



# Midterm Evaluation Report

of

**Energy Efficiency in New Construction in the Residential and Commercial Buildings Sector in Mongolia (in short Building Energy Efficiency Project),  
MON/09/301**

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## EXECUTIVE SUMMARY

The UNDP Building Energy Efficiency project required a Mid-Term Evaluation to be conducted. The project selected “DKhBDS” Construction company to conduct this review and assessment of the project’s implementation and progress against the expectations and objectives contained in the Project Document<sup>1</sup>. The results of this evaluation of the Project may provide useful information for the design of a subsequent project. The mid-term evaluation of the project “Building Energy Efficiency” Project (BEEP) was carried out from February 13 to March 16, 2012.

The comprehensive Terms of Reference (TOR) given to the Evaluation Team were to coordinate and conduct the evaluation with participation from stakeholders and partner organizations. The team was responsible for the analysis of qualitative and quantitative information provided to it. Team members reviewed project documents, reports, and conducted interviews with project and government officials, researched the current status of selected subjects pertinent to project accomplishments.

The objective of the evaluation has been to determine the progress of the project achievements. Therefore, this mid-term evaluation focused on **achievements, successes and effectiveness** of the project through a review of the **impact and sustainability** of medium-term outputs and outcomes, including the contribution to the implementation of the national policy on construction, individual and organizational capacity development, and public awareness raising and education. The evaluation report includes a **detailed review of the three expected component**, and number of recommendations concerning actions to follow up.

The project is intended to achieve enhanced energy efficiency in the Mongolian buildings sector compared to the baseline (business-as-usual) scenario and following three components were considered:

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<sup>1</sup>UNDP, Project Document, BEEP-2009.

- **Component 1:** The project 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 the project 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.
- **Component 2:** the project 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.
- **Component 3:** the project 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.

The project activities covered mostly limited to Ulaanbaatar, Erdenet, and Darkhan since started and planned to extent the activity to regional centres Dalanzadgad, Dornod, and Khovd from 2012. Energy Efficient Centers in Ulaanbaatar, Erdenet, and Darkhan are working with project very closely in implementation of project activities at the grass root level.

**Overall, the medium-term results have been satisfactory. All the people benefited from the project spoke highly appreciative of the energy efficient houses.**

*Rating* of project results is done, using the scores of highly satisfactory (H), satisfactory (S), marginally satisfactory (M), and unsatisfactory (U), on the basis of the key indicators set in Project Log-Frame. The complete rating table with detailed information is attached in Annex Y. Summary of the results are presented in the below table.

Rating of project results	Scores
<b>Project Objective:</b> <b>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</b>	S
<b>Outcome 1: <i>Energy efficiency provisions of the Mongolian Building Code, Norms and related Standards (BCNS) updated and strengthened</i></b>	HS
<b>Outcome 2: <i>Training and Awareness Program</i></b>	S
<b>Outcome 3: <i>Access to energy efficiency financing facilitated</i></b>	MS

**Recommendations** to further carry out tasks are:

- In Mongolia, building energy consumption rate estimation based on square meter (m<sup>2</sup>), which means that users do not care. It is more appropriate to introduce energy utilization based system. Therefore, the project could consider introducing this system in remaining period of implementation.
- Building Energy Efficient house is very costly for the time being for not only low income but also middle income families. The design and size of the house do not meet the interest of middle and more income families. Also, almost 70 per cent of families in the *Ger* area has some kind of houses. Therefore, it is recommended to look for alternatives to provide support to low and middle income families to insulate and re-habilitate their existing houses as Energy Efficient. This option will be more attractive measure to increase energy efficiency in *Ger* area instead of building few even if 200 houses in random bases in term of location. Also, should consider for finding solution for decreasing the cost of the Energy Efficient houses. The cost should be similar to ordinary non-energy efficient houses, for enabling low income families to benefit building Energy Efficient houses.
- It is recommended to build Energy Efficient semi-attached house complexes, villages, towns instead of building individual houses at random bases. Can be considered options of building semi-attached energy efficient houses in combining of 2-3 households' fenced areas. Desirable cost per square meter should be lower than MNT 350,000 and bank loan rate lower than 1.2. Also, can be considered providing XacBank apartment loan for families, who is moving to apartment houses, certified with Energy Efficient Label.

- Consider re-structuring existing XacBank's loan risk sharing fund, which supported by the UNDP. One option can be establishment of "EE House Fund for Energy Conservation Centers (ECC)" at the XacBank with support from UNDP/BEEP. Purpose of this fund is for funding ECC for carrying out energy auditing for new and existing buildings.
- Introduce a system to provide economic and financial incentives for individuals as well organizations who build energy efficient houses.
- Recommended to conduct household interest survey on Energy Efficient housing, involving professional institution and determine suitable financial mechanisms specifically for low income families. Loan policy must be based on household's incomes.
- Investigate low cost, energy efficient construction materials and introduce in Mongolia
- Expand the promotion of energy efficient housing concept, models, establish sustainable financial mechanisms and provide trainings, where required.
- Recommended to recruit new Project Officer, responsible for Component 3 - Facilitating Access to Energy Efficiency for intensification of establishing sustainable financing mechanisms on energy efficient housing.

## Acknowledgments

We would like to thank all who contributed to this evaluation through sharing of experiences, points of views, ideas and suggestions as well as the providing of all required documents. We thank very much all the time and effort offered. Special appreciation goes to the project team for their trust, patience and cooperation during the evaluation. We are grateful to all interviewers for responding to our many questions. The field visits to households in Ulaanbaatar gave us the opportunity to see constructed energy efficient houses.

## Acronyms and Abbreviations

ADB	Asian Development Bank
APR	Annual Project Review
BCNS	Building Code, Norms and Standards (System)
BEEP	Building Energy Efficiency Project
DNA	Designated National Authority (for CDM purposes)
ECC	Energy Conservation Center
EE	Energy Efficiency
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
GoM	Government of Mongolia
MACE	Mongolian Association of Civil Engineers
MBMMA	Mongolian Building Materials, Manufactures Association
MCA	Millennium Challenge Account
MNET	Ministry of Nature, Environment and Tourism
MRTCUD	Ministry of Roads, Transport, Construction and Urban Development
MTE	Midterm Evaluation
MUST	Mongolian University of Science and Technology
NGO	Non-Governmental Organization
NPD	National Project Director
NPM	National Project Manager
ToR	Terms of Reference
WB	World Bank

## Chapter 1. INTRODUCTION

### 1.1. Objectives of the Evaluation

The Midterm Evaluation of the project is part of the on-going process to enhance monitoring and evaluation of UNDP program activities. The objectives of the evaluation were:

- Evaluate the effectiveness of project activity in the energy efficiency financing sector, status of agreement implementation between XacBank and UNDP.
- Evaluate housing policy and its interrelation with the green housing or EE housing.
- Evaluate the effectiveness of project activities in contribution to key objectives (Policy, and Public awareness) of the project
- Evaluate the impact and sustainability of project activities on the target communities, in particular, the level of beneficiary participation in project activities
- Evaluate the effectiveness of project management, particularly the partners capacity in coordination, monitoring, planning, reporting, learning and resource management

According to the UNDP Evaluation Guidance for GEF-financed projects and Terms of Reference (Annex I), the evaluation was focused on the achievements, success and effectiveness of the project by assessing impacts and sustainability of components' outputs such as the contribution to the implementation of the national policy on construction sector, individual and organizational capacity development, and public awareness and education. The evaluation highlights the best and worst practices in addressing issues related to relevance, performance and success. Based on the evaluation results, recommendation is made concerning actions to follow up and reinforce initial benefits from the project. Thus, the evaluation focuses on the merits of the project and how effectively have the activities been implemented. The evaluation report will be submitted to the project implementation unit of BEEP. The results are presented in more detail in following chapters.



## 1.2. Methodology of the Evaluation

Our methodology for evaluations coincides largely with that indicated in most UNDP ToRs.

Desk review of the key documentation (Project Document, project reports, minutes of meetings, key technical consultancy reports, etc.) to get an overview of the design and current level of implementation and an initial lead for interview questions.

A combination of interviews and direct observation. We preferred to use detailed interviews rather than questionnaires. Interviews, focussed on certain key points provide flexibility in allowing the evaluator to pick up on certain issues and draw vital information out from what often starts as a seeming “throw-away” answer to a question.

All interviews were treated as confidential and the point is made clear to all interviewees that any information used in the final report will not be attributable unless they wish it to be otherwise. All information so collected is cross-checked between various sources, also by interview as well as by critical observation of outputs, to ascertain its veracity. Occasionally, repeat interviews to clarify a key point may be necessary.

Divided the work between team members, so that the key responsibility for obtaining factual information on the activities and outputs (i.e. the results - what has actually been done), while we concentrate on other aspects such as the relevance of the design to current national priorities, the effectiveness of the management and oversight arrangements, the financial assessment, the efficiency of the implementation procedure, the monitoring and evaluation methods and risk assessment procedures, the sustainability (and where appropriate replicability) of the results, and the key cross-cutting issues that have affected the project, e.g. good/poor management, external challenges or barriers and gaps, lessons learnt and the extent the effectiveness of stakeholder involvement, etc.. Appropriate lessons learned are extracted.

All recommendations made provide details of who is responsible for carrying out the action, what the task and it’s timeframe are, and what the deliverable should be. Where a formal recommendation is inappropriate, a suggestion may be made instead.

Evaluations are undertaken using UNDP-GEF’s six point evaluation criteria, to assess the overall project performance; its implementation approach; stakeholder participation; monitoring and evaluation; and the sustainability will be assessed using the four-point scale of likelihood.

The final delivery status of each of the project’s indicators is also rated using the same scale and a four-point colour-coded ranking (green = indicators show achievement successful; yellow = indicators show some progress; orange = indicators show poor progress; and red = indicators show little or no progress).

### Evaluation plan and Key evaluation topics

<b>Topic</b>	<b>Methods</b>	<b>Schedule</b>
Understanding the project, and intervention strategy	Project Document review, discussion, interview	2 days
Understanding the role of the project team / project management	Interviews, , discussion with project team, observation	2 days
Identifying the stakeholders' roles, their relationships and participation in project activities	Output document review, discussion with project team, interview, field visit	6 days
Identifying outputs, outcomes, impact	Document review, interviews, questionnaire, group exercise with beneficiaries, field visit	3 days
Identifying useful indicators for rating and drafting the report	Team exercise	1 day
Presentation of preliminary findings	Presentation	0.5 day
Identifying options for the further activities of the project	Interviews, group exercise with project team	2 days
Drafting the report and get feedback from respective stakeholders	Team exercise	4 days
Finalize the report and submit		2.5 days

### 1.3. Structure and Evaluation Team

The evaluation team consisted of the following 3 professionals, who specialized in Monitoring and Evaluation, Constriction Engineering and Financial loan policy:

- Badraa Mijiddorj, Monitoring and Evaluation specialist
- Sanjaasuren Munkhtsetseg, Constriction Engineering
- Munkhgerel Altangerel, Financial loan policy specialist

A considerable amount of descriptive, reporting and summary documentation both in English and Mongolia was provided to the Team for review, as listed in Annex III. Every request for additional information or clarification was gratefully provided and delivered by the project team. Interviews were conducted by various Team members, and representatives of other selected officers of the Ministry of Road, Transportation, Construction and Urban Development with some additional technical or organizational representatives (Energy Efficient Centres, construction material providers, construction companies).

## Chapter 2. PROJECT DESCRIPTION AND DEVELOPMENT CONTEXT

### 2.1. Project Description

As summarized in the Project Document, 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. In order to fulfill this three integrated and synergistic components have been identified with set of activities.

#### **Component 1: Updating and Strengthening of Mongolian Energy Efficiency Building Codes, Norms, and Standards (BCNS)**

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 that would be more strictly enforced and that would lead to higher overall energy efficiency levels being achieved in practice across new buildings. Planned activities to facilitate this component are:

*Activity 1.1 Development of a More Effective BCNS Energy Efficiency System*

*Activity 1.2 Development of New Energy Efficiency Mandatory BCNS Documents*

*Activity 1.3 Development of Voluntary Energy Efficiency Guidelines.*

*Activity 1.4 Development of Building Energy Monitoring and Reporting System*

#### **Component 2: Training and Awareness**

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. Planned activities to facilitate this component are:

*Activity 2.1 Technical Support for Improved Building Energy Efficient Technologies*

*Activity 2.2 Technical Support, Training, Awareness and Communication*

### **Component 3: Facilitating Access to Energy Efficiency Financing**

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. Planned activities to facilitate this component are:

*Activity 3.1 Market Analysis and Establishment of Energy Efficiency Financing*

*Activity 3.2 Training in Energy Efficiency Financing*

*Activity 3.3 Raising Awareness and Building Capacity of Energy Efficiency Financing*

*Activity 3.4 Sustaining Energy Efficiency Financing Support*

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 Green House Gases (GHG) emissions savings from 2011.

The project components focused to remove barriers identified 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.

The project also identified the both global and national benefits from reduction of GHG emissions. The Global benefits are the direct GHG emission savings as a result of the project is expected to be 63,000 tones of CO<sub>2</sub> 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 CO<sub>2</sub>. National benefits include 1) achieving MDG-7 on ensuring environmental sustainability, 2) reducing air pollution in urban areas of Mongolia, specifically CO<sub>2</sub> and SO<sub>2</sub> emissions and particulate matter during the heating (winter) season, 3) contribution to building individual, institutional, and systemic capacity for applying energy efficient technologies within the building sector, 4) reduction the level of required direct subsidies as well as indirect cross-subsidies as the building sector accounts for the majority of district heating and electricity system demand in Mongolia, and 5) 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.

## 2.2. Mongolian Building Sector Situation Analyses

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 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 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* areas<sup>2</sup> 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 wood), most in the winter and mostly for space heating. As a result, on average, national air quality standards for SO<sub>2</sub> are exceeded by a factor of two and by more than five times on some winter days.<sup>3</sup>

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

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<sup>2</sup>Ger refers to traditional tent dwellings in Mongolia.

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



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.

### **2.3. Barriers to Energy Efficiency in the Building Sector of Mongolia**

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 are :

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, 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 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 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.

## Chapter 3. FINDINGS OF THE EVALUATION

### 3.1. Project Management and Monitoring

**Project Management:** The decision making body of the project is Project Board (Annex IV) chaired by the State Secretary of the Ministry of Road, Transportation, Construction and Urban Development. Its role is to:

- 1) advise on policy issues concerning project activities,
- 2) coordinate relationship between Ministries and other bodies involved in project implementation,
- 3) review progress reports covering the previous six months,
- 4) review proposed work plans and targets for the following six months including research and/or pilot project topics,
- 5) provide general advice to the project and
- 6) disseminate project findings to central and local government, donors and NGOs. The board operated effectively based on board meeting minutes and interviews with several members.

National project manager (NPM) led the day to day project coordination. NPM well managed and controlled the planning and execution of team tasks. Regarding the Project Component 3, his workload increased unexpectedly to deal with energy efficient housing efforts, which he handled reasonably well. Coordination included the commission and oversight of technical policy studies, which were carried out and supported by efficient use of international and national consultants when needed.

The project activities were well planned at periodic base as annual and quarterly. Annual as well as all quarterly work plans approved by the project director and monitored by project manager and project officer at UNDP.

Implementation of the project was centralized to a large degree as project designed so but some decentralized effort was made involving Energy Efficient Centers in implementation of some activities.

It is noted that the team underestimated the implementation Component 3 because energy efficient private housing is a relatively new understanding in Mongolia with many different stakeholders. The project team faced difficulties to interact with construction companies, XacBank and low income individuals who were interested to have Energy Efficient House.

**Monitoring and Evaluation Mechanisms.** The NPM was responsible for monitoring overall project implementation with support of the UNDP country office. Progress was reflected in quarterly and annual project reports. Monitoring of the project activities was done by Programme Officer by project component through review of reports, monthly progress meetings, and field-visits. The project team spent a lot of time and effort on monitoring of house constructions hiring number of supervising engineers depending on construction technology.

The project board discussed annual reports and approved annual plans and budgets of the project. Quarterly reports were timely submitted to the UNDP country office. The reports delivered by the international consultants are very valuable project outputs. A large number of reports are available in both Mongolian and English.

The project team strongly supported government and private sector in construction sector and overall capacity development. The team also encouraged and guided them in sharing information and organizing joint activities, and provided continuous technical when necessary.

## 3.2. Results and Analyses by Project Components

### 3.2.1. First Component-Updating and Strengthening of Mongolian Energy Efficiency Building Codes, Norms, and Standards (BCNS)

This component proposed to develop a new mandatory Building Codes, Norms, and Standards (BCNS) energy efficiency system that would require higher or new energy efficiency levels in some critical building elements, that would be more strictly enforced and that would lead to higher overall energy efficiency levels being achieved in practice across new buildings. To achieve the objective five activities have been identified:

*Activity 1. Development of a More Effective BCNS Energy Efficiency System*

*Activity 2. Development of New Energy Efficiency Mandatory BCNS Documents*

*Activity 3. Development, Implementation and Monitoring of Voluntary Energy Efficiency Performance Standard*

*Activity 4. Development of Building Energy Monitoring and Reporting System*

*Activity 5. Strengthening of Building Control Agencies*

#### Relevance

All the activities planned and implemented under this component directed to mitigate of Green House Gases emissions.

As all newly developed and updated building norms and standard approved by the related government organizations the enforcement is granted to apply in the implementation of project “100,000 housing units” programme of the Government.

#### Effectiveness/achievements

3 new Building Codes, Norms, and Standards developed:

- BNbD 41-01-11 “Heating, Ventilation, Air conditioning”,
- BNbD 23-103-10 “Building thermal performance planning”, and
- BNbD 23-02-09 “Building thermal performance”

Total 29 MNS ISO standards developed (vocabulary, window, heat transfer, insulation materials).

Energy efficient construction technology manuals developed.

4 handbooks developed:

- Handbook for Cooling load calculation method,
- Handbook for Control of HVAC systems,
- Handbook for Design principle of heat recovery system and
- Catalogues of drawings for insulated joints of building in cooperation with professional institutions.

Method for calculation of building thermal performance and special software program is developed.

### **Efficiency**

The project was able to renew 5 per cent of mandatory construction norms and standards of Mongolia for 2.5 years.

### **Impacts/Results**

Building thermal performance evaluation and certification procedure for newly constructed houses put into practice.

The tested and certified the thermal performance of 9 public buildings and 60 private houses.

### **Sustainability**

All developed norms and standards approved by the Ministry of Road, Transportation, and Urban Development and Center for Standardization and Measurement.

ECCs in UB, Darkhan and Erdenet cities are provided with necessary equipments for testing and certifying thermal performance of buildings and special trainings related to equipment operation and maintenance which enables the centres to certify and control thermal performance of new buildings. Also the project will cover 3 regional centers in this year.

### **Activities under implementation**

Activities related to the development of voluntary norms and standards and user manuals related to the construction of passive houses are under implementation.

Important part of the project is to describe the policy recommendations for enhancing how energy efficiency is addressed in building codes and other policies for new buildings. A lot of work was dedicated to understand the different policy options for increasing energy efficiency in new buildings and examination of other energy efficiency requirements in Building Codes, Norms and Standards such as energy efficiency requirements by major renovation or refurbishment. The development of the Building Codes, Norms, and Standards was not just of copying/translating of another country's BCNS energy efficiency system and requirements into a suitable Mongolian language.

*“The project team worked hard since its implementation. For example, in last two years 19 standards out of 22 standards approved by Center for Standardization and Measurement with support of BEEP. All these standards were useful for our daily works.”, Enkhtuul.T /Senior officer, secretary of TC, Consultant engineer and trainer of ISO/ Date:17 Feb 2012*

Initial work to develop **Building Codes, Norms and Standards for energy efficiency system in the construction sector** started with the in-depth research including case study of BCNS systems in different countries, namely, Finland, Sweden and Russia because of their similarity with Mongolian weather conditions.

Following the research, comparative studies, and recommendation the project team worked with the

MRTCUD, Mongolian Building Materials, Manufacturers Association (MBMMA), Mongolian Association of Civil Engineers (MACE), MUST, Center for Standardization and Measurement (MASM) and engineers from private construction and design companies to develop primary required BCNS and developed 3 norms and 29 standards (Annex II). There is general agreement among the interviewees that it took considerable time and effort to steer the development of these new BCNS through all the required channels, and that it was not easy to find common ground among the many and diverse stakeholders but all the interviewers very much appreciated that almost 5 percent of all applicable standards (700 currently applicable standards) have been updated and renewed. However out of the total applicable one about 80 Norms and Standards in Mongolia is covering issues related to building energy efficiency. In that sense about 40 per cent of the building energy efficiency technical documents have been updated.

The newly approved BCNS made changes in legal and policy framework setting requirements for thermal performance of buildings to save energy while ensuring sanitary and optimal parameters of indoor climate and the durability of enclosing structures of buildings. It also introduces new energy efficiency indicators, for example, the specific heat consumption for heating, and established a classification and evaluation norms for the energy efficiency performance.

High requirements for energy efficiency in new buildings will only have an impact if new buildings are actually constructed in accordance with the requirements. Since there are so many barriers and as the construction of new buildings is complicated, there is often a need for



enforcement of efficiency regulations for new buildings. More positive way to look at the question of BCNS implementation is to view the project activities. In the opinion of the evaluators, actual enforcement of norms and standards are already put into practice.

The BEEProject and GIZ signed formal Memorandum of Understanding to improve energy efficiency norms and standards, and may also support new technologies, and technical training. But the evaluators could not detect a direct

influence on outcomes since many of the accomplished tasks and results were planned and prepared for prior to the MoU.

With an aim to introduce and publicize the newly approved norms and standards relevant trainings and seminars were organized and this will be discussed later in Project Component 2.

One of the important and innovative results achieved by the project is certain activities undertaking towards the development of voluntary norms and standards and user manuals related to the construction of passive houses.

Aiming to support the construction of Energy Efficient (EE) houses among the ger area residents and to increase the design possibilities, the project developed the following four technologies for EE houses:

- Insulated masonry house
- Insulated timber framed house
- Structural Insulated Panel (SIPS) house
- Insulated concrete form

And technology guideline for insulated masonry houses, insulated timber framed houses and SIPS houses also were developed.

The research on Energy efficient Window conducted by the project and issued the guidelines:

*“How enforcement of advanced energy efficient construction norm and standards put into practice. One example the enforcement is design drawings of 399 buildings developed in accordance with on the newly approved norm and standards approved by the MRTUD in 2011.”, Mr. Gantulga.D /Head of Construction and Public Utilities Department, MRTUD/ Date: 15 Feb 2012.*

- Guideline for testing of insulated windows
- Guideline for certification of insulated windows
- Guideline for labeling of insulated windows
- Guideline for proper installation of insulated windows

In 2011 according to the recommendation of the research, the project procured and installed “Window thermal resistance measuring set” in Laboratory of Building Physics and Air Study at MUST. The equipments calibrated and validated. This is the first equipment that test thermal resistance of windows so that MUST have the first laboratory for window resistance measurement and testing installed in Mongolia.

In 2010 the guidelines including mandatory requirements, construction technology refinement, basic properties of the building materials and their technical specifications, design features, structural solutions of wall and roof joint parts, application of affordable insulation materials, window and door installation conformity to national or other standards etc. were developed and disseminated to three Energy Conservation Centers (ECC), three libraries of professional institutions (the National Library of Mongolia, Library at the Mongolian University of Science and Technology, Library at the Land affairs, Construction, Geodesy and Cartography Administration), universities and other interested parties.

Building Energy Performance Certificate put in place. This very important and sustainable outcome of the project because the new BNbD code requires the completion of an “Energy Passport” for the building, a document intended to verify energy performance on design, construction, and operation. Energy Passports also give potential buyers and resident’s information on what they can expect regarding the building’s energy efficiency and real costs, helping to stimulate market preferences for high-performance buildings.

It is common practice in Mongolia that during construction, there are often deviations from design- for example, a change in material or components. As a rule, these deviations have to be approved by various building inspectors. But in practice, there do existing cases where the construction company carries out unsanctioned changes from the original design. In these cases

and before the building has completed and commissioned it is important that building owner as well as the responsible construction company elaborate a new set of documents showing that the building also after design changes still is able to fulfill the energy efficiency requirements, the building inspectors can hereafter complete and issue a second, updated Energy passport. In the consultants opinion is it furthermore important that the construction company also elaborate a building operation manual. This requirement became an integrated part of the building code.

An certification of insulation effectiveness was established, in order to implement BNbD 23-02-09 “Building thermal performance. Conducted energy auditing in 9 public buildings and on the base of the result developed recommendation for future activities to improve thermal performance. Thermal energy evaluation conducted for 60 private houses, certified, and issued “Green Building” Label.

The example of thermal performances of 10 existing buildings (2 gers, 2 insulated private houses, 2 non insulated private houses, 2 insulated apartments, 2 non insulated apartments) shown in Table 2.

**Table2. Energy consumption and classification of buildings**

No	Type of building	Specific heat load			EE class
		Norm	Cal	Test	
1	5 storey pre-cast building	78.8	23.6		E
2	5 storey break masonry building	23.6	42.3		E
3	6 storey insulated brick masonry building	22.2	23.2		C
4	6 storey insulated light concrete building	22.2	21.3		C
5	1 storey insulated timber framed house	39.0	26.9		B
6	1 storey SIP house (MgO board)	39.0	60.2		D
7	2 storey brick masonry house	31.0	46.2		D
8	1 storey un-insulated timber framed house	39.0	96.6		E
9	5 wall <i>ger</i> with 2 layer felt covering	39.0	106.5		E
10	5 wall <i>ger</i> with synthetic wool/felt covering	39.0	86.0		E
11	5 wall <i>ger</i> with internal Al-sheet and felt covering	39.0	112.5		E

As can be seen from the Table 1 most of the old apartment buildings and *Ger* are classified unsatisfactory(E level). Newly constructed buildings fall under the level C while the Canadian timber framed houses are in the level B.

The another good achievement of the project is partnership development and cooperation with professional organizations. The testing and certification of thermal performance was done in close cooperation with the School of Civil Engineering and Architecture (SCEA) at the Mongolian University of Science and Technology. Now all the EE houses built in scope of the project are gone through a rigorous thermal performance evaluation.

The another example of partnership as well as capacity building to clarify the mandate of the building control agencies is closely cooperation with Energy Conservation Centers in Ulaanbaatar, Darkhan and Erdenet. This activity is very much linked activity 2.2. These Energy Conservation Centers provided with equipments for testing and certifying thermal performance of buildings and staffs were also provided with special trainings on operation and maintenance of equipments. The operation of ECCs in Ulaanbaatar, Darkhan and Erdenet cities is strengthened through project trainings, workshops and other types of assistance provided to enhance the center management and personnel professional skills. Currently the ECCs are mainly responsible for the project implementation activities at local levels and is in direct communication with the public for better outreach in grass-roots. Approximately more than 1000 people have benefited from the ECC advisory and training activities.

**Everybody interviewed, without exception, emphasized the outstanding contribution to the individual and organizational capacity development of construction sector.**

### **3.2.2. Second Component - Training and Awareness**

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, specifies, developers, construction companies, and building owners and tenants.

*Activity 2.1 Technical Support for Improved Building Energy Efficient Technologies*

*Activity 2.2 Technical Support, Training, Awareness and Communication.*

<b>Relevance</b>
For the first time the project has introduced energy efficient house in Mongolia that also contributes in reduction of Green House Gases emission.
<b>Effectiveness/Achievements</b>
16 house designs of energy efficient houses with floor size of 30, 60, 80 m <sup>2</sup> developed using advanced energy efficient construction standards.
14 trainings and seminars on policy, planning, technology and construction aspects of different building technologies provided for more than 450 professionals, engineers and technicians in construction sectors and officers of regulatory bodies.
A technical support and assistance is provided to other international donor organizations and relevant projects engaged in the energy efficiency sector, including the Energy and Environment project at the MCA Mongolia, Habitat for Humanity, UN Habitat, etc.
<b>Impacts</b>
By completion of 21 energy efficient houses reduced 151.58 tonnes of CO <sub>2</sub> /year.
<b>Sustainability</b>
Developed energy efficient house designs make available for beneficiaries for free.
Construction companies built energy efficient houses became able to provide their services in future.
<b>Activities under implementation</b>
95 energy efficient houses are under construction to be completed in 2012

The activity to develop High Efficiency Smokeless Stoves and to engage a NC for development of necessary standards and recommendations related to manufacturing, testing and certification of Energy Efficient stoves was not done due to lack of qualified specialist in the area.

Aiming to introduce and apply **new technologies in construction of private houses** in Ulaanbaat city's *Ger* districts, has been developed 16 house designs drawings of energy efficient

houses, such as Timber framed, Structural insulated panel, Brick masonry, Light weight concrete masonry with floor size of 30, 60, 80 m<sup>2</sup>. For the sustainability 1) house designs drawings made available for beneficiaries for free, 2) contracted construction companies on the competitive base who can assist a family to build an energy efficient house and 3) provided supervising engineers who take over quality construction and ensure application of newly developed BCNS.

Currently the project completed 21 energy efficient houses that used advanced energy efficient construction standards, 95 are under construction and 10 to start in 2012. All the interviewed household expressed their satisfaction in saving of coals by up to 50 percent. They also aware that even though the initial cost to build the house is expensive the maintenance cost is going to be much less. It is stated that the BCNS

***"We are really happy to our new house which have been built with support from the project. Our new EE house is comfortable and warm. Most importantly, we are saving money from coal for winter heating. We used before 5 tons coals each winter, but now it reduced to 2 tons."***

*Sukhbaatar.P /household, who built EE house/ Date:18 Feb 2012.*

updating exercise will start to produce energy and GHG savings from 2011 in the project document. The average use of coals is 5-7 tons per year per households. Thus reduction of CO<sub>2</sub> accounts for 151.58 tonnes/year if assume that 21 houses saved about 53 tones of coals and one tone of coal emits 2.86 tons of CO<sub>2</sub>.

However, it is noted that the cost of the house is very expensive for low income people even they cannot afford for them to have this house. Middle and more income people do not really appreciate the design and floor size. In some case even middle income people also cannot meet the criteria for loan.

As the project pursues the goal to provide the middle and low income households with affordable, cost saving, energy efficient houses, certain steps towards facilitating access to energy efficiency financing had been made within the project. In order to make the energy efficient housing loans more affordable for ger area households, the BEEP has already reached certain agreements with the MCA-Mongolia (Millennium Challenge Account-Mongolia) in terms of providing interested households with housing subsidies. Now within the project forty new energy efficient houses are planned to be built with the MCA-Mongolia housing subsidy

assistance in the first year of construction. As project assumes, this will certainly facilitate the commercialization process of energy efficient houses into the broad construction market. More detailed assessment of the financial mechanism is presented in Component 3.

Within the project activity to establish of an Energy Efficient town house a Memorandum of Understanding was signed with the Ulaanbaatar Electricity Distribution Company to construct a “Green zone” town house consisting of 60 Energy Efficient private houses in Khan Uul district. According to the MoU, the project provided house designs and constant technical monitoring. This activity of the project to provides fully functional energy efficient homes to employees of the company. All houses are almost completed and after the completion it is assumed to reduce 390 tones of CO<sub>2</sub> emissions.

The project very much succeeded to build capacity of professionals, engineers and technicians in construction sectors and officers of regulatory bodies. Capacity building included a large number of training activities in technical and methodological, such as training of trainers, practical knowledge and skills, production of varied training curriculum, training materials and technology manuals, and procurement of equipment and technologies for testing and certifying thermal performance of buildings. Some of them are discussed in Component 1.

Only in 2011 more than one hundred professionals from construction design companies, architects, and heat, ventilation, and air conditioner engineers benefited from training on Low energy and Design planning of Passive buildings conducted by international consultant. 28 representatives from policy making, training, academic and design organizations of the construction sector and executing companies get knowledge in “Enhancing Energy efficiency of buildings and heating boilers” from the training conducted jointly with German Alumni Engineers’ Association. Trainers highly satisfied with the training and evaluated 100% successful. See Annex VI for a list of all trainings offered across the project components.

A research regarding the possibilities of commercializing high quality, affordable construction materials was carried out among the potential building material manufacturers and suppliers. As

a result a cooperation is launched with a series of manufacturing companies, including suppliers of windows, doors, rock wool, basalt wool, plastic foam, facing and polishing materials, etc.

For information dissemination purposes a project website – [www.beep.mn](http://www.beep.mn) – was developed and is being updated on a regular basis. All products of the project published in the web site for dissemination.

### **3.2.3. Third Component: Facilitating Access to Energy Efficiency**

This component proposed 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 proposed to capacitate both the demand and supply-side, and XacBank to 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, the project planned to 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.

*Activity 3.1 Market Analysis and Establishment of Energy Efficiency Financing*

*Activity 3.2 Training in Energy Efficiency Financing*

*Activity 3.3 Raising Awareness and Building Capacity of Energy Efficiency Financing*

*Activity 3.4 Sustaining Energy Efficiency Financing Support*



Achievements
<p>10 households benefitted from XacBank loan, and 60 others from the Savings Bank of Mongolia. Currently the loan interest rate for Energy Efficient housing loan and risks related to it stay relatively high, terms are short and banks tend to favour lending for apartments.</p> <p>XacBank provided 150 mln. MNT (approximately \$ 0.1M) of its own funds for Energy Efficient housing loans.</p> <p>In cooperation with XacBank and the Mongolian Mortgage Corporation were organized 2 trainings on Energy Efficient housing financing for banking sector specialists enrolling 30 loan officers in total.</p> <p>Memorandum of Understanding was signed with Millennium Challenge Account Mongolia in July 2010, establishing a mechanism for energy efficient housing subsidy, equal to 25-30% of the total cost of the EE house.</p>
Impacts
<p>70 house holders benefitted from bank loan.</p>
Sustainability
<p>Established of Energy Efficiency Financing mechanism at the XacBank with support of the project. First draft of a sustainable financing scheme for Energy Efficient housing is being developed through the participation of XacBank, Khaan Bank and Golomt Bank.</p> <p>However, sustainability is not yet secured by March 2012.</p>
Activities under implementation
<p>95 houses are under construction and 10 is planned to start in 2012.</p>

One of main activity or expected output of this component is **Establishment of New Financing Support Mechanism**. It is agreed to create a combined housing subsidy system within the

mechanism in order to ensure the sustainability of that financing scheme and further commercialization of Energy Efficient houses in the Mongolian construction sector. The housing subsidy system assumes to allow such opportunities like creating more demand from the consumer side and assisting in strengthening the capacity of suppliers operating in the construction sector. According to the combined version of subsidy, up to 10% of down payment (out of 20%) will be given as a down payment subsidy and 20% of the loan (out of 80%) – as a loan subsidy.

Project made an extensive study of existing market and legal conditions for energy efficient housing financing. There has been conducted a considerable number of meeting with all

***“Mostly Ger area householders are low income families. Thus, building EE house is very costly for them even they cannot pay 1<sup>st</sup> 20% of total payment for the ordered new house”,  
Oyungerel.B /Head of Mortgage Banking Division, XACBank/  
Date: 16 Feb 2012.***

concerned parties (government NGO, WB, ADB, WV, MDF, UDRC, Mongol Bank, commercial banks, NBFIs, local governments and community members. The project and its financial consultant got a clear picture of existing housing finance situation in the country and did presented the long term vision of the project and concept of new financial mechanism for support of energy efficient housing financing to all

stakeholders. Extensive study reveals that without community support and new non-commercial ways of channeling of housing funds country in existing market conditions cannot provide affordable housing for low income people.

A Memorandum of Understanding was signed with Millennium Challenge Account (MCA) Mongolia in July 2010, establishing a mechanism for energy efficient housing subsidy, equal to 25-30% of the total cost of the Energy Efficient houses. Currently the overall amount of subsidy for houses with 35m<sup>2</sup> is USD 5 mln, and for houses with 65m<sup>2</sup> – USD 9 mln.

To ensure the sustainability of the financing system the project planned to 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. Seeking possible ways of cooperation

several consultative meetings were organized with an active participation of the Mongolian Mortgage Corporation. A number of commercial banks took part in the discussion, including XacBank, Khaan and Golomt. The first draft of a sustainable financing scheme for Energy Efficient housing is being developed through the assistance of the above mentioned institutions. Moreover a concept for Clean Development Mechanism project was developed and submitted to relevant parties.

Relevant information regarding the XacBank loan opportunities and MCA down payment were disseminated to *Ger* district households in 3 target cities through loan manuals, project brochures and pamphlets.

## 4. Conclusions and Ratings

### Conclusions and Lesson Learnt:

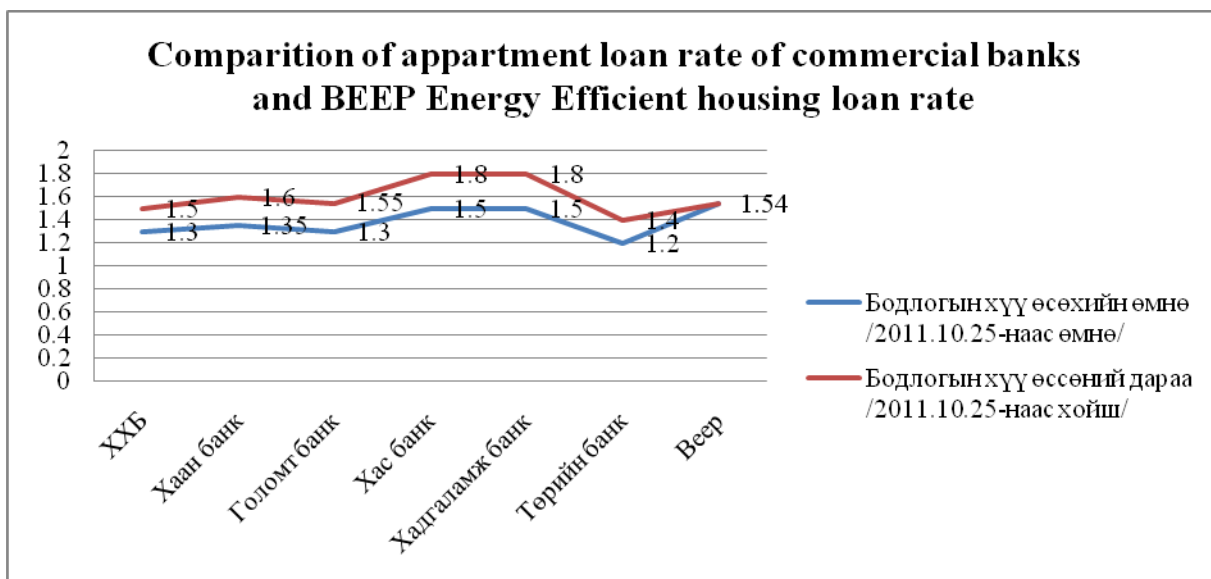
1. Development of new and updated mandatory and voluntary Building Code, Norms Standards (BCNS) were carried out successfully. Related government officers at the MRTCUD and National Agency for Standardization highly appreciated the new BCNSs and expressed further interest to develop more with the project. Some characteristics of these BCNSs are:
  - Technical bases to reduce energy consumption up to 50 per cent.
  - User-friendly and fully compliant with international requirement in term if energy efficiency.
  - Allow to assess and evaluate energy efficiency of old buildings and certification of new buildings to monitor/control energy utilization. Already 399 new building drawing have been approved by the LACGCA against compliance with these new BCNSs.
2. All research conducted were very useful and contributed to the development of BCNSs. International and national consultants were recruited when needed. The project organized trainings and seminars to introduce the new BCNSs.
3. Regarding the Building Energy Efficient Technologies, developed several handbooks, manuals and guidelines. Introduced “Green Building” Labels to energy efficient houses and building materials. Furthermore first time, “Energy Conservation Center”s in Ulaanbaatar, Darkham and Erdenet, supported by the project have been carrying out energy auditing for new and existing buildings in Mongolia. According to new BNbD Code, produced by the project requires the completion of an “Energy Passport” for all buildings to verify energy performance in terms of its design, construction, and operation. All these results confirming that Building Energy Efficient Technologies have been adequately addressed by the project.
4. Regarding providing construction loans for energy efficient houses, since the project implementation 10 loans released from XacBank and 60 loans from Savings Bank. In

total 70 loans released out of 100 planned loans for EE houses. Completed 21 houses, which used advanced energy efficient construction standards. 95 houses are under construction and 10 is planned to start in 2012. Some of these house owners constructing their houses without bank loans, only using energy efficient technology promoted by the project. The following are highlights during the interviews and site visits:

- All householders, who got loans from the project are middle income families and highly concerns about the high construction cost of the house. However, they expressed their satisfaction, highlighting benefits of comfort, warm and most importantly saving of coals by up to 2-3 tones/year (winter). Thus reduction of CO<sub>2</sub> accounts for 151.58 tones/year, if assume 21 houses saved about 53 tones of coals and 1 ton of coal emits 2.86 tons of CO<sub>2</sub>. They also not much appreciated the design and size of the proposed Energy Efficient house models.
  - When interviewed construction companies, who built the houses they expressed that this is not profitable business for them and not much willing to involve again. However, learning for building energy efficient houses was only promotion for them.
  - In general, most *Ger* area households are low and middle income families. Therefore, they mostly interested in re-habilitation of their existing houses or building new cheaper non-energy efficient ordinary houses, rather than building Energy Efficient houses, proposed by the project with loans from XacBank. However, project team succeeded cooperating with the Millennium Challenge Account (MCA) for providing subsidy for building Energy Efficient houses, which will continue until September 2013. This was intensified increasing interest of building these houses. In future, project team should consider for finding solution for decreasing the cost of the Energy Efficient houses. Cost should be similar to ordinary non-energy efficient houses, for enabling low income families to benefit building Energy Efficient houses. For further intensification and promotion needs to collaborate with more organizations, projects and funds, such as Renewable energy fund, Housing development fund, Clean air fund.
5. During the project design period, seems not adequately assessed baseline situation on wiliness and financial capacity of low income individual households for building Energy Efficient houses. Therefore, households interest survey on Energy Efficient housing

should be conducted properly, involving professional institution and determine suitable financial mechanisms specifically for low income families. Interviewing households, who received bank loans for building the Energy Efficient houses, seems that they are middle or even higher income families. Since, most Ger area families already built some kind of houses, thus they do not interested much on building new houses, but more interested in re-habilitation of their houses as energy efficient.

- By the project design, the XacBank planned USD 2 million for financing Energy Efficient housing loan, which is based on their bank customers' deposits rate. XacBank's average deposit rate for 2011 was 14-15% per year. Therefore, it mainly resulted in setting higher rate for energy efficient housing loans and restricting to benefit low income households. In other hand, since third quarter of 2010, construction sector started to intensify and all commercial banks offered more favorable conditions for apartment loans. Thus, seems it was more attractive for getting loans for 1-2 rooms apartments, instead of having energy efficient house loan.



*Note: Rapid change occurred in apartment loan rates after increasing of Mongol Bank rate 11-12.25%/year from 25 Oct. 2011.*

- Project team lacks specialist, who is responsible for implementation of Component 3 - Facilitating Access to Energy Efficiency, which resulted in low performance of this

component activities and weakening cooperation with the XacBank. Therefore, needs to recruit Project Officer, responsible for this component.

**Rating** of project results is done, using the scores of highly satisfactory (H), satisfactory (S), marginally satisfactory (M), and unsatisfactory (U), on the basis of the key indicators set in Project Log-Frame. The complete rating table with detailed information is attached in Annex V. Summary of the results are presented in the below table.

**Table. Rating of project results**

Criteria	Scores
<b>Project Objective:</b> <b>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</b>	S
<b>Outcome 1: <i>Energy efficiency provisions of the Mongolian Building Code, Norms and related Standards (BCNS) updated and strengthened</i></b>	HS
<b>Outcome 2: <i>Training and Awareness Program</i></b>	S
<b>Outcome 3: <i>Access to energy efficiency financing facilitated</i></b>	MS

## 5. Recommendations

- In Mongolia, building energy consumption rate estimation based on square meter (m<sup>2</sup>), which means that user do not care. It is more appropriated to introduce energy utilization based system. Therefore, the project could consider introducing this system in remaining period of implementation.
- Building Energy Efficient house is very costly for the time being for not only low income but also middle income families. The design and size of the house do not meet the interest of middle and more income families. Also, almost 70 per cent of families in the *Ger* area has some kind of houses. Therefore, it is recommended to look for alternatives to provide support to low and middle income families to insulate and re-habilitate their existing houses as Energy Efficient. This option will be more attractive measure to

increase energy efficiency in *Ger* area instead of building few even if 200 houses in random bases in term of location. Also, should consider for finding solution for decreasing the cost of the Energy Efficient houses. The cost should be similar to ordinary non-energy efficient houses, for enabling low income families to benefit building Energy Efficient houses.

- It is recommended to build Energy Efficient semi-attached house complexes, villages, towns instead of building individual houses at random bases. Can be considered options of building semi-attached energy efficient houses in combining of 2-3 households' fenced areas. Desirable cost per square meter should be lower than MNT 350,000 and bank loan rate lower than 1.2. Also, can be considered providing XacBank apartment loan for families, who is moving to apartment houses, certified with Energy Efficient Label.
- Consider re-structuring existing XacBank's loan risk sharing fund, which supported by the UNDP. One option can be establishment of "EE House Fund for Energy Conservation Centers (ECC)" at the XacBank with support from UNDP/BEEP. Purpose of this fund is for funding ECC for carrying out energy auditing for new and existing buildings.
- Introduce a system to provide economic and financial incentives for individuals as well organizations who build energy efficient houses.
- Recommended to conduct household interest survey on Energy Efficient housing, involving professional institution and determine suitable financial mechanisms specifically for low income families. Loan policy must be based on household's incomes.
- Investigate low cost, energy efficient construction materials and introduce in Mongolia
- Expand the promotion of energy efficient housing concept, models, establish sustainable financial mechanisms and provide trainings, where required.
- Recommended to recruit new Project Officer, responsible for Component 3 - Facilitating Access to Energy Efficiency for intensification of establishing sustainable financing mechanisms on energy efficient housing.



## ANNEXES

### Annex I: Terms of Reference of Midterm Evaluation of BEEP

Reference No. BEEP/RFP/2012/01

#### TERMS OF REFERENCE

#### MIDTERM EVALUATION

of

#### Energy Efficiency in New Construction in the Residential and Commercial Buildings Sector in Mongolia (in short Building Energy Efficiency Project), MON/09/301

--To be conducted by National consulting institution--

#### I. BACKGROUND

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.

Component 1: Updating and Strengthening of Mongolian Energy Efficiency BCNS 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.

Component 2: Training and Awareness 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.

Component 3: Facilitating Access to Energy Efficiency Financing 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.

The project is funded by Global Environmental Fund (GEF), Korea Energy Management Corporation (KEMCO) and the United Nations Development Programme (UNDP). It started in July 2009 and will end in March 2013.

## **II. OBJECTIVES**

The Midterm Evaluation (ME) of the project is part of the on-going process to enhance monitoring and evaluation of UNDP program activities. The Consulting institution is required to carry out full set of supportive functions in line with UNDP's requirements for Monitoring and Evaluation (see list of documents for review).

The ME will assess the achievements, success and effectiveness of the project by looking at potential impacts and sustainability of outcomes and outputs, including the contribution to the implementation of the national policy, capacity development, and public awareness and education.

The Consulting institution shall address the following objectives:

- Evaluate the effectiveness of project activity in the energy efficiency financing sector, status of agreement implementation between Xacbank and UNDP.
- Evaluate housing policy and its interrelation with the green housing or EE housing.
- Evaluate the effectiveness of project activities in contribution to key objectives (Policy, and Public awareness) of the project
- Evaluate the impact and sustainability of project activities on the target communities, in particular, the level of beneficiary participation in project activities
- Evaluate the effectiveness of project management, particularly the partners capacity in coordination, monitoring, planning, reporting, learning and resource management

The Review process will answer the following questions

- What is the main issue for energy efficiency financing?

- What problems are there and how can they be solved?
- What are the external and objective view, information and assessment of the project for decision making?
- What have learnt about: 1) the context of the project; 2) the project outcomes; 3) the project outputs?
- What are going to do about it?
- Who will take action and when?
- What will feed into other reports and discussions?

The ME is considered as a significant opportunity to provide donors, government and project partners with an independent assessment of relevance and achievement of objectives and impacts, and to determine potential results towards the achievement of outcomes and outputs with reference to the Project Document.

### **III. SCOPE OF THE EVALUATION**

The ME should cover the following areas:

#### **Appropriateness:**

- Are the approach and achievement of project outcomes and outputs appropriate?

#### **Progress:**

- Did the project produce the stated outcomes and outputs?
- To what extent are the outcomes and outputs achieved?
- What is the likelihood that project objectives are achieved?
- To what extent are the achievements of outcomes and outputs attributable to sustainability

#### **Coverage:**

- Are the intervention's objectives responding to the needs and priorities of the target populations?
- To what extent do the project activities reach the vulnerable groups
- Which resources/opportunities do the target populations make use of for meeting project activities/outputs?

#### **Coherence:**

- Which organizations are working on the same project of building energy efficiency as the implementing organization?
- Are they successfully co-coordinated and are there any overlaps, different points of view, strategies/approaches that could have been avoided?
- How well do the partners coordinate their activities with other organizations – are these organizations carrying out activities suitable to their capacities?

- Which different methods are used to collaborate and coordinate with other organizations, particularly those who are not represented for long-term and regularly at any of the main coordinating bodies?

**Efficiency and effectiveness:**

- Do policies and practices ensure timely and effective implementation of the project?
- Have the available means been optimally exploited?
- Are the resources in terms of personnel, finance, and facilities transformed into results and outputs or were they used to achieve specific outcomes?
- Which contributions do the project activities and outputs make to the achievement? What additional activities partly contributed to the achievement?
- What were the most significant aspects of the project environment that affected the achievement of project objectives – were they foreseen and monitored?
- What were the unforeseen effects of the project? How quickly were these identified? How could we have mitigated the negative effects? How could we have used the positive effects to the benefit of the project?

**Learning/training:**

- Has evidence of learning/training opportunities been captured and utilized by the project/country programme?
- What are the learning/training opportunities of the project?
- How the learning/training has been used?
- How the lessons are learnt being shared locally, nationally, regionally and internationally?

**Management:**

- How are the project documents produced and approached to donors?
- How is quality of data for drawing monitoring conclusions?
- What is the management mechanism of the project? Is there any constraint of project management system?
- How are the project staff managing the project? Is project staffing effective?
- What are the finance monitoring mechanisms? Does it work as expected?
- What challenges were faced by the project management and how it was coped.

**Sustainability:**

- What are the main changes achieved that are likely to last, it means that activities can be sustained where necessary and/or that beneficiaries and their organizations have gained significant new capacities in pursuit of their own development objectives?
- What are the dimensions of sustainability: economic/financial; social/organizational; technological; environmental?
- Are all project activities carried out in a sustainable manner wherever possible?
- How are local resources and capacities strengthened in order to be able to use more effectively in the future?
- Have there been any community development and relationships being formed?
- Are they likely to initiate other building energy efficiency projects in the vulnerable community?
- What relationships have been formed through project implementation to date that are likely to continue beyond the life of the project?

## **Products Expected from the Evaluation**

The evaluation shall report on the findings focusing on above listed area. The main products from the ME are:

- Presentation of findings (verbal presentations will be made to all major stakeholders on the approach of the ME and its preliminary findings)
- An interim draft report
- A final evaluation report will be an independent and comprehensive document with annexes as necessary. However, the main report should not exceed 50 pages. 3 copies of the final, bound report to UNDP for distribution shall be submitted and an electronic copy (MS Word) of the report included.

### ***The minimum requirements for the content of the final version of ME report are:***

#### 1. Executive summary

- Brief description of project
- Context and purpose of the evaluation
- Main conclusions, recommendations and lessons learned

#### 2. Introduction

- Purpose of the evaluation
- Key issues addressed
- Methodology of the evaluation
- Structure of the evaluation

#### 3. The project(s) and its development context

- Project start and its duration
- Problems that the project seek to address
- Immediate and development objectives of the project
- Main stakeholders
- Results expected

#### 4. Findings and Conclusions

In addition to a descriptive assessment, all criteria marked with (R) should be rated using the following divisions: Highly Satisfactory, Satisfactory, Marginally Satisfactory, Unsatisfactory.

##### 4.1. Project Implementation

Implementation Approach (R). This should include assessments of the following aspects: 1). The use of the logical framework as a management tool during implementation; 2). The general operational relationships between the institutions involved and others and how these relationships have contributed to effective implementation and achievement of project objectives; 3). Technical capacities associated with the project and their role in project development, management and achievements.

Monitoring and evaluation (R). Including an assessment as to whether there has been adequate periodic oversight of activities during implementation to establish the extent to which inputs, work schedules, other required actions and outputs are proceeding according to plan; whether formal evaluations have been held and whether action has been taken on the results of this monitoring oversight and evaluation reports.

Stakeholder participation (R). This should include assessments of the mechanisms for information dissemination in project implementation and the extent of stakeholder participation in management, emphasizing on 1). the production and dissemination of information generated by the project; 2). local resource users and NGOs participation in project implementation and decision making and an analysis of the strengths and weaknesses of the approach adopted by the project; 3).the establishment of partnerships and collaborative relationships developed by the project with local, national and international entities and the effects they have had on project implementation; 4). Involvement of governmental institutions in project implementation, the extent of governmental support of the project.

Financial Planning: Including an assessment of the actual project cost by objectives, outputs, activities; the cost-effectiveness of achievements; financial management (including disbursement issues) and co-financing.

Sustainability. Extent to which the benefits of the project will continue, within or outside the project domain, after it has come to an end. Relevant factors include for example: development of a sustainability strategy, establishment of financial and economic instruments and mechanisms, mainstreaming project objectives into the economy or community production activities.

Execution and implementation modalities. This should consider the effectiveness of the UNDP counterpart and Project Co-ordination Unit participation in selection, recruitment, assignment of experts, consultants and national counterpart staff members and in the definition of tasks and responsibilities; quantity, quality and timeliness of inputs for the project with respect to execution responsibilities, enactment of necessary legislation and budgetary provisions and extent to which these may have affected implementation and sustainability of the Project; quality and timeliness of inputs by UNDP and Government of Mongolia and other parties responsible for providing inputs to the project, and the extent to which this may have affected the smooth implementation of the project.

#### 4.2. Results

Attainment of Outcomes/ Achievement of objectives (R): Including a description *and rating* of the extent to which the project's objectives were achieved using Highly Satisfactory, Satisfactory, Marginally Satisfactory, and Unsatisfactory ratings. If the project did not establish a baseline (initial conditions), the evaluators should seek to determine it through the use of special methodologies so that achievements, results and impacts can be properly established.

This section should also include reviews of the sustainability including an appreciation of the extent to which benefits continue, within or outside the project domain after Government of Luxemburg's assistance/external assistance in this phase III has come to an end and contribution to upgrading skills of the national staff

4.3. *Recommendations*: This should focus on

- Actions to follow up or reinforce initial benefits from the project
- Proposals for future directions underlining the further needs

#### 4.4. Lessons learned

This should highlight the best and worst practices in addressing issues relating to relevance, performance and success.

#### 5. Annexes

- Evaluation TORs
- Itinerary
- List of persons interviewed
- Summary of field visits
- List of documents reviewed
- Questionnaire used and summary of results
- Comments by stakeholders (only in case of discrepancies with evaluation findings and conclusions)

### METHODOLOGY

The evaluation methodology will be determined by the evaluation institution, guided by the requirements of UNDP as articulated in various guidelines, policies, and manuals on the conduct of evaluations as well as key project documents such as project document, the inception workshop report, the project log frame and annual budgets and work plans, the annual Project Implementation review, Project Steering Committee minutes, and other technical reports and documents as relevant. A list of key documents is given in Annex 1.

The review will be carried out during a total period of 23 working days in January/February 2012 and its evaluation methodology should be clearly documented in the report.

### IMPLEMENTATION ARRANGEMENTS

The assessment will be carried out within 23 working days in February - March 2012. The work is scheduled to commence on 6<sup>th</sup> of February, 2012 and be completed by 7<sup>th</sup> of March, 2012. A preliminary work plan is shown below:

No	Task	Week I	Week II	Week III	Week IV
1	Review of project documents				
2	Meetings with UNDP, XacBank, Project Staff				
3	Meet with Stakeholders in UB				
4	Field trips to project sites (EE houses), meeting with house owners, construction				

	companies, supervisor engineers				
5	Presentation of findings to UNDP and BEEP				
6	Draft Report writing and submission				
7	Final Report writing and submission				

The **Building Energy Efficiency Project (BEEP)** staff shall provide any necessary logistical support. The staff will assemble the suggested documents and prepare for the field trip. The evaluator shall use the office space of the project. The Consulting institution is expected to bring his/her own computers/laptops for the written work.

The mission will produce the following deliverables by the dates specified:

- Work plan by 6<sup>th</sup> of February, 2012
- Presentation by 25<sup>th</sup> of February, 2012
- A draft report submission by 1<sup>st</sup> of March, 2012.
- A final report by 7<sup>th</sup> of March, 2012.

The tentative program of the ME mission is shown below, and a more detailed schedule is under development.

Dates	Item
6 -8 <sup>th</sup> , Feb (3w/d)	Review of main documents
9 <sup>th</sup> – 15 <sup>th</sup> Feb (5w/d)	Meetings with stakeholders in Ulaanbaatar
16 <sup>th</sup> -17 <sup>st</sup> Feb (2w/d)	Field missions in houses
20 <sup>th</sup> Feb- 24 <sup>nd</sup> Feb ( 5 w/d)	Debriefing in Ulaanbaatar and submission of draft report
27 <sup>d</sup> Feb- 7 <sup>th</sup> March ( 8 w/d)	Preparation of final report

Note: detailed mission schedule to be developed by the Project Unit and NCT.

#### IV. INSTITUTIONAL ARRANGEMENTS



The National Consulting Institution will conduct necessary arrangements for performing the tasks outlined in this TOR. He/she will be responsible for consolidating a midterm report with a full set of annexes. The National Consulting Institution will be responsible to the MRTCUD and UNDP Mongolia and will report to the National Project Director (NPD), UNDP, project unit and a representative of the MRTCUD on the status of the work.

The MRTCUD, UNDP and project unit hold the copyright of the assignment outputs. The present TORs may be adjusted and modified, without changing the overall objective and the scope of work, on the basis of consultations.

### 1. Duty Station

Ulaanbaatar

### 2. Qualification Requirements for the Contractor

The institution/organization commissioned to carry out the Midterm Evaluation shall have minimum 3 (three) personnel, described below:

- Evaluation expert /Team leader/ (1 person)
- Financial specialist (1person)
- Housing/Urban development specialist (1person)

And the personnel of the Consulting institution shall possess the following qualifications:

Good practical experience relevant to the announced TOR  
 Substantial experience (at least 3 years) in the field of Financing, Housing and Environmental science and other related field  
 Excellent participatory process skills  
 Good interpersonal and communication skills  
 Experience in working with international organizations and in developing countries  
 Ability to establish priorities and to plan and coordinate works  
 Fluent in English language (oral and written)  
 Computer literacy, particularly, with MS Office

### 3. Scope of Bid Price and Schedule of Payments

The following payments shall be made to the Contractor for completion of the following deliverables. Payment shall be effected upon the successful achievement of the specific milestones described in the contract. The price of payments will be fixed based on the overall contract amount, regardless of any extension of the specified duration.

Table 2

Deliverable	On or before:	Percentage of total
Draft report	1 March 2012	60%
Final report	7 March 2012	40%

#### 4. Proposal Presentation

Interested institution/organizations should submit technical and financial proposals separately. A two-stage procedure will be utilised in evaluating the bids:

- 1) Evaluation of the technical proposals,
- 2) Evaluation of the financial proposals.

##### 4.1 Technical Proposal

The technical proposal should include, but not necessarily limited to, the following information, with the maximum length of the main text up to 15 pages:

- a) A letter of interest to conduct the assignments together with a brief description of the institutional capability, outlining recent experience on projects/assignments of a similar nature in Mongolia.
- b) Certification of the firm/institution
- c) Contact details of at least two current or recent clients;
- d) A detailed work plan comprising, among others, the number of person-days in each activity that is considered necessary to carry out the assignment, and the composition of your proposed work tasks which would be assigned to each team member;
- e) The curriculum vitae of the team leader and each team member who will be involved in the evaluation process and their time availability;
- f) Financial statement of past two years

##### 4.2 Financial Proposal

The financial proposal will be quoted in Mongolian Tugrugs. Please submit your proposal according to the table shown in the Attachment 5.

Note that the cost of preparing a proposal and of negotiating a contract, including any costs for any related travel, is not reimbursable as a direct cost to the proposed services.

#### 5. Criteria for Evaluation of the Proposal

Table 4

Summary of Technical Proposal Evaluation Forms		Score Weight
1.	Expertise of Firm / Organization	20%
2.	Proposed Work Plan and Approach	40%
3.	Personnel	40%

## ANNEX to TOR

### List of documents to be reviewed

- Handbook on Planning, Monitoring and Evaluating for Development Results (2009) UNDP
- Project document
- Project board meeting minutes
- Annual reports
- Financial reports
- Agreement with Xacbank and related loan information
- MOU between UNDP and MCC, and related documents
- BNbD 23-02-2009 and other related building norm, standards
- Draft National Program on reducing green house gas emission from Construction sector
- All annual work plans of the project
- Donor reports
- Others (meeting minutes, correspondence and TORs as needed)

List of key persons to be interviewed during the evaluation field mission:

### **Ulaanbaatar:**

- UNDP Country Office
- MRTAUD, NPD
- Steering committee Members

### *Community level:*

- Professional NGOs, (MACE, MWDMA, MBMMA)
- EE house owner

### *Local Authorities:*

- MASM
- Governmental implementation agency of Land affairs, construction, geodesy, cartography
- MMCA Clean Air Project
- Energy efficiency centers

### *Project sites*

- Project staffs
- Construction companies
- Construction supervisor engineers

**PROPOSAL SUBMISSION FORM**

Dear Sir / Madam,

Having examined the Solicitation Documents, the receipt of which is hereby duly acknowledged, we, the undersigned, offer to provide Professional services to Building Energy Efficiency Project (BEEP) in respect of conducting Project Midterm Evaluation for the sum as may be ascertained in accordance with the Price Schedule attached herewith and made part of this Proposal.

We undertake, if our Proposal is accepted, to commence and complete delivery of all services specified in the contract within the time frame stipulated.

We agree to abide by this Proposal for a period of 90 days from the date fixed for opening of Proposals in the Invitation for Proposal, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

We understand that you are not bound to accept any Proposal you may receive.

Dated this day /month of year

Signature

(In the capacity of)

Duly authorized to sign Proposal for and on behalf of

### SUMMARY OF PRICE PROPOSAL

The Contractor is asked to prepare the Price Proposal as a separate envelope from the rest of the RFP response as indicated in Section D paragraph 14 (b) of the Instruction to Offerors.

All prices/rates quoted must be exclusive of all taxes, since the UNDP is exempt from taxes. However, VAT is to be specified separately from the proposed amount.

The Price Proposal must provide a detailed cost breakdown. Provide separate figures for each functional grouping or category.

The format shown on the following pages should be used in preparing the summary of price schedule. The format includes specific expenditures, which may or may not be required or applicable, but are indicated to serve as examples.

In addition to the hard copy, if possible, please also provide the information on CD-ROM.

Table 5

<b>Price Schedule</b>					
<b>Request for Proposals for Services</b>					
	<b>Description of Activity</b>	<b>Number of person</b>	<b>Monthly rate</b>	<b>Number of Months</b>	<b>Estimated Amount</b>
<b>1.</b>	<b>Remuneration</b>				
1.1	Evaluation expert	1		1	
1.2	Financial specialist	1		1	
1.3	Housing and urban development specialist	1		1	
	<b>Sub total</b>				
<b>2.</b>	<b>Estimated Expenses</b>				
<b>No</b>	<b>Demonstration and show-how training materials, Cut-view models and displays.</b>				
	<b>Name</b>	<b>Q'ty</b>	<b>Unit price</b>	<b>Total</b>	

2.1	Miscellaneous (Communication, local transportation, stationery cost etc)			
	<b>Grand total</b>			

Note:

- A detailed breakdown for each category is required to be attached to the summary table along with explanation note.

## Annex II: List of the Building Code, Norm and tandards

№	Building Code, Norms and Standards	ID	Newly developed	Amended	Approved organization and date
	<b>Building Code and Norms</b>				
1	Thermal performance	БНБД 23-02-09		X	MRTUD-2009
2	Thermal performance design of buildings	БНБД 23-103-10	X		MRTUD -2010
3	Heating, ventilation, air conditioning	БНБД 41-01-11		X	MRTUD -2011
	<b>Building Standards</b>				
1	Building and civil engineering-Vocabulary-Part 1: General terms	MNS ISO 6707-1 : 2010	X		CSM-2010
2	Building and civil engineering- Vocabulary- Part 1: Contract terms	MNS ISO 6707-1 : 2010	X		CSM -2010
3	Thermal insulation- Vocabulary	MNS ISO 9229 : 2010	X		CSM -2010
4	Thermal insulating products for building applications- Determination of length and width	MNS ISO 29465 : 2010	X		CSM -2010
5	Thermal insulating products for building applications- Determination of thickness	MNS ISO 29466 : 2010	X		CSM -2010
6	Thermal insulating products for building applications- Determination of squareness	MNS ISO 29467 : 2010	X		CSM -2010
7	Thermal insulating products for building applications- Determination of flatness	MNS ISO 29468 : 2010	X		CSM -2010

8	Thermal insulating products for building applications- Determination of compression behavior	MNS ISO 29469 : 2010	X		CSM -2010
9	Thermal insulating products for building applications- Determination of the apparent density	MNS ISO 29470 : 2010	X		CSM -2010
10	Thermal insulating products for building applications- Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)	MNS ISO 29471 : 2010	X		CSM -2010
11	Thermal insulating products for building applications- Determination of dimensional stability under specified temperature and humidity conditions	MNS ISO 29472 : 2010	X		CSM -2010
12	Thermal insulating products for building applications- Determination of dimensional under specified compressive load and temperature conditions	MNS ISO 29764 : 2010	X		CSM -2010
13	Thermal insulating products for building applications- Determination of tensile strength perpendicular to faces	MNS ISO 29765 : 2010	X		CSM -2010
14	Thermal insulating products for building applications- Determination of tensile strength parallel to faces	MNS ISO 29766 : 2010	X		CSM -2010
15	Thermal insulating products for building applications- Determination of Short term water absorption by partial immersion	MNS ISO 29767 : 2010	X		CSM -2010
16	Thermal insulating products for building applications- Determination of linear dimensions of test specimens	MNS ISO 29768 : 2010	X		CSM -2010
17	Thermal insulating products for building applications- Determination of behavior under point load	MNS ISO 29769 : 2010	X		CSM -2010



18	Thermal insulating products for building applications- Determination of thickness for floating-floor insulating products	MNS ISO 29770 : 2010	X		CSM -2010
19	Thermal insulating products for building applications- Determination of the tensile bond strength of the adhesive and of the base coat to the thermal insulation material	MNS ISO 29804 : 2010	X		CSM -2010
20	Thermal insulating products for building applications- Determination of the mechanical properties of glass fiber meshes	MNS ISO 29805 : 2010	X		CSM -2010
21	Thermal insulating products for building applications- Determination of the resistance to impact of external thermal insulation composite systems	MNS ISO 29803 : 2010	X		CSM -2010
22	Thermal insulating products for building applications- Determination of organic content	MNS ISO 29771 : 2010	X		CSM -2010
23	Thermal insulation products for buildings; Factory made mineral wool (MW) products; Specification;	MNS EN 13162-2011		X	CSM -2011
24	Thermal insulation products for buildings; Factory made products of expanded polystyrene (EPS); Specification;	MNS EN 13163-2011		X	CSM -2011
25	Thermal insulation products for buildings; Factory made products of extruded polystyrene foam (XPS); Specification	MNS EN 13164-2011	X		CSM -2011
26	Thermal insulation products for buildings; Factory made rigid polyurethane foam (PUR) products; Specification;	MNS EN 13165-2011	X		CSM -2011
27	Thermal insulation – Physical quantities and definitions	MNS ISO 7345-2011	X		CSM -2011
28	Thermal insulation - Heat transfer by radiation - Physical quantities and definitions	MNS ISO 9288-2011	X		CSM -2011

29	Hygrothermal performance of buildings and building materials —Physical quantities for mass transfer — Vocabulary	MNS ISO 9346-2011	X		CSM -2011
	<b>Handbooks and Software</b>				
1	Software for calculation of thermal performance		X		2010
2	Handbook for break made nary design				2010
3	Handbook for timber framed house technology				2010
4	Handbook for structural insulated panel house				2010
5	Recommendation for calculation of HVAC system cooling load		X		2011
6	Handbook for passive building design				2011
7	Handbook on calculation method for air-air heat recovery system		X		2011
8	Guideline on automatic control of HVAC system		X		2011
9	Drawing catalogue of joint details for EE buildings		X		2011

## Annex III: Persons Interviewed

### UNDP / GEF

Batimaa P	Programme Officer, Environmental Cluster, UNDP CO, Mongolia
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### Project Staff

Munkhbayar Buyan	National project manager
Tsogt Ayurzana	Policy and Institutional development officer
Battur Tsolmon	Technical and Training development officer
Boldbaatar Lkhamjav	Former Finance officer who is responsible for component 3
Sarnai Ganbold	Admin and Finance Officer
Mongoljin Ganbold	Secretary-Translator

### Ministry of Road, Transportation, and Urban Development

Gantulga Dorjpalam	Head of Construction and Public Utilities Department, The project Alternate NPD
Enkhtuul.T	Senior officer, secretary of TC, Consultant engineer and trainer of ISO

### Building company

Bayarkhuu Samdanpurev	Director of Burkhanth Khus Co.Ltd
Davaachimeg Baatar	Director of Alag khairkhan bugat Co.Ltd
Bodigerel Bat-Erdene	Sales Manager of M Solid LLC
Delgermaa Ganbaatar	Manager of ATA trade Co.,Ltd

### Bank

Oyungerel.B	Head of Mortgage Banking Division, XACBank
Chimegsuren.G	Senior Officer of Mortgage Banking Division, XACBank
Zorigbaatar.B	Former loan specialist, Banking Department of Small and Medium sized Enterprises, XACBank. (present job: Risk analyst, Trade and Development

	Bank)
Mandakh Gungaanyam	Director of Business Audit Department, Golomt Bank

### **Beneficiaries**

Sukhbaatar Purevdulam	45-455 Suragch, 17-r khoroo, Chingeltei duureg
Delgertsetseg. D	59-774 Sogoot, 16-r khoroo, Chingeltei duureg
Chuluuntsetseg	13-247 Zuun naran, 22-r khoroo, Bayanzurkh duureg
	60 buildings which in Nisekh

### **NGOs, International organizations and projects**

Bilguun Buyantogtokh	Manager of Energy Efficient Conservation Centre, Mongolian University of Science and Technology-School of Civil Engineering and Architecture
Batbaatar Buyangerel	Energy efficient home manager of Energy and Environment Project, Millennium Challenge Account-Mongolia
Gantumur Baasankhuu	Executive Director of Mongolian Association of Civil Engineers
Tsetsegdelger Ganbold	Inspection engineer of BEEP

## Annex IV: List of Project Board Members

<b>№</b>	<b>Name</b>	<b>Title</b>	<b>Agency</b>
1.	Bat-Erdene,J	Chairman, State Secretary	MRTCUD
2.	Byambajav.B	Director at the State Administration and Management Department, National Project Director	MRTCUD
3.	Sukhbaatar.S	Senior specialist at the Policy Department for Construction, Housing and Public Utilities	MRTCUD
4.	Bolormaa.B	Specialist at the Loan and Aid Policy Department	MOF
5.	Erdenepurev.A	Head of the Fuel Policy Department	MMRE
6.	Enkhbat.D	Head of the Environmental and Natural Resources Department	MNET
7.	Gantulga.D	Head of the Building Codes and Regulations Division	LACGCA
8.	Enkhtuul.T	Expert of Road, Transportation and Construction	NSM
9.	Thomas Eriksson	UN Deputy Resident Representative	UNDP
10.	Tunngalag.U	UNDP Environmental Cluster Practice Manager	UNDP
11.	Otgonbayar.T	Director of the School of Civil Engineering and Architecture	MUST
12.	Munkhbaatar.G	Specialist at the Social Banking Department	XACBank
13.	Munkhbayar.B	National Project Manager (non-voting member)	BEEP

## Annex V: Summary Evaluation of Project Achievements by Objectives and Outcomes

The evaluation matrix uses the logframe in the Project document. The delivery status here in is taken largely from the 2011 PIR supplemented by information from the National Project Manager.

**KEY:**

GREEN = Indicators show achievement successful at the Midterm evaluation of the Project.

YELLOW = Indicators show achievement nearly successful at the Midterm evaluation of the Project.

RED = Indicators not achieved at the Midterm evaluation of the Project

#	Aim	Performance Indicator	Baseline	End of Project Target	Delivery Status at Midterm evaluation	Comments	HS	S	MS	MU	U	HU
1	<b>Project Objective7</b> 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	❖ Specific energy consumption, kWh/m <sup>2</sup> /yr:										
➤ <i>Baseline existing construction sector buildings</i>		❖ 250	❖ 250 by project end	N/A								
➤ <i>New construction sector buildings that do not fully comply with BCNS EE requirements</i>		❖ 200	❖ 169 by project end	N/A								
		➤ <i>New buildings that fully comply with existing BCNS EE requirement</i>	❖ 150	❖ 135 by project end ❖ 100 (through voluntary agreements) by project end ❖ 500 by project end	N/A N/A N/A							



#	Aim	Performance Indicator	Baseline	End of Project Target	Delivery Status at Midterm evaluation	Comments	HS	S	MS	MU	U	HU
				6. Domestic hot water system energy efficiency	Not developed yet							
				7. Thermal resistance of external walls	BNbD 23-02-2009							
				8. Thermal resistance of ground floors, basements, and foundations	Set forth as a guidance at BNbD 23-103-1							
				9. Thermal resistance of roofs and insulated ceilings	BNbD 23-02-2009							
				10. Thermal resistance of windows	BNbD 23-02-2009							
				11. Air tightness, leakage and ventilation	BD 23-103-10, BNbD 23-02-2009							
				12. Energy efficient lighting systems	Not developed yet							
				❖ Government officials trained in the operation and enforcement of the new BCNS energy efficiency provisions	2 trainings aimed to introduce the newly approved building norms and standards within the project and operation and enforcement procedures of norms were organized for relevant government officials at the Ministry of Road, Transportation, Construction and Urban Development, Administration of Land Affairs, Construction, Geodesy and Cartography and state inspectors from the General Agency for Specialized Inspection, covering in total approximately 90-100 people.	50 construction design engineer obtained a primary knowledge of using the EnergyPlus software for energy analysis and thermal load simulation.						
				❖ 85% of newly constructed buildings meet the updated BCNS EE requirements by 2015	The final evaluation on compliance with BCNS EE requirements is planned to be conducted in 2012. The development of a building energy monitoring and reporting system is being discussed with relevant							



#	Aim	Performance Indicator	Baseline	End of Project Target	Delivery Status at Midterm evaluation	Comments	HS	S	MS	MU	U	HU
					parties.							
				❖ Building energy monitoring and reporting system developed and implemented	N/A							
3	<b>Outcome 2:</b> <i>Training and Awareness Program</i>											
		❖ New and improved EE related building technologies developed, tested, refined, demonstrated and documented ❖ New building EE technologies supported and necessary training provided ❖ Number of	❖ Key new building EE technologies are not developed and supported ❖ Key building EE issues will remain poorly known and understood ❖ No building	❖ 4 new building EE technologies supported	Technological study covering the investigation of potential new environmentally friendly EE construction technologies available in local market, its design solution, durability, weather protection, EE engineering aspects was carried out in cooperation with International and National consultants. As a result, the following 4 EE housing technologies were introduced: Insulated masonry, Timber framed, Structural insulated panel and Insulated concrete. 3 technology manuals were published and disseminated to 3 Energy Conservation Centers (ECC), 3 libraries of professional institutions (the National Library of Mongolia, Library at the Mongolian University of Science	For improving public awareness on EE, TV spots were aired via TV channels in UB, Darkhan and Erdenet cities, 8 series of “Green building” programmes were developed and disseminated via the C1 channel						

#	Aim	Performance Indicator	Baseline	End of Project Target	Delivery Status at Midterm evaluation	Comments	HS	S	MS	MU	U	HU
		training courses ❖ Number of trainees employing building EE technologies ❖ Number of trainees engaged in building EE service provision	EE training courses and publicity campaigns will be run ❖ Minimal numbers of new urban area buildings will fully meet EE requirements	❖ 4 existing Energy Conservation Centers in UB, Darkhan and Erdenet supported	and Technology, Library at the Land affairs, Construction, Geodesy and Cartography Administration), universities and other interested parties. EE house designs with a range between approximately 30 m2 and 90 m2 and envelopes that include Insulated masonry, Timber Framed, and Structural insulated panel were developed and offered to interested households free of charge. EE houses are being constructed in ger districts of UB, Darkhan and Erdenet cities according to designs offered by the project.							
					The operation of ECCs in UB, Darkhan and Erdenet cities is strengthened through project trainings, workshops and other types of assistance provided to enhance the center management and personnel professional skills. ECCs were provided with 4 new equipments for testing and certifying thermal performance of buildings, namely the thermal image analyzer, heat flow, thermal resistance determiner. In 2010 ECC staffs were provided with several trainings (once at each ECC) on operation and maintenance of the above mentioned equipments. Currently the ECCs are mainly responsible for the project implementation activities at local levels, especially for the organization of weekly trainings for interested households and is in direct communication with the public for better outreach in grass-roots. For the reporting period approximately more than 1000 people got benefited from the ECC							

#	Aim	Performance Indicator	Baseline	End of Project Target	Delivery Status at Midterm evaluation	Comments	HS	S	MS	MU	U	HU
					advisory and training activities.							
				❖ 3 new regional centre EE advisory services in Dalanzadgad, Dornod and Khovd introduced and operating effectively	The project planned to support 3 regional centres and scheduled all activities.	It is expected to finish before the Project end.						
				❖ 12 training courses completed by end of project	Planned in 2012							
				❖ 500 trainees trained in building EE technologies by end of project	Several trainings covering in total almost 1500 construction sector professionals, including design and construction engineers, were organized within the project. Weekly trainings are organized on a regular basis for interested households through ECC.s at UB, Darkhan and Erdenet cities.							
				❖ 200 trainees providing building EE services by end of project	250 construction sector professionals got trained in building EE technologies as of July 2011.							
				❖ 6 publicity campaigns completed by end of project	110 in total got trained in providing building EE services/technological services through trainings offered by BEEP.							
				❖ 9,000 buildings applying EE by 2012	3 on-site public awareness campaigns for targeted ger area households were organized in cooperation with the Millennium Challenge Account Mongolia PR team.							

#	Aim	Performance Indicator	Baseline	End of Project Target	Delivery Status at Midterm evaluation	Comments	HS	S	MS	MU	U	HU
4	<b>Outcome 3: Access to energy efficiency financing facilitated</b>	❖	❖	❖								
		❖ 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.	❖ 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	❖ 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	In cooperation with XacBank and the Mongolian Mortgage Corporation 2 trainings on EE housing financing were organized for banking sector specialists enrolling 30 loan officers in total  As of June, 2011, 10 households benefitted from XacBank loan, and 60 others from the Savings Bank of Mongolia. Currently the loan interest rate for EE housing loan and risks related to it stay relatively high, terms are short and banks tend to favour lending for apartments.	Several trainings and workshops for banking sector loan specialists were organized with an aim to familiarize them with EE housing loan specifics.  Memorandum of Understanding was signed with Millennium Challenge Account Mongolia in July 2010, establishing a mechanism for energy efficient housing subsidy, equal to 25-30% of the total cost of the EE house.						
				❖ \$2M invested by banks/FIs in building EE and reinvested in building EE as loans repaid by 2013	So far, XacBank provided 150 mln. MNT(approximately \$ 0.1M) of its own funds for EE housing loans.							
				❖ Workshops conducted to raise awareness and build the capacity of commercial, government and residential property owners to access financing for energy efficiency improvements	N/A							

## Annex VI: Training and Workshop conducted by Project

№	Training and Workshop	Location	Date	Number of participants
1.	New building technology	Ulaanbaatar	2009	
2.	Energy efficiency system and framework of the building sector	Ulaanbaatar	March, 2010	50
3.	Norm for calculating energy efficiency of buildings	Ulaanbaatar	2010	45
4.	Introduction of thermal performance norms	Ulaanbaatar	2010	60
5.	Methods and approaches for planning, determining and saving thermal energy consumption	Ulaanbaatar	2011	30
6.	Methods and approaches for determining thermal energy consumption	Ulaanbaatar	2011	30
7.	Methods and approaches for saving and determining thermal efficiency of buildings	Ulaanbaatar	2011	50
8.	Introduction of BCNS "Heating, ventilation and conditioner" /БНБД 41-01-11/	Ulaanbaatar	2011	45
9.	Planning and design of energy efficient and passive houses	Ulaanbaatar	2011	45
10.	Energy efficient buildings and stoves	Ulaanbaatar	2011	20
11.	Methods and approaches of thermal energy efficiency of buildings	Ulaanbaatar	2011	50
12.	Energy efficient private house	Ulaanbaatar	2009	42
13.	Consultative meeting on EE technology	Ulaanbaatar	2009	26
14.	Energy efficient private house	Ulaanbaatar	2010	46
15.	Energy efficient private house	Erdenet	2010	17
16.	Energy efficient private house	Darkhan	2010	16
17.	Evaluation and measurement of energy consumption of buildings	Ulaanbaatar	2011	12
18.	"Evaluation and measurement of energy consumption of buildings" training for engineers and technical workers	Ulaanbaatar	2011	11
19.	"Timber-framed construction technology" training for construction engineers and architects	Ulaanbaatar	2011	50
20.	Weekly training for public for promotion and awareness of EE house technologies	Ulaanbaatar (every Thursday)	2011	1180
21.	Consultative meeting for window and building material manufacturers to "Issue quality labeling for insulation materials and windows"	Ulaanbaatar	2011	15
<b>21</b>	<b>Total</b>			<b>1840</b>

## **Annex VII: List of Documents provided to the Team for review**

- Handbook on Planning, Monitoring and Evaluating for Development Results (2009)  
UNDP
- Project document
- Project Implementation Review (PIR)
- Project board meeting minutes
- Annual reports
- Financial reports
- Agreement with Xacbank and related loan information
- MOU between UNDP and MCC, and related documents
- BNbD 23-02-2009 and other related building norm, standards
- Draft National Program on Strengthening the to reduce green house gas emission from Construction sector
- All annual work plans of the project
- Donor reports
- Others (meeting minutes, correspondence and TORs as needed)