UNDP Project Document

Government of China

and

United Nations Development Programme

MARKET TRANSFORMATION of ENERGY EFFICIENT BRICKS and RURAL BUILDINGS (MTEBRB) PROJECT

(PIMS# 3675)

Brief Description:

This project contributes to the reduction of GHG emissions through the transformation of the Chinese rural buildings market towards more energy-efficient building materials (mainly bricks) and technologies. It is in line with the GEF's climate change strategic programs on Promoting Energy Efficiency in Residential and Commercial Buildings (SP-1); and, Promoting Energy Efficiency (EE) in the Industrial Sector (SP-2). It is comprised of activities aimed at improving energy efficiency and promoting the widespread adoption of energy-efficient bricks, as well as energy efficient building technologies and practices in the building markets in rural China. The proposed project will positively respond and make great contribution to the strategy and policy of the Government of China concerning energy efficiency in rural areas through its close linkage with the new government campaign on "Building a New Socialist Countryside" and promoting the upgrade of brick products and production technology of rural brick plants and the application of EE buildings, promoting the sustainability of rural brick industry, improving the living standard of rural residents thus increasing energy efficiency in rural areas.

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List of Acronyms

Acronym	Meaning
ABC	Agricultural Bank of China
AEDI	Agricultural Engineering and Designing Institute
APR	Annual Project Report
AWP	Annual work plan
CCTV	China Central Television
CO	Country Office
CTA	Chief Technical Advisor
EE	Energy efficiency
EPS	Expanded Polystyrene
GEF	Global Environmental Facility
GOC	Government of China
IA	Implementing Agency
IR	Inception report
M&E	Monitoring and evaluation
MEP	Ministry of Environmental Protection
MLR	Ministry of Land Resources
MOA	Ministry of Agriculture
MOHURD	Ministry of Housing and Urban-Rural Development
MOST	Ministry of Science and Technology
MTEBRB	Market Transformation of Energy Efficient Bricks and Rural Buildings
NAB	National Association of Bricks
NDRC	National Development and Reform Committee
NSC	National Standardization Commission
PMO	Project Management Office
PSC	Project Steering Committee
RCC	Rural Credit Collectives
RCI	Rural Communication Institute
RCU	Regional Coordination Unit
SNRC	Socialism New Rural Construction
STDCMOHURD	Scientific and Technological Development Center of MOHURD
UNDP	United Nations Development Program
WMRO	Wall Material Reform Office
XWMRDI	Xi'an Wall Material Research and Designing Institute

SECTION I: ELABORATION OF THE NARRATIVE

PART I: SITUATION ANALYSIS

Context and Global Significance

1. China is presently the second ranked country in the world in terms of energy consumption and CO_2 emissions. In addition, due to its ongoing rapid economic development, and its growth from a generally low economic development level, the energy consumption of the country will expectedly continues to increase strongly into the future.

2. China's energy demand is being driven by its relatively high energy intensity, the dominance of heavy and energy intensive industries (which has led to energy use rising faster than GDP in recent years), a focus on expanding production rather than lowering unit production costs, and the low energy efficiency of key determinants of energy use such as the generally low efficient building sector.

Buildings Sector in China

3. Being the world's biggest and fastest growing building market, China's annual increment of buildings is equal to the growth of all the developed countries combined. China's current total floor-area of buildings is 42 billion m^2, and this is increasing by 2.07 billion m^2 each year. Of the total building floor area in China, 60% is for residential buildings, with public and industrial buildings accounting for the remaining 40%. Taking into account it's still low per capita floor-area for its level of development, Chinese building construction levels will clearly remain high for the foreseeable future.

4. Along with its fast expansion, the building sector's energy use[1] is also increasing rapidly. In 1978, the energy consumption by the buildings sector in China accounted for only 10% of national total energy use; however in 2007 this figure had grown to 27.5%. The buildings sector has now become one of the major energy consuming sectors in China. Of the total energy consumption in the buildings sector, two thirds is used for space cooling and heating. Driven by the increasing cooling/heating demand and the fast growing building area, the buildings sector will inevitably play a larger role in shaping China's future energy consumption. According to developed countries' (with a similar mostly continental heating/cooling climate) experience, the energy consumption of the buildings sector can be expected to rise towards more than half of total energy use over time. It is estimated (ERI report) that by the year 2020 the Chinese building sector will triple its energy use compared to 2000 levels.

5. According to research by Chinese experts[2], Chinese buildings are much less efficient in terms of their energy use than in developed countries. Energy use per unit floor-area is on average 2~3 times higher than the average developed world level (for similar climate).

6. For a predominantly continental climate (hot summers and cold winters) climate such as China, the performance of building materials' thermal insulation is crucial to the buildings

[1] As defined by The Provisions of Energy Conservation Management for Civil Buildings (MOHURD, 2008), the energy consumption in buildings sector in China includes the energy use of buildings' heating, cooling, lighting, ventilating, and water supply and sewage systems

[2] Tu Fengxiang, 2006

sector's energy efficiency performance. In Chinese municipal areas, the building envelope[3] accounts for 70% of the buildings' total energy demand. Because of the poor insulation performance of the building envelope, the heating/cooling energy use in China is much higher than the world's advanced level. For example, in Beijing, the annual heating energy use per square meter of floor area is 25 kgce, while in Germany which has a similar climate to Beijing, the figure is only 3.7~8.6 kgce.

Table 1: Comparison of Building Envelope Heat Transfer Coefficient (W/m^2 K)

Location	Exterior Wall	Exterior Window	Roof
Beijing	0.3~0.6	2.8~2.5	0.6~0.45
Shanghai	1.0~1.5	3.2~4.7	0.8~1.00
South Sweden	0.17	2.0	0.12
Germany	0.20~0.30	1.5	0.2
USA[4]	0.32~0.45	2.04	0.19
EU	0.25	1.3	0.3

Rural Buildings in China

7. China's rural areas now dominate the national building construction market as well as its related energy consumption. China's rural areas now account for 60% of the nation's existing buildings, and 57% of the total annual building sector's additional floor space. With the ongoing governmental "Building a New Socialist Countryside" campaign to encourage faster rural development and construction, it is expected that the new building construction rate in the China's rural areas will continue at current record-breaking levels.

8. Among rural buildings, 95% are residential buildings. Unlike the residential buildings in urban areas where central heated multi-layer (6 stories or above) apartment buildings are the typical layout, Chinese rural buildings are typically isolated stand-alone houses without central heating or cooling systems. Each building has one or 2 floors built of locally made solid clay bricks with very poor thermal insulation properties (EE buildings).

9. The energy efficiency of rural buildings[5] in China is much lower than those in urban areas. An investigation conducted in a Beijing suburb shows that the heating energy use in the local rural area (in terms of unit floor area) is 2 to 3 times higher than that in the urban region (which itself is already 2 to 3 times higher than the world advanced level), while the average in-door temperature in winter is 8◦C lower.

10. Buildings' low energy efficiency leads to excessive energy consumption in Chinese rural areas. Typically, 50% to 80% (in the hot summer and cold winter zone, cold zone and severe cold zones respectively) of the total per-household energy use is due to house heating and cooling. Of the overall national building sector energy consumption, 58%[6] is used in the rural areas (including biomass).

Rural Bricks Production

[3] This is referred to as the exterior building cladding that is directly exposed to the exterior, which includes walls, windows, doors and roof.
[4] Same HDD numbers as in Beijing
[5] EE buildings refer to low-energy-consuming buildings designed using EE building materials (e.g. EE bricks) that minimizes heat losses and/or heat gains, and with building systems/services that are optimally and systematically designed and meet the national 50% or 65% energy efficiency standards for buildings
[6] 2008 Annual Report on China Building Energy Conservation, Qiu Baoxing et al., 2008

11. There are over 90,000 brick making plants in China making around one trillion bricks per year. More than 95% of these brick manufacturers are located in rural areas and are overwhelmingly owned by individuals (former farmers). Brick making accounts for around 70 million tons coal consumption per year (leading to 170 million tons of CO_2 emissions per year). In addition, due to the production of clay bricks, more than 1 billion m3 of clay resources are consumed every year, which translates into a significant damage of half a million Mu of arable land per year, a serious concern in a country that has only 9% of the world's total arable land to feed 21% of the world's total population.

12. The current Chinese rural brick market is still overwhelmingly dominated by solid clay brick products (99% of the total rural market), which have much worse thermal insulation properties than EE bricks7 , and need 50% more energy than EE bricks to produce.

13. Circular (Hoffman) kilns are currently used to produce 90% of rural bricks. Circular kilns require much less capital investment than the new tunnel kiln technology, but it is technically more difficult to produce high quality EE bricks in circular kilns, and circular kilns need around 60% more land (for the air drying of green bricks) per unit production capacity than tunnel kilns (which fire the green bricks directly). The tunnel kilns represent 10% of the total bricks outputs at present, while due to increasingly strict control of the limited rural land resource by the government (more details in 1.2) in recent years, tunnel kilns are growing much faster than circular kilns.

Institutional, Sectoral and Policy Context

14. The Government of China's priority for promoting energy efficient buildings is most clearly stated in a series of laws, policy documents and action plans:

    i. The "Energy Conservation Law" (1997, revised in 2007) aims to regulate the overall energy conservation behavior of the nation, including buildings construction and wall materials production. The law focuses on three main strategic areas, namely: (1) industrial; (2) buildings; and, (3) transportation sectors. The law regulates the administration, supervision, planning, management, rewards and sanctions regarding energy use activities in each of these three areas. According to the law, throughout the process of designing, construction, and supervision of buildings, the related EE codes and standards must be complied with; and the government also encourage the application of new EE wall materials in new construction and the renovation of old buildings.

    ii. The policy vision set out in the Energy Conservation Law was extended into a long-term strategy documented in the "National Mid-Term and Long-Term Energy Conservation Plan" (2004) and "The National 11th Five-Year Development Plan" (2006). The plans require that by 2010, the energy consumption per unit of GDP output will be reduced by 20% compared with 2005, as a result, the total energy savings in the period are expected to be 0.56 billion tce, among which, the energy savings from buildings sector are expected to reach 0.11 billion tce, 20% of the nation's total. In order to achieve this goal, the plans require that the 50% EE standard[8] will be enforced for new buildings; and in

[7] EE bricks refer to rectangular fired bricks made primarily of clay and shale (and industrial waste materials), that are used for building walls or load bearing and/or packing structures, and which can satisfy the requirement of national 50% and 65% EE building standards. Additives such as polyamine or polystyrene, sawdust and sludge, etc. can be used as composite thermal insulating materials to improve such bricks' heat-insulation performance and physical strength compared to typical clay solid or perforated bricks

[8] Which means the unit floor-area energy intensity will be as 50% as that in 1980 under the same in-door temperatures (18 ˚C in winter and 26 ˚C in summer respectively).

big cities such as Beijing, Tianjin, Shanghai, and Chongqing, the more strict EE standard (65%) will be applied and enforced.

iii. In 2006, the "Comprehensive Work Plan for National Energy Conservation and Wastes Discharge Reduction" and related action plans for building sector were formulated, which focuses on four strategic actions in urban buildings' energy conservation during the period of 2006~2010: (1) build new and energy efficient buildings; (2) existing residential buildings' EE renovation and heating system reform in Northern China; (3) improved efficiency and performance of major public buildings, and (4) application of renewable energy and green lighting.

iv. The 2006 action plan describes the measures required to improve the energy efficiency of buildings sector, which include the incorporation of EE indicators into the development of city panning; improvement of performance monitoring and reporting system; prohibition of solid clay bricks; development of suitable incentives; and capacity building of technical supporting institutions and service providers. It also includes conducting public awareness programs to foster energy awareness amongst residents, developers, and wall material manufacturers.

15. In order to promote the production and application of the so called "new types of wall materials[9]", the NDRC, MOA, MOHURD and MOLC set up the joint "Wall Material Reform Program" in 2004. The main objectives of the program are: 1) land conservation; 2) integrated utilization of wastes; and 3) promotion of EE buildings. Under the leadership of WMRP, a campaign of "Prohibiting Solid Clay Bricks Production and Application" has been undertaken. Up to now, in major big Chinese cities, the application of solid clay bricks have been successfully phased out and the prohibition is being extended into all urban areas now. As the result, the market share of solid clay bricks have dropped from 90% in 2004 down to 60% in 2007. On the other hand, the rural wall material market is still overwhelmingly dominated by solid clay bricks, and the "new types of wall materials" that currently used in urban areas are either too expensive to be accepted by rural customers or have unsatisfactory mechanical and thermal qualities that cannot meet the requirement of EE building standards on wall materials.

16. The project concept also links into an important on-going governmental campaign namely the "Socialism New Rural Construction (SNRC)" that was initiated in 2006. The major objective of the campaign according to the 11th Five Year Plan of National Economic and Social Development is to address the increasing difference between the rural and urban areas in terms of public services, per-capita income, and living standard. In the campaign, the GOC has significantly increased its input in rural areas. According to NDRC and MOF, the total investment in rural areas increased by 17% annually; the governmental investment in rural areas has been increased from 37% (of the national total governmental investment) in 2003 to 48% in 2007; and 15.3% more fiscal income was spent in rural areas in 2007 than that in 2006.

17. One of the major activities in the campaign is the conduct of township and village construction planning and promotion of the improvement and development of rural infrastructures and residential buildings. As required by the 11th Five Year Plan that these constructional activities should follow the principles of: (1) land conservation; (2) energy efficient and environmentally friendliness; (3) integrated in terms of functions and facilities;

[9] In contrast to traditional clay solid bricks, the broad and general terminology of "new types of wall materials" inclusively refers to wall materials that are: made of industrial wastes; energy efficient or less polluting in production or in application; or use less or no clay.

and, (4) preserve the local unique architectural characteristics. The campaign was envisaged by the central government to provide the rural residents with free blueprints of new building samples which are energy efficient and compact in land use terms. The campaign has provided improved building samples have been handed over to thousands of villages. But investigations show that the samples' development and collection process is simply a compilation of building models that have been developed for urban customers, and has not considered the very different requirements by rural residents (such as overall affordability; farming living habit and requirement; durability in the much tougher rural environment; and engineering and construction sophistications which the much less skilled rural building developers cannot yet provide). As a result, the samples have been put aside by rural villagers, rural building construction is still following traditional routines, and the promotion of rural EE buildings applications will never take their required momentum in the "Socialism New Rural Construction" campaign.

18. The planning and construction activities are usually organized by county and township governments. The village construction plan will be developed by local government, and then the government will organize the identification, and selection of designing, developing and supervision companies (may or may not through the bidding process depends on local market and economic development conditions) to undertake the whole construction. Financially the initial investment usually comes from governmental input, developing company's equity and bank loan. The constructed buildings will be sold to the villagers by the developer. Local governments will often help the developers acquire the commercial bank loan from the local financial institutions, the government will also provide grant or loan interest subsidy through the developers to the rural house buyers. In some places, the up-front payment will be required from the house buyers to finance the building construction. Generally, villagers tend to not borrow money from local banks to buy their new houses, the major financial sources for the house buyers are their incomes from regular farming and other economic activities as well as the money they received from the local government for their old residential land. The major criteria applied by the local financial institutions to determine whether or not to grant the loan to the developer are the company's payback abilities, which include its capital principle, construction cost of the houses, the support from the local government, and the payback ability of the house buyers.

Problem Description and Barrier Analysis

19. The Chinese rural building market accounts for nearly 60% of the national total, primarily from the rapid economic development and the improvement of the rural population's living conditions. Due to the extensive on-going campaign of "Socialism New Rural Construction", Chinese rural areas are expected to continue to play an important role in the country's future building construction market.

20. Overall, Chinese buildings have low levels of energy efficiency, but the buildings in rural China are much worse even than the low efficiency urban buildings. The most critical problem in the rural buildings' energy use is the very poor thermal performance of their building envelope, especially the widely used but low thermal efficiency wall materials. China's rural wall material market is overwhelmingly dominated by solid clay bricks, which not only provide low levels of thermal insulation in building applications but also consume a lot more energy in their production process than EE bricks.

21. Despite the strong commitment and successful implementation of the Chinese Government's policy of promoting EE buildings and EE wall materials in the country's urban areas, the unfortunate fact is that the efforts and achievements in cities has not yet been extended onto

rural areas. Unlike the case in cities, the EE bricks and EE buildings have not broken through into the rural building market; and the huge potential for energy savings and GHG emissions reductions in rural buildings has not yet been achieved.

22. During the barrier and gap analysis in the project's PPG phase, and from consultation with stakeholders, the reasons that have caused the above mentioned problems have been carefully discussed. From PPG analysis and stakeholder feedback, the main identified barriers to energy efficient rural buildings in China are: 1) lack of public awareness and information dissemination capacities; 2) ineffective policies and lack of implementation capabilities; 3) limited financial accessibility; 4) lack of performance demonstration and technical supporting capabilities.

Barriers to EE Bricks Market Transformation & Application in Rural Buildings

23. The following paragraphs elaborate the detailed findings during the PPG phase regarding the barriers to EE bricks market transformation and application in rural buildings.

Information and Public Awareness-related Barriers

24. The lack of knowledge and information as well as the lack of information dissemination capabilities about rural EE bricks production and rural EE buildings exist among the major project related stakeholders, especially those at the local level.

25. The related previous and on-going public awareness and information dissemination campaigns initiated by the government and international institutions have been primarily targeting urban areas. These campaigns do not take into account the rural residents' different behavior and the related unique requirements for EE buildings and wall materials; and there are no specific information dissemination venues (such as taking advantage of existing information networks on rural energy and environmental protection) were developed. As a result, although the production of high quality EE bricks exists in a few rural brick mills and the technical information about rural EE building models and EE bricks have been developed by some technical and academic institutions, the lack of awareness and access to the necessary information on these subjects by the key stakeholders makes their application in rural areas almost impossible.

Policy and Institutional Barriers

26. At the central government level, although the government has realized the significance of addressing the construction of EE buildings and promote EE brick production in the rural areas:

- The issue has not been taken into account in the national overall EE building development planning process or action plans; no specific policies on promoting and supporting the manufacture and application of EE building materials (particularly bricks) in rural buildings have been developed, and the necessary incentives are not available;

- The campaign regarding wall material reform has not yet involved the practical promotion of rural EE buildings development in the context of enabling policies and policy support actions;

- Although EE building standards and codes have been developed and enforced in cities, the action plan for the enforcement of such standards in rural areas has not been worked

out; the construction codes for rural EE buildings have not yet been developed; and there are no EE brick production and product standards available;

- The necessary market oriented competition and bidding procedures and mechanism to identify and certify the EE products has not yet been put into place to promote energy efficient rural building models, brick products and EE building technologies.

27. Local governments show great interest and enthusiasm (due to the central government's ruthless enforcement of 20% ES target, which has been disaggregated and allocated to various levels of local administrations, and become the top prioritized mandatory task with no compromise) in committing to the implementation of the project, but:

    - The promotion of EE buildings application has not been incorporated in the local village and township planning process (which is one of the major actions of Socialism New Rural Construction campaign and will be the rules to regulate the future house construction activities in the region);

    - Local officials generally have no idea about EE buildings and EE bricks;

    - Local governments have little experience, knowledge and skills of implementing EE projects and activities.

Financial Access Barriers

28. From the perspective of rural building developers and brick makers, the lack of access to commercial finance has always been a major concern in their business operation and expansion. The loan application/approval process is complicated and time consuming. Because of the lack of financial management skills and accounting capability, the usual inquiry of financial and business status are about accounting records. The rural building developers and brick makers find this fundamental requirement by commercial financial institutions in accepting and approving the loan applications hard to fulfill.

29. The local financial institutions have little idea and experiences about EE technologies, commercial and financial viability of EE projects, and in financing EE project for small and medium rural businesses. They generally viewed the EE projects as a financial cost, commercially unattractive. Even if these initiatives could possibly be a financial gain, they consider these as technically too risky and with too much market uncertainties. To the local financial institutions, rural EE building and EE brick manufacturing are brand new concepts. They have to revise and reformat their existing financial products, business models, and operational procedures so as to develop this new market and run it successfully.

Technical Capacity Barriers

30. The development of rural EE buildings has unique technical characteristics in contrast to EE buildings in urban areas. The typical buildings in China's rural areas are stand-alone 1- or 2-storey houses built from solid clay bricks walls and a concrete roof. During the New Rural Construction, usually a small local rural building developing company will be hired by the villages when they want to build their new houses. Because of the use of lower cost building materials and lower labor costs, the unit floor area cost of new buildings in rural areas is 50% to 80% lower than that in cities. Due to the much larger surface-volume ratio and less efficient thermal insulation of the building envelope, the heat loss of rural buildings is much higher than for city buildings.

31. The major technical barriers that hinder the application of EE buildings in rural areas are:

- Although preliminary sample studies and information collection have been conducted in some related technical and research institutions, the EE building models have not been carefully studied and systematically developed for rural areas. Such type of EE buildings should be: (1) affordable to financially less capable rural residents; (2) long lasting and require less maintenance and refurbishing care and cost (as the many cases in the cities EE buildings); and, (3) technically easier to be built;

- Lack of detailed feasibility studies and demonstrations to showcase the technical and engineering viabilities of such EE building models;

- The technical institutions, especially the local ones, that may provide immediate assistance to rural developers and villagers in developing, designing, and building EE buildings, are inexperienced and lack skills regarding the special requirements of rural EE building development and construction;

- The local rural building developers are mostly not well trained and managed, technically not capable of undertaking the EE building projects which require more complicated engineering treatment and more sophisticated construction skills and techniques.

- The most widely adopted thermal insulation technologies and materials for building envelopes (especially for exterior walls) in the city areas are too expensive or not robust enough to be applied in rural areas. Although some suitable (less expensive, long lasting and easier to be used) energy efficient building materials such as EE bricks (which can meet the strict requirement of 50% and even 65% EE standards in all the climate zones) are available and have been developed or produced in a few places, the production and application of such materials in rural areas are rare.

32. There are three types of such EE bricks now available in China. In contrast to the previously developed old types of so called “EE bricks” that are currently used in urban areas, the latest types of EE bricks have much better thermal insulation performances and can satisfy the 50% or even 65% EE standards without using other complementary insulation materials. Another advantage of these latest types of EE bricks compared to the old EE bricks and solid clay bricks is the fact that they are much more energy efficient in the production process (using 50% less energy than solid clay bricks, 18% less than old EE bricks). Unlike the mostly widely adopted insulation materials (Expanded Polystyrene or XPS, for example) in urban EE buildings, the latest EE bricks are much less expensive (50% lower in cost terms per unit floor area), easier to use by construction workers, and last much longer (as long as the buildings’ life time) without having to be repaired or refurbished like XPS (which according to the national standards have to be repaired once in 5 years in order to maintain the original quality of insulation).

33. However, the production of these higher quality EE bricks requires higher quality equipment, more experienced and more sophisticated control and manipulation of production process, and better technical and management skills. A combination of lack of demonstration of these new production technologies and the lack of technical support from the local technical institutions gives the interested rural brick mills cold feet in taking advantage of the new technologies and overcoming their possible technical and production risks and uncertainties.

Baseline Scenario

34. The policy and administrative initiatives undertaken by GOC have provided a suitable framework for further efforts in developing and promoting EE buildings and wall materials in general, and the related governmental and international activities have already been extensively conducted in Chinese urban areas.

35. According to the National Energy Conservation and Waste Reduction Comprehensive Work Plan" and related action plans, major governmental activities have been focused on Chinese urban areas as follows: 1) build new and energy efficient buildings, which has 70 million tce of energy savings potential; 2) old residential buildings' EE renovation and heating system reform in Northern China, which can save 16 million tce; 3) improved efficiency and performance of big public buildings, which will cut energy use by 11 million tce; and, 4) application of renewable energy and green lighting, to save 14 million tce of energy.

36. At the same time, the on-going GEF/UNDP EUEEP project also focused on Chinese urban EE building development. The EUEEP activities that focus on buildings include: 1) Data collection and analysis of urban building energy use; 2) Development and update of policies and standards for residential and commercial energy efficiency building; 3) Implementation of energy efficiency standards; 4) Dissemination of energy efficiency information to the pilot cities; and, 5) Research on innovative building technologies.

37. An initial policy/institutional barrier and gap analysis, carried out during the project development phase shows that despite the on-going efforts by GOC and international institutions, significant institutional, staffing, financial and planning barriers can be found in the rural areas on EE building development:

- Although local governments have completed their five year plan on EE building, and action plans have been developed and under implementation, the plans and actions are only targeting urban areas. There was no plan was made to tackle the issues of rural EE buildings. Hence, no action was undertaken on rural building EE promotion.

- During the extensive implementation of GOC's top priority program "Socialism New Rural Construction", the towns and villages throughout the nation's rural area are developing their new construction plans, and some of these plans have been carried out, and yet no considerations on new buildings' energy efficiency has been incorporated into the town/village planning and construction actions.

- County, township and village level governments, which are crucial in implementing rural EE building projects, have not been involved in the on-going public awareness and training programs. Hence, a lack of relevant knowledge and implementing capabilities is apparent.

- The rural financial institutions are rarely involved in EE activities, in general, and EE buildings construction and brick production, in particular.

- From a technical perspective, the availability of EE bricks is critical to the application of rural EE buildings. Nonetheless the current on-going activities have not included the development, performance demonstration and market expansion of high quality EE bricks that can satisfy the national building EE standards.

38. In conclusion, although the commitment of GOC to improve the building sector's energy efficiency is strong, the on-going government-, and international organization-assisted activities have not addressed the specific barriers that hinder the development and application of rural EE buildings, and the development and production of EE bricks. As a result, in urban areas the government's goal of achieving 50% and 65% energy saving in the building sector will most likely be achieved. However, without the GEF incremental activities suggested in the proposed project, the development of EE buildings and bricks application in rural China will be overlooked, the opportunity to realize even more overall energy savings in the country's building sector and the associated significant GHG reduction potentials will be missed.

PART II: STRATEGY (Expanded Details Contained in Section IV, Part VI)

Project Rationale and Policy Conformity

39. Chinese rural buildings and brick production markets represent great potential in terms of energy savings and GHG emission reductions due to its significant market share and exceptionally low energy efficiency. Although the Chinese Government's commitment to address its building sector's energy efficiency issue and improve the rural countryside environmental and resources sustainability is strong, due to the impediment of the following unattended barriers, the GOC's efforts to incorporate the rural EE buildings application and EE brick production into its overall EE buildings development and new rural construction programs have not achieved their goal: (1) Lack of information dissemination capacities and public awareness; (2) Ineffective policies and lack of implementation capabilities; (3) Limited financial accessibility; and, (4) Lack of performance demonstration and technical supporting capabilities

40. If these barriers are not quickly and effectively removed, and the well functioning rural buildings and brick productions' EE improvement cannot be showcased along with the nationwide implementation of "Socialism New Rural Construction" campaign, which is still in its early phase of implementation and township/village planning is being developed across the countryside, the great opportunity for developing the rural EE buildings and EE bricks markets will be lost.

41. The project intends to provide an effective, sustainable and integrated rural EE buildings application and EE bricks production program to build on the ongoing governmental efforts on urban EE buildings application and "Socialism New Rural Construction", as well as the on-going urban focused GEF/UNDP EUEEP project and to develop the Chinese rural markets for EE buildings and bricks. To make this vision reality, the intervention strategy of the project is designed around the following four components to overcome the 4 respective barriers through a series of technical assistance and capacity building actions: (1) Information Dissemination and Awareness Enhancement; (2) Policy Development and Institutional Support; (3) Finance Support & Accessibility Improvement; and, (4) Demonstration and Technology Support.

42. The project fits the objectives of the GEF's Operational Program #5 (Removal of Barriers to Energy Efficiency and Energy Conservation) and will contribute to the reduction of GHG emissions through the transformation of the Chinese rural buildings market towards more energy-efficient building materials (mainly bricks) and technologies. The project is in line with the climate change strategic programs on Promoting Energy Efficiency in Residential and Commercial Buildings (SP-1); and, Promoting Energy Efficiency in the Industrial Sector

(SP-2). It is comprised of activities aimed at improving energy efficiency and promoting the widespread adoption of energy-efficient bricks, as well as energy efficient building technologies and practices in the building markets in rural China.

Alternative Scenario

43. To address the barriers with respect to the lack of public awareness and information dissemination capacities, the proposed GEF-assisted alternative (i.e., the MTEBRB Project) will include the development and operation of specific information dissemination network; development of related media products; and the design and implementation of a public awareness program specially targeting the major stakeholders identified during the PPG phase. The overall intervention scheme with regard to the removal of barriers on public awareness and information dissemination is carefully designed to target the rural population in general, and specifically the rural building developers, brick mills and local governments. The project will take advantage of the current information dissemination actions and networks of rural construction campaign, and effectively complement the GOC and international public campaign on EE buildings which have not specifically targeted the rural communities. Based upon the experiences and lessons learnt from the related projects and programs, the project will include activities specially enhancing the information exchange and knowledge sharing not only inside China but also around the developing world so as to maximize the GEF impact on rural EE buildings and EE bricks in China, in the whole region and around the world.

44. Under the second project component, the technical assistance and capacity building activities will be carried out at both national and local levels to address the specific policy development and enforcement barriers with respect to the rural EE building application and EE bricks production. The project will pay special attention to help combine the efforts of promoting both EE buildings and new wall material reform, which are currently separate and without effective integration in terms of their objectives, institutional coordination, policy development and specific actions.

45. The third project component will address the needs from both actors involved in the financial aspect of EE brick market transformation and application in rural buildings, namely: (1) the rural developers and brick mills as the potential borrowers; and (2) the local financial institutions as the potential lenders. This will be done through a series of technical assistance and capacity building activities. The anticipated outcome from this project component is more effective business partnership between the local financial institutions with EE building developers as well as EE brick makers.

46. The main focus of the project component 4 is to address: (1) the lack of demonstration of rural EE buildings and EE bricks[10] technical and engineering viabilities; and, (2) the lack of technical capabilities of the related stakeholders (local governments, rural developers, local technical institutions, and brick mills) to develop and implement rural EE buildings and EE bricks production activities and projects. The implementation of the activities in this project component will be carried out by 3 steps: (1) preparation and implementation of

[10] As for the economic attractiveness of the EE bricks that will be promoted by the project, on one hand, these are much cheaper than the current EE wall materials used in Chinese urban areas. On the other hand, these are more expensive than the common solid clay bricks that are widely used in rural areas. The survey conducted during the PPG exercise regarding the rural customers' willingness to pay indicates that as long as the energy performance of such bricks is comparable to the results of the demonstration projects, the carefully targeted rural market has substantial potential customers who are willing to pay the extra money to enjoy the energy savings and more importantly the improved indoor living conditions.

demonstration sub-projects; (2) technical capacity building on replications; and, (3) development and implementation of replications. The implementation of the component activities will facilitate the development of a nationwide roadmap and replication mechanism to guide the future large scale rural EE buildings application and EE bricks production across the country. A total of 60 replication projects are planned to be supported under this project component[11].

47. The concept that underpins this project was developed drawing on lessons and experiences generated through other GOC and GEF-funded EE buildings and rural EE projects and activities, as well as the practice on rural construction, these projects and programs include: GOC's EE buildings development program in cities; End-use Energy Efficiency Project funded by GEF/UNDP; Township and Village Enterprises Energy Conservation and Pollution Control Phase II (GEF/UNDP); Socialism New Rural Construction (GOC). The principal lessons used to inform the development of the project concept are as follows:

Lessons Learnt	Design Features
Project should consider a complete market development strategy.	The project will pay attention to not only the demand side but also the supply side of the rural EE building market: both the EE buildings application and EE brick production will be addressed in the project.
The project should involve all the major decision makers at central government level in designing and implementation.	All major decision makers (MOA, NDRC, MOHURD, MOST, ABC) at central government level have been involved in the design process, future institutional arrangement proposed.
The project should involve all major local stakeholders.	Major stakeholders have been identified and numerous consultation meetings held, specific stakeholders' involvement plan proposed.
More effective participation of technical institutions in designing and implementation is critical to the success of the project.	National leading technical institutions with respect to all major project related technical issues have been actively involved in the designing process, involvement plan in future implementation developed and incorporated in the design of project activities.
Specific target information dissemination system may provide more effective impacts.	The project will design and develop the information dissemination system and public awareness program to particularly target major stakeholders in rural EE building and EE bricks application.

[11] During the implementation of the GEF/UNDP TVEII project, USD 1 million of GEF fund was used to develop and assist in the operation of a revolving capital fund (RCF) to facilitate financial accessibility of rural industries to commercial EE fund. After the completion of that project, the fund was transferred by GEF/UNDP to the Chinese Government. Based on the recommendations of the project's final evaluation, the GEF/UNDP and GOC agreed to use this transferred fund in the proposed project. During the project preparation, the project development team consulted with the related participants in the TVEII RCF practices (GEF, UNDP, MOA, ABC, HY Com., technical expert and designer on RCF, TVEII final evaluators, RCF borrowers) to draw upon the lessons on its previous operation and enlighten the feasible options to utilize the fund in the proposed project. Based upon these consultations, the team believes that the most efficient way that will optimize the catalytic impact of this fund is to combine it with the other proposed GEF budget on supporting technical assistance in replication activities. If doing so, the project will be able to commit much more in conducting its replication activities (with the help of this added budget, all 60 replication sub-projects and their energy savings and GHG emission reductions will be included into the project M&E plan). Moreover, the project will be able to use extra financial resource to support the development of the future nationwide replication scheme and the necessary capacity building activities. GEF through the project will significantly increase its catalytic impact on Chinese rural GHG emission reductions and capabilities, and through the continual involvement of TVE brick mills in the replication sub-projects, the GEF intervention on rural brick industries will be effectively sustained.

Lessons Learnt	Design Features
Information exchange and knowledge sharing will provide significant impact to future replications and project overall sustainability not only in China but also around the developing world.	Information exchange and knowledge sharing activities have been included in the project design to promote the post-project replications in China and in the region.
The policy development should be based upon and combined with real technical and engineering pilot and demonstration.	The project provides integrated interventions which not only address policy barriers but also address the technical, information and financial barriers in a comprehensive manner.
More realistic and careful designing and planning of financial TA activities; Local financial institutions involvement and capacity improvement will lay necessary foundation to develop future specific financial supporting mechanisms.	Careful investigation and numerous stakeholders consulting meetings were held during the development of project concept and project document to identify the most critical financial barriers and needs for TA assistance. Based upon these preparations, activities were developed specially target local financial institutions.
Demonstration and replication should be based upon solid preparation and identification process.	1) During the project preparation phase, the screening process and criteria were developed based on stakeholders' consultation meetings; 2) project will provide systematic assistance in demonstration and replication projects' feasibility study and preparation; 3) the project will make special effort to develop and pilot the operation of a sustainable replication mechanism.
Collaboration with existing action and network.	During the implementation, the project will closely cooperate with the on-going GOC program Socialism New Rural Construction and take advantage of the existing MOA SNRC information network, rural energy/environmental protection network as well as XWMDE's brick information network.
Monitoring & Evaluation	
The strong technical and administrative personnel are critical to a successfully implemented project.	The major administrative and management framework established in GEF/UNDP TVEII project will be continued in this project.
Post project sustainability and replication mechanism	Sustainable replication mechanism will be developed and piloted during the project implementation which will significantly increase the project sustainability and replicability.

Project Goal, Objective, Outcomes and Outputs/Activities

48. The goal of the project is the reduction of GHG emissions from brick manufacturing and the commercial & residential (C&R) buildings in Chinese rural areas.

49. The objective of the project is the removal of barriers that have persistently hindered the widespread development and application of EE bricks and EE buildings in rural China. The major focus of the project will involve addressing the key barriers (policy, technical, informational, and financial) that currently hinder the rural buildings market from adopting EE bricks and EE buildings. The project will also help the government to strengthen its capability to develop and implement EE bricks and EE buildings activities in a market environment. This project will address these barriers through a combination of training and capacity-building, learning by doing, and technical assistance activities.

50. The project is comprised of four components, each of which addresses one of the four major barriers:

- Component 1: Information Dissemination and Awareness Enhancement;
- Component 2: Policy Development and Institutional Support;
- Component 3: Finance Support & Accessibility Improvement;
- Component 4: Demonstration and Technology Support.

Component 1: Information Dissemination and Awareness Enhancement

51. This component is intended to address the barriers related to the low level of awareness of local government, rural citizens, local brick makers, and local building practitioners of the effective application of EE bricks and EE building technologies in the buildings sector in China's rural areas. This component also addresses the lack of access to suitable information on such technologies and energy conserving practices.

52. The primary outcome of this component is the enhanced knowledge and access to technical and market information, particularly among local governments, rural residents, and builders in rural areas, on EE bricks and buildings.

53. The project outputs are:

- Output 1.1: Established and operational information dissemination network;
- Output 1.2: Developed and disseminated full package of multi-media products
- Output 1.3: Completed promotion and advocacy program

Output 1.1: Established and Operational Information Dissemination Network

54. A survey will be conducted (in the provinces where demonstration and replication sub-projects will be undertaken) to identify the specific information and knowledge demand among major stakeholders. The current status of information availability and accessibility, as well as the current and potential dissemination means, and evaluation of their effectiveness, will all be determined.

55. Based on the survey results, an appropriate information dissemination network will be designed and developed to provide the comprehensive information (technical, market, policy, and financial) needed by rural brick makers, developers, residents, local governments, financial institutions as well as technical service providers who want to understand, participate in, develop, or implement rural EE brick and EE buildings projects or activities. The information network will provide an integrated information exchange service to enable users to keep abreast of developments in relevant EC&EE technologies and applications both from within and outside China.

56. The detailed network framework, development and operation plans will be designed. It is envisioned to be an internet/intranet based web connected information system to cover the rural areas of the whole country. The network will include:

- A database of EE brick manufacturers in the country, as well as local building practitioners that provide services for the design, construction, operation and maintenance of EE buildings. This is referred to as the Rural Buildings Sector Database (RBSD).

- A project website that will include all project related information including the progress, experience and events. The website will be the information sharing platform which will promote the necessary information exchange and public involvement. The project website will be regularly updated and will be linked with UNDP/GEF and other relevant projects websites.

GEF support is needed for the required technical assistance in the design of the RBSD and the project website including the equipment to be used and initial logistical requirements for the operation of the database and website.

57. Also part of the information network framework is a rural buildings sector energy reporting and monitoring (RBERM) program will be incorporated into the information network, which includes the building materials sub-sector (mainly the rural brick makers). The RBERM program will provide an on-line portal for M&E program carried out in Component 4. In addition, it will monitor, among others, the production, sales volume, and prices of EE bricks and brick products, as well as the stock of EE buildings in the country's rural areas.

58. The RBERM program will involve the monitoring of the energy utilization performance of the rural buildings sector in China. Building owners will be required to submit periodic reports (e.g., quarterly) of, among others, their energy consumption and level of activities for a specific period. During the MTEBRB project implementation, the periodic reports will be submitted to the PMO, which will monitor and evaluate the energy performance of each participating building[12]. Information collected from the RBERM program will be stored in the RBSD. That database will include, among others, a special module for the energy consumption data of each participating building, and the energy performance of building materials companies. The relevant staff members of the authorities concerned (such as MOA, NDRC, MOHURD, WMRO and their local branches) and the building owners will be trained to carry out the energy consumption monitoring (in some cases systematic calculation or estimation). The training will also include energy consumption reporting and ways and means to improve the energy utilization efficiency in building operations. The program will track the achievement of the relevant target indicators (e.g., % of rural buildings that are EE buildings) to determine project impacts.

- Design of Data Collection System – MTEBRB will develop an energy reporting template that will be used to collect data on energy consumption and production figures from the rural brick makers and the energy consumption of rural buildings. The data that will be collected will be the bases for determining the energy performance of the participating brick makers and rural building owners.

- Energy Performance of Rural Buildings – This will involved the evaluation of the energy performance of the various buildings that are participating in the RBERM. The PMO will mail the energy reporting forms (with guidelines) to the participating buildings and brick making companies. At the initial stages of the program, MTEBRB personnel will conduct visits to selected buildings and brick makers. Data obtained from the submitted reports and from the site visits will be used to determine the energy use performance of the rural buildings and brick makers.

[12] This includes the demo buildings and other rural buildings that are interested in participating and agreed to participate in the RBERM program.

- Dissemination of Rural Building and Brick Making Energy Performance – Data gathered from the energy report submissions and site visits will be processed and stored in the RBSD. The database will be updated regularly based on the next batch of energy consumption reports that will be submitted by the monitored buildings and brick makers. The initial findings and results of the established energy performance of rural buildings and brick makers will be presented in a seminar-workshop. Recommendations as to the energy use reporting format and the regular reporting requirement for buildings will be put forth and discussed. Moreover, the energy use performance analysis report for each participating building and brick making company will be provided to the owner of the building or company. Such report will serve as feedback to the building owners and brick making company owners that complied with the energy reporting requirement.

GEF support is required for the necessary technical assistance in the design of the program and initial logistical support for the program design such as the surveys and site visits.

59. The development of the network will consist of several steps:

- The first step will focus on the general and project specific information exchange and knowledge sharing among the demonstration sub-projects. The network will provide on-line connection of 16 demonstration sites (local governmental project implementation unit, villages and plants) with national project office and major technical institutions. The identified national technical institutions on rural EE bricks and EE buildings (such as Xi'an Wall Material Engineering and Designing Institute and Agricultural Engineering and Designing Institute) will provide technical support in network design, development, and daily maintenance, as well as trainings for local staff on appropriate method and procedures of data collection, entry, and on-line updating.

- In the second step, the information network will be extend to 60 replication sites; more stakeholders (various local administrative branches, local building developers, local technical institutions, associations, local communities, local financial institutions, etc) will be involved in the development and expansion of the network;

- Eventually by taking the advantage of MOA's current rural energy and environmental network (both administrative and technical) throughout rural China (down to each county), the project will provide technical assistance in developing the nationwide rural EE brick and EE building information network.

60. A suitable action plan will be developed of how to maintain the operational sustainability of the network after the completion of the Project. The general principle is to develop the network into an independent, commercially viable information service provider in the future developed rural EE bricks and buildings market.

GEF support is needed for the required technical assistance in the design of the information network, particularly in the gathering and processing data/information, as well as in the preparation of the action plan.

<u>Output 1.2: Developed and Disseminated Full Package of Multi-media Products</u>

61. This output will be delivered through the conduct of activities that are aimed at developing and producing public awareness and promotion materials to support the overall EE bricks and EE building program in the Chinese rural areas. The full package of information and communications (I&C) materials is expected to develop strong consciousness of the national

and provincial governments and the people in the rural areas on the benefits and advantages of EE technologies and practices in the production of building materials (particularly bricks) and in the construction of rural buildings. It involves the conduct of an assessment of the information needs of the rural people, the suitable media of promotion and outreach, the processing of data/information that will be used, preparation and production of the information and promotional materials, and dissemination of these materials.

62. The MTEBRB will carry out the assessments of the information needs of the rural people. This will involve the conduct of surveys to gauge the level of knowledge and awareness of the rural folks about EE buildings and EE brick making. The surveys will help define the scope, limitations and the types of information and communications materials that will be produced under the project.

63. Consultants will be hired to determine the suitable types and formats of presentation of the I&C materials. They will also determine the target audiences for each type of I&C materials that will be produced, and design and produce these materials. The administrative and logistical requirements for each I&C material will be defined. The institutional arrangements for the delivery of each material will also be determined.

64. Work on the relevant data and information that will be used in preparing the various I&C materials and presentations will be carried out by the MTEBRB based on the findings and results of the survey. Coordination with the project staff working on the RBERM program and the RBSD will be ensured in order to come up with the required information that are needed in the development of the different I&C materials.

65. The various I&C materials that will be prepared will be a compilation of a full-package of multi-media products (DVDs, books, brochures, TV programs, and on-line databases) which will then be disseminated through the Information Network (Output 1.1) and the EE Building and EE Brick Making promotion and advocacy program (Output 1.3). It should be noted that deliverables (such as training materials, progress and evaluation reports, study reports, feasibility studies, etc) from the other project components will also be included in the I&C package.

GEF support is needed for the required technical assistance in the surveys, I&C product design and production, and in the production of the full package of I&C products

Output 1.3: Completed Promotion and Advocacy Program

66. Based on the survey results in Output 1.1 and the implementation of other project activities, a promotion and advocacy program will be developed for promoting and marketing both the project and rural EE bricks and EE buildings in China. The project will use the I&C materials in Output 1.2, as well as various forms of mass media (newspapers, TV, radio, billboards, internet site, etc.) to publicize results of the various demonstrations and plans that were conducted and prepared under the MTEBRB to inform future projects.

67. National and international conference/workshop and other information exchange activities will be organized to promote the cooperation, information exchange and knowledge sharing among national and international stakeholders including policy makers, investors, and industries. The workshops will be organized to: (a) keep organizations, institutions, universities and the various layers of government informed of the progress of the MTEBRB project; (b) to foster the advancement of China's scientific, technical, and manufacturing capabilities; and, (c) for policy and financial development and implementation capacity

relating to rural EE bricks and buildings. The workshops will be held every two years. The project will solicit and review feedback from the workshop participants on the relevance and quality of the workshop.

- Assessment of Potential Coverage for the Promotion & Advocacy Program – This will involve the design and development of an outreach and promotion program using appropriate communication mechanisms (e.g., mass media, conferences and site visits) for the rural buildings sector and brick making industries. The targets in the rural areas may include, among others: (1) building designers/contractors; (2) building owners; (3) brick making companies; (4) building materials suppliers/distributors; and, (5) policy decision-makers in local governments such as the MOHURD, MOST, MOA, etc. The scope and limitations of the program that will be conducted under the project will be defined. The program will also cover the additional promotional support needed by the other activities of the MTEBRB project such as the establishment of the RBSD, etc.

- Program Design and Development – This will entail the design of a program for promotion & advocacy program taking into consideration the socio-economic conditions and development targets in the various rural areas in China. Each promotional or IEC activity under the program will be defined by identifying the target audience, its size, the mechanism to be employed, responsible institution/s, and the other modalities of the activity. A corresponding monitoring and evaluation system to measure success of each activity will be developed. A work plan of activities will be developed for the duration of the MTEBRB with corresponding budgetary requirements. The design of the program will also provide recommendations towards its sustainability after the completion of the MTEBRB.

- Program Implementation - The designed promotion and advocacy program will be implemented in coordination with groups, agencies and institutions with existing networks such as the MOA. The active participation of the local governments, building materials research organizations, building practitioners, brick makers and building materials suppliers/distributors, etc. will be ensured.

- Monitoring and Evaluation - Each program activity will be fully monitored and reviewed to provide guidance in the overall implementation of the program, using a specific M&E system that will be developed for the program. Where and when necessary, program redirection will be made.

GEF support is needed both for the technical assistance required for the program design and development and also to cover for the initial costs for printing, publishing, advertisement etc.

Component 2: Policy Development and Institutional Support

68. This component is designed to address the policy and regulatory barriers that currently prevent the widespread manufacturing of EE bricks in the rural areas, as well as in the application of EE bricks and EE technologies in rural buildings in China.

69. The expected outcome of the outputs that will result from the activities that will be carried out in this component will be the promulgation of, and compliance to, favorable policies that encourage manufacturing and utilization of EE bricks and the application of EE technologies and practices in the buildings sector in the country's rural areas. Relevant policies would include, among others, rural building energy codes, brick making emission standards, fuel

usage policies in the brick sector, and the standardization of EE brick structural and thermal properties and qualities.

70. The outputs under this component include:

- Output 2.1: Formulated policies, and associated implementing rules on EE building materials production and utilization; and,
- Output 2.2: Improved local governments' policy enforcement capabilities and implemented action plans.

Output 2.1: Formulated Policies, and Associated Implementing Rules on EE Building Materials Production and Utilization

71. This output will be realized through the conduct of a number of activities that will include: (a) review of policies and programs implemented in other countries regarding EE buildings and EE building materials production and application; (b) formulation of support policies; and, (c) development of a framework for the implementation of EE performance standards and codes for EE buildings and EE brick manufacturing in Chinese rural areas.

72. A special study will be carried out to survey the national and international practices and experiences on developing and implementing rural EE policies, programs and projects with specially focus on rural EE bricks and buildings. The study will evaluate their effectiveness, relevance and feasibility to be incorporated into the project context. The study will also survey and evaluate the current planning process, policies and regulations as well as their implementation effect, incentives and subsidies, institutional framework and effectiveness regarding rural EE brick production and EE buildings application. During the study, special attention will be paid to the viable ways of integrating the on-going governmental efforts on wall material reform and EE building application.

73. Based upon the study, and related project implementation of demonstration and replication sub-projects, a detailed policy proposal will be developed under the coordination and guidance of the Project steering Committees at both national and local levels. The policy proposal will include the improvement of national and local planning processes, integrated policy and regulation frameworks regarding rural EE brick and building applications, institutional arrangements, and a national action plan. The outputs from the policy proposal will be incorporated into MOA's relevant decision-making process, and will be circulated among other major related authorities (WMRO, MOHURD, NDRC and MOF):

- Review EE Brick and EE Building Policies - This activity involves the review of existing EE-related policies and regulations in China as applied to brick making and building construction and operations. Similar policies found in other countries that are aimed at promoting EE in buildings will also be reviewed. It will also involve the evaluation of possible policy support activities and strategies that can be considered for building developers, managers and owners/investors. Specific policy studies will be carried out based on the suggestions of the project stakeholders as well as the recommendations from the policy reviews. Examples of such studies would include: (a) EE Brick Making Process Options; (b) Feasible EE building Designs for Rural China; (c) EE Building Construction Incentives Schemes; (d) Incentive Schemes for EE Building Materials Production; and, (e) Regulatory Frameworks for EE Building Design. The last one will be in conjunction with the Social Rural Construction Program.

- Policy Formulation on EE Brick Manufacturing and Application on EE Buildings in Rural Areas – Based on the results of the policy studies, and the approved EE brick and EE building design standards, proposed policies and regulatory frameworks will be drafted. Regular consultation meetings will be conducted with the various stakeholders in the buildings sector and among the brick makers to solicit their comments on the adoption and implementation of proposed policies. Among the agenda for discussion during these meeting are the review of the specific provisions of the proposed policies, and the preparation of its implementing rules and regulations (IRRs). Other potential support programs and incentives to accelerate the growth of EE technology applications in the buildings sector as well as in brick manufacturing will also be taken up during these meetings. The formulated policies will be presented to the stakeholders and the Project Steering Committee. Once favorably endorsed, the policy document will be submitted to the authorities concerned (MOA, MOHURD, NDRC, MOF, etc).

- Drafting of the IRRs - Once the formulated policies and regulatory frameworks are already available and endorsed by the concerned authorities, the IRRs will be prepared.

74. The project will also develop the detailed framework of rural EE brick (for both production and products) and rural building EE performance standards and codes which will be applied in the design and implementation of the pilot and replication sub-projects.

- Documentation of Best Practices on EE Bricks Applications and EE Buildings – Desk research will be carried out to learn about and assess best practices on EE building and building services design and installation particularly in rural areas of other countries with similar climatic conditions as in China. Also to be researched are experiences in EE brick manufacturing and applications in other countries with a significant brick making industry and market. Other important information to be studied are the EE brick making process cost and energy performance, as well as EE building system cost, system performance and/or quality. Standards and best practices on the performance, design, manufacture, assembly and installation will be researched in-country and internationally.

  Information on international experience related to rural EE buildings (EE building technologies, building models, monitoring and evaluation techniques, how to incorporate EE consideration into township and village planning) and EE wall materials production will also be gathered and incorporated in the documentation. Such information and experience sharing is very important to promote technology improvements and facilitate successful demonstrations.[13]

- EE Brick and EE Building Standard Setting - Based also on the results of the study conducted, a comparative analysis shall be conducted between existing systems and manufacturing practices and prevailing performance standards available for EE brick manufacturing, as well as for EE building design. The analysis shall also include cost factors. The output of the activity will be a set of recommended designs and standards for EE brick manufacturing and EE building design & construction technologies.

- Development of EE Brick and Rural EE Building Standards and Testing Program - Based on the results of the foregoing activities, a program to support standards development and the testing of manufactured EE brings and rural EE building construction designs will be developed and implemented in consultation with various

[13] Emphasis will be given to interactions with other similar GEF-supported EE building projects in the region and around the world through the information exchange network.

building practitioners and other key players in the buildings sector in China. Testing procedures, which are in conformity with existing building material testing facilities in the country, will also be developed for use in the program.

- Preparation of Rural EE Building Codes/Standards - This activity involves the preparation of the code of practice for the application EE features, as well as EE systems in rural buildings. The provisions of the codes/standards will be based on an assessment of best practices on EE residential building design and operation in China and in other countries. Standards and best practices on the performance, design, construction and installation of energy systems will be researched in-country and internationally. A comparative analysis will be conducted between existing domestic building design and their energy systems and existing building energy performance standards available. Based on the results of the said assessment, best practices on EE building and building energy system design and installation shall be identified and be used for formulating the suitable standards according to criteria set for cost, system performance and/or quality. A set of recommended codes/standards for rural buildings will be prepared including the corresponding testing and evaluation scheme for the measurement of the same.

- Establishment and Enforcement of EE Brick and EE Building Codes/Standards and Prescribed Practices – Consultation meetings with stakeholders in the buildings sector, in general, and in the rural buildings sector in particular, as well as local brick makers, and building materials suppliers/distributors will be carried out for the setting up of the performance standards, best practices and the recommended testing procedures. Registration of said standards and practices with concerned government institutions shall be pursued. Once approved, a promotional program for the adoption and widespread use of the prescribed standards and best practices shall be developed and implemented. This will include dissemination of the standards and best practices on the information sharing network and other government and industry channels.

GEF support is needed for the technical assistance in the EE brick and EE building research studies, and in the development and setting up of the EE brick and EE building design standards and codes.

Output 2.2: Improved Local Governments' Policy Enforcement Capabilities and Implemented Action Plans

75. This output which is expected to bring about improved policy making and implementation capabilities for local governments will be achieved by carrying out a series of activities that will involved: (a) conduct of policy studies on EE brick manufacturing and use, as well as EE building technology applications; (b) formulation of EE brick and EE building policies and action plans; and, (c) implementation of EE brick and EE building policies, rules and regulations.

- Conduct of Policy Studies on EE Brick Manufacturing and Use and EE Building Technology Applications - Detailed surveys will be conducted in 8 provinces, 16 counties and 16 township and villages where the demonstration sub-projects will be implemented. In the context of rural EE brick production and EE building application, the survey will study the local governments' policy, planning, and regulation development process, relevant activities, actions and programs, implementation capability and effectiveness, as well as the practices on planning and implementing "Social Rural Construction" program.

An assessment of the different level local governments' policy enforcement capabilities will be carried out with the view of improving present capacities, as well as in policy and institutional framework development and action plan implementation. Training materials will be developed for this purpose and training and knowledge sharing workshops will be held at various levels of local governments at both demonstration and replication areas.

- Formulation of Policies on EE Brick Manufacturing and Application on EE Buildings in Rural Areas - Based on the above activities and the results of the activities that will bring about Output 2.1, selected local governments (in the demonstration and replication areas) will be assisted to formulate and enforce the action plans on promoting EE brick production and rural EE building applications in their respective provinces. Regular consultation meetings will be conducted with the various stakeholders in the buildings sector and among the brick makers to solicit their comments on the adoption and implementation of proposed policies. Among the agenda for discussion during these meeting are the review of the specific provisions of the proposed policies, and the preparation of its implementing rules and regulations (IRRs). Other potential support programs and incentives to accelerate the growth of EE technology applications in the buildings sector as well as in brick manufacturing will also be taken up during these meetings.

- Implementation of EE Brick and EE Building Policies, Rules and Regulations - This entails the provision of capacity building for the local Governments in the enforcement of the approved policies and IRRs. A training program for the local government personnel responsible for the enforcement of the policies and regulations will be designed and implemented. This will include training on the evaluation of the EE features of building designs that are applied for building permits and approvals, as well as on the enforcement of the EE brick and EE building design standards. An evaluation will be carried out to ascertain the level of technical and institutional capacity built within the local governments a year after the training program completion. In addition, studies on policy-related practices and outcomes in implementing demonstration and replication sub-projects will be carried out. The studies will evaluate the effectiveness of the implementation results, identify the places where further improvement can be achieved and proposed the action plan for further improvement. Based upon the study, together with relevant outputs from other project components, national roadmap for develop national rural EE brick and building market will be proposed and circulated among relevant national and local level decision-makers.

GEF support is required for the technical assistance needed in preparing the policy and implementing rules and regulations and for the training program for MOHURD personnel in policy making and implementation.

Component 3: Finance Support & Accessibility Improvement

76. This component is primarily aimed at addressing the lack of access to finance for, and uncertainties on the part of investors in supporting EE bricks manufacturing and EE building technology application initiatives in the rural areas in China.

77. The expected outcome from this component is the enhanced availability of financial and institutional support for initiatives on EE brick production, and EE building technology applications.

78. The following outputs will be delivered under this component:

- Output 3.1: Completed Financial and Business Development Assessments for Rural Brick Makers and Building Developers
- Output 3.2: Developed and Implemented New Business Models for Local Banks and Financial Institutions for Financing EE Brick Making and EE Buildings Projects in Rural Areas

Output 3.1: Completed Financial and Business Development Assessments for Rural Brick Makers and Building Developers

79. This output will be delivered through the conduct of specific activities such as: (a) assessment of the current business practices of rural brick makers and building developers; (b) capacity development on business development and management; and, (c) development and dissemination of an information guide on EE brick making and EE building development projects.

- Assessment of the Current Business Practices – This activity will involve the conduct of surveys and investigations among rural brick makers and building developers, in general, and those companies that are hosting the EE brick making and EE building demonstration projects, in specific, on their business operations. The aim is to understand how these entities currently develop, operate and manage their respective businesses in order to determine potential improvements. Such improvements when employed will help ensure the success and sustainability of their new ventures into EE brick manufacturing and EE building developments. Specific investigations on how they carry out market analyses, financial analyses, improving their cash flows, and in making business proposals will be carried out. Based on these investigations and analyses, specific training programs for business planning, development and management, as well as in preparing business proposals will be developed and conducted for selected rural brick makers, building developers and building manufacturers.

- Capacity Development on Business Development & Management – This activity is designed to assist rural brick makers and building developers in planning their EE brick manufacturing and EE building development projects. Specifically, capacity development actions will be carried out to inform them on how they should develop and manage their businesses in order to ensure profitability and sustainability. This capacity development will also ensure that the EE brick making and EE building development projects in the rural areas of China will flourish.

  Moreover, selected rural brick makers and building developers and practitioners will be supported in designing and developing their EE brick making and EE building development project proposals. The MTEBRB will help them prepare professional presentations of their financial accounts, which will be presented to local banks/financial institutions for potential financing. A special business planning manual that will include useful templates will be developed for the use of rural brick makers and building developers to help them in accessing loans from financial institutions for their EE brick making and EE building development ventures.

- Information Guide on EE Brick Making and EE Building Development Projects – This involves the compilation of comprehensive information on: (a) all EE brick making and EE building design and implementation of MTEBRB demonstration projects; (b) potential entrepreneurs and investors on EE brick making and EE building development projects; (c) market conditions for EE brick making and EE building technology

applications; and, (d) possible financing modalities for EE brick manufacturing and EE building developments. An action plan will be prepared outlining the essential steps and actions to be taken to facilitate the provision of financing of these energy efficiency initiatives in the rural buildings sector of China. The guide will also provide recommendations towards reaching agreements on mobilizing local and international financial institutions and local industry resources through co-financing counterpart to the proposed. Financing will be carried out by engaging key parties (e.g., foreign EE equipment suppliers and local ESCO), businesses and end-users to implement EE building and EE building technology projects.

GEF support is needed both for the technical assistance required for the assessment of the current business practices; the capacity development program; and in development and production of the information guide.

Output 3.2: Developed and Implemented New Business Models for Local Banks/Financial Institutions for Financing Rural EE Brick Making and EE Buildings Projects

80. This output will be delivered through a program on capacity building for 2 target groups: (a) banks and financial institutions; and, (b) rural brick makers and building developers. The first module is on EE brick making and EE building technologies for the local banking/financial sector in the Chinese rural areas. The main activity will involve the conduct of training workshops on evaluating the financial viability of: (a) EE brick manufacturing; and (b) EE building and EE building technology application, projects. The workshops will also serve as campaigns addressed towards enhancing the banking/financial sector's interest in providing financing to prospective local brick makers and EE building project developers/owners. This will also involve securing support from banks and financing institutions in the financing scheme that the project will help develop.

81. The other module is aimed at rural brick makers and building developers. A series of seminar-workshops for the local brick makers and for the rural buildings sector on potential financing options, including a special course on CDM and ESCOs, for supporting their EE brick making and EE building and EE building technology projects will be conducted. Also covered under this activity is the provision of technical assistance to prospective EE building project developers/owners in accessing and partnering with ESCOs (local and/or foreign).

82. Also among the activities to deliver this output is the development and implementation of actions aimed at encouraging the local banking/financing institutions in venturing in the financing of EE brick making and EE building development projects in Chinese rural areas. It includes deliverables like: (a) established business links between prospective brick makers and EE building developers and commercial/cooperative banks; and, (b) financing scheme for supporting local banks/financing institutions in financing EE brick manufacturing and EE building initiatives in rural areas.

- Business Development Matching and Strategic Partnership Establishment - This activity will involve mobilizing local and international financial institutions as well as the rural brick making industry and rural building sector resources to promote and support the commercialization of EE brick manufacturing and EE building technology applications. In conjunction with the demonstration activities in Component 4, the MTEBRB will identify business opportunities through providing technical support to EE building project financing. MTEBRB experts will be involved in the business planning and financial advice to the EE Brick Making and EE Building Demonstration Projects in order ensure that these demonstration projects will be implemented as planned according

to the purposes of the demonstration activity. Working through existing public and private sector partners, the MTEBRB experts will work directly with private companies and FIs, responding to their individual needs to structure investments, develop products, build their capacity to deliver EE brick making and EE building technology application project financing. Within the five year project, the MTEBRB will engage key parties (e.g., foreign EE building materials and equipment suppliers, local ESCOs and other institutes engaged in energy efficiency), businesses and end-users to implement EE brick making and EE building technology application projects in the long run.

- Design of Financing Schemes for EE Brick Making and EE Building Project Financing - This is targeted to assist potential: (1) Local suppliers and/or manufacturers in locally producing EE building materials and products, particularly EE bricks; and, (2) EE building project developers/owners. A working group will be formed comprising of such key stakeholders as financial and EE experts, local governments, financing institutions, local ESCOs and other institutes engaged in energy efficiency to carry out the review of the performance of the existing credit schemes in China to determine the most appropriate baseline scheme (or a combination of schemes) for the envisioned schemes for financing EE brick making projects and EE building design and construction projects. The latest international literature and experience on similar financial mechanisms for EE brick making and building improvements and/or building construction investments will also be evaluated. They will also assess how much financing is currently being extended to local industrial projects (e.g., brick making TVEs) and EE building projects by the local banking/financing institutions. Part of the assessments will be the evaluation of possible financial incentives to: (a) increase the involvement of rural residents and start-up the rural EE building market; (b) reduce the uncertainties and market risk for local financial institutions and leverage more commercial funds; and, (c) showcase sustainable financial support mechanisms to local governments and increase the sustainability and momentum for future relevant governmental actions and efforts.

  The working group will also evaluate the viability of financing EE brick making and EE building projects, as well as the assessment of potential financing schemes. A report detailing the terms and conditions of each viable schemes will be prepared. Technical assistance will be provided in the design of appropriate financing schemes for such projects, based on government grants, and loans from financial intermediaries. The identification and assessment of sources of finance, tariff structures and fiscal aspects will also be covered. This activity will also involve the development of selection criteria for the financing schemes and the selection of eligible borrowers, and the various components of viable new business models such as market development requirements, institutional arrangements, operational procedures, criteria for project evaluation, loan and risk management, etc) will be developed.

- Promotion of Local ESCO (or other institutes engaged in EE)-supported EE Brick Making and Building Projects - This activity will entail investigation and assessment of the feasibility of local ESCOs financing EE brick making and EE building project. The potentials for financing through foreign-based ESCOs will also be investigated and analyzed. If feasible, the financing of such projects will be promoted also to local technology developers and suppliers. For example, local building services equipment (e.g., air conditioning) suppliers that are currently engaged in ESCO-type and/or EPC-type building system projects. It will facilitate information sharing and confidence building activities between ESCOs and financial institutions through the conduct a series of seminars/ workshops for financial institutes & ESCOs.

GEF support is needed both for the technical assistance required in the design and conduct of the training courses/seminars and in partnering with ESCOs and also to cover for the costs of the seminar-workshops; assessment of financing schemes; the design of the recommended financing scheme for EE building projects; and, for assisting ESCOs in venturing into EE building projects.

Component 4: Demonstration and Technology Support

83. This component comprises activities that will address the technical barriers that hinder: (a) brick makers in the rural areas in manufacturing EE bricks; and, (b) widespread application of EE technologies (e.g., utilization of EE bricks) in the design, construction and operation of rural buildings.

84. The outputs that will be delivered under this component include:

- Output 4.1: Completed demonstration of rural EE buildings and EE bricks production;
- Output 4.2: Developed and disseminated technical guidelines for the development and implementation of rural EE brick and EE building applications; and,
- Output 4.3: Constructed replication projects

85. The activities related with the demonstration of rural EE buildings and EE brick production will address the need for showcasing the major aspects of EE brick manufacturing (in particular, technology options and delivery and production practices), and the application of rural EE buildings in China. The main outcome will be the establishment of a critical mass of demonstration projects that will provide detailed information on technical performance and operations, energy savings and environmental impacts to interested brick makers, rural building developers, residents, local financial institutions, and local governments.

86. The technology support and replication sub-components will involve activities that will help bring about thorough understanding and appreciation of the EE brick production technology options, EE building models and their environmental impacts by brick makers, developers and the government policy makers, and of the utilization of EE bricks by building developers and house buyers in the rural areas of the country. This component will also address the barrier of inadequate technical capacity to support the retrofit/improvement of brick production lines (in particular to facilitate EE brick production) as well as in EE building design and construction. The expected outcome from this component includes the improved local vocational, technical, and managerial capacity to manage and sustain operations of EE brick production lines and EE building practices in rural areas.

Output 4.1: Completed Demonstration of Rural EE Buildings and EE Bricks Production

87. A short-list of potential demonstration sites (brick mills and rural villages)[14] based on extensive surveys and investigations was developed based on following major screening considerations: (a) local climate conditions (the candidate sites must be located in the severe cold zone, cold zone or hot summer and cold winter zone); (b) raw material resources for EE brick making; (c) planning and implementation effectiveness of local "Social Rural Construction" program; and, (d) potential market conditions.

[14] Major stakeholders involved in the identification process are local (provincial, county, township and village) governments (including local branches of MOA, MOHURD, NDRC, MOF, WMRO, etc), technical experts and technical institutions (XWMDEI, STDCMOHURD, etc.), local brick makers, rural residents, rural building developers, local financial institutions (local branches of ABC, RCC).

88. During the selection of demonstration sites, the project preparation team paid special attention to the Sichuan Earthquake disaster areas15. In order to respond to the Government of China's alleviation and salvage action, Sichuan Province was identified as one of the 9 demonstration candidate provinces. In Dujiangyan County, Sichuan Province, where as one of the most damaged areas by the earthquake, one plant and one village were selected as the demonstration sites. In addition to the criteria applied in identifying other demonstration sites, the identification process particularly considered the feasibility of applying earthquake trash as EE building raw material and the mechanical resiliency of EE buildings against future earthquakes.

Figure 1: Climate Zone Classification for Buildings Thermal Engineering Design

89. Nine demonstration candidate sites (9 brick mills and 9 villages) were identified in Jilin, Hebei, Henan, Shan'xi, Gansu, Sichuan, Hunan, Anhui and Zhejiang Provinces. Eventually 8 demonstration sites will be selected by the project to implement relevant demonstration activities. The major criteria applied in the identification process are:

- Local government commitment to rural EE brick production and EE building application;
- Brick makers' commitment and interests in EE brick making;
- Local policy environment, planning and implementation performance of "Social Rural Construction" program, and local governments' track records of implementing EE activities and programs;
- Brick mills' technical, financial and management capabilities, market risks;
- Local financial institutions' interest in EE activities; and,
- Local developers' technical capability, local residents' willingness to be involved in the project.

[15] On 12 May 2008, a major 8 degree earthquake occurred in Sichuan Province and its adjacent areas. Among the 46 million people affected by the earthquake, 69,227 people were killed; 374,636 people were injured; 17,923 persons were missing; 7 million buildings and houses were razed to the ground; and, 23 million buildings were damaged to some extent.

Table 2: Major Cities/Provinces in Various Climate Zones

Climate Zone	Provinces and Cities
Severe Cold	Inner Mongolia, Hei Longjiang, Liaoning, Jilin, Xinjiang, Ningxia, Gansu, Tibet, Qinghai
Cold	Hebei, Beijing, Tianjin, Shanxi, Shan'xi, Gansu, Tibet, Sichuan, Henan, Anhui, Jiangsu, Shandong,
Hot Summer Cold Winter	Sichuan, Chongqing, Hunan, Hubei, Anhui, Jiangxi, Shanghai, Zhejiang, Fujian,
Hot Summer Warm Winter	Guangdong, Guangxi
Moderate	Yunnan, Guizhou

90. The demonstrations of the application of EE building designs and construction, and EE brick manufacturing will showcase real-life examples to follow and aspire for. With this major output, the project will achieve not only visibility and attention to the issues but also produce proofs that EE technologies can be applied in the production of building materials (specifically for bricks) and can be integrated in real buildings, for real people in real locations. Among the demonstrations that may be featured under this activity are:

- EE Brick Manufacturing
  - EE brick composition/formulation and preparation
  - EE brick kiln application, operation and maintenance
  - Energy conservation and EE practices in brick manufacturing
  - Design, engineering, financing, operation and maintenances of EE brick making facilities/plants

- EE Building Design & Construction
  - Application of building EE technologies
  - Building retrofits for enhancing EE performance
  - Application of building EE codes/standards
  - Design, engineering, financing, operation & maintenance of EE buildings

91. To realize the completed demonstrations, the activities will be carried out:

- Conduct of Comprehensive Feasibility Analyses, Cost-Benefit Analyses and Engineering Studies/Designs for 16 Demonstration Projects – This will involve the provision of technical assistance to the demonstration hosts in the techno-economic feasibility analyses; basic and detailed engineering design of their respective demo projects. If there are already available pre-feasibility analyses, these will be reviewed to determine and verify project implementation requirements. Further feasibility assessments will be carried out by the demonstration hosts. This will involve carrying forward the existing EE building feasibility studies for the demonstration projects to detailed technical design and engineering, cost calculation, design of ownership and management models, cost-benefit analysis, design of operation and maintenance concept, in-door air ventilation approach and air quality assessment plan, and assessment of financing aspects. Special attention will be provided to fully satisfy the national 50% EE building standards with the appropriate technical treatments that are financially more attractive to the low income rural residents.

- Conduct of Specific Demonstration Project Implementation Requirements – This will involve the performance of activities to meet certain requirements required to facilitate the smooth and effective implementation of the demonstration projects. Among these are

the following: (a) verification and confirmation of the availability and quantity of clay resources and other possible raw materials (e.g. various kinds of industrial waste, such as furnace slag); (b) availability of materials needed and manpower for the retrofit of brick production lines and rural buildings; (c) financing assistance mechanism for the financing of some of the demo projects; and, (d) setting up of administration, as well as operation and maintenance systems at the demonstration sites.

- Establishment of Baseline Data for Each Demonstration Project – In line with the design of each demonstration project, detailed data gathering and analyses, as well as field measurements will be conducted to set up the baseline conditions to which the energy savings and GHG emission reductions from the demonstration will be reckoned. For the EE brick making demonstrations, these include the production capacity, specific energy consumption, brick product properties and qualities, etc. For the EE building demo projects, these include, among others, the building design specifications, and design energy consumption. The operating performance targets for each demonstration projects will also be established. This activity could be carried out in conjunction with the review/conduct of the feasibility analyses for each demonstration.

- Finalization of the Demonstration Project Design and Assistance in the Demonstration Project Financing - This activity will involve the provision of technical assistance in the preparation basic engineering designs of the demonstration projects, particularly to sites where no previous designs have been proposed. It will also involve provision of technical advice in the comprehensive technical and economic feasibility evaluations, as well as in the detailed engineering designs. Part of this activity is the provision of assistance in the processing of applications for the financing of the operation and maintenance of each demonstration site. Host companies that are availing of the financing from banks/financial institutions will be assisted (if needed) in securing their financing.

- Installation, Operation, Monitoring and Evaluation of the Demonstration Projects – Technical assistance (if needed) will be provided in the installation and commissioning works for each demonstration. Each demo project will be regularly monitored by the host and the MTEBRB project personnel using a common M&E system that will be designed and employed for this purpose. Both the MTEBRB project team and demo host will collect, analyze, and evaluate operating data on efficiencies, reliability, failures, and potential improvements. All information gathered as well as the results of the demo project performance will be uploaded into the RBSD.

- Demonstration Project Results Documentation - This activity involves the preparation of the project profiles (as case studies) of the EE brick making and EE building demonstrations that will be carried out under the project. This will be based on the results of the detailed evaluation of the technical, operational and energy performance of each demonstration that will be carried out as part of the activities to implement the replication projects (Output 4.3). An inventory of the demonstration project results will be made. Each project report will be summarized into project profiles (or case studies) following an agreed presentation format. These project profiles will be inputted into a specific module of the RBSD.

- Demonstration Results Dissemination - A workshop will be organized and conducted to discuss the results of the demonstration projects. The demonstration hosts will present the demonstration project they have implemented highlighting the EE technology involved, the scheme, the investment involved, results, energy savings achieved, actual

project economics, estimated GHG emission reductions, and their respective recommendations. The workshop will assess the overall performance of the demonstration program and will come up with recommendations to the MTEBRB concerning the relevance of such kind of programs to support the government's efforts to improve the energy efficiency in the rural buildings sector in China.

GEF support is needed for the technical assistance required for the feasibility studies, establishment of baseline data, and final design of the demonstration projects, n the installation and operation of the demonstration projects (if required by the demonstration hosts) and in the preparation of the project profiles (case studies). Moreover, GEF support is required for the conduct of the workshop and in the publication and dissemination of the workshop proceedings.

Output 4.2: Developed and Disseminated Technical Guidelines for the Development and Implementation of Rural EE Brick Making and EE Building Applications

92. This output will be delivered through the conduct of specific activities designed to assist rural brick makers and building developers in ascertaining their capabilities and the viability of their venturing into EE brick manufacturing and EE building development in the Chinese rural areas. Capacity development actions will be carried out to enhance the capacity of rural brick makers and building developers in the application of EE building designs and EE building technologies. The following activities will be carried out to deliver this major output, which are necessary to enable rural brick makers and building developers to develop and implement; and to facilitate the implementation of, EE brick manufacturing and EE building developments, respectively:

- Assessment of the Viability of Local Manufacturing of EE Bricks - This activity will involve the evaluation of the feasibility of, and requirements for the local manufacture of EE bricks and other EE building materials and associated equipment and components. Assessment reports highlighting findings and recommendations for the local building materials industry for the manufacture of such materials (particularly EE bricks) for use in rural areas (and possibly also for urban areas and for the export market) will be prepared. The assessment reports will be provided to local brick manufacturers and will be explained to them in a series of EE brick market development workshops that will be conducted in selected rural areas. Moreover, part of the assessment is the evaluation of the capacity of local engineering/consulting firms in providing technical services in the design, engineering, operation and maintenance of EE brick making plants and facilities.

- Assessment of the Capability of the Local Building Service Providers – This activity will involve the evaluation of the current capacity of local building practitioners (engineers, architects, consultants, contractors), particularly in rural areas, in providing building services (e.g., EE building design, engineering, construction, as well as energy conserving operation and maintenance of buildings). Assessment reports highlighting findings and recommendations for the local building services industry will be prepared. The assessment reports will be provided to local building practitioners and will be explained to them in a series of EE building development workshops that will be conducted in selected rural areas.

- Development of Technical Guidance – This major activity is for the preparation of guidelines for the development and implementation of EE brick making and EE building projects.

- EE Brick Making - This activity involves the preparation of a compendium of guidelines on engineering design and operational practices for rural EE brick manufacturing for application in EE building projects. Assessments will be carried out for the purpose of coming up with the required guidelines on, but not limited to, the following: (a) other feasible EE options (based on weather conditions, thermal requirement, residential behavior, financial affordability) that brick makers can consider available; (b) availability of raw materials and fuels, as well as alternative raw materials and fuels for manufacturing EE bricks; (c) energy performance of existing brick products; and, (d) identification of potential improvements in the energy performance of brick products.
- EE Building Development[16] - Based on the results of the previous governmental activities on development of model rural buildings, detailed architectural and engineering specifications of various EE building models, blueprints, EE features and specific requirements for EE building systems design and guidelines for the planning and operation of rural EE building programs.

- Design and Conduct of Capacity Development Programs - This will involve the development of 2 separate capacity building programs based on the 2 previous assessments. One will be for the local brick making industry, and the other for the local building practitioners. The former will be a specific module to be included in the capacity development program on business development and management for rural brick makers and building developers. The latter will consists of the conduct of a training course on EC&EE in the buildings sector for MOHURD personnel, as well as a comprehensive training course on EE building materials applications and production technology for local engineering and architectural firms.

  These training courses will be conducted in various rural areas each year. Each training course will be evaluated for the purpose of assessing their effectiveness and impacts particularly on the actual application of the fundamentals and principles involved in the areas of EE building materials (e.g., EE bricks) and applications, and EE building design and construction. These are expected to be continuously conducted by the MOHURD after the completion of the MTEBRB.

- Development of Rural EE Brick Making and Building Sector EC&EE Projects and Plans – This activity will involve the provision of technical assistance to the rural brick makers, rural building developers, building practitioners and local governments in efforts towards widespread adoption of EC&EE in the Chinese rural buildings sector beyond the MTEBRB. New project proposals for EE brick manufacturing and EE buildings will be prepared and for these new projects assistance will be provided for project set-up, cost-benefit analysis (e.g., energy saving potentials and GHG emissions reduction) and financial plan. These proposals will be presented to interested local and/or foreign investors.

GEF support is required for the technical assistance needed in the assessment of the capabilities of local brick makers, building practitioners and building service providers, in the evaluation of potential improvements as well as in the design and conduct of capacity development programs and in the development of rural EE brick making and EE building development projects and plans.

[16] This will be supplementary to the main guidance for EE building design and construction that are covered in the formulated EE Building Codes/Standards in Component 3.

Output 4.3: Constructed Replication Projects

93. In order to demonstrate the effectiveness of the technical and EE performances of the demonstrations that will be implemented under this project, several replication projects (based on the completed/ongoing demonstration projects) will be implemented. The different demonstrations (EE brick making and EE building development) carried out at different geographical, topographical, climatic, economic and resource conditions, and the effectiveness of the above developed business models and operational procedures, will be replicated in selected brick making companies and rural towns/villages.

94. The following activities will be conducted:

- Evaluation of the Completed Demonstration Projects – This will involve the evaluation of all the data/information gathered during the monitoring of the operations of the various demonstrations that will be carried out. The evaluation will focus not only on the operational and energy performance of each demo project, but also their economics, environmental and where relevant social impacts. The profile of each demo project will be prepared under Component 3, as well as the lessons learned. The potentials for replication of each demonstration, including the feasibility of and requirements for the possible replications will also be determined and reported.

- Selection and Development of Replication Projects – Based on the results of the evaluation of the potentials and feasibility of the replication of the demonstrations, a set of criteria and selection procedure will be developed for selecting the potential candidate replication sites. A survey will be conducted to identify the potential candidates. A selection committee will be organized which will be tasked to do the selection. Under the guidance of the PSC and Technical Advisory Committee and using the agree selection criteria and the agreed selection procedure, 60 replication projects will be identified. Where needed, technical assistance will be provided to the host of the replication projects in conducting their detailed feasibility studies, baseline data and project implementation plans.

- Technical Assistance for the Design & Implementation of Replication Projects – Similar to that in the demonstration projects, the hosts of the replication projects will be assisted in the preparation of basic engineering designs, in the comprehensive technical and economic feasibility evaluations, as well as in the detailed engineering designs. Part of this activity is the provision of assistance in the processing of applications for the financing of the operation and maintenance of each replication project. Host companies that are availing of the financing from banks/financial institutions will be assisted (if needed) in securing their financing. Furthermore, technical assistance (if needed) will be provided in the installation and commissioning works for each replication project. M&E plans will be developed for all replication projects. Both the MTEBRB project team and the project host will collect, analyze, and evaluate operating data on efficiencies, reliability, failures, and potential improvements17. All information gathered as well as the results of the project performance will be uploaded into the RBSD. The replication results will be carefully documented and evaluated, and provide inputs to the development of national implementation roadmap.

[17] During the implementation of the replication projects, the monitoring will focus on aspects that will provide pertinent data/information in the development of mechanisms that will further enhance national efforts on: (a) energy conservation and wastes emission reduction; (b) new rural construction; and, (c) possibilities of leveraging commercial finance (e.g., through carefully targeted subsidies on loan interest).

GEF support is needed for the technical assistance required in the evaluation of the demonstration projects, in the design and implementation of replication projects (e.g., feasibility studies, establishment of baseline data, and final design of the demonstration projects, n the installation and operation of the demonstration projects) if required by the project hosts.

Project Indicators, Risks and Assumptions

95. The project success indicators are shown in the Project Planning Matrix (PPM) in Section II, Part II of this Project Document. The target values for these indicators based on the PPM, which will be monitored during the course of the MTEBRB implementation, are summarized in Section IV, Part V.

96. While all possible efforts have been made to ensure the effective design and implementation of the project activities in the project design phase, there are inevitably some unavoidable residual risks that will have to be carefully monitored and managed during the project to ensure its success. The different risks that were identified during the project formulation and the recommended mitigation measures and a commentary on the need for mitigation measures are provided in detail in Section IV, Part IV.

97. During the project design stage, based on the meetings held with the various stakeholders, several potential risks have been identified, closely analyzed and mitigation strategies have been incorporated. The following section briefly summarizes and assesses these risks.

98. While the detailed risks identified and related mitigation strategies are summarized and presented in Section IV Part IV, the major risks that might prevent the project objective(s) from being achieved include:

- Effectiveness of organizing and coordinating a large, complex project with key stakeholders;
- Technical capacity of implementing partners; and,
- Effective involvement of financial institutions in the project implementation;
- Replication projects that do not match pilot projects' technical and EE performances.

99. To mitigate the first risk, the project will establish a strong project steering committee (consisting of key governmental authorities including MOF, MOHURD, MOFT and MEP, etc.) and local project steering committees (to be led by local wall-material offices that are in charge of EE brick production and replication, or offices that are in charge of the "Building a New Socialist Countryside" campaign) to facilitate the project implementation. At the same time, various measures will also be taken to facilitate the collaboration between the stakeholders, including the full use of the existing SME networks and the rural energy service system established by the MOA, plus the sound relationship with concerned governmental authorities at various levels established by the previous UNDP-GEF TVE project.

100. As to the technical capacity of MOA, this agency will strengthen its project management capacity by setting up a technical advisory committee consisting of prominent experts to enhance the project management and provide technical support to the PMO. In order to strengthen the project implementation capacity of local partners, extensive training will be conducted through the implementation of relevant project activities which will specially target the various stakeholders' roles and their special needs for capacity enhancement in the project implementation and to the successful achievement of the project goal.

101. The project preparation team believes that the active and effective involvement of financial institutions in the project is one of the major risks faced by the project. Based on the consultation with the GEF/UNDP TVE II participants on the lessons of developing and operating rural EE financial mechanisms, which is one of the major components of TVE II project, and through the investigation and discussion with local governments, developers, brick manufactures, as well as financial experts, the project intend to address this risk through the following strategy:

- The most pivotal and active financial institutions in the new rural construction campaign of the Chinese Government and for supporting rural EE brick production are the ones rooted in local economy, such as Rural Credit Cooperatives (RCCs). Unlike other national financial institutions, (ABC, for example) the RCCs are locally and collectively owned (at county level and below), their major business are related with local economic activities (80% or more in terms of loan balance), and were strongly influenced by the local governments.

- The project will specially target these local financial institutions with specially designed capacity building and information dissemination activities to address their particular needs and requirements;

- The project will carefully select the demonstration and replication sites where local governments and local RCCs are having a strong bond in promoting new rural construction and EE activities.

102. Unlike the demonstration projects, due to the much larger magnitude of the replication activities, and relatively less financial support from the project, it will be difficult to apply hands on management on replication projects. Doing so may result in lesser than expected magnitudes of EE achievements. In order to deliver quality management and implementation results of the replication projects, the project plan to use the 1 million USD budget from the TVEII RCF, which has been transferred by GEF/UNDP to the Chinese government, in the TA activities related with replication projects. With the help of the additional fund, and through careful design, the project will:

- Under the leadership of Technical Advisory Committee, the detailed eligibility criteria will be developed and applied in the site-selection process, which will include the technical EE performance specification on EE brick products and EE buildings;

- Conduct extensive and special target training and capacity building activates in the replication sites to address the technical and administrative incapability; the project will mobilize quality technical expertise and personnel to provide technical assistance in feasibility study and detailed engineering planning and operation;

- Unlike the commitment made in PIF to “influence” 60 replication projects, during the project implementation 60 replication projects will be physically built by the project, and 1) the EE performance and ES/GHG reduction of the replications will be included into the project PPM 2) the M&E plan will be developed to specially focus on the effective technical and institutional procedures of EE performance M&E; and, 3) local training program and institutional arrangement (by taking the full advantage of MOA’s national rural energy and environmental network) will be developed and put into place to assist PMO in day-to-day M&E activities and data documentation.

Expected Global, National and Local Benefits (Details Contained in Section IV, Part V)

Global Benefits

103. The project is projected to reduce GHG emissions from China's rural C&R sectors by 234,047 ton of CO_2 by project end. It is envisioned that the project direct CO_2 emission reductions throughout the demonstration and replication projects' life time will be 2.65 M tons (by the end of 2033), and the indirect CO_2 emission reduction influenced by the project will be as high as 62 M tons by the end of 2033.

National Benefits

104. Through the implementation of the project, about 95,200 tce of energy will be saved by the end of the project, and the direct and indirect energy savings of the project will be 1.06 and 25 million tce respectively.

105. Nationally, endorsement and adoption of this project would position China as one of the front runners in the area of market transformation for rural energy efficient technologies applications in buildings and building materials, with wide-ranging applications and replication potential, both in- and outside of China.

106. Due to the implementation of the project, the currently adopted solid clay bricks will be replaced by much less clay consuming EE bricks, thereby resulting in the conservation of the country's valuable clay resource. Because of the construction of EE buildings that will be demonstrated and promoted by the project, the heating coal use in winter time is expected to be reduced, in-door and out-door air quality will be improved, which will be also improve the respiratory system health of rural residents.

Country Ownership: Country Eligibility and Country Drivenness

107. According to the Instrument for the Establishment of the Restructured Global Environment Facility, China qualifies for GEF financing on the following grounds: (a) It has ratified the United Nations Framework Convention on Climate Change on February 28, 1994; and, (b) It receives development assistance from UNDP's core resources.

108. The proposed project will positively respond and make great contribution to the strategy and policy of the GOC concerning energy efficiency in rural areas through its close linkage with the new government campaign on "Building a New Socialist Countryside" and promoting the upgrade of brick products and production technology of rural brick plants and the application of EE buildings, promoting the sustainability of rural brick industry, improving the living standard of rural residents thus increasing energy efficiency in rural areas. The project is clearly in line with the GOC's strategy and policy to: (1) "Reduction of energy consumption by 20% per unit GDP by 2010" as enacted by the State Council in the 11th 5-year National Economic and Social Development Plan in 2006; and, (2) "Promotion of the application of energy efficient building materials, and guide rural residents to build energy efficient buildings" as stated in the MOA circular on "Opinions on Enhancing Energy Conservation and Pollution Reduction in Agriculture and Rural Areas".

109. This proposed GEF-supported technical assistance & capacity building project that the Ministry of Agriculture of China intends to implement through the UNDP is definitely within this particular GEF IA's proven comparative advantage. UNDP currently

implements similar GEF-assisted projects in the Asia-Pacific region on EE in the brick industry (e.g., India, Bangladesh) and the buildings sector (e.g., India, Mongolia).

Sustainability

Institutional Sustainability

110. The project will support the improvement of existing rural EE and construction services and administration thereof. Local government officials responsible for rural EE and construction management will use the project as a strong platform for engagement, monitoring and evaluation, thereby building their capacity and knowledge in a very practical 'learning-by-doing' way. Improved rural building sector energy efficiency will improve overall national energy conservation and rural development and living standards. In this context the project will compliment the nation's plans to promote building sector's energy efficiency and construct the sustainable new countryside. The designed project will explicitly serve low-income rural residents through improved EE residential buildings and EE bricks supply.

111. Through the extensive capacity building activities and through the workshops and information exchange platforms, the project will also increase the country's expertise and capacity on rural EE buildings application and its implementation. Increased awareness resulting from the supported projects is expected to generate a paradigm shift in people perception of new rural construction, with demo projects repeated throughout the country.

112. The project is not proposed in isolation in terms of governmental development strategy and policy framework, but arises from the existing long-term Energy Conservation Plan of the nation. The GEF project will fast-track elements of the plan, enhance it with a strong and very high profile example, and allow the local governments to spend scarce financial and human resources on rural energy conservation enhancements that will strongly support the realization of governmental development goals.

Technical Sustainability

113. The project not only showcases the technical viability of rural EE buildings and brick products, but also pays special attention to increase the major stakeholders' technical capacities in implementing rural EE building and brick applications activities through a series technical assistance.

114. The extensive training activities will increase the understanding and knowledge about the technologies on rural EE building and bricks among local public. The pilot and replication practices will provide opportunities for rural developers, local technical institutions, and brick mills to increase their technical capability through trial-and-error process. Moreover, the focus of the project activities try to develop and pilot a sustainable replication mechanism (which include detailed, easy to understand technical manuals, guidelines, drawings and blue prints, as well as suggested rural EE building codes and standards) will provide technical guidance and facility to future post-project replications and for local governments to implement relevant programs.

Financial Sustainability

115. The project focuses on strengthening the knowledge and capacity of local financial institutions because they are the ones most deeply rooted in local economic activities. They

are not only closely cooperating with the local governments in providing financial support to the relevant governmental programs and efforts (such as SNRC and EE/EC campaigns), but also have a better understanding of the local market and related uncertainties and risks. Unlike other national financial institutions, the majority of these local financial institutions' financing activities are local businesses.

116. Through the capacity building activities of the project, these local financial institutions will gain their appreciation of the potential of this brand new rural EE building and brick market, and more skillful in developing the market, evaluating and controlling the related market risks, and provide more effective and sufficient financial support to the future relevant activities.

Socio-economic sustainability

117. Through the implementation of the project, especially through the demonstration and replication projects, the comprehensive benefits of EE buildings and EE bricks (such as improvement of in-door living condition, reduced heating cost, as well as the cleaner local environment) will be appreciated and followed by the broader rural population along with their fast increasing financial capability.

Replicability

118. The project is envisaged to provide examples for implementation of rural EE building and brick applications in selected rural areas, which may be replicated in other rural places with similar climate conditions. The replicability of each category of project supported interventions in other Chinese provinces is shown in the Table 3. Of the total 33 provinces in the country, 23 of them can follow the lead of the project in rural building sector EE improvement. About 60% of the total rural population stands to receive the impact.

Table 3: Project Replication Potential

Provinces	Rural Households (million)	Rural Population (million)	Possibility of Replication	
			Rural EE Buildings	Rural EE Bricks
Hei Long Jiang	5.34	17.63	Yes	Yes
Jilin	3.89	12.79	Yes, project	Yes, project
Liaoning	5.53	17.54	Yes	Yes
Inner Mongolia	3.78	11.99	Yes	Yes
Hebei	12.35	41.48	Yes, project	Yes, project
Beijing	0.86	2.53	Yes	Yes
Tianjin	0.79	2.64	Yes	Yes
Shanxi	5.29	18.99	Yes	Yes
Shan'xi	6.63	22.26	Yes, project	Yes, project
Gansu	4.44	17.90	Yes, project	Yes, project
Ningxia	0.82	3.41	Yes	Yes
Sichuan	17.74	52.34	Yes, project	Yes, project
Chongqing	4.85	14.55	Yes	Yes
Hunan	12.25	37.84	Yes, project	Yes, project
Hubei	10.04	31.74	Yes	Yes
Henan	18.18	61.46	Yes, project	Yes, project
Anhui	11.98	37.50	Yes, project	Yes, project
Shandong	16.91	49.88	Yes	Yes
Jiangsu	11.94	35.69	Yes	Yes
Zhejiang	7.57	21.66	Yes, project	Yes, project
Jiangxi	7.65	26.30	Yes	Yes

Provinces	Rural Households (million)	Rural Population (million)	Possibility of Replication	
			Rural EE Buildings	Rural EE Bricks
Shanghai	0.78	2.10	Yes	Yes
Guizhou	7.34	27.00	Yes	Yes
Total	176.95	567.20		

119. The project offers a demonstrable example of how efficient rural buildings application and brick production can be implemented, and a tangible opportunity to quantify the benefits of such an investment in terms of energy savings and avoided costs, local and global emissions and their externality costs, improved living conditions and environment, and many other benefits. This articulation of benefits as part of the project implementation will be of enormous value to policy makers as they can craft additional tools and measures to manage the rural construction and development and provide sustainable services and infrastructure. The demonstration and replication projects/mechanisms are likely to provide a best-practice model, thereby influencing a climate change benefit of lasting impact well beyond the reach of a once-off project.

120. The project will include a component on dissemination of experiences and the lessons learned to interested parties not only in China but also in other countries of the region. Lessons will be extracted from that body of experience and through an aggressive communication and outreach plan. Relevant and cost effective climate and pollution mitigation measures will be demonstrated, and the cost-effective nature of the interventions will be highlighted to encourage implementation of similar initiatives in other areas. It is hoped that within China, rural governments and brick mills will quickly learn about the replicable elements and start including these elements in their own plans. To facilitate such learning, the project during its final stage will invite related authorities and technical institutes to visit the rural building sector's EE improvements in the selected host villages and plants. From the experience in TVEII, it could be expect that the project will be the catalyst of a ripple effect in China and Asia-Pacific Region.

121. In order to capture the experiences and impacts of the project, key performance indicators with respect to its objectives and outputs will be specified and a comprehensive monitoring and evaluation system will accompany the intervention. These indicators will facilitate monitoring of the progress of national and local authorities in implementing sustainable rural construction and will help to identify what works, what doesn't and why.

PART III: MANAGEMENT ARRANGEMENTS

122. Given the past experience with UNDP-supported project, UNDP seeks to implement an innovative management approach based on a partnership where accountability and responsibility for managing and achieving project outputs are equally shared among the MTEBRB partners. The organizational structure is shown in Fig. 2.

Project Implementation Arrangements

123. The management structure of the MTEBRB project will be as follows: A Project Steering Committee (PSC) will be established and will comprise of the representatives of the UNDP-GEF Regional Coordination Unit (RCU) for Asia-Pacific, UNDP-China, MOA, and also including the representatives from all major relevant governmental agencies, such as MOHURD, NDRC, MOF, etc. The PSC will play the role of an advisory committee. The PSC member will also be invited to participate in the annual project review meetings. The Chairperson of the PSC will be the representative from MOA. The Project

Management Office (PMO) will be also established by MOA to be responsible for coordinating and implementing the project activities of the project. The PMO Director will serve as the Secretary of the PSC. MTEBRB will be Nationally-Executed (NEX) by the Chinese Government. It will assume the overall responsibility of ensuring that all activities are executed accordingly and as per the approved Project Document. The Ministry of Agriculture (MOA) will be the Implementing Partner (or Executing Agency) for the MTEBRB project.

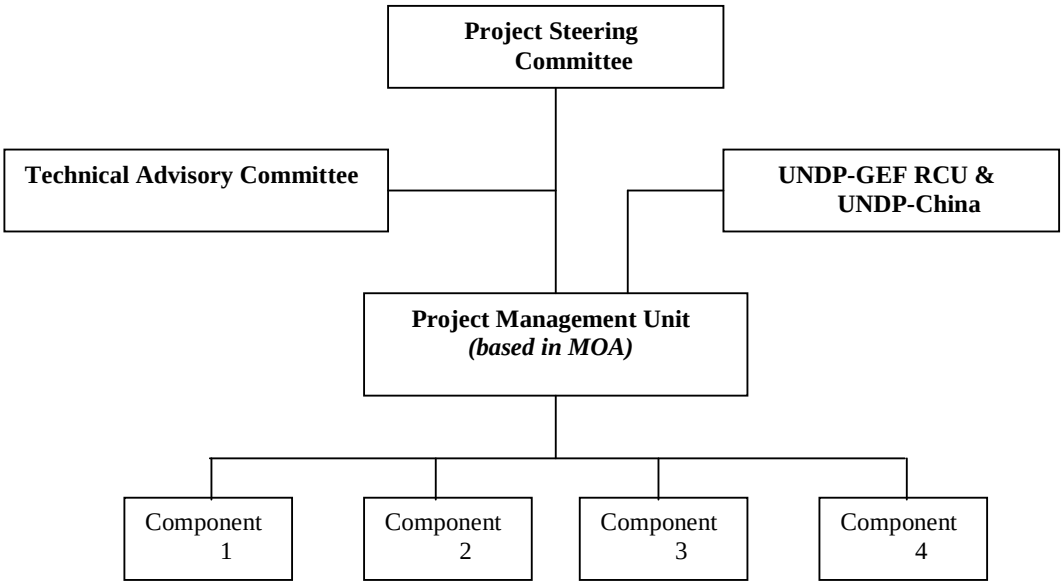


Fig 2: Project Organizational Structure

124. The PSC will be established with the key responsibilities as follow: (a). Reviewing of annual progress reports for necessary guidance; (b) Reviewing and approving the annual work plans and budgets; (c) Providing guidance on the effectiveness of MTEBRB implementation, and its linkages to corporate UNDP policy decisions, and other UNDP initiatives; and, (d) Monitoring and evaluating the implementation of MTEBRB towards the intended outputs, after two years of project execution. As a minimum, the PSC will meet at least once a year, allowing for the stakeholders to review the progress with the project implementation and to agree on a coordinated annual project implementation strategy and plan.

125. UNDP-China, together with the UNDP-GEF Regional Technical Advisor for Climate Change in the Asia-Pacific region will carry out the GEF oversight. Working in conjunction with the various project partners, UNDP-China will be responsible for monitoring and evaluation (M&E), including organizing project reviews, approving annual implementation work plans and budget revisions, monitoring progress, identifying problems, suggesting actions to improve project performance, facilitating timely delivery of project inputs, and provide linkages to the other sub-regional, Asia-Pacific regional and global initiatives. All M&E functions will be carried out in line with standard UNDP and UNDP-GEF procedures. UNDP China will also provide country office support for all the activities of the project as agreed with the implementation partner of China.

126. As the Implementing Partner for this project, China's MOA will appoint a National Project Director (NPD) to be in charge of overall responsibilities, including planning,

coordination, administration and financial management of the project with support by UNDP-China. The NPD will be responsible for the achievement of the project objectives, for all projects' reporting, including the submission of Annual Work Plans (AWP) and financial reports. He/She will ensure the delivery of the project outputs and the judicious use of the project resources. This will ensure that expected outputs are delivered using the most efficient and cost-effective implementation strategies and procedures. The NPD will be also a member of the PSC. As the project's Implementing Partner, the MOA will also provide in-kind contribution to implement the MTEBRB.

127. A Project Management Unit (PMO) will be established by UNDP-China, together with the MOA. The PMO will be responsible for the day-to-day management of all the project activities including those on capacity building, demonstration sub-projects and dissemination activities both at the provincial and national levels. PMO will be managed by a PMO Director, who will be supported by three staff members.

128. A Technical Advisory Committee (TAC) will be established with the main responsibility of providing the necessary expert advice in the implementation of the technical aspects of the implementation of the various project components.

129. National government professionals and other relevant national stakeholders from the private sector and civil society will, to the extent possible, manage, coordinate and implement the MTEBRB activities.

MTEBRB Implementation

130. The proposed MTEBRB will be implemented for a period of five years. Considering the duration of the process of obtaining GEF funding, it is anticipated that the project will kick-off by the second quarter of 2009 and will conclude by the end of 2014.

131. To accord proper acknowledgement to GEF for providing funding, a GEF logo will appear on all relevant publications and documents produced by the project, including among others, project hardware purchased with GEF funds. Any citation from any of the MTEBRB publications and documents will also accord proper acknowledgment to GEF. The UNDP logo should be more prominent and separated from the GEF logo if possible, as UN visibility is important for security purposes.

Audit Clause:
Audits will be conducted following UNDP Financial Regulations and Rules and related audit policies.

PART IV: MONITORING AND EVALUATION PLAN AND BUDGET

132. Project monitoring, evaluation and dissemination will be undertaken in accordance with UNDP and GEF established procedures. The executing agency will be required to prepare Quarterly Project Reports (QPR) and combined Annual Project Reports and Project Implementation Review reports (APR/PIR) to UNDP. The QPR will provide the summary of the project results, progress and variances from the original plan, implementation issues, and steps being taken to address these issues, and work plans for the next quarters for review and endorsement.

133. Quarterly work plans will be prepared based on the overall project objectives and performance indicators. These will be used to measure performance. It is through these

reports and meetings that the project approach and activities will be formally refined. The PMO will present the project status and accomplishment to the PSC every quarter. A quarterly work plan based on project objectives and performance indicators will be presented, evaluated and adjusted as and when necessary.

134. The APR/PIR will provide a more in-depth summary of work-in-progress, measuring performance against both implementation and impact indicators. Any adjustments in project approach will be reported to the Project Steering Committee who will evaluate and approve the adjustments recommended.

135. The project is subject to two in-depth independent reviews. One will be conducted in the mid-term (first quarter of the third year) and the other will be scheduled upon project termination. A terminal report would be completed prior to the completion of the project and would detail project achievements and lessons learned. Additional independent evaluation may be conducted if UNDP and the GEF deem it necessary.

136. As executing agency, MOA will carry out continuous self-monitoring of the project implementation performance. The Section II, Part II states all the success indicators and means of verification for each activity that will be carried out under this project. These indicators are the parameters that will be monitored by MOA under this project.

137. To ensure coherent, coordinated and timely implementation of project activities, appropriate practical mechanisms, monitoring and evaluation (M&E) procedures and implementation arrangements will be developed between and among national and local government agencies, financial institutions, private sector partners, local NGOs and consumer groups. Specifically, an M&E plan for the MTEBRB implementation will be developed together with the key stakeholders, and this plan will be based on the identified success indicators and means of verification for the project goal, project purpose, project outcomes, and project activities. The PSC will advise and approve this M&E plan.

138. Surveys will be conducted during the project to track these and other indicators of project impact. Monitoring and Evaluation (M&E) activities will be undertaken to best international practice standards with reference to the International Monitoring and Verification Protocol (IPMVP) methodology. This reference to established international best practice IPMVP methodologies will be a vital element in the presentation of the results of the overall MTEBRB to the full range of project stakeholders, including but not limited to GEF.

139. Success indicators for each objective and activity in the PPM will be monitored and evaluated during the course of project implementation. Section IV, Part VI provides the annual targets and the monitoring plan. The extent by which the GEF developmental goal is achieved will be evaluated from the monitored results. Annual target values for the indicators will be confirmed during project document finalization.

140. The project will coordinate with all the project partners. The continuous monitoring and evaluation of all project activities, even after completion of the project period, will bring sustainability of the project with desired benefits in the long run. All evaluation reports will be uploaded to the project website for widespread dissemination. A formal Monitoring and Evaluation Strategy will be developed and implemented in the full-scale project to track the activities and contributions of the activities by all the project partners, in terms of both in-cash and in-kind contributions as detailed in the attached letters of commitment. These M&E findings will be reported on in the project's two in-depth independent reviews.

PART V: PARTNERSHIPS STRATEGY

141. The successful implementation of MTEBRB will depend on the development of effective partnerships between numerous different agencies at multiple levels. Partnerships will be pursued with international and national agencies, as well as international partners to enrich and further project aims. The project will form a partnership strategy with three elements: (a) international coordinating and implementation function; (b) national coordination and implementation function; and, (c) Technical and commercial function.

Key Partners

142. MTEBRB will undertake the following activities to ensure that the project work is synergized with on-going national and provincial level activities, as well as to benefit from the expertise available in the region:

- Strengthen its links by developing Inter-agency Partnerships with key energy-related project nationally and internationally. These will include MOA, NDRC, MOHURD, and other national administrative agencies and their local branches. The detailed list of stakeholders identified during the PPG phase is listed in Table 4. MTEBRB will work with financing institutions in the region to provide support for energy service related initiatives.

- Partner with the NGO funding and implementation agencies such as the ones listed in Table 4 to broaden the reach and impact of the MTEBRB project.

Table 4: Key Stakeholders of MTEBRB Project

Category	Institution/Organization	Branch/Department
Central Government	MOA	Dep. of Science and Technology; TVE Bureau
	NDRC	Dep. of Township and Rural Construction
	MOHURD	Dep. of Science and Technology
	MEP	Dep. of Rural Development
	NSC	
Provincial Government	Jilin	Agricultural bureau, construction bureau, economic and trade bureau, Wall Material Reform Offices.
	Hebei	Same as above
	Henan	Same as above
	Shan'xi	Same as above
	Gansu	Same as above
	Sichuan	Same as above
	Hunan	Same as above
	Anhui	Same as above
	Zhejiang	Same as above
Local Government	County, township and village in the above provinces	Agricultural, construction and economic and trade offices, WMRO.
Financial Institutions	ABC	Headquarters and provincial branches
	RCC	Groups in the above 9 provinces
Technical and Academic Institutions	XWMRDI	National brick quality supervision center, national brick information network office, etc.

Category	Institution/Organization	Branch/Department
	AEDI	Rural Architecture Institute
	STDCMOHURD	EE center
	Qinghua University	School for sustainable development
	People University	Financial School
	CCTV7	
	RCI	
Associations	NAB	
Private Sector	Rural developers; Brick mill owners; Rural residents	
GEF Agencies	UNDP	Bangkok Regional Office, Beijing Country Office

143. During the PPG phase consultative meetings with various stakeholders (see the list above) and key market players revealed that the private sector (rural residents, developers, brick mills, financial institutions) is willing to integrate EE considerations in the brick making and buildings development process under specific conditions, including: (1) having the government take the leadership on this issue through EE township and village planning and construction programs, financial incentives and support, (2) having a demonstration program in place to showcase the EE benefits.

144. The role of the government will therefore be pivotal to the participation of other stakeholders in this project. The Ministry of Agriculture (MOA) has been strongly supportive of this project from beginning and will act as the Executing Agency and will work in close cooperation with other relevant ministries.

145. The Ministry of Housing and Urban-Rural Development of China (MOHURD) and the National Development and Reform Committee (NDRC), as well as the MOA will oversee the global implementation of the project during its entire execution as part of the national project steering committee together with ABC and various private sector representatives.

146. Furthermore, as the project will need the support of a wide range of stakeholders within the market, it is expected that the project implementation will be coordinated in conjunction with the following stakeholders:

- Xi'an Wall Material Research and Designing Institute (XWMRDI) will provide technical expertise on EE bricks development, production and equipments to MOA and PMO and will contribute in the Information dissemination and Technical components implementation with regards to EE bricks production.
- Agricultural Engineering and Designing Institute (AEDI) and Scientific and Technological Development Center of MOHURD (STDCMOHURD) will provide technical expertise on rural planning and rural EE buildings development, designing and construction to MOA and PMO, and will contribute in the Information dissemination and Technical components implementation with regards to rural EE buildings.
- Agricultural Bank of China (ABC) and Rural Financial Credit Collectives (RFCC), who are starting to establish their new EE financing programs especially in rural areas, will potentially be able to benefit from this project through its capacity building and information and knowledge sharing activities.
- National Standardization Commission (NSC) will provide guidance and technical assistance in developing and promoting EE brick products' standards;

- ESCOs and other rural energy service providers such as Hongyuan Co. and Zhongjie Co. (subcontractors in GEF/UNDP TVEII project) will actively participate in the project as implementers.
- Various academic institutions such as Qinghua University and People University will assist in promoting the various training activities included in the project.
- National Association of Bricks (NAB) will assist ESCOs, rural brick mills and developers in their efforts to take advantage of the Project.
- Rural Communication Institute (RCI) and China Central Television Rural Channel (CCTV7) will participate in the development and implementation of related media products (DVD, training materials) and implement the project's public awareness program through their national network throughout the rural China.
- Other stakeholders are also expected to collaborate in the project implementation, as it is more widely marketed and gains renown.

PART VI: LEGAL CONTEXT

147. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of China and the United Nations Development Programme, signed by the parties on June 29, 1979. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

148. UNDP acts in this Project as Implementing Agency of the Global Environment Facility (GEF), and all rights and privileges pertaining to UNDP as per the terms of the SBAA shall be extended mutatis mutandis to GEF.

149. The UNDP Resident Representative in China is authorized to affect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

- Revision of, or addition to, any of the annexes to the Project Document;
- Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
- Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and,
- Inclusion of additional annexes and attachments only as set out here in this Project Document

SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

PART I: INCREMENTAL COST ANALYSIS

Broad Development Goals

1. The broad development goal of the project is to provide affordable, reliable, and sustainable buildings and building materials in Chinese rural areas to accelerate market penetration of energy efficient technologies for buildings and building materials through the removal of various and specific market barriers. The project will contribute to improve EE in the rural building sectors by about 1.06 million tce directly through the lifetime of pilot and replication projects, and reduce greenhouse gas emissions in the order of 2.65 M tons CO_2eq over the same period through application of environmentally sound and energy-efficient alternative technologies; the energy savings and CO2 emission reductions through the indirect impact of the GEF project over a 10 year influence period and across the lifetime of the investments will be 25 M tce and 62 M tons of CO2 equivalent respectively.

2. The proposed project will contribute to the realization of the Millennium Development Goals (MDG), particularly MDGs 1, 7 and 8, whereby the program can contribute to the eradication of extreme poverty directly and indirectly, improve environmental sustainability of a country's and/or a region's development path, and help improve trade ties and develop global partnership for development.

Global Environmental Objective

3. Rural EE buildings application and EE bricks production are among the most cost-effective types of policies and EC&EE measures to address global climate change. Such programs have the potential to effect transformation of energy consuming building markets, which translates to widespread utilization of energy efficient buildings and building materials, at a cost far below the cost of providing new energy supply. With the widespread utilization of energy efficient rural buildings and brick products, GHG emissions from rural areas in China can be reduced significantly.

4. The objective of the project is the removal of barriers that have persistently hindered the widespread development and application of EE bricks and EE buildings in rural China. These barriers were discussed in Section I above. The majority of the project will address barriers (technical, informational, and financial) that hinder the rural building market from adopting EE bricks and EE buildings; project will also help the government to strengthen its capability in developing and implementing EE bricks and EE buildings activities in a market environment. This project will address these barriers through a combination of training and capacity-building, learning by doing, and technical assistance.

Baseline Activities

5. Despite the significant importance and great potential of rural areas in overall building sector's energy use and GHG emission reduction, the current governmental efforts and international assistances are focusing on urban areas.

6. According to the National Energy Conservation and Waste Reduction Comprehensive Work Plan" and related action plans, major governmental activities have been focused on Chinese urban areas as follows: 1) build new and energy efficient buildings, which has 70 million tce

of energy savings potential; 2) old residential buildings' EE renovation and heating system reform in Northern China, which can save 16 million tce; 3) improved efficiency and performance of big public buildings, which will cut energy use by 11 million tce and 4) application of renewable energy and green lighting, to save 14 million tce of energy.

7. The on-going GEF/UNDP EUEEP project also focused on Chinese urban EE building development, the activities include: (a) Data collection and analysis of urban building energy use; (b) Development and update of policies and standards for residential and commercial energy efficiency building; (c) Implementation of energy efficiency standards; (d) Dissemination of energy efficiency information to the pilot cities; and, (e) Research on innovative building technologies.

8. In conclusion, although the commitment of GOC to improve the building sector's energy efficiency is strong, the on-going governmental and international activities have not addressed the special barriers (as described in Sec 1.3) hinder the development and application of rural EE buildings, and the development and production of EE bricks. As the result, in urban areas the governmental goal to achieving 50% and 65% energy saving in building sector will most likely be achieved, but without GEF intervention the development of EE buildings and bricks application in rural China as well as its related huge GHG reduction potentials will continue to be overlooked.

GEF Alternative

9. The GEF-supported alternative would be to provide an effective, sustainable and integrated rural EE buildings application and EE bricks production program to complement the ongoing governmental efforts on urban EE buildings application and "Socialism New Rural Construction", as well as the on-going urban focused GEF/UNDP EUEEP project and to develop the Chinese rural markets for EE buildings and bricks.

10. In line with the GEF Strategic Program Nos. 1 & 2, the GEF alternative (i.e., MTEBRB) will reduce energy use in both the rural brick production and building applications through a series of technical assistance and capacity building activities.

11. The proposed project is comprised of four major components consisting of complementary activities designed to remove barriers to achieve the project objectives. A separate component on project management is also included. The project components are as follows:

    - Component 1: Information Dissemination and Awareness Enhancement;
    - Component 2: Policy Development and Institutional Support;
    - Component 3: Finance Support & Accessibility Improvement;
    - Component 4: Demonstration and Technology Support.

12. **Component 1: Information Dissemination and Awareness Enhancement** - This component is intended to address the barriers related to the low level of awareness of local government, rural citizens, local brick makers, and local building practitioners of the effective application of EE bricks and EE building technologies in the buildings sector in China's rural areas. This component also addresses the lack of access to suitable information on such technologies and energy conserving practices. The primary outcome of this component is the enhanced awareness of the public, particularly in the rural areas, local governments and other stakeholders on EE bricks production and EE buildings. The activities under this component will collectively cost about US$ 6.118 million to implement, of which US$ 0.83 million will be financed by the GEF.

13. **Component 2: Policy Development and Institutional Support** - This component is designed to address the policy and regulation related barriers that currently prevent the widespread manufacturing of EE bricks in the rural areas, as well as in the application of EE bricks and EE technologies in rural buildings in China. The expected outcome of the activities that will be carried out in this component will be the promulgation of, and compliance with, favorable policies that encourage the manufacture and utilization of EE bricks and the application of EE building technologies in the buildings sector in China's rural areas. Relevant policies would include, among others, rural building energy codes, brick making emission standards, fuel usage policies in the brick sector, and the standardization of EE brick structural and thermal properties and qualities. The activities under this component will collectively cost around US$ 3.890 million to implement. Out of this, US$ 0.8 million will be financed by the GEF.

14. **Component 3: Finance Support & Accessibility Improvement** - This component is primarily aimed at addressing the lack of access to finance for, and uncertainties on the part of investors in supporting EE bricks manufacturing and EE building technology application initiatives in the rural areas in China. The expected outcome from this component is the enhanced availability of financial and institutional support for initiatives on EE brick production, and EE building technology applications. The activities under this component will collectively cost about US$ 3.265 million to implement. Out of this, the implementation of incremental activities that GEF will support cost US$ 1.01 million.

15. **Component 4: Demonstration and Technology Support** - This component is comprised of activities that will address the technical barriers that hinder: 1) brick makers in the rural areas in manufacturing EE bricks and; 2) widespread application of EE technologies (e.g., utilization of EE bricks) in the design, construction and operation of rural buildings. The activities related with the demonstration of rural EE buildings and EE brick production will address the need for showcasing the major aspects of EE brick manufacturing (in particular, technology options and delivery and production practices), and the application of rural EE buildings in China. The main outcome will be the establishment of a critical mass of demonstration projects that will provide detailed information on technical performance and operations, energy savings and environmental impacts to interested brick makers, rural building developers, residents, local financial institutions, and local governments. The technology support and replication sub-components will involve activities that will help bring about thorough understanding and appreciation of the EE brick production technology options, EE building models and their environmental impacts by brick makers, developers and the government policy makers, and of the utilization of EE bricks by building developers and house buyers in the rural areas of the country. This component will also address the barrier of inadequate technical capacity to support the retrofit/improvement of brick production lines (in particular to facilitate EE brick production) as well as in EE building design and construction. The expected outcome from this component includes the improved local vocational, technical, and managerial capacity to manage and sustain operations of EE brick production lines and EE building practices in rural areas. The implementation of the activities under this component will collectively cost about US$ 37.423 million. The implementation of incremental activities that GEF will be funding will cost US$ 3.65 million.

16. The following are the expected outcomes by end of the project:

- GHG emissions reduced by 118,480 tons/yr CO_2 compared to business-as-usual scenario and cumulative emission reductions of 236,670 tons CO_2 by the end of project (2013).

- Annual energy savings of about 47,580 tce compared to business-as-usual scenario and cumulative energy savings of about 95,050 tce by end of project.
- 20% market share of EE bricks in the local brick market by end-of-project
- 20% of rural buildings that are EE buildings in the targeted rural areas.

Incremental Cost Matrix and Project Indicative Budget

17. The proposed budget for each project component is shown in Table 5, 6, and 7 below. In total, the GEF contribution to the project amounts to US$ 7,000,000.

Table 5: Summary Cost of Each Project Component (US$)

Project Component	Baseline	Incremental		Total Cost	%
		GEF	Non-GEF		
1. Information Dissemination	20,000	833,309	5,264,570	6,117,879	11.7
2. Policy Development and Institutional Support	50,000	800,000	3,040,392	3,890,392	7.4
3. Finance Support & Accessibility	200,000	1,012,007	2,053,248	3,265,255	6.2
4. Demonstration and Technology Support	250,000	3,654,684	33,518,802	37,423,486	71.5
Project Management	0	700,000	965,106	1,665,106	3.2
Total	**520,000**	**7,000,000**	**44,842,118**	**52,362,118**	**100**

18. Table 6 provides the summary of budget cost sharing among GEF and the co-financiers of the full-scale project by components/activities.

Table 6: MTEBRB Cost Sharing Matrix (US$)

COMPONENTS	Baseline[18]	Incremental				Total
		GEF	Central Gov't	Local Gov't	Private Sector	
1. Information Dissemination	20,000	833,309	618,293	4,646,277	0	6,117,879
2. Policy Development and Institutional Support	50,000	800,000	3,040,392	0	0	3,890,392
3. Finance Support & Accessibility	200,000	1,012,007	0	2,053,248	0	3,265,255
4. Demonstration and Technology Support	250,000	3,654,684	0	26,901,156	6,617,646	37,423,486
5. Project Management	0	700,000	965,106	0	0	1,665,106
TOTAL	**520,000**	**7,000,000**	**4,623,791**	**33,600,681**	**6,617,646**	**52,362,118**

19. Table 7 shows the summary of the project co-financing. The co-financing is mainly from the rural brick makers hosting the EE brick making demo projects, and Ministry of Agriculture, accounting for about 45% of the total co-financing; and the rural building developers,

[18] All baseline activities are carried out by the local governments. The budgets for such activities are the baseline costs of the project.

accounting for about a third of the total co-financing; and the rest (about 21%) from the Ministry of Agriculture.

Table 7: Summary of Project Co-Financing*

Contributor	Classification	Type	Amount (US$)	Status
Central Chinese Government**	Government	cash and in-kind	4,623,791	Confirmed
Local Government Agencies (Agricultural offices/bureaus – *for baseline activities demonstration and replication EE building projects*	Government	cash and in-kind	34,120,681	Confirmed***
Rural Brick Makers – *for demonstration and replication EE brick plants*	Private sector	cash and in-kind	6,617,646	Confirmed***
Total			**45,362,118**	

*This does not include co-financing for the PPG Exercise

**Included in the cash co-financing from MOA is the US$ 1 million which is rolled over from previous UNDP-GEF TVE project.

***The co-financings from the local governments (i.e., agricultural offices/bureaus) and brick makers have been guaranteed by the MOA, as per Letter of Commitment to Co-finance. Should any of these entities default on their commitment, the MOA has to make-up for the shortfall.

20. Table 8 shows the incremental cost matrix. The baseline and alternative courses of actions are presented together with the costs of achieving them.

Table 8: Incremental Cost[19] Matrix

Component	Baseline	Alternative	Increment
Global Environmental Benefits	• In the baseline, due to the major barriers remain untouched, and the lack of demonstration, the investment and projects on rural EE buildings and EE brick productions will develop slowly throughout the nation's countryside. • CO_2 emissions = 454417 ton/yr	• Under the proposed project, the major barriers on information, policy, finance as well as technology will be comprehensively removed in major rural areas, sustainable replication models will be developed and applied; • As the result, the GHG emission performance from the nation's rural building sector will be significantly improved: CO_2 emissions =365940 ton/yr.	• CO_2 emission savings will be 118,476 ton/yr; • Cumulative CO_2 emission savings by the end of the project will be 236669 ton. • Direct CO_2 reduced in the life span of the demonstration and replication projects = 2.65 million ton CO_2; • Indirect CO_2 emission reductions projected as a result of the project will be 62 MT.
Domestic Benefits	• Energy efficiency of rural brick making and rural buildings remain low • Energy use = 194545 tce/yr;	• Energy efficiency from rural brick making project will be increased by 20%; • Energy efficiency from rural building applications will be increased by 30% • Energy use = 146964 tce/yr;	• Energy savings will be 47581 tce/yr; • Cumulative energy savings by the end of the project will be 95048 tce. • Direct energy savings in the life span of the demonstration and replication projects = 1.06 Mtce; • Indirect savings projected as a result of the project will be 25 Mtce.
Component 1: Information Dissemination & Awareness Enhancement	**Business as Usual** • Indirect information and knowledge on urban EE buildings will be accepted by rural residents through on-going governmental and international programs	**Proposed Situation** • Direct and focused knowledge sharing and information dissemination programs will be designed and conducted in rural areas; • Special targeted info dissemination systems will be developed and put in operation	**Additional Features** • Shared information, knowledge and success story will make it much easier for rural residents, developers and brick makers to adopt EE technologies and building models;
	Domestic Benefits • Limited access and understanding of relevant technologies, markets and ES benefits	**Domestic Benefits** • Significantly increased accessibility and awareness of EE buildings and brick makings' technologies among major rural stakeholders	**Domestic Benefits** • Better and more widely understanding of the relevant EE products, and technologies in rural markets

[19] For the MTEBRB, the incremental activities are a combination of those that are GEF-supported, and those that are funded by the co-financers. See Table 6.

Component	Baseline	Alternative	Increment
	Global Benefits • Information dissemination capacity on GHG emission reduction in rural building sector grow slowly	**Global Benefits** • Capacity increases significantly, enabling large scale GHG emission reduction projects in rural building sector	**Global Benefits** • Potential customers and other relevant stakeholders throughout the countryside will share the most effective and cost-beneficial models and technologies on GHG reduction.
COST (USD)	**20,000**	**6,117,879**	**6,097,879**
Component 2: Policy Development and Institutional Support	**Business as Usual** The national policy and planning framework on rural EE buildings and brick making will developed slowly; relevant national standards and codes will remain unavailable	**Proposed Situation** The project will provide technical assistance to strengthen the capability at national level to develop EE policies, standards and codes, and plans to promote rural EE buildings and EE brick making; the project will also assist in improving local governments' capacity in enforcing such policies, plan and standards	**Additional Features** The national policy and regulation framework on rural EE building sector will be developed; the local governmental enforcement capacity improved.
	Domestic Benefits • Governmental capacity on rural EE building sector will develop slowly;	**Domestic Benefits** • Significantly increase the governmental capability to enforce its ES plan in rural areas	**Domestic Benefits** • Significantly improved policy framework and enforcement capability to conduct ES plans in rural building sector
	Global Benefits • Governmental capability to reduce GHG in rural building sector will remain weak	**Global Benefits** • Sound policy environment to reduce GHG emission in rural building sector.	**Global Benefits** • Enabling the government to conduct large scale GHG reduction projects in rural areas.
COST (US$)	**50,000**	**3,890,392**	**3,840,392**
Component 3: Finance Support & Accessibility	**Business as Usual** Commercial financial accessibility remain limited for rural EE building projects	**Proposed Situation** Project will provide assistance to increase the potential customers technical capability to access commercial finance resource; the project will also assist commercial finance to develop their rural EE building markets	**Additional Features** Increased accessibility of rural EE building activities to commercial finance.
	Domestic Benefits • Commercial financing resources remain very limited accessibility to rural residents and developer, brick makers; • Limited businesses breakthrough for financial institutions in the rural EE	**Domestic Benefits** • Rural customers (residents, developers, and brick makers) and commercial financial institutions technically more knowledgeable and accessible to each other;	**Domestic Benefits** • More commercially developed rural EE building financial market with much decreased information and technical risks

Component	Baseline	Alternative	Increment
	building markets.		
	Global Benefits • Limited financial support to reduce GHG emission activities in rural building sector	**Global Benefits** • Increased capacity for both financial institutions and customers to develop relevant GHG reduction projects.	**Global Benefits** • Much improved financial support for GHG reduction projects in rural EE building sector
COST (US$)	**200,000**	**3,265,255**	**3,065,255**
Component 4: Demonstration and Technology Support	**Business as Usual** EE technologies and models in rural building sectors will be slowly developed and adopted	**Proposed Situation** The project will demonstrate and showcase the EE technologies and models for rural building sector in various geographical conditions; the project will support the development of technical capabilities of rural building sectors in developing and replicating such technologies and models	**Additional Features** The ES and GHG emission reduction performance of efficient technologies and models will be demonstrated and showcased among rural potential users; the sustainable replicating mechanism will be established and put into operation
	Domestic Benefits • Energy efficiency of rural building sector remain low	**Domestic Benefits** • ES technologies will be widely adopted and disseminated	**Domestic Benefits** • EE performance in the rural building sector will be significantly improved;
	Global Benefits • GHG emission from the rural building sector will be improved slowly	**Global Benefits** • Rural customers will be technically much more capable of adopting GHG reduction technologies	**Global Benefits** • GHG emissions from the rural building sector will be decreased greatly.
COST (US$)	**250,000**	**37,423,486**	**37,173,486**
Project Management Cost	**0**	**1,665,106**	**1,665,106**
TOTAL COST (US$)	**520,000**	**52,362,118**	**51,842,118**

PART II: Logical Framework Analysis (Project Planning Matrix)

Table 9: Project Planning Matrix (PPM)

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
Goal: Reduction of GHG emissions from brick manufacturing and the commercial & residential (C&R) buildings in rural areas	• Annual Reduction in CO_2 emissions from rural brick production and from the C&R buildings in rural areas by end-of-project (EOP), ton/year • Cumulative CO_2 emission reduction in rural brick production and from the C&R buildings in rural areas by EOP, ton	• 0[20] • 0	• 118,476[21] • 236,669[22]	• Project progress and evaluation reports,· • Baseline surveys, end of project surveys, • Mid-term and final evaluation reports	• Ensured long-term commitment of the Government to promoting reductions in GHG emissions from the industrial and building sectors, especially in rural areas.
Objective: Removal of barriers that have persistently hindered the widespread development and application of EE bricks and EE buildings in rural China.	• Reduction in total energy use in rural building sector and in rural brick making industry by EOP, tce; • % improvement in energy efficiency in targeted rural buildings by EOP • % improvement in energy efficiency in targeted rural brick makers by EOP • % share of EE brick products in the targeted local rural building construction materials market by EOP • % of rural buildings in the targeted local areas that are considered as EE buildings by EOPs	• 0[23] • 0 • 0 • 0[24] • 0	• 95,048[25] • 30% • 20% • 20% • 20%	• Project progress reports, • Baseline surveys, end of project surveys, • Mid-term review and final evaluation reports	• The governmental policies to promote energy conservation activities remain as active as at the current level, especially during the global financial crisis and rescission

[20] Annual CO2 emissions in Year 0 to year 5 is 484,417 tons/yr
[21] Annual CO2 emissions in Year 4 to Year 5 is 365,940 tons/yr
[22] This is derived from the last 2 years of the MTEBRB project
[23] Annual energy use in the bricks and C&R sectors in rural areas in Year 0 to Year 5 is194545 tce/yr;
[24] Rural building developers and residents are not building and adopting EE buildings and EE bricks.
[25] Annual energy consumption is reduced to 146,964 tce/yr. This amount is for accumulated savings from Year 4 to Year 5 @ 47,581 tce/yr

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
Component 1: EE Brick and EE Building Information Dissemination Network OUTCOME: Enhanced knowledge and access to technical and market information, particularly among local governments, rural residents, and builders in rural areas, on EE bricks and buildings	• An operational EE Brick & EE Building information dissemination network by Year 3 • Number of multi-media product packages developed and disseminated per year starting Year 3 • Number of completed promotion and advocacy program by EOP • Number of people reached by project information dissemination network and public awareness campaign starting Year 1	• 0[26] • 0 • 0 • 0	• Operational starting year 3 • 5 • 1 • At least 1 million[27]	• Project progress reports, APRs • Mid-term and final evaluation reports • Customer/client surveys	• Sustained governmental policies in EE activities and New Socialist Countryside Construction at least at current level; • Customers' interests in web-based information
Output 1.1 Established and operational information dissemination network	• An operational EE Brick & EE Building information dissemination network by Year 3 • Number of stakeholders that are utilizing the information exchange services starting in Year 3 • Number of on-line connections with the information exchange services each year starting Year 3	• 0[28] • 0 • 0	• Operational starting year 3[29] • At least 10,000[30] • At least 76	• Project website • Survey report, • on-site visits • Project progress reports, APRs • Mid-term and final evaluation reports	• Effectiveness and commitment of MOA, WMRO and other governmental agencies' local networks remain at least at current level.

[26] The relevant governmental and GEF activities (such as EE building program and EUEEP, TVE II projects) have some related public awareness programs and actions either to target urban EE building market or promote the production of less energy efficient brick products

[27] These are people reached through rural broad casting or agricultural TV channel the information disseminated by the project.

[28] MOA are currently running a successful SNRC information network, and a rural energy/environmental protection network; XWMRDI is running the national brick technologies and market information network; These networks do not include information and knowledge on rural EE buildings and EE bricks

[29] Information dissemination network will be developed and put into operation to connect at least 30 counties, 50 villages by the end of the project

[30] At least 10000 hits/yr to the web-site by the end of project; Assumes a well-functioning intranet connection between PMO, MOA and 16 demonstration sites, 60 replication sites put in place by the year 4

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
Output 1.2 Developed and disseminated full package of multi-media products	• Number of multi-media product packages developed and disseminated starting Year 3 • CDs developed & disseminated • Books/training materials disseminated • TV/radio program produced and aired	• 0[31]	• At least 5 • 2 (1000 copies) • 2 • 1	• Multi- media products such as CDs, books, broachers, • TV broadcasting • Rural audio broadcasting	• Interest and active involvement by the media products producers
Output 1.3 Completed promotion and advocacy program	• Number of provinces, counties, and villages covered by the program starting Year 1 • Provinces • Counties • villages • Number of on-site visits (not by individual but by group of individuals) to demonstration and replication sites starting Year 3 • Total number of promotional/advocacy workshops and conferences conducted by EOP	• 0[32] • 0 • 0	• At least 10 • At least 20 • At least 100 • At least 500[33] • At least 6	• project routine M&E report, and impact documentation • Surveys on impacts of the promotional/advocacy program • Proceedings of workshops and conferences • Progress reports, APRs • Mid-term and final evaluation reports	• Interest and support of key stakeholders at both national and local level are ensured.
Component 2: Policy Development and Institutional Support	• Number of project policy proposals incorporated into the national EE building and rural development decision making processes by EOP	• 0[34]	• 1[36]	• Project progress reports, APR, midterm and final evaluation	• Consistent strong GOC commitment to rural construction and ES planning goals

[31] The UNDP-GEF TVE II project has successfully developed the related media products and circulated in the rural media market on EE brick making technologies; but these media products are focus on the energy conservation technologies in producing solid bricks or less efficient EE bricks.

[32] Previous public campaigns on EE buildings are focused on urban application; no public awareness program has ever been conducted on rural EE building applications.

[33] On-site visits by various local stakeholders and the ones from abroad will make on-site visits to the demonstration and replication sites

[34] During the implementation of GOC and GEF projects on urban EE buildings, special studies and research have been conducted to develop the policy framework and incentives in promoting urban EE building development; special planning have been developed by local governments to promote local urban EE buildings.

[36] The policy proposal put forward by the project will be incorporated into the MOA's relevant rural energy conservation and rural construction decision making process; and MOA will circulate these proposals to the relevant administrations (such as MOHURD, NDRC).

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
OUTCOME: Promulgation of, and compliance to, favorable policies that encourage manufacturing and utilization of EE bricks and the application of EE technologies and practices in the buildings sector in the country's rural areas.	• Number of standards and codes on rural EE buildings developed and approved by the local government authorities by EOP • Number of local governments that have incorporated rural EE building application and EE brick production into their local development planning and action plan implementation by EOP	• 0[35] • 0	• At least 1 • At least 10	• Documentation on the approved policies and associated implementing rules & regulations • Documentation on the enforced standards and codes for EE building materials • Formulated rural building energy code • Formulated EE brick standards	
Output 2.1: Formulated policies, and associated implementing rules on EE building materials production and utilization	• Number of completed policy studies carried out and utilized in the policy formulation on EE building materials production (e.g., EE bricks manufacturing) and utilization (e.g., EE building constructions) by EOP • Number of successful promotional activities conducted to help influence and petition the approval of formulated policies on EE bricks production and EE building construction by EOP • Number of formulated policies that were recommended and approved by government authorities by EOP	• 0[37] • 0 • 0	• 1 • At least 1[38] • 1	• Completed Policy Study reports, • Investigation report; policy report	• Sound economic & policy environment to promote rural ES/EE policies and regulations.

[35] Although urban EE building standards and code are enforced successfully; but according to the EE building experts they are not applicable in rural areas; Although solid brick and old hollow/perforate brick production and product standards are developed and enforced, but no EE brick production and products standards available

[37] Extensive information exchange activities has been organized by the GOC and EUEEP project on improving policies and incentives to promote EE buildings in cities; the unique characteristics of policy framework and incentives on rural building sector is not fully addressed if any. There was no policy study conducted specially target the development of rural EE building and EE brick. Standardization administration developed a series of standards on production and products which cover solid brick, old EE brick. The authority intends to develop the new standards on EE bricks, but due to the lack of practices, the plan is put on a halt.

[38] Mainly a knowledge sharing and information exchange activity (workshop or field visit) will be conducted to understand the international best practices and decision making process; study report developed. Investigation in target areas will be conducted. Based on the investigation, policy and institutional improvement and action plans will be proposed. Based on the demonstration and replication projects, developed or proposed rural EE building construction code, EE brick product standard.

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
Output 2.2: Improved local governments' policy enforcement capabilities and implemented action plans	• Number of capacity development programs (inclusive of the training materials) on policy formulation and enforcement developed by EOP • Cumulative number of trained local government officials that by EOP are directly involved in EE brick making and/or EE building development projects • Number of policies/action plans developed and enforced by the local governments by EOP	• 0[39] • 0[40] • 0	• 8[41] • At least 200 • 10	• Investigation report • study report and action plan • Training materials • progress reports and APRs • Mid-term and final evaluation reports	• Central and local governmental commitment to EE/ES and NSRC remain strong;
Outcome 3: Finance Support & Accessibility Improvement	• Number of financial institutions involved in the project by EOP; • Total amount of funds (RMB) leveraged by the project into the rural EE building construction and brick production by EOP;	• 0 [42] • 0	• At least 40 • At least 50 million	• Project progress reports, APR, • Mid-term and final evaluation reports	• Sustained financial policy environment to encourage commercial financial institutions involve in EE/ES activities
Output 3.1 Completed and publicized financial and accounting assessment of rural EE brick makers and EE building developers	• Number of local developers and brick mills trained by EOP • Number of financial and accounting reports developed by EOP	• 0[43] • 0[44]	• At least 200 • At least 60	• Project progress reports, • training materials • Investigation report • Financial reports	• Relevant policies remain in favor of commercials EE activities

[39] The GOC has disaggregated its overall EC target to local governments, and the local administrations have developed their plans to fulfill the goal; however local governments have not included rural EE building application and EE brick promotion in their EC plans;

[40] Local governments do not have the knowledge and experience to implement EE building and brick application activities; no special training programs or capacity building activities has ever conducted on promoting rural EE building and bricks

[41] Capacity development programs (inclusive of the training materials) on policy formulation and enforcement

[42] The GOC is in full swing to redirect its financial resources to the rural areas in the context of SNRC campaign; commercial financial institutions are encouraged to develop and expand their business in rural S&ME; however according to the statistics, the percentage of commercial loans received by rural S&ME has been declining; commercial finance especially the one from local FCCs have been actively involved in the SNRC; but commercial finance in rural EE/EC activities are rare, none for rural EE buildings;

[43] No special governmental efforts on increasing rural developers and EE brick mills financial and accounting capacities

[44] The GOC are working actively to pilot the financial information collection and publication for rural S&ME in a selected regions; but the overall accessibility of rural brick mills financial information and professional presentation is very primitive;

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
Output 3.2 Developed and implemented new business models for local banks/financial institutions to engage in rural EE brick and EE buildings projects	• Number of information exchange and knowledge sharing programs completed to identify and disseminate best Practice and business models by EOP; • Number of local financial staff involved in knowledge sharing activities by EOP	• 0[45] • 0	• at least 5 • at least 100	• Study report • Evaluation report • feasibility study and business plan • Progress reports, APRs, • Training materials n • Midterm and final evaluation reports	
Outcome 4: Demonstration and Technology Support	• Total number of rural brick mills making EE bricks by EOP; • Total output of EE bricks (pieces) in the targeted rural areas by EOP; • Total rural EE buildings constructed in targeted areas by EOP	• 0[46] • 0[47] • 0[48]	• At least 28 • At least 1.4 billion • At least 1760	• Project progress reports, • Baseline surveys, end of project surveys, • Mid-term and final evaluation reports	• Local governmental support to EE/ES activities remain at least at the current level; • Local market environments remain in favor of the competitiveness of EE bricks and buildings
Output 4.1 Completed demonstration of rural EE buildings and EE bricks production	• Number of feasibility study reports (including baseline development) developed by year 3 • Number of EE building and EE brick making projects in place and satisfy the preset EE targets	• 1[49] • 0	• At least 9 (EE brick production projects) and 8 (EE building projects) • At least 8 (EE brick production) and 8 (EE	• Project progress reports and feasibility reports, • M&E reports • dissemination materials	• Active involvement of key equipment manufacturers and other relevant stakeholders

[45] Some of the local financial institutions are successfully developing micro-credit businesses in rural areas (for example households biogas projects); and actively involved in the NDRC campaign; however rural financial institutions are lack of experiences and knowledge to develop industrial EE projects such as brick making; and the commercial finance are currently unavailable to rural EE buildings application (to developers and farmers) due to the lack of market and lack of knowledge and skills by the local financial institutions

[46] There is few rural brick makers are producing EE bricks

[47] Output of EE bricks is negligible right now in rural areas;

[48] In some suburban areas of metropolitans (such as Beijing), due to the fast expansion of big cities, the local rural residential houses are required to adopt EE building standards which are being enforced in urban areas under heavily governmental subsidy; overall there is no systematic demonstration and replication activities and programs on rural EE buildings and bricks;

[49] In 2004 a feasibility study report was developed by Xian Wall Material Design and Engineering Institute for MOST EE brick R&D project; no feasibility study reports on rural EE building available.

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
	(see Objectives) by year 3 • Number of information dissemination program completed by year 3	• 0[50]	building) • At least 1[51]	• progress report, and attendants survey	
Output 4.2 Developed and disseminated technical guidelines and templates to develop and implement rural EE brick and EE building applications	• Number of study reports on national and international best practices, lessons learnt on rural EE building and EE brick production by EOP • Number of feasibility study of standardization of EE brick products by EOP • Number of rural EE buildings database and report developed by EOP • Number of information dissemination program conducted by EOP • Number of training materials on EE brick making and EE building development in rural areas developed by EOP • Number of persons trained by EOP	• 0[52] • 0 • 0[53] • 0[54] • 0 • 0	• 2[55] • 1[56] • 1[57] • 1[58] • At least 2 • 200	• Study reports, • Progress report • Assessment reports • Database and technical report • training materials • progress report	• MOA and its local branches commitments to rural energy development and ES/EE activities remain high, the effectiveness of MOA's local technical support networks remain operational and functioning at current level; • WMRO and local offices remain effective and functioning at current level

[50] Local manufacturers, developers, governments and residents do not receive relevant technical information
[51] 80 key stakeholders in the demonstration and future replication regions will be invited to attend the workshop.
[52] No such study has been conducted;
[53] Local technical institutions have been actively involved in the EE buildings application in urban areas, but knowledge and capacity in developing rural EE buildings are poor; Although the TA activities are extensive through the previous GOC and GEF activities on EE buildings in urban areas, rural areas are overlooked; local developers and brick makers are poorly trained and educated regarding EE building construction and EE brick making;
[54] No such special information exchange and knowledge sharing activities have ever been conducted; local developers and brick makers are poorly trained and educated regarding EE building construction and EE brick making;
[55] 1 report on rural EE building and 1 Report on EE brick production
[56] Inclusive of relevant drawings, operational manuals, and guidelines developed.
[57] Database includes technical report (include blueprints, and code of construction; guidelines, manual and business model/operation).
[58] At least 30 people involved in the information exchange and knowledge sharing activities

Project Strategy	Success Indicators			Means of Verification	Critical Assumptions
	Indicators	Baseline	Target		
Output 4.3 Constructed replication projects	• Number of Evaluation reports of demonstrations developed by EOP • Number of Replication projects constructed by EOP;	• 0 • 0	• 16[59] • 60[60]	• Evaluation reports, • Mid-term and final evaluation reports • survey and identification report • Feasibility study reports • M&E plan and reports	• local governments' support to rural EE/ES activities remains strong;

[59] Evaluation reports disseminated during the workshops carried out in specific activities for delivering Outputs 4.1 and 4.2.

[60] Reports include survey of selected 60 replication sites selected; feasibility studies, baseline data and implementation plans for the replication sub-projects; M&E plan, documentation of the engineering installation, construction, and energy utilization performances.

SECTION III: Total Budget and Work Plan

Award ID:	*00049006*	**Project ID(s):**	*00059500*
Award Title:	China: Market Transformation of Energy Efficiency Bricks and Rural Buildings		
Business Unit:	*CHN10*		
Project Title:	China: Market Transformation of Energy Efficiency Bricks and Rural Buildings		
PIMS no.	*3675*		
Implementing Partner (Executing Agency)	Ministry of Agriculture (MOA)		

Table 10: MTEBRB Project Budget

Activity	Responsible Agency	Source of Fund	Budget Code	Description	Annual Expenses					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
Component 1: Information Dissemination and Awareness Enhancement										
Output 1.1: Established and operational information dissemination network	PMO	GEF	71300	National Experts	96000	96000	96000	96000	96000	480,000
	PMO	GEF	71300	National Expert (Info Officer)	10,800	10,800	10,800	10,800	10,800	54,000
	PMO	GEF	71600	Travel	10000	10000	10000	10000	10000	50,000
	PMO	GEF	72200	Info. System Hardware	0	0	50,440	0	0	50,440
Sub-Total					***116,800***	***116,800***	***167,240***	***116,800***	***116,800***	**634,440**
Output 1.2: Developed and disseminated full package of multi-media products	PMO	GEF	71300	National Experts	0	30667	30667	30666	0	92,000
Sub-Total					**-**	***30,667***	***30,667***	***30,666***	**-**	**92,000**
Output 1.3: Completed promotion and advocacy program	PMO	GEF	71300	National Experts	0	0	13333	13334	13333	40,000
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	5000	5000	5000	41,868	10000	66,868
Sub-Total					***5,000***	***5,000***	***18,333***	***55,202***	***23,333***	**106,868**
Component 1 Total					**121,800**	**152,467**	**216,240**	**202,668**	**140,133**	**833,308**
Component 2: Policy Development and Institutional Support										
Output 2.1: Formulated	PMO	GEF	71200	International Expert	30000	30000	0	0	0	60,000

Activity	Responsible Agency	Source of Fund	Budget Code	Description	Annual Expenses					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
policies, and associated implementing rules on EE building materials production and utilization	PMO	GEF	71300	National Experts	60000	60000	60000	60000	0	240,000
	PMO	GEF	71600	Travel	7,500	7,500	7,500	7,500	0	30,000
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	16,250	16,250	16,250	65,000	16,250	130,000
Sub-Total					***113,750***	***113,750***	***83,750***	***132,500***	***16,250***	**460,000**
Output 2.2: Improved local governments' policy enforcement capabilities and implemented action plans	PMO	GEF	71300	National Experts	48,000	48,000	48,000	48,000	48,000	240,000
	PMO	GEF	71600	Travel	6,000	6,000	6,000	6,000	6,000	30,000
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	0	17,500	17,500	17,500	17,500	70,000
Sub-Total					***54,000***	***71,500***	***71,500***	***71,500***	***71,500***	**340,000**
Component 2 Total					**167,750**	**185,250**	**155,250**	**204,000**	**87,750**	**800,000**
Component 3: Finance Support & Accessibility Improvement										
Output 3.1: Completed financial and business development assessments for rural brick makers and building developers	PMO	GEF	71200	International Expert	20,000	20,000	20,000			60,000
	PMO	GEF	71300	National Experts	48,000	48,000	48,000	48,000	48,000	240,000
	PMO	GEF	71600	Travel	10,000	10,000	10,000	10,000	10,000	50,000
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	0	0	80,000	10,371	10,371	100,742
Sub-Total					***78,000***	***78,000***	***158,000***	***68,371***	***68,371***	**450,742**
Output 3.2: Developed and implemented new business models for local banks/financial institutions for financing rural EE brick making and EE buildings projects	PMO	GEF	71300	National Experts	96,000	96,000	96,000	96,000	96,000	480,000
	PMO	GEF	71600	Travel	10,000	10,000	10,000	10,000	10,000	50,000
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	6,253	6,253	6,253	6,253	6,253	31,265
Sub-Total					***112,253***	***112,253***	***112,253***	***112,253***	***112,253***	**561,265**
Component 3 Total					**190,253**	**190,253**	**270,253**	**180,624**	**180,624**	**1,012,007**
Component 4 Demonstration and Technology Support										
Output 4.1: Completed demonstration of rural EE buildings and EE bricks	PMO	GEF	71400	Contractual Services	160,000	160,000	160,000	0	0	480,000
	PMO	GEF	71600	Travel	16,667	16,667	16,667	0	0	50,001
	PMO	GEF	74500	Misc Exp: Info	5,956	5,956	5,956	5,956	0	23,824

Activity	Responsible Agency	Source of Fund	Budget Code	Description	Annual Expenses					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
production				Exchanges/Workshops						
Sub-Total					***182,623***	***182,623***	***182,623***	***5,956***	***0***	**553,825**
Output 4.2: Developed and disseminated technical guidelines for the development and implementation of rural EE brick and EE building applications	PMO	GEF	71200	International Expert	60,480	60,480	20,160	20,160	40,320	201,600
	PMO	GEF	71200	International Expert	84,000	84,000	0	0	0	168,000
	PMO	GEF	71300	National Experts	144,000	144,000	144,000	144,000	144,000	720,000
	PMO	GEF	71600	Travel	22,880	22,880	22,880	22,880	22,880	114,400
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	5,186	5,186	80,000	5,186	5,186	100,744
Sub-Total					***316,546***	***316,546***	***267,040***	***192,226***	***212,386***	**1,304,744**
Output 4.3: Constructed replication projects	PMO	GEF	71400	Contractual Services	0	390,000	390,000	390,000	390,000	1,560,000
	PMO	GEF	71600	Travel	0	30,000	30,000	30,000	30,000	120,000
	PMO	GEF	74500	Misc Exp: Info Exchanges/Workshops	0	29,029	29,029	29,029	29,029	116,116
Sub-Total					***0***	***449029***	***449029***	***449029***	***449029***	**1,796,116**
Component 4 Total					**499,169**	**948,198**	**898,692**	**647,211**	**661,415**	**3,654,685**
Project Management	PMO	GEF	71200	International Expert (CTA)	15,120	15,120	5,040	5,040	10,080	50,400
	PMO	GEF	71300	National Expert (Project Coordinator)	36,000	36,000	36,000	36,000	36,000	180,000
	PMO	GEF	71300	National Expert (Contract Officer)	21,600	21,600	21,600	21,600	21,600	108,000
	PMO	GEF	71300	National Expert (M&E Expert)	20,000	20,000	20,000	20,000	20,000	100,000
	PMO	GEF	72100	Contractual Services - Mid-Term & Final Evaluations and Annual Financial Audits	5000	5000	40,000	5000	45,000	100,000
	PMO	GEF	71400	Contractual Services - Secretary	10,200	10,200	10,200	10,200	10,200	51,000
	PMO	GEF	71600	Travel	17,120	17,120	17,120	17,120	17,120	85,600
	PMO	GEF	74500	Miscellaneous	5,000	5,000	5,000	5,000	5,000	25,000
Project Management Total					***130,040***	***130,040***	***154,960***	***119,960***	***165,000***	**700,000**
Project Grand Total					**1,109,012**	**1,606,208**	**1,695,395**	**1,354,463**	**1,234,922**	**7,000,000**

SECTION IV: ADDITIONAL INFORMATION

PART I: Other Agreements (See attached)

A. GEF Operational Focal Point Letter of Endorsements
B. Co-Financing Letters

Attached separately

PART II: Stakeholder Involvement Plan

Extensive stakeholder involvement is absolutely essential to ensure cooperation of relevant national and local government authorities, acceptance by rural residents, developers, and brick mills. A list of stakeholders is given in Section I Part V. As such, each outcome of this proposal includes specific activities targeted at stakeholder participation:

- Formation of a Project Steering Committee with representatives from relevant government departments;
- The numerous workshops and the information dissemination network planned will offer the opportunity for networking of local stakeholder groups;
- The set-up of Technical Advisory Committee, as well as the deep involvement of national leading scientific and research institutions on EE building EE bricks will offer opportunity for strengthening the links with academia and national technological community.
- Civil society will be involved through community stakeholder meetings and mass media outreach campaign associated with each of the proposed subprojects to strengthen public awareness.

The following list presents key stakeholder groups and their involvement in the proposed project.

Table 11: Role of Stakeholders

Institutions	Official Mandate	Role in Project
Government		
MOA	Rural energy conservation and GHG emission reduction	Project Executing Agency
NDRC	Overall national EE/EC planning, policy	Member of PSC; through the NPSC, the agency will be actively involved in the project implementation, especially the development of relevant policy research and suggestions, standards and codes, as well as the formation of national roadmap and replication mechanism.
MOHURD	Overall policy and planning, on EE building	Member of PSC; through the PSC, the agency will be actively involved in the project implementation, especially in the development and construction of EE building demonstration and replication projects, standards and codes, as well as the formation of national roadmap and replication mechanism
MOST	R&D on EE building and bricks	Same as above
MLR	Land resource conservation	Member of PSC; through the NPSC, the agency will be actively involved in the project implementation, especially in the development of relevant policy research and suggestions, standards and codes, as well as the formation of national roadmap and replication mechanism.
MEP	Policy and rules on environmental protection	Same as above
MOF	GEF national focal point, financial policies on EE/EC	Same as above
Local Governments	The local branches of the above mentioned agencies will share the same responsibilities as their national headquarters with only regard to the specific region.	These local governments will involve in the supervision and guidance of local sub-projects implementation; and will be targeted by the project TA activities to build their capacities in organizing and implementing rural EE building and brick application activities.

Institutions	Official Mandate	Role in Project
International Organizations		
GEF	Funding Agency	
UNDP	Implementing Agency	On behalf of GEF, supervise the overall implementation of the project
Private Sector		
Local Rural Building Developers	Major players in the EE building demonstrations (local rural buildings development and construction)	Major GEF TA targets and will be actively involved in the various project activities, The project will strengthen their capabilities on EE building and brick applications through a series of training and knowledge sharing activities.
Rural Residents	Major players in the EE building demonstrations - Together with local building developers, they will be in charge of the construction of their individual EE houses.	Major GEF TA targets and will be actively involved in the various project activities, The project will strengthen their capabilities on EE building and brick applications through a series of training and knowledge sharing activities.
Rural Brick Mills	Major players in the EE brick making and EE building demonstrations - Major providers of rural building materials.	Major GEF TA targets and will be actively involved in the brick production related project activities, The project will strengthen their capabilities on EE building and brick applications through a series of training and knowledge sharing activities.
Local Financial Institutions	Major finance sources of rural brick manufacturers and building developers.	Major GEF TA targets and will be actively involved in the financial related project activities, The project will strengthen their capabilities on developing EE building and brick applications businesses through a series of training and knowledge sharing activities.
Technical & Academic Institutions		
EE Building Research and Engineering Institutions	Playing active role in supporting rural building development and brick production.	Member of Technical Advisory Committee; sub-contractors
EE Brick Research and Engineering Institutions	Playing active role in supporting rural brick production and applications.	Member of Technical Advisory Committee; sub-contractors
Financial Research Institutions	Advise the governmental agencies, banks, and rural enterprises in formulating, implementing and exercising related policies, rules, and business operations	Member of Technical Advisory Committee; sub-contractors
EE/EC Policy Research Institutions	Playing active role in supporting the various level governmental agencies and businesses in developing and implementing EE/EC policies and regulations, EE/EC management plans	Member of Technical Advisory Committee; sub-contractors

PART III: CO_2 Emissions Reduction Estimates

Summary

The MTEBRB Project is intended to remove barriers to EE brick market transformation and application to energy efficient buildings in Chinese rural areas. The anticipated energy savings from the production and use of energy efficiency products (EE bricks and building models) that will be facilitated and influenced by the interventions that will be carried out in the project will bring about CO_2 emission reductions from the reduced utilization of fossil fuels used in rural brick making process and rural buildings' heating and cooling processes. The implementation of the MTEBRB project will lead to about 236,669 tons of CO_2 emission reductions by end of project. The long-term direct CO_2 emissions reductions will be much greater, and cumulative direct reductions will reach about 2.65 million tons of CO_2 in 2033. The cumulative indirect GHG emission reduction influenced by the project is about 62 Mtons of CO_2 by year 2033.

Direct CO_2 Emissions Reductions

The MTEBRB includes the implementation of activities intended to promote the widespread applications of EE brick making and EE building technologies in the rural commercial & residential sectors of China (see Section I for details).

Assumptions

The major assumptions used in the estimation of CO_2 emissions reductions are as follows, and the detailed assumption and calculation is shown in Section IV, Part VI:

Table 12: Major Assumptions in Incremental Cost Analysis[61]

CO_2 emission factor (tCO_2/tce)	2.49
Equivalent coal coefficient	
• Raw Coal (tce/t)	0.7
• Electricity (kgce/KWh)	0.404
Lifetime of brick making plants (year)	20
Lifetime of EE buildings (year)	50
Influence period (year) for indirect effects	10

Table 13: Direct Energy Savings during the Lifetime of Demo & Replication Projects

EE Brick Making[62]

Year	Baseline energy consumption (tce/yr)	Alternative energy consumption (tce/yr)	Project energy savings (tce/yr)	Percent energy savings (%)	Cumulative Project energy savings (tce)
2009	194,165	194,165	0	0	
2013	194,165	146,698	47,467	24	94,934
2033	194,165	146,698	47,467	24	1,044,272

[61] The calculation of direct and indirect GHG emission reductions follows the methodology issued by GEF in "Manual for Calculating GHG benefits of GEF projects" in 2008. www.gefweb.org/Operational_Policies/Operational_Strategy/documents/CC_DRAFT-GEFCO2Manual.doc

[62] Direct energy savings from the EE brick projects are the cumulative energy savings over the project lifetime.

EE Buildings[63]

Year	Baseline energy consumption (tce/yr)	Alternative energy consumption (tce/yr)	Project energy savings (tce/yr)	Percent energy savings (%)	Cumulative Project energy savings (tce)
2009	379.8	380	0	0	0
2013	379.8	266	114	30	114
2033	6224	4,357	1,867	30	19,925
2063	6224	4,357	1,867	30	75,941

EE Brick Making & EE Buildings

Year	Baseline energy consumption (tce/yr)	Alternative energy consumption (tce/yr)	Project energy savings (tce/yr)	Percent energy savings (%)	Cumulative Project energy savings (tce)
2009	194,545	194,545	0	0	
2013	194,545	146,964	47,581	24	95,048
2033	200,389	151,055	49,334	25	1,064,198

Table 14: Direct CO_2 Emissions Reductions During and After MTEBRB Implementation

EE Brick Making[64]

Year	Baseline CO_2 emissions (tons/yr)	Alternative CO_2 emissions (tons/yr)	Project CO_2 reduction (tons/yr)	% CO_2 Reduction	Cumulative CO_2 Reduction (tons)
2009	483,471	483,471	0	0	0
2013	483,471	365,278	118,193	24	236,385
2033	483,471	365,278	118,193	24	2,600,238

EE Buildings[65]

Year	Baseline CO_2 emissions (tons/yr)	Alternative CO_2 emissions (tons/yr)	Project CO_2 reduction (tons/yr)	% CO_2 Reduction	Cumulative CO_2 Reduction (tons)
2009	946	946	0	0	0
2013	946	662	284	30	662
2033	15,498	10,848	4,649	30	49,993
2063	15,498	10,848	4,649	30	189,473

[63] Direct energy savings from EE buildings projects are the cumulative energy savings over the project lifetime
[64] Direct CO2 reduction from EE brick projects are the cumulative CO2 reductions over the project lifetime
[65] Direct CO2 reduction from EE buildings projects are the cumulative CO2 reductions over the project lifetime

EE Brick Making & EE Buildings

Year	Baseline CO_2 emissions (tons/yr)	Alternative CO_2 emissions (tons/yr)	Project CO_2 reduction (tons/yr)	% CO_2 Reduction	Cumulative CO_2 Reduction (tons)
2009	484,417	484,417	0	0	0
2013	484,417	365,940	118,476	24	236,669
2033	498,969	376,127	122,842	25	2,649,852

Indirect CO_2 Reductions

There will be a significant amount of indirect CO_2 emissions reductions due to the MTEBRB project. The indirect impacts are attributed to the following:

- The project focuses on the building market in the country's rural areas, which represents 60% of the nation's existing buildings, 57% of the annually increased floor space, and more than 95% of the total brick output;
- The project will address the buildings' energy efficiency issues in 3 major climate zones, which cover 90% of the nation's territory, 60% of the total rural population;
- The project will target all of the major brick making technologies, which account for 90% of the equipments and facilities being used in the brick making industry;
- Through the implementation of project component on information dissemination, the project information, knowledge and successful stories of EE technologies and applications in rural building sector will reach the major parts of the countryside;
- By developing and implementing the comprehensive replication mechanism and program, showcasing the EE performance and effective implementing strategy, the project will leverage more governmental and commercial financial resources into the EE market transformation of rural building sector through their on-going efforts of New Socialist Countryside Construction.

The GEF methodology issued in 2008 on for calculating GHG benefits of GEF projects was applied in estimating the MTEBRB project's indirect emission reductions. The influence period will be 10 years, and during this period the potential CO2 emission reduction is cumulative indirect CO2 emission reduction over the lifetime of the influenced investments has been calculated by using the "Top-down" method. The top-down calculation starts with an assessment of the total potential of rural EE bricks and EE buildings application in the country. The resulting 10-year potential has been corrected with another factor, the GEF causality factor, which describes how much of that savings can really be attributed to the GEF interventions, and how much would have happened in the business-as-usual scenario in the long-term future anyway.

Bottom-Up Approach:

Particulars	Direct CO2 Emission Reductions, Mtons	Replication Factor[66]	Indirect CO2 Emission Reductions, Mtons
EE Brick Making	2.364	3	7.090
EE Building Development	0.189	3	0.566
Total	2.553		7.656

[66] This makes use of the suggested replication factor for projects involving market transformation and demonstrations as per the GEF prescribed methodology for estimating indirect CO2 emission reductions.

Top-Down Approach:

Particulars	P10 CO2 Emission Reductions[67], Mtons	Causality Factor	Indirect CO2 Emission Reductions, Mtons
EE Brick Making	11.557	0.8[68]	9.246
EE Building Development	32.135	0.2[69]	6.427
Total	43.692		15.673

Range of Indirect CO2 Emission Reductions, Mtons

Particulars	Low	High
EE Brick Making	7.090	9.246
EE Building Development	0.566	6.427

Total CO_2 Emissions Reduction

Table 15: Total CO_2 Emissions Reduction Attributed to MTEBRB

Particulars	Quantity (M tons)	Remarks
Direct CO_2	2.65	Cumulative savings occurring since year 4 and 5 when the demonstration and replication projects implemented
Indirect CO_2	0.57 – 9.25	Range of possible combined indirect savings from EE brick making and EE building developments during the MTEBRB's influence period.

[67] P10 refers to the potential CO2 emission reduction amount during the influence period of a GEF project, which is 10 years after the end-of-project

[68] MTEBRB influence in the brick sector is expected to be high, and in that regard the causality factor is around 0.8("dominating").

[69] Since the application of EE building technologies in the rural buildings sector is affected by various factors, it is estimated that the MTEBRB's influence in this sector is relatively weak. In that regard, the causality factor is estimated conservatively at 0.2 ("weak")

Part IV: Project Risks and Assumptions

While all efforts are made to ensure the effective design and implementation of the project activities, there are some risks that have to be addressed to ensure success of the project. The Project Planning Matrix (Sec II, Part II) shows a detailed overview of the project's risk and assumptions. The principal risks, which can potentially hinder the successful project implementation and/or reduce project effectiveness, relate to:

- Effectiveness of organizing and coordinating a large, complex project with key stakeholders;
- Technical capacity of implementing partners;
- Effective involvement of financial institutions in the project implementation; and,
- Replication projects that do not match pilot projects' technical and EE performances.

To mitigate the first risk, the project will establish a strong project steering committee (consisting of key governmental authorities including MOF, MOHURD, MOFT and MEP, etc.) and local project steering committees (to be led by local wall-material offices that are in charge of EE brick production and replication, or offices that are in charge of the "Building a New Socialist Countryside" campaign) to facilitate the project implementation. At the same time, various measures will also be taken to facilitate the collaboration between the stakeholders, including the full use of the existing SME networks and the rural energy service system established by the MOA, plus the sound relationship with concerned governmental authorities at various levels established by the previous UNDP-GEF TVE project.

As to the technical capacity of MOA, this agency will strengthen its project management capacity by setting up a technical advisory committee consisting of prominent experts to enhance the project management and provide technical support to the PMO. In order to strengthen the project implementation capacity of local partners, extensive training will be conducted through the implementation of relevant project activities which will specially target the various stakeholders' roles and their special needs for capacity enhancement in the project implementation and to the successful achievement of the project goal.

The project preparation team believes that the active and effective involvement of financial institutions in the project is one of the major risks faced by the project. Based upon the consultation with GEFTVEII participants on the lessons of developing and operating rural EE financial mechanisms, which is one of the major components of TVEII project, and through the investigation and discussion with local governments, developers, brick manufactures, as well as financial experts, the project intend to address this risk through the following strategy:

- The investigation revealed that the most pivotal and active financial institutions in new rural construction campaign and rural brick production are the ones rooted in local economy, such as Rural Credit Cooperatives (RCCs). According to the investigation, unlike other national financial institutions, (ABC, for example) the RCCs are locally and collectively owned (at county level and below), their major business are related with local economic activities (80% or more in terms of loan balance), and were strongly influenced by the local governments.

- The project will specially target these local financial institutions with specially designed capacity building and information dissemination activities to address their particular needs and requirements;

- The project will carefully select the demonstration and replication sites where local governments and local RCCs are having a strong bond in promoting new rural construction and EE activities.

Unlike the demonstration projects, due to the much larger magnitude of the replication activities, and relatively less financial support from the project, the project will hard to apply hands on management on replication projects, which may bring such consequences as less performed EE achievements as what demonstrations likely to accomplish. In order to deliver quality management and implementation results of the replication projects, the project plan to use the 1 million USD budget from the TVEII RCF, which has been transferred by GEF/UNDP to Chinese government, in the TA activities related with replication projects. With the help of the additional fund, and through careful design, the project will:

- Under the leadership of Technical Advisor Committee, the detailed successful criteria will be developed and applied in the site-selection process, which will include the technical EE performance specification on EE brick products and EE buildings;

- Based upon investigation and survey, conduct extensive and special target training and capacity building activates in the replication sites to address the technical and administrative incapability; the project will mobilize quality technical expertise and personnel to provide technical assistance in feasibility study and detailed engineering planning and operation;

- Commit more than that in PPG document: 1) the EE performance and ES/GHG reduction of the replications will be included into the project LFA; 2) the M&E plan will be developed to specially focus on the effective technical and institutional procedures of EE performance M&E; 3) local training program and institutional arrangement (by taking the full advantage of MOA's national rural energy and environmental network) will be developed and put into place to assist PMO in day-to-day M&E activities and data documentation.

The different risks that were identified during the MTEBRB formulation exercise and the recommended mitigation measures are the following:

Table 16: Summary of Risk Mitigation Measures for the MTEBRB

Risk	Severity	Mitigation Strategies
Market and Financial		
Public acceptance of EE buildings and EE bricks.	L	Special target public awareness and information dissemination program
Demonstrations		
EE bricks may not be well accepted by the market	L	Carefully selected demonstration and replication sites where market investigation showed the promising market acceptance Hands-on TA activities to improve the quality of products
Not effective involvement by financial institutions in the project implementation	L	Detailed investigation and financial arrangements for pilot projects under the assistance of local government Specially target local financial institutions such as local Credit Collective Groups
Funds may become available too late to perform desired level of planning	L	Advance from GEF prior to formal approval
Timely availability of construction finance for demonstration and replication projects	L	Careful identification process includes consultation meetings with local financial institutions, and local governments. Capacity building and knowledge sharing

Risk	Severity	Mitigation Strategies
		activities focused on local financial institutions
Policy and Institutional		
Poor coordination of key decision-makers	M	Active involvement of all major key stakeholders in the project designing phase Project Steering Committee that includes all key partners at both central and local levels
Lack of commitment by central and local governments	L	Carefully designed project objectives, components and activities fully consistent with long term governmental priorities in energy conservation and rural construction Pay significant attention to the local governments' track records of commitment to the rural EE and new rural construction activities
Technical incapability of project implementation	L	Setting up of Technical Advisory Committee consists of leading experts in relevant to the project activities Extensive and specific target trainings to the major stakeholders at local level Other capacity enhancement and technical assistance activities
Technical		
Replication projects can't match up the demonstration projects in product quality and EE performance	M	Sufficient information exchange and knowledge sharing Extensive and carefully designed training and capacity building activities
Unable to decide the real ES and GHG results	L	Well developed baseline data Complete M&E plan and effective implementation in both pilots and replications Training and capacity building for local partners
OVERALL	**Medium**	

The above risks have been rated according to perceived severity, and mitigating strategies have been developed as shown in the table above. Overall the Project Risk Rating can be categorized as Medium, although substantial institutional risks are present, particularly the risk of inter-agencies coordination.

At the inception stage of MTEBRB the project risks and assumptions will be reviewed, and where necessary additional project risks will be identified. In addition, also as part of the project inception activities, a detailed risk management strategy for project implementation will be prepared.

Part V: Monitoring & Evaluation Plan and Budget

The following summarizes the annual targets for high-level success indicators that will be monitored to gauge the effectiveness and impacts of the MTEBRB. More detailed indicators for each project activity are shown in the Project Planning Matrix (Part II)

Table 17: Annual Targets for Project Outcomes

Success Indicators	Annual Targets				
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
GOAL					
GHG emission reductions, ton CO_2/yr	0	0	0	118193	118476
OBJECTIVE					
ES (tce/yr)	0	0	0	47467	47581
EE brick market share (%)	0	0	0	10%	20%
EE building market share (%)	0	0	0	10%	20%
Component 1: Information Dissemination and Awareness Enhancement					
people reached	500	500	10000	100000	889000
Information system			Functioning		
Media products	0	0	1	2	2
Component 2: Policy Development and Institutional Support					
Policy proposal			to MOA	to other GOC branches	
Standard, code		1 EE brick standard in place			1 rural EE building code in place
Action plans		1	3	3	3
Component 3: Finance Support & Accessibility					
Banks involved	2	5	5	10	18
Commercial funds (million RMB)		1	5	10	34
Component 4: Demonstration and Technology Support					
Pilot projects completed			16		
Replication projects completed				30	30
EE Bricks (10000 pieces/yr)		10000	30000	50000	50000
EE buildings (M^2/yr)		4000	12000	80000	80000
No of people trained	100	200	200	310	

Monitoring Plan

The following table summarizes the monitoring plan for the high-level success indicators of the MTEBRB

Table 18: Monitoring Plan for MTEBRB

Success Indicators	Targets (EOP)	Means of Verification	Sampling Frequency	Location
GHG emission reductions (ton/yr)	118,476	Monitoring and measurement reports by M&E teams and local project teams to PMO PMO field visits	Annually, starting with year 3	Demonstration and replication regions
Energy savings (tce/yr)[70]	47,581	Same as above	Same as above	Same as above
Improvement in % market share	20%	Same as above	Same as above	Same as above
People reached by dissemination program (million)	1	TV broadcasting PMO and local project teams documentation;	Same as above	PMO
Information system (no. of operational locations)	76 project locations	PMO and local teams documentation and field visits	Same as above	PMO, demonstration and replication regions
Media products	5 CDs and TV programs produced and aired	TV broadcasting; PMO and local project teams documentation;	Same as above	PMO
Policy proposal	proposed and incorporated in GOC action plan	Governmental official documentation	Same as above	PMO
EE Bricks and EE Building Standard and Code	1 EE brick standard and 1 rural EE building code adopted	Governmental official documentation	Same as above	PMO
Banks involved in financing EE brick making and EE building developments	40 local banks	PMO and local project teams documentation and field visits Banks commercial records	Same as above	PMO, demonstration and replication regions

[70] The target % improvement in energy efficiency in targeted rural buildings by EOP is 30%. The target % improvement in energy efficiency in targeted rural brick makers by EOP is 20%. Both of these apply to pilot and replication projects

Success Indicators	Targets (EOP)	Means of Verification	Sampling Frequency	Location
Commercial loans for EE bricks and EE building projects (million RMB)	50	Same as above	Same as above	PMO, demonstration and replication regions
Pilot projects	16 projects built	Monitoring and measurement reports by M&E teams and local project teams to PMO PMO field visits	Same as above	PMO, demonstration sites
Replication projects	60 project built	Same as above	Same as above	PMO, replication sites
EE bricks produced (10000/yr)	140000	Same as above	Same as above	PMO, demonstration and replication regions
EE buildings (m^2)	176000	Same as above	Same as above	PMO, demonstration and replication regions
People trained	810	PMO and local project teams documentation	Same as above	PMO, demonstration and replication regions

Monitoring & Evaluation Budget

The following table summarizes the budget for the various monitoring & evaluation (M&E) activities that will be carried out to manage and gauge the effectiveness of the MTEBRB implementation. The table also shows the parties responsible for each M&E activity and the time frame of each activity.

Table 19: M&E Budget for MTEBRB Project

Type of M&E Activity	Responsible Parties	Budget US$	Time Frame
Inception Workshop (IW)	• Project Manager • UNDP-China • UNDP/GEF	Part of PM Budget	Within first 2 months of project start up
Inception Report (IR)	• Project Team • UNDP China • UNDP/GEF	Part of PM Budget	a) Draft IR available before IW b) Final IR available immediately following IW
Measurement of Means of Verification	• Project Manager • Project team members	50,000	throughout the implementation period of the project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis) [71]	• Oversight by UNDP-GEF Technical Advisor and PM • Measurements by MOA field officers	50,000	throughout the implementation period of the project
APR and PIR	• Project Team • UNDP China • UNDP-GEF	Part of PM Budget	Annually
Tri-Partite Review (TPR) and TPR report	• GOC Counterparts • UNDP China • Project team • UNDP-GEF RCU	Part of PM Budget	Every year, upon receipt of APR
PSC Meetings	• Project Manager • UNDP China	Part of PM Budget	Following Project IW and subsequently at least once a year
Periodic status reports	• Project team	Part of PM Budget	To be determined by Project team and UNDP China
Technical reports	• Project team • Hired consultants as needed	Part of PM Budget	To be determined by Project Team and UNDP China
Mid-term External Evaluation	• Project team • UNDP- China • UNDP-GEF RCU • External Consultants	35,000	At the mid-point of project implementation.

[71] The elaboration of the M&E plan will be carried out by the PMO during the inception phase of the project. The main bases of the M&E plan are the success indicators for the goal, objective, outcomes and outputs in the Project Planning Matrix (PPM or Log Frame). Such indicators will be monitored and evaluated during the course of project implementation. The annual targets in Table 17 will be useful in the annual performance evaluation as to the extent of achieving the set targets. Specific surveys and studies will be designed and implemented during the project to track these and other indicators of project impact. For the demonstration and replication projects, specific M&E procedures will be designed and used. Such procedures shall focus on specific performance parameters that were studied and information gathered during the PPG exercise, as well as on the assumptions for these parameters that were used in estimating the potential energy savings and CO2 emission reductions from the various pilot and replication projects that will be carried out under the project.

Type of M&E Activity	Responsible Parties	Budget US$	Time Frame
Final External Evaluation	• Project team • UNDP China • UNDP-GEF RCU • External Consultants	35,000	At the end of project implementation
Terminal Report	• Project team • UNDP China • External Consultant	Part of PM Budget	At least one month before the end of the project
Lessons learned	• Project team • UNDP China • UNDP-GEF RCU	Part of PM Budget	Annually
Audit	• UNDP China • Project team	30,000	Annually
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	• UNDP China • UNDP-GEF RCU (as appropriate) • Government representatives	Part of PM Budget	Annually
TOTAL indicative COST *Excluding project team staff time and UNDP staff and travel expenses*		200,000	

Part VI: Assumptions and Calculation of Baseline and Alternative Scenarios

Table 20: TC/T713-2009 Brick Making Energy Use National Standard

Process & Kiln Type	Energy Consumption per ton Brick	
	Heat (kJ)	Electricity (kWh)
Artificial dry, Circular	1,590,000	12.4
Artificial dry, Tunnel	1,780,000	13.6

Source: Xian'an Wall Material Research and Design Institute (XWMRDI), 20
Note: Heat consumption refers to all fuels used excluding electricity

Table 21: Clay Brick Product Specifications

Type of Brick	Unit Weight, kg	Vacuum Ratio, %
Solid Brick	2.5	0%
Perforated Brick	1.88	25%
Hollow Brick	1.50	40%
EE Perforated Brick	1.70	32%
EE Hollow Brick	1.375	45%

Source: Survey and investigation by XWMRDI during the project PPG exercise.

Table 22: Profile of Pilot and Replication Brick Plants

Kiln Type	Clay Brick Product Type	Annual Production Rate (10,000)	Plant Life Time, years	No. of Pilot Plants	No. of Replications
Circular	EE Perforated	5,000	20	2	0
Circular	EE Perforated	5,000	20	0	8
Tunnel	EE Perforated	5,000	20	6	0
Tunnel	EE Perforated	5,000	20	0	12

Notes: Baseline for Circular kilns is solid clay brick production (0% VR)
Baseline for Tunnel kilns is perforated brick production (25% VR)
Source: Survey and investigation by XWMRDI during the project PPG exercise.

Table 23: One Typical Tunnel Kiln Demonstration Project (Henan)

Particulars	Baseline Scheme	Alternative Scheme
Kiln Type	Tunnel	Tunnel
Annual Production (10,000)	5,000	5,000
Product	Perforated Brick	EE Perforated Brick
Vacuum Ratio	25%	32%
Energy Consumption & CO2 Emissions (per ton solid bricks)		
• Coal (KJ)	1,780,000	1,780,000
• Coal (kgce)	60.81	60.81
• Electricity (KWh)	13.60	13.60
• Total (kgce)	66.31	66.31
Energy Consumption & CO2 Emissions (per 10,000 pieces product)		
• Total (kgce)	1,243.22	1,127.19

Particulars	Baseline Scheme	Alternative Scheme
• Coal (kgce)	1,140.20	1,033.78
• Electricity (kWh)	255.00	231.20
Total Annual Energy Consumption		
• Total (tce)	6,216.1	5,635.9
• Coal (tce)	5,701.0	5,168.9
• Electricity (KWh)	1,275,000	1,156,000
Total CO2 emissions, Tons CO2/yr	15,478.08	14,033.46
Energy Savings & CO2 Emission Reductions from Use of Alternative Scheme		
• Energy Savings , tce/yr	-	580.17
• CO2 Emission Reduction, tons/yr	-	1,444.62
• Lifetime Energy Savings, tce	-	11,603.38
• Lifetime CO2 Emissions Reduction, tons	-	28,892.42
Unit Energy Savings & CO2 Emission Reduction (per 10,000 bricks)		
• Tons of Coal Equivalents	-	0.116
• Tons CO2	-	0.289

Source: Survey and investigation by XWMRDI during the project PPG exercise.

Table 24: One Typical Circular Kiln Demonstration Project (Gansu)

Particulars	Baseline Scheme	Alternative Scheme
Kiln Type	Circular	Circular
Annual production (10,000)	5,000	5,000
Product	Solid clay	EE Perforated Brick
Vacuum Ratio	0%	32%
Energy Consumption & CO2 Emission (per ton solid bricks)		
• Coal (KJ)	1,590,000	1,590,000
• Coal (kgce)	60.81	60.81
• Electricity (KWh)	12.40	12.40
• Total (kgce)	66.31	65.82
Energy Consumption & CO2 Emission (per 10,000 bricks)		
• Total (kgce)	1,645.51	905.03
• Coal (kgce)	1,520.27	836.15
• Electricity(kWh)	310.00	170.50
Total Annual Energy Consumption & CO2 Emissions		
• Total (tce)	8,227.5	4,525.1
• Coal (tce)	7,601.3	4,180.7
• Electricity (KWh)	1,550,000	852,500
• CO2 Emissions (tCO2)	20,486.55	11,267.60
Annual Energy Savings & CO2 Emission Reductions		
• Energy (tce)		3,702.39
• CO2 Emissions (tCO2)		9,218.95
• Lifetime Energy Savings (tce)		7,4047.75
• Lifetime CO2 Emission Reductions (tCO2)		184,378.91
Unit Energy Savings & CO2 Emission Reductions		
• Tons of Coal Equivalents		0.7405

Particulars	Baseline Scheme	Alternative Scheme
• Tons CO2	1.844	

Source: Survey and investigation by XWMRDI during the project PPG exercise.

Table 25: Calculated Direct Emission Reductions from EE Brick Production Projects[72]

Particulars	Pilot Projects	Replication Projects	Total
Lifetime Energy Savings (tce)	217,716	731,623	949,338
Lifetime CO2 Emission Reductions	542,112	1,821,740	2,363,853
Unit Abatement Cost (GEF$/ton CO2			2.96

Table 26: Indirect CO_2 Emission Reductions from EE Brick Projects[73]

Particulars	Value	Remarks
Assumptions		
Impact Period	10	As per GEF Manual
Number of Brick Plants Impacted per Year		
• Circular	10	More difficult to improve products in circular kilns
• Total Circular Kilns	100	Annual production = 50 million pieces/plant
• Tunnel	40	Considered best practice for EE brick production
• Total Tunnel Kilns	400	Annual production = 50 million pieces/plant
• Total Brick Plants Impacted	500	This represents 2.5% of the national annual brick production output of about 1 trillion pieces
Indirect CO2 Emission Reduction Estimations		
Replication Factor	3	Bottom-up Approach; Replication factor is based on market transformation and demonstration interventions carried out during the MTEBRB project.
P10 Potential CO2 Emission Reduction, tons	30	Estimated for the anticipated impacted brick plants
GEF Causality Factor	0.8	Top-Down Approach: Conservative estimate for the anticipated impacted plants

Table 27: EE Buildings Major Data & Assumptions

Particulars	Data/Assumption
Building Lifetime, yr	50
Energy Saving Goal due to GEF Intervention	30%[74]
Year when indoor temperature meets national standards	Year 20
National Standards:	

[72] According to GEF methodology, the direct ES and CO2 reductions are the cumulative over the lifetime of the demonstration and replication projects.

[73] According to GEF methodology, the influence period will be 10 years. And across the influence period, the cumulative indirect CO2 emission reduction over the lifetime of the influenced investments has been calculated by using the "Top-down" method. The Casualty factor is less than 3 %.

[74] The ES goal is determined based on EE building experts' on-site investigation and calculation based on the current building models, wall materials, building thermal specifications and the suggested demonstrations' wall material and building models' thermal characteristics. Based upon the above information, EE building experts used the simulation software calculated the possible energy savings could be achieved by the GEF intervention.

Particulars	Data/Assumption
Winter Indoor Temperature, ^{O}C	18
Winter: Share of Energy Carriers	Firewood/Biogas = 20%
	Coal = 80%
	Electricity = 0%
Summer Indoor Temperature, ^{O}C	26
Summer: Share of Energy Carriers	Electricity = 100%

Source: PPG Exercise investigation and field visits.

Table 28: Rural Building Survey Baseline Data

Particulars	Severe Cold Zone (Jilin)	Cold Zone (Gansu)	Hot Summer-Cold Winter Zone (Anhui)
House Floor Area, m2	100	100	100
Total Energy Consumption (kgce/m2/yr)	0.504	4.235	5.499
Winter (coal & electricity, kgce/m2)	0.504	4.235	2.905
• Firewood (kg/m2)	40.4	0	0
• Coal (kg/m2)	0.72	6.05	4.15
• Biogas (m3/m2)	0.87	0	0
• Electricity. (kWh/m2)	0	0	0
Summer (kgce/m2)	0	0	2.594
• Electricity (KWh)	0	0	6.42

Source: PPG Exercise survey and field visits.

Table 29: EE Building Baseline and Alternative Scenario

Project Site	SCZ (Jilin)	CZ (Gansu)	HSCWZ (Anhui)
Baseline Scheme			
• Total	45	45	40
• Winter	45	40	20
• Summer	0	5	20
Alternative Scheme			
• Total	31.5	31.5	28
• Winter	31.5	28	14
• Summer	0	3.5	14

Baseline Scheme: Energy usage (kgce/m2/yr) when meeting indoor temperature standard at year 20; Note: Linear growth trend from Years 1 to 20.
Alternative Scheme: Energy usage (kgce/m2/yr) when meeting indoor temperature standard at year 20; Note: Linear growth trend from Years 1 to 20.

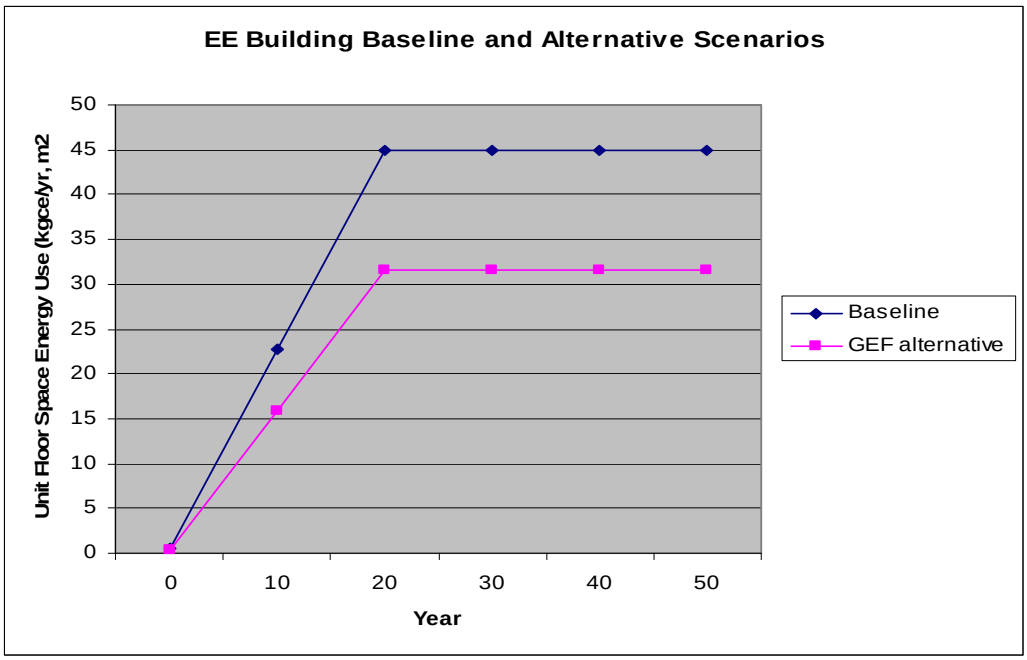
Table 30: EE Building Pilot and Replication Project Profile

No of Demonstration Houses	20
No of Demonstration Villages	8
• Severe cold zone	1
• Cold zone	3
• Hot summer cold winter zone	4

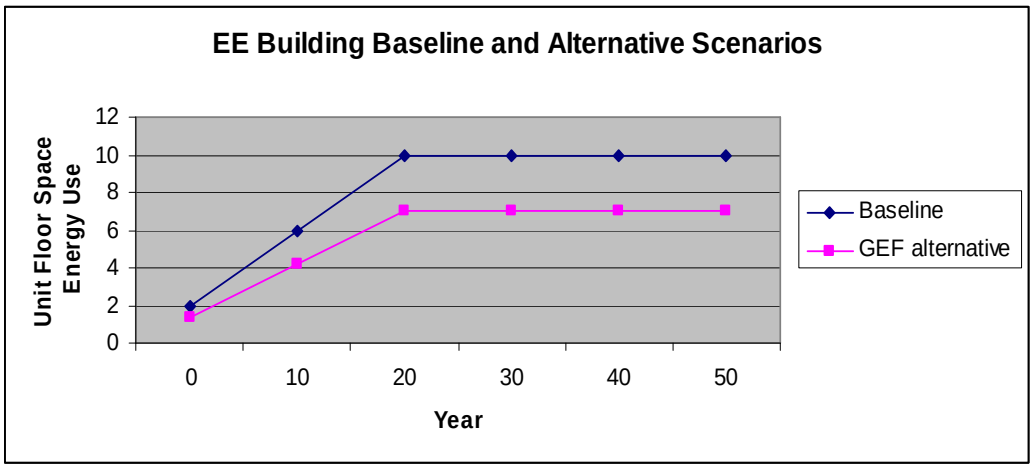
No of Replication Houses	40
No of Replication Villages	40
• Severe cold zone	20
• Cold zone	15
• Hot summer cold winter zone	5
Floor area m2/house (for replication and pilot)	100

Source: PPG Exercise survey and field visits.

Fig. 3: EE Building Baseline and Alternative Scenario[75]



Source: Survey Results from Jilin Province.



[75] Based upon EEB experts experience and estimation, it is assumed that by year 20 the indoor temperature will meet the national standards, before that, the indoor temperature and energy use will increase linearly, after year 20, the in-door temperature and energy use will keep at the constant level. Throughout the lifetime of the sub-project (year 0 to year 50), the for unit floor space energy use for GEF alternative scenario will be 70% as much as baseline scenario as described in Table 26.

Table 31: Typical EE Building Project in Severe Cold Zone (Jilin)

Particulars	Baseline Scheme	Alternative Scheme
Year 1 to 20		
Specific Energy Use (kgce/m2)	364	255
Total Energy Use (tce)	728	510
Energy Savings ex Alternative Scheme (tce)	-	218
CO2 Emission Reductions ex Alternative Scheme (tCO2)	-	544
Year 21 to 50		
Specific Energy Use (kgce/m2)	1,080	756
Total Energy Use (tce)	2,160	1,512
Energy Savings ex Alternative Scheme (tce)	-	648
CO2 Emission Reductions ex Alternative Scheme (tCO2)	-	1,614
Lifetime Energy Savings & CO2 Emission Reductions		
• Tons of Coal Equivalents	-	866
• Tons CO2	-	2,157

Source: PPG Exercise survey and field visits.

Table 32: Typical EE Building Project in Cold Zone (Gansu)

Particulars	Baseline Scheme	Alternative Scheme
Year 1 to 20		
Specific Energy Use (kgce/m2)	394	276
Total Energy Use (tce)	788	551
Energy Savings ex Alternative Scheme (tce)	-	236
CO2 Emission Reductions ex Alternative Scheme (tCO2)	-	588
Year 21 to 50		
Specific Energy Use (kgce/m2)	1,080	756
Total Energy Use (tce)	2,160	1,512
Energy Savings ex Alternative Scheme (tce)	-	648
CO2 Emission Reductions ex Alternative Scheme (tCO2)	-	1,614
Lifetime Energy Savings & CO2 Emission Reductions		
• Tons of Coal Equivalents	-	884
• Tons CO2	-	2,202

Source: PPG Exercise survey and field visits.

Table 33: Typical EE Building Project in Hot Summer-Cold Winter Zone (Anhui)

Particulars	Baseline Scheme	Alternative Scheme
Year 1 to 20		
Specific Energy Use (kgce/m2)	364	255
Total Energy Use (tce)	728	510
Energy Savings ex Alternative Scheme (tce)	-	218
CO2 Emission Reductions ex Alternative Scheme (tCO2)	-	544
Year 21 to 50		

Particulars	Baseline Scheme	Alternative Scheme
Specific Energy Use (kgce/m2)	960	672
Total Energy Use (tce)	1,920	1,344
Energy Savings ex Alt. Scheme (tce)	-	576
CO2 Reductions ex Alt. Scheme (tCO2)	-	1,434
Lifetime Energy Savings & CO2 Emission Reductions		
• Tons of Coal Equivalents	-	794
• Tons CO2	-	1,978

Source: PPG Exercise survey and field visits.

Table 34: Direct CO_2 Emission Reductions for EE Building Projects

Particulars	Quantity
Demonstrations	
Energy Savings (tce)	6,697
CO2 Emission Reductions (tons)	16,675
Replications	
Energy Savings (tce)	69,131
CO2 Emission Reductions (tons)	172,135
TOTAL	
Energy Savings (tce)	75,828
CO2 Emission Reductions (tons)	188,811

Table 35: Indirect ES & CO_2 Emission Reductions for EE Buildings[76]

Particulars	Quantity
Impact Period (yrs)	10
No of houses per village @ 100 m^2 floor area/house	100
No of villages impacted per year	300
• Hot Summer-Cold Winter Zone	50
• Cold Zone	100
• Severe Cold Zone	150
Bottom-Up Approach	
Direct CO2 Emission Reduction, Mtons	0.19
Replication Factor	3
Indirect CO2 Emission Reduction, Mtons	0.57
Top-Down Approach	
Potential Energy Savings (P10), Mtons	12.91
• Hot Summer-Cold Winter Zone	1.99
• Cold Zone	4.42
• Severe Cold Zone	6.50
Potential CO2 Emission Reduction (P10)	32.14
GEF Causality Factor	0.2
Indirect CO2 Emission Reduction, Mtons	6.43
Indirect CO2 Emission Reduction Range, Mtons	0.57 – 6.43

[76] According to the GEF methodology, the influence period is 10 years. Replication factor is 3, which corresponds to MTEBRB interventions on market transformation and demonstrations. The estimated GEF Causality Factor is 0.2.

Annex A: List of EE Brick Making Technology Application Demonstrations

Demo Project Location	Demonstration Project	Production Capacity (10,000/yr)	Energy Consumption (tce/yr)	Investment Cost, US$	Expected Annual Energy Savings (tce/yr)	Brief Description
Jilin	Application of Tunnel Kiln Technology	5000	6216.1	882,353	580.17	Renovation of existing kiln and replacement of existing extruders for producing low EE bricks; New production process and raw material treatment to adopt coal gangue to produce EE bricks Private brick making plant
Hebei	Application of Tunnel Kiln Technology	5000	6216.1	882,353	580.17	Renovation of existing kiln and replacement of existing extruders for producing low EE bricks; New production process and raw material treatment to adopt coal gangue to produce EE bricks Private brick making plant.
Gansu	Application of Circular Kiln Technology	5000	8227.5	294,118	3702.39	Renovation of existing brick kilns and extruders, new production process; Privately owned brick making plant.
Shan'xi	Application of Circular Kiln Technology	5000	8227.5	294,118	3702.39	Renovation of existing brick kilns and extruders, new production process; Privately owned brick making plant.
Henan	Application of Tunnel Kiln technology	5000	6216.1	882,353	580.17	Renovation of existing kiln and replacement of existing extruders for producing low EE bricks; New production process and raw material treatment to adopt coal gangue to produce EE bricks Private brick making plant.
Sichuan	Application of Tunnel Kiln technology	5000	6216.1	882,353	580.17	Renovation of existing kiln and replacement of existing extruders for producing low EE bricks;

Demo Project Location	Demonstration Project	Production Capacity (10,000/yr)	Energy Consumption (tce/yr)	Investment Cost, US$	Expected Annual Energy Savings (tce/yr)	Brief Description
						New production process and raw material treatment to adopt earthquake debris to produce EE bricks Private brick making plant.
Anhui	Application of Tunnel Kiln technology	5000	6216.1	882,353	580.17	Renovation of existing kiln and replacement of existing extruders for producing low EE bricks; New production process and raw material treatment to adopt industrial wastes to produce EE bricks Private brick making plant.
Zhejiang	Application of Tunnel Kiln technology	5000	6216.1	882,353	580.17	Renovation of existing kiln and replacement of existing extruders for producing low EE bricks; New production process and raw material treatment to adopt paper mill slurry to produce EE bricks Private brick making plant.

Annex B: List of EE Residential Building Technology Application Demonstrations

Demo Project Location	Climate Zone	Number of Houses	Floor space per house, m^2	Expected Lifetime Energy Savings (tce)	Brief Description
Chenjidian Village, Jilin	Severe Cold	20	100	866	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.
Qinyang Village, Hebei	Cold	20	100	884	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building

Demo Project Location	Climate Zone	Number of Houses	Floor space per house, m^2	Expected Lifetime Energy Savings (tce)	Brief Description
					standards currently applied in urban areas.
Zhoujiahe Village, Gansu	Cold	20	100	884	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.
Siwei Village, Shan'xi	Cold	20	100	884	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.
Chaochuan Village, Henan	Hot Summer, Cold Winter	20	100	794	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.
Cigou Village, Sichuan	Hot Summer, Cold Winter	20	100	794	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.
Chen Village, Anhui	Hot Summer, Cold Winter	20	100	794	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.
Pinghu Village, Zhejiang	Hot Summer, Cold Winter	20	100	794	New EE architectural design and application of EE bricks to build EE houses that satisfies national EE building standards currently applied in urban areas.

SIGNATURE PAGE

Country: China

UNDAF Outcome(s)/Indicator(s):
By the end of 2010, more efficient management of natural resources and development of environmentally-friendly behavior to ensure environmental sustainability (with special focus on energy, biodiversity and water resources)

Expected Outcome(s)/Indicator (s):
End-use energy efficiency and application of new and renewable energy technologies improved

Expected Output(s)/Indicator(s):
Energy consumption per unit GDP decreased

Implementing partner: Ministry of Agriculture

Programme Period: 2008 – 2014 Programme Component: Environment and Energy Project Title: Market Tranformation of Energy Efficiency Bricks and Rural Buildings Project ID: 00059500 (PIMS 3675) Project Duration: 5 years Management Arrangement: NEX	Total budget: $52,362,118 Allocated resources: • GEF $7,000,000 • Government $38,744,472 • Private Sector $6,617,646 • Other: o Donor _____ o Donor _____ o Donor _____

Agreed By: Government of China

Signature _____ Date _____ Title Director General

Agreed By: Ministry of Agriculture, China

Signature _____ Date _____ Title Director General

Agreed By: UNDP

Signature _____ Date 04 MAY 2010 Title _____