

United Nations Development Programme

Country: MONGOLIA

PROJECT DOCUMENT



Project Title: Energy Efficiency in New Construction in the Residential and Commercial Buildings Sector in Mongolia

UNDAF Outcome(s): A holistic approach to environmentally sustainable development is promoted and practiced for improving the well-being of rural and urban poor.

UNDP Strategic Plan Environment and Sustainable Development Primary Outcome: Strengthened national capacities to mainstream environment and energy concerns into national development plans and implementation systems

UNDP Strategic Plan Secondary Outcome: Countries develop and use market mechanisms to support environmental management

Expected CP Outcome(s): **CP Outcome 7:** Access to energy options for poor households increased.

Expected CPAP Output (s)

- 7.1 Government has pro-poor, energy efficiency policies and planning, and is able to implement them at all levels
- 7.2 Appropriate technologies for renewable energy and cleaner and safer use of coal promoted with greater access for the poor
- 7.3 National capacity for interventions towards clean development mechanisms and for access financing through Kyoto Protocol strengthened

Executing Entity/Implementing Partner: Ministry of Construction and Urban Development

Implementing Entity/Responsible Partners: UNDP Mongolia, UNDP Korea, KHAS Bank of Mongolia

Brief Description

The project will contribute to the reduction of greenhouse gas emissions through the transformation of the Mongolian residential and commercial buildings market towards more energy-efficient building technologies and services, sustainable private house insulation and energy efficiency financing mechanisms. With successful completion of the barrier removal and other capacity building and technical assistance activities that will be implemented, as well as the EE investments, it is expected that about 63,000 tonnes of CO₂ will be cumulatively avoided over a 20 year period.

Programme Period:	2007-2011
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Project ID:	00070071
PIMS #	3571
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End Date	Dec 31, 2013
Management Arrangements	NEX
PAC Meeting Date	Apr 16, 2009

Total resources required	USD 3,815,000
Total allocated resources:	USD 3,815,000
• Regular	USD 300,000
• Other:	
o GEF	USD 975,000
o KEMCO	USD 340,000
o XaBank Mongolia	USD 2,000,000
o Government (in-kind)	USD 50,000
o GTZ (in-kind)	USD 150,000

Agreed by:

Ministry for Construction and
Urban Development

UNDP Mongolia

Kh. Battulga, Minister

Debora Comini, Resident Representative

Date: _____

Date: _____

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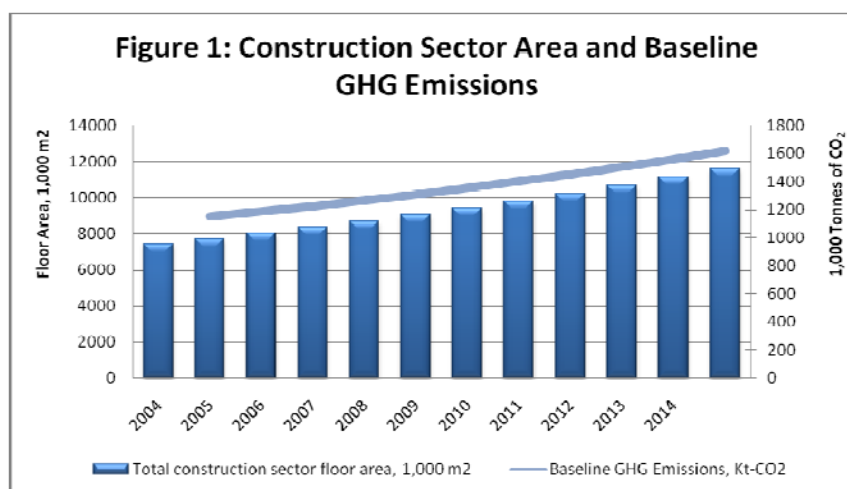
LIST OF ACRONYMS

ADB	Asian Development Bank
ADRA	Adventist Development and Relief Agency
Aimag	Province center in Mongolia
BCNS	Building Code, Norms and Standards (System)
BEEP	Building Energy Efficiency Project (this project by UNDP GEF)
CDIA	Cities Development Initiative for Asia (supported by ADB and GTZ)
CDM	Clean Development Mechanism, a Kyoto Protocol flexibility mechanism
Ceramazit	Ground ceramic (gravel) used as insulation in light concrete panel system
CHP	Combined Heat and Power (plants)
DNA	Designated National Authority (for CDM purposes)
EBRD	European Bank for Reconstruction and Development
ECC	Energy Conservation Center
EE	Energy Efficiency
EPC	Energy Performance Contract
EPS	Expanded Polystyrene Sheet (insulation), also called Styrofoam and polystyrene
ESCO	Energy Service Company
FMO	The Netherlands Development Finance Company
GEF	Global Environment Facility
<i>ger</i>	Traditional Mongolian round nomadic family felt tent
<i>ger</i> area	Areas with a mix of <i>ger</i> and private houses
GHG	Greenhouse Gases
GTZ	German Technical Cooperation (Agency)
HOB	Heat Only Boilers
HVAC	Heating, Ventilation and Air-Conditioning
KFW	Kreditanstalt für Wiederaufbau
MDG	Millennium Development Goals
MACE	Mongolian Association of Civil Engineers (an NGO)
MECS	Ministry of Education, Culture and Science
MCUD	Ministry of Construction and Urban Development
MMRE	Ministry for Mineral Resources and Energy
MNE	Ministry of Nature and Environment
NEW 21	No Energy Wastage in 21 st Century
NGO	Non-Governmental Organization
PDF	Project Development Facility
PEESS	Provision of Energy Efficient Social Services (MON/97/301)
SBB	Straw Bale Building
SEC	Specific Energy Consumption
Soum	Local Administrative Center in rural area of Mongolia (322 in total)
TRV	Thermostatic Radiator Valve
Tugric	Mongolian National Currency (1USD=1480 Tugric at April 2009)
UB	Ulaanbaatar (with 80% of urban residents and 40% of population of Mongolia)
UB CG	Ulaanbaatar City Government
UDCP	(Integrated) Urban Development, Construction sector and VET Promotion program (GTZ)
UNOPS	United Nations Operational Program Service
VET	Vocational Education and Training
WB	World Bank

1. SITUATION ANALYSIS

Mongolian Building Sector

In 1990, after nearly four decades of central planning based on the Soviet model, Mongolia opted for a market-led economy. After a volatile period of transition in the 1990s that featured high inflation and unemployment, the economy has grown rapidly over the past decade. Since 2004, real GDP has expanded by an average of 9% per year. The construction sector has picked up strongly in recent years, driven by property development in Ulaanbaatar in particular, and by infrastructure projects around the country. In 2005 the construction sector expanded by 15.5%, slowing to 5% growth in 2006. Figure 1 below shows the steady growth (and projected growth) in area of commercial and residential buildings in Mongolia. While the economic crisis has temporarily hampered construction projects, the long-term trend of continued growth in this sector is clear. Another important trend is urbanization. The urban population of Mongolia comprises 1.6 million people or over 60% of the total population.



Due to its heavy reliance on coal for its energy supply, Mongolia has one of the most GHG-intensive economies in the world. Consequently, there is tremendous potential for GHG savings by introducing energy efficiency measures in important and emerging economic sectors such as the residential and commercial buildings sector. In light of the eight month heating season in Mongolia, heating is the primary building energy demand and coal is the main heating fuel in urban areas, as Mongolia currently has no domestic gas or oil supplies. Construction sector¹ buildings are generally supplied by space heating and domestic hot water from combined heat and power (CHP) plants, or from district heat only boilers (HOB), both burning coal. The apartment and commercial property development underway offers an opportunity to build more efficient buildings than is current normal construction practice in Mongolia.

Mongolia's system of building controls, based on the former Soviet Union's system of building energy efficiency Norms, Regulations and Standards from the 1960-70's, is very outdated and excessively complicated, and hence urgently needs to be completely updated. There are 700 applicable construction norms and standards, of which around a third are still in Russian (with few people under 30 in Mongolia now likely to be able to read Russian), around a third are translated directly from Russian into Mongolian, and only around a third are tailored (to some degree) to Mongolian conditions and published in Mongolian. The BCNS energy efficiency requirements also largely refer to socialist period construction methods and materials that are no longer used.

Around 60% of urban families live in *ger* areas² in a mixture of traditional Mongolian felt tent *ger* and in slightly larger informally constructed private houses that are generally built with minimal levels of insulation and high ventilation heat losses. In *ger* areas, buildings are heated with highly inefficient traditional stoves. This inefficient use of heating energy significantly contributes to the extremely bad winter ambient air quality that poses a serious threat to human health in urban areas of Mongolia, particularly in Ulaanbaatar city. Both *ger* and small private houses are estimated to use on average around 5 tons of coal and 1.5 tons of (mostly unsustainable) fuel wood per year for fuel (large private houses use around 10 – 15 tons of coal per year and around 2.5 tons of fuel

¹ In the Mongolian context, "construction sector" refers to heavyweight, multi-storey commercial and residential apartment buildings (and a few private houses), since these are the only buildings connected to water supply, sewage, district heating and domestic hot water systems. Forty percent of the urban population lives in multi-storey buildings.

² Ger refers to traditional tent dwellings in Mongolia.

wood), most in the winter and mostly for space heating. As a result, on average, national air quality standards for SO₂ are exceeded by a factor of two and by more than five times on some winter days.³

A combination of extreme winter conditions, a long heating season of eight months, very low existing heating energy supply system efficiencies, inadequate metering and tariff structures, and generally inadequate building insulation levels and quality are major contributors to Mongolia's extremely high per capita fossil fuel use, which is dominated by heating uses and which is a major cause of serious adverse local and national environmental impacts. Furthermore, lighting constitutes a major electricity load during evening peak hours. Therefore, improved energy efficiency in building lighting systems would reduce peak electricity demands, and consequently, the need for future electricity generation, transmission and distribution capacity additions. The current BCNS system does not have any EE requirements for lighting.

1.2 Barrier to Energy Efficiency of Building Sector in Mongolia

1.2.1 Barrier analysis

The main barriers facing the improvement of energy efficiency in the wider Mongolian buildings sectors were identified through the review of key documents, and interviews and discussions with key stakeholders during the BEEP preparatory stage. These main barriers were then discussed and summarized during the logical framework analysis (LFA) workshop. After the LFA workshop, the barriers were then discussed again with key stakeholders to confirm their links to the proposed barrier removal activities under the project. The barriers were then refined and updated in the completion of the BEEP MSP proposal. These updated key building sector energy efficiency barriers are as follows:

1. *The BCNS System is Complex and Outdated.* The Mongolian BCNS system is complex and hard to understand with nearly 700 applicable construction norms and standards, of which around a third are still in Russian (with few people under 30 in Mongolia now likely to be able to read Russian), around a third are translated directly from Russian into Mongolian, and only around a third are tailored (to some degree) to Mongolian construction and energy supply conditions (e.g., no low-cost oil or natural gas available for heating) and published in Mongolian. These BCNS documents are outdated and complex to understand, comply with, and enforce. The BCNS energy efficiency requirements also largely refer to socialist period construction methods and materials that are no longer used (e.g. structural panel buildings and not the modern reinforced concrete with non-structural inset wall insulation system used in Mongolia). So a key barrier is that the current Mongolian BCNS system is well overdue for rationalization and simplification around a more modern, easy to understand and more usable performance-based building controls approach.
2. *Compliance with Current BCNS Energy Efficiency Requirements is Uneven.* The current wall, roof and window ("no-think" schedule) insulation requirements of the "BNaR (Building Norm and Regulations) 2.01.03 Construction Thermo-Technics" appear to be broadly realistic for Mongolia's climate. However, a key barrier is that the critical ground floor, basement and foundation insulation methods and levels are unclear and inadequate, roofs are generally inadequately insulated, and only an estimated 10% of new buildings are fitted with the required (by BNaR) triple glazed performance windows.
3. *The BCNS System is not aligned for Independent Certification.* The BCNS system is not aligned for independent and science-based certification and control of the quality, effectiveness and durability of the multiple private suppliers of building insulation materials, let alone imports, primarily from China. This is a barrier that is holding back the utilization of lower cost and more effective materials that are being developed by, or could be imported by, companies in Mongolia.
4. *Key Insulation Materials are not available.* In the socialist period, good quality mineral wool and fiberglass insulation was manufactured in Mongolia in central factories and was widely used, but the factories closed down as part of the early 1990's economic restructuring. EPS (Styrofoam/Polystyrene) is now the most widely used insulation material but has variable density, thickness, and insulation value and effectiveness levels. Imported mineral wool and fiberglass alternatives to EPS are not commonly used, partly because their insulation values and durability are unclear. Window triple glazing (as required by the current BCNS energy efficiency requirements) and best practice argon gas window insulation is still not common, and low-emissivity window coated windows are not yet available.
5. *Growing Numbers of Energy Inefficient Buildings Being Built.* New construction sector buildings are being built in growing numbers as the Mongolian economy develops, and as Mongolian and foreign capital starts to invest in this sector. The best time to add energy efficiency to buildings is when they are first built, as it is either very costly or impossible to fully retrofit a building with insulation later. So a key barrier is that the

³ National Air Quality Office of Mongolia, <http://www.naqo.mn>

complex and outdated BCNS system and its current imperfect system of enforcement do not lead to most construction sector buildings being built with the mandated levels of insulation, nor does it encourage the use of lower cost or enhanced performance innovative building insulation and cladding materials.

6. *New BCNS System cannot be Simple Copy of another Country's System.* There has been an underlying assumption that the new Mongolian BCNS energy efficiency system and requirements can almost be a copy of another country's requirements and system. However there are significant structural, insulation, materials, rainfall, HVAC system, building controls and enforcement approach and capacity, heating fuels used and heating energy systems differences between Mongolia and other countries. This means that the translation of another country's BCNS energy efficiency system and requirements into a suitable Mongolian language and relevance version is a non-trivial exercise.
7. *Large Private House Owners Lack Knowledge of Energy Efficiency.* There are a small but growing number of large private houses being built in and around urban centers. A key barrier is that these large private houses could afford to install extra insulation and high efficiency smokeless heating systems on a voluntary basis, but these houses are generally not formally designed or controlled to ensure this, and are generally unaware of the benefits of doing this.
8. *Key Construction Techniques Not Known.* For the better quality/higher budget houses in *ger* areas, construction materials usually include 15cm thick solid wood walls, or wooden frames with weatherboard, brick and mud, or plaster external finishes. Insulation levels are generally minimal. A key barrier is that regionally appropriate and available energy efficient construction materials and techniques such as straw bale, engineered timber frame, and modern engineered earthquake designed mud-brick/adobe/rammed earth for the southern Gobi region which lacks straw and construction timber, are not yet fully developed and/or widely accepted.
9. *Housing Mortgage Market Still Developing.* A further barrier is that demand for housing finance outstrips supply so interest rates are high and terms are short and banks tend to favor lending for apartments.
10. *Limited Awareness of Value of Insulation.* A significant barrier is that homeowners and construction workers generally have low awareness of the value of insulation, the alternatives available, nor realistic means to make informed choices about any insulation materials or installation quality.

1.2.2 Addressing the barriers to improved energy efficiency in Mongolian building sector

The project focus will be on removing barriers to the widespread adoption of energy efficiency technologies and practices in buildings through the:

- Development and implementation of updated mandatory energy efficiency measures for the large numbers of new apartment and commercial buildings, and private houses that are being built and that are included in the current formal "construction" sector where around 40% of urban Mongolians live, and where there is an existing BCNS enforcement system in place that can be used as the basis to effectively implement the measures; and also developing updated, more stringent, and more accessible voluntary energy efficient guidance for the rapidly growing number of houses where 35% of urban Mongolians now live in urban *ger* areas, and which will over time be gradually covered by the Mongolian mandatory BCNS system;
- Development and implementation of technical development, certification and awareness measures for enhanced energy efficiency in buildings as well as the training and technical support needs of construction sector stakeholders, including building control bodies and officials, financial and funding bodies, testing and certification bodies and providers, designers, specifiers, developers, construction companies, and building owners and tenants; and
- Development and improved access to financing of energy efficiency measures in new buildings through the improved understanding and stimulation of both the financing supply and demand side, and appropriate loan risk evaluation and its effective mitigation for energy efficiency financing.

1.3 Stakeholder Analysis and Baseline Conditions

1.3.1 Stakeholder involvement

The following stakeholders were identified as key relevant bodies to consult during the preparation stage. The stakeholders were all visited and interviewed (or their interests and roles clarified from multiple sources if they could not be contacted) to ascertain their views on the most appropriate elements for BEEP and interactions with

past, present and proposed future relevant other projects and activities. The key stakeholders were then visited again once an outline design for BEEP had emerged, invited to the Logical Framework Analysis (LFA) workshop, re-interviewed in the BEEP updating exercise, and then their proposed roles confirmed.

Table 1: Stakeholder Involvement

<i>Stakeholder</i>	<i>Strengths & Constraints</i>	<i>Anticipated Roles</i>
MCUD	Responsible for development and control of construction sector and for developing and administering building codes, norms and standards system. Also responsible for “100,000 Dwelling Program”.	MCUD will be lead national project agency, and will be particularly involved in Codes/Norms/Standards project development component.
XacBank	A Mongolian development bank with a strong interest in supporting energy efficiency initiatives. Primarily serves low income families, SMEs, women, herdsman, with a number of existing microfinance, housing, leasing and finance products supported by 15 foreign donors, incl. the former WB Stoves Project and MON/99/G35 project house insulation.	XacBank will provide a \$2M energy efficiency loan window from its own funds at normal credit terms.
GTZ	GTZ is currently operating the first phase (June 2006 – May 2010) of an Integrated Urban Development Program with MCUD and UB CG. This program has strong synergies with BEEP. In particular GTZ’s input has a strong emphasis on energy efficient building technical development, training, improved building control systems, and private investment through utilizing carbon markets.	GTZ will provide technical support in terms of the shared energy efficiency objectives of improved energy efficiency norms and standards, and may also support new technologies, and technical training.
MMRE	Responsible for energy and energy efficiency policy development and implementation.	Assistance with technical energy aspects of development of new energy efficiency codes/norms/standards system.
Ulaanbaatar City Government (UB CG)	Provides city administration, planning and infrastructure for Ulaanbaatar city and related <i>ger</i> areas. UB CG has its own radio, TV and newspapers for information dissemination.	Assisting in <i>ger</i> area energy efficiency, as well as information dissemination.
MNE	Provides support for the Mongolian CDM DNA	Supporting CDM development for <i>ger</i> insulation
Construction and Architecture Corporation	Funded by Ministry of Education, Culture and Science. Undertakes research and laboratory testing on construction materials and responsible for architectural and construction codes, standards and cost estimation.	Technical advisor on new mandatory and voluntary building energy efficiency requirements.
Energy and Development Centre	Undertake energy R&D for Ministry of Fuel and Energy	Technical advisor to BEEP.
State Specialized Inspection Agency	Government agency responsible for building inspection for compliance with Mongolian Codes/Norms/Standards system.	Advising on and supporting enforceability aspects of new mandatory energy efficiency requirements.
National Centre for Construction, Urban Development and Public Utilities	Institute under MCUD, with strong interest in improved quality, testing and durability of building energy efficiency materials and updating of construction Codes, Norms and Standards.	Technical advisor and potential partner in updating BCNS.
World Bank	A multi-lateral development bank active in Mongolia	Operated the now completed GEF-funded improved stoves project and provided support for MNE DNA.
ADB	A multi-lateral development bank supporting a	Partner with GTZ in training

<i>Stakeholder</i>	<i>Strengths & Constraints</i>	<i>Anticipated Roles</i>
	grant-funded <i>ger</i> insulation blanket project in Mongolia through the Japan Fund for Poverty Reduction (JFPR)	provision. Active in development of mortgage market.
MOF	Mongolian counterpart for \$25M Japanese Government Loan for SME Development and Environmental Protection, signed in April 2006.	Aims to provide funding for briquette manufacturers.
MACE	MACE is an NGO that provides training to the construction industry and provides services to its members.	Currently operating three of the four ECCs established under the UNDP-GEF project on promotion of super-insulating buildings in Mongolia.
Building Developers and Homeowners	With growing urbanization, mostly focused on UB, there is considerable potential to facilitate private investment by developers and homeowners in improving energy efficiency of buildings in the new and retrofit construction sector and in <i>ger</i> areas.	The updated Building Code/Norms/Standards, as well as urban <i>ger</i> area activities, will lead to significant new private sector energy efficiency investments.
Habitat for Humanity	An NGO that assists communities in working co-operatively to build small houses for under \$2,000. Many houses under-insulated with 5cm of EPS insulation in walls and ceilings and with unknown floor insulation. 10cm EPS walls and floors, and 15cm ceilings specified.	Potential for increasing insulation levels in walls, floors and ceilings of new houses using BEEP's insulation financing mechanism.
"Hungunbeton" Shareholding Company	Main manufacturer of lightweight insulating concrete in UB, interested in improving product quality and in developing new structural lightweight insulating concrete system.	Partner for project with key construction sector insulating material.
Other private companies producing building/insulation materials	A limited number of national private companies started producing building and insulation materials, such as rock wool.	Partner in promoting energy efficient technologies and insulation materials.

1.3.2 Baseline conditions

At least three drafts of an Energy Conservation Law have been prepared since 2003, but it seems that there has been little active consideration of this issue by the Mongolian Parliament to date. There seems to be an ongoing expectation that the draft Law may yet be discussed by Parliament. If this eventuates, the proposed law may provide useful support to BEEP activities through providing a legal basis for appliance and equipment energy efficiency standards and labels, may make larger buildings' energy audits mandatory, may provide a new impetus for energy efficiency through the proposed new National Energy Conservation Centre, may assist ESCO and EPC operations, and may facilitate extra funding provision from donors through the proposed Energy Conservation Fund. However, the passage of this proposed law, the adequate provision of resources, and the effectiveness of activities under the proposed new law as above, is not an integral part of the BEEP project design.

The current Building Law, Housing Law, and Urban Planning Law of Mongolia provides the necessary legal basis for the proposed BEEP updating of the Mongolian BCNS energy efficiency provisions systems, and their effective enforcement.

The following table summarizes the current (2009) state of the buildings sector in Mongolia, as well as the forecast of the most probable situation considering the business-as-usual scenario, i.e., in case this proposed project will not be funded by GEF.

Table 2: Business-as-usual Scenario

<i>Parameter</i>	<i>Value (2009)</i>
Total floor area of all construction sector buildings in Mongolia (in 2008). Existing construction sector buildings assumed to continue to be used for the project duration (i.e. no significant demolition of existing buildings to continue as has been case to date).	8,681,000 m²

<i>New construction sector area added to building stock from 2009-2013 – 108 apartment buildings were completed and certified (added to the building stock) in 2008⁴ comprising 375,296 m² (but this was due to the 2007-08 world commodities bubble doubling in the price of copper - comprising 25% of Mongolia's GDP). For the 2009 and 2010 construction seasons a construction level of 200,000 m² per year is anticipated, given the severe constraints on construction and apartment finance and the many unfinished buildings from the 2008 construction season. From 2011 to 2013, new construction sector floor area additions are assumed to increase by the more sustainable 250,000 m² per year levels of 2006 and 2007.</i>	200,000 - 250,000 m²/year
Baseline energy intensity of new construction sector buildings⁵	188 kWh/m²-yr
Baseline energy consumption of new buildings in 2008⁶	70,368,000 kWh
Estimated business-as-usual cumulative CO2 emissions from newly constructed buildings in the Mongolian residential and commercial buildings sector	1.2 million tonnes by 2029

While the significant expansion in the building stock in 2008 was a bit of an anomaly due to the world commodities bubble, the construction sector is expected to grow at a steady rate into the future. New construction sector buildings are expected to continue to be built at current energy intensities. Given the excellent structural and cladding durability of the socialist period construction sector buildings, their superior insulation and comfort to *ger* area housing, and the overall shortage of affordable urban housing, it is not expected that many of these existing buildings will be replaced in the foreseeable future. Within urban *ger* areas there is expected to be a growing shift from *ger* to small private houses due to small houses' somewhat greater comfort and the lower maintenance requirements, but in the business-as-usual case this not expected to make much impact on GHG emissions as urban small private houses are on average still under-heated.

The above analysis suggests that the primary building sector driver for GHG emissions growth in the long term will be the growing total floor area of new construction sector buildings and private houses, whilst in the short to medium term the poor insulation and stove efficiency in urban *ger* will be a major driver of growing GHG emissions in the business-as-usual case.

⁴ Mongolian Statistics Yearbook 2008

⁵ The estimated energy consumption of buildings constructed to current BCNS energy efficiency requirements is 150 kWh/m²/yr, while the energy consumption of buildings that do not comply with the existing BCNS is 200 kWh/m²/yr. The 188 kWh/m²/yr figure assumes a 25% compliance rate with the existing building codes and 75% non-compliance rate (i.e., 188 = (150*.25) + (200*.75)).

⁶ This is projected to increase by about 5% per year through 2015.

2. STRATEGY

2.1 Project rationale and policy conformity

The proposed project is in line with the Government of Mongolia's (GOM) plan to promote improved building energy efficiency as among the means to help the country meet its sustainable development and environmental objectives. It is also relevant in contributing to achieving its objective of reducing major local environmental effects of excessive and inefficient building fuel use such as growing deforestation due to excessive construction timber use, and improved economic development through enhanced insulation materials and building energy-using systems leading to lower ongoing energy, and in particular heating, costs for buildings. The GOM strongly recognizes that its system of building controls, based on the former Soviet Union's system of building energy efficiency Norms, Regulations and Standards from the 1960-70's, is now very outdated, excessively complicated, hard to understand and enforce, limits innovation, and hence urgently needs to be completely updated. This project will facilitate these much needed improvements in the country's system of building controls.

Moreover, the project will contribute to the achievement of the GOM's MDG-7 target 14 of "incorporating sustainable development principles into and implement national policy and programs, and clean up air pollution of settlements, especially in Ulaanbaatar City". An integral part of meeting that target is defined to be "Developing and approving standards and norms for energy efficient building, introducing heating energy assessment system for buildings, support production of construction insulating materials, works on additional insulation of plants, public sites and housing units are important to reduce air pollution gradually." The current Building Law, Housing Law, and Urban Planning Law of Mongolia provides the necessary legal basis for the proposed project activity on the updating of the Mongolian BCNS energy efficiency provisions systems, and their effective enforcement.

UNDP-Mongolia commits its support to this project as this project contributes strongly to its country programme outcome of increased access to energy efficient options for poor households (UNDAF 2007-2011). UNDP will support the project particularly in seeing to it that the building energy codes/norms/standards that will be developed contributes to policymaking and planning in the government that incorporates pro-poor and energy efficiency aspects, and in ensuring that comprehensive energy efficiency programs (in the residential and commercial buildings sectors) and policies are approved and implemented.

The comparative advantage of UNDP in implementing this project is its experience in integrated policy development, human resources development, institutional strengthening, and non-governmental and community participation.

2.2 Country ownership: country eligibility and country drivenness

Mongolia is very focused on reducing the excessive energy use and energy cost in the buildings sector, which contributes in particular to major environmental impacts and also contributes to the high levels of poverty in the poorest and most vulnerable parts of the population.

2.2.1 Eligibility

The Government of Mongolia signed the United Nations Framework Convention on Climate Change (UNFCCC) on 12 June 1992, the Great Khural (Parliament) ratified it on 30 September 1993, and the date of entry into force was 15 December 1999.

The project fits the objectives of GEF Operational Programme 5 and will contribute to the reduction of greenhouse gas emissions through the transformation of the Mongolian buildings market towards more energy-efficient building technologies and services, through mandatory energy efficiency building codes, training and awareness, and the provision of energy efficiency financing. The project is in line with the climate change strategic program on promoting the widespread adoption of energy-efficient design, technologies and low-GHG emitting materials and practices in the commercial and residential buildings markets (CC-SP1).

2.2.2 Country drivenness

The Government of Mongolia recognizes the major contribution that improved building energy efficiency would provide to meeting its UNFCCC and other environmental commitments, as well as the related need to reduce major local environmental effects of excessive and highly inefficient building fuel use (esp. the extreme urban air pollution levels in winter, the growing deforestation due to excessive fuel wood and construction timber use), to reduce fuel poverty, and to improve economic development through enhanced insulation and improved building energy using systems leading to lower ongoing energy, and in particular heating, costs for buildings.

The Government of Mongolia therefore continues to support a large number of related projects, assisted by international donors, to improve urban district heating and local heat only boiler (HOB) energy efficiency and reduce particulate emissions, reduce heat losses in heat distribution networks, improve the quality of the fuels used in *ger* areas through developing and promoting the use of coal based smokeless briquette and coke fuels, and promote the widespread uptake of ger insulation blankets. A project is underway through the City Government of Ulaanbaatar by the Cities Development Initiative for Asia (CDIA), with support under consideration to support an initial investment phase through KfW, to undertake thermo-technical rehabilitation of the nearly 500 under-insulated pre-cast panel apartment buildings in Ulaanbaatar with no means or incentive for occupants to control excessive heating except by opening their windows to vent excessive heat. There is also movement towards gradually increase district heat tariffs to be more fully financially cost reflective (at present heat tariffs are only around 25% of the true financial heat supply costs).

This energy efficiency update will involve a large number of players - as in Mongolia there are around 200 architectural and engineering design companies, more than 200 construction materials factories, and over 1,000 construction companies. The Government of Mongolia also supports the development and implementation of thermo-technical retrofit projects to improve the inadequate insulation levels and heating control systems of the around 500 multi-storey existing socialist era designed apartment buildings that will still remain in use for decades to come.

The following specific projects, all undertaken with strong support of Government of Mongolia, demonstrate the active steps that have been undertaken to improve energy efficiency in the Mongolian buildings sector to date.

Table 3: Previous and Ongoing Initiatives related to Building Energy Efficiency in Mongolia

Project & Funding Institution	Objective	Outcomes Related to BEEP	Potential Synergies
Previous Projects			
ADRA Straw Bale Building project 1995-1999	Introduce modern SBB construction to Mongolia	Fifteen SBB built for formal RD&D and for training of SBB technology aspects.	Successfully introduced modern SBB technology to Mongolia.
UNDP GEF Provision of Energy Efficiency for Social Services	Promotion of SBB technologies in the social sector	40 SBBs built and 600 builders trained in SB technology, and retrofitting of 28 existing buildings.	Demonstrated value of SBB and retrofits for kindergartens, hospitals, and other small social buildings.
UB City Government	Demonstrate that SBB were an inexpensive and warm housing technology, and provide free SBB for homeless people	Twelve SBB built to informal construction methods. Problems with fire, questionable insulation, and poor foundations added to SBB negative perceptions.	Showed that SBB need proper design, training, construction, budgets, technical support and supervision to be effective.
Tuv Aimag Government	Provide housing for local government employees	Sixteen SBB built, SB ceiling insulation not used due to fire risk perception.	Showed critical need for SB or use of other ceiling insulation materials for full SBB effectiveness.
UNDP GEF Commercialization of Super-Insulated Buildings in Mongolia	Facilitate the uptake of energy efficient SBB and other new and retrofit house insulation means in Mongolia.	Developed sound technical basis for SBB as a proven construction method, insulation techniques demonstrated for existing houses, ger insulation blankets developed and demonstrated.	SBB and ger insulation techniques now available for wider dissemination, including through the four project Energy Conservation Centers established by the project.
World Bank GEF Improved Household Stoves project	Facilitate market-based institutional delivery system for more efficient stoves	Raised awareness of need for higher efficiency stoves in ger areas.	Showed critical need for proper independent ger stove efficiency testing, certification and project

Project & Funding Institution	Objective	Outcomes Related to BEEP	Potential Synergies
			evaluation
Netherlands funded NEW 21 Project	Facilitate the development of ESCOs and EPCs in Mongolia	Development of ESCOs, and ESCO and EPC financing mechanisms	Energy Conservation Law redrafted. ESCO guarantee fund established.
Ongoing Projects			
Ulaanbaatar City Government	Production of coal based smokeless briquettes and coke fuels for ger area stoves	Develop and increase use of smokeless fuels to lower air pollution in ger area stoves.	Raised awareness of need for effective and affordable lower pollution fuels for ger area stoves.
GTZ Integrated Urban Development, Construction Sector and VET Promotion Program (UDCP)	Develop improved integrated urban development planning and implementation strategies in UB	Cost and energy efficient affordable housing, apartment building rehabilitation, ger area development, technical vocational education and training, energy efficient stoves.	Demonstration of higher end energy efficient private houses, demonstrated retrofit apartment building insulation technology, developing technically sound ger stoves
Government of Mongolia 100,000 Housing Units Master Plan	Provide 100,000 affordable dwellings from 2007-2010	Provide apartments, houses, and access to services, primarily in urban areas, using national and foreign funding.	Opportunity for demonstrating improved energy efficient building technologies.
ADB ger insulation blanket project	Support 4,000 ger insulation blanket dissemination and investigate CDM potential	Improved ger insulation will lead to energy efficiency gains and reduced UB air pollution	No need for BEEP to be concerned with ger insulation issues
XacBank ger insulation package project	Provide 10,000 ger energy efficiency packages including EE stove, ger insulation blanket, and coal briquettes	Improved energy efficient ger	Financing mechanisms for ger energy efficiency being developed
CDIA (ADB and GTZ) Pre-Cast Panel Buildings Thermo-Technical Retrofit project	Develop feasibility study of large scale thermo-technical retrofit of pre-cast panel buildings	Will address energy efficiency issues of the more than 426 panel buildings in UB	Demonstration of value of insulation and proper heating pipe-work design in new apartment buildings

2.3 Design principles and strategic considerations

2.3.1 Design principles

The proposed project is intended to achieve enhanced energy efficiency in the Mongolian buildings sector compared to the baseline (business-as-usual) scenario. As an alternative, the following are considered:

1. BEEP will help realize a modern, user-friendly, less confusing, lower compliance cost, more effective, and proper performance-based Building Code/Norms/Standards (BCNS) energy efficiency system that is more appropriate for Mongolian conditions and that will be strictly enforced by the relevant government agencies. This new BCNS energy efficiency system developed by BEEP will lead to higher average energy efficiency levels in new commercial buildings, apartments, and also ultimately include insulation and high efficiency smokeless stoves in *ger* area private houses.
2. BEEP will help facilitate an increased level of awareness by designers, specifiers, construction companies, builders, developers, private sector building certifiers (when established) and apartment and private house users of the benefits of thermal insulation, improved insulation windows and new energy efficient building construction techniques and energy systems in all new and existing buildings.
3. BEEP will help support the development and deployment of new financing means to cover the enhanced access to investment in enhanced building energy through a local bank (XacBank) with a strong presence and focus on energy efficiency financing.

Table 4: Alternative Scenario under GEF Project

<i>Parameter</i>	<i>Value (2015)</i>
<i>Alternative scenario energy intensity of residential and commercial buildings constructed to new BCNS energy efficiency requirements</i>	<i>135 kWh/m²-yr</i>
<i>Average compliance rate of newly constructed buildings with updated BCNS EE requirements</i>	<i>85%</i>
<i>Direct GHG emission reduction as a result of the project</i>	<i>63,000 tonnes of CO₂ over 20 years</i>
<i>Indirect GHG emission reduction from spill-over effects (bottom-up)</i>	<i>189,000 tonnes of CO₂</i>
<i>Indirect GHG emission reduction from spill-over effects (top-down)</i>	<i>240,000 tonnes of CO₂</i>

The proposed project targets the realization of an improvement of the energy efficiency level of buildings that fully comply with the BCNS energy efficiency performance or insulation level from the baseline 150 kWh/m²/yr to 135 kWh/m²/yr by 2011, as well as an increased average compliance to the improved BCNS to 85% by 2015. In addition, the project will establish a voluntary energy performance level of 100 kWh/m²/yr. The project will pursue a program of “voluntary agreements” with specific building owners (those who are planning to erect a new building and/or retrofit an existing building). The voluntary agreement would be for such buildings to target the “beyond-code” SEC level which will be more stringent than the mandatory level required for EE buildings. The possibility of setting up an incentive structure for compliance with the voluntary code will be explored during project implementation.

With the interventions that will be carried out under BEEP, it is expected that that the BCNS updating exercise will start to produce energy and GHG savings from 2011 (the 2011 construction season) as the various elements are developed and released ahead of the full BCNS energy efficiency system completion and enforcement for the 2013 construction (non-winter) season. The updated BCNS energy efficiency system will also continue to lead to new construction sector building energy efficiency gains even after its full introduction as new technologies, standard construction systems, and familiarity and degree of compliance continue to increase after the project’s completion. Savings rates also continue to rise as the construction sector rate of new floor area additions per year continues to rise.

Overall electricity and heat generation efficiency for the mix of energy delivered to buildings from CHP and HOB is assumed to be 50%, giving 0.6 kg CO₂ per kWh of GHG savings. With successful completion of the barrier removal and other capacity building and technical assistance activities that will be implemented as well as the EE investments funded by XacBank, it is expected that about 63,000 tonnes of CO₂ will be cumulatively avoided over a 20 year period. Considering the flow on effects of the project to the entire residential and commercial buildings sector, it is estimated that between 189,000 – 240,000 tonnes of CO₂ emissions will be cumulatively avoided (see Annex 2 for detailed calculations and assumptions).

2.3.2 Benefits

Global Benefits

With the successful implementation of the envisioned activities, it is expected that the anticipated global benefits in terms of reduced GHG emissions from the Mongolian buildings sector will be realized. The direct GHG emission savings as a result of the project is expected to be 63,000 tonnes of CO₂ over a 20 year period. These global benefits are a conservative estimate of direct project GHG emission savings from XacBank-funded incremental EE investments in new commercial and apartment buildings that meet the strengthened BCNS. Flow on effects of the project to the rest of the sector are estimated at between 189,000 - 240,000 tonnes of CO₂.

Domestic Benefits

The project will produce significant domestic benefits, including:

- Improved building energy efficiency will directly contribute to:
 - Achieving MDG-7 on ensuring environmental sustainability.
 - Reducing air pollution in urban areas of Mongolia, specifically CO₂ and SO₂ emissions and particulate matter during the heating (winter) season.
- The project will contribute to building individual, institutional, and systemic capacity for applying energy efficient technologies within the building sector.
- The building sector accounts for the majority of district heating and electricity system demand in Mongolia. Given that these energy supply sectors currently lose money, the project’s building energy efficiency gains will reduce the level of required direct subsidies as well as indirect cross-subsidies.

- New construction sector and *ger* area housing costs will be reduced by the project as new, more cost-effective construction methods and materials are developed and facilitated by the project.

2.4 Project objective, components, and activities

2.4.1 Project objective

The project objective is the reduction in the annual growth rate of GHG emissions from the buildings sector in Mongolia, by improving the energy utilization efficiency in new construction in the residential and commercial buildings sector. This objective will be realized through the removal of barriers to the uptake of building energy efficiency construction systems, construction practices, and investment patterns. The building sub-sectors being addressed in the project comprise new construction sector commercial, apartment buildings and private houses, and new large private houses not connected to infrastructure systems. BEEP is comprised of three (3) integrated and synergistic components that will work together to address the barriers to the widespread adoption of energy efficiency in the wider Mongolian buildings sector. Each component consists of specific activities designed to address these barriers.

2.4.2 Components and Activities

Component 1: Updating and Strengthening of Mongolian Energy Efficiency BCNS (Total Cost USD 713,200; GEF Assistance USD 450,000)

This component involves the development of a new mandatory BCNS energy efficiency system that would be simpler to understand, would require higher or new energy efficiency levels in some critical building elements (currently poorly covered), that would be more strictly enforced and that would lead to higher overall energy efficiency levels being achieved in practice across new buildings. The performance orientation of the new BCNS energy efficiency system would foster materials and construction system innovation, lower environmental impacts and improve new building life-cycle cost effectiveness. The new BCNS energy efficiency system would set clearly understood and simple to evaluate performance rationale for regulating energy efficiency, and establish clear minimum efficiency benchmarks for buildings to exceed. This component would also develop voluntary energy efficiency guidelines for the growing numbers of smaller new houses that are not yet covered by the Mongolian BCNS mandatory energy efficiency provisions but that will gradually become covered over time. In-kind co-funding of \$20,000 from MCUD and \$150,000 from GTZ, and in cash funding by KEMCO of \$93,200 will be provided for this component (note that the KEMCO funding applies to activities to be undertaken in calendar 2009).

Activity 1.1 Development of a More Effective BCNS Energy Efficiency System – This activity involves the establishment of overarching building energy efficiency code performance requirements covering objectives, functional requirements, and performance principles and coverage. This activity will be undertaken with wide government, research and building industry input and consultation, including, but not limited to, building officials and “construction industry” players. The activity would also work to get the new BCNS energy efficiency system to increase its influence on new buildings outside the traditional formal construction buildings sector. In particular, this activity will work to get the new BCNS mandatory energy efficiency systems to be increasingly relevant to the growing numbers private houses that are being built in more established urban *ger* areas. *GEF assistance is required for TA on the development of a suitable overarching Mongolian focused BCNS energy efficiency system.*

Activity 1.2 Development of New Energy Efficiency Mandatory BCNS Documents - Specific outputs for this activity include the consensus based development with MCUD and other relevant agencies and stakeholders of an integrated suite of mandatory energy efficiency BCNS requirements and documents covering:

- Building energy efficiency performance modeling
- Methods for determining the total thermal resistance of parts of buildings
- Thermo-technics of construction materials
- Methods for determining the thermal resistance of insulation materials
- Space heating system energy efficiency
- Domestic hot water system energy efficiency
- Thermal resistance of external walls
- Thermal resistance of ground floors, basements, and foundations
- Thermal resistance of roofs and insulated ceilings
- Thermal resistance of window systems
- Air tightness, leakage and ventilation
- Energy efficient lighting systems

GEF assistance is required for TA on the development of new mandatory energy efficiency standards.

Activity 1.3 Development, Implementation and Monitoring of Voluntary Energy Efficiency Performance Standard – Under this activity, the project will establish a voluntary energy performance level of 100 kWh/m²/yr. The project will pursue a program of “voluntary agreements” with specific building owners (those who are planning to erect a new building and/or retrofit an existing building). The voluntary agreement would be for such buildings to target the “beyond-code” SEC level which will be more stringent than the mandatory level required for EE buildings. The possibility of setting up an incentive structure for compliance with the voluntary code will be explored during project implementation. This activity will also involve the development of voluntary energy efficiency guidelines for those small buildings that would not initially be covered by the mandatory requirements of the new BCNS energy efficiency system. In particular this activity would develop guidelines for the energy efficiency of ger area private housing that would be supported and followed by international donors and NGO supported private housing, including in principle for all houses built under the current “100,000 Dwellings Program” in conjunction with MCUD. *GEF assistance is required for TA on the development of the voluntary EE performance standard.*

Activity 1.4 Development of Building Energy Monitoring and Reporting System – This activity involves institutionalizing the regular data gathering, monitoring, analysis and reporting of the energy performance of buildings. In particular this activity would be based on providing enhanced availability of data concerning the energy consumption performance in the buildings sector and would provide the information basis required to ensure that policies are implemented, revised and updated in a timely and effective manner, as necessary. *GEF assistance is required for TA on a system to systematically gather data and report on building energy performance in Mongolia.*

Activity 1.5 Strengthening of Building Control Agencies – Under this activity, the mandate of the building control agencies will be clarified, the agencies’ functions will be augmented and strengthened, and the number and capacity of building control officials will be increased, with a view to ensuring that the functions and capacity of the building control system are both sufficient to enforce the new building codes and sustainable. As a first step, the capacity building requirements will be identified and will inform the design of Activity 2.2 on technical support and training. Such an assessment will include an estimation of the human resource and office hardware requirements of the building control system. Based on the recommendations, the agencies will undertake procurement of the human resources and office hardware required to effectively carry out their functions. This activity will be closely coordinated with UNDP’s project on Strengthening Environmental Governance in Mongolia, for which the State Specialized Inspection Agency is the main implementing partner. *GEF assistance is required for TA to assess the capacity building and resource needs of the building control agencies.*

Component 2: Training and Awareness (Total Cost USD 504,800; GEF Assistance USD 372,000)

This component involves the development and implementation of capacity building technical development, certification and awareness measures for enhanced energy efficiency in buildings as well as the training and technical support needs of construction sector stakeholders, including building control bodies and officials, financial and funding bodies, testing and certification bodies and providers, designers, specifiers, developers, construction companies, and building owners and tenants. In-kind co-funding of \$30,000 from MCUD, and in cash funding by KEMCO of \$102,800 will be provided for this component (note that the KEMCO funding applies to activities to be undertaken in calendar 2009).

Activity 2.1 Technical Support for Improved Building Energy Efficient Technologies – this activity will provide technical development, support and certification for key energy efficiency technologies and systems. Technologies and systems that will be targeted include:

- the research, testing, refinement, design and application of affordable, durable and effective ground floor, foundation and basement insulation approaches;
- testing and certification of the key bulk insulation materials for new buildings comprising EPS, mineral wool, fiberglass, foamed concrete, and straw bales;
- affordable, reduced-timber use and durable timber frame construction systems for private houses and low rise multi-storey buildings;
- energy efficient heating and domestic hot water systems, including stoves used in new houses that have high efficiency and automatic or maximum duration between refueling to reduce unsustainable wood use for relighting;
- high overall insulation value, low air infiltration and durable, increased-insulation window systems including their frames; and
- general and task lighting design, installation, control and their effective integration with day lighting.

The project will provide technical assistance to building developers/owners who will build EE buildings based on the new codes and using loans from XacBank. *GEF assistance is required for TA on building energy efficiency technologies and applications.*

Activity 2.2 Technical Support, Training, Awareness and Communication – this activity would involve the development of enhanced local technical and managerial capacity to design, finance, construct, manage, and maintain energy efficiency in buildings, through the improved operation of the four existing Energy Conservation Centers (ECCs) in UB, Erdenet and Darkhan; as well as by part-time contracting of construction professionals in the three Mongolian regional centers (Dalanzadgad, Dornod and Khovd) to provide effective regional technical support, training and awareness to construction sector construction companies, clients, developers, consultants, financiers, specifiers, construction industry workers, building control system officials, financial and funding bodies, and testing and certification bodies and enterprises on the new BCNS performance oriented system and its new and enhanced energy efficiency requirements. The technical support centers would be used to provide the bulk of the training and public awareness campaigns and project activities to as far as possible ensure post-project sustainability and effectiveness. *GEF assistance is required for support and operation of effective technical support centers.*

Component 3: Facilitating Access to Energy Efficiency Financing (Total Cost USD 2,293,300; no GEF Assistance required)

This component involves facilitating access to financing for energy efficient building approaches, technologies and systems by bridging the gap between energy efficiency supply and demand. After conducting a market analysis of potential demand, the project will capacitate both the demand and supply-side, and XacBank will provide \$2 million of its own funds for building energy efficiency loans. It is proposed that normal commercial interest rates and loan duration periods for this type of financing be applied to ensure ongoing sustainability post-project and to avoid undermining the development of a healthy commercial mortgage market. Under this component, BEEP will provide technical assistance to help identify suitable projects, raise awareness of the demand-side, i.e. prospective customers, on the availability of financing, build the capacity of those customers to apply for loans, and build the capacity of XacBank to evaluate the proposed energy efficiency projects, and hence manage the loan risks by appropriate loan due diligence and risk management mechanisms for the disbursement and credit management of the new building energy efficiency loans. Cash funding by KEMCO of \$93,300 and \$200,000 by UNDP will be provided for this component. No GEF resources will be applied to this component.

Activity 3.1 Market Analysis and Establishment of Energy Efficiency Financing – this activity involves the analysis of potential new building energy efficiency financing by market segment and by market player and influencer, to ensure accurate targeting of awareness and capacity building efforts. The Bank/Financial Intermediary involved will be XacBank, which is a local development bank with a wide depositor and loan recipient customer base. *No GEF assistance is required.*

Activity 3.2 Training in Energy Efficiency Financing – this activity will involve the training and ongoing support for XacBank of the financing support scheme including the due diligence of proposed loans and their underlying technologies, the risks of the loans not performing as expected, and the means to mitigate these risks. This activity will involve the ECCs providing much of the training and ongoing support to build ECC and XacBank capacity and sound ongoing mutual interactions for the post project sustainability of both the ECCs and XacBank’s ongoing commercial relationships. *No GEF assistance is required.*

Activity 3.3 Raising Awareness and Building Capacity of Energy Efficiency Financing – this activity will involve the generation of suitable materials and publicity, and the conducting of workshops for commercial, government, and residential building developers, specifiers, designers, construction companies, owners and tenants on how to access energy efficiency financing. The workshops and materials will also include information on how to comply with the revised building EE codes. A review process within MCUD will be established to ensure that the investment proposals comply with the new codes. *No GEF assistance is required.*

Activity 3.4 Sustaining Energy Efficiency Financing Support – this activity will involve working closely across all energy efficiency financing elements with stakeholders who are likely to be able and willing to continue to pursue the project objectives after the project ends in 2013. To ensure the sustainability of the project beyond its end in 2013, the project will embed the financial aspects with long-term financial institutions, the technical aspects with agencies and market players that have a long term energy efficiency focus, and the policy aspects with the appropriate central and local government agencies and ministries. This activity will also involve the investigation and support of the development by other entities of carbon market energy efficiency financing options, such as CDM, for developing additional private sector investment in building energy efficiency measures. *No GEF assistance is required.*

2.5 Risks and mitigation

Table 5: Project Risks and Mitigation Measures

Risks	Risk Mitigation Measures	Risk Rating
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Project is unable to complete Building Code/Norms/Standards (BCNS) Energy Efficiency updating process during project duration.	The Government is in favor of updating BCNS. Also, the project will implement a simpler performance-based approach.	Low
BCNS energy efficiency provisions are not able to be extended to cover private houses.	The project will consult widely with government stakeholders and consider: <ul style="list-style-type: none"> • Moderate initial voluntary insulation requirements as appropriate for private houses • Inclusion of certain incentive mechanisms for exceeded building EE performances that are certified. 	Modest
	Put in place system of certification of insulation effectiveness and building energy monitoring and reporting.	
	Enhance EE knowledge of homeowners, construction sector professionals, and relevant government personnel.	
Building Code/Norms/Standards Provisions are not strictly enforced.	Consult widely and consider moderate initial insulation requirement changes.	Modest
	Train the building inspectors on provisions of new BCNS for better enforcement and provide them with necessary documents and manuals on the new BCNS.	
	Build capacity of construction sector workers and professionals through mandatory trainings.	
	Raise awareness on the new law provisions focusing on various stakeholders.	
Commercial and apartment buildings and tenants are generally not metered for district or HOB heat supply but are charged on a per m ² basis.	Support other projects that aim to deal with this issue. Retrofits in this sector are not included in BEEP. Introduce heat metering BCNS requirements in BEEP for new buildings as far as possible.	Modest
Banks not prepared to finance energy efficiency (e.g. insulation) for buildings.	Focus on mandatory measures for new commercial and apartment buildings and large houses where finance access for EE incremental cost is not a significant barrier.	Low
	Develop energy efficiency/ insulation funding mechanism with a local bank focused on EE financing access.	
	Train the loan officers of the banks/FIs on evaluating building energy efficiency credit proposals.	
Technical developments are not successful	Focusing on the use of technologies that are already well proven, mature and well understood in similar climates.	Low
Few or no building owners agree to participate in the “voluntary agreement” program.	Liaise with the MCUD in the promotion and advocacy campaigns to building owners in meeting the challenge to achieve “beyond code” energy performance levels.	Modest

The risk analysis above shows that the overall risk of the project not meeting its key objective and outcomes is low as there is no reliance on substantial or high risk elements.

2.6 Financing Plan

The total estimated project cost (including the PDF preparatory phase exercise, which cost US\$ 25,000 to carry out) is US\$ 1 million. The cost for all of the incremental activities that will be funded by the GEF amounts to US\$ 0.975 million. In addition to the US\$ 0.975 million requested from GEF, a total of US\$ 2.84 million will be provided by the Government of Mongolia, and co-financing partners (XacBank, KEMCO, UNDP, and GTZ), representing the cost of identified baseline activities. These contributions were identified and discussed during the PDF-A exercise and subsequent developments, and have been confirmed in the attached letters of commitment (Annex 1).

PROJECT BUDGET (US\$)

Project Component	GEF	GTZ	GOM	XacBank	KEMCO	UNDP	Total
1.Updating and Strengthening BCNS	450,000	150,000	20,000	0	93,200	0	713,200
2.Capacity Building	372,000	0	30,000	0	102,800	0	504,800
3.Access to Financing	0	0	0	2,000,000	93,300	200,000	2,293,300
4. Monitoring and Evaluation	68,000	0	0	0	0	0	68,000
5. Project management budget/cost*	85,000	0	0	0	50,700	100,000	235,700
Total project costs	975,000	150,000	50,000	2,000,000	340,000	300,000	3,815,000

The funds requested from GEF will be utilized to support all incremental activities to facilitate the realization of expected domestic and global environmental benefits. Of the GEF funds requested, US\$ 450,000 would be utilized for updating and strengthening the energy efficiency provisions of the Mongolian BCNS; and US\$ 372,000 for capacity building. For the project co-financing, the Mongolian Government will provide in-kind co-financing amounting to US\$50,000. GTZ will provide in-kind support in the amount of \$150,000. KEMCO has agreed to provide \$340,000 in-cash to the project in calendar 2009, while UNDP will contribute \$300,000 in grant financing to the project. A local bank (XacBank) has agreed to provide cash co-financing amounting to US\$ 2.0 million for energy efficiency investments under the project. The table below summarizes the co-financing contributions for the BEEP.

Co-financing Sources				
Name of Co-financier (source)	Classification	Type	Amount (US\$)	Status
MCUD	Government Agency	In Kind	50,000	Confirmed
GTZ	Bilateral Donor	In Kind	150,000	Confirmed
KEMCO	Bilateral Donor	In Cash	340,000	Confirmed
UNDP	Implementing Agency	In Cash	300,000	Confirmed
XacBank	Private Bank	In Cash	2,000,000	Confirmed
Total Co-financing			2,840,000	

2.7 Cost-effectiveness

The proposed approach of barrier removal and other capacity building and technical assistance activities will facilitate the realization of the expected outcomes. The barrier removal approach is considered as more appropriate, holistic and cost effective, as can be gleaned from the previous work that was carried out in the area of EE in the residential and industrial sectors of the country that applied the same approach. Only limited success can be expected if we rely on individual consumers implementing EE initiatives, which will be implemented in a fragmented and ad hoc manner. The impacts would also be limited to those that are directly involved in the project, compared to the proposed approach, which includes a program for disseminating the results and lessons identified.

Over 20 years the direct GHG emission savings as a result of the project is expected to be 63,000 tonnes, with flow on effects to the rest of the sector estimated at between 189,000 - 240,000 tonnes of CO₂. Using the lower end of the range, this translates to an approximate unit abatement cost (UAC) of US\$ 3.87/tonne CO₂ (i.e., GEF\$ per tonne CO₂). The project will also deliver major health and poverty reduction benefits that are not included in cost effectiveness figures.

Without the GEF support, the potential significant global environmental benefit in terms of CO₂ emissions reduction from the application of EE building technologies and practices, as well as the enabling environments facilitated by the relevant policy and regulatory frameworks in the Mongolia buildings sector will not be realized. If the current barriers that hinder building developers/owners in venturing into EE buildings will persist, the

potential CO₂ emission avoidance would not be realized and the country would have limited success in promoting energy efficiency as an effective policy and institutional instrument for achieving the country's energy objectives. The work that was done on promoting high insulation building materials under the UNDP-GEF Project on promoting super-insulated buildings has helped realize GHG emissions reductions but has to be supplemented.

By implementing the proposed activities, the magnitude of national development benefits (energy savings) and global environmental benefits (CO₂ emissions reductions) from the Mongolian buildings sector will become more significant. Incremental funding from the GEF will be critical in removing remaining barriers and expanding the energy savings and CO₂ emissions reductions opportunities through the widespread application of building EE technologies and practices in the buildings construction market. The current growth trend in the built up area of the sector indeed presents an opportunity to transform the country's buildings construction market, and at the same time improve the energy utilization performance of the buildings sector. With the GEF support for the incremental costs required to create the much needed policy and regulatory regimes that will support energy conservation and energy efficiency in the buildings sector, capacity building to improve local skills in building design and operation based on the improved BCNS, the anticipated energy savings in the buildings sector can be achieved. In that regard, the GEF support will ultimately help achieve significant GHG emissions reductions in the buildings sector in Mongolia.

2.8 Sustainability and Replicability

The primary objectives of the project are directed toward sustainability by accelerating the availability and uptake of energy efficient building technologies and design practices in Mongolia. Sustainability of project outputs is ensured as the outputs of most of the project components have been carefully designed to endure in a viable form after the completion of BEEP in December 2013. In particular, durable BEEP legacies will include: an updated and more stringent BCNS energy efficiency system that is better enforced and more widely applicable and will continue to strengthen its stringency and enforcement after the project, the development and technical support of key energy efficient building technologies, and an enhancement of financing mechanisms to cover building energy efficiency measures that will persist after the project.

To ensure the sustainability of the project beyond its end in 2013, the project will work closely in its various components and activities with stakeholders who are likely to be able and willing to continue to pursue the project objectives after the project ends. In particular this entails embedding the financial aspects with long-term financial institutions, the technical aspects with agencies that have a long term energy efficiency focus, and the policy aspects with the appropriate central and local government agencies and ministries.

MCUD will not only be directly responsible for executing the project, but it will also continue with its primary responsibility to spearhead and sustain the activities after the project's end through its ongoing support for the energy efficiency aspects of the Mongolian BCNS system.

A successful BEEP project can be expected to have strong positive impacts on energy efficiency in existing construction sector buildings and in wider *ger* area housing.

3. PROJECT RESULTS FRAMEWORK:

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD:					
CP Outcome 7: Access to energy options for poor households increased.					
Country Programme Outcome Indicators: 3.4.1 Comprehensive energy efficient programme and policy approved and implemented; 3.4.3 Reduced use of firewood and coal					
Primary applicable Key Environment and Sustainable Development Key Result Area 1. Mainstreaming environment and energy					
Applicable GEF Strategic Objective and Program: CC-SPI: Promoting Energy Efficiency in Residential and Commercial Buildings					
Applicable GEF Expected Outcomes: Improved efficiency of energy use in the built environment					
Applicable GEF Outcome Indicators: CO ₂ emissions reduction, Adoption of policies contributing to enabling environment, Quantity of energy saved, Volume of investments					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Objective⁷ Reduction in the annual growth rate of GHG emissions from the buildings sector in Mongolia, by improving the energy utilization efficiency in new construction in the residential and commercial buildings sector	<ul style="list-style-type: none"> • Specific energy consumption, kWh/m²/yr: <ul style="list-style-type: none"> • <i>Baseline existing construction sector buildings</i> • <i>New construction sector buildings that do not fully comply with BCNS EE requirements</i> • <i>New buildings that fully comply with existing BCNS EE requirements</i> • <i>Private houses</i> 	<ul style="list-style-type: none"> • 250 • 200 • 150 • 550 	<ul style="list-style-type: none"> • 250 by project end • 169 by project end • 135 by project end • 100 (through voluntary agreements) by project end • 500 by project end 	<ul style="list-style-type: none"> • Evaluation of building construction rates, energy intensities, and GHG emission factors 	<ul style="list-style-type: none"> • Energy consumption evaluation and analysis activities under the project are fully supported. by stakeholders
Outcome 1⁸	<ul style="list-style-type: none"> • Increased stringency 	<ul style="list-style-type: none"> • New Construction 	<ul style="list-style-type: none"> • New energy efficiency standards 	<ul style="list-style-type: none"> • Review of new BCNS 	<ul style="list-style-type: none"> • Updated BCNS EE system

⁷ Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR

<p><i>Energy efficiency provisions of the Mongolian Building Code, Norms and related Standards (BCNS) updated and strengthened</i></p>	<p>of EE provisions of BCNS system</p> <ul style="list-style-type: none"> • Increased compliance with BCNS EE levels • BCNS EE coverage extended to higher proportion of new buildings 	<p>Sector buildings meet 25% of overall average current BCNS EE requirements</p> <ul style="list-style-type: none"> • Key BCNS EE elements are not fully enforced • BCNS system only enforced for construction sector buildings 	<p>developed, covering:</p> <ol style="list-style-type: none"> 1. Building energy efficiency performance modeling 2. Methods for determining the total thermal resistance of parts of buildings 3. Thermo-technics of construction materials 4. Methods for determining the thermal resistance of insulation materials 5. Space heating system energy efficiency 6. Domestic hot water system energy efficiency 7. Thermal resistance of external walls 8. Thermal resistance of ground floors, basements, and foundations 9. Thermal resistance of roofs and insulated ceilings 10. Thermal resistance of windows 11. Air tightness, leakage and ventilation 12. Energy efficient lighting systems <ul style="list-style-type: none"> • Government officials trained in the operation and enforcement of the new BCNS energy efficiency provisions • 85% of newly constructed buildings meet the updated BCNS EE requirements by 2015 • Building energy monitoring and reporting system developed and implemented. 	<p>EE control system and stringency levels</p> <ul style="list-style-type: none"> • Review of actual EE levels achieved in practice in sectors covered by BCNS requirements 	<p>development is fully supported</p> <ul style="list-style-type: none"> • New BCNS EE system and requirements are more strictly enforced
<p>Outcome 2 <i>Training and Awareness Program</i></p>	<ul style="list-style-type: none"> • New and improved EE related building technologies developed, tested, 	<ul style="list-style-type: none"> • Key new building EE technologies are not developed and supported 	<ul style="list-style-type: none"> • 4 new building EE technologies supported • 4 existing Energy Conservation Centers in UB, Darkhan and Erdenet supported 	<ul style="list-style-type: none"> • Evaluation of the suitability of new building EE technologies for 	<ul style="list-style-type: none"> • Technical support partners provide necessary support • Building sector is interested in and supports new building EE

⁸ All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.

	<p>refined, demonstrated and documented</p> <ul style="list-style-type: none"> • New building EE technologies supported and necessary training provided • Number of training courses • Number of trainees employing building EE technologies • Number of trainees engaged in building EE service provision 	<ul style="list-style-type: none"> • Key building EE issues will remain poorly known and understood • No building EE training courses and publicity campaigns will be run • Minimal numbers of new urban area buildings will fully meet EE requirements 	<ul style="list-style-type: none"> • 3 new regional centre EE advisory services in Dalanzadgad, Dornod and Khovd introduced and operating effectively • 12 training courses completed by end of project • 500 trainees trained in building EE technologies by end of project • 200 trainees providing building EE services by end of project • 6 publicity campaigns completed by end of project • 9,000 buildings applying EE by 2012 	<p>Mongolian conditions</p> <ul style="list-style-type: none"> • Evaluation of training and technical support provision and effectiveness • Initial and final project surveys of awareness of the government, public and the building sector on the new BCNS and EE building technology applications • Monitoring of building EE loans 	<p>technologies</p> <ul style="list-style-type: none"> • Building industry, financial sector and public are interested in building EE issues
<p>Outcome 3 <i>Access to energy efficiency financing facilitated</i></p>	<ul style="list-style-type: none"> • Number of building EE training courses provided for banks/FIs staff • Number of financing schemes lending to building EE projects • Volume of investments in building EE projects funded by banks/FIs. 	<ul style="list-style-type: none"> • Only minimal bank loans are available and utilized for building EE • No training courses provided to banks/FIs staff in building EE loan appraisal • No financing schemes for building EE in place 	<ul style="list-style-type: none"> • At least 4 training events and workshops conducted for XacBank and other FI's loan officers on how to assess and conduct due diligence of energy efficiency investments • At least 100 loans provided to BEE projects by end of PY4 • \$2M invested by banks/FIs in building EE and reinvested in building EE as loans repaid by 2013 • Workshops conducted to raise awareness and build the capacity of commercial, government and residential property owners to access financing for energy efficiency improvements 	<ul style="list-style-type: none"> • Monitoring of banks/FIs provision of building EE loans • Initial and final survey of building EE levels 	<ul style="list-style-type: none"> • Building owners and tenants will borrow additional funds for building EE at commercial terms

4. TOTAL BUDGET AND WORKPLAN

Award ID:	00056924	Project ID(s):	00070071
Award Title:	Building Energy Efficiency Project		
Business Unit:	MNG10		
Project Title:	Mongolia: Building Energy Efficiency Project		
PIMS Number:	3571		
Implementing Partner (Executing Agency)	Ministry of Construction and Urban Development of Mongolia		

GEF Outcome/ATLAS Activity	Responsible party	Chart of account			ATLAS Budget Description	Budget by years				
		Fund ID	Donor	Account		2010	2011	2012	2013	Total
<i>Outcome 1. Energy Saving Policy and Institutional Development enhanced</i>	MCUD	62000	GEF	71200	International experts	24,000	43,500	0	0	67,500
				71300	National experts	16,400	16,400	16,400	10,400	59,600
				72100	Contractual services	48,000	63,000	0	0	111,000
				71400	Administrative assistant	500	400	0	0	900
				71600	Training events	0	30,000	30,000	30,000	90,000
				74200	Publication and dissemination	0	20,000	20,000	19,000	59,000
				72200	Equipments/materials	4,000	20,000	15,000	5,000	44,000
	MCUD	30000	KEMCO	71600	In-country travel	0	6,000	6,000	6,000	18,000
				72100	Contractual services	13,000	0	0	0	13,000
				71300	National experts	9,600	5,000	0	0	14,600
				71400	Administrative assistant	600	0	0	0	600
				71600	Training events	10,000	0	0	0	10,000
				74500	Meetings and workshops	16,500	2,500	2,000	0	21,000
				74200	Publication and dissemination	20,000	0	0	0	20,000
MCUD	30000	KEMCO	72200	Equipments/materials	10,000	0	0	0	10,000	
			71600	In-country travel	3,000	0	0	0	3,000	

GEF Outcome/ATLAS Activity	Responsible party	Chart of account			ATLAS Budget Description	Budget by years				
		Fund ID	Donor	Account		2010	2011	2012	2013	Total
				72500	Supplies	1,000	0	0	0	1,000
Activity 1 Total		62000			GEF	92,900	199,300	87,400	70,400	450,000
Activity 1 Total		30000			KEMCO	83,700	7,500	2,000	0	93,200
Activity 1 Total		4000			UNDP	0	0	0	0	0
Activity 1 Total		SUBTOTAL				176,600	206,800	89,400	70,400	543,200
<i>Outcome 2. Training and awareness</i>	MCUD	62000	GEF	71200	International experts	25,500	10,500	0	0	36,000
				71300	National experts	32,220	32,220	32,220	32,220	128,880
				72100	Contractual services/research	9,620	15,000	0	0	24,620
				74200	Publication and dissemination	4,000	21,000	21,000	21,000	67,000
				72200	Procurement	0	10,000	0	10,000	20,000
				71600	Trainings	0	16,000	16,000	16,000	48,000
				71600	International travel	2,000	2,000	15,000	0	19,000
				71600	In-country travel	2,000	3,500	3,500	3,500	12,500
				74500	Miscellaneous	2,000	2,000	2,000	2,000	8,000
				72500	Supplies	2,000	2,000	2,000	2,000	8,000
	MCUD	30000	KEMCO	71300	International experts	30,000	0	0	0	30,000
				71300	National experts	11,175	11,175	11,175	11,175	44,700
				74200	Publication and dissemination	9,600	0	0	0	9,600
				71600	Training	17,000	0	0	0	17,000
				71600	In-country travel	1,500	0	0	0	1,500
Activity 2 Total		62000			GEF	79,340	114,220	91,720	86,720	372,000
Activity 2 Total		30000			KEMCO	69,275	11,175	11,175	11,175	102,800
Activity 2 Total		4000			UNDP	0	0	0	0	0
Activity 2 Total		SUBTOTAL				148,615	125,395	102,895	97,895	474,800
<i>Outcome 3. Financing Support</i>	MCUD	30000	KEMCO	71200	International experts	7,500	7,500	7,500	7,500	30,000
				72100	Contractual services	7,000	0	0	0	7,000

GEF Outcome/ATLAS Activity	Responsible party	Chart of account			ATLAS Budget Description	Budget by years				
		Fund ID	Donor	Account		2010	2011	2012	2013	Total
<i>provided to those interested in energy efficiency in their dwellings.</i>				71300	National experts	7,975	7,975	9,875	8,975	34,800
				71400	Administrative Assistant	0	500	500	500	1500
				71600	Training	2,000	2,000	2,000	2,000	8,000
				74500	Meetings and workshops	2,000	0	0	0	2,000
				74200	Publication and dissemination	1,500	1,500	1,500	1,500	6,000
				74500	Miscellaneous	1,000	1,000	1,000	1,000	4,000
	MCUD	4000	UNDP	72600	Policy grant	100,000	100,000	0	0	200,000
MCUD	30000	XacBank	72600	Policy grant	300,000	400,000	600,000	700,000	2,000,000	
Activity 3 Total		62000			GEF	0	0	0	0	0
Activity 3 Total		30000			KEMCO	28,975	20,475	22,375	21,475	93,300
Activity 3 Total		4000			UNDP	100,000	100,000	0	0	200,000
Activity 3 Total		30000			XacBank	300,000	400,000	600,000	700,000	2,000,000
Activity 3 Total		SUBTOTAL				428,975	520,475	622,375	721,475	2,293,300
<i>Outcome 4. Monitoring and Evaluation</i>	MCUD	62000	GEF	74100	International consultants	0	15,000	0	15,000	30,000
			GEF	71300	National experts	3,000	5,000	0	5,000	13,000
			GEF	71600	Inception workshop	3,000	0	0	0	3,000
			GEF	72100	Audit firm	500	500	500	500	2,000
			GEF	71600	In-country travel	5,000	5,000	5,000	5,000	20,000
Activity 4 total		62000			GEF	11,500	25,500	5,500	25,500	68,000
Activity 4 Total		30000			KEMCO	0	0	0	0	0
Activity 4 Total		4000			UNDP	0	0	0	0	0
Activity 4 Total		SUBTOTAL				11,500	25,500	5,500	25,500	68,000
Project management	MCUD	62000	GEF	71300	Personnel	21,250	21,250	21,250	21,250	85,000
	MCUD	30000	KEMCO	72200	Office equipment	14,200	2,000	500	0	16,700
				73100	Office rental & expenses	2,000	2,000	2,000	2,000	8,000

GEF Outcome/ATLAS Activity	Responsible party	Chart of account			ATLAS Budget Description	Budget by years				
		Fund ID	Donor	Account		2010	2011	2012	2013	Total
				72500	Travel	5,000	5,000	5,000	5,000	20,000
				74500	Miscellaneous	1,500	1,500	1,500	1,500	6,000
	MCUD	4000	UNDP	71300	Personnel	16,250	16,250	16,250	16,250	65,000
				72200	Office vehicle, fuel and maint.	29,000	2,000	2,000	2,000	35,000
Activity 5 total		62000			GEF	21,250	21,250	21,250	21,250	85,000
Activity 5 total		30000			KEMCO	22,700	10,500	9,000	8,500	50,700
Activity 5 total		4000			UNDP	45,250	18,250	18,250	18,250	100,000
Activity 5 Total		SUBTOTAL				89,200	50,000	48,500	48,000	235,700
GRAND TOTAL						854,890	928,170	868,670	963,270	3,615,000

Summary of funds:⁹

	2,010	2011	2012	2013	Total
GEF	204,990	360,270	205,870	203,870	975,000
KEMCO	204,650	49,650	44,550	41,150	340,000
UNDP	145,250	118,250	18,250	18,250	300,000
XacBank	300,000	400,000	600,000	700,000	2,000,000
GoM (in-kind)	12,500	12,500	12,500	12,500	50,000
GTZ (in-kind)	150,000	0	0	0	150,000
TOTAL	1,017,390	940,670	881,170	975,770	3,815,000

⁹ Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc...

5. MANAGEMENT ARRANGEMENTS

- The primary stakeholder of this project is the Ministry of Construction and Urban Development (MCUD), which is the designated national executing agency (i.e., implementing partner of UNDP-Mongolia) for the project. The MCUD, which is responsible for development and control of the country's construction sector and for developing and administering the building codes, norms and standards system, has committed to support the implementation of the project, given the benefits that it would provide to Mongolia and to the global environment. Moreover, MCUD is the strategic implementing entity for the key project component covering the development and implementation of the BCNS system. The MCUD also provides significant synergies with its "100,000 Dwellings" Program (formerly the "40,000 Dwellings" Program), with the activities of that program providing a platform for demonstrations on the application of improved energy efficient building technologies.
- Project implementation will adhere to **National Execution Modality (NEX)**. The Ministry of Foreign Affairs (MFA) is the focal point for coordinating UNDP's technical cooperation in Mongolia. The designated Implementing Partner of the project will be MCUD which is ultimately responsible for the timely delivery of inputs and outputs and for coordination of all other Responsible parties including other line ministries, relevant agencies, and local government authorities. MCUD will establish a Project Implementation Unit (PIU) within its location to execute the project activities, including management of day-to-day operations of the project, and the overall operational and financial management and reporting of the UNDP funds in accordance with the NEX Modality.
- **Project Board (PB** - formerly Project Steering Committee) is responsible for making management decisions for a project in particular when guidance is required by the Project Manager. The Project Board plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

In order to ensure UNDP's ultimate accountability for the project results, PB decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition.

Potential members of the PB are reviewed and recommended for approval during the PAC meeting. The PB contains three roles; 1) Executive role for representing the project ownership, 2) Senior Supplier role to provide guidance regarding the technical feasibility of the project, and 3) Senior Beneficiary role to ensure the realization of project benefits from the perspective of project beneficiaries. The Project Board will be chaired by the State Secretary of MCUD. The PB will be composed of designated senior-level representatives of the following organizations in accordance with the Results Management Guide:

1. State secretary of MCUD – *Chair of the Board/Executive*
2. National Project Director appointed by MCUD - *Senior Supplier*
3. Ministry of Nature and Environment and Tourism (from officer from DNA/CDM)- *Senior beneficiary*
4. UNDP Mongolia (Energy Programme Officer) – *Project Assurance*
5. National Centre for Construction, Urban Development and Public Utilities
6. Khas Bank
7. GTZ Urban Development Program
8. State Specialized Inspection Agency
9. UB City Government
10. Construction and Architecture Corporation
11. Energy and Development Centre
12. Representative of UB Songinokhairkhan district
13. Representative of UB Chingeltei district

Appointments to the PB will be on an honorary basis and no fees will be paid. Upon request of NPD to nominate a PB member, the heads of the respective organizations shall appoint its relevant staff to represent them to the PB which is to be confirmed in the form of a nomination letter to NPD. The PM

serves as a secretary to PB with a status of a non-voting member. The TOR of the PB is presented in Annex 3.

- **Project assurance** - UNDP Mongolia will support project implementation by assisting in monitoring project budgets and expenditures, recruiting and contracting project personnel and consultant services, subcontracting, procuring equipment, and providing other assistance upon request of MCUD. UNDP Mongolia will also monitor the project implementation and achievement of the project outcomes/outputs and ensure the efficient use of donor funds. Financial transactions, reporting and auditing will be carried out in compliance with national regulations and UNDP rules and procedures for national execution. UNDP will carry out its management and monitoring functions through an assigned Programme Officer in the Country Office in Ulaanbaatar, who will be also responsible for the project coordination with NPD and the project team, and other national counterparts.

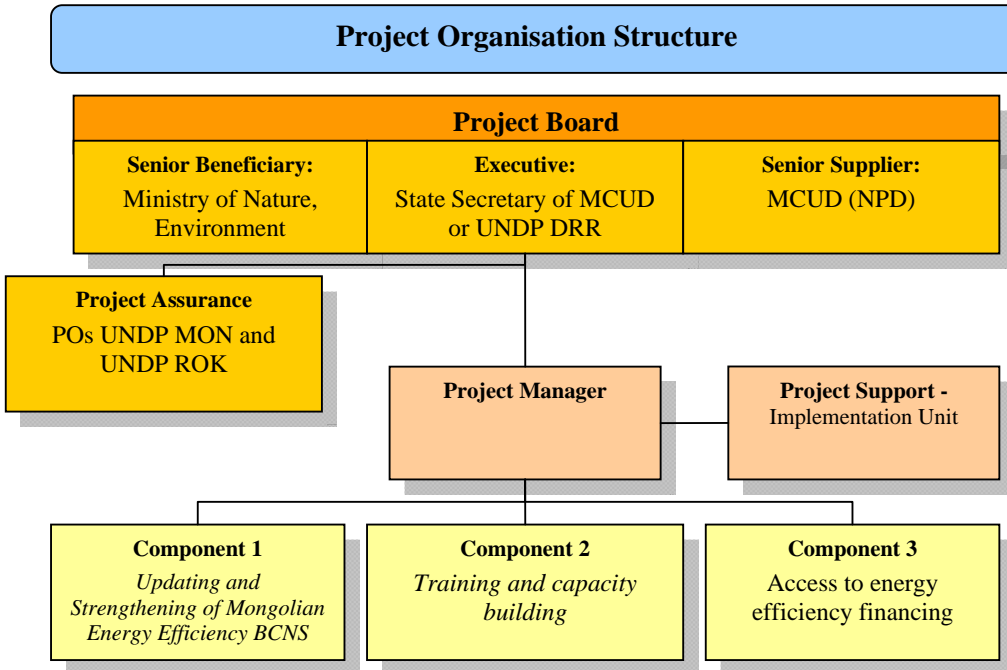
UNDP Korea, who actively facilitated mobilization of the resources for BEEP, will provide assistance in receiving cost-sharing contributions from the ROK Government in accordance with the payment schedule, monitoring the progress, issues, and risks through UNDP Mongolia, assisting in the timely submission of annual reports, coordinating budget revisions, if required and liaising with the donor on monitoring visits, if needed during the project implementation.

The GEF Regional Technical Advisor for Climate Change (through the UNDP-GEF Regional Coordination Unit) will provide quality assurance for the project through the UNDP CO.

- **Project Manager** – (PM). He/she will be a national professional designated for the four-year duration of the project. The PM is responsible for day-to-day management for the project. The PM's prime responsibility is to ensure that the project produces the results specified in the project document to the required standard of quality and within the specified constraints of time and cost. TOR of PM is presented in Annex 3.

The PM will work under the guidance of a **National Project Director** (NPD), a senior level official of MCUD appointed by the Minister. The NPD will be responsible for ensuring the proper implementation of the project on behalf of the Government. In doing so, the NPD will be responsible for overseeing proper project implementation for the Government of Mongolia. Terms of reference of NDP is given in Annex 3. An **alternate NPD** will be nominated by the Minister to ensure smooth operation of the project in the absence of NPD.

- **Project-Support** - PM will be supported by a core technical and support staff forming **Project Implementation Unit** (PIU) located at the MCUD. The following composition of the team is viable for smooth implementation of the project:
 - National Project Manager
 - 3 professional staff:
 1. Policy and Institutional Development Officer, responsible for Outcome 1
 2. Training and Technical Development Officer, responsible for Outcome 2
 3. Energy Efficiency Finance Officer, responsible for Outcome 3
 - 1 Administration and Finance Officer
 - 1 translator/interpreter with extra secretarial duties
 - 1 driver
 - 2 local coordinators (in 2 khoros)
 - Local coordinators (LC) at khoroo levels will be responsible for the implementation of all project activities at khoroo level. In order to facilitate a participatory decision making, transparency and good governance at community level, the Khoroo Resident Representative Meeting (Local Parliament) will serve as a local decision making body for project activities, and LC will serve as a secretary to RRK on project matters only.



6. MONITORING FRAMEWORK AND EVALUATION

The project will be monitored through the following M& E activities. The M& E budget is provided in the table below.

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team staff time</i>	Time frame
Inception Workshop and Report	<ul style="list-style-type: none"> ▪ Project Manager ▪ UNDP CO, UNDP GEF 	3,000	Within first two months of project start up
Measurement of Means of Verification of project results.	<ul style="list-style-type: none"> ▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. 	7,000	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on <i>output and implementation</i>	<ul style="list-style-type: none"> ▪ Oversight by Project Manager ▪ Project team 	0.0	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG 	0	Annually
Periodic status/ progress reports	<ul style="list-style-type: none"> ▪ Project manager and team 	0	Quarterly
Mid-term Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	18,000	2011
Final Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team, ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	18,000	2013, at least three months before the end of project implementation
Project Terminal Report	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ local consultant 	0	2013, at least three months before the end of the project
Audit	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Project manager and team 	2,000	Yearly
Visits to field sites	<ul style="list-style-type: none"> ▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives 	20,000	Yearly
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US\$ 68,000 (~7% of total budget)	

Project start:

A **Project Inception Workshop** will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan. The Inception Workshop should address a number of key issues including:

- a) Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- b) Based on the project results framework and the relevant GEF Tracking Tool if appropriate, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- c) Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- d) Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- e) Plan and schedule Project Board meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.

An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

- Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.
- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).
- Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs can be used to monitor issues, lessons learned etc... The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually:

- Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements.

The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
- Project outputs delivered per project outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management
- ATLAS QPR
- Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

Periodic Monitoring through site visits:

UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of project cycle:

The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (insert date). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present

initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the [UNDP Evaluation Office Evaluation Resource Center \(ERC\)](#).

The relevant GEF Focal Area Tracking Tools will also be completed during the mid-term evaluation cycle.

End of Project:

An independent [Final Evaluation](#) will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

The **Terminal Evaluation** should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the [UNDP Evaluation Office Evaluation Resource Center \(ERC\)](#).

The relevant GEF Focal Area Tracking Tools will also be completed during the final evaluation.

During the last three months, the project team will prepare the [Project Terminal Report](#). This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and knowledge sharing:

Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

7. LEGAL CONTEXT

Standard text has been inserted in the template. It should be noted that although there is no specific statement on the responsibility for the safety and security of the executing agency in the SBAA and the supplemental provisions, the second paragraph of the inserted text should read in line with the statement as specified in SBAA and the supplemental provision, i.e. “the Parties may agree that an Executing Agency shall assume primary responsibility for execution of a project.”

This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA [or other appropriate governing agreement] and all CPAP provisions apply to this document.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP’s property in the implementing partner’s custody, rests with the implementing partner.

The implementing partner shall:

- a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;
- b) Assume all risks and liabilities related to the implementing partner’s security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

8. ANNEXES

ANNEX 1. ENDORSEMENT/COMMITMENT LETTERS

ANNEX 2. CO2 EMISSION REDUCTION CALCULATION

ANNEX 3. DETAILED BARRIERS FOR EACH MONGOLIAN BUILDING SUB-SECTOR

ANNEX 4. TERMS OF REFERENCES

Annex 1. Endorsement/Commitment Letters

1.1 GEF OFP Endorsement Letter

1.2 Co-financing Commitment Letters

Annex 2. CO2 Emission Reduction Estimates Summary

The BEEP includes the implementation of enhanced energy efficiency provisions of the Mongolian national Building Code/Norms/Standards (BCNS) system, and the provision of voluntary building energy efficiency guidance control provisions to private houses, to achieve GHG reductions directly where building controls are applied and to houses on a voluntary basis. The project also provides technical support for the development and dissemination of improved building energy efficiency technologies. The project provides training support and awareness of project supported building energy efficient technologies to ensure that available technologies are actually deployed and actually achieves GHG reductions. These main GEF supported activities are all designed to continue their GHG impacts post-project.

The project will also provide flow on GHG reductions from positive spillover effects to the entire residential and commercial buildings sector buildings. In urban *ger* areas, the project will create positive spillover effects from demonstration effects, enhanced skills quality of energy efficient building techniques and word-of-mouth awareness raising to new private houses that are not directly and explicitly targeted or assisted by the project.

Project CO₂ Emissions Reductions

The following are the important parameters underlying the CO₂ emissions reduction that could be expected from the BEEP project:

1. New buildings comply with new building control system energy efficiency BCNS provisions to a greater extent than they comply with the baseline BCNS system, with an average compliance increasing from the baseline 25% to the alternative scenario's 85% in 2015;
2. The stringency level (energy efficiency level of buildings that fully comply with the BCNS energy efficiency performance or insulation level) increases from the baseline 150 kWh/m²-yr to the alternative scenario's 135 kWh/m²-yr and this enhanced energy efficiency level is implemented in time for the start of the 2011 construction season;
3. New building materials, technologies and techniques are successfully developed, disseminated and assist in the new BCNS energy efficiency provisions' enhanced effectiveness;
4. The CO₂ emission factor used in calculating CO₂ emission reductions is an average of 0.6 tonne CO₂/MWh for district heat and electricity supplied to construction sector buildings from CHP plants and HOB. For urban *ger* areas the direct project savings are assumed to come only from coal savings from the insulation funded under the project with the coal savings emissions factor for Baganuur or Nalaikh coal (as used in UB) producing 1.62 tonne CO₂/ ton coal saved.

With successful completion of the barrier removal and other capacity building and technical assistance activities that will be implemented as well as the EE investments funded by XacBank, it is expected that the cumulative direct CO₂ emission reduction will be 63,000 tonnes of CO₂ over a 20 year period. Considering the flow on effects of the project to the entire residential and commercial buildings sector, it is estimated that the indirect CO₂ emission reduction will be between 189,000 – 240,000 tonnes of CO₂. Using the lower end of the range, the unit abatement cost (UAC) comes to approximately US\$ 3.87/tonne CO₂ (i.e., GEF\$ per tonne CO₂).

Results Overview

Measure	Emissions Reduction (tCO ₂)
Direct	63,000
Indirect Bottom-up	189,000
Indirect Top-down	240,000

Direct GHG Emissions Calculation

EE investments stimulated by the project

Total area of new construction that will benefit from XacBank loans, m ²	Baseline energy intensity for new construction, kWh/m ² /yr	Baseline energy consumption, kWh	Baseline GHG Emissions, t-CO ₂	Target energy consumption, kWh/m ² /yr	Energy consumption for new buildings with BEEP, kWh	Annual savings for new construction, kWh	GHG emission factor, kg CO ₂ per kWh	Total GHG emission savings, tonnes
100,000	188	18,750,000	11,250	135	13,500,000	5,250,000	0.60	3,150

Direct GHG emission savings through 2029 (20 year period) 63,000

Indirect GHG Emissions Calculation

➤ Bottom-up calculation

Assuming a replication factor of 3, which is in line with market transformation programs, the bottom-up indirect GHG emissions reduction is 189,000 tonnes of CO₂.

➤ Top-down calculation

Coal comprises the bulk of Mongolia's energy production, generating 80% of the country's power and heat, with oil products (mainly diesel oil) accounting for the remainder. According to current estimates of population and economic growth, Mongolia may experience a three-fold increase in energy demand by the year 2020. As mentioned in the baseline analysis, the estimated cumulative baseline CO₂ emissions from newly constructed buildings in the Mongolian residential and commercial buildings sector is 1.2 million tonnes. Assuming that the technical and economic potential for GHG mitigation in this sector is a 25% reduction compared to the baseline scenario (this is consistent with Mongolia's Initial National Communication), the cumulative CO₂ mitigation potential in this sector is 300,000 tonnes of CO₂. Applying a GEF causality factor of 80% yields a total top down indirect GHG emission reduction of 240,000 tonnes of CO₂.

Annex 3. Detailed Barriers for each Mongolian Building sub-sector

CONSTRUCTION SECTOR BUILDINGS

In principle the construction sector covers all buildings. However, as the term is defined and used in Mongolia, the “construction sector” effectively only includes commercial and apartment multi-storey heavyweight concrete and masonry buildings (and a few private houses). This is because the buildings in this sector are the only buildings connected to water supply, sewage and CHP or HOB district heating and domestic hot water systems. The system of building controls used still continues the socialist period’s historical pattern where building controls were largely applied by means of permission to connect to these utilities being conditional on compliance of the buildings with the various requirements of the BCNS system, including for building energy efficiency. So when people talk about the Mongolian “construction sector”, they really only mean the multi-story buildings sector, where 40% of the urban population lives, and where only around 20% of the total Mongolian population lives.

The current wall, roof and window (“no-think” schedule) insulation requirements of the current “BNaR (Building Norm and Regulations) 2.01.03 Construction Thermo-Technics” are realistic for Mongolia’s climate. The requirements for apartments are R-value of 3.5 for Walls (equivalent of 150mm of fiberglass insulation), 4.6 for roofs, 5.2 for attics and 0.53 (effectively, triple glazing) for windows in the UB climate zone. The requirements are slightly lower for commercial buildings, as is logical given their lower occupancy and higher internal energy loads providing internal background heating. Ground floor, basement and foundation insulation levels are based on calculations, and not on specified R values. Equivalent R-values were not readily apparent for ground floor, basement and foundations, but were reported to be inadequate, and these inadequate levels are also apparently frequently not complied with nor enforced even in the construction sector buildings.

In principle, these BNaR 2.01.03 insulation requirements apply to all new buildings, but in practice, only the construction sector is currently subject to mandatory building controls. At present, the building control agencies with mandatory building code enforcement powers are (1) the State Specialized Inspection Agency which controls buildings of a size greater than 2000m³ in UB and all “construction sector” buildings elsewhere in Mongolia, and (2) the UB City Government which applies the building controls for the limited number of construction sector buildings under 2000m³ in UB. In practice, the inspectors are similarly trained and motivated in both systems, so they can effectively be considered as part of one integrated building controls system, for construction sector buildings only. However, it appears that beyond wall insulation levels, these two inspection agencies do not enforce high levels of compliance with mandatory BCNS energy efficiency requirements. There have also been proposals for private sector buildings to be controlled by private sector inspection agencies with direct state inspection control to then be focused only on state funded buildings. It does not seem that this proposed change is likely to happen anytime soon, and in any case while no doubt desirable in other regards, such a change would not in itself make much difference to the current level only moderate of BCNS energy efficiency compliance in Mongolia.

The development and control of the construction sector has traditionally been the primary buildings focus of the Ministry of Roads, Transport, Construction and Urban Development and its predecessors, as well as of the City governments of Ulaanbaatar, Erdenet and Darkhan cities and for Aimag center governments. So a key BEEP project barrier is that, in practice, the construction sector is currently the only part of the building sector that is currently covered by building controls and enforcement.

The Mongolian building controls and enforcement system is still working under a very strong legacy of Mongolia’s pre-1990 socialist system. Of the huge number of theoretically still applicable construction norms and standards (nearly 700 according to some estimates), around a third are still in Russian (noting that few people under 30 in Mongolia are now likely to be able to read Russian), around a third are translated directly from Russian into Mongolian with no changes, and only around a third are tailored (to some degree) to Mongolian conditions and published in Mongolian. Many of the requirements are not only too detailed and complex for non-technical experts to understand, and the documents are not very readable and accessible, but apparently some stated requirements in different documents are also contradictory. Even in the construction sector, some key BNCS energy efficiency requirements are clearly not being enforced, such as the insulation value for windows being only able to be met by triple glazing (R 0.53) but that 90% of new windows are still using double glazing (R value of less than 0.4 with the common PVC frames now used) or that ground floor, basement and foundation and roof insulation as designed and approved is apparently commonly being replaced by cheaper and lower insulation alternatives due to constrained budgets or cost-cutting exercises. So a key

barrier is that the current Mongolian BCNS system is prescriptively orientated, confusing to comply with and enforce, contradictory, and well overdue for rationalization and simplification around a more easy to understand and use modern performance based building controls approach.

Most of the norms and standards are rooted in 1960's and 1970's Soviet Union building practices and construction methods for the mass construction of buildings of standardized designs and materials. This approach focused on extreme simplicity, low construction cost, minimal maintenance, and durability over optimized ongoing energy use. With the collapse of centrally planned Mongolian industry from 1990, and gradual revival of the economy in a more market focused guise from the mid-90's, an important barrier is now that many of the construction methods of the socialist period (which are still detailed and covered in the current Mongolian BCNS system) are no longer applicable. In particular, the mass-produced apartment building system with external non-load bearing un-insulated pre-cast concrete or Ceramazit panel walls is no longer used. These around 500 pre-cast panel buildings in UB account for around 50% of "construction sector" energy use and are now being considered for insulation and heating system retrofits by a CDIA project.

The BCNS system is also not aligned for independent and science-based certification and control of the quality, effectiveness and durability of the multiple private suppliers of building insulation materials, let alone imports, primarily from China. This is holding back the utilization of lower cost and more effective materials that are being developed by, or could be imported by, companies in Mongolia.

In the socialist period, good quality mineral wool and fiberglass insulation was made in Mongolia in centralized factories and was widely used, but the factories closed down as part of Mongolia's economic restructuring in the early 1990's. These large centralized insulation manufacturing factories are probably not viable to be revived, given the small size of the Mongolian market and Mongolia's open trading relationship with China. EPS (Styrofoam/Polystyrene) is now the most widely used insulation material and is made in Mongolia from styrene imported from China. This EPS seems to be of variable density, thickness, insulation value and effectiveness with apparently few effective building controls being in place to police its use as insulation.

The largest glazing manufacturer in Mongolia makes all their windows (with triple glazed units at a 4 – 20 % price premium over baseline double glazing) with modern insulating argon gas filling. However, around 20 smaller glazing factories and hundreds of roadside window assemblers make lower cost double glazed-only units without argon gas filling - although only triple glazed units or top quality argon filled double glazed windows meet the current BCNS windows heat loss requirements in UB - that in theory apply to all new buildings.

Therefore, a key barrier is that critical insulation materials, such as EPS and insulating windows, as currently used in Mongolian buildings, and promising alternatives such as mineral wool, fiberglass and argon filled and "low-e" windows, are not widely available or are of poor quality, durability and insulation effectiveness.

Construction sector buildings are generally supplied by space heating and domestic hot water from combined heat and power (CHP) plants, or from district heat only boilers (HOB), both burning inexpensive local Mongolian brown (lignite) coal. The main CHP plants (no 4 and partly no 3) are now mostly rehabilitated, of reasonable efficiency, and with moderate average flue gas particulate control. However, the HOB plants are generally still very inefficient, with no flue gas control and hence very high emissions of particulate matter, thereby adding to the generally extremely bad winter urban ambient air quality in Mongolia.

Space heating supply (winter only) and the separate domestic hot water system (operating at lower temperatures and for the whole year) from the CHP plants and HOB is distributed in heat distribution networks that are generally under-insulated, with high water leakage losses. The high make-up water requirements, coupled with generally inadequate (if any) water treatment, leads to major boiler and distribution heat system pipe work scaling and hence limited life and a frequent need for boiler, pipe work and radiator replacement, exacerbating financial losses and leading to inexpensive and poor quality replacement components being used.

A further key barrier in the construction sector is that the tariffs for heat supply from CHP and HOB heat sources are still generally well below the full financial cost of heat supply (for social, poverty and historical reasons). This under-pricing of district heating reduces the incentives for adequate insulation levels, high insulation level windows and the use of user-controllable radiator pipe work layouts and automatic heat output controls (esp. TRV).

EXISTING CONSTRUCTION SECTOR BUILDINGS

Existing socialist period construction sector buildings are present in large numbers (around 4000 in UB). In central city areas they may be replaced by private developers with newer/larger buildings, but elsewhere the socialist period buildings are likely to remain in use for decades to come. These existing buildings have minimal levels of insulation and need to be retrofitted with extra (generally external) wall insulation and modern lower heat loss windows to replace old leaky socialist period twin openable wooden windows. These existing buildings are not fitted with heat meters, nor do tenants have user-controllable heat output controls on their radiators, nor can automatic temperature control thermostatic radiator valves (TRV) be fitted due to the single pipe vertical heating pipe layouts used.

Therefore, for these existing socialist period buildings a key barrier is that building owners and tenants have no means to control their heat use except by opening their windows and venting excessive heat to the outside, nor do they have any incentive to fit (expensive) retrofit insulation or modern insulating and air-tight windows. Given the low income level of most occupants of existing apartment buildings, it is not realistic to expect any future building control system to be able to mandate, let alone enforce, the necessary costly retrofitting of insulation, re-piping of radiators, the fitting of heat meters, the use of consumption based heat tariffs, the fitting of controls such as TRV on radiators, and the installation of triple glazed or other equivalent performance insulating windows. CDIA has funded a pre-feasibility study, and funding by KfW for a feasibility study and initial investment phase project is now under consideration, so it is not proposed that BEEP, with its limited resources and timescale, try to add to these existing and planned efforts by others.

NEW CONSTRUCTION SECTOR BUILDINGS

New construction sector buildings are being built in growing numbers as the Mongolian economy develops, and as Mongolian and foreign capital starts to invest in this sector. A key barrier is that the complex and outdated BCNS system and its current imperfect system of enforcement does not lead to most construction sector buildings being built with the mandated levels of insulation (e.g. the triple glazed windows required to meet the current BNaR 2.01.03 mandated levels are apparently only installed in around 10% of new buildings), nor does it encourage the use of lower cost or enhanced performance innovative building insulation and cladding materials.

MCUD, and its associated research and development agencies, appear to be keen to base the new Mongolian BCNS system, and presumably the necessary underlying new/updated technical Standards that will be required as well, on an existing building code from another country. However there are likely to be significant structural, insulation, materials, rainfall, HVAC system, building controls and enforcement approach and capacity, fuels and heating energy systems differences between the Mongolian building sector and that for any other country. This will make the translation of another country's building control system into a suitable Mongolian language and relevance version a non-trivial exercise.

BEEP can only address the elements of the BCNS system that are directly related to energy considerations. So BEEP can only deal with one out of the around seven main building control regulatory categories (regulatory principles and management, structural and durability, electrical and communications systems, plumbing and sanitary, fire safety, surveying and cost estimation, and HVAC systems) of the current Mongolian BCNS system. This should not pose a problem as a stand-alone BCNS energy efficiency system should be able to developed before other parts of the wider BCNS system are developed

A specific key barrier to simply adopting another country's Building Energy Code approach in Mongolia is that only around 10-20% of it is likely to be directly relevant to Mongolian buildings, fuels, energy systems and climate. So in practice it may be simpler and more efficient to start with a national building energy efficiency code approach that is simpler, more performance oriented, and can call up a much smaller number of key technical standards (as these will need to also be developed for Mongolian conditions, climate, construction methods and stage of economic development) than just translating another country's BCNS approach. This simplified performance based approach is proposed to be followed in BEEP. This proposed focused BEEP approach is also more compatible with BEEP's limited budgets as well as limited timescales compared to those that have been applied in more ambitious and wide ranging BCNS systems, such as for developed countries, over decades of development.

Around 60% of urban families live in *ger* areas in a mixture of traditional Mongolian felt tent *ger* (around 70% of *ger* are “5 wall *ger*” of 25m²), and in slightly larger informally constructed private houses that are generally built with minimal levels of insulation and high ventilation heat losses. These *ger* area private houses are of generally modest quality as there is a general lack of knowledge, construction skills, and available funding. To reduce costs the workers are usually hired directly by the urban family and not employed and supervised by a construction company. These private houses are usually small (6 or 8m by 4m is typical). There are also some (around 1.5% of houses) larger houses (typically of 40 – 80 m²) which have insulation of less than R 1.5 (optimal levels would be around R 3.5 for a Mongolian climate) and usually use inexpensive Chinese boilers and hot water radiator systems for heating. Larger houses sometimes have a second storey which is not heated or occupied during Mongolia’s bitterly cold winters. Sometimes, private houses are only used in summer and not occupied during winter with a *ger* being used instead due to its smaller size and sometimes superior insulation, or families rent a city apartment in winter to reduce travel times to work and school and utilize the superior district heating provision of apartment buildings.

Both *ger* and small private houses are estimated to use on average around 5 tons of coal and 1.5 tons of (mostly unsustainable) fuel wood per year for fuel (large private houses use around 10 – 15 tons of coal per year and around 2.5 tons of fuel wood), most in the winter and mostly for space heating. Calculations and the results of some studies suggest that the energy use of *ger* and small private houses could be halved with optimal levels of insulation and halved again with high efficiency smokeless stoves (although less savings would be achieved with improved *ger* area stoves technology as they could be produced at an acceptable price). In practice, some of the insulation and stove energy efficiency savings would be taken as improved and more consistent internal temperatures. However, coal use of under 2 tons/year for *ger* and small private houses along with greatly reduced fuel wood use would seem to be technically achievable from results from previous projects and studies.

There are also housing areas where single family houses are being built under the Habitat for Humanity NGO community development scheme for less than US\$2000 for an around 35m² house. However, in spite of realistic insulation design guidelines being available, it seems that in practice insulation levels have generally been minimal in the Habitat for Humanity new houses (apparently 5cm of EPS in walls and less in ceilings and none in floors is common) so the insulation levels, under-heating and energy use of these houses are probably broadly similar to that of *ger* and other private houses.

In the countryside, nomadic families mostly continue to live in traditional *ger*, although they often move with their *ger* to Soum centers in winter for social, education and evening electricity supply reasons. In the countryside heating fuels are mainly dung and wood, so GHG reduction potentials are more limited than in urban areas. Hence BEEP is proposed to only focus on the urban buildings sector.

Ger were traditionally insulated with one layer of felt in summer and two layers in winter. In the socialist period, most *ger* were insulated with either two layers of felt or one layer of felt and a winter insulation blanket of cotton from Soviet Central Asia. However, since the 1990 post-Soviet Union economic contraction in Central Asia, and the adoption of market pricing for Central Asian cotton, the use of cotton in winter insulation blankets is no longer cost effective. The existing cotton insulation blankets are now worn out and mostly ineffective. It is estimated that only 70% of urban *ger* are now insulated in winter with two insulating layers (for an R value of around 1.0, and an R-value of 0.5 for one layer of felt). *Ger* are generally occupied by the lowest income families with no savings and often limited winter income levels.

Therefore, affording the necessary 5 tons of coal and 1.5 tons of fuel wood for adequate heating throughout the long harsh Mongolian winter is a major drain on urban poor finances (fuel poverty). A key barrier is that without financing assistance the *ger* families would also struggle to afford to purchase outright the current around \$200 *ger* insulation blankets developed by the MON/99/G35 project (giving a *ger* R value of 1.5 when combined with one felt layer). New felt *ger* blankets cost around \$300 and give slightly less insulation value than the new insulation blankets. Such families also often lack the collateral or proof of income necessary to obtain finance from banks, although the *ger* insulation blankets are proven to approximately halve *ger* fuel use and to pay for themselves in around 18 months. The ADB and XacBank *ger* insulation blanket projects aim to provide 14,000 *ger* insulation blankets in UB, and hence are expected to make a major impact in insulating *ger* in UB.

A further key barrier is that nearly all *ger* and small private houses use inexpensive locally manufactured lightweight welded steel stoves for heating and cooking. Such stoves are appropriate for a rural nomadic lifestyle in *ger* using mostly abundant local dried dung as a fuel. In small houses, the stoves are generally connected to wall heat exchange units (“wall stoves”) hand made on site from mud that usually give improved heat transfer and hence somewhat higher efficiency. However, such *ger* and private house stoves are not really appropriate for heating the under-insulated private houses and *ger* in urban *ger* areas in temperatures as low as -40°C, where they burn coal and fuel wood with low efficiency and extremely high particulate and smoke emissions. As the *ger* and private house stoves have minimal mass and no insulation, they cannot always be operated at low heat output, and hence often require re-lighting several times per day, accounting for a large fraction of the unsustainable and expensive firewood use. These stoves are also generally poorly sealed, causing low indoor air quality, especially for women and children. These stoves now apparently cause 90% of the extreme winter air pollution levels in UB (and increasingly in Darkhan and Erdenet as well). GTZ have now developed what seems to be higher efficiency stoves, and with some testing of the stove’s efficiency and a suitable certification of their efficiency and hours between refueling, there now seems to be the technical basis of improved *ger* area stoves.

Urban *ger* areas are comprised of 700m² land plots which, in principle, are granted free on request (privatized) to each Mongolian family. *Ger* areas comprise older more organized areas closer to city centers and new areas on city boundaries that are frequently weakly administered by the local sub-district (Khoroo) and neighborhood (Bagh) administrations.

A key barrier is then that state and city controls are generally weak. It is widely accepted that it is unrealistic to expect any effective enforcement of any minimum insulation levels or stove efficiencies for the *ger* and small private houses in these *ger* areas. This lack of control is a much wider issue than just for energy efficiency. Moves are underway to improve this situation, but it seems clear that many years of work and capacity building will be needed to make much impact in this regard. It does not seem that any BEEP activities would be able to make mandatory energy efficiency for small houses and *ger* a viable option.

There are a small but growing number of large private houses being built in and around urban centers by Mongolia’s small but growing wealthy class who are benefiting from the development of a market economy and the often cash basis of business. A key barrier is that these large private houses could afford to install extra insulation and high efficiency smokeless heating systems on a voluntary basis, but these houses are generally not formally designed or controlled to ensure this, and are generally unaware of the benefits of doing this.

SMALL PRIVATE HOUSES

Ger are small (70% are traditional ‘5-wall *ger*’ of 25m² floor area) and relatively costly to maintain as they use 3-10 year lifetime wall and ceiling felt and waterproof coverings that also need to be taken off and adjusted 4 times a year with the seasons, as well as limited lifetime floor coverings. So a natural progression in *ger* areas is that, as families become more settled and accumulate savings, they start to build similar sized, or slightly larger, lower maintenance private houses. Construction is usually undertaken by the homeowners themselves, or with directly engaged construction workers, and they use whatever materials are traditional, available and affordable. Architects, construction companies, construction guidelines, formal plans and external state inspections are generally not applicable to these small private houses’ construction. Construction materials are usually timber with inside and outside mud plaster coverings and no bulk insulation, or for the better quality houses 15cm thick solid wood, or wooden frames with weatherboard, brick, mud or plaster external finishes. Insulation levels are generally minimal with R value of less than 1.0 (with larger or better quality houses at best using 5cm of EPS of uncertain insulation value in walls and 3-5 cm EPS in ceilings and less, if any, in floors). Therefore insulation is inadequate, as a current widely accepted minimum insulation levels by Mongolian building professionals is 10cm EPS for floors and walls and 15 cm for ceilings. However, an optimal level of insulation is probably 20/25cm of high quality EPS or equivalent. Air leakage levels are high (measured at around 25% of total heat loss), and inefficient stoves are used (with estimated efficiencies as low as 25-35% for *ger* and 45 – 55% for small houses with wall stoves) with resulting extremely high particulate emissions. These small private houses in *ger* areas use approximately the same amount of energy as the *ger* they replace.

A key barrier is that regionally appropriate and available construction materials and techniques such as straw bale, engineered timber frame, and modern engineered earthquake designed mud-brick/adobe/rammed earth for

the southern Gobi region which lacks straw and construction timber, are not yet fully developed and/or widely accepted.

Further barriers are that the land may not yet be privatized, the family building the house may only have a short term lease on the land, the family may have limited/insecure/informal income, they may have limited collateral for a loan, demand for housing finance outstrips supply so interest rates are high and terms are short and banks tend to favor lending for apartments, and the homeowners and construction workers generally have low awareness of the value of insulation, the alternatives available, nor realistic means to make informed choices about any insulation material or installation quality.

Annex 4. Terms of References

4.1 Project Board

The **Project Board** (PB) provides overall technical advisory and management guidance, project assurance and oversight for the implementation of the project. Day-to-day coordination of the project will rest in the Project Manager. Appointments to the PB will be on an honorary basis and no fees will be paid.

The Project Board will meet semi-annually, or if need be, more often, to review progress of the project. The Project Board will be responsible for the following:

-
- Provide overall guidance and direction to the project, ensuring it remains within any specified constraints;
 - Agree on Project Manager's tolerances in the achievement of Outputs and Activities;
 - Review and approve end project report, make recommendations for follow-on actions;
 - Provide ad-hoc direction and advice for exceptional situations when the project manager's tolerances are exceeded;
 - Assess and decide on project changes;
 - Assure that all planned deliverables are delivered satisfactorily.
 - To monitor project implementation in terms of effectiveness and timeliness of inputs and in terms of the success of project activities.
 - To oversee and provide guidance to project activities and ensure such activities address national priorities.
 - To monitor project implementation to ensure that it remains in-line with the approved project document, financial rules and regulations of UNDP and requirements of any other donors providing co-funding.
 - To provide a forum for ensuring an integrated approach to project activities and serve as a forum for stakeholder input and discussion.
 - To resolve any conflicts or disagreements that arises with respect to project activities that cannot be resolved by the project team.
 - To facilitate implementation of project activities in their respective organizations.
 - To review Annual Project Reports (APRs) and annual work plans and budgets for project activities and consider proposed changes as recommended.
 - To participate in a Tripartite Review and propose strategic changes of the project document if needs arise.

For the process of closing a project:

- Assure that all products deliverables are delivered satisfactorily;
- Review independent project evaluation and approve the end project report;
- Make recommendations for follow-on actions and post project review plan;
- Notify project closure to the Outcome Board.

4.2 National Project Director

Duties and Responsibilities

The Ministry of Road, Transportation, Construction and Urban Development has been designated by the Government of Mongolia to oversee the national execution (NEX) of the UNDP-supported Building Energy Efficiency project on its behalf.

1. The **National Project Director** (NPD), appointed by the Minister for Road, Transportation, Construction and Urban Development, is a government representative, responsible for supporting implementation of the project. The NPD serves as the focal point on the part of MCUD and as such ensures effective communication between the government and other relevant national stakeholders/actors and monitors the progress towards expected outputs and strategic results under the project.
2. Specifically, the NPD's major responsibilities, in close collaboration with UNDP CO and the MCUD are:
 - (a) Undertake project advocacy at the policy level (high officials of the parliament, cabinet, line ministries, government agencies and other public sector institutions, civil society, private sector and the donor community) to ensure national commitment and contribution to the project objectives;

- (b) Undertake policy level negotiations and other activities to facilitate effective and efficient project implementation and maximize its impact;
- (c) Provide policy guidance to the PIU (Project Implementation Unit) congruent with national policies, including for the selection of local consultancy, training and other specialist services;
- (d) In consultation with the Ministry of Finance (MF) and the Designated institution concerned, ensures that requisite financial allocations are contained in the national budget, in accordance with the in-kind, cash or cost-sharing budgets, and the established schedules of payment;
- (e) Ensures that the project document revisions requiring Government's approval are processed through the MF (as a Government's Coordinating Authority), in accordance with established procedures;
- (f) Participate in the finalization and approve the Project Annual and Quarterly Work Plans and budget, in close discussion with the UNDP, to maximize the leverage of the project resources in order to achieve the desired overall state of development and immediate objectives set out in the project document; s/he may also approve individual payments on a day-to-day basis.
- (g) Supervise and approve the project budget revision and NEX delivery report;
- (h) Review jointly with the PIU success indicators and progress benchmarks against expected project outputs so that progress can be assessed, and review and clear Annual Project Progress and Terminal Reports;
- (i) Conduct regular monitoring sessions with UNDP and the PIU, including Project Appraisal Committee (PAC) Meeting, Annual and Terminal Tripartite Review Meetings to measure progress made or achieved towards the project objectives, and comment on Project Review and Evaluation Reports;
- (j) Report regularly to the Project Board on the project progress, in conjunction with the PIU staff;
- (k) Assess on regular basis staff work performance in the PIU, including that of National Project Manager, Administrative & Finance Assistant and other staff;

Establishes close linkages with other UNDP and UN supported as well as other donor or nationally funded projects/programmes in the same sector.

4.3 Project Manager

Organizational Setting

The **Project Manager** (PM), under supervision of the National Project Director (NPD), will be responsible for achieving the outputs and, hence, objectives of the project, and ensuring the co-operation and support from the executing and implementing agent(s).

Job content

The PM will be responsible for managing the implementation of the project, which includes personnel, subcontracts, training, equipment, administrative support and financial reporting keeping the NPD aware of all relevant factors which could impact on project implementation. The specific responsibilities of the PM will be to:

1. Set up and manage the project office, including staff facilities and services, in accordance with the project work plan;
2. Prepare and update project work plans, and submit these to the NPD and DRR/P UNDP CO for clearance and ensure their implementation consistent with the provisions of the project document.
3. Ensure that all agreement with designated project implementing agencies are prepared, negotiated and signed.
4. With respect to external project implementing agencies:
 - a) Ensure that they mobilize and deliver the inputs in accordance with their implementation agreement and contract, and
 - b) Provide overall supervision and/or coordination of their work to ensure the production of the corresponding project outputs.
5. Act as a principal representative of the project during review meetings, evaluations and in discussions and, hence, be responsible for preparation of review and evaluation reports such as the Annual Project Report (APR) for the consideration of the NPD.
6. Ensure the timely mobilization and utilization of project personnel, subcontracts, training and equipment inputs, whether these are procured by the Executing Agent itself or by other implementing agents:

- a) Identify potential candidates, national and international, for posts under the project
 - b) Prepare the ToR, in consultation with the implementing agent and subcontractors;
 - c) Prepare training programmes (in consultation with the implementing agents) designed for staff, with particular emphasis on developing an overall training plan.
 - d) Draw up specifications for the equipment required under the project; procure such equipment according to Government and UNDP rules and procedures governing such procurement.
7. Assume direct responsibility for managing the project budget on behalf of the NPD, ensuring that:
 - a) Project funds are made available when needed, and are disbursed properly;
 - b) Accounting records and supporting documents are kept;
 - c) Required financial reports are prepared;
 - d) Financial operations are transparent and financial procedures/regulations for NEX projects are applied; and
 - e) The project is ready to stand up to audit at any time.
 8. Exercise overall technical and administrative oversight of the project, including supervision of national and international personnel assigned to the project.
 9. Report regularly to and keeps the NPD/Executing Agency and UNDP CO up-to-date on project progress and problems, if any.
 10. Ensure timely preparation and submission of required reports, including technical, financial, and study tour/fellowship reports;
 11. Perform others coordinating tasks as appropriate for the successful implementation of the project in accordance with the project document.

Responsibilities on project completion and follow-up

In order to ensure the efficient termination of project activities, the PM will:

1. Prepare a draft Terminal Report for consideration at the Terminal Tripartite Review meeting (Project Board Meeting), and submits a copy of this report to the UNDP Resident Representative and designated Executing Agency's official for comments at least 12 weeks before the completion of the project;
2. Make a final check of all equipment purchased under the project through a physical inventory, indicating the condition of each equipment item and its location; discusses and agrees with the UNDP and the implementing agent(s) the mode of disposition of such equipment and follow up on the exchange of letters among the UNDP, Government and implementing agent(s) on the agreed manner of disposition of project equipment; take action to implement the agreed disposition of equipment in consultation with the project parties.
3. Ensure all terminal arrangements relating to project personnel are completed at the final closure of the project.

Accountability

The PM will work under the general guidance of and report to the National Project Director. The PM is accountable to UNDP for the manner in which he/she discharges the assigned functions.

The PM shall discharge his/her duties in line with the rules and procedures set forth in the UNDP National Execution Manual and other project management guidelines including, where applicable, the provisions of the agreements concluded with cost-sharing donors. The PM acts as the Certifying Officer. As such, he/she is responsible for the actions taken in the course of his/her official duties. The PM may be held personally responsible and financially liable for the consequences of actions taken in breach of the prevailing financial rules and regulations.

General qualifications

Education: Post-graduate level (preferable academic background)
 Experience: At least 5 years work experience in the relevant area;
 Demonstrated management experience and organizational capacity;
 Previous experience/familiarity with UNDP (or other donors) would be an asset.
 Skills: Good analytical skill, good interpersonal and communication skills, good computer skill
 Language: Fluent in both English and Mongolian