the work they need to complete. As a consequence, the PMO were able to more easily manage subcontractors and spend less time being encumbered by procurement procedures;

- The Project had few English versions of subcontract final reports. As a result, outside reviews by UNDP and independent project evaluators of EUEEP were difficult to conduct for those unable to read Chinese script. As a minimum, UNDP-GEF funded projects should have an English version available of the executive summary of each subcontract for external review;

- Project implementation success is dependent on the stability of the government stakeholders involved with the Project. The Evaluation Team has noted that the National Project Director and several of the NDRC technical specialists are still involved with EUEEP. Comparing EUEEP with similar projects in other countries, other projects have not had the successes of EUEEP due to the frequent movement of government officers within their civil service, government instability, the use of project resources to familiarize new officers with the project, and longer implementation times.

Recommendations

For designers of future GEF projects, the following actions are recommended:

- Greater care and scrutiny during the project preparation phase on:

- ➔ rightly identifying the relevant stakeholders and assessing their absorptive capacities;
- ➔ providing realistic implementation schedules;
- ➔ preparing the project logical framework as this is the main basis of the project design and is the primary tool for monitoring and evaluating the project. UNDP oversight is required to ensure the project log-frames are kept in the latest formats as required by UNDP and GEF.

These aspects of project preparations should be managed and overseen by qualified personnel from the Country Office;

In terms of recommendations specific for a post-Phase I EUEEP, the Government of China has been clear in its position that the country must continue to scale-up its efforts to meet energy efficiency targets. With the 11th FYP ending in December 2010, preparations are underway for the 12th FYP that reportedly has a heavy emphasis on energy conservation and reducing carbon in a number of sectors that includes the transport sector.

Due to the wide range of sectors that Phase II EUEEP will address, a Phase II EUEEP will need to avoid sectoral components (as was done in Phase I), and incorporate a structure that is flexible and can laterally address other sectors (i.e. telecommunications, agriculture, transport). In this regard, NDRC has provided for discussion a Phase II EUEEP project structure designed to assist GoC in attaining its energy conservation objectives of the 12th FYP; Phase II components include policy and regulatory framework, EC technologies, EC products and capacity building. On the basis of this structure, the FE team has made a number of recommendations for a Phase II EUEEP project listed under the proposed components.

Policy and Regulatory Framework

⇒ *Support and strengthening new policies, implementing rules and regulations should be in the context of the expansion of the current Energy Conservation Agreement program*. New policies, implementing rules and regulations would be required in the formulation of other sectoral-level ECAs within the "Top-1000 Energy-Consuming Enterprises Program" such as the telecommunications sector or with sector specific trade associations such as the cement industry;

⇒ *"Energy system standards" for industrial and commercial enterprises and residences need to be strengthened under the standards and labelling (S&L) program started in Phase I.* The standards should provide realistic energy targets (based on international and domestic energy consumption experience), and identify appropriate EC products to meet these targets and promote best energy consumptive practices.

⇒ *The formulation of incentive policies needs to be continued to accelerate adoption of EE technologies and practices promoted by the 12th FYP*.

Energy Conservation Technologies:

⇒ *Technology process demonstrations and benchmarking activities need to be continued for various industrial sectors included in the 12th FYP* including:

- the construction, transportation, small-to-medium enterprise, rural and agricultural sectors and other energy-intensive industries (such as non-ferrous and the pulp & paper industries) in addition to the industrial and building sectors;
- demonstration of EE technologies that provide significant energy savings to a particular enterprise. This would include variable speed drives and blast furnace top gas recovery turbines (TRTs) in existing iron & steel enterprises;
- additional benchmarking for other numerous products manufactured in the cement, chemical and iron & steel industries as well as the buildings sector;
- mechanisms to provide continuous improvements to Phase I benchmarking activities (that were mainly in the industrial sector) through consultants specializing in international best practices on benchmarking methodologies;
- creation of benchmarking indicators that can be posted on-line for wider dissemination; and
- benchmarking in an expanded geographical area (i.e. other provinces and cities).

⇒ *Support is required to strengthen measures to encourage energy efficiency retrofits in existing buildings.* Since most BEE activity during Phase I EUEEP involved new building construction comprising less than 3% of all buildings in China, efforts are required to bring the remaining 97% of existing buildings under EE standards. To catalyze EE retrofits, implementing EE measures for large office buildings (>20,000 m^2) and government-owned buildings may be considered due to their higher public profile. EE measures can be demonstrated on these buildings such as the use of photo-voltaic units and heat pumps to offset consumption of fossil fuels or grid power. Energy audits can be conducted on the building facilities before and after the retrofits to gauge the impact of the EE measures, and the compliance to a standard where energy consumption is reduced by 20%. These activities could lead to greater adoption of EE products and technological processes by building owners and building developers;

Energy Conservation Products:

⇒ *Support is required to continue strengthening the Phase I S&L program.* Activities would include:

- review of more sales data on EC products (including residential, commercial and industrial sectors) that will strengthen the assessment of market penetration of EC products;
- increased access to information on energy usage at the household level to determine residential and commercial baselines and actual EC product usage;
- comparing energy consumption information of other countries on typical EC products and household appliances;
- correlating household income levels with energy consumption in China as well as other countries;
- providing more publicity for product labelling and standards to increase the public's knowledge on EC products;
- testing of new EC products entering the Chinese market for EE performance and consumer protection;
- ensuring Phase II EUEEP S&L activities do not overlap with the UNDP-GEF project "Barrier Removal to the Cost Effective Development and Implementation of Energy Efficiency Standards and Labelling Project" (BRESL Project).

Capacity Building:

⇒ *Local capacity building for collecting energy consumption information and data needs to be continued.* Industrial enterprises and building owners need to report their energy consumption data to a central data repository. An on-line energy information reporting website that can be developed to monitor energy usage and conservation within a certain jurisdiction. ECCs and local consultants can provide valuable services to enterprises and owners in reporting energy consumption data;

⇒ *Regulatory enforcement on energy efficiency standards for new building construction needs to be continued.* Current programs involving capacity building for government building inspectors and their consultants needs to be expanded within the pilot cities as well as other cities;

⇒ *Training programs for ECCs and ESCOs on energy auditing and benchmarking needs to be continued to include a wider scope of industrial sectors under the 12th FYP*; this would include energy intensive sectors including the non-ferrous and pulp and paper industries;

⇒ *Efforts to raise awareness of commercial banks on the ESCO business model need to be strengthened.* This is necessary to overcome their perceptions of the ESCO business model as one of high risk, and the general view that a strengthened ESCO industry in China is important to increasing adoption of EE measures especially in the building sector. Close collaboration is required with the GEF-funded project "China Energy Efficiency Financing Project (GEF Project ID: 2951)" on avoidance of overlapping TA activities;

⇒ *The capacity of laboratories for testing new products for energy consumption needs to be increased.* New standards will create the demand for new testing equipment for new EE industrial, commercial and residential products. The Phase II EUEEP PMO should ensure their TA activities do not overlap with the BRESL project;

⇒ *The current monitoring and evaluation system for EC&EE programs needs to be strengthened to*:

- facilitate monitoring and analysis of energy savings and GHG reductions resulting from various EE projects throughout China;
- easily disseminate accurate energy use data;
- meet the reporting needs of NDRC; and
- be easily managed by one or two dedicated persons.

Strengthening of PMO Functions

Since Phase II EUEEP is different from Phase I, changes will be required to current PMO staffing to more effectively assist the GoC in the implementation of the 12th FYP. As a Phase II EUEEP project is expected to address policy aspects, evaluation and deployment of new technologies, evaluation of new EC products and capacity building, the PMO will need to:

⇒ *staff a national technical advisor with extensive EE experience who can effectively work with NDRC to implement Phase II EUEEP.* Under the current setup, the PMO is directed and managed by NDRC in implementing project functions and mainly serves as an administrative clearing house for contracts and payments with some technical inputs. A re-structured Phase II EUEEP will require a national CTA who can provide technical inputs (such as a product evaluations and policy formulation to accelerate EC product adoption) and assist in executing NDRC directives;

⇒ *improve technical ability of current PMO staff to manage a Phase II project that is more complex than Phase I*. Since Phase II is required to address more sectors, PMO staff will need to address different issues, formulate strategic actions and bring in appropriate consulting resources to properly address. An example of this would be in the transport or agricultural sectors where end use emission sources are mobile with differing issues in comparison to stationary sources encountered in the industrial and building sectors.

⇒ *employ a full time M&E officer.* The role of this officer would be the oversight of the development and implementation of a monitoring system for Phase II activities. This would include the development of the overall M&E framework that should include mechanisms to more accurately estimate energy saved from project activities (both direct and indirect). The officer would be responsible for the setting up of an M&E system that can be easily managed by one or two dedicated project officers.

1. INTRODUCTION

This report summarizes the findings of the Final Evaluation Mission conducted during the April 26 – June 30 2010 period for "China: End Use Energy Efficiency Project" (herein referred to as the "Project") implemented by the United Nations Development Program (UNDP), Project Code CPR/02/G32 and with financing support from the Global Environment Facility (GEF). The Project Document (Prodoc) provides details on removal of key barriers to the increased adoption of energy efficiency measures in selected industrial sectors and the building sector. Project activities include:

- Benchmarking and demonstration activities for the cement, iron & steel and petro-chemical industrial sectors;
- Benchmarking and demonstration activities for the building sector;
- Cross cutting actions that provide support to the promotion and increased implementation of energy efficiency measures including policy formulation, capacity building, awareness raising and financial support mechanisms.

1.1 Background

1.1.1 Overview of the China Energy Sector and Its Economy

China is the second largest energy user and emitter of greenhouse gases (GHGs) in the world. In 2007, nearly 87% of China's primary energy supplies were based on fossil fuels (i.e. coal, oil, gas and peat). Energy consumption in China has increased 6.0 percent annually between 1990 and 2007 - more than three times faster than the world's average annual growth, rising from 990 million tons of coal equivalent (Mtce) in 1990 to 2,650 Mtce in 2007. Despite the high growth, China's per capita energy consumption is still less than one fifth of the average for the Organization for Economic Cooperation and Development (OECD). If left unchecked, however, China's energy consumption that is primarily met by coal will accelerate the country's significant contribution to the deterioration of local air quality and the increase of GHG emissions. Improving energy efficiency is one of the keys to sustaining China's economic growth with reduced energy needs and lessened local and global environmental impacts.

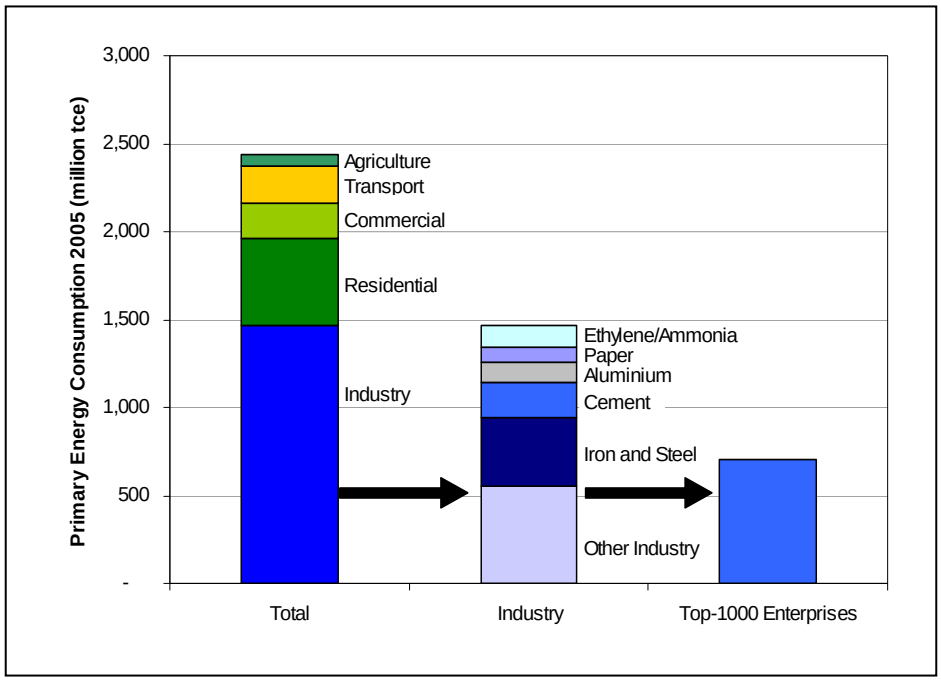
China's energy efficiency lags far behind the world's most efficient economies, especially in its industrial sectors. Its energy-intensive manufacturing industries, accounting for about 50% of total final energy consumption, operate at significantly higher levels of energy intensity (energy use per unit of physical output) than international best practices. The significant potential for improving energy efficiency and reducing GHG emissions in the industrial sector is largely unrealized.

The Government of China (GoC) has stepped up its efforts to improve energy efficiency. In 2000, the Chinese government set an energy supply target of only increasing energy consumption, 1,300 Mtce in 2000 to 1,830 Mtce in 2020. Unfortunately, statistical data indicated energy use was growing much faster than planned due to its spectacular GDP growth between 2002 and 2005. At these rates, China would need at least 5,240 Mtce of final energy supply by 2020, 100% more than planned to achieve its economic development targets. In 2004, the National Development and Reform Commission (NDRC) issued "The Medium and Long-Term Special Plan for Energy Conservation" (Energy Conservation Plan), highlighting 10 energy conservation programs targeting the

country's major energy consuming sectors. This plan outlined specific targets to reduce energy intensities for various sectors by 2020, such as the industrial sector by 14%. In China's Eleventh Five-Year Plan (FYP) (2006-2010) for Economic and Social Development, the GoC pledged to reduce the energy intensity as a function of the gross domestic product (GDP) by 20% from 2005 to 2010 equivalent to avoided energy consumption of over 560 Mtce annually by 2010.

The NDRC launched the "1,000 Large Industrial Enterprises Energy Conservation Action Plan" in April 2006, targeting the top 1,008 largest industrial energy consumers that account for 30% of China's total primary energy consumption. Government efforts included policy initiatives to foster technology development and deployment, and various fiscal incentives to improve energy efficiency of which EUEEP is providing technical assistance. Figure 1 provides an illustration of the energy consumption of the Top 1000 Enterprises relative to other energy consuming sectors.

Figure 1: Primary Energy Consumption of China, China's Industrial Sector, and the Top-1000 Energy-Consuming Enterprises



The required investments in energy conservation to achieve the 20% reduction target were estimated to be more than USD 50 billion. Although Chinese experts agree that most of the identified industrial energy conservation investments are financially viable, most of these enterprises prefer investments in business expansion than energy conservation. Furthermore, the domestic banking sector had not facilitated the required financing, especially for medium and large-sized energy conservation investment projects. In 2006 and 2009, energy intensity of GDP did not decline as planned. The 12th-FYP is currently under preparation and will have actions to facilitate more widespread reduction of energy intensities in the industrial sector and other energy intensive sectors.

1.1.2 Energy Efficiency in China

Since the 1990s, the Government of China has recognized the importance of reducing its historically excessive dependence on energy imports and the need for action to strengthen its energy security. This has been reflected in a number of GoC programs that outline government strategy and develop concrete action plans to modernize the energy sector, improve energy efficiency, and increase the use of domestic energy resources. Moreover, there have been significant governmental efforts in energy efficiency in China for more than twenty years; prior to EUEEP, the government had established an evolving regulatory framework of laws, regulations, standards, policies, and similar measures, which are well documented in EUEEP preparatory documents. There has also been engagement of a wide range of NGOs, engineering societies, industrial representatives, energy service companies, merchant associations, architectural organizations, environmental entities, project developers, and other organizations.

In June 2005, the Mr. Hu Jintao, the Chinese President stated that China needs to make greater efforts in energy conservation (China CCTV 2005). The seven key points on energy conservation and technology included:

1. *the need for China to use advanced energy efficiency technologies to substitute the out-of-date technologies, speed up the development of high-tech and service industries, change the old mode of economic development with high investment, high consumption, high pollution and low efficiency;*
2. *accelerating the establishment of an energy resource technical support system where the government will increase its national budget and investment in energy technology development and R&D in energy technologies;*
3. *an improved focus on end-use energy savings. This will involve the promotion of energy saving consumer technologies and products;*
4. *building an energy conservation system, mechanism and capacity. This would involve implementation of energy efficiency standards, phasing out of inefficient technologies and products, establishment and promotion of energy conservation systems and market-based mechanisms, and the development of government regulatory systems;*
5. *strengthening government planning and policy guidance. This will involve improved forecasting of energy demand, targets for energy savings, and a series of incentives to encourage energy conservation (including energy taxes, preferential pricing and trading policies;*
6. *establishing laws, regulations and standards for energy conservation. This includes implementing relevant energy conservation laws, strengthening law enforcement and surveillance inspection, formulating and implementing compulsory standards, and promoting energy efficiency in production, construction and transportation;*
7. *strengthening awareness and education in energy conservation.*

1.1.3 Issues Prior to Commencement of EUEEP

Prior to EUEEP, regulatory oversight to energy efficiency directives in China was deemed to be ineffective. Furthermore, to strengthen the GoC's transition to market-driven policies that support the economic growth of China, the GoC has made clear

through its reform efforts and its efforts to accession to the WTO that governmental energy efficiency activities must be decentralized to energy service companies, market-driven fuel pricing, activities undertaken under the Kyoto Protocol's Clean Development Mechanism, and other similar modalities. The scenario faced by the GoC prior to EUEEP in 2005 included:

- Energy efficiency targets of the 10th Five-Year Plan (2001-05) were not being met. The EE targets for the 11th Five-Year Plan were being reviewed to ensure a continual decreasing trend in energy intensity for industries and the building sector. Notwithstanding GoC's efforts to promote energy conservation, there has been a lack of incentives for enterprise managers to become energy efficient as energy prices in 2002 did not provide them sufficient operational cost savings. Government directives to use energy efficient equipment or adopt practices were not well enforced; for example, enterprise managers would often pursue least cost options irrespective of the energy consumption of that option;

- Regulations empowering the local entities to promulgate energy efficiency standards and codes were not developed. This is partly due to the fact that an Energy Conservation Law had not yet been promulgated. Delegation of this regulatory function to local entities would have enabled new financing options for energy efficiency to be developed in the country with adequate promotion and support;

- Lack of a developed market for foreign technologies that were viewed as being more efficient; and

- Lack of knowledge within industrial and commercial enterprises on the benefits and implementation of energy efficiency projects. Enabling environment for promoting building energy efficiency was poor including a lack of unified codes and certification, insufficient state policy support, lack of awareness of building energy efficiency amongst property owners and building development practioners (i.e. architects, real estate developers).

1.1.4 Government Initiatives Supporting Energy Efficiency

Energy efficiency initiatives are strongly stated in the 11th FYP that includes the following programs:

1. Making use of exhaust heat and pressure: Iron and steel enterprises will apply coke dry quenching (CDQ) and power generation through the pressure differences in blast furnaces; renovating all blast furnaces and implementing converter gas recovery; and annually installing 30 sets of medium-and-low-temperature exhaust-heat power generation equipment in concrete production lines;

2. Reducing and displacing petroleum use: This will be done through replacing fuel oil (light oil) with clean coal, petroleum coke and natural gas in targeted industries (i.e. power, petroleum and petrochemical, metallurgy, construction materials, chemical and transportation), replace small oil-burning units;

implement regulations on fuel use and associated policies and rules; implement operational plans on clean motor vehicles (i.e. automobiles, hybrid vehicles, natural gas buses and taxis in cities); intensify promotion of methanol and alcohol as clean fuels, develop coal-liquefaction projects; and develop alternative fuels;

3. Energy conservation in electrical motors: Programs will be in place to improve efficiency of China's 420-million-kw electrical motors (comprising 60% of the country's total that are running with an efficiency that is 0 to 30 percent lower than their foreign counterparts). This will include promotion of highly efficient electrical motors; launching systematic optimization and renovation of high-efficiency pumps and compressors; and promotion of variable-speed, frequency conversion and automated system controls;

4. Optimization of energy systems: This will include optimization of energy system in major industries mainly in the metallurgical, petrochemical, and chemical industrial sectors for lower energy use and higher competitiveness in enterprises;

5. Energy conservation in buildings: Standards will be strictly adopted to save energy in residential and public buildings and public by 50%; accelerate reform in heat supply systems; strengthen efforts in promoting building energy efficiency technology and related products; and renovation of existing building in the northern regions and hotels that need heating systems;

6. Environment-friendly lighting: This will involve replacing ordinary candescent lamp with high-efficiency energy-saving fluorescent lamps, replacing traditional electromagnetic ballast with electronic ballast; replacing traffic signals that are incandescent lamps with light emitting diodes (LED); and targeting public facilities, hotels, shopping centers, office buildings, sports venues, for high efficiency lighting;

7. Energy conservation in governmental departments. This will involve governmental buildings (including those supported by public finance) that will be reconstructed for EE heating, air-conditioning and lighting systems, regulating reconstruction to comply to building energy efficiency standards; promotion of high-efficiency products and include them into the list of governmental procurement;

8. Build monitoring and technical service system. This will involve boosting the capability of the energy saving monitoring centers at the provincial level or associated with major energy-consuming industries, upgrading monitoring equipment; strengthening personnel training; introducing and popularizing contractual energy management; monitor and manage compliance to an energy conservation law.

1.1.5 Assistance of the Donor Community

There are a number of other EE projects in China that have provided support for GoC initiatives for developing energy efficiency including:

⇒ The China Energy Efficiency Financing Project (GEF Project ID: 2951). The objective of the project is to improve the energy efficiency of medium and large-sized industrial enterprises in China through promotion of EE financing through investment preparations, investment lending to ESCOs, policy and capacity building support and project implementation support. The project is scheduled for completion in 2013 and is being implemented by IBRD and executed by NDRC.

⇒ The China Utility-Based Energy Efficiency Finance Program (CHUEE) (GEF Project ID: 2624): Implemented under the IFC Private Enterprise Partnership for China, CHUEE is designed to provide marketing, development and financing services to commercial, industrial, and municipal sector energy users to implement energy efficiency (EE) equipment installations. CHUEE brings together financial institutions, utility companies, and suppliers of energy efficiency equipment to create a new financing model for the promotion of energy efficiency. CHUEE is also supported by grant funding from Finland's Ministry of Employment and Economy and the Norwegian Agency for Development Cooperation;

⇒ Promoting Energy Efficient Room Air Conditioners (GEF Project ID: 4070): Project is designed to reduce China's GHG emissions through transformation of the room air conditioner market and the sale of more energy efficient room air conditioners. It is being implemented by UNDP and executed by the Ministry of Environmental Protection (MoEP);

⇒ China Energy Efficiency Promotion in Industry (GEF Project ID: 4109): The objective of this project is to improve energy efficiency and reduce greenhouse gas (GHG) emissions in key industrial sectors in China by addressing both the management and technical aspects of rational use of energy. It is being implemented by the IBRD and executed by the Ministry of Industry and Information Technology (MoIIT);

⇒ Phasing-out Incandescent Lamps & Energy Saving Lamps Promotion (PILESLAMP) (GEF Project ID: 3672). This project was commenced in 2009 and involves enhanced promotion and implementation of the utilization of energy saving lamps (ESLs) in China through the transformation of the local lighting products market and the phasing-out of incandescent lamp production and sale. It is being implemented by UNDP and executed by NDRC;

⇒ Heat Reform and Building Energy Efficiency Project (GEF Project ID: 1892): Project aims to improve the energy efficiency of new building construction in China through a combination of building equipment market transformation and heat supply policy approaches. This includes promoting demand in the housing sector for more efficient building materials and for more effective heat metering and control equipment. The project is part of a broader program for heat reform and building energy efficiency by the World Bank and China and is being implemented by the IBRD and executed by the Ministry of Construction (MoC);

1.2 Project Objectives and Expected Results

The UNDP-GEF Project "China: End Use Energy Efficiency Project" was commenced in 2005 with the **development goal** *to reduce GHG emissions of China by removing barriers to the widespread application and practice of energy conservation and energy efficiency in the major energy consuming sectors (buildings and industrial) in China.*

Recognizing the long time requirements to meet the scale of this development objective, EUEEP was planned as a contribution to an integrated 4-phase, 12-year energy efficiency program that was developed by the GoC. Phase I of EUEEP was designed to support the initial stages of the development of EE in China through benchmarking, demonstrations, small-scale capacity building and awareness raising. Subsequent phases of EUEEP would expand the scope of the program. For example, Phase II may consist of expanded EE activities to include all industries under a particular sectoral scope such as cement or iron & steel. Phase III may involve one trade association making a commitment for their entire industry to energy conservation agreements.

To achieve the Phase I goal, EUEEP was designed with a number of barrier-removal **objectives**:

- Objective 1: Provide the necessary benchmarks and demonstrations of industrial energy efficiency in selected energy intensive industries, cement, iron & steel and petro-chemicals;
- Objective 2: Provide the necessary benchmarks and demonstrations of building energy efficiency;
- Objective 3: Strengthen supporting policies and laws, local capacity for energy audits, local awareness of EE and financial mechanisms that would facilitate implementation of EE measures in various industrial sectors and buildings.

The expected **outcomes** for the Project include:

- The removal of barriers to the effective application and practice of energy efficiency in the industrial and residential sectors of the Chinese economy;
- The removal of barriers to effective application and practice of energy efficiency in the building sector of the Chinese economy; and
- Increased human capacity in China amongst business, technical and financial organizations to realizing energy conservation in China.

Section 2 provides the assessment on the achievements of project objectives and outcomes.

1.3 Final Evaluation

1.3.1 Purpose of the Evaluation

For all UNDP projects funded by GEF, a final evaluation (FE) is required after completion of a project to *provide a comprehensive and systematic account of the*

performance of the completed project by evaluating its design, process of implementation and achievements vis-à-vis GEF project objectives and any agreed changes during project implementation. As such, the FE for this Project will serve to:

- promote accountability and transparency, and to assess and disclose levels of project accomplishments;
- synthesize lessons that may help improve the selection, design and implementation of future GEF activities;
- provide feedback on issues that are recurrent across the portfolio and need attention, and on improvements regarding previously identified issues; and,
- contribute to the GEF Evaluation Office databases for aggregation, analysis and reporting on effectiveness of GEF operations in achieving global environmental benefits and on the quality of monitoring and evaluation across the GEF system.

This Final Evaluation was prepared to:

⇒ be undertaken independent of project management to ensure independent quality assurance;
⇒ apply UNDP norms and standards for evaluations;

⇒ assess achievements of outputs and outcomes, likelihood of the sustainability of outcomes; and if the project met the minimum M&E requirements;

⇒ report basic data of the evaluation and the project as well as provide lessons from the Project on broader applicability.

An evaluation team was fielded to Beijing for the 26 April – 31 May 2010 period. The Terms of Reference (ToRs) for the Final Evaluation are contained in Appendix A.

1.3.2 Key Issues to be Addressed

Key issues addressed on this FE include:

- The appropriateness of the project concept and design in the context of the current events in China;
- Implementation of the Project in the context of relevance, efficiency and effectiveness of the activities; and
- Project impacts based on current outputs and outcomes and the likelihood of sustaining project results.

1.3.3 Evaluation Methodology and Structure of the Evaluation

The methodology adopted for this evaluation includes:

- Review of project documentation (i.e. project documents, APRs, meeting minutes of Steering and Advisory Committees) and pertinent background information;

- Interviews with key project personnel including the Project Manager, technical advisors (domestic and international), demonstration project proponents, investors and relevant UNDP staff;
- Interview with relevant stakeholders from Government; and
- Field visits to selected project sites and interviews with beneficiaries.

A full list of documents reviewed and people interviewed is given in Annex B. A detailed itinerary of the Mission is shown in Appendix C. The Evaluation Mission for the UNDP-GEF project was comprised of one International Expert and two National Experts.

This evaluation report is presented as follows:

- An overview of project achievements from the commencement of operations in June 2005;
- An assessment of project results based on project objectives and outcomes through relevance, effectiveness and efficiency criteria;
- Assessment of sustainability of Project outcomes;
- Assessment of the replication or catalytic effect of the Project;
- Assessment of monitoring and evaluation systems;
- Assessment of progress that affected Project outcomes and sustainability; and
- Lessons learned and recommendations.

This evaluation report is designed to meet GEF's "Guidelines for GEF Agencies in Conducting Terminal Evaluations, Evaluation Document No. 3" of 2008:

http://www.thegef.org/gef/sites/thegef.org/files/documents/Policies-TEguidelines7-31.pdf

The Evaluation also meets conditions set by the UNDP Guideline for Evaluators, June 2002:

http://www.undp.org/gef/documents/me/ME-HandBook.pdf

1.4 Project Implementation Arrangements

The 2005 Prodoc allocated UNDP-GEF funds for:

- technical support for the demonstration of EE policies, technologies, standards, labelling and investments targeted for selected industrial sectors and the general public as well as development and use of related EE monitoring tools;
- technical support for the building sector to demonstrate EE policies, building codes and practices;
- capacity building to EE practioners to conduct energy audits, identify and implement EE opportunities for industrial and building clients, promote compliance with the Energy Conservation Law, and assist in the raising of finances to implement EE investments.
- monitoring and evaluation support.

In 2002, the executing agency for EUEEP (PDF-B Phase) was the State Economic Trade Commission (SETC). In 2008, SETC was merged with the National Development

Reform Commission (NDRC) with the executing agency for EUEEP changed to the Department of Environment and Resources (DERC), which was then reorganized as the Department of Resource Conservation and Environmental Protection (DRCEP) of the NDRC.

DRCEP along with the Ministry of Finance (MoF), Ministry of Construction (MoC), Ministry of Science and Technology (MoST) and UNDP China comprise the National Project Coordinating Committee (NPCC). Under the nationally-executed (NEX) project modality, EUEEP execution is through the Department of Energy Conservation (DEC) Head who is the National Project Director (NPD) and assisted by the DEC Deputy Head as the National Project Manager (NPM), who together provide direction for the Project Management Office (PMO).

The UNDP-GEF funded PMO is under the direction of NDRC and with oversight from the NPCC. The PMO administers, manages and monitors most of the Project activities that are executed by sub-contractors. The total value of all EUEEP sub-contracts is US$ 10.8 million or around 63.5% of the total GEF funding. Subcontractors consist of international and national consultants, consulting firms, universities and NGOs who provide technical support to PMO to deliver EUEEP's intended outputs; in turn, NDRC provides the institutional support for policy coordination and establishing relationships with other government agencies and local government units.

At the project level, standard UNDP-GEF monitoring and evaluation procedures are followed including Annual Project Report/Project Implementation Review (APR/PIR), Quarterly Progress Reports (QPRs), periodic thematic reports and independent evaluations.

The present EUEEP implementation structure is seen in Fig. 2. Figure 3 provides the structure of the PMO.

Figure 2: EUEEP Implementation Structure (modified from 2003 Prodoc)

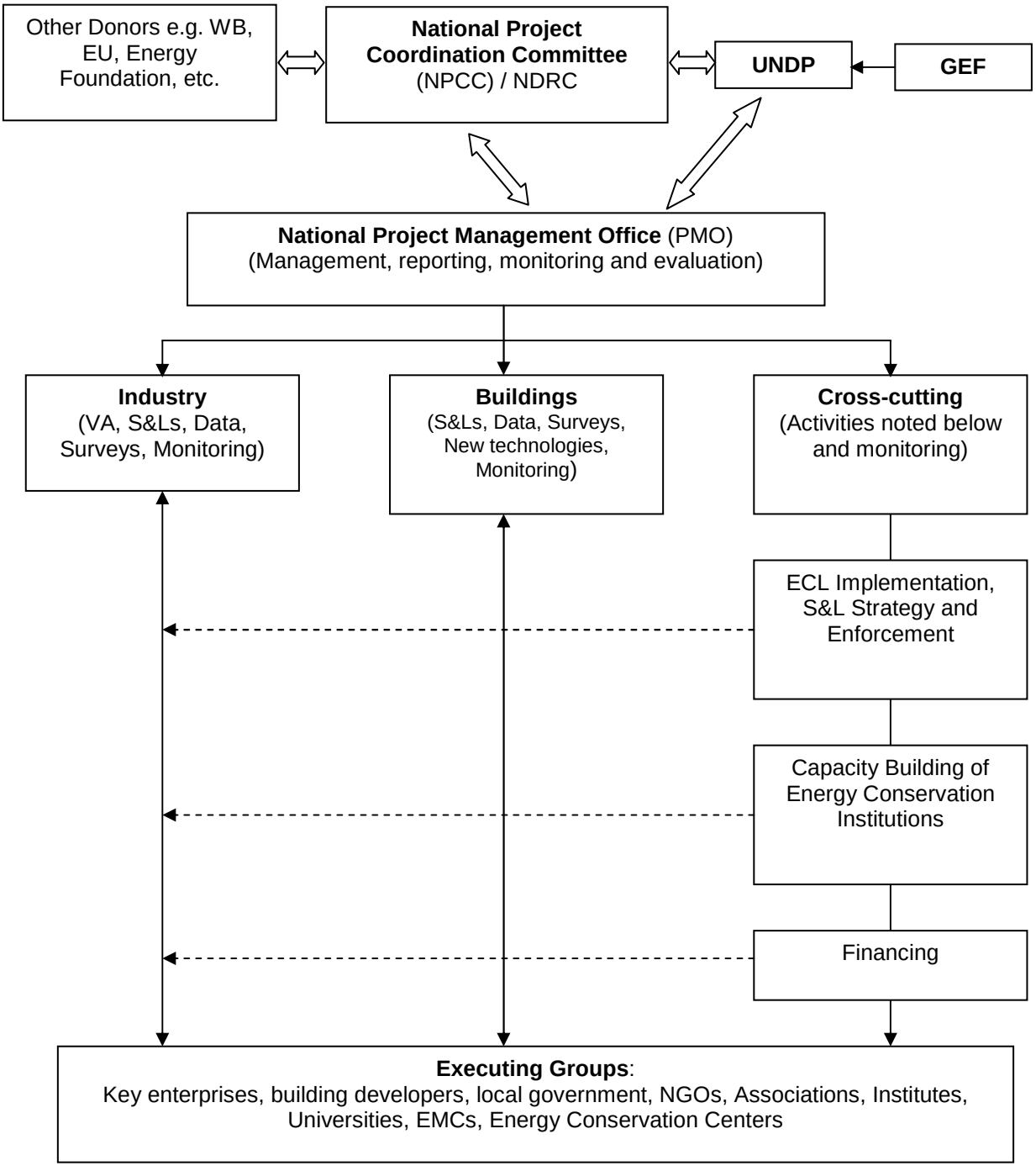
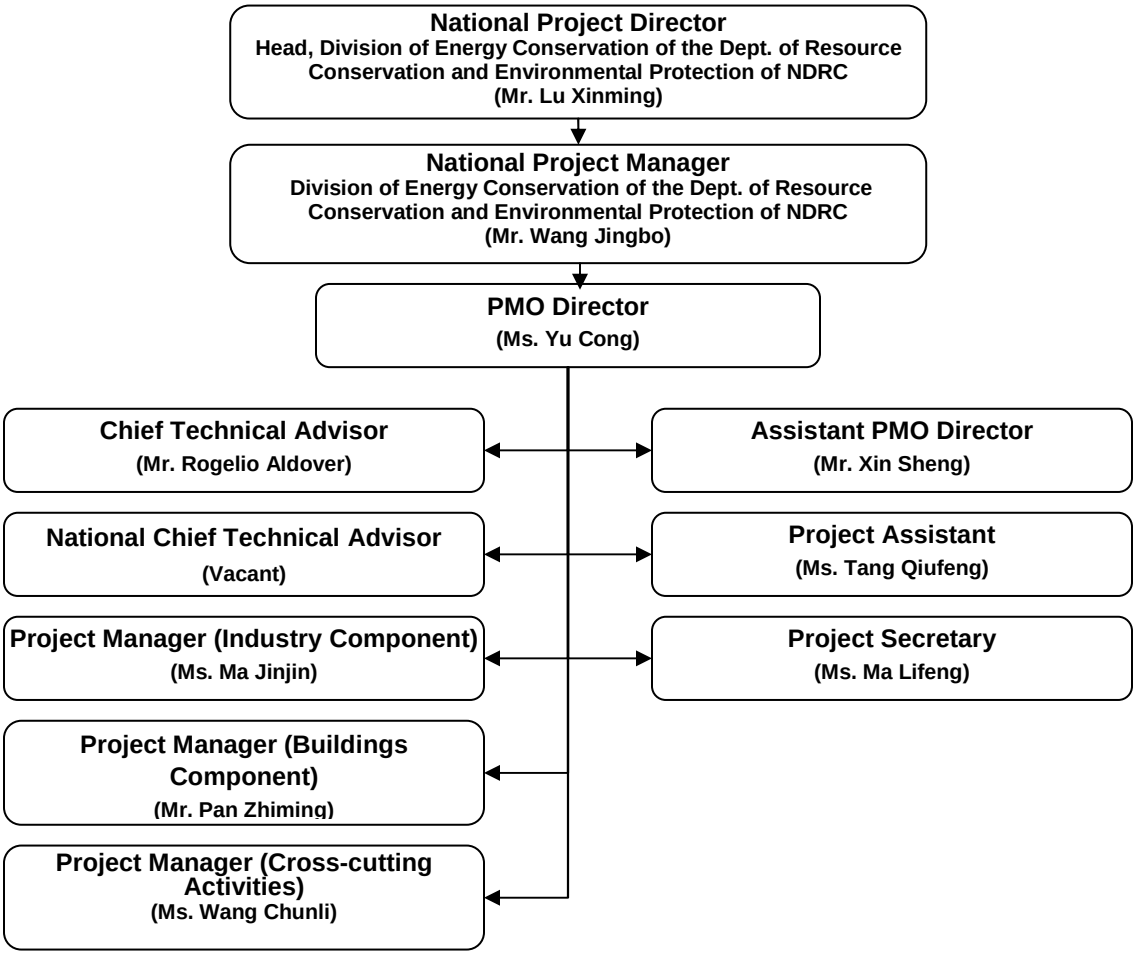


Figure 3: Project Management Organization Structure



The Execution Teams consisted of the most appropriate and capable organizations, domestic and international experts and others to successfully complete the activities. This included:

- Energy Conservation Centers
- China Energy Conservation Association
- Energy Research Institute, SDPC
- The Building Energy Conservation Center, Ministry of Construction
- China Energy Research Institute
- China Standard Research Center
- China Energy Conservation Product Certification Center
- China Iron and Steel Industry Association
- China Chemicals Energy Conservation Association
- China Building Material Industry Association
- Universities
- Enterprises
- Energy Management Companies
- NGOs
- Local governments
- Media

2. ASSESSMENT OF PROJECT RESULTS

Project results are assessed in this section against project objectives and outcomes.

2.1 Overview of Project Achievements and Results

The Project has achieved most of its objectives as set out in the Prodoc of 2005. Moreover, there is ample evidence that the Project has been instrumental in removing a significant number of barriers to EE investments in China. As a consequence, the Project appears to have achieved its modest targets for GHG emission reductions, catalyzed further GHG reductions through policies and financial incentives, and met a demand for technical assistance to project proponents.

Expected results for the Project (as stated in Section 1.3) or "intended Project outcomes" have been achieved including:

- The implementation of "energy conservation agreements" in the industrial sector;
- Establishment and implementation of EE designs codes for new and industrial facilities;
- Transformation of China's motor system markets;
- Adoption by industry of EE standards and labelling to promote the use of major energy saving equipment;
- Establishment of EE standards and labelling for commercial and residential equipment;
- Collection of data on building energy use for setting and assessing impact of standards;
- Development of policies and standards for building energy efficiency (BEE);
- Establishment of BEE standards with incentives to exceed the standards;
- Dissemination of BEE information;
- Promotion of innovative building technologies;
- Strengthened energy conservation centers (ECCs) for energy auditing and inspection of new building designs;
- Strengthened ECC capacity to conduct EE training and to disseminate BEE information;
- The Energy Conservation Law (ECL) being promulgated and implemented;
- Policies and options developed for financing EE initiatives.

2.2 Assessment of Project Results

Each outcome was evaluated against individual criterion of:

- *Relevance* – the extent to which the outcome is suited to local and national development priorities and organizational policies, including changes over time;
- *Effectiveness* – the extent to which an objective has been achieved or how likely it is to be achieved; and
- *Efficiency* – the extent to which results have been delivered with the least costly resources possible.

The Project outcomes were rated based on the following scale:

- *Highly Satisfactory (HS)*: The project has no shortcomings in the achievement of its objectives;
- *Satisfactory (S)*: The project has minor shortcomings in the achievement of its objectives;
- *Moderately Satisfactory (MS)*: The project has moderate shortcomings in the achievement of its objectives;
- *Moderately Unsatisfactory (MU):* The project has significant shortcomings in the achievement of its objectives;
- *Unsatisfactory (U)* The project has major shortcomings in the achievement of its objectives;
- *Highly Unsatisfactory (HU):* The project has severe shortcomings in the achievement of its objectives.

In addition, the Evaluation team has provided an assessment (wherever appropriate) on Project impacts, positive or negative, and possible long-term effects of the outcomes or outputs.

2.2.1 Goal: Reduction in Carbon Emissions from Major Energy-Consuming Sectors in China

Intended GHG Outcome:
⇒ CO_2 emissions are reduced by an accumulated total of 42.4 million tonnes at the EOP.
Actual GHG Outcome:
⇒ *The forecast CO_2 emissions reductions are 47.1 million tonnes up to June 30, 2010 or EOP.*

Rating: *relevance: HS*
effectiveness: HS
efficiency: S
overall rating: HS

The impact of this outcome provides an excellent basis for sustained decreases in GHG emissions and fossil fuel consumption in China. GHG emission reduction estimates for the Project were directly generated from demonstration projects. Estimates of indirect emission reductions from policy compliance, training programs and programs for

standards, codes and labelling were derived from survey reports on the performance of energy efficiency activities in various energy consuming sectors prepared by various subcontractors under EUEEP. Given the wide geographic scale of the Project and uniqueness of each energy efficiency investment, a sampling of the energy efficiency investments was reviewed. Due to the large scale of the indirect energy savings derived from Outcome A.1 (Energy Conservation Agreements), Outcome A.5 (standards and labelling program) and Outcome B.4 (dissemination of BEE information), statistical sampling was used by subcontractors to estimate indirect GHG reductions.

The GHG emission reduction information from the PMO was used to calculate Project GHG reductions on the basis of methodologies suggested by the "Manual for Calculating GHG Benefits of GEF Projects: Energy Efficiency and Renewable Energy Projects", April 16, 2008, GEF/C.33/Inf.18[16]. These calculations included important assumptions:

- the GHG emissions factor of 0.93 tCO_2/MWh for the Chinese electric grid[17];
- a 10-year influence period after the 2010 completion of project as recommended by GEF guidelines. Hence, only GHG emissions up to and including 2020 were credited to GEF;
- the GEF causality factor for indirect GHG emission reductions at 0.7 given the Project is under the strong influence of a state-planned economy and transitioning to a market-driven economy;
- growth of EE investments each year by 20% based on the growth of current work loads of ECCs and other EE professionals.

Integration of these calculations into a comprehensive M&E system is further discussed in Section 5 of this report. Table 1 summarizes these GHG reductions resulting from the Project.

Table 1: Summary of CO_2 Reductions Resulting from the Project

Total direct emission reduction, Mt CO_2 [18]	*31.64*
Total direct post-project emission reduction, Mt CO_2 [19]	*0*
Indirect emission reduction, Mt CO_2 [20]	*13.20*
TOTAL EMISSION REDUCTIONS DUE TO UNDP-GEF PROJECT, t CO_2	***44.84***

16 Available at: http://gefweb.org/uploadedFiles/Documents/Council_Documents__(PDF_DOC)/GEF_33/C.33.Inf.18%20Climate%20Manual.pdf

17 Available at: http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=3843

18 These GHG reductions are from demonstration projects operating to the end of the Project.

19 These are GHG reductions generated from investments supported by the revolving funds that continue operating after the end of the project. As there are no revolving funds on EUEEP, the GHG reductions are 0.

20 A top-down approach assumed with a high causality factor (0.7) assumed due to a formerly centrally planned economy of China that is transitioning to a market economy.

It should also be noted that the efficiency of the delivery of EUEEP GHG emission reductions took 5 years instead of the 3 years as envisaged by the 2005 EUEEP design. Reasons for this include the first year of implementation being devoted to mobilization, organization of the PMO and NPCC, harmonization of policies between UNDP/GEF and GoC regarding procurement procedures, national energy conservation policy and program formulation, reconstitution of work plans and annual targets due to the absence of a workable logical framework as the basis for project planning, and establishment of co-financing arrangements and working relationships with partners and the private enterprises. While these were necessary steps in the context of building project partnerships and trust, project designs need to incorporate the necessary preparatory time requirements for the project.

2.2.2 Objective: Removal of Barriers to Energy Efficiency in the Industry and Building Sectors

Intended Energy Savings Outcome: ⇒ Cumulative energy savings from EUEEP activities in the industrial sector is 7.9 million tce ⇒ Cumulative energy savings from EUEEP activities in the building sector is 6.8 million tce ⇒ Cumulative energy savings from EUEEP activities from cross-cutting activities is 5.3 million tce
Actual Energy Savings Outcome: ⇒ *Cumulative energy savings from EUEEP activities in the industrial sector is 8.6 million tce* ⇒ *Cumulative energy savings from EUEEP activities in the building sector is 6.9 million tce* ⇒ *Cumulative energy savings from EUEEP activities from cross-cutting activities is 6.3 million tce*

Rating: *relevance:* *HS*
effectiveness: *HS*
efficiency: *S*
overall rating: *HS*

This is an excellent outcome for this project though it was delivered in 5 years instead of the original design of 3 years. However, the use of a comprehensive M&E system to monitor these energy savings is recommended and further discussed in Section 5 of this report.

2.2.3 Objective A: To Remove Barriers to EE in the Industrial Sector

Intended Outcome A.1*:* ⇒ Energy Conservation Agreements (ECAs) are being implemented in three industries with: 1. 998 enterprises with ECAs that are signed and being implemented; 2. 10 enterprises where benchmarking methodology piloting has been implemented; 3. USD 35 million being invested as a result of ECA implementation; 4. 2.5 Mtce of energy being saved under EC&EE investment capital under the ECA program

Actual Outcome A.1:

⇒ *ECAs have been implemented in 3 industrial sectors: iron & steel, cement and petro-chemicals. This includes:*

1. *998 enterprises that have signed ECAs and are implementing EC measures;*
2. *10 enterprises where benchmarking methodology piloting has been implemented for the 3 industrial sectors;*
3. *USD 255 million has been invested in projects involving ECA implementation;*
4. *2.6 Mtce of energy being saved under EC&EE investment capital under the ECA program*

Rating: *relevance:* *HS*
effectiveness: *HS*
efficiency: *HS*
overall rating: *HS*

At the commencement of EUEEP in 2005, the Project was seeking to have voluntary agreements adopted by selected by major energy consuming industries. After 2007, voluntary agreements were replaced by the stronger Energy Conservation Agreements (ECAs) as required by the GoC under the "Top 1,000 Enterprise Energy Conservation Program". In return for adopting ECAs, the GoC would support enterprise implementation of EE measures with detailed EE training programs, provision of benchmarking software and technical assistance from energy conservation centers (ECCs).

Prior to EUEEP, the enterprises under the Top 1000 program had no data, relevant information, training material and credibility to implement EE measures. Moreover, many industrial associations such as the Chemical Energy Conservation Technology Association (supported by 240 members) whose mandate is industrial technical support, did not have had any exposure to technical information to assist their membership (i.e. benchmarking methodologies, EE technical knowledge, and real and credible energy data to measure the impact of their EE measures).

NDRC's Energy Research Institute (ERI) and the various industrial associations (e.g. China Chemical Energy Conservation Technology Association and the Central Iron & Steel Research Institute) indicated that the EUEEP was instrumental in introducing EE measures through benchmarking demonstrations, providing software and training materials on benchmarking and EE measures, training and facilitating financial assistance (i.e. to replace inefficient equipment such as boilers and air conditioners). Numerous training materials were developed by EUEEP specific to each industrial sector, and in some instances, a specific process (i.e. rolling specific sized steel structural members, production of specific types of cement, etc.). Workshops organized by the ERI with EUEEP support were conducted to outline ECA requirements and present technical information on the issues of implementing EE for their enterprises. The ERI also played a pivotal role in EE research, technology identification to the enterprises and public awareness on EE and EC.

Benchmarking activities were implemented in 10 enterprises to demonstrate energy savings with an excellent benefit cost ratio. The 10 EE benchmarking activities included a USD 8.6 million investment by 3 enterprises in the chemical industry (mainly caustic soda industries), a USD 43.7 million investment by 4 enterprises in the cement industry,

and a USD 210 million investment by 3 enterprises in the iron & steel industry. All benchmarking activities started in 2007. The impact of the benchmarking activities has been increased confidence of the respective industry sectors to implement EE measures and share EE experiences to improve their energy performances. Subcontract A17 provided an evaluation of the Top 1,000 Program and made recommendations to sustain the program by a form of results-based management or "awarding based on amount of energy conserved".

Box 1 Top 1,000 Enterprise Energy Conservation Program, Example of Government Importance on Energy Conservation

Between 1980 and 2000, China's energy efficiency policies resulted in a decoupling of the traditionally linked relationship between energy use and gross domestic product (GDP) growth, realizing a four-fold increase in GDP with only a doubling of energy use. During China's transition to a market-based economy in the 1990s, many of the country's energy efficiency programs were dismantled and between 2002 and 2005 China's energy use increased significantly, growing faster than GDP. Continuation of this trend in increased energy consumption relative to GDP growth (given China's stated goal of again quadrupling GDP between 2000 and 2020) would lead to significant demand for energy, most of which is coal-based; the resulting local, national, and global environmental impacts could be substantial. Realizing the significance of this situation, the Chinese government in 2005 through the NDRC announced an ambitious goal of reducing energy consumption per unit of GDP by 20% between 2005 and 2010 in their 11th Five-Year Plan. One of the key initiatives for realizing this goal is the "Top-1000 Energy-Consuming Enterprises Program" that targets energy consumption of the 1,000 enterprises that account for 33% of national and 47% of industrial energy usage in 2004. Under the Top-1000 program, 2010 energy consumption targets were announced for each enterprise. The implementation plan provided guidance to the enterprises, calling on them to significantly improve their energy efficiency with the goal that energy intensity (energy used per unit of production) reach the level of advanced domestic production and that some enterprises attain either international or industry advanced levels of energy intensity.

Activities undertaken as part of this program include benchmarking, energy audits, development of energy saving action plans, information and training workshops, and annual reporting of energy consumption. The industries included in the Top-1000 Energy-Consuming Enterprise program are large-scale, financially independent enterprises in nine major energy consuming industries: iron and steel, petroleum and petrochemicals, chemicals, electric power generation, non-ferrous metals, coal mining, construction materials, textiles, and pulp and paper. In 2004, energy consumption of the iron and steel and petrochemical industries was the highest amongst these sectors (1.07 Mtce in the petroleum and petrochemical sector per enterprise and 1.00 Mtce per iron & steel enterprise). Targets for energy savings within the Top-1000 program was 100 Mtce from the expected 2010 energy consumption of these 1000 enterprises.

These programs are "essentially a contract between the government and industry, or negotiated targets with commitments and time schedules on the part of all participating parties" (IEA, 1997 "Voluntary Actions for Energy-Related CO_2 Abatement"). Such agreement programs typically have a long-term outlook, covering a period of five to ten years, so that strategic energy-efficiency investments can be planned and implemented. A key element is that they focus the attention of all actors on energy efficiency or emission reduction goals.

Intended Outcome A.2*:*

⇒ Energy efficiency design codes for new and existing facilities and equipment are established and implemented with:

1. One energy efficiency design code for an industry established and enforced;
2. 145 cement enterprises employing these design codes on their EC&EE projects;
3. 145 registered EC&EE plan designs based on EE design codes;
4. 2 EE catalogues on new EE codes prepared and published;
5. 80% of all enterprises satisfied with the new EE design codes.

Actual Outcome A.2:

⇒ *Energy efficiency design codes for new and existing facilities and equipment were established and implemented resulting in:*

1. *One energy efficiency design code for the cement industry established and enforced;*
2. *145 cement enterprises employing these design codes on their EC&EE projects;*
3. *145 registered EC&EE plan designs based on EE design codes;*
4. *2 EE catalogues on new EE codes prepared and published;*
5. *100% of all enterprises satisfied with the new EE design codes.*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

The "Cement Plant Energy Efficiency Design Code" was developed and issued jointly by the Ministry of Construction and the General Administration of Quality Supervision, Inspection and Quarantine in October 2007 and widely disseminated to design institutes and cement enterprises. The code has been applied to over 400 new and renovated cement production lines. Prior to the introduction of these cement codes in 2007, the energy intensity for the production of cement was 0.115 tce/tonne cement produced. After the design codes were introduced, cement associations have been reporting energy intensity of cement production being reduced to 0.097 tce/t or over 15%. The cumulative energy savings for the 4 cement enterprises (that are directly related to EUEEP contributions to the cement code) is 1.1 Mtce. Based on industry-wide production capacity of 1,080 million tonnes in 2007, the energy savings of the 4 enterprises affected 3% of the industry's production capacity.

Intended Outcome A.3.1*:*

⇒ China's motor systems market is transformed through:

1. one EE design criteria for motor systems established and used by design institutes;
2. one new and updated EE labels and standard for electric motors approved for implementation;
3. A 3% improvement in the market share of locally developed EE motors;
4. 10 motor system service organizations with trained staff to provide assistance to industry users;
5. 80% of all EUEEP-trained personnel providing technical services to electric motor users in industries;
6. A minimum of 8 EE motor system demonstration sites setup;
7. Cumulative energy savings from EE motor system demonstrations of 4 Mtce

Actual Outcome A.3.1:

⇒ *China's motor systems market has been transformed through:*

1. *One EE design criteria for motor systems established and used by design institutes;*
2. *One new and updated EE labels and standard for electric motors approved for implementation;*
3. *A 10% improvement in the market share of locally developed EE motors;*
4. *12 motor system service organizations with trained staff to provide assistance to industry users;*
5. *More than 90% of all EUEEP-trained personnel providing technical services to electric motor users in industries;*
6. *A minimum of 16 EE motor system demonstration sites setup.*
7. *Cumulative energy savings from EE motor system demonstrations of 1.6 Mtce*

Rating: *relevance:* *HS*
effectiveness: *S*
efficiency: *S*
overall rating: *S*

Demonstration of efficient motor systems was implemented under subcontract A06 with completion of the contract on June 30, 2010. Efficient motor systems were demonstrated at 16 sites with local assistance from ECCs. Guidelines on optimization design for motor systems for the cement, petrochemical, iron & steel and power sectors were developed under this subcontract. This included the use of EE labelling and standards for EE motor systems for water pumping and other fluid media. The PMO estimates that for every USD 1,000 invested in EE motor systems, an energy savings return of 12.7 tce is expected leading to a cost benefit ratio of 1.3.

Lease financing guidelines, a manual for motor system energy conservation and case studies of the actual motor system demonstrations were prepared under Subcontract A07 and disseminated under Subcontract A15 in 6 training workshops (with international and national trainers) to 65 organizations with more than 1,000 participants, far exceeding expectations. This includes several fledgling ESCOs, which in 2008 were recognized by the GoC as needing support for further capacity building and development to implement EE measures in China.

Original estimates of energy savings from the motor systems demonstrations (4.0 Mtce) was not achieved due to an overestimated energy savings target (with the end of Project energy savings being only 1.6 Mtce).

Intended Outcome A.3.2*:*

⇒ Industry adopts energy efficiency standards and labelling to promote use of major energy saving equipment resulting in:

1. a minimum of 4 EE standards for industrial equipment being developed and established;
2. government setting 4 guidelines on standards for EE industrial equipment;
3. government setting 4 guidelines for certification and labelling for EE industrial equipment nationally;
4. 50% of all equipment complies with established EE labels and standards (at par with imported equipment).

Actual Outcome A.3.2:

⇒ *Industry adopts EE standards and labelling that has resulted in:*

1. *4 EE standards for industrial equipment being developed and established;*
2. *government setting 4 guidelines on standards for EE industrial equipment;*
3. *government setting 5 guidelines for certification and labelling for EE industrial equipment nationally;*
4. *75% of all equipment complying with established EE labels and standards at par with imported equipment (referenced from reports of Subcontract A08 and A09).*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

Prior to EUEEP, there were no standards or data on which to develop EE labelling for industrial equipment. Moreover, there was little or no data on equipment sales and industry opinions towards certain products. Through Subcontracts A08 and A09, the China National Institute of Standardization and the China Standard Certification Center were tasked to deliver standards and labelling for key energy consuming industrial equipment including power transformers, industrial boilers, air compressors fans, industrial sewing machines and water pumps.

In addition, Subcontract A09 strengthened EE certification policies and implementation rules for selected industrial products. International and domestic expertises were used to provide technical support and market analysis assistance to formulate these standards. The impact of these activities is the increased market share of labelled industrial equipment of 10%[21]. This serves as a strong basis on which to continue EC awareness amongst industrial stakeholders, growth of market share of EE labelled products, and EE labelling for other products.

Intended Outcome A.3.3*:*

⇒ EE standards and labelling has been established for equipment in the residential and commercial sectors resulting in:

1. a minimum of 5 EE appliances that have been developed and implemented;
2. market penetration of new EE appliances of 10% for commercial refrigerators, 50% for electric water heaters, 30% for microwave ovens and 50% for duplicating machines;
3. the average annual energy saved from the use of EE appliances being 60 GWh;
4. 50% of all equipment that comply with established EE labels and standards (at par with imported equipment).

Actual Outcome A.3.3:

⇒ *EE standards and labelling has been established for equipment in the residential and service sector resulting in:*

1. *8 appliances that have developed and implemented EE standards for the residential and services sectors;*
2. *18% market penetration for commercial refrigerators, 30% for electric water*

[21] Estimate from the China National Institute of Standardization in 2009 under Subcontract A09.

heaters, 32% for microwave ovens, and 97% for copy machines (data from Subcontract A11);

3. *The average annual energy saved from the use of these EE appliances estimated to be 33,700 GWh (data from Subcontract A11).*

Rating: *relevance:* *HS*
effectiveness: *HS*
efficiency: *HS*
overall rating: *HS*

Activities towards this outcome are similar to Outcome A.3.2 with the exception that this outcome deals only with equipment in the residential and commercial sector. Under subcontracts A10 and A11, the China National Institute of Standardization and the China Standard Certification Center were again tasked to develop standards and labelling programs for equipment in the residential and commercial sectors. The contribution of this activity to EE was significant in that standards for determining energy ratings for selected residential and commercial equipment were developed and disseminated. This included air conditioners, copy machines, computers, stoves, microwave ovens, refrigerators, gas heaters, and lighting fixtures. International and domestic expertise was used to provide technical support and market analysis assistance to formulate these standards. Estimates of market penetration and energy savings from labelling activities of residential and commercial equipment were made through statistical analysis of equipment sales from supermarkets, electronic stores and other retail outlets. Actual energy efficiency tests were conducted for refrigerators, air conditioners and washing machines (Subcontract A18).

Impacts of the standards and labelling program on energy conservation in China were deemed significant and recommendations were made study consumer incentives that would accelerate market penetration of labelled EE products (Subcontracts A12). Subsequently, the China Energy Saving Catalogue and a Catalogue of Energy Conservation Techniques were developed to provide consumer guidelines to government sanctioned EE equipment and techniques to be used in all sectors, industrial, residential and commercial (Subcontracts A13 and A22), and studies were undertaken to formulate financial subsidy programs for high EE conservation products (Subcontract A19), high efficiency motors (Subcontract A20), and air conditioners (Subcontract A21).

Intended Outcome A.4

⇒ Energy management information system and reporting program (EMISRP) has been developed for key energy intensive industries with:

1. EMISRP developed by Year 4;
2. a minimum of 3,500 energy intensive enterprises reporting under EMISRP;
3. 80% of reporting establishments finding that EMIRSP is useful in their EC&EE initiatives and projects.

Actual Outcome A.4

⇒ *EE standards and labelling has been established for equipment in the residential and service sector resulting in:*

1. *An energy management information system was developed but not with EUEEP*

resources. NPCC made a decision in 2008 not to duplicate the information system work being done by ERI and NDRC;
2. *998 energy intensive enterprises reporting under the ERI/NDRC system);*
3. 100% of reporting establishments found ERI/NDRC information system to be useful in their EC&EE initiatives).

Rating: *relevance: HS*
effectiveness: MS
efficiency: S
overall rating: S

While EUEEP resources were not used to develop the EMISRP, it has been developed using an ERI/NDRC system of reporting. While it has been reported that 998 enterprises are using the system to report energy management to a central database, the Evaluation Team was unable to verify the contents of the database as there are controls and limits in place on the disclosure and sharing of energy monitoring data. NDRC tasks the ECCs with monitoring energy savings for a given sector, and to calculate the energy savings. The results of the calculations are then reported back to the ERI for entry into the EMISRP for NDRC use.

2.2.4 Objective B: To Promote Building Energy Efficiency

Intended Outcome B.1:
⇒ Data on building energy use has been collected and used as a basis for setting and assessing the impact of standards. This includes by the EOP:
1. 4 pilot cities with systems to collect data on building energy consumption;
2. 4 completed surveys in the pilot cities;
3. 12 annual reports produced and published based on data collected and its analysis;
4. 19 cities that replicate or modify the data gathering and analysis of trends;
5. 0.6 million Mtce energy savings in the pilot cities based on the data collection analysis system.

Actual Outcome B.1:
⇒ *Data collection and analysis systems have been developed for a "statistical indicator system" for energy consumption in buildings resulting in:*
1. *4 pilot cities with systems to collect data on building energy consumption;*
2. *4 completed surveys in the pilot cities (Beijing, Shanghai, Shenzhen and Chongqing);*
3. *12 annual reports produced and published based on data collected and its analysis;*
4. *23 cities that replicate or modify the data gathering and analysis of trends;*
5. *0.6 million Mtce energy savings in the pilot cities based on the data collection and analysis system.*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

For China to realize its 11th 5-Year Plan objectives for reducing building energy consumption by 20% by the end of 2010, more specific norms for heating, air conditioning, appliances, lighting and other energy consumption in buildings needed to be developed and established. This required the strengthening of baseline data collection, however, for current building energy consumption.

This activity was designed to formulate a "statistical indicator system" for energy consumption in residential buildings in four cities, Beijing, Shanghai, Shenzhen and Chongqing, each with differing climatic conditions (Subcontract B01). The system is important in the establishment of a baseline for building energy consumption that can be used to measure the impact of any EE measures undertaken. The statistical data collection system was setup and established at local governmental levels; this approach has been advantageous in that regular data collection for buildings has been institutionalized and does provide the basis for larger scale statistical data collection efforts. Baseline building energy consumptive information was collected during 2007 and 2008 (Subcontracts B01 and B02) for a number of building types including residential and public buildings; energy consumptive data included the use of electricity, gas, cold and hot water heating and various appliances.

Intended Outcome B.2:

⇒ Policies and standards for building energy efficiency (BEE) have been developed resulting in:

1. 6 policies and instruments being developed for building energy efficiency
2. 1 standard developed and approved for new residential building in a hot summer warm winter region
3. 1 standard developed and approved for retrofitting existing commercial buildings
4. 2 heating standards updated for residential buildings in a cold winter region
5. 10 buildings participating in building energy rating system
6. 80% of all new buildings complying to new building energy standards by EOP
7. 1.03 Mtce of energy saved from buildings that comply with new energy standards.

Actual Outcome B.2:

⇒ *Policies and standards for BEE have been developed resulting in:*

1. *6 policies and instruments being developed for BEE*
2. *1 standard developed and approved for new residential building in a hot summer/ warm winter region*
3. *1 standard developed and approved for retrofitting existing commercial buildings*
4. *2 heating standards updated for residential buildings in a cold winter region*
5. *12 buildings participating in building energy rating system*
6. *90% of all new buildings complying to new building energy standards by EOP*
7. *1.0 Mtce of energy saved from mainly from new buildings that comply to new energy standards*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

Buildings in China are divided into 2 categories: industrial and civil buildings. The Ministry of Construction (MoC) provides oversight to all civil building construction (mainly

residential buildings) with the exception of buildings classified as public buildings or non-residential (i.e. government office buildings or hotels/dormitories for public use). Oversight to the construction of non-residential buildings is provided by the Ministry of Housing Urban and Rural Development (MoHURD).

Prior to EUEEP, China's residential building codes for new buildings were from 1995 and were deemed to be too general for specifying energy consumption standards; more specifically, they did not reflect the requirements for energy consumption in the three climatic zones of China, and had a number of ambiguities. This included existing building heating standards that were more than 10 years old. Moreover, there were no standards for retrofitting existing buildings to make them more energy efficient. In comparison, the 2005 codes for energy efficiency in public buildings covered the 3 climatic zones of China with MoHURD providing regulatory control over the construction of new public buildings.

Building codes for energy efficiency retrofits for public buildings, standards for EE design for residential buildings in severe and cold zones, and standards for EE inspections of heating in residential buildings were developed (Subcontracts B02 and B03). Market-based incentive policies were studied and formulated to improve adoption and implementation of these codes (Subcontract B05). MoHURD observed 80% compliance to new codes; 53% during the design phase in 2006 increasing to 99% in the design phase in 2009, and 83% in the construction phase during 2009 (MoHURD aims for 90% compliance in the construction phase by 2010).

Intended Outcome B.3:

⇒ Standards for BEE have been implemented with incentives for buildings to exceed the standards resulting in:

1. 20 kWh savings per m^2 of the demonstration building program
2. 4 building performance standards, policy guidelines and other instruments having been implemented in the four pilot cities
3. 8 courses delivered for senior government officials and professional designers in building code implementation and related regulations and systems
4. 85% of the trainees rating the courses as satisfactory and useful
5. 75% of the trainees being engaged in BEE code regulations (e.g. building construction permitting) and code applications (e.g. building design and construction)
6. 4 guidelines for planning, design and construction of low energy buildings
7. 30% of building practioners apply the guidelines
8. 50% of these practioners find the guidelines useful in their projects for building EE
9. 1 computer-aided BEE management system being established and operational.

Actual Outcome B.3:

⇒ *BEE standards have been implemented with incentives to exceed the standards resulting in:*

1. *40 kWh savings per m^2 of the demonstration building program*
2. *8 building performance standards, policy guidelines and other instruments having been implemented in the four pilot cities*
3. *13 courses delivered for senior government officials and professional designers in building code implementation and related regulations and systems*

4. *90% of the trainees rating the courses as satisfactory and useful*
5. *75% of the trainees being engaged in BEE code regulations (e.g. building construction permitting) and code applications (e.g. building design and construction)*
6. *4 guidelines for planning, design and construction of low energy buildings*
7. *50% of building practioners apply the guidelines*
8. *90% of these practioners find the guidelines useful in their projects for building EE*
9. *1 computer-aided BEE management system being established and operational*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

To implement the new building EE standards, several workshops were held in Shanghai, Chongqing and Shenzhen to build the capacity of designers, consultants, contractors and government inspectors on municipal EE regulations and codes for buildings, and technical specifications for building envelopes in these cities (Subcontracts B07, B08 and B09); there were more than 12,000 participants in these training workshops. Training workshops for BEE standards for other cities in Southern China and BEE codes for municipal officials were also delivered but with marginal results (Subcontracts B10 and B13).

An evaluation of efforts to demonstrate new BEE standards for Shanghai (that included BEE testing and labelling for residential buildings) found this to be an excellent initiative that could be used for instructive purposes in other districts (Subcontract B11). Pilot studies for low energy buildings in Beijing, Shanghai, Shenzhen and Chongqing were also developed for dissemination to building practitioners (Subcontracts B14, B15, B16 and B18). The development and use of software to measure the impact of Shanghai BEE demonstration projects with a BEE labelling system was found to be useful (Subcontract B17). Studies were also prepared to improve the understanding and promote the concepts of solar energy in buildings according to location and climatic zones; these studies have proven useful in accelerating the development of appropriate solar energy codes for buildings throughout China (Subcontract B20). Energy audits and the impacts of BEE in the 4 pilot cities were compared to practices in other cities internationally (Subcontracts B21, B22, B23 and B24) to improve the existing systems of BEE audits and data collection. In Chongqing, a computer-based management system was piloted to demonstrate its use in managing building construction and monitoring building energy consumption (Subcontract B22). Low energy building guidelines included technical regulations of village residential solar heating application (DB11/635-2009), a technical manual on solar heating applications, and new rural housing designs that were disseminated and could be easily adopted in the future construction of low energy consumption rural buildings.

Intended Outcome B.4:

⇒ Building energy efficiency information has been disseminated resulting in:

1. 10% of government and commercial buildings in pilot cities that are investing in and implementing EE measures
2. 2 BEE video presentations that have been developed and disseminated

3. 3 BEE brochures having been developed and disseminated
4. 700 building owners, architectural research institutes and real estate agents being influenced by BEE advertisement.

Actual Outcome B.4:

⇒ *BEE information has been disseminated resulting in:*

1. *15% of government and commercial buildings in pilot cities that are investing in and implementing EE measures*
2. *3 BEE video presentations that have been developed and disseminated*
3. *4 BEE brochures having been developed and disseminated*
4. *1,855 building owners, architectural research institutes and real estate agents being influenced by BEE advertisement*

Rating: *relevance:* *HS*
effectiveness: *S*
efficiency: *S*
overall rating: *HS*

Awareness raising activities were conducted aimed at the general public as well as government inspectors, architects and real estate developers (Subcontracts B26, B27 and B28). In support of these activities and workshops, reference material and information reports were prepared and widely disseminated including:

- information reports for the various BEE pilot project cities in China (Subcontract B24);
- reference material on financing and investment in BEE and a collection of BEE laws and regulations (Subcontract B29);
- reference literature for BEE management, energy conservation building materials (for different climatic zones) and energy efficiency and emission reduction technologies (Subcontracts B30, B33 and B34).

The reference literature combined with the awareness raising activities was instrumental in raising interest in BEE investments amongst government officials and real estate developers.

Intended Outcome B.5:

⇒ Innovative building technologies have been promoted resulting in:

1. Surveys indicating that 1% of respondents are using or planning to use EE building materials in their buildings or in their building designs
2. 1 building employing and investing on locally developed innovative building technologies
3. 3% of building practitioners that are interested in using or are committed to using the innovative product

Actual Outcome B.5:

⇒ *Innovative building technologies have been promoted resulting in:*

1. *Surveys indicating that 1% of respondents are using or planning to use EE building materials in their buildings or in their building designs*
2. *1 building employing and investing on locally developed innovative building technologies*

3. *5% of building practitioners that are interested in using or are committed to using the innovative product*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

As a follow-up the BEE information dissemination activities (under Subcontract B30), surveys were conducted indicating that 1% of the participants were interested in adopting EE building materials in new designs (Subcontract B33). An investment to demonstrate BEE concepts (that were prepared under subcontracts B09 and B16) was made in 2008 at the building housing the Institute of Building Research (IBR) in Shenzhen. The 7-storey building demonstrates a number of BEE concepts including water spray for air conditioning, solar PV panels, and strategic placement of building layout to maximize solar exposure and natural ventilation. This BEE demonstration is impressive and serves as an excellent example on which to expand awareness of BEE concepts.

2.2.5 Objective 3: To Remove Barriers to EE through Cross-Cutting Activities

Intended Outcome C.1.1:
⇒ Energy Conservation Centers (ECCs) strengthened for energy auditing and inspections of new building designs through:
1. 8 ECCs receiving technical assistance to build their capacity
2. 80 projects annually implemented by strengthened ECCs starting in Year 2
3. 140 high quality energy audits and new building design inspection conducted by ECCs
4. 110 companies that annually applied recommendations from energy audits and realized savings

Actual Outcome C.1.1:
⇒ *ECC capacity has been strengthened for energy auditing and inspection of new building designs through:*
1. *10 ECCs receiving technical assistance to build their capacity*
2. *An average of 90 projects have been annually implemented by the strengthened ECCs starting in 2007 (Year 2)*
3. *ECCs completing 393 high quality energy audits and new building design inspection (from the 998 enterprises)*
4. *359 companies that annually apply recommendations from energy audits and realized savings*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

Energy Conservation Centers (ECCs) have a special role on EUEEP serving as:

- members of EUEEP project execution teams most notably with activities associated with building capacity on standards enforcement, information gathering and information dissemination;
- the lead on crosscutting activities on EUEEP; and
- potentially valuable resources for performing enforcement and information collection and dissemination roles when their capacity has been built by the Project.

Similar to industrial and building stakeholders, ECC did not have data, relevant information, or training material to assist clients with EE initiatives prior to EUEEP. EUEEP strengthened ECC capacity in a number of different jurisdictions throughout China including Guangdong, Shanghai, Shandong, Sichuan, Beijing, Tianjin, Jiangsu, Hebei and Fujian (subcontracts C7-C10 and C16-23). EE training materials developed included:

- motor systems (Subcontract C01);
- industrial boilers (Subcontract C02);
- central air conditioners for buildings (Subcontract C03);
- industrial furnaces (Subcontract C04);
- building insulation materials (Subcontract C05);
- management and financing of EE projects (Subcontract C06);
- summaries of national energy conservation policies, laws and codes as well as documentation on domestic and international EE experiences, EC products and techniques and the national EE database. These were prepared and distributed to ECCs and various industrial and building enterprises by the National Energy Center (Subcontract C07)

Intended Outcome C.1.2:

⇒ ECC capacity to conduct EE training has been strengthened resulting in:

1. 48 energy efficiency training courses designed and conducted by ECCs annually
2. 40 trained ECC personnel that are delivering EE training
3. 1,440 industrial and commercial enterprise clients of the ECCs employing and implementing EE practices and projects

Actual Outcome C.1.2:

⇒ *ECC capacity to conduct EE training has been strengthened by:*

1. *48 EE courses designed with 158 courses delivered to 8 different in 2007 and 2008*
2. *157 trained ECC personnel are delivering EE training*
3. *1,692 industrial and commercial enterprise clients of the ECCs employing and implementing EE practices and projects*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

ECC capacity to conduct EE training was strengthened in 8 locations (Subcontracts C16 to C23). Progress at the beginning of these subcontracts was slow due to the lack of ECC capacity; however, towards to back end of these subcontracts, progress became satisfactory due to the increased knowledge of ECCs on energy efficiency issues and regulations. The training was strengthened by the completion of appropriate training materials that included periodic evaluations on the implementation and conservation measures of the ECL (Subcontracts C11, C12 and C13), financing energy conservation projects (Subcontract C15), and promotional activities of the ECL by ECCs (Subcontract C24).

Intended Outcome C.1.3:

⇒ Capacity to disseminate BEE information has been strengthened resulting in:

1. 19,650 survey respondents that are using or are planning to use information disseminated to them by, or received by them from, the EUEEP;
2. 2 websites on EE information established;
3. 6,000 EE information packages/materials disseminated annually;
4. 80% of users of information that are satisfied or find service provided useful

Actual Outcome C.1.3:

⇒ *Capacity to disseminate BEE information has been strengthened as indicated by:*

1. *322,000 hits on websites. The assumption is that these persons will be using the information on the EUEEP website*
2. *2 websites supported by EUEEP*
3. *More than 16,000 EE packages delivered by ECCs annually*
4. *Surveys conducted by the ECCs indicate that more than 90% of users find the information useful.*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

The surveys conducted by ECCs on the usefulness of BEE information reveals a high degree of interest by real estate developers, architects and city planners. It serves as an important indicator of the effectiveness of the ECCs to disseminate BEE information, and a foundation on which to scale-up BEE information dissemination.

Intended Outcome C.2:

⇒ The Energy Conservation Law (ECL) is being implemented as a result of:

1. the ECL being promulgated by 2008
2. 350 local government buildings and 200 state-owned factories applying EC&EE annually in accordance to the ECL
3. 500 private sector buildings and 500 private industries applying EC&EE each year in accordance with the ECL

Actual Outcome C.2:

⇒ *The Energy Conservation Law (ECL) is being implemented as a result of:*

1. *the ECL being promulgated on April 1, 2008*
2. *460 local government buildings and 500 state owned buildings applying EC&EE*

annually in accordance with the ECL
3. *750 private sector buildings and 750 private industries applying EC&EE each year in accordance with the ECL*

Rating: *relevance: HS*
effectiveness: HS
efficiency: HS
overall rating: HS

The project provided valuable assistance in drafting and strengthening the 2006 version of the ECL, most notably through the 2007 evaluation on the impact of ECL implementation and suggestions on revisions to the ECL that would meet the energy conservation targets of the 11th FYP (Subcontracts C11 and C12). In response to a GoC request for assistance after the sharp rise of oil prices in 2008, the Project also assessed the impacts of these prices on China's efforts to curb oil consumption, provided recommendations on how China can meet its long term energy conservation targets beyond the 11th FYP, and provided a framework to analyse EC measures of most energy consuming sectors (Subcontracts C13 and C14).

Intended Outcome C.3:
⇒ Policies and options developed for financing energy efficiency resulting in:
1. the study proposing of 6 EE financing options by Year 1;
2. completion of 4 proposals on available financing models in China by Year 2;
3. 6 financing schemes having been designed and implemented on a demonstration basis in 2 regions by Year 3;
4. One EC&EE project being assisted through the demonstration financing schemes;
5. The investment of USD 260,000 through the demonstration financing scheme (inclusive of reflows)
6. 1,100 tce of energy savings from EC&EE projects that were financed through these schemes
7. The allocation of funds for new financing schemes totalling USD 137,000
8. One new financing option for the increased availability of EE investment financing in a local area;
9. 10 financing institutions are providing financing assistance for EC&EE projects;
10. Cumulative energy savings of 5.3 million Mtce.

Actual Outcome C.3:
Policies and options for financing EE have been developed resulted in:
1. *ERI study provided 4 financing options available in China in 2007 (Year 3)*
2. *Completion of 4 proposals on available financing models in China by 2007 (Year 2)*
3. *6 financing schemes were designed and implemented on a demonstration basis in Shandong and Zhejiang Province in 2008 (Year 3)*
4. *One EC&EE project being assisted through the demonstration financing schemes in Zhejiang province*
5. *The investment of USD 257,430 through the demonstration financing scheme (inclusive of reflows)*
6. *3,200 tce of energy savings from EC&EE projects that were financed through these schemes. This is based on EE lighting scheme for households 40 to 12 w IL to CFL*

replacement. There were 300,000 CFLs disseminated, 3 times more than planned and hence the higher ES

7. *The allocation of funds for new financing schemes totalling USD 772,000*
8. *One new financing option available in Zhejian demonstration area*
9. *10 financing institutions are providing financing assistance for EC&EE projects*
10. *Cumulative energy savings of 6.33 million Mtce measured by 11 subcontractors and 9 ECCs (with trained auditors) at EE sites in buildings and industries (e.g. iron & steel, cement, non-ferrous) with EE measures focused on variable speed drives, EE lighting, and boilers.*

Rating: *relevance: HS*
effectiveness: HS
efficiency: S
overall rating: HS

The Project has provided good documentation and dissemination activities to prepare enterprises and other investors to finance EE measures. After evaluating the baseline scenarios of financing EE measures from the 10th FYP, policy recommendations were made for improving the effectiveness of EE financing in the 11th FYP (Subcontract C15). Fiscal and taxation incentives were formulated and shared with stakeholders to increase EE&EC investments ranging in the industrial and building sectors (Subcontract C25). The findings from the subcontract were very useful to the GoC.

2.2.6 Overall Evaluation of Project

The overall rating of the project results is S. This is based on the Project achieving most of its intended outcomes including reduction of GHG emissions from selected industrial sectors and the building sector, removal of knowledge, regulatory and financial barriers to EE in the industrial and building sectors, and the strengthening of local capacity to train and support the promotion and implementation of EE&EC projects in China.

3. SUSTAINABILITY OF PROJECT OUTCOMES

In assessing Project sustainability, we asked "how likely will the Project outcomes be sustained beyond Project termination?" Sustainability of these objectives was evaluated in the dimensions of financial resources, socio-political risks, institutional framework and governance, and environmental factors, using a simple ranking scheme:

- *Likely (L):* very likely to continue and resources in place;
- *Moderately Likely (ML):* model is viable, but funding or resources may not be in place;
- *Moderately Unlikely (MU):* model is not viable or needs changing; and/or resources not in place; and
- *Unlikely (U):* model is not viable and resources are not in place.

The evaluation for sustainability is shown on Table 2. The Table provides a rating of the project design and viability going forward, including availability of budget and resources for continuation.

The overall Project sustainability rating is ML. Notwithstanding the strong drivenness of the GoC to meet its energy efficiency targets of the Five-Year Plans, this rating is primarily based on:

- financial resources not being fully in place for various EE barrier removal activities during the post-Phase I EUEEP period, and the capacity not fully in place;
- the need to continue developing financial incentives to sustain investment in EE retrofits within existing buildings in China; and
- the need to continue building capacity of all stakeholders involved with EC&EE activities in China that will sustain interest in EE&EC investments. This would include government officials, industrial personnel, real estate developers and architects, ECCs, ESCOs and stakeholders from the financial sector.

Table 2: Assessment of Sustainability of Outcomes

Actual Outcomes (as of June 2010)	Assessment of Sustainability	Dimensions of Sustainability
Objective A: To remove barriers to energy efficiency in the industrial sector		
Actual Outcome A.1: Actual ECA agreements are being implemented in the cement, petro-chemical and the iron and steel industries.	• *Financial Resources:* No financial risks as industries participating in the "Top 1,000 Enterprise Energy Conservation Program" have the fiscal resources to sustain EC investments; • *Socio-Political Risks:* Risks are low since energy conservation is a national priority, and enterprises participating in the "Top 1,000 Enterprise Energy Conservation Program" will make efforts towards EC as it will reduce their operational costs and increase their profitability; • *Institutional Framework and Governance:* The Project assisted the GoC in strengthening the institutional and regulatory framework for the ECA agreements. Initially, enterprise participation with ECAs was voluntary; in 2007, the GoC selected the most energy consuming enterprises to participate in the "Top 1,000 Enterprise Energy Conservation Program" in return for GoC regulatory support such as enterprise training and a collaborative working relationship with GoC. • *Environmental Factors:* No identifiable risk since consumption of energy is to be reduced. ***Overall Rating***	L L L L **L**
Actual Outcome A.2: EE design codes for new and existing facilities and equipment were established and implemented	• *Financial Resources:* Fiscal resources are in place for industries to comply with EE codes for cement and other industrial sectors. Additional resources likely required to continue development of these codes in other industrial sectors; • *Socio-Political Risks:* There is GoC regulatory pressure to improve old and new industries through compliance with EE design codes. In addition, industrial enterprises acknowledge that conserving energy is good business; hence, there is high compliance to new codes; • *Institutional Framework and Governance:* The government-supported ECCs are positioned to disseminate EE design codes to participating enterprises; • *Environmental Factors:* No identifiable environmental risks with EE design codes. ***Overall Rating***	ML L L L **ML**

Table 2: Assessment of Sustainability of Outcomes

Actual Outcomes (as of June 2010)	Assessment of Sustainability	Dimensions of Sustainability
Actual Outcome A.3.1: China's motor systems market has been transformed.	• *Financial Resources:* Many industrial sector enterprises have the finances necessary to invest in EE motor systems. • *Socio-Political Risks:* Motor system demonstrations support the national EC&EE priorities; hence, no identifiable risks; • *Institutional Framework and Governance:* In part due to the Project outcome of stronger ECCs, there is strong institutional governance support for the continuation of motor system market transformation. This has been accomplished through the training of technical personnel to assist industries in implementing EE electric motors installations; • *Environmental Factors:* No environmental risks as energy consumption will be reduced from these activities ***Overall Rating***	L L L L **L**
Actual Outcome A.3.2: Industry has adopted EE standards and labelling	• *Financial Resources:* GoC has not yet committed funding for improvements to the current EE standards and labelling program; • *Socio-Political Risks:* This outcome supports a national priority; hence, no identifiable risks; • *Institutional Framework and Governance:* NDRC will have the mandate to sustain standards and labelling for industrial equipment; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	ML L L L **ML**
Actual Outcome A.3.3: EE standards and labelling has been established for equipment in the residential and service sector	• *Financial Resources:* GoC has not yet committed funding for the strengthening and expansion of the current EE standards and labelling program; • *Socio-Political Risks:* This outcome supports a national priority; hence, no identifiable risks; • *Institutional Framework and Governance:* NDRC will have the mandate to sustain standards and labelling for residential and service equipment; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	ML L L L **ML**

Table 2: Assessment of Sustainability of Outcomes

Actual Outcomes (as of June 2010)	Assessment of Sustainability	Dimensions of Sustainability
Actual Outcome A.4: EMISPR has been established for 9 industrial sectors	• *Financial Resources:* GoC has committed funding for energy monitoring and reporting system; • *Socio-Political Risks:* This outcome supports a national priority; hence, no identifiable risks; • *Institutional Framework and Governance:* NDRC will undertake their own initiatives to setup and operate the EMISRP; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	L L L L **L**
Objective B: To remove barriers to energy efficiency in the building sector		
Actual Outcome B.1: Data collection and analysis systems have been developed for a "statistical indicator system" for energy consumption in buildings	• *Financial Resources:* Financial resources not yet committed to sustain further data collection and analysis for energy consumption in existing buildings; • *Socio-Political Risks:* Insufficient social pressure to sustain data collection analysis for existing buildings; • *Institutional Framework and Governance:* Most cities are now developing codes and guidelines for EE for new buildings. Codes for EE retrofits in existing buildings have not yet been fully developed. Capacity of most cities to collect and analyse building energy consumption data is not yet sufficient; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	ML ML ML L **ML**
Actual Outcome B.2: Policies and standards for building energy efficiency have been developed	• *Financial Resources:* GoC have the resources to continue development of building EE policies and standards; • *Socio-Political Risks:* Since EE is a national commitment, GoC will continue to develop building EE policies and standards; • *Institutional Framework and Governance:* The capacity to sustain development of retrofit standards and BEE standards for other climatic areas is still lacking. In addition, enforcement capacity for policy and standards compliance for existing buildings is also lacking; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	L L ML L **ML**
Actual Outcome B.3: BEE standards have been implemented with incentives to exceed the	• *Financial Resources:* Financial resources at the local government levels to monitor and enforce BEE standards are likely not in place;	ML

Table 2: Assessment of Sustainability of Outcomes

Actual Outcomes (as of June 2010)	Assessment of Sustainability	Dimensions of Sustainability
standards	• *Socio-Political Risks:* This activity demonstrated high compliance to standards. However, awareness of BEE needs to be raised amongst owners of existing public buildings to implement EE retrofits and exceed standards; • *Institutional Framework and Governance:* Municipal governments such as Chongqing are housing computer-base management systems for building construction and monitoring building energy consumption. Technical assistance, however, is required to expand the use of these computer-based management systems; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	ML ML L **ML**
Actual Outcome B.4: BEE information has been disseminated	• *Financial Resources:* CCTV and other official Chinese media have sufficient financial resources to disseminate BEE information; • *Socio-Political Risks:* Since EE is a national commitment, there is a political commitment for GoC to continue to disseminate BEE information; • *Institutional Framework and Governance:* Dissemination of BEE information has been effectively undertaken by the GoC and municipal governments. This will continue in the foreseeable future; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	L L L L **L**
Actual Outcome B.5: Innovative building technologies have been promoted	• *Financial Resources:* Financial resources not yet committed to the continuation of the promotion of innovative building technologies; • *Socio-Political Risks:* The promotion of innovative building technologies would be sustained if there were good partnerships between technology developers/owners, building owners and local and central governments. This does not appear to be case at this time; • *Institutional Framework and Governance:* GoC and local governments are supportive of innovative technologies to promote BEE; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	ML ML L L **ML**
Objective C: Strengthening local capacity and the development of supporting for promoting and implementing EC&EE projects in the industrial and building sectors		

Table 2: Assessment of Sustainability of Outcomes

Actual Outcomes (as of June 2010)	Assessment of Sustainability	Dimensions of Sustainability
Actual Outcome C.1.1: ECC capacity has been strengthened for energy auditing and inspection of new building designs	• *Financial Resources:* GoC do not yet have financial resources committed to continue ECC capacity building for energy auditing and inspection of new building designs; • *Socio-Political Risks:* Few risks since as there is a need for growth of ECCs to help the GoC to achieve its FYP goals for energy conservation; • *Institutional Framework and Governance:* GoC and municipal government support for ECCs is in place; • *Environmental Factors:* The outcome of strengthened ECCs will be reduced CO_2 emissions that supports China's commitment and compliance to Kyoto Protocol to which it is a signatory. ***Overall Rating***	ML L L L **ML**
Actual Outcome C.1.2: ECC capacity to conduct EE training has been strengthened	• *Financial Resources:* GoC resources are not yet in place to sustain continued ECC capacity building for delivery of EE training; • *Socio-Political Risks:* GoC support for continued ECC capacity building is strong; hence, socio-political risks are low; • *Institutional Framework and Governance:* GoC EE&EC programs are in place as drivers to continue strengthening of ECC capacity for EE training; • *Environmental Factors:* The outcome of strengthened ECCs will be reduced CO_2 emissions that supports China's commitment and compliance to Kyoto Protocol to which it is a signatory ***Overall Rating***	ML L L L **ML**
Actual Outcome C.1.3: Capacity to disseminate BEE information has been strengthened	• *Financial Resources:* Municipal governments have the financial resources to continue disseminating BEE information; • *Socio-Political Risks:* No risks as GoC EE&EC program will continue to be primary driver of continued capacity strengthening of BEE information; • *Institutional Framework and Governance:* Municipal governments have the network and outreach to disseminate BEE information; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	L L L L **L**
Actual Outcome C.2: The Energy Conservation Law (ECL) is being implemented	• *Financial Resources:* GoC financial resources for the continual review of the ECL are likely in place; • *Socio-Political Risks:* No risks as energy efficiency is a high priority within the 11th FYP and likely the 12th FYP;	L L

Table 2: Assessment of Sustainability of Outcomes

Actual Outcomes (as of June 2010)	Assessment of Sustainability	Dimensions of Sustainability
	• *Institutional Framework and Governance:* GoC framework in place to provide continual review of the ECL; • *Environmental Factors:* No identifiable environmental risks. ***Overall Rating***	L L **L**
Actual Outcome C.3: Policies and options for financing EE have been developed	• *Financial Resources:* Resources for developing financing EE options in place for industry. For the building sector, EE financing options is not clear, especially for building retrofits. The ESCO business model has not been fully developed in China due to lack of recognition by China's financial institutions; • *Socio-Political Risks:* Tools for financing building EE projects not fully in place due to ESCO issue; • *Institutional Framework and Governance:* Institutional framework for sustaining financing of EE is in place for building sector in pilot cities. Expansion of this institutional framework into other cities may be delayed due to constraints on the ability of central government to coordinate this expansion; • *Environmental Factors:* No identifiable environmental risks ***Overall Rating***	ML ML ML L **ML**
	Overall Project Sustainability:	**ML**

4. REPLICABILITY OR CATALYTIC ROLE

The scale of implementing an EE&EC program throughout China is enormous. The task of EUEEP at its commencement in 2005 was to assist China in achieving the critical mass and market penetration of EE&EC practices and products; as such, catalyzing replication during Phase I EUEEP was crucial. To this end, Phase I EUEEP deserves significant credit for catalyzing the replication of energy efficiency projects in the industrial sector and to a lesser extent, the building sector by:

- providing critical inputs to strengthening the GoC's regulatory framework under the Energy Conservation Law in 2008 as well as setting of EE standards for equipment such as fans, air conditioners, boiler, and transformers that could be utilized by industrial and building sector stakeholders;

- setting up effective demonstrations and benchmarking activities under the "Top 1000 Enterprises" program. This included the provision of technical support for industrial stakeholders and the necessary confidence to invest on EE equipment and projects;

- setting up of standards and labelling programs that facilitated the purchase of EE equipment by industrial enterprises as well as from the commercial and residential sectors;

- providing training for ECCs to train other energy specialists and auditors. This would accelerate and develop the adoption of EE initiatives by other industrial stakeholders;

- effectively disseminating regulatory and EE&EC information on best approaches to implementing EE projects to a wide range of stakeholders including the general public, industrial enterprises and energy specialists; and

- providing advice to government on fiscal incentives that can further accelerate adoption of energy conservation by industrial stakeholders and stakeholders in the buildings sector;

EE replication in the building sector has not been as extensive, mostly due to the project focus on new building construction which account for less than 3% of all buildings in China, and piloting of BEE standards on a small scale in 4 pilot cities. EUEEP has provided a good foundation from EE demonstrations and policy strengthening on which BEE standards compliance can be catalyzed for retrofits in existing buildings; for this to occur, external assistance will be required to:

- increase BEE retrofit demonstrations to convince building owners that BEE financially benefits are significant through energy savings;
- strengthen BEE policy that defines EE standards for existing buildings in all climatic zones of China;

- strengthen BEE financing schemes that should include improved support for ESCOs; and
- increase capacity of institutions for building inspections, specifically on BEE issues.

5. ASSESSMENT OF MONITORING & EVALUATION SYSTEMS

5.1 M&E during Project Implementation

The original log-frame of EUEEP was designed in 2004. Since 2004, GEF's M&E requirements have evolved including the independence of the GEF Monitoring and Evaluation Unit that now reports directly to GEF Council. Notwithstanding the excellent achievements of EUEEP, the Project needed to revise its log-frame for M&E to conform to changing GEF M&E requirements:

- Prior to 2007, APRs and PIRs provided reports on Project progress, impacts and issues though the reporting was mainly qualitative in nature. Up to 2009, EUEEP used reporting formats for M&E contained in the 2004 Prodoc, specifically the "Results Framework"[22] and the "Climate Change Project Indicators"[23];
- In 2007, GEF projects were required to report quantitative impacts based on "Project Impact Metrics for Climate Change Indicators"[24]; these were required to measure and report the levels of achievement for climate change projects, and be complementary to the qualitative achievement descriptions of the APR and PIR reporting processes;
- In 2009, project progress was also required to be reported into the UNDP-GEF on-line reporting system for APRs and PIRs;
- As a recommendation of the MTE, a new Project log-frame was approved on August 26, 2009 due to the need to harmonize and simplify the number of indicators, and to retrofit the log-frame to GEF changes to "outcome" reporting. The new log-frame provided well-defined energy savings and GHG reduction performance indicators designed to be closely tied to the original Project objectives of 2004. This has resulted in an improved definition of the outputs expected from the Project. The 2009 log-frame is contained in Appendix E.

Ratings of the Project's Monitoring and Evaluation system[25] are as follows:

- *Quality of M&E design – MS*. This is mainly due to the fact that the M&E system for EUEEP has evolved from its original 2002 design;
- *Quality of M&E implementation – S*.

5.2 Monitoring Long Term Changes

Despite the changes to the M&E system during EUEEP, the overall purpose of the M&E system has been to monitor the effectiveness of EUEEP in assisting the GoC in reforming its regulatory framework for energy conservation programs in the industrial and buildings

[22] On page 9

[23] On page 31

[24] From page 34 of EUEEP PIR

[25] HS or Highly Satisfactory: There were no shortcomings in the project M&E system;
S or Satisfactory: There were minor shortcomings in the project M&E system,
MS or Moderately Satisfactory: There were moderate shortcomings in the project M&E system;
MU or Moderately Unsatisfactory: There were significant shortcomings in the project M&E system;
U or Unsatisfactory: There were major shortcomings in the project M&E system; HU or Highly Unsatisfactory: The Project had no M&E system

sectors within the time period of EUEEP. As such, the M&E system with the 2009 revised log-frame serves this purpose and could be used by the PMO after the completion of EUEEP Phase I. Both qualitative and quantitative indicators provide clear indications of project progress, and should allow for extrapolations of long term changes and impacts of EUEEP.

In the context of monitoring long term changes from EUEEP activities, an issue of the EUEEP M&E system revolves around *the absence of systematic collection of quantitative information related to energy savings*. The measurement of energy savings for each EE project investment is cumbersome requiring the enterprise to recruit an ECC or energy specialist. The FE team were only informed of two systems currently in use for monitoring and reporting energy savings:

- The EMISRP system as operated and managed by ERI and NDRC. The FE team was informed of the system but did not get to view it on-screen. The system reportedly only involves discrete reporting of energy savings, usually at the time of completion of the EE project;
- A crude system under the PMO to monitor energy usage on demonstration projects using spreadsheets. The spreadsheet only summarizes discrete energy savings on an annual basis from demonstration projects and benchmarking activities. Eventually, energy savings information from ECCs, consultants and subcontractors are reported to the PMO in their reports.

At this time, the PMO is not equipped to undertake an M&E role for a larger EE&EC program; in a post Phase I EUEEP period, either the capacity of the PMO will need to be strengthened for such a role (through the recruitment of a dedicated M&E officer) or an independent professional firm should be subcontracted to perform M&E tasks within a prescribed system that meets NDRC's approval.

The tools for monitoring long term changes also need strengthening. The PMO will needs to have a structured database to provide a systematic means of collecting energy use data that will calculate the energy savings within a jurisdiction such as a city or a province. For larger EC programs, the database will need to incorporate information from surveys and statistical sampling methodologies to provide aggregated energy savings data for industries and buildings within certain jurisdictions. As the energy conservation program expands, data collection for energy savings will become more complex and require improved reporting protocols. A database should be designed to provide a systematic means of collecting energy use data to determine provincial or national energy savings. Table 3 provides an example of such a database. The long term outcome of the EUEEP M&E system is its migration to a monitoring cell within the NDRC after Phase 1 EUEEP is completed.

There is strong drivenness in the Government of China to reduce its consumption of fossil fuels; to improve monitoring and impact assessments of China's EE&EC programs, a post-Phase I EUEEP monitoring system should include:

- strong linkages to the energy conservation activities in the 12th FYP;
- tools to supplement statistical data in China especially with energy consumption data being weaker than energy production data;

- a means of determining the overall effect of EUEEP in promoting the energy efficiency activities relative to the applicable FYP (i.e. 20% reduction in the 11th FYP).

Table 3: Example of Database Table for Monitoring Long-Term CO_2 Savings

Sector	Province	Type of Project	Enterprise Name	Brief Descriptor of EE Measure	CO2 Emissions in Year prior to EE Measure (Ton/Yr)	CO2 Emissions Year 1 (ton)	CO2 Emissions Year 2 (ton)	Avg. Annual CO2 reduction (ton)	Actual Investment (Million Rb)
Cement	Jiangsu	DEMO	A	10 new EE motor installations					
I&S	Jiangsu	DEMO	B	5 new EE boilers					
I&S	Jiangsu	REPL	C	15 EE pumps					
Chemical	Jiangsu	REPL	D	6 new EE boilers					
Chemical	Jiangsu	REPL	E	Installation of EE lighting					

6. ASSESSMENT OF PROCESSES AFFECTING PROJECT OUTCOMES AND SUSTAINABILITY

6.1 Preparation and Readiness

The Project designs from the PDF B Phase were well prepared, comprehensive and easy to execute. The roles and responsibilities of all government institutions were clear with counterpart funding and enabling legislation to meet project objectives. The quality of these preparations has definitely had a positive effect on implementation of the project.

One issue on EUEEP designs was the project schedule which did not provide realistic time allocations for project mobilization and preparing stakeholders (industrial and building sector as well as ECCs) for EUEEP activities. The impact of this oversight was an increase of 24 months for project implementation of which 12 additional months were required to setup the Project's financial system that required harmonization between accounting systems of UNDP and the GoC. Time was also required to strengthen the relationships between Project staff and the various project beneficiaries including industrial enterprises in cement, iron & steel and chemicals, ECCs, industrial associations, building owners, architects and local government officials that oversee building inspections and new building construction.

6.2 Country Ownership and Drivenness

To a significant extent, Project outcomes have been attained with strong ownership and drivenness of the Chinese government. Evidence supporting this statement includes:

- Clear directives from NDRC on government targets and policies on EE objectives;
- The 2008 promulgation of the ECL;
- High levels of co-financing of ECCs (~USD 5.0 million) to deliver training to other trainers and energy consuming enterprises.

6.3 Stakeholder Involvement

With China moving from a centrally planned to a market-based economy, stakeholder involvement of appropriate government and private sector personnel has been a key to the success of EUEEP. This included MoC, MoHURD, MoNREP and MoF and a number of stakeholders from private enterprises and relevant technical institutes throughout China who were consulted throughout the development and implementation of the Project. Stakeholder involvement was expanded to ECCs, emerging energy professionals, architects, real estate developers, and financing institutions. These efforts were sustained throughout the entire duration of the Project with workshops and informal meetings concluding with the final Project Workshop of April 2008.

Awareness raising activities also provided the Project with the necessary outreach to project proponents in various provinces and cities such as Guangdong, Shanghai, Beijing, Tianjin, Jiangsu, Shandong, Hebei and Fujian on the Project's available mechanisms to provide technical expertise and facilitate financial assistance. Project involvement in these regions has provided industrial enterprises and to a lesser extent, building owners with the necessary tools for assessing and implementing EE projects.

The strong coordination arrangements have also contributed to the success of EUEEP. The coordinating forum within the NPCC structure encourages a wide range of stakeholder participation that includes local government agencies in the event they want to table policy and directional changes; this facilitates promotion of effective multi-agency policy coordination, decision making and resolution of issues. Moreover, with strong local government support of ECCs on EUEEP, the NPCC structure provides strong oversight and management for cross-cutting activities. This is consistent with the GoC's reforms where more decision-making powers are being given to local government. This coordinating structure can be sustained after the end of EUEEP Phase I.

6.4 Financial Planning

Overall financial controls of the Project were adequate. Table 4 presents an overview of expenditures of the GEF contribution to the budget. Expenditures until the end of April 30, 2010 were an estimated USD 15.5 million out of a total budget of USD 17 million.

Management of the original budget allocations of 2005 has been satisfactory in achieving the Project objectives. With more than USD 10.8 million or 63.5% of EUEEP's budget expended on technical assistance from subcontractors, the PMO expended a significant portion of its resources in contracting, monitoring and managing these subcontracts. A list of subcontractors is provided in Appendix D.

6.5 Supervision and Backstopping by UNDP

Supervision and backstopping efforts by UNDP China and the UNDP-GEF Regional office in Bangkok were satisfactory. Review of the Project APRs and PIRs reveals their interventions were minimal given that there were few deviations of Project activities from the Prodoc.

Considering the size of EUEEP, project management under the UNDP-funded PMO structure has also been effective and efficient. The roles of the various component managers in the PMO have been to execute directives from NDRC and within the framework of the Prodoc, and to manage and administer the numerous subcontracts. The only issue with the PMO was the need to have recruited a dedicated M&E officer to systematically monitor project progress and energy savings from the various project activities; this comment concerning M&E of EUEEP was made in Section 5.2 and the MTE.

6.6 Co-Financing and Delays

The Project slightly exceeded its co-financing objectives by garnering USD 75.26 million, USD 12 million over the 2004 co-financing budget of USD 63.35 million. The additional finance was mainly government grants and industrial stakeholder equity finance for the benchmarking activities and demonstrations. The co-financing has also had a direct effect on achieving the intended Project outcomes and spurring sustained growth of energy efficiency projects in China. EUEEP co-financing is summarized on Table 5.

There were delays in the project completion date of 2008 to June 2010 due to time required to:

- set up financial systems between UNDP and the GoC during Year 1;
- establish working relationships with various government agencies in the pilot cities during Year 1;
- establish working relationships with industrial stakeholders who were hosting demonstration and benchmarking activities of the industrial component during Year 1;
- receive GoC approvals for the promulgation of the ECL and acceptance of various EE standards.

Although the Prodoc did not allocate the time and resources required to complete the mobilization activities of Year 1, these mobilization delays did not affect outcomes and sustainability of the Project.

Table 4: Project Expenditures (in USD as of March 31 2010)

Project expenses	2005	2006	2007	2008	2009	2010	unspent 2010	2005-2010
Component A: *Removal of EE Barriers in Industrial and Residential Sectors*								
A.1: ECA Implementation	0	29,500	450,976	317,039	633,727	0	24,231	1,455,473
A.2: Adoption of EE Design Codes	0	42,000	129,825	57,612	104,050	0	0	333,487
A.3: Strengthening Capacity for EE Standards for Industrial and Residential Service Equipment	0	1,154,945	872,303	762,286	760,961	119,800	151,000	3,821,295
A.4: EMISRP for Key Energy Intensive Industries	0	0	10,000	151,478	698,027	84,000	146,240	1,089,745
Sub-Total:	0	1,226,445	1,463,104	1,288,415	2,196,765	203,800	321,471	6,700,000
Component B: *Removal of EE Barriers in Building Sector*								
B1: Building Energy Use Data Collection	0	4,000	195,614	143,556	219,564	0	0	562,734
B2: BEE Policies and Standards	0	193,830	173,100	132,040	39,254	59,340	42,840	699,744
B3: BEE Standards Implemented	0	725,730	475,600	755,199	474,190	89,752	111,798	2,632,268
B4: BEE Information Dissemination	0	134,000	199,120	154,365	283,040	0	117,000	887,525
B5: Innovative Building Technology Promotion	0	57,855	32,000	76,000	157,559	140,580	103,735	567,729
Sub-Total:	0	1,115,415	1,075,434	1,261,160	1,173,607	289,672	434,713	5,350,000
Component C: *Cross Cutting Activities*								
C1:Capacity Building for ECC	0	424,600	549,003	341,277	206,564	160,000	232,002	1,913,446
C2:ECL Implementation	0	70,462	176,520	167,183	226,260	90,000	139,940	900,365
C3: EE Financing	0	24,861	90,966	88,900	96,962	21,000	13,500	336,189
Sub-Total:	0	519,923	816,489	597,360	529,786	271,000	415,442	3,150,000
Component D: Management & Evaluation								
D1:Management	49,806	290,100	243,905	309,271	282,997	62,178	133,207	1,347,510
D2:Monitoring & Evaluation	0	2,078	22,191	92,290	98,920	33,000	149,548	452,490
Sub-Total	49,806	292,178	266,096	432,070	381,917	95,178	282,755	1,800,000
Total	***49,806***	***3,153,961***	***3,621,123***	***3,579,004***	***4,282,075***	***859,650***	***1,454,381***	***17,000,000***

Table 5: Co-Financing and Leveraged Resources

Co financing (Type/ Source)	IA own Financing (mil USD)		Multi-lateral Agencies (Non-GEF) (mil USD)		Bi-laterals Donors (mil USD)		Central Government* (mil USD)		Local Government (mil USD)		Private Sector (mil USD)		NGOs (mil USD)		Total Financing (mil USD)		Total Disbursement (mil USD)	
	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual	Pro-posed	Actual
Grant							13.094	20.810									13.094	20.810
Credits																		
Loans																		
Equity											32.000	38.304					32.000	38.304
In-kind							18.256	16.150									18.256	16.150
Non-grant Instruments																		
Other Types																		
TOTAL							31.350	36.960			32.000	38.304					**63.350**	**75.264**

* Resources from NDRC and local government

7. LESSONS AND RECOMMENDATIONS

7.1 Lessons Learned

Project Design:

- Investment in a good project design during the preparatory phase will increase the probabilities of successful implementation. The preparatory phase should include sufficient time and effort to design a project that government has the capacity to fully support. EUEEP implementation has only slightly deviated from its original design, and the outcomes were satisfactory;

- Equally important during project design is identification of stakeholders crucial to the success of the project and the development of collaborative and sustainable working relationships with them. In the case of EUEEP, its success has been founded on an excellent and close working relationship between the NDRC and UNDP;

Project Implementation:

- A clear and well-designed project logical framework with both quantitative output and impact indicators is crucial to improved and efficient project implementation as well as a means for the host government to measure project impacts. In the case of EUEEP, the log-frame has evolved from a qualitative format to the current format of qualitative and quantitative project indicators. While there are strong indications that the Project appears to have had a positive impact on energy efficiency with industrial stakeholders, the Project needs to improve its reporting based on quantitative impacts. This is particularly true if the next phases of EUEEP are scaled-up and more complex, with more energy efficiency projects being implemented in the industrial and building sectors as well as other sectors in the 12th FYP such as transport and the power sector;

- Delegating project technical work to subcontractors can be effective provided the subcontracted works are well defined and contracts are easily manageable. EUEEP subcontracts appear to be not only well defined but clear to the subcontractors on the work they need to complete. As a consequence, the PMO were able to more easily manage subcontractors and spend less time being encumbered by procurement procedures;

- The Project had few English versions of subcontract final reports. As a result, outside reviews by UNDP and independent project evaluators of EUEEP were difficult to conduct for those unable to read Chinese script. As a minimum, UNDP-GEF funded projects should have an English version available of the executive summary of each subcontract for external review;

- Project implementation success is dependent on the stability of the government stakeholders involved with the Project. The Evaluation Team has noted that the National Project Director and several of the

NDRC technical specialists are still involved with EUEEP. Comparing EUEEP with similar projects in other countries, other projects have not had the successes of EUEEP due to the frequent movement of government officers within their civil service, government instability, the use of project resources to familiarize new officers with the project, and longer implementation times.

7.2 Recommendations

For designers of future GEF projects, the following actions are recommended:

- Greater care and scrutiny during the project preparation phase on:

  - ➔ rightly identifying the relevant stakeholders and assessing their absorptive capacities;
  - ➔ providing realistic implementation schedules;
  - ➔ preparing the project logical framework as this is the main basis of the project design and is the primary tool for monitoring and evaluating the project. UNDP oversight is required to ensure the project log-frames are kept in the latest formats as required by UNDP and GEF.

  These aspects of project preparations should be managed and overseen by qualified personnel from the Country Office;

In terms of recommendations specific for a post-Phase I EUEEP, the Government of China has been clear in its position that the country must continue to scale-up its efforts to meet energy efficiency targets. With the 11th FYP ending in December 2010, preparations are underway for the 12th FYP that reportedly has a heavy emphasis on energy conservation and reducing carbon in a number of sectors that includes the transport sector.

Due to the wide range of sectors that Phase II EUEEP will address, a Phase II EUEEP will need to avoid sectoral components (as was done in Phase I), and incorporate a structure that is flexible and can laterally address other sectors (i.e. telecommunications, agriculture, transport). In this regard, NDRC has provided for discussion a Phase II EUEEP project structure designed to assist GoC in attaining its energy conservation objectives of the 12th FYP; Phase II components include policy and regulatory framework, EC technologies, EC products and capacity building. On the basis of this structure, the FE team has made a number of recommendations for a Phase II EUEEP project listed under the proposed components.

Policy and Regulatory Framework

⇒ *Support and strengthening new policies, implementing rules and regulations should be in the context of the expansion of the current Energy Conservation Agreement program*. New policies, implementing rules and regulations would be required in the formulation of other sectoral-level ECAs within the "Top-1000 Energy-Consuming Enterprises Program" such as the telecommunications sector or with sector specific trade associations such as the cement industry;

⇒ *"Energy system standards" for industrial and commercial enterprises and residences need to be strengthened under the standards and labelling (S&L) program started in Phase I.* The standards should provide realistic energy targets (based on international and domestic energy consumption experience), and identify appropriate EC products to meet these targets and promote best energy consumptive practices.

⇒ *The formulation of incentive policies needs to be continued to accelerate adoption of EE technologies and practices promoted by the 12th FYP*.

Energy Conservation Technologies:

⇒ *Technology process demonstrations and benchmarking activities need to be continued for various industrial sectors included in the 12th FYP* including:

- the construction, transportation, small-to-medium enterprise, rural and agricultural sectors and other energy-intensive industries (such as non-ferrous and the pulp & paper industries) in addition to the industrial and building sectors;
- demonstration of EE technologies that provide significant energy savings to a particular enterprise. This would include variable speed drives and blast furnace top gas recovery turbines (TRTs) in existing iron & steel enterprises;
- additional benchmarking for other numerous products manufactured in the cement, chemical and iron & steel industries as well as the buildings sector;
- mechanisms to provide continuous improvements to Phase I benchmarking activities (that were mainly in the industrial sector) through consultants specializing in international best practices on benchmarking methodologies;
- creation of benchmarking indicators that can be posted on-line for wider dissemination; and
- benchmarking in an expanded geographical area (i.e. other provinces and cities).

⇒ *Support is required to strengthen measures to encourage energy efficiency retrofits in existing buildings.* Since most BEE activity during Phase I EUEEP involved new building construction comprising less than 3% of all buildings in China, efforts are required to bring the remaining 97% of existing buildings under EE standards. To catalyze EE retrofits, implementing EE measures for large office buildings (>20,000 m^2) and government-owned buildings may be considered due to their higher public profile. EE measures can be demonstrated on these buildings such as the use of photo-voltaic units and heat pumps to offset consumption of fossil fuels or grid power. Energy audits can be conducted on the building facilities before and after the retrofits to gauge the impact of the EE measures, and the compliance to a standard where energy consumption is reduced by 20%. These activities could lead to greater adoption of EE products and technological processes by building owners and building developers;

Energy Conservation Products:

⇒ *Support is required to continue strengthening the Phase I S&L program.* Activities would include:

- review of more sales data on EC products (including residential, commercial and industrial sectors) that will strengthen the assessment of market penetration of EC products;
- increased access to information on energy usage at the household level to determine residential and commercial baselines and actual EC product usage;
- comparing energy consumption information of other countries on typical EC products and household appliances;
- correlating household income levels with energy consumption in China as well as other countries;
- providing more publicity for product labelling and standards to increase the public's knowledge on EC products;
- testing of new EC products entering the Chinese market for EE performance and consumer protection;
- ensuring Phase II EUEEP S&L activities do not overlap with the UNDP-GEF project "Barrier Removal to the Cost Effective Development and Implementation of Energy Efficiency Standards and Labelling Project" (BRESL Project).

Capacity Building:

⇒ *Local capacity building for collecting energy consumption information and data needs to be continued.* Industrial enterprises and building owners need to report their energy consumption data to a central data repository. An on-line energy information reporting website that can be developed to monitor energy usage and conservation within a certain jurisdiction. ECCs and local consultants can provide valuable services to enterprises and owners in reporting energy consumption data;

⇒ *Regulatory enforcement on energy efficiency standards for new building construction needs to be continued.* Current programs involving capacity building for government building inspectors and their consultants needs to be expanded within the pilot cities as well as other cities;

⇒ *Training programs for ECCs and ESCOs on energy auditing and benchmarking needs to be continued to include a wider scope of industrial sectors under the 12th FYP*; this would include energy intensive sectors including the non-ferrous and pulp and paper industries;

⇒ *Efforts to raise awareness of commercial banks on the ESCO business model need to be strengthened.* This is necessary to overcome their perceptions of the ESCO business model as one of high risk, and the general view that a strengthened ESCO industry in China is important to increasing adoption of EE measures especially in the building sector. Close collaboration is required with the GEF-funded project "China Energy Efficiency Financing Project (GEF Project ID: 2951)" on avoidance of overlapping TA activities;

⇒ *The capacity of laboratories for testing new products for energy consumption needs to be increased.* New standards will create the demand

for new testing equipment for new EE industrial, commercial and residential products. The Phase II EUEEP PMO should ensure their TA activities do not overlap with the BRESL project;

⇒ *The current monitoring and evaluation system for EC&EE programs needs to be strengthened to*:

- facilitate monitoring and analysis of energy savings and GHG reductions resulting from various EE projects throughout China;
- easily disseminate accurate energy use data;
- meet the reporting needs of NDRC; and
- be easily managed by one or two dedicated persons.

Strengthening of PMO Functions

Since Phase II EUEEP is different from Phase I, changes will be required to current PMO staffing to more effectively assist the GoC in the implementation of the 12th FYP. As a Phase II EUEEP project is expected to address policy aspects, evaluation and deployment of new technologies, evaluation of new EC products and capacity building, the PMO will need to:

⇒ *staff a national technical advisor with extensive EE experience who can effectively work with NDRC to implement Phase II EUEEP.* Under the current setup, the PMO is directed and managed by NDRC in implementing project functions and mainly serves as an administrative clearing house for contracts and payments with some technical inputs. A re-structured Phase II EUEEP will require a national CTA who can provide technical inputs (such as a product evaluations and policy formulation to accelerate EC product adoption) and assist in executing NDRC directives;

⇒ *improve technical ability of current PMO staff to manage a Phase II project that is more complex than Phase I*. Since Phase II is required to address more sectors, PMO staff will need to address different issues, formulate strategic actions and bring in appropriate consulting resources to properly address. An example of this would be in the transport or agricultural sectors where end use emission sources are mobile and different from stationary sources encountered in the industrial and building sectors.

⇒ *employ a full time M&E officer.* This officer would be tasked with oversight of the development and implementation of a monitoring system for Phase II activities. This would include the development of the overall M&E framework that should include mechanisms to more accurately estimate energy saved from project activities (both direct and indirect). The officer would be responsible for the setting up of an M&E system that can be easily managed by one or two dedicated project officers.

Appendix A
Terms of Reference for Final Evaluation of UNDP-GEF Project "China: End Use Energy Efficiency Project – Phase I"

1. INTRODUCTION

1.1 Country Context

China's economic reform and opening to the outside world have been under way for nearly thirty years, and China's economy continues to be one of the most dynamic in the world. Meanwhile, China's energy demand is growing very fast in recent years and the energy matrix is characterized by the dominance of coal, followed by oil.

China's growth over the past years has created great pressures on China's environment. Issues such as energy and climate change have gained increased attention. China's emergence as the second largest energy consumer in the world has placed it in a position to affect global energy supplies. China is faced with distinct and pressing energy challenges that threaten its economic growth and overall development objectives. These include reliance on coal and its negative environmental impact, insufficient energy supply, and low overall level of energy efficiency.

These challenges also provide China the opportunity to do practice on the energy efficiency and renewable energy and make some contributions. In the 11th Five-Year-Plan, China has set its objective of reducing energy consumption per unit GDP by 20% by 2010 compared to the level of 2005, while increasing the share of renewable energy in China's energy use portfolio to 16% by 2020. On January 1, 2006, the Chinese government launched Renewable Energy Law. To meet the challenge from energy security and climate change, in October 2007, China publicized the revised Energy Conservation Law. Also key is a new National Climate Change Programme, China's 1st such policy passed in mid-2007, and China's Scientific Action plan on Climate Change, passed right after the programme, setting the overarching policy platform for actions in China to combat climate change while also improving energy security.

UNDP's support to China in terms of sustainable environment and energy development has been focusing in two broad strategic areas: (a) environmental governance that emphasizes building national capacity in mainstreaming sustainable development and implementing relevant policy, legal and regulatory measures; and (b) capacity development to negotiate and implement global environmental conventions. In this regard, UNDP has been cooperating with the following partners in China in achieving development results in those two main areas:

- National Development and Reform Committee (NDRC - macro-economic and social policy making);
- Ministry of Science and Technology (MOST);
- Ministry of Finance (MOF);
- Ministry of Commerce (MOFCOM)
- Ministry of Environmental (MOE - drafting environmental laws and regulations, their enforcement);
- Ministry of Agriculture (MOA);
- Ministry of Construction;

- China Council for International Cooperation on Environment and Development (CCICED - a high-level policy advisory body for the Government on sustainable development);
- World Bank and Asian Development Bank (WB/ADB - working in this area through their loan/TA programmes);
- Bilateral donors such as European Union (EU), Italy, Norwegian, the Netherlands, and
- Non-profit and non-government organizations (promoting public awareness raising and serving as a bridge between government and civil society).

The Government of the China (GoC) has been working on integrating the different activities in the energy efficiency program of the country through the National Development and Reform Council (NDRC) among various relevant government agencies and institutions and the private enterprises. A major need has been the capacity building and barrier removal in pursuing the GoC energy saving and climate change agenda. This was found out in the UNDP-initiated project development activity through an elaborate consultation and project design in 2002-2004 for China in the area of energy efficiency and its environmental benefits. In 2005, activities started along this line through the Phase 1 of the UNDP/GEF-supported project, the ***China: End-Use Energy Efficiency Program (EUEEP) – Phase I***.

1.2 Project Summary

EUEEP Phase I was designed to support the first phase of a 4-phase, 12-year strategic plan developed by the Chinese government to significantly improve the efficiency of its major end-use sectors, buildings and industry. Phases 2 to 4 will continue by expanding the scope of policies, standards, enforcement and outreach to end-users based on the successful completion of Phase I.

The Phase I Project fosters a strategic approach to developing, implementing and enforcing a comprehensive and effective energy conservation policy and regulatory system consistent with the objectives of the Energy Conservation Law of 1998.

The project aims at removing barriers to the widespread application and practice of energy conservation and energy efficiency in the major energy consuming sectors (buildings and industrial) in China. This will be achieved through partnerships with donors in assisting China establish a sustainable and market-based energy efficiency focus, which will lead to improved economic productivity, reduced greenhouse gas emissions and an improved global environment.

Considering the importance of the program, UNDP's support to China has been in terms of sustainable environment and energy development in cooperation with relevant GoC partner agencies, international organizations and private sector, focusing in two broad strategic areas:

a) environmental governance that emphasizes building national capacity in mainstreaming sustainable development and implementing relevant policy, legal and regulatory measures; and
b) capacity development to negotiate and implement global environmental conventions. In this regard, UNDP has been cooperating with the different partners in achieving development results in those two main areas

The project activities described below focus on the industrial and buildings sectors and are supplemented by crosscutting activities that will benefit both sectors.

1.3 Project Expected Outcomes and Outputs

The project outcomes and outputs covered by the entire project duration include:

- *Outcome 1:*

  Removal of barriers to effective application and practice of energy efficiency in the industry and residential sectors of the Chinese economy

- *Outcome 2:*

  Removal of barriers to effective application and practice of energy efficiency in the building sector of the Chinese economy

- *Outcome 3:*

  National human capacity in Government, business, financial and technical organizations for realizing energy conservation in China increased

Most of the project activities are implemented through the sub-contract and consultancy services which are administered, managed and monitored by PMO and overseen by the NPCC towards these expected outcomes. The total value of all the sub-contracts is US$ 10.8 million or around 63.5% of the total GEF fund for EUEEP. NDRC provides institutional support for policy coordination and establishing relationships with other government agencies and local government units.

1.4 Project Status

Based on the Mid-Term Report done in February - March 2009, the following describe the status of the different activities under the three EUEEP Components:

Component A: Industry
(Outcome 1: Removal of barriers to effective application and practice of energy efficiency in the industry and residential sectors of the Chinese economy)

A.1 Energy Conservation Agreement Implementation in three industries (*Formerly:* Voluntary Agreements adopted by major energy consuming industries)

The GoC launched the government's Top-1000 program where energy conservation agreements were signed between the government and 998 energy intensive enterprises. The activity description in this EUEEP Component was thus modified from voluntary agreements to *energy conservation agreements* (ECAs). Main achievements under this activity include the following:

- EUEEP assisted NDRC to carry out training for these 998 enterprises on energy audit and energy conservation planning. Benchmarking was also carried out for selected enterprises in the list.
- A Draft guideline for energy efficiency benchmarking, and additional industry specific guides for Iron and Steel, Cement and Caustic Soda sectors have been developed and to be used in piloting.
- 11 pilot enterprises have been selected to implement Energy Conservation Agreement focusing on benchmarking (5 for cement, 3 for iron and 3 steel)

A.2 Adoption of Energy Efficiency Design Codes for New and Existing Facilities and Equipment

The design codes are targeted to be adopted within the project duration on energy efficiency for major energy-using equipment in the three energy consuming industries. The final measure of the output for the activity is when the enterprises begin employing design codes. Around 1.3% out of the 3% target has been achieved. In pursuit of these outputs, the project conducted two promotional events during the first quarter of 2008.

A.3 Strengthening of national capacity on Energy Efficiency Standards for Industrial, Residential and Service Equipment

This activity is divided into three sub-activities as follows:

A.3.1. China Motor Systems Market Transformation

The output for this sub-activity is to develop the market for energy efficient motor system in China. In order to achieve it, the project is to develop design criteria and labeling, train motor system organizations, and monitor energy efficient motor systems installed as demonstration. The improvement in energy efficiency and the actual savings in energy are to be evaluated. The guidelines on the design criteria was developed, 6 training workshops (with international and national trainors) provided training to 65 organizations with more than 700 participants which exceeded expected results. On the other hand, the installation of energy efficient most and evaluation of performance were not achieved. The outputs are from a sub-contract in A6, and the national standard for motor system design has not been released. So the energy efficient motor system has not been installed and applied. The evaluation of improvement of energy efficiency and savings of energy are therefore not achieved yet as of the MTR.

A.3.2. Energy Efficiency Standards, Labelling and Promotion for Major Energy-Consuming Equipment for Industry

This sub-activity aims at improving energy efficiency performance of locally-made major energy-using equipment to be at par with imported equipment. This can be achieved if the energy efficiency labels and standards for selected major energy consuming equipment are established. At this point, standard documents for fans, electric transformers, industrial boilers and air compressors have been completed, and submitted to government for approval, motor system energy efficiency labeling developed and 3 workshops to promote EE labeling has been completed in March 2008.

A.3.3. Energy Efficiency Standards and Labeling for Equipment in Residential and Service Sectors

This sub-activity aims at a Substantial increase in market demand and sales of energy efficient equipment in residential and service sectors. This activity is supporting the market penetration of five or more energy efficient appliances and by end of the EUEEP, about 10% of new sales for each appliance achieved. This activity involves product selection, data collection, techno-economic analyses, information dissemination to consumers and manufacturers, and the feasibility study on harmonization of labels across countries. As of the MTR, the energy efficiency standard documents have been completed (for electric water heaters, microwave ovens, duplicating machines) and submitted to government for

approval. The final energy efficiency standard documents for commercial refrigerators, multi-connected air condition units have also been developed. However, the market penetration cannot be calculated because the standards have not been formally enforced. Therefore, the market penetration cannot have sufficient basis.

A.4 Energy Management Information System and Reporting Programme (EMISRP) for Key Energy-intensive Enterprises

· This activity aims at operationalizing a national energy usage monitoring mechanism for major energy consuming enterprises to involve development of tools, techniques, and procedures to establish the management information system and conduct trial operation in selected enterprises. The output is in terms of the portion of the 7000 energy-intensive enterprises are using the system.

Component B: Buildings

(*Outcome 2:* Removal of barriers to effective application and practice of energy efficiency in the building sector of the Chinese economy)

The activities that fall under this component **include** activities involved in government and commercial buildings, hotels, hospitals and other public buildings. For the building sector, major project activities are the establishment of a building energy consumption data collection system, the building energy efficiency standards and policy development, promotion of the implementation of building energy efficiency standards, dissemination of building conservation information, advancement of Chinese building conservation technology and products. Based on the modification and changes in the descriptive titles and coverage of the activities and outputs as decided by the NPCC last December 2007, the following are the accomplishment of outputs under Component B.

In general, there were no change to the project strategy, objective and outcomes; just some adjustments at the activity level to reflect work achieved between program design and program implementation, or for bundling of small sub-contracts into medium size sub-contracts for better implementation efficiency. It was noted that the adjustments followed the suggestions from related government agencies to meet the demand of energy conservation mandate by the GoC and/or for more effective and smooth project implementations.

B.1. Collection of Data on Building Energy Use As a Basis for Setting and Assessing Impacts of Standards

This activity entails the development of a survey instrument, gathering of data, performance of measurements on selected buildings, establishment of baseline data for setting standards, and performance of measurements and surveys to assess the impact of the standards in at least one city. Full surveys to collect data on building energy use will be performed in Beijing, Shanghai, Shenzhen, and Chongqing, and the data analysis will be completed for one year by end of EUEEP project.

In order for a good energy saving program to be successful, the baseline of present energy consumption should be established first so that the effect of the interventions could be measured with certainty.

As of MTR, for its target, the Activity aimed at having the baseline on energy-use in buildings in four cities (Beijing, Shenzhen, Shanghai and Chongqing) established and data collection plan for other cities and regions developed. For the accomplishment, the first lot energy use data were collected in four pilot cities and the indicators for statistical data collection established.

B.2. Development of Policies and Standards for Building Energy Performance:

This activity includes reviews of existing standards, codification of standards into regulations, development of incentive policies to go beyond standards, and development of a rating system for buildings that substantially exceed standards. By end of this activity, the following outputs are expected: (1) Revised standards in the heating zone; (2) Developed and enforced regulations in the hot summer, warm winter zone; and, (3) Regulations for retrofitting of office buildings. As of the MTR, the following are the highlights of accomplishment in this sub-activity are the policy recommendations submitted (date indicated) to Ministry of Construction for approval and subsequent implementation:

- Incentive policy recommendations on energy conservation retrofit in existing public buildings. by Apr. 2008
- Incentive policy recommendations on energy conservation retrofit in existing residential buildings in north area. by Apr.2008
- Standards for retrofitting of existing public building. by Mar. 2008
- Revised energy conservation design standard for residential building in severe and cold zone by May 2008
- Revised energy conservation examining standard for residential building in heating zone. by May 2008
- Implementing rules and regulation in the energy conservation design standards for residential buildings in hot summer and warm winter zone (June 2008)

B.3. Standards Implementation and Incentives for Buildings to Exceed the Standards

This activity involves provision of extensive training to building code officials in the four cities mentioned in B1; assessment of the experience in Shanghai; preparation and introduction of a computer model for use in one city, creation of trial programs to promote green buildings concepts: and. experimentation with pilot systems.

Most of the activities achieved their June 30, 2008 target, except for the guidelines for low energy building. The Beijing solar building design guideline was not completed, because it needs long data testing period on the pilot building which is at present a work-in-progress.

B.4. Energy Efficiency Information Dissemination:

This activity entails the creation of a dissemination program to provide information about building EE to a widespread network of stakeholders, and an EE training network for the promulgation of information on building EE. The expected outputs include three BEE video on awareness of BEE, brochures and the awareness of a number of people on BEE. All the outputs were achieved as targeted with an estimated 3 million people influenced by BEE advertisement on the bus in Beijing.

B.5. Technology Advancement:

This activity involves the conduct of a research on different materials to improve insulation and wall systems, and to seek low-cost materials and equipment. The immediate output of the research effort will be the development of at least one commercially viable product. More importantly this sub-activity will point towards target standards that will help push a faster improvement in buildings EE.

A draft survey report on the energy saving building materials available in China has been prepared in May 2008.

Component C: Cross-Cutting Activities

(*Outcome 3:* National human capacity in Government, business, financial and technical organizations for realizing energy conservation in China increased

The common capacity building activities constitute Component C: Cross-cutting Activities (which include training, information, financial studies and application of policies and standards developed towards capacity building for provincial energy conservation centers in China. For the cross-cutting sector, activities are focused on capacity building of Energy Conservation Centers, strengthening the implementation of the Energy Conservation Law, research and implementation of energy conservation financing policies.

C.1 Strengthening the Energy Conservation Centers (ECCs)

The ECCs continue to play an important role in all facets of training, capacity building, enforcement, certification of buildings and products etc. The EUEEP will assist them so that they can continue to function as before despite the cutbacks due to government restructuring and market reform.

The following are the sub-activities and corresponding accomplishments that are included Activity C.1:

C.1.1 Energy Auditing and New Building Design Inspecting Capacity

Based on the outputs of Components A and B, energy audits will be conducted in selected enterprises in the industrial and buildings sectors and train energy professionals to play a role in standards enforcement. This activity is expected to turn in at least 140 high quality audits, and in-depth foreign training of selected staff on audits. There were actually 230 energy audits completed passing the quality standards set for the purpose.

C.1.2 Capacity Building for Conducting Training

In this activity, at least two ECCs and one Energy Conservation Association (ECA) are expected to be trained to conducting training on advanced energy efficiency courses. The target consists of 6 training courses and material designed with at least 1,200 copies (200 copies each) published in the following topics: Boiler and Steam EE; Building and Central Air Conditioning EE; Motor EE; Furnace EE; Heat insulation; and EE management and financial analysis.

The training courses were planned to be delivered by 4 Energy Conservation Centers (in Shandong, Sichuan, Shanghai and Beijing (total 26 training courses with 100 trainees each or a total of 2,600 participants).

As of the MTR, the following were accomplished:

- 6 training material produced on industrial boilers, motor system, building energy conservation and central air conditioning, industrial kilns, use of insulation material in buildings and energy management and financial analysis
- 3 training material currently undergoing acceptance appraisal
  - Industry furnace energy efficiency
  - Building insulation material and energy efficiency
  - Energy management
- More than 50 training courses delivered by trained trainers from local Energy Conservation Centers
- More than 5,000 participants were trained by Energy Conservation Centers

C.1.3 Capacity Building for Information Dissemination

Several ECCs are being established as leaders in the dissemination of energy efficiency information in this activity. It is expected that the following should have been accomplished by this MTR:

- EE information dissemination plan developed and approved
- Questionnaire / survey of information dissemination effectiveness developed
- 3 local EE websites established.
- Regular dissemination of EE policy and laws
- 3 EE databases for key energy used sectors established.
- Approved EE information dissemination plan implemented across China
- Annual survey of information service effectiveness

This sub-activity should have disseminated 12,000 information packages and such materials were utilized also with at least 75% satisfaction.

C.2. Implementation of the Energy Conservation Law (ECL)

Under this major activity is the development of detailed regulations and enforcement guidelines that will assist the implementation of the ECL. Based on the planned activities, the following should have been accomplished by June 30, 2008:

- Survey of national and local EC policy and law, by-laws and regulations completed by local experts.
- Analysis of national and local regulations on Energy conservation Law completed.
- Research on strengthening the implementation of the Energy Conservation Law and its regulations completed.
- 2 workshops on ECL amendment, including analysis and suggestions on policy and institutional issues
- Recommended measures to strengthen the implementation of ECL piloted

With the implementation of the ECL, it is expected that government buildings and state-owned enterprises will apply energy conservation and efficiency, that annual energy savings can be attributed from the government sector (buildings and

industries) and the private sector buildings and industries will likewise apply the same.

C.3 Policy Development on Energy Efficiency Financing Options

Under this activity, existing business models for financing of energy efficiency worldwide are being reviewed. Based on the results, piloting of at least one such model for use in China is included under the project. A strategy and plan will be developed for the pilot implementation in 2-3 local regions.

2. OBJECTIVES OF THE FINAL EVALUATION

Purposes of evaluation include understanding why and the extent to which intended and unintended results are achieved, and their impact on stakeholders. Evaluation is an important source of evidence of the achievement of results and institutional performance, and contributes to knowledge and to organizational learning. Evaluation should serve as an agent of change and play a critical role in supporting accountability. Evaluation can be used to improve the design and performance of an ongoing program (a formative evaluation); to make an overall judgment about the effectiveness of a completed program, often to ensure accountability (a summative evaluation); and to generate knowledge about good practices. It should help the UNDP-GEF to position itself to better address the pursuit of global environmental benefits. Evaluation differs from other oversight mechanisms, such as investigation and audit that focus on the adequacy of management controls; compliance with regulations, rules, and established policies; and the adequacy of organizational structures and processes.

Each full-sized project, like the EUEEP, should be evaluated at the end of implementation (or as early as six months before the official end of the project).

2.1 Main Purpose of the Final Evaluation of EUEEP Phase I

As defined in the GEF Monitoring and Evaluation (M&E) Policy, the purpose of the final evaluation is to analyze and assess the relevance, sustainability, impact and effectiveness of the strategies, project design, implementation methodologies and resource allocations that have been adopted for the purpose of achieving the objectives stated in the project document. An evaluation should provide evidence-based information that is credible, reliable and useful, enabling the timely incorporation of findings, recommendations and lessons into the decision-making processes.

The objectives of this Final Evaluation are in line with the following overarching objectives of the monitoring and evaluation of GEF projects:

a. Promote accountability for the achievement of GEF objectives through the assessment of results, effectiveness, processes and performance of the partners involved in GEF activities. GEF results will be monitored and evaluated for their contribution to global environmental benefits;
b. Promote learning, feedback and knowledge sharing on results and lessons learned among the GEF and its partners, as basis for decision-making on policies, strategies, program management, and projects and to improve knowledge and performance.

The specific objectives of the Final Evaluation of EUEEP Phase I are as follows:

- To identify and evaluate the constraints and problems, which have been or are being encountered, the effectiveness of resource utilization and the delivery of project outputs
- To identify and evaluate the constraints and problems, which have been or are being encountered, the effectiveness of resource utilization and the delivery of project outputs;
- To assess progress towards attaining the project's global environmental objectives per GEF Operational Programme concerned (OP No. 6).
- To assess policy, institutional and financial instruments which have been identified and developed at the local level to ensure long-term sustainability of project-initiated activities beyond the life of the programme;

2.2 Scope and Focus of Evaluation

The scope of the Final Evaluation covers the entire UNDP/GEF-funded EUEEP Phase I Project and its components as well as the co-financed components of the project based on the three expected outcomes:

Outcome 1: Removal of barriers to effective application and practice of energy efficiency in the industry and residential sectors of the Chinese economy

Outcome 2: Removal of barriers to effective application and practice of energy efficiency in the building sector of the Chinese economy

Outcome 3: National human capacity in Government, business, financial and technical organizations for realizing energy conservation in China increased

The evaluation should be done in line with GEF Guidelines for Implementing and Executing Agencies to Conduct Terminal Evaluations. Scope of assessment includes:

1. Achievement of outputs and outcomes, and assessment for targeted objectives and outcomes

    - review and summarization of project outputs as a basis for evaluating achievement of project outcomes;
    - assessment of project outcomes in accordance with project monitoring indicators established in the project document;
    - assessment of project outcomes in terms of relevance, effectiveness and efficiency as defined in the GEF Guidelines;
    - assessment and explanation of variances between planned and actual results;
    - assessment of project contribution to national development goals and strategies;
    - assessment of assumptions or risks in the project design that subsequently affected project implementation;
    - assessment of project achievements using reliable, representative measures of results that can be objectively verified.

2. Sustainability of project outcomes and assessment

    - assessment of project designed measures or strategy for sustaining project results;
    - review of policy and enabling environment factors that provide support for sustaining project results;
    - review of institutional capacity for sustaining project results;
    - consideration of financial and technical resources required for sustaining results

3. Describe any catalytic role or replication effect of the project

4. Monitoring and evaluation (M&E) systems. The Final Evaluation Report should include separate assessments of the achievements and shortcomings of the project M&E plan and of implementation of the M&E plan. In accordance with the GEF Guidelines, the following assessments will be undertaken by the Final Evaluation Team:

    - the existence and quality of the M&E Plan, including baseline conditions, methodology and roles and responsibilities;
    - the extent to which M&E were sufficiently budgeted and funded during project preparation and implementation;
    - the effectiveness of monitoring indicators from the Project Document for measuring progress and performance;
    - compliance with the progress and financial reporting requirements/schedule, including quality and timeliness of reports;
    - discussion with participants the value and effectiveness of the monitoring and evaluation reports and process;
    - follow-up action, or adaptive management, taken to respond to monitoring and evaluation reports.

5. Process that affected attainment of project results. The following issues affecting project implementation and attainment of project results shall be considered by the Final Evaluation Team:

    - Preparation and readiness for next phase of the program. This includes questions such: were the project objectives and components clear, practicable and feasible within its timeframe? Were lessons from other relevant projects properly incorporated in the project design?
    - Country ownership/drivenness.
    - Stakeholders involvement;
    - Financial planning;
    - Implementing/Executing Agency supervision and backstopping;
    - Co-financing and project outcomes and sustainability;
    - Delays and project outcomes and sustainability.

EUEEP being a multi-phase program, the Final Evaluation of EUEEP Phase I should include ratings on at least five (5) GEF Project Review Criteria. The following five (5) aspects are suggested: (1) Sustainability; (2) Outcome/Achievement of objectives (the extent to which the project's environmental and development objectives were achieved); (3) Implementation Approach; (4) Stakeholder Participation/Public Involvement; and (5) Monitoring & Evaluation.

The Final Evaluation Team should use a six-value rating system (Highly Satisfactory (HS), Satisfactory (S), Moderately Satisfactory (MS), Moderately Unsatisfactory-(MU), Unsatisfactory (U), and Highly Unsatisfactory (HU). The International Lead Consultant is expected to suggest the rating scheme most applicable to the situation to be discussed and agreed upon during the Opening Meeting.

The Final Evaluation Report should also present and analyze main findings and key lessons, including examples of best practices applicable to EUEEP Phase II and other similar projects. The evaluation team will present lessons and recommendations in the terminal evaluation report on aspects related to factors that contributed or hindered attainment of project objectives, sustainability of project benefits, innovation, catalytic effect and replication, and project monitoring and evaluation.

3. APPROACHES AND METHODOLOGY

The Final Evaluation Team is expected to become well versed as to the project objectives, historical developments, institutional and management mechanisms, activities and status of accomplishments. Information will be gathered through document review, group and individual interviews and site visits. Review relevant project documents and reports will be based on the following sources of information: review of documents related to the Project and structured interviews with knowledgeable parties

The Final Evaluation Team will conduct an opening meeting with the National Project Director (NPD), Project Management Office (PMO), MOHURD, MOST, CICETE, and MINFIN to be followed by a De-briefing "exit" Meeting to discuss the initial findings of the assessment prior to the submission of the draft Final Report.

Prior to engagement and visiting the PMO, the Final Evaluation Team shall receive all the relevant documents including at least:

- EUEEP Project Document and Project Brief
- Inception Report
- Reconstituted EUEEP Logical Framework
- Annual Work and Financial Plans
- Annual Project Report/Project Implementation Review (API/PIR) for 2006 up to 2009

To provide more details, as may be needed, the following will be made available for access by the MTR Evaluation Team:

- Executive summary of all quarterly reports
- Internal monitoring results
- Terms of Reference for past consultants' assignments and summary of the results
- Past audit reports

The Final Evaluation Team should at least interview the following people:

- National Project Director

- National Project Manager
- PMO Director
- Assistant PMO Director
- International Chief Technical Advisor
- Project Component Managers
- Project Administrative Officer
- Project Financial Officer
- NPCC Members (representatives from Ministry of Construction, Ministry of Finance, Ministry of Science and Technology)
- UNDP Country Office in China in-charge of the EUEEP
- EUEEP Focal Points in participating cities in China

With the aim of having an objective and independent evaluation, the Final Evaluation Team is expected to conduct the project review according to international criteria and professional norms and standards as adopted by the UN Evaluation Group and covered by the GEF M&E Policy.

In pursuit of the above, the following key issues should be included and carefully looked at:

Component/Project Level

At the component and project level, the following issues should be covered:

- An analysis of the attainment of global environmental objectives, project objectives, delivery and completion of project outputs/activities, and outcomes/impacts (based on indicators).
- Evaluation of project achievements according to GEF Project Review Criteria:
    1. Implementation approach
    2. Country ownership/Drivenness
    3. Stakeholder participation
    4. Sustainability
    5. Replication approach
    6. Financial planning
    7. Cost-effectiveness
    8. Monitoring and evaluation

Program Level

- Changes in the enabling environment such as policy changes, increasing stakeholder involvement, alternations in institutional capacity
- Within the life of project implementation, how has the state of end use energy efficiency application in China changed?
- What has been the contribution of this UNDP/GEF-supported project to those changes?
- Impact: Aside from direct and obvious impacts, the project may have generated indirect or collateral impacts. These are difficult to quantify, but may be usefully illustrated according to types and examples and evaluated using narrative approaches, through case studies, evaluations, for example. A few examples of indirect or **collateral impacts** of GEF activities include:

    - *Political influence:* Contributing to an enhanced political profile that support energy efficiency program in China;
    - *Enhancement of information and access to it:* Generating and disseminating information on end use energy efficiency and its status that contributes to the global and regional information base

- *Replication*: Promoting the adoption of successful GEF approaches in other locations and projects
- *Catalytic effects*: Generating other positive steps, catalyzing state legislation that is outside the project's objectives
- *Financial leverage*: Prompting the availability of new and additional resources and co-financing,
- *Synergy*: Fostering positive synergies across conventions and focal areas.
- *Empowerment:* Boosting the stature and power of focal points through finance, information, and projects

The International Lead Consultant, in behalf of the Team, is responsible for agreeing on evaluation methodologies for data verification during the field visits and stakeholder meetings (questionnaires, surveys, interview techniques etc) and presenting them to UNDP before the country visits commence for endorsement.

The approaches and methodology to be employed by the Final Evaluation Team in undertaking the evaluation will include:

1. Develop an Evaluation Work Plan for the evaluation indicating the schedules;
2. Brief and debrief UNDP-CO, the National Development and Reform Council, the PMO, members of the National Project Coordinating Committee (NPCC) and relevant key stakeholders, if deemed necessary;
3. Complete a desk review of the relevant documents regarding the project;
4. Conduct interviews with relevant project management staff, NDRC and UNDP officers, and key stakeholders and other groups as necessary.
5. Conduct field visits in the three Cities in China involved in the EUEEP for on-site evaluation, field interviews and information gathering on project management and other related activities.

4. FINAL EVALUATION TEAM

The Final Evaluation Team will be composed of one (1) International Lead Consultant and two (2) National Consultants. The Team is expected to combine international standards of evaluation expertise, excellent knowledge of the end use Energy Efficiency (EE) and Climate Change projects and national context of energy efficiency project and program implementation as applied to the EUEEP.

At the minimum, the members of the Final Evaluation Team shall have the following professional background and responsibilities:

International Lead Consultant - one person

Numbers of Mission Work-days: Around twenty (20) work-days
No. of Missions to China: 1 time
Location of Work: Beijing and other selected cities in China with major EUEEP involvement

Profile

- Post-Graduate in Engineering, Management or Business
- Minimum of ten years accumulated and recognized experience in energy efficiency and climate change projects
- Minimum of five years of project development, evaluation and/or implementation experience in the result-based management, logical framework approach and other strategic planning approaches, M&E methods and approaches (including

quantitative, qualitative and participatory), Planning, design and implementation of M&E systems, adaptive management and UNDP or GEF Monitoring and Evaluation Policy
- Familiarity in economic and social development issues in similar country or regional situations relevant to that of China
- Experience with multilateral and bilateral supported EE/RE and climate change projects
- Comprehensive knowledge of international EE/RE industry best practices
- Very good communication and report writing skills in English
- Team work spirit
- Professional experiences in working in China and with Chinese counterparts will be a plus

Responsibilities

- Documentation of the review process and results, including cross-cutting activities under Component C.
- Leading the Final Evaluation Team in planning, conducting and reporting on the evaluation.
- Deciding on division of labor within the Team and ensuring timeliness of reports
- Use of best practice evaluation methodologies in conducting the evaluation
- Leading the preparation and presentation of the draft evaluation findings and recommendations in-country
- Conducting the debriefing for the UNDP Country Office in Beijing and the EUEEP Project Management Office.
- Leading the drafting and finalization of the Final Evaluation Report.

B. National Consultants – Two (2) persons, one for each Project Component, Component A & B

Numbers of working days: At least twenty (20) work-days
Location of Work: Beijing and other selected cities in China with major EUEEP involvement

Profile

- Post-graduate in engineering, management or business, or college degree in said areas with at least ten years of project development and implementation.
- A minimum of five years of project management experience in EE/RE or related climate change projects
- EE/RE and climate change training and technical experience
- Knowledge of EE/RE industry and projects
- Multilateral and bilateral funded project development and implementation
- Familiarity with energy conservation, end use energy efficiency and related areas of national development policies, programs and projects.

Responsibilities

- Documentation review, data gathering, analysis and reporting under the assigned Component
- Contribution to the development of the final evaluation plan and methodology
- Conduct of those elements and activities of the final evaluation determined by the International Lead Consultant
- Contribution to preparation and presentation of the evaluation findings and

recommendations at the evaluation wrap-up meeting
- Contribution to the drafting and finalization of the Final Evaluation Report.

The members of the Final Evaluation Team must be independent from both the policy-making process and the delivery and management of the UNDP/GEF assistance. Therefore, candidates who had any direct involvement with the design and implementation of the EUEEP Project will not be considered.

5. IMPLEMENTATION ARRANGEMENTS

5.1 Deliverables

The Final Evaluation Team is expected to deliver the following outputs:

1. A proposed evaluation work plan for the evaluation period indicating the suggested schedules to be presented by the International Lead Consultant during the Opening Meeting with the UNDP representatives, NDRC Officials and the PMO for the Final Evaluation process to agree on the implementation arrangements of the process and necessary coordination among parties involved to be submitted as an Inception Report;
2. A power point presentation of the initial findings of the Final Evaluation to be presented by the International Lead Consultant during the De-briefing Meeting at the end of the Evaluation Mission
3. A draft Final Evaluation Report to be submitted to UNDP China and the PMO (following the format outlined in this TOR), including a discussion on the special issues on the preparedness of the EUEEP Program for the EUEEP Phase II Project and ;
4. A final Terminal Evaluation Report addressing the comments and recommendations of PMO, the UNDP China and NDRC within 15 days from receipt of the draft Final Evaluation Report.

UNDP China Office shall be the main operation point for the evaluation, which shall be responsible for liaising with the independent Final Evaluation Team and relevant persons involved. It shall, in coordination with the EUEEP PMO, set-up the stakeholders' interviews and meetings, arranging field visits in coordination with EUEEP focal points outside Beijing and receiving and accepting the compliance requirements of the deliverables more specifically defined in the individual members of Evaluation Team's Professional Service Contracts. It shall ensure the timely provision of travel arrangements, DSA, professional fees in accordance with the contract to be entered with the CICETE. The NDRC/EUEEP PMO shall provide all project documents and necessary data for review of the evaluators to be available at EUEEP PMO Office. It shall provide the necessary logistical support (for field arrangements and stakeholders interviews and meetings).

5.2 Timetable

The Final Evaluation will be conducted for a period of twenty (20) working days. To fully capture the range of activities and assess significantly the results and impacts, it is planned that the final evaluation process starts around April 2010 and complete the Final Evaluation Report by May 2010.

Benchmarks	Timeline
a) Establish TOR of final evaluation experts(international and national experts) as approved by the NDRC and UNDP for announcement in relevant websites	February 2010
b) Carry out the recruitment process	March 2010
c) Carry out the Final Evaluation activities	
• Opening Meeting and approval of the Evaluation Work Plan and Implementation Arrangements	April 14, 2010
• Final Evaluation Inception Report containing the approved Work Plan and Implementation Arrangements	April 16, 2010
• Final Evaluation Meetings, data gathering, interviews and report preparation	April 19 – 30, May 2010
• De-briefing Meeting on the initial findings of the Final Evaluation presented in MS Power Point Presentation	May 14, 2010
d) Submit the draft Final Evaluation Report to UNDP China and PMO	May 21, 2010
e) Submit written feedback from UNDP China and PMO based on NDRC approval	May 28, 2010
f) Submit Final Evaluation Report incorporating written feedback from UNDP China and PMO based on NDRC approval	June 4, 2010

In case of further written comments on the final draft from any of the partners or stakeholders, the UNDP GEF Regional Office will acknowledge and assess whether these should be annexed to the report. The final report will not be revised at that stage.

Appendix B – List of Persons Interviewed and Documents Reviewed

Beijing			
#	**Respondent's name**	**Respondent's position**	**Organization**
1	Mr. Xin Sheng	Assistant Director	EUEEP Project Management Office (PMO)
2	Ms. Ma Jinjin	Project Manager	
3	Mr. Pan Zhiming	Project Manager (Buildings Component)	
4	Ms. Wang Chunli	Project Manager (Cross-Cutting Activities)	
5	Mr. Roger Aldover	Chief Technical Advisor	
6	Ms. Yu Cong	Director, PMO	NDRC
7	Mr. Wang Jing Bo	National Project Manager	
8	Ms. Liu Zhiping	Director, Energy Research Institute	
9	Ms. Shijun Liu	Programme Manager, Energy & Environment Team	UNDP China
10	Ms. Yang Chunling	Deputy Secretary-General	China Chemical Energy Conservation Association (CECA)
11	Mr. Zhou Jicheng	Director	Central Iron & Steel Institute
12	Dr. Tony Cheng	Professor	China National Institute of Standardization
13	Zhulin	Deputy Chief of Training	ESCO Committee

Field visits, demonstration sites			
#	**Respondent's name**	**Respondent's position**	**Organization/ location**
1	Ms. Zhong Lingying	Director Minister	Jiangsu Energy Conservation Center (JECC) Nanjing Energy Conservation Center (NECC)
2	Mr. Ma Wuzhong	Director, Senior Engineer	
3	Mr. Ding Bo	Deputy Director	
4	Mr. Liang Sensen	Deputy, Section Chief Engineer of the Department of International Project	
5	Mr. Li Xiao	Clerk of Department of International Project	
6	Ms. Tang Lu	Clerk of Department of International Project	
7	Ms. Jin Di	Translator	

8	Mr. Cao Xiangdong	Director	Nanjing Energy Conservation Center (NECC)
9	Mr. Zhang Wencai	Senior Engineer	Nanjing Iron & Steel United Group
10	Mr. Jiang Xiaochun	Deputy Manager General	Nanjing Xinsu Thermal Power Company Limited
11	Mr. Li Cheng Zong	Vice Section Chief	Bureau of Housing & Construction of Shenzhen Municipality
12	Ms. Wang Xiangyi	Secretary General	Shenzhen Green Building Association
13	Dr. Chen Ze Guang	Vice Dean	Shenzhen Institute of Building Research
14	Mr. Mao Hongwei	Deputy Director of R&D Center	
15	Mr. Liu Zongyuan	Engineer and Attache, Office of Board	
16	Mr. Yan Tao	Deputy Manager of Research Department	

Total number of respondents involved: **29**

Documents reviewed for this evaluation includes:

1) UNDP Project Document for "China: End Use Energy Efficiency Project", 2004;

2) All EUEEP APR and PIR reports;

3) UNDP Report, "China: End Use Energy Efficiency Project - Mid-Term Evaluation Report", January 2009;

4) EUEEP Training Manuals (deliverables from Contract Nos. C01 to C06);

5) Government of China, "Energy Conservation Law of the People's Republic of China, April 2008;

6) Ernest Orlando Lawrence Berkeley National Laboratories, "Energy Efficiency Improvement Opportunities for the Petroleum Refining Industry", Environmental Energy Technologies Division, August 2006;

7) Ernest Orlando Lawrence Berkeley National Laboratories, "Energy Efficiency Improvement Opportunities for the Iron & Steel Industry", Environmental Energy Technologies Division, May 2006;

8) Ernest Orlando Lawrence Berkeley National Laboratories, "Energy Efficiency Improvement Opportunities for the Cement Industry", Environmental Energy Technologies Division, January 2008.

Appendix C – Mission Itinerary

The evaluation mission composed of an international consultant Mr Roland Wong and two national consultants in accordance with the objectives of the evaluation and obtained data relevant for making judgments regarding Project success and lessons learned.

***April 26, 2010** (Monday)*			
#	**Activity**	**Stakeholder involved**	**Place**
	Arrival of Mr. Roland Wong		Beijing
***April 27, 2010** (Tuesday)*			
1	Discussion of Mission Schedule and Logistics with Ms. Ma Jinjin, Project Manager, and briefings from Mr. Roger Aldover, CTA	PMO	Beijing
***April 28, 2010** (Wednesday)*			
2	Briefing on EUEEP by Ms. Shijun Liu, Programme Manager UNDP	UNDP	Beijing
3	Further discussion of Project outcomes with Ms. Ma Jinjin	PMO	Beijing
***April 29, 2010** (Thursday)*			
4	Discussions with Mr. Xin Sheng and Mr. Roger Aldover on Project outcomes	PMO	Beijing
***April 30, 2010** (Friday)*			
5	Briefing on EUEEP by Mr. Xin Sheng, Assistant Director EUEEP, National Project Manager (from NDRC), Mr. Wang Jin Bo and PMO Director (from NDRC), Ms. Yu Cong	NDRC and UNDP	Beijing
May 1 to 9, 2010 – May Day holidays			
May 10, 2010 (Monday)			
	Mr. Roland Wong returns to Beijing to resume Final Evaluation Mission		Beijing
6	Further discussion with Ms. Ma Jinjin on industrial sector activities	PMO	Beijing
***May 11, 2010** (Tuesday)*			
7	Discussions with Mr. Pan Zhimpan, Project Manager for Buildings Component	PMO	Beijing

***May 12, 2010** (Wednesday)*			
8	Discussions with Ms. Wang Chunli, Project Manager for Cross-Cutting Component and Ms. Ma Jijnjin	PMO	Beijing
***May 13, 2010** (Thursday)*			
9	Discussions with Ms. Liu Zhiping (ERI-NDRC), Ms. Yang Chunling (CECA) and Mr. Zhou Jicheng (Central Iron & Steel Research Institute) on EUEEP benefits to catalyzing EE in the industrial sectors	NDRC, CECA, Central Iron & Steel Research Institute	Beijing
10	Discussion with Dr. Tony Cheng on standards and labelling programs on EUEEP	China Institute of Standardization	Beijing
11	Discussion with Mr. Zhulin on ESCO training and future of ESCOs in China	ESCO Committee	Beijing
***May 14, 2010** (Friday)*			
12	Review of industrial and cross cutting activity subcontracts, and further discussions with Mr. Xin Sheng, Ms. Ma Jinjin and Ms. Yang Chunling on these subcontract outcomes	PMO	Beijing
***May 16, 2010** (Sunday)*			
13	Departure for Nanjing @ 15:00	JECC/NECC	Nanjing
***May 17, 2010** (Monday)*			
14	Meeting with key representatives from the Jiangsu and Nanjing Energy Conservation Centers led by Mr. Ding Bo (Deputy Director), Mr. Ma Wuzhong (Director, Senior Engineer) and Mr. Liang Sensen (Deputy Section Chief Engineer) on activities of these ECCs and their EE projects (09:30 to 12:00)	JECC/NECC	Nanjing
15	Visit to the Nanjing Steel Company facilities to view efficient motors for water pumps and generation of power from hydraulic head available in water cooling structures (14:00 to 17:00)	Nanjing Steel Company (demonstration sites for efficient motors)	Nanjing
	Departure from Nanjing to Shenzhen @ 18:40		
***May 18, 2010** (Tuesday)*			
16	Site visit and briefing of EE building demonstrations at the Shenzhen Institute of Building Research	Bureau of Housing and Construction of Shenzhen Municipality, Shenzhen Institute of Building Research	Shenzhen
	Departure from Shenzhen to Beijing		

***May 19, 2010** (Wednesday)*			
#	**Activity**	**Stakeholder involved**	**Place**
17	Review of assessment of building component subcontracts		Beijing
***May 20, 2010** (Thursday)*			
18	Preparation of draft FE report and presentation of evaluation findings and recommendations		Beijing
***May 21, 2010** (Friday)*			
19	Presentation of Final Evaluation mission findings to UNDP and NDRC at UNDP China offices	UNDP, NDRC	Beijing
***May 31, 2010** (Monday)*			
20	Meeting with PMO to discuss recommendations for post-Phase I EUEEP activities	PMO	Beijing
***June 1, 2010** (Tuesday)*			
21	Departure of Roland Wong from Beijing		

Total number of meetings conducted: **21**

Appendix D – Listing and Brief Assessment of Subcontracts

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
A01	Energy Research Institute / China Energy Conservation Association	Sept. 1, 2007 – June 30, 2009	Organize and Coordinate the Energy Conservation Agreement Activities Implementation	Benchmarking guideline on energy efficiency for key energy consuming industries	Significant improvement in energy efficiency was seen for the enterprises involved the project. Nine sectors involved with ECAs Benchmarking is a very useful tool for Chinese enterprises to improve their performances in energy conservation. The improvement of energy performance could be achieved by technical renovation, management improvement, etc.	Subcontracts A01 - A04 are from a cluster project. The purpose of the cluster project is to support the energy conservation agreement in three sectors. The targets of the projects have been achieved. The outputs of these projects help the implementation of benchmarking in key energy uses. Through the activity, enterprises identified their potential of energy conservation. Their energy management was strengthened. The efficiencies of energy utilization were improved. In relevant activities, enterprises spent more than 35 million USD in technical renovation and management. The energy saving amount reached 2.55 million TCE. The guidelines could be used in more enterprises in these industrial sectors. They also provide a model for designing guidelines for other

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
						sectors More guidelines should be developed in other sectors.
A02	Central Iron & Steel Research Institute	Dec. 1, 2007 – June 30, 2009	Organize and Coordinate the Energy Conservation Agreement Activities implementation in the Iron and Steel industry	Benchmarking guideline on energy efficiency for iron and steel enterprises	See above Sector associations could play key role in formulating the benchmarking guideline in relevant sectors.	See above
A03	China Chemical Industry Energy Conservation Technique Association	Sept. 1, 2007 – June 30, 2009	Organize and coordinate the Energy Conservation Agreement implementation in the chemical industry	Benchmarking guideline on energy efficiency for chemical enterprises(caustic soda)	See above Sector associations could play key role in formulating the benchmarking guideline in relevant sectors.	See above
A04	China Cement Association	Sept. 1, 2007 – June 30, 2009	Organize and coordinate the energy Conservation Agreement implementation in the cement industry	Benchmarking guideline on energy efficiency for cement enterprises	See above Sector associations could play key role in formulating the benchmarking guideline in relevant sectors.	See above
A05	China Cement Association	Sept. 15, 2006 – Dec. 31, 2007	Development and promotion of cement	Design Code on Energy Conservation for Cement Plants	The Design Code could help the cement industry to improve their energy	This Design Code is the first one on energy conservation for cement plants. It was promulgated by

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
			energy efficiency design code		conservation performance. Cement plants were very interested in adopting the Code. Similar codes could be developed in other sectors.	Chinese government on Oct. 25, 2007, and enacted on May 1, 2008. This Code has been applied for more than 400 newly built or renovated cement production line. Significant benefits on energy conservation have been achieved. This Design Code could provide a good model for other sectors. Similar codes could be developed in other sectors.
A06	Tsinghua University / Institute of Electrical Engineering, China Academy of Science / China Power Saving & Green Power Committee	Sept. 15, 2006 – June 30, 2010	Establish and demonstrate the implementation of optimization design criteria for existing and new motor systems	Guideline on optimization design for motor system (submitted for approval)	The Guidelines are suitable for use in training for each industrial sector. The subcontractor delivered training to demonstrate significant energy savings can be achieved through the use of the Guidelines.	The subcontractor has achieved significant success. The guideline on optimization design for motor system has been submitted to the government for approval. Trainings were conducted for more than 1000 design technicians in the four sectors in seven provinces. This subcontract could also serve as a good model for other areas aside from motor system optimization design, and guidelines could be developed for other equipment in other industrial sectors such as cement, petrochemical, iron

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
						& steel and power
A07	ESCO Committee of China Energy Conservation Association	Sept. 15, 2006 – Dec. 31, 2008	Support for capacity building for motor systems energy service companies	• Finance lease plan for motor system energy conservation in China (draft) • Implementation plan on governmental subsidy for pilots on motor system energy conservation in China (draft) • Implementation Manual for Motor System Energy Conservation • Assessment report on motor systems energy conservation • Case study of actual demonstrations	ESCO is new in China. Capacity building is essential for its development. Government's support is important in the development of ESCO. The government may provide financial supports for ESCO's projects. 120,000 tce annual energy savings could be realized through these 16 demonstrations (320,000 tonnes carbon annually)	This project has helped to promote the development of motor systems energy conservation service organizations. These two reports could help the government to consider financial support on motor system energy conservation activities. Recently, the government is considering the introduction of more incentives to promote the development of ESCO. This project provided a good model for such support. During EUEEP, 16 demonstration projects on motor system energy saving was implemented saving an estimated 4 Mtce.
A08	China National Institute of Standardization	Dec. 14, 2006 – Dec. 31, 2008	Development of Energy Efficiency standards for industrial energy use equipments	• Implementation Code for Motor Energy Efficiency Labelling • Power Transformer Energy Efficiency Limit Value and Grade (Submitted for approval)	Energy efficiency standards and labelling could help increase market share of EE products. The number of energy efficiency standards and labels needs to be increased.	Significant achievements have been made. Upon the closing of the project, the market shares of the five energy conservation home electrical appliances have increased to 10% (based on the Institute's consumer surveys) The standards developed are set for

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				• Industrial Boiler Energy Efficiency Standard (Submitted for approval) • Air Compressor Energy Efficiency Standard (Submitted for approval) • Fan Energy Efficiency Standard (Submitted for approval)		key energy consuming equipment; therefore, the project is very important. The formulation of these standards is a good start. It is helpful for developing other similar standards. More energy efficiency standards and labels are needed.
A09	China Standard Certification Center	Dec. 14, 2006 – Dec. 31, 2008	Energy Efficiency Certification (labelling) for industrial energy use equipments	• Frequency Converter Implementation Code • Industrial Sewing Machine Energy Conservation Certificate Technical Requirement • Analysis on the priorities of industrial equipment energy conservation certification • Clean water pump procurement guideline • Three-Phase Motor	Energy efficiency certification could improve energy conservation performances, and increase competition ability in the market. More energy efficiency certifications and labelling should be developed. Government procurement could play a role to stimulate the application of the certificates and labels.	This project has accelerated implementation of energy efficiency certification policy. The formulation and revision of the certification implementation rules for selected products provided a sound basis for energy conservation certification of these products. This project has provided a good start of energy conservation certification and energy conservation labeling. It could help the industry to improve their energy conservation awareness and increase market share. More energy efficiency certifications

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				Energy Conservation Certificate Specification • Clean Water Pump Energy Conservation Specification • Three-phase asynchronous motor procurement guideline		and labeling should be made.
A10	China National Institute of Standardization	Dec. 14, 2006 – Dec. 31, 2008	Development of EE standards for commercial & residential energy use equipments	• Inverter Air Conditioner Energy Efficiency Standard • Computer Monitors Energy Efficiency Standard • Water Heater Energy Efficiency Standard • Multi-link Air Conditioner Energy Efficiency Standard • Copy Machine Energy Efficiency Standard • Auto Cooker Energy Efficiency Standard	Energy efficiency standards could increase the sales of relevant products significantly, and thus could contribute to the energy conservation. More energy efficiency standards should be developed.	This project developed 8 energy efficiency standards. It upgraded China's energy efficiency standard level significantly. It also provided a technical basis for the implementation of energy efficiency label and energy conservation product certification systems. During the formulation of these standards, a number of institutions, experts, enterprises were involved, creating a strong team on energy efficiency standards. The energy conservation and carbon reduction effects have been estimated for the 8 standards. They could help achieve China's energy

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				• Microwave Oven Energy Efficiency Standard		conservation targets. More energy efficiency standards should be developed.
A11	China Standard Certification Center	Dec. 14, 2006 – Dec. 31, 2008	EE labelling for commercial and residential energy use equipments	• Gas heater energy conservation procurement guidelines • Implementing rule for gas heater • Technical specification on road lighting system energy conservation certification • Implementation rule for cold water units energy efficiency labelling • Implementation rule for self-ballasted fluorescent lamps energy efficiency labelling • Implementation rule for high pressure sodium lamp energy efficiency labelling • Analysis on the priorities of commercial and residential products	The establishing of the certificates and labels has been demonstrated a success, which could promote the sales of energy conservation products on the market. Report on the increased sales of labelled EE products More labels and certificates should be established.	Subcontract was a success in that the project prioritized implementing energy conservation certification and energy efficiency labelling for commercial and residential products. Some of the products involved in this project were included in the government priority procurement catalogue. The researchers in this project also conducted an integrated awareness raising program on energy conservation products to the market. This project serves as a good model to develop more energy efficiency labels and certificates. Efforts such as government procurement should also be used to promote the sale of labelled EE products.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				on energy conservation		
A12	China Energy Conservation Association	July 31, 2008 – June 30, 2009	Current situation, potential and policy recommendations targeting energy conservation in China	Report on the analysis of current situation, potential and policy recommendations on electricity saving in China (Draft)	The exiting problems of energy conservation were identified. Results of the study showed that the potential of energy conservation is huge. Incentives from government are essential for energy conservation.	This project provided a very detailed analysis on current situation, potential and policy recommendations on electricity saving in China, which are helpful for both government and enterprises to adopt adequate measures to promote energy conservation in China.
A13	China National Institute of Standardization	Dec. 1, 2007 – June 30, 2009	Development of the China Energy Saving Product Catalogue	• Investigation report on the incentives toward energy conservation products in China and abroad • Research report on the framework of Catalogue of Energy Conservation Products in China • Catalogue of Energy Conservation Products in China (First) • Policy recommendations for the	Catalogue is widely used in China to promote energy conservation and pollution reduction for government, enterprises and consumers. Incentives must be provided to support the use of the products and techniques listed in the catalogue. A good catalogue needs to be updated regularly.	The Energy Saving Product Catalogue could help the spreading of energy conservation products and techniques, and increase the energy efficiency significantly. The formulation of the catalogue could provide good experiences to include more products in the catalogue. Policy recommendations consisted of subsidies and other incentives to make the catalogue more useful. The catalogue needs to be updated in the 12th FYP.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				implementation of the Catalogue of Energy Conservation Products in China (First)		
A14	Transport Planning and Research Institute, Ministry of Transport	June 10, 2009 – Dec. 31, 2009	Policy study on the promotion of energy conservation on logistics	Research report on the measures toward establishing logistics information platform in China	Energy conservation through logistics is new. More studies should be carried out. The study has demonstrated that logistics could play important role in energy conservation. Logistics information platform is a useful tool to promote energy conservation.	The study report of this project provided a detailed analysis on the measures toward establishing logistics information platform in China, which could help achieve energy conservation effects in logistics area. A14 is just a preliminary study. More detailed and specific study should be carried out, such as the selection of transportation manners through energy using analysis.
A15	International Copper Association	Dec. 1, 2007 – May 31, 2009	Education and training on motor system energy conservation	Training materials and 7 training summaries	Totally 11 trainings were organized. More than 2000 trainees attended the training, which came from ECCs, enterprises, government agencies from 6 provinces.	Trainings workshops and training materials were useful in the adoption of motor system energy conservation. More training of trainers is recommended.
A16	Energy Research Institute	July 31, 2008 – June 30, 2009	Energy conservation potential and realization for small and	• Report on the evaluation and analysis for international experiences on	Small and medium size enterprises have great energy conservation potential.	In China, the energy conservation in small and medium size enterprises are extremely important since their number is large, their energy efficiency is extremely low. The

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
			medium size enterprises in energy intensive industry	energy conservation in small and medium size enterprises in energy intensity sectors • Report on the energy conservation potential and realization measures for small and medium size enterprises in energy intensity sectors • Research on the incentives promoting energy conservation in small and medium size enterprises in energy intensity sectors	Good policy incentive could play significant role for energy conservation in small and medium size enterprises. It is more difficult to implement energy conservation in small and medium size enterprises than large enterprises. The policy system should be designed carefully.	outputs of this project could help identify the energy conservation potential in these enterprises and realize the energy conservation targets. The study team also carried out very detailed case studies for selected enterprises. These analyses are also very useful. It is strongly recommended that during the 12th Five-year Plan period, energy conservation in small and medium size enterprises should be taken as a priority.
A17	Beijing Century Zhongneng Information Technique Co. Ltd.	July 31, 2008 – June 30, 2009	Evaluation on the performance of the Top-1000 Energy Conservation Program	• Investigation report on typical enterprises involved in the Top-1000 Enterprises Energy Conservation Program • Report on the measurement of	The Top-1000 enterprise energy conservation program has achieved significant success. A methodology of measurement of energy conservation amount has been developed, which could	Top-1000 Enterprises Energy Conservation Program is one of the most important tools taken by Chinese government to realize the energy conservation targets of the 11th Five-year Plan. This study is thus extremely important to help identify the success or failure of the program.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				energy conservation amount for the Top-1000 Enterprises Energy Conservation Program • Report on the performances of Top-1000 Enterprises Energy Conservation Program	help to evaluate the performances of enterprises involved in the Top-1000 Program. Target of 11th 5-year plan saved 100 million tce of energy during the 5 year plan for top 1000 enterprises achieved in 3 years	The measurement of energy conservation amount is a key step for the policy of "awarding based on the energy conservation amount", which was taken by the government in recent years. The methodology study is thus very important.
A18	National Institute of Metrology	July 31, 2008 – June 30, 2009	Supervision and inspection on the implementation of energy efficiency labelling	• Report on refrigerator energy efficiency test, and Report on the supervision and inspection on the implementation of energy efficiency labelling • Report on air conditioner energy efficiency test, and Report on the supervision and inspection on the implementation of energy efficiency labelling • Report on washing machine energy	Supervision and inspection could help find existing problems and promote the development of energy efficiency labelling system. Results showed that energy efficiency label system has achieved significant success.	This study was useful for government to find problems in the implementation of energy efficiency labelling and improve its performance. This study calculated the changes of sales of three kinds of products in different energy efficiency grades, which are important data to evaluate the implementation results of the energy efficiency labelling.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				efficiency test, and Report on the supervision and inspection on the implementation of energy efficiency labelling		
A19	China National Institute of Standardization	June 10, 2009 – Dec. 31, 2009	Formulation of financial subsidy program for the spreading of high efficiency energy conservation products	• Research report on the market of high efficiency energy conservation products • Management Measures for Financial Subsides on High Efficiency Energy Conservation Products (Final)	The Management Measures have been adopted and promulgated by the government. Financial subsidy could stimulate the use of high efficiency energy conservation products A detailed subsidy plan is needed to implement the subsidy.	In this study, the researchers made a policy recommendation on using incentives such as financial subsidies to promote the spreading of high efficiency energy conservation products. This could help these products take more share in the market and reduce the energy consumption. A detailed implementation rule for the subsidies was also developed, which make the policy more applicable. The findings of the study have been adopted by the government. More studies are required to evaluate if more products should be involved in the subsidy program.
A20	China Quality Certification Center	June 10, 2009 – Dec. 31, 2009	Formulation of Management Measures on High Efficiency	• Research report on the high efficiency motor sector • Management	See above.	The study team's "Management Measures on High Efficiency Motors Promotion Subsidy Fund" provided very detailed policy

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
			Motors Promotion Subsidy Fund	Measures for Financial Subsides on the Promotion of High Efficiency Motors (Final)		recommendations to push the using of high efficiency motors
A21	China National Institute of Standardization	June 10, 2009 – Dec. 31, 2009	Formulation of Management Measures on High Efficiency Air Conditioner Promotion Subsidy Fund	• Research report on the high efficiency energy conservation air conditioner • Management Measures for Financial Subsides on the Promotion of High Efficiency Energy Conservation Air Conditioner	See above	A policy recommendation was made on using incentives such as financial subsidies to promote the spreading of high efficiency air conditioner and could help the product take more share in the market and reduce the energy consumption. Detailed implementation rules for the subsidies were made and found to be useful. See also above
A22	CECIC Blue-Sky Investment Consulting & Management Co., Ltd	June 10, 2009 – Dec. 31, 2009	Development of the Key Energy Saving Techniques Promotion Catalogue (Second)	• Investigation on the application of key energy conservation techniques • Catalogue of Key Energy Conservation Techniques (Second)	Catalogue is widely used in China to promote energy conservation in industry. Incentives must be provided to support the use of the products, techniques in the catalogue. Good evaluation and inspection are also essential. A good catalogue needs to	The team developed the Key Energy Saving Techniques Promotion Catalogue to promote the spreading of key energy conservation techniques, and encourage enterprises to adopt advanced new techniques and new equipments. The catalogue needs to be updated regularly.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
					be updated regularly.	
A23	Industrial Economy Research Academy, Xinjiang Autonomous Region	Nov. 10, 2009 – June 30, 2010	Study on the energy conservation potential and the realization of energy conservation targets of the 11th Five-year Plan in Xinjiang	Report on the energy conservation potential and the way to realize 12th Five-year Plan in Xinjiang (Draft)	A23-A26 These provinces have great potential in energy conservation. With good policy measures, they can improve their performances significantly. The industrial structures are different in these provinces; therefore, measures should be different. The study could help other provinces in western China to develop their energy conservation plan	A23-A26 are four studies to help 4 provinces in western areas to identify the potential of energy conservation and provide policy recommendations for them to realize the energy conservation targets of the 11th Five-year Plan. Since the four provinces are all located in western areas and the ability and personnel are relatively weak, the studies could play important roles to help them realize the targets. In addition, it is also very important to help these provinces to create their own teams in energy conservation area. More provinces in western areas could be involved.
A24	School of Economy, Sichuan University	Nov. 10, 2009 – June 30, 2010	Study on the energy conservation potential and the realization of energy conservation targets of the 11th Five-year Plan in Sichuan	Report on the energy conservation potential and the way to realize 12th Five-year Plan in Sichuan (Draft)	See above	See above

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
A25	Engineering Consulting Center of Qinghai Province	Nov. 10, 2009 – June 30, 2010	Study on the energy conservation potential and the realization of energy conservation targets of the 11th Five-year Plan in Qinghai	Report on the energy conservation potential and the way to realize 12th Five-year Plan in Qinghai (Draft)	See above	See above
A26	Energy Research Institute	Nov. 10, 2009 – June 30, 2010	Study on the energy conservation potential and the realization of energy conservation targets of the 11th Five-year Plan in Hainan	Report on the energy conservation potential and the way to realize 12th Five-year Plan in Hainan (Draft)	See above	See above

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
B01	Center of Science and Technology of Construction Ministry of Construction, P.R.China	Sep.1, 2007 - Jun.30,2009	Collection of Data on Building Energy Use As a Basis for Setting and Assessing Impacts of Standards	1. Subcontract summary report. 2. Statistical indicator system for energy consumption of residential buildings. 3. Report on the statistical data analysis of the energy consumption of residential buildings in four cities. 4. Report and explanation on the statistical test of the energy consumption of residential buildings.	"The statistical indicator system" is very important for the implementation of energy efficiency, and is approved afterward by relevant authorities. "The report on the statistical data analysis of the energy consumption of residential buildings in four cities" is very useful and lays a solid foundation.	Target achieved. On the basis of the present subcontract, the statistical data collection system of energy efficiency consumption in residential buildings is established at relevant governmental level, which is a guarantee for enforcing the collection of statistical data and provides experience for collecting statistical data in a larger scale. It is hopeful to perfect the method for collecting statistical data.
B02	China Academy of Building Research	Dec.15,2006 - Dec.31,2008	Develop Standard of Energy Efficiency Retrofitting on Existing Public Buildings	1. Subcontract summary report. 2. The code for energy efficiency retrofits technology for public buildings (draft submitted for approval). 3. Survey report on the current status of energy consumption of existing public buildings. 4. Assessment guideline for energy efficiency retrofits of existing	The code provides a standard for relevant industries. Reports are useful in providing principles and technical tools for improving energy efficiency in existing public buildings.	Target achieved. The code provides a good guiding principle and benchmark for implementing energy efficiency retrofit of public buildings. It should be strengthened to disseminate and implement the present code.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				public buildings (draft). 5. Instruction book on the energy efficiency retrofit technology for existing public buildings (draft).		
B03	Building Physics Institute, China Academy of Building Research	Dec.15,2006 - Dec.31,2008	Review and update of the standard developed for residential buildings in heating zone	1. Subcontract summary report. 2. Standard of energy efficiency design for residential buildings located in severe and cold zone. 3. Standard for energy efficiency inspection of heating residential buildings JGJ132-2001 (revised version, draft submitted for approval). 4. Survey report on the current status of energy consumption of residential buildings in heating zone. 5. Training for implementing "The standard of energy efficiency design for residential buildings located in severe and cold zone".	The standard JGJ132-2001 for heating zone is very important and lays the foundation for consequent development	Target achieved. The amendment and revision make the standard JGJ132-2001 more feasible and more applicable. It should be strengthened to publicize and enforce the present standard.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
B04	Tianjin University	Dec.15,2006 - Dec.31,2008	The study of regulations for promoting building energy efficiency standards implemented	1. Subcontract summary report. 2. Report of the study on the administrative laws and regulations for facilitating the enforcement of various standards for buildings energy efficiency.	The study recommends enhancement of the thermal properties of the building envelope and EE enhancement of building's internal facilities (mainly heating and air-conditioning). The report, however, does not focus on policy rather on technical descriptions (i.e. heating and air-conditioning: green environment, natural ventilation and prolonged sunshine). As a result, the study outputs have shortcomings and are not satisfactory on the whole.	Target not achieved.
B05	Beijing University of Civil Engineering And Architecture	Sep.15,2006 - Dec.31,2008	Budget breakdown of study and assessment on incentive policies for more efficient buildings, compliant with market economy	1. Subcontract summary report. 2. Framework and key point in the formulation of incentive policies for energy efficiency buildings. 3. Regulations for encouraging energy efficiency buildings (draft). 4. Regulations for encouraging energy	These regulations and reports related to incentive policies for energy efficiency are based on broad survey and investigation, and are thus very important and fruitful.	Target achieved. Eighteen reports have been submitted and thus facilitated the formulation of incentive policies related to energy efficiency buildings. It is hoped to further recommend proper financing approaches for energy efficiency retrofit of existing public buildings in North China in accord with the principle of market

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				efficiency retrofit in existing public buildings (draft). 5. Regulations for encouraging energy efficiency retrofit of existing buildings in North China (draft). 6. Regulation on incorporating renewable energy into buildings (draft). 7. Regulations for encouraging the incorporation of renewable energy into buildings (draft). 8. Regulations for encouraging energy efficiency and land-saving buildings (draft). 9. Assessment report on overseas incentive policies for energy efficiency buildings. 10. Assessment report on the existing incentive policies for energy efficiency buildings. 11. Assessment report on the current condition for implementing		economy.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				incentive policies for energy efficiency buildings in the four pilot cities. 12. Consultant scheme for implementing incentive policies for energy efficiency buildings in the four pilot cities. 13. Assessment report on implementation impacts of the incentive policies for energy efficiency buildings in the four pilot cities.		
B06	Tsinghua University	Sep.15,2006 - Dec.31,2008	Study and Design of a Rating System of Energy Consumption for New Residential Buildings	Survey on the overseas rating system of Energy Consumption for New Residential Buildings	None	Subcontract terminated before completion
B07	Shanghai Institute of Building Sciences (Group) Co., Ltd	Dec.15,2006 - Dec.31,2008	Capacity building on building code and its implementation in Shanghai	1. Subcontract summary report. 2. Collection of Shanghai municipal regulations on energy efficiency for buildings. 3. Standard for the 65% energy efficiency design of residential buildings in Shanghai district.	"Standard for the 65% energy efficiency design" and "Technical specification for energy efficiency" have been applied in practice.	Target achieved. The present subcontract has promoted activities related to energy efficiency buildings in Shanghai and increased the level. "Standard for the 65% energy efficiency design of residential buildings in Shanghai" can be used as reference or benchmark

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				4. Technical specification for energy efficiency in residential building envelop in Shanghai district. 5. Problems and solutions in exterior wall external insulation system.		for the hot-summer and cold-winter zone. Series of high-quality training activities have been carried out with personnel involved up to 4,600 or more.
B08	Chongqing Construction Technology Development Center	Dec.15,2006 - Dec.31,2008	Capacity building on building code and its implement in Chongqing	1. Subcontract summary report. 2. Guideline for the 65% energy efficiency design of residential buildings in the hot-summer and cold-winter zone (draft submitted for approval). 3. Chongqing municipal regulations on energy efficiency in buildings (draft submitted for approval). 4. Survey report on the current status of energy efficiency in buildings in Chongqing City. 5. Training program and materials for senior government officials and professional	"Guideline for the 65% energy efficiency design" is very useful. "Survey report" and "Chongqing municipal regulations" are also important outcome.	Target achieved. "Guideline for the 65% energy efficiency design" can be used as reference or benchmark for the hot-summer and cold-winter zone, and thus has promoted related activities. "Survey report" has laid foundation for the compilation of "Chongqing municipal regulations", which is also proven important. Series of high-quality training activities have been carried out with personnel involved up to 3,000 or more.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				designers engaged in BEE. 6. Training courses on the implementation of relevant standards for senior government officials and professional designers engaged in energy BEE held in Chongqing City.		
B09	Shenzhen Institute of Building Research	Dec.15,2006 - Dec.31,2008	Capacity building on building code and its implement in Shenzhen	1. Subcontract summary report. 2. Program of energy efficiency buildings for Shenzhen City. 3. Stipulations for enforcing the Standard of energy efficiency design for residential buildings in Shenzhen City. 4. Stipulations for enforcing the Standard of energy efficiency design for public buildings in Shenzhen City. 5. Technical guideline for check and acceptance on the completion of energy efficiency building in Shenzhen.	These standards and stipulations are very important and can be used as reference in promoting energy efficiency building in the hot-summer and warm-winter zone.	Target achieved. This subcontract promoted activities related to increasing adoption of energy efficiency designs in buildings in Shenzhen. "The standard for the 65% energy efficiency design" can be used as reference or benchmark for the hot-summer with warm-winter zone. Series of high-quality training activities have been carried out with personnel involved up to 5,000 or more.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				6. Standard for the 65% energy efficiency design of residential buildings in Shenzhen. 7. Standard for energy efficiency design of residential buildings in the hot-summer and warm-winter zone (revised version). 8. Training and dissemination activities related to energy efficiency buildings in Shenzhen.		
B10	Beijing Building Construction Research Institute	Dec.15,2006 - Dec.31,2008	Training to other cities in region in key aspects of standards implementation	1. Subcontract summary report. 2. Training materials for senior government officials on BEE in transitional region. 3. Training materials for professional designers of BEE in transitional region. 4. Training materials for senior government officials on energy efficiency buildings in Southern China. 5. Training materials for professional designers of energy efficiency	Two sets of teaching materials are provided for two regions with different typical climates.	Basic target is achieved, but the results are not very satisfactory. The training has promoted energy efficiency activities in Southern China and transitional region.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				buildings in Southern China.		
B11	The Center for Housing Industrialization	Sep.15,2006 - Dec.31,2008	Assess Trial Implementation in Shanghai to Learn From Shanghai's Experience of Implementing Standards	1. Subcontract summary report. 2. Technical guideline for testing and labeling on BEE of residential buildings. 3. Assessment report on the implementation of energy efficiency standard in Shanghai. 4. Report on the evaluation of implementation impact of BEE standard in four pilot cities and recommendation for further promoting the implementation of BEE standard.	"Technical guideline for testing and labeling" has already been promulgated for enforcement by the Ministry of Construction. Reports are based on profound survey, and can thus be used as reference by other cities.	Target achieved. Profound investigation has been carried out on the implementation of BEE standard in Shanghai, and its method of survey and investigation is very instructive for other districts.
B12	College of Civil Engineering, Chongqing University	Dec.15,2006 - Dec.31,2008	Information Technology in the Implementation of BEE standards	1. Subcontract summary report. 2. Research report on "the IT model for BEE review". 3. Computer-aided BEE management system (software). 4. Assessment report on pilot applications of the computer-aided BEE management system.	The computer-aided BEE management system can, together with "the assessment report", serve as a useful tool for BEE activities. "The IT model" is also helpful for BEE.	Target achieved. These achievements are helpful in carrying out BEE review, and can thus enhance the management level of BEE activities.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
B13	Sino-overseas Construction Information Co., Ltd/ Beijing University of Civil Engineering And Architecture	Dec.15,2006 - Dec.31,2008	Capacity building a subset of building code officials and other key organizations in the use of the rating system	1. Subcontract summary report. 2. Teaching materials for the training course on BEE testing and labeling. 3. Teaching materials for implementing "the standard for the BEE retrofit design of existing public buildings". 4. Teaching materials for implementing "the standard for BEE design in heating zone". 5. Teaching materials for the training on BEE labeling.	Several teaching materials are compiled.	Basic target is achieved, but the results are not very satisfactory. Series of training activities help promote the implementation of BEE related standards and policies. It is hoped to perfect the teaching materials used in training.
B14	Beijing Building Materials Administration Office	Dec.15,2006 - Dec.31,2008	Pilot Study on Low-energy Buildings in Beijing (Solar Energy Buildings)	1. Subcontract summary report. 2. Survey report on low energy consumption buildings and solar energy applications in Europe. 3. The energy consumption test and research report on the GuaJiaTun low energy consumption demonstration project.	The GuaJiaTun low energy consumption demonstration project is described in detail, which is valuable for the construction of low energy consumption buildings and provides important data and experiences thereby. "Report on the solar energy-aided heating	Target achieved. Thanks to the implementation of the present subcontract, 1484 demonstration projects of low energy consumption were promoted. Series of technical codes and documents related to low energy consumption were compiled, which has effectively promoted the development of low energy

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				4. Report on the solar energy-aided heating technology and its economic analysis. 5. Assessment report on the energy efficiency of Beijing low energy consumption demonstration project. 6. Brochure of construction of rural residential buildings and collection of blueprints of rural residential buildings. 7. Instruction book on solar energy heating technique. 8. Specifications for solar energy heating applied to rural residential buildings.	technology" and "Instruction book on solar energy heating technique" are also helpful for promoting solar energy heating.	consumption buildings in Beijing, in particular in solar energy heating. It is hoped to sum up experiences and explore the feasibility of their extension to severe and cold zone.
B15	Shanghai Institute of Building Sciences (Group) Co., Ltd	Dec.15,2006 - Dec.31,2008	Pilot Study on Low-energy Buildings in Shanghai	1. Subcontract summary report. 2. Research report on Shanghai low energy consumption demonstration projects. 3. The energy consumption test and evaluation report on Shanghai low energy	As for Shanghai low energy consumption demonstration projects, data has been collected and analysis been conducted, and a few standards and documents were thereby developed and submitted.	Basic target is achieved. This subcontract has actively promoted the development of low energy consumption, green buildings in Shanghai. It is hoped to sum up and analyze economic feasibility of the involved low energy consumption technologies so that these

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				consumption demonstration projects. 4. Collection of papers dedicated to Shanghai low energy consumption demonstration projects. 5. Collection of administration documents on the BEE demonstration project. 6. Research report on JianKe Building BEE retrofit project.		technologies can be applied to broader areas and other cities.
B16	Shenzhen Institute of Building Research	Dec.15,2006 - Dec.31,2008	Research and Application of Green and Low Energy Consumption Construction Standard of Shenzhen	1. Subcontract summary report. 2. Report on the standard outfit system for green buildings in Shenzhen. 3. Research report on integrated technologies for low energy consumption, green buildings Shenzhen. 4. Guideline on the integrated technologies for the planning, design and construction of green buildings in Shenzhen.	These reports and activities have promoted BEE in Shenzhen and serves as helpful reference for other cities.	Target achieved. The achievement consists of series of research reports, technical code and construction of demo platform, which has promoted Shenzhen to initiate several projects of green buildings, develop the 65% BEE standard and build itself into a demonstration city in energy efficiency pubic buildings. This subcontract has an active impact and can serve as a good reference for other cities.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				5. Materials related to the construction of demo platform and integrated technologies for low energy consumption, green buildings in Shenzhen. 6. Materials related to training activities about the integrated technologies for low energy consumption, green buildings in Shenzhen. 7. Materials related to the organization of visitors to demonstration projects.		
B17	Shanghai Institute of Building Sciences (Group) Co., Ltd	Dec.15,2006 - Dec.31,2008	Establish the evaluation grades and labelling system for energy efficiency residential buildings in Shanghai	1. Subcontract summary report. 2. Compilation of software for assessing BEE of residential buildings in Shanghai and its application. 3. Research report on the grading system in evaluating BEE of residential buildings in Shanghai. 4. Collection of administration	The subcontractor has compiled software for evaluating BEE in Shanghai district. The grading system in evaluating BEE is also helpful.	Basic target is achieved, but the results are not very satisfactory. These achievements answered some important questions arising in grading and labeling in evaluating BEE, and thus are valuable for application.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				documents on the testing and labeling of BEE. 5. Assessment report on the demonstration projects.		
B18	Chongqing Construction Technology Development Center	Dec.15,2006 - Dec.31,2008	Energy efficiency building demonstration and a economic incentive policy pilot in Chongqing	1. Subcontract summary report. 2. 5.4 million square meter of energy efficiency floor area have been newly constructed in the recent two years. 3. Standard for energy efficiency design of residential buildings in the hot-summer with cold-winter zone (draft submitted for approval). 4. Analysis report on incentive policies and instruments for BEE in Chongqing. 5. Survey report on overseas incentive policies and instruments effective for BEE. 6. Survey report on incentive policies and instruments effective	The subcontractor has recommended an incentive mechanism encouraging BEE in Chongqing and the corresponding management system.	Basic target is achieved, but the results are not very satisfactory. This subcontractor has conducted investigation and analysis on overseas and domestic incentive policies for BEE, and recommended accordingly an incentive mechanism encouraging BEE in Chongqing and the corresponding management system. This achievement has promoted the implementation of BEE in Chongqing.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				for encouraging BEE in the hot-summer, cold-winter zone. 7. Recommendation of an incentive mechanism encouraging BEE in Chongqing and the corresponding management system. 8. Assessment report on the trial implementation of incentive policies for BEE in Chongqing.		
B20	Center of Science and Technology of Construction Ministry of Construction, P.R.China	Sep.15,2006 - Dec.31,2008	To improve the better understanding and to promote the concept of solar energy building in accordance with the location, local climate and resources	1. Subcontract summary report. 2. Evaluation on overseas achievements in effective implementation of solar energy buildings and incorporation of solar energy into buildings. 3. Assessment report on domestic technologies that are either effectively applied to solar energy buildings or incorporating solar energy into buildings.	"Assessment report on domestic technologies" and "Report on the main barriers" are both important for promoting solar energy application technology used in buildings.	Target achieved. These reports reflect the current status of solar energy application in China and the prospect. This subcontract gave a targeted recommendation for further development, which would play an important role in promoting the application and practice of solar energy buildings and the incorporation of solar energy into buildings. It is hoped to transfer and develop these achievements into related technical codes, guiding policies

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				4. Report on the main barriers in the effective application and practice of solar energy building technology and the technology of incorporating solar energy into buildings. 5. Research report on "Technical guideline for comprehensive applications of solar energy to buildings".		and development programs.
B21	Chongqing Construction Technology Development Center	Dec.15,2006 - Dec.31,2008	Establish the Audit and Record System for BEE in China	1. Subcontract summary report. 2. Research report on "The regulation on audit of the energy sources for public buildings" and its draft submitted for approval. 3. Research report on "The management on audit of the energy sources for public buildings" and its draft submitted for approval. 4. Consultant scheme for establishing the review and record for trace system for BEE in China.	"Research report on "The regulation on audit" and "Research report on "The management on audit" are new and helpful for China to establish the system of audit and record for trace.	Basic target is achieved, but the results are not very satisfactory. By referring to overseas experiences in BEE, the subcontract recommended a regulation on audit of the energy sources for public building, and carried out assessment on its implementation in specific project, which is important for establishing the system of audit and record for trace.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				5. Examination report on the Moscow 'Energy Passport' system. 6. Summary of experiences in implementing BEE standard in 4 pilot cities. 7. Pilot plan for the system of BEE review and the assessment report.		
B22	Center of Science and Technology of Construction Ministry of Construction, P.R.China	Sep.15,2006 - Dec.31,2008	Establish the Audit and Record System for BEE in Chongqing	1. Subcontract summary report. 2. Summery report of experience and the existing obstacles for implementation BEE design standards in Chongqing 3. Scheme and assessment report of the system of BEE audit and record for trace in Chongqing 4. Recommendation of establishment the system of BEE audit and record for trace in China 5. Assessment review of sustainable impact in building whole life	The accomplishments are helpful for the establishment of the system of audit and record for trace.	Target achieved. The achievement has strong feasibility, and trial implementation has also acquired distinct accomplishments. As a result, the implementation of BEE design standard has been promoted in both the design and construction stages. It is recommended to popularize and perfect the system of audit and record for trace.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				cycle 6. Proposal of establishment the assessment criteria on sustainable impact in building whole life cycle		
B23	Beijing Building Construction Research Institute	Dec.15,2006 - Dec.31,2008	Promote the Renovation of Existing Buildings to Implement BEE Codes	1. Subcontract summary report. 2. Technical code of energy efficiency retrofits for existing residential buildings. 3. Notice from Beijing Municipal Construction Commission on "Guideline for assessing energy efficiency retrofit of Beijing existing residential buildings". 4. Draft for financing and incentive policies and instruments for energy efficiency retrofit of existing buildings. 5. Report on the financing and incentive policies and instruments for energy efficiency retrofit of existing buildings. 6. Scheme for diversified	"Technical code" and "Draft for financing and incentive policies" have instructive importance.	Target achieved. The subcontract has put forward instructive recommendations on energy efficiency retrofit for existing residential buildings in Beijing, and thus provided technical baseline and engineering experiences for comprehensive implementation of EE retrofit for existing residential buildings.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				energy efficiency retrofit projects located in and near Huangmuchang Village. 7. Assessment report and test report on energy efficiency retrofit projects. 8. Examination report on domestic BEE retrofit of existing residential buildings. 9. Examination report on overseas BEE retrofit of existing residential buildings.		
B24	Sino-overseas Construction Information Co., Ltd.	Dec.15,2006 - Dec.31,2008	Integrate and identify the fundamental knowledge on BEE and survey achievements during the initial period of EUEEP project program, and establish the specific plan that could be disseminated to the public in pilot cities	1. Subcontract summary report. 2. Summary report on the achievement of BEE national demonstration projects and the experience of International cooperation projects. 3. Summary report on the applications of new technology and new products to BEE. 4. Local policies and regulations on BEE and implementation.	Lots of information and documents related to BEE were collected. BEE experience communications for different districts were promoted.	Target achieved. The accomplishments achieved in this subcontract have disseminated scientific knowledge on BEE and helped people to understand the current status and demonstration projects of BEE in China.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				5. Analysis report on BEE related main body surgery. 6. Implementation plan of BEE information dissemination.		
B26	Beijing Energy Conservation & Environment Protection Center	Sep.1, 2007 - Jun.30,2009	Process a sustained dissemination campaign towards the public	1. Subcontract summary report. 2. Popular scientific films on BEE. 3. Popular scientific brochure on BEE. 4. Brochure dedicated to professional knowledge related to BEE.	The films and brochures completed in this subcontract have played an important role in popularizing BEE concepts.	Target achieved. The subcontractor has disseminated the idea of BEE via diversified channels and different formats, and thus enhanced people's consciousness of BEE and their initiative in taking part in BEE activities.
B27	Sino-overseas Construction Information Co., Ltd.	Dec.15,2006 - Dec.31,2008	Process a sustained dissemination campaign towards government officials	1. Subcontract summary report. 2. Management and decision-making of BEE (book).	A book related to BEE was compiled, and TV feature films on BEE were developed. BEE policy forum was held.	Basic target is achieved, but the results are marginally satisfactory. These activities help senior government officials to enhance their consciousness of BEE.
B28	Sino-overseas Construction Information Co., Ltd.	Dec.15,2006 - Dec.31,2008	Process a sustained dissemination campaign towards employees, real estate developers and product manufacturers	1. Subcontract summary report. 2. Report on practices of energy efficiency retrofits for existing residential buildings in heating zone of Northern China (book).	A book related to BEE was compiled, and TV feature films named BEE investment and income was developed. Series promoting activities were held, such as seminar, communication meeting,	Basic target is achieved, but the results are marginally satisfactory. Series of dissemination activities have been conducted for related personnel to promote BEE business.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
					etc.	
B29	Sino-overseas Construction Information Co., Ltd.	Dec.15,2006 - Dec.31,2008	Report and popularize the periodic outputs of this EUEEP project activities (buildings sector)	1. Subcontract summary report. 2. Mechanism and corresponding model for financing and investment in BEE (book). 3. Collection of laws and regulations on BEE (book).	Two time spot diffusion meetings of demonstration project were held. Two books related to BEE were compiled.	Basic target is achieved, but the results are marginally satisfactory. The subcontractor has organized conferences in Beijing and Chongqing to popularize demonstration projects, and has thus extended their impacts. Two books, "Collection of laws" and "Mechanism and model", can serve as reference for personnel related to BEE.
B30	Beijing Building Construction Research Institute	Dec.15,2006 - Dec.31,2008	Capacity building for government officials, designers, supervisors, operation management personnel, and developers, in 4 pilot cities and other cities, to enhance BEE management, knowledge, and skill level	1. Subcontract summary report. 2. Training institutions and training materials for teacher training. 3. Training materials for senior government officials. 4. Training materials for personnel engaged in the management of construction facilities or system operation. 5. Training materials for supervisors of construction engineering. 6. Training materials for professional building	Different training materials for employees in different departments of construction field were compiled, and training activities were carried out.	Basic target is achieved, but the results are marginally satisfactory. The subcontract has produced many training materials with personnel involved up to 2500. The training results are good, helpful for enhancing their consciousness of BEE.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				designers. 7. Training materials for real estate developers.		
B31	Guangdong Provincial Academy of Building Research	Dec.1,2007 - Jun.30,2009	Development of the Implementation Regulation for Building Energy Efficiency Design Standard of Hot Summer and Warm Winter Zone	Implementation Regulation for Building Energy Efficiency Design Standard of Hot Summer and Warm Winter Zone (draft)	No assessment of findings	No assessment of findings
B32	Information Center, Ministry of Construction	Dec.1,2007 - Jun.30,2009	Establishment of Information Dissemination and Training System of BEE Supervision and Management	Guideline for inspection on large office building energy use	No assessment of findings	No assessment of findings
B33	China Building Material Federation	Dec.1,2007 - Jun.30,2009	Survey and Extension of Energy Conservation Building Material and Their Application Technology	1. Subcontract summary report. 2. The current development status of energy conservation building materials industry in China. 3. Survey and analysis on the application of energy conservation building materials in China. 4. Comparative study on	These reports are helpful for popularizing energy conservation building materials in China.	Basic target is achieved. The subcontract has provided instructive opinions for the development of envelop structure, and thus promoted the comprehensive development of related industries.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				overseas and domestic standards for energy conservation building materials. 5. Code for the applied technologies of advanced energy conservation building materials and its practice. 6. Guidebook for engineering application of energy conservation building materials (case study). 7. Policy recommendation on the development of advanced energy conservation building materials.		
B34	Center of Information, Ministry of Construction, P.R.China	Aug. 2008 – Dec 2008	Comparative Study on the Key Technologies of Energy Saving and Emission Reduction in Sino Foreign Construction Field	1. Subcontract summary report. 2. Collection of the energy efficiency and emission reduction technologies. 3. Comparative study on overseas and domestic major technologies of energy efficiency and emission reduction in	"Comparative study" and "Analysis of the development trend" are important for the development of energy efficiency and emission reduction in China.	Target achieved. The subcontract produced a study comparing major energy efficiency and emission reduction technologies in 14 subsectors (both domestic and international) within the construction sector with recommendations on which technology should be adopted.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				the field of construction. 4. Analysis of the development trend of energy efficiency and emission reduction technologies in the field of construction and policy recommendation.		

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
C01	International Copper Association Ltd. China	Sept 2006 to June 2007	Developing training material on motor system energy efficiency	Training material on motor system energy efficiency	Training materials provided information on existing standards, overview of different motor system models (i.e. pumps, fans, etc.), and their application to industrial situations and economic returns	Training materials have been well received by ECCs and various enterprises
C02	China Energy Conservation Association	Sept 2006 to June 2007	Developing training material on energy efficiency for industrial boilers	Training material on energy efficiency for industrial boilers	Training materials provided information on existing standards, overview of different boiler system models, and their application to industrial situations and economic returns	Training materials have been well received by ECCs and various enterprises
C03	Harbin Industry College	Sept 2006 to June 2007	Developing training material on energy efficiency for building central air conditioning	Training material on energy efficiency for central air conditioning systems for buildings	Training materials provided information on existing standards, overview of different central air conditioning systems, and their application to various situations and economic returns	Training materials have been well received by ECCs and various enterprises
C04	China Energy Conservation Association	Dec 2006 to Dec 2007	Developing training material on improving industry furnace energy efficiency	Training material on improving industry furnace energy efficiency	Training materials provided information on existing standards, overview of different furnace systems, and their application to various industrial situations and economic returns	Training materials have been well received by ECCs and various enterprises
C05	Tsinghua	Dec 2006 to	Developing	Training material on	Training materials provided	Training materials have been well

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
	University	Dec 2007	Training material on insulation material for building heat energy efficiency	building heat insulation material energy efficiency	information on existing standards, overview of different insulation materials for buildings, and their application to various situations and economic returns	received by ECCs and various enterprises
C06	Tsinghua University	Dec 2006 to Dec 2007	Developing training material on energy efficiency management and financial	Training material on energy efficiency management and financing	Training materials included overview of EC potential analysis, methods of energy management (examples related to iron & steel, cement, power, petro-chemicals, building, SME sectors), overview of incentive mechanisms, and suggested methodologies for financial analysis.	Training materials have been well received by ECCs and various enterprises
C07	National Energy Conservation Center	Nov. 2009 to June 2010	EE Information Dissemination by National Energy Center	• Summary on the compilation and distribution situation of national energy conservation policies, laws and codes • Guide of typical energy conservation cases and techniques • Catalogue of energy conservation management	All deliverables were provided except program for sustainable development of national energy communication centers (to be completed June/10)	Reports and dissemination activities have been satisfactory.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				experience of companies and other entities • Report on the development and establishment of the national energy efficiency database • Catalogue of energy conservation products and techniques for public dissemination • Summary of foreign energy conservation management experience • Program for sustainable development of national level energy conservation information communication centers		
C08	Shanghai Energy Conservation Center	Dec 2006 to Dec 2007	EE Information dissemination by Shanghai Conservation Center	• Document of energy conservation information to publicize the Energy Conservation Law and regulations	All deliverables were provided	Reports and dissemination activities have been satisfactory.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				• Information for the Shanghai Scientific Energy Conservation Exhibition Hall • Energy efficiency databases that provide key energy utilization indicators		
C09	Shandong Energy Conservation Center	Dec 2006 to Dec 2007	Information dissemination by Shandong Conservation Center	• Shandong energy conservation website to publicize the Energy Conservation Law and regulations • Document of energy conservation technical information • Energy efficiency databases that provide key energy utilization indicators	All deliverables were provided	Reports and dissemination activities have been satisfactory.
C10	Sichuan Energy Conservation Center	Dec 2006 to Dec 2007	Information dissemination by Sichuan Conservation Center	• Sichuan energy conservation website to publicize nationally the Energy Conservation Law and regulations • Document of energy conservation information	All deliverables were provided	Reports and dissemination activities have been satisfactory.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				• Energy efficiency databases that provide key energy utilization indicators		
C11	Material Energy Conservation Center	Dec 2006 to Dec 2007	Evaluation of Energy Conservation Law (ECL) Implementation and Suggestions for Its Revision	• Report on Evaluation of Implementation of ECL and Suggestions for Its Revision	Guidelines were developed for regulations under the ECL, implementation regulations and targets for energy performance standards, implementation for the energy labelling system for industrial equipment, regulatory approach for oil conservation developed, and a supervision and review mechanism implementation of the ECL. In addition, 2 workshops on ECL amendments were conducted including analysis and suggestion on policy and institutional issues. Target stakeholders were local government, energy-consuming enterprises and local energy policy experts.	Reports and dissemination activities have been satisfactory.
C12	Energy Research Institute	Dec 2006 to Dec 2007	Measures to achieve target of the 11th 5 years energy	Evaluation of Energy Conservation Measures and associated impacts of	Report provided an evaluation of the impact of adopting EC measures as defined in the 11th FYP.	Report was satisfactory and useful.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
			conservation plan	the "11th Five-Year Plan"		
C13	Energy Research Institute	Aug 2008 to July 2009	Approaches and Measures of Oil Conservation in the Era of High Oil Price (Compiling Oil Conservation & Oil Replacement Medium & Long Term Plan)	Draft on Compiling Oil Conservation & Oil Replacement Medium & Long Term Plan	Report provided guidance to amending the oil conservation measures on the 11th Five-Year Plan that would reduce China's exposure to high oil prices.	Report was satisfactory and useful.
C14	All China Marketing Research Co.	Aug 2008 to July 2009	Study on the Framework of Energy Conservation Situation Analysis	• Report of analyzing the status of energy conservation situation analysis methods • Research report of establishing indicator system of energy conservation situation analysis • Research report of methodology for energy conservation situation analysis • Template report for analysis of energy conservation situation	A model and framework were established for analyzing EC measures for most sectors (i.e. industry, buildings and transport)	Reports and dissemination activities were highly satisfactory.

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
C15	Energy Research Institute	Dec 2006 to Dec 2008	Current situation on investigation of financing energy conservation in China	Report on current situation on financing energy conservation in China	• Evaluated the effectiveness of energy conservation investments (including central and local governmental funds and enterprise funds) in achieving energy savings targets during the 10th FYP; • Policies and incentives in financing energy conservation from various regions were found to be ineffective due to existing barriers and bottlenecks in the financing of energy conservation financing; • Policy recommendations were provided on energy conservation financing for various regions in China.	Report was satisfactory and useful.
C16	Guangdong Energy Conservation Center	Dec 2006 to Oct 2008	Capacity building of provincial ECC in Eastern region (Guangdong)	• Energy auditing for the key enterprises using new monitoring and testing equipment purchased by GoC • Training courses • The summary report of capacity building of ECC • Recommended next-steps for sustainable	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
				development measures		
C17	Shanghai Energy Conservation Center	Dec 2006 to Oct 2008	Capacity building of provincial ECC in Eastern region (Shanghai)	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract
C18	Beijing energy conservation center	Dec 2006 to Oct 2008	Capacity building of Provincial energy conservation center in Eastern region (Beijing)	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract
C19	Tianjin energy conservation center	Dec 2006 to Oct 2008	Capacity building of Provincial energy conservation center in Eastern region (Tianjin)	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
					• training courses were provided to enterprises, local ECC staff, and local consultants	
C20	Jiangsu energy conservation center	Dec 2006 to Oct 2008	Capacity building of Provincial energy conservation center in Eastern region (Jiangsu)	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract
C21	Shandong energy conservation center	Dec 2006 to Oct 2008	Capacity building of Provincial energy conservation center in Eastern region (Shandong)	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract
C22	Hebei energy conservation center	Dec 2006 to Oct 2008	Capacity building of Provincial energy conservation	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07,	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
			center in Eastern region (Hebei)		this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	end of the subcontract
C23	Fujian energy conservation center	Dec 2006 to Oct 2008	Capacity building of Provincial energy conservation center in Eastern region (Fujian)	Same as C16	• Monitoring and testing equipment procured using GoC funds • Using training from subcontracts C01 to C07, this ECC was able to complete energy audits • training courses were provided to enterprises, local ECC staff, and local consultants	Capacity building activities were satisfactory. Some mobilization problems were experienced due to lack of capacity; however, delivery was satisfactory towards the back end of the subcontract
C24	China energy conservation Association	Aug 2008 to July 2009	Communication of the revised Energy Conservation Law	A dissemination and promotional meeting summary	Report summarizing meetings for 8 workshops	Report and dissemination activities were satisfactory
C25	Energy Research Institute	Aug 2008 to July 2009	Development of Energy Conservation Fiscal Taxation policy model	Report on energy conservation fiscal taxation policy model	Report delivered on incentives to increase EC investments including national fiscal taxation policy and its relationship to EC savings, and recommendations on new fiscal taxation policies to incentivize the industrial sector	Report was highly satisfactory

Contract No.	Subcontractor Name	Contract Dates (end/start)	Name of Study/Survey	Deliverables	Actual Findings	Assessment on Subcontractor Usefulness
C26	Energy Research Institute	Nov 2009 to June 2010	Developing Energy Conservation 12th FYP five-year plan in China	Report on 12th 5-year Energy Conservation Plan in China	In progress at the time of writing of this evaluation	NDRC are likely to adopt findings of this report
C28	Shanghai ECC and Shandong ECC	Nov 2009 to June 2010	Development and promotion of national energy conservation supervision	Manual for national energy conservation supervision	In progress at the time of writing of this evaluation	NDRC are likely to adopted findings of this report

Appendix E – Revised Project Log-Frame (August 26, 2009)

EUEEP Logical Framework and Objectively Verifiable Impact Indicators

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
GOAL Reduction in carbon emissions from the major energy-consuming sectors in China.	Cumulative carbon emissions reduction, in million tons, *Mt C* (*or, Mt CO2*)	0	11.6 (*42.4*)	Calculated GHG emissions reduction based on documentation such as the following: • Survey results and reports on performance of energy efficiency activities in the various energy consuming sectors. • Annual reports on the energy supply, demand and consumption in the country. • Energy consumption databases of ECCs and energy data gathered from project surveys of buildings. • Detailed data gathering, interviews, field trips and analysis of key projects (e.g., results of ECAs)	China policy makers and relevant agencies continue to aggressively pursue, support and approve energy efficiency policies. China remains a viable political entity capable of supporting governmental initiatives and non-governmental organizations, such as industry associations, energy conservation association, etc. involved in energy efficiency International co-operation, technology transfer and information exchange on energy efficiency among major nations continue.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
				Report on aggregation of CO_2 reduction based on approved methodology.	Energy consumption data are continuously gathered, reported and published by the government. CO_2 emission reduction calculation methodology is approved and relevant agencies are using it.
OBJECTIVE OF THE PROJECT Removal of barriers to effective application and practice of energy efficiency in the industry and buildings sectors of the Chinese economy	Cumulative energy savings, in million tons of coal equivalent (Mtce)			Survey results on performance of energy efficiency activities in the various energy consuming sectors. Annual reports on the energy supply, demand and consumption in the country. Energy consumption databases of Energy Conservation Centers. Improved data collection system in the National Bureau of Statistics, based in part on	China policy makers continue to aggressively pursue energy efficiency policies. China remains a viable political entity capable of supporting governmental initiatives and non-governmental organizations, such as industry associations, energy conservation association, etc. involved in energy efficiency International co-operation, technology transfer and information exchange on energy efficiency among major nations continue. Energy consumption data are continuously gathered, reported
	• Industrial Sector	0	7.9		
	• Buildings Sector	0	6.8		
	• Cross-Cutting Activities	0	5.2		
	Total	0	19.9		

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
				contributions from this project. Detailed data gathering, interviews, field trips and analysis of key projects (e.g., results of VAs). Estimation techniques and methodology to approximate the spread of project results to other regions of China based on sampling data.	and published by the government.
OUTCOME A: Industrial Energy Efficiency Program					
A.1. Energy Conservation Agreements (ECAs) Implementation in three (3) industries	1. No. of enterprises with ECAs signed and implemented	0	998[14]	Documentation of the signed ECAs Project documents of energy efficiency projects that were planned, designed and implemented in line with	The enterprises under the ECA will implement their commitments in meeting the energy conservation agreements and realize the agreed energy savings targets. Incentives that are applied for by
	2. No. of enterprises where benchmarking methodology piloting were implemented	0	10[15]		
	3. Amount of investment for	0	35		

[14] Initially, 12 enterprises were nominated from iron and steel, chemical and cement industries under the Voluntary Agreements (VAs). The Government of China decided to change the VAs to Energy Conservation Agreements (ECAs) which now become mandatory. All the Top 1000 energy consuming enterprises (998 in actual number because of two mergers) signed the ECA and are committed to pursue EE activities and achieve targeted savings.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	EC&EE activities by companies as a result of ECA implementation, *in US$ million*			ECAs. Energy consumption reports submitted by companies with ECAs Report on completed design of ECA implementation plans suitable for China industry's actual conditions Documentation of investments made for energy efficiency projects carried out under ECs. Reports on dissemination of experience in implementation of ECA activities in pilot enterprises. Reports on investments	enterprises, which are usually provided by government for these types of projects, such as loans, tax reduction, etc., are sufficient and will be approved accordingly to encourage the industries to improve their energy efficiency performance, in accordance with the ECAs. The M&E System for EUEEP is continuously implemented by the relevant agencies and industrial sector entities after the project.
	4. Amount of energy saved from implemented capital investment EC&EE projects under the ECA program, million tce	0	2.5		

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
				in EC&EE activities	
A.2. Energy Efficiency Design Codes for New and Existing Facilities and Equipment	1. No. of energy efficiency (EE) design codes for an industry[16] established and enforced	0	1	Documents on the expert review of existing design codes studies and development of new codes in the cement and petrochemical industries. Documentation of design codes Energy survey/audit reports of cement and petrochemical industries to determine degree of compliance with and	Management of the relevant enterprises support energy efficiency efforts, including hiring and/or training staff as needed.
	2. No. of enterprises in the cement industry employing the design codes in their EC&EE projects[17]	0	145[18]		
	3. No. of registered EE&EC project plans designed based on the EE design codes approved for implementation	0	145		
	4. No. of catalogues on the	None	2		

[15] Original EUEEP commitment was for 6 enterprises for benchmarking (2 for each of the 3 industries). In 2008, actual number of enterprises included in the benchmarking became 10 (composed of 4 for cement, 3 for iron & steel, and 3 for chemical industry).

[16] Originally, there were 2 industries planned in the ProDoc where design codes are to be adopted, disseminated and provided training for. But since the other industry, chemical industry, has many varied products, the cement industry, generally with only one product, was chosen for formulating such design codes. The cement industry design code was enforced beginning May 2008.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	new EE codes prepared and published			impact of EE design codes and standards.	
	5. % of enterprises that are satisfied with the new EE design codes	0	80	Evaluation reports prepared. Published the China Energy Saving Product Catalogue and Key Energy Conservation Technologies Promotion Catalogue Documentation of proposed and approved EC&EE plans	
A.3. Energy Efficiency Standards for Industrial, Residential and Service Equipment					
A.3.1. China Motor Systems Market Transformation Program	1. No. of EE design criteria for motor system established and used by design institutes	None	1	Documents on the established design criteria for motor systems. Description of labeling system. Adoption of labeling system in selected locations.	. Adequate training for technical staff in industry to convey a practical understanding of the complexities of properly designing and deploying efficient motor systems to be conducted by industry associations, ECCs or training service providers after
	2. No. of new and updated EE labels and standards for electric motors approved for implementation	0	1[19]		
	3. Percent (%) improvement	0	3		

[17] The cement industry is composed of 4,000 small and big enterprises. Targets include only the big enterprises for bigger impact.
[18] This represents 3% of 4,000 enterprises in the cement industry

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	of market share of locally developed energy efficient motors[20]			Documents on the profile and results of the demo sites. Observation reports on training in motor system design Results of survey of EE performance of electric motor systems. Report on the established approach to labeling the energy efficiency of motor systems Survey report on trained personnel regarding application of learning and other training information.	the project using the training materials developed. Industry management supports energy efficiency efforts on motor systems usage and manufacture, including additional investment if needed.
	4. No. of motor system service organizations where staff were trained to provide assistance to industry users	0	10		
	5. % of total trained personnel that are actually providing technical services to electric motor users in industries	0	80		
	6. No. of demonstration sites where EE motor systems were installed and applied	0	8 (minimum)		
	7. Cumulative amount of energy savings from the EE motor system demonstration, *in Mtces*	0	4		
A.3.2. Energy Efficiency Standards,	1. No. EE standards for industrial equipment developed and	0	4 (minimum)	Documents on the established design codes and standards for	The government enforces EE standards for industrial equipment at a high level of

[19] Standards and labelling were done for 3-phase small and medium asynchronous motors under the project.

[20] In 2007, the market share of high efficiency motors is only 5%. EUUEP has a new sub contract to develop a subsidy system for the manufacture of efficient motor system to improve market share for a total of 3%.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
Labeling and Promotion for Major Energy-Consuming Equipment for Industry	established			industrial equipment.	energy efficiency.
	2. No. of sets guidelines on EE industrial equipment[21] set by the Government			.	.
	a. For standards	0	4		
	b. For certification/ labeling developed and used nationally	0	4		
	3. Percentage of products for all types of equipment that comply with the established EE labels & standards (at par with imported equipments), *in %*	0	50		
A.3.3. Energy Efficiency Standards and Labeling for Equipment in Residential and Service Sectors	1. No. of appliances with EE standards and labels developed and implemented	0	5 (minimum)	Documents on the standards for at least five appliances used in the residential and service sectors. Data on sales and efficiency of the products covered by the new standards, either collected during the project or by the	The government is willing to set and enforce meaningful EE standards household appliances and service sector equipment.
	2. Percent of increase in market penetration of new EE appliances in residential and service sectors,				
	• commercial refrigerators	0	10		
	• electric water	0	50		

[21] The equipment includes industrial boiler, fan, electric transformers and air compressors.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	heaters			evaluation team. Increase in the capabilities of manufacturers of air conditioners to produce efficient models; increased sales of efficient models; ability to set standards at higher levels because of greater market acceptance	
	• microwave ovens,	0	30		
	• duplicating machines	0	50		
	3. Ave. annual energy saved from the use of EE appliances, *in Gigawatt-hours*	0	60		
A.4. Energy Management Information System and Reporting Program (EMISRP) for Key Energy-intensive Enterprises[22]	1. EMISRP developed and applied	None[23]	Year 4[24]	The existence of a computerized EMISRP that is fully functional and free of major bugs. Documents on the rules and regulations and implementing guidelines	Establishments in other industry sub-sectors will comply with the reporting requirements.
	2. No. of energy intensive enterprises reporting under the EMISRP	0	3,500 (minimum)		

[22] The EMISRP has not been developed and applied as planned in the Prodoc. There is an existing similar system already developed in ERI and NDRC. The NPCC decided in February 2009 to forego the establishment of the system so as not to duplicate efforts, but it will still pursue the activities using the existing NDRC/ERI MIS which also includes same energy efficiency activity planned under the EUEEP.

[23] Only technical guidelines and government regulations were available.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
				on the EMIRSP.	
	3. % of reporting establishments that find the EMIRSP useful in their EC&EE initiatives and projects	0	80	Reports submitted by companies, based on the use of EMIRSP. Working EMIRSP database installed at NDRC. Annual reports on updating and maintenance of EMIRSP database	
OUTCOME B: Buildings Energy Efficiency Program					
B.1. Collection of Data on Building Energy Use As a Basis for Setting and Assessing Impacts of Standards	1. No. of pilot cities to establish building energy consumption statistical and data collection system	None	4[25]	Statistical assessment of energy use by end-use for residential and commercial buildings in the four cities Results of surveys in the four pilot cities that have implemented building	Highly qualified individuals will be retained by the pilot cities to continue the survey implementation even after the end of the project.
	2. Number of surveys conducted in pilot cities by End of Project	None	4		
	3. No. of annual reports	None	12		

[24] The EMISRP was not developed and applied as planned in the ProDoc. There is an existing similar system that was already being developed in ERI and NDRC. The NPCC decided in February 2009 to forego the establishment of the system so as not to duplicate efforts, it also decided that it will still pursue the activities using the existing NDRC/ERI MIS which also includes same energy efficiency information activity that was originally planned under the EUEEP.

[25] Full surveys planned to be conducted in the four pilot cities (Beijing, Shenzhen, Shanghai, Chongxing)

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	produced and published based on data compiled together with an analysis of trends by EOP			energy standards (activity B.3) to determine impact of the standards Report on approved plans to extend the data collection to other cities and regions for the next phase of the China EE program	
	4. No, of cities that replicate or modified the data gathering and analysis systems of the pilot cities	0	19		
	5. Quantified energy savings in the pilot cities based on the results of data gathering and analysis system	No data	0.6 million		
B.2. Development of Policies and Standards for Building Energy Performance.	1. No. of policies and instruments to increase building energy efficiency developed	0	6[26]	Documents on the three standards: residential building standards for two regions; draft commercial building standards. Supporting documentation on the means used to develop the standards. Report of MOC on the	The expertise and will to develop and implement meaningful building energy policies and standards exists in the government.
	2. No. of standards for new residential building for the hot summer, hot winter region completed	None	1		
	3. No. of new energy standards for retrofitting existing commercial buildings developed and	None	1		

[26] Draft regulations to be submitted to Ministry of Construction, among others, include: Economic incentive method for the promotion of energy conservation retrofit project of existing residential buildings in northern area, Management method for the promotion of the integration of building with renewable energy technology and Economic incentive method for the implementation of renewable energy building, etc.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	approved by EOP			annual inspection of new buildings	
	4. No. of heating standards for residential buildings in heating region updated	0	2		
	5. Number of buildings participating in the building energy rating system	0	10		
	6. % of new buildings complying to building energy standards by EOP	0	80		
	7. Cumulative amount of energy savings from buildings, Mtce	0	10.3		
B.3. Standards Implementation and Incentives for Buildings to Exceed the Standards	1. Average kWh savings/m2 from the demonstration program.	0	20[27]	Training course materials on the design, application and enforcement of building energy standards/code. Documents on the results of the trial implementation of building energy standards in Shanghai. Documentation of the	City governments assure that sufficient funds are available for proper and continuous implementation of building energy standards and that the standards are in fact enforced. National and local government officials are willing to provide support and incentives to encourage the construction and operation of energy efficient buildings.
	2. No. of building performance standards, policy guidelines and other instruments implemented in four pilot cities	None	4		
	3. No. of completed training courses for senior government officials and professional designers in	None	8		

[27] This Includes 100,000 m^2 in Beijing and 2,000 m^2 in Shanghai. With the data on total energy consumption, the ratio kWh/ m^2 was derived.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	building code implementation and related regulations and systems			implementation success of the standards in the three remaining cities, based on surveys (Activity C.1). Documents on the assessment of the policy pilot programs for promoting energy efficient buildings. Documentation of selected green and/or energy efficient buildings that go beyond the standards, either constructed or (more likely) in design phase that can be directly attributed to the project. Report on evaluation of trial implementation of building energy standards in Shanghai (for 1 million m^2 residential buildings). Report on assessment of pilot programs for	Architects and engineers apply the basic principles of energy efficient and/or green buildings Building materials manufacturers and suppliers in China are able to supply the materials/equipment needed for efficient buildings. Building developers are interested in very efficient and/or green buildings and are willing to pay the extra cost of such buildings Practitioners believe that the guidelines are proper and are being promoted and enforced by government in terms of regulations.
	4. Average % of trainees that rated the training courses as satisfactory and useful	0	85		
	5. % of trainees that are engaged in : • Building EE code regulations (e.g., building construction permitting process	0	75		
	• Building EE code applications (e.g., building design & construction)	0	75		
	6. No. of guidelines for low energy building planning, design and construction	None	4		
	7. % of building practitioners that apply the guidelines	0	30		
	8. % of recipients of the guidelines that consider the guidelines as useful in their building and/or building EE projects.	No data	50		

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	9. No. of Computer-aided management system for the assessment of BEE established and made operational	None	1	various policy instruments for the promotion of energy efficient buildings. Report on survey of post-training applications and impact	
B.4. Energy Efficiency Information Dissemination	1. Percent of government and commercial buildings annually that are employing, and investing on EE measures in pilot cities	No data available	10	Documents relating to the information dissemination program in pilot cities. Survey results indicating the likely impact of the information dissemination program (Activity C.1)	
	2. No. of BEE video presentations developed and disseminated	None	2		
	3. No. of BEE brochures developed and disseminated	None	3		
	4. No. of building owners, architectural research institutes and real estate agents influenced by BEE advertisement,	None	700[28]		
B.5. Promotion of Innovative Building	1. % of target survey respondents that are	None	1	Documents on the	China (government and/or private sector) will finance the

[28] The 700 building owners, architectural research institutes and real estate agents who attended BEE workshops are influenced more by the advertisements and promotions to consider BEE projects.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
Technologies	using or are planning to use EE building materials in their buildings or in their building designs			building energy technology development and applicable technologies. Documents on the results of R&D on building materials and equipment. Results of analysis of pilot programs for one product that has resulted from the R&D.	hardware requirements of the R&D work and demonstration schemes. Skilled researchers available to perform R&D activities.
	2. Number of buildings employing and investing on locally developed innovative building technologies	Nil	1		
	3. % of building practitioners that are interested in using or are committed to using the innovative product	0	5		
OUTCOME C: Crosscutting Activities on Energy Efficiency					
C.1. Strengthening the Energy Conservation Centers					
C.1.1. Energy Auditing and New Building Design Inspecting Capacity	1. No. of ECCs that received technical assistance on capacity upgrading	0	8	Documents on the training programs provided to the ECCs. Energy audit reports prepared by the ECCs. Documentation of the recommended measures in energy audits	Continued willingness of the NDRC to rely on the ECCs as a means of promoting energy efficiency investment and management in building and industry in their areas. Continued serious attention to the Energy Conservation Law by the NDRC.
	2. Average no. of projects implemented by capacity-strengthened ECCs annually starting Year 2	0	80		

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	3. No. of high quality energy audits and new building design inspection conducted by ECCs	No data	140	List of ECCs that participated in the EUEEP. Results of interviews with these ECCs to determine the strengths and weaknesses of the training and institution building. Report on modern energy audit equipment purchased for ECCs with co-financing Chinese funds	ECCs can ensure their long-term sustainability The lead time for implementing each of the EE projects of the ECCs after an energy audit is manageable to undertake the whole process of decision, planning, design, procurement and execution within the timeframe of theEUEEP Project Phase 1.
	4. No. of companies annually that applied recommendations from energy audits and realized savings	No data	110		
C.1.2.Capacity building to conduct energy efficiency training	1. No. of energy efficiency training courses designed and conducted by ECCs annually	None	48	Evaluation reports of courses given, length of time, attendees, agendas, training material provided, etc. Interviews with trainees with particular emphasis on how they used knowledge gained in courses; interviews with trainers	The ECCs have or can hire individuals who can become masters of important technical aspects of energy efficiency and are able to use this knowledge to provide practical training.
	2. No. of trained ECC personnel that are delivering EE training	0	40[29]		
	3. No. of industrial and commercial enterprises clients of the ECCs that are employing and implementing EE	0	1,440		

[29] On the average, there are 5 trainors trained for each of the 8 ECCs.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	practices and projects				
C.1.3.Capacity building for energy efficiency information dissemination	1. No of survey respondents that are using or are planning to use information disseminated to them by, or received by them from, the EUEEP	None	19,650[30]	Documentation of information prepared and where and how disseminated. Documentation of any tools developed for information dissemination. Surveys to determine the effectiveness of the information dissemination. Report on the development of a plan for energy efficiency information dissemination, approved by PMO in light of needs of individual activities of the project	The ECCs have or can hire individuals who can become masters of important technical and other aspects of energy efficiency and are able to use this knowledge to prepare high-quality material for information dissemination
	2. No. of websites on EE information established	None	8		
	3. Number of EE information packages/materials disseminated annually	None	6,000		
	4. Annual average percentage of users of information that are satisfied or find service provided useful, *in %*	Non e	80		
C.2. Implementation of	1. Enactment of the ECL	None	Within 2008	Documentation of the various specific	NDRC continues to give ECL implementation high priority, and

[30] Please see table on estimation of impact for dissemination of EE information for ECCs.

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
the Energy Conservation Law	2. No. of government entities applying EC&EE each year in accordance with the ECL			implementation requirements of the ECL on at least the following ECL requirements: • Targets of the energy performance standards system. • Energy performance labeling system for industrial equipment. • Oil conservation guideline and approaches to regulate its use. • ECL supervision and adequacy review mechanism. • Info dissemination activities on experiences in the implementation of ECL. • Others that are identified as necessary Assessment of impact of the regulations through surveys and interviews.	provides proper staff to carry out the activities.
	a. Local government buildings	None	350		
	b. State-owned factories	None	200		
	3. No. of private sector entities applying EC&EE each year in accordance with the ECL				
	a. private sector buildings	None	500		
	b. private industries	None	500		
C.3. Policy	1. No. of feasible financing	None	6 by Year 1	Reports on international	Private enterprises are

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
Development on Energy Efficiency Financing Options	options for EE initiative studied and proposed			models and lessons learned on energy efficiency financing. Documents on the proposed financing models. Documents on the strategy and plan for implementation of best models. Results of the demonstration of the application of the selected model. Statement by NDRC and other relevant policy agencies on willingness of China to provide funds for EE financing. Report on survey on financing status of local government EE investment and recommendation on implementation of increasing financing	interested in availing of the financing options provided under the financing schemes.
	2. No. of proposals on models of financing available to China's situation completed	None	4 Year 2.		
	3. No. of financing schemes designed and implemented (on demonstration basis) in 2 regions by Year 3	None	6 by Year 1		
	4. No. of EC&EE projects that were assisted through the demonstrated financing schemes	0	1		
	5. Total amount of funds managed through the demo financing schemes (inclusive of reflows), in USD	0	260,000		
	6. Total energy savings from the EC&EE projects that were financed through the financing schemes, *tce/year*	0	1,100		
	7. No. of replications of the demonstrated financing schemes	0	2		

PROJECT STRATEGY	OBJECTIVELY VERIFIABLE INDICATORS				CRITICAL ASSUMPTIONS
	INDICATOR	BASELINE	TARGET (BY EOP, UNLESS INDICATED)	SOURCES OF VERIFICATION	
	8. Total amount of funds allocated for the new financing schemes, *in USD*	0	137,000	investment Reports on in-depth reviews and evaluation on proposed new models of energy efficiency financing. Reports on workshops on government EE financing investment Reports on the replication of the demonstrated financing schemes.	
	9. No. of new financing options for increased availability of energy efficiency investment financing implemented in a local area	None	1		
	10. Number of financing institutions each year that are providing financing assistance for EC&EE projects.	No data	10		
	11. Cumulative energy savings, in million tons of coal equivalent (Mtce)	0	0.6		