Global Environment Facility (GEF)

Ministry of Construction and Urban Development (MCUD)

TERMINAL EVALUATION REPORT

Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia

UNDP PIMS no.: 5315 GEF ID no.: 5830
UNDP Project Id.: 00086244

MONGOLIA
GEF-5; GEF Climate Change Mitigation; CC2-Promote market transformation for energy efficiency in industry and the building sector

Evaluation timeframe: May 2016 – January 2020

January 2020

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Disclaimer

Please note that the analysis and recommendations of this evaluation report do not necessarily reflect the views of the United Nations Development Programme, its Executive Board or the United Nations Member States. This publication reflects the views of its authors.

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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AWP	Annual Work Plan
BEEP	Building Energy Efficiency Project
BCNS	Building Construction Norms and Standards
Cal	calorie
CBB	Consumption-based billing
CDC	Construction Development Center
CEO	Chief Executive Officer
CEO ER	CEO Endorsement Request
CO	Country Office
$CO_{2\text{-ea}}$	Carbon dioxide (equivalent)
CSO	Civil society organization
EA	GEF Executing Agency (UNDP Implementing Partner)
ECF	Environment and Climate Fund (of MET)
EE	Energy efficiency
EoP	End of project
ERC	Energy Regulatory Commission
ESMAP	Energy Sector Management Assistance Program
ESCO	Energy service company
Gcal	Gigacalorie
GCF	Green Climate Fund
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GIZ	Gesellschaft für Internationale Zusammenarbeit GmbH (Germany)
GJ	Gigajoule (= 1 billion Joule)
GWh	Gigawatt-hour (= 1 billion Watt-hour)
HE	High efficiency
HPUA	Housing and Public Utility Authority
IA	GEF Implementing Agency
ICLEI	'Local Governments for Sustainability
IGES	Institute for Global Environmental Strategies
K	Kelvin
$ktCO_2$	Kilotons of CO_2
ktoe	kiloton of oil equivalent
kW	Kilowatt
LED	Light-emitting diode
M&E	Monitoring and evaluation
MACC	Marginal abatement cost curve
MOE	Ministry of Energy
MOU	Memorandum of understanding
ME(GD)T	Ministry of Environment (Green Development) and Tourism
MGCF	Mongolian Green Credit Fund (MGCF
MRV	Monitoring, Reporting, and Verification
MCUD	Ministry of Construction and Urban Development
MUST	Mongolian University of Science and Technology
MW	Megawatt (= 1 million Watt)
NAMA	Nationally Appropriate Mitigation Actions
NDC	Nationally Determined Contributions
NGO	Non-governmental organization
NPC	National Project Coordinator
NPD	National Project Director

OECD	Organisation for Economic Cooperation and Development
PIF	Project Identification Form
PIR	Project Implementation Review
PIU	Project Implementation Unit
PSC	Project Steering Committee
RE	Renewable energy
RTA	Regional Technical Advisor
SDG	Sustainable Development Goal
TNA	Technology needs assessment
ToC	Mongolian Sustainable Finance Association
ToR	Terms of Reference
tCO_2	Ton of carbon dioxide
UB	Ulaanbaatar
UBHD	Ulaanbaatar District Heating Company
UNDP	United Nations Development Programme
UNEP	UN Environment (formerly known as UN Environment Programme)
UNFCCC	UN Framework Convention on Climate Change
USD	United States dollar
WB	World Bank

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EXECUTIVE SUMMARY

Project Title:	**Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia**			
GEF Project ID:	5830		*at endorsement (USD)*	*at completion (USD)*
UNDP PIMS ID:	5315	GEF financing:	1,269,863	
Country:	Mongolia	IA/EA own:	100,000	
Region:	Asia and the Pacific	Government:	3,350,000	
Focal Area:	Climate Change	Other:	3,450,000	
FA Objectives, (OP/SP):	CCM2 for GEF 5: Promote market transformation in the energy efficiency industry and building sector	Total co-financing:	6,900,000	
Executing Agency:	Ministry of Construction and Urban Development (MCUD)	Total project Cost:	8,169,863	
		Approved by GEF for implementation: 16 May 2016		
Other Partners involved:	Ministry of Environment and Tourism[1] (MET); Energy Regulatory Commission (ERC); Construction Development Center (CDC)	ProDoc Signature (date project began):		28 June 2016*)
		Operational closing date	Proposed: 31 Dec 2019	Actual: 31 April 2020

*) Actual project inception took place in April 2017 due to the restructuring of the government after the 2016 parliamentary election.

Description of the Project

With an increase in housing demand from economic growth and a surging rural to urban migration, the construction sector in Mongolia has been thriving over the past decade. As the building stock continues to grow, energy demand will simultaneously escalate. The heating season lasts for eight months during the cold winter period which exerts additional constraints on energy demand. Energy production and consumption form by far the largest contributor to total greenhouse gas (GHG) emissions in the country, while the building subsector is the largest contributor with the energy sector. Mongolia's GHG mitigation policy is primarily directed towards burning coal by more environmentally friendly technologies, as well as focusing on the efficient use of the electricity and heat produced from coal burning, using energy-efficient appliances and equipment and by reducing heat losses in buildings. Concerning the latter, the Government aims to reduce 20% of heat loss from buildings by 2020 and 40% by 2030 compared to 2014 levels. However, at the time of the formulation of the NAMA project, several regulatory, institutional, technical, financial and social barriers for the scaling up of initiatives in the construction sector remained.

Nationally Appropriate Mitigation Actions (NAMA) refer to a set of policies and voluntary actions that countries undertake as part of a commitment to reduce greenhouse gas emissions; a concept introduced at the Bali Conference of the UN Framework Convention on Climate Change (UNFCCC) in 2007. The Government of Mongolia recognizes NAMA) as a comprehensive instrument to translate the targets into action. To address the before-mentioned barriers to energy efficiency (EE) in the construction sector, the Ministry of Construction and Urban Development (MCUD) and the United Nations Development Programme (UNDP), with financial support from the Global Environment Facility (GEF) formulated the Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia Project (hereafter referred to as the 'NAMA Project'). The objective of the NAMA Project is to "facilitate market transformation for energy efficiency in the construction sector through the development and implementation of Nationally Appropriate Mitigation Actions (NAMA) in Mongolia". This objective will be achieved by removing barriers to increased adoption of energy efficiency technology in the construction sector through three components:

- Establishment of baseline energy consumption and GHG emissions in the construction sector;

[1] Before known as Ministry of Environment, Green Development and Tourism (MEGDT)

- Development and implementation of NAMA in the construction sector;
- Measurement, Reporting, and Verification (MRV) system for NAMA in the construction sector

The Project Document was signed in June 2016, but due to the restructuring of the government resulted from the 2016 parliamentary election, project inception only took place in April 2017. Nonetheless, thereafter implementation proceeded smoothly and the Project's operations were closed in December 2019, while the Project was extended until the end of April for closure purposes.

Achievements – summary

Objective: **Goal:**	To facilitate market transformation for energy efficiency in the construction sector through the development and implementation of NAMA; Reduced GHG emissions in the construction sector[2]
.Indicators and end-of-project (EoP) target:	
• Cumulative CO2 emissions reduced from the start of the project to EoP: 10,709 tCO_{2eq} from baseline, 2,014 tC_{O2e}) • Cumulative heat and electrical energy savings due to the Project by EoP: 18,722 MWh, from baseline 3,521 MWh)	Based on the first five (demo) projects the lifetime (taken conservatively as 14 years) energy savings and GHG emission reduction are 134 GWh and 48,140 tCO_2. The target values (GHG emission reduction) of the project logframe are not very well chosen: with demos just installed by EoP, the savings at EoP are just a fraction of lifetime energy savings (which is a better indicator for direct emission reduction). Direct emission reduction will be higher if the sixth demo is added (calculations still need to be done)
• Number of construction sector NAMA developed and implemented (target: one).	This indicator has created a lot of confusion, due to different interpretation by stakeholders of the 'NAMA' concept, ranging from the individual demo project labeled as 'NAMA', to the formulation of a follow-up NAMA programme (in construction). The latter has not happened (even though this was also discussed during the Mid Term Review but perhaps due to project management changes not taken up in the project execution, and also because of the limit in the budget available in this medium-size project). The Evaluation Team feels that the Project as such has been 'the NAMA' having a GHG baseline methodology development, a MRV system, capacity building, and with specific investment (demonstratration) projects.

Outcome indicators and outputs	**Achievement**
Outcome 1 Effective EE policymaking informed by robust energy consumption monitoring and reference baselines for the construction sector	
Indicators and end-of-project (EoP) target:	
a) Number of energy consumption and GHG emission inventory systems operational and adopted for the construction sector NAMA Target: one system by Year 3	The GHG inventory methodology was developed during 2017-2019. The methodology was reviewed by an inter-ministerial Science and Technology Committee of MCUD, MET, and MOE; and formally adopted by Ministerial Order. A web-based energy consumption and GHG inventory system operational and adopted.
b) Number of MOU to operationalize the data collection frameworks for the energy consumption and GHG inventory system Target: one by EoP	A MOU between MCUD and ERC was signed on 4 January 2019. In addition, "conducting GHG inventory and MRV activities in the construction sector" is included in the State Policy on the Construction Sector (Clause No.5.3.2) and its Action plan, an official document approved by the government in February 2019. It also will support future climate change mitigation action in future policy documents, such as new versions of NDC
c) Number of public and private sector entities supporting the sustainable operation of the GHG inventory system Target: four by EoP	There are 7 entities already involved and supporting the GHG inventory system, directly and indirectly, including MCUD, ERC, Land Management Agency (of MCUD), Ulaanbaatar municipality, energy utilities, and other agencies.
Outputs of Outcome 1:	

[2] Objective and goal as mentioned in the ProDoc's results framework

Outcome indicators and outputs	Achievement
1.1. Designed and completed capacity building development programs for decision-makers and agencies on data collection and sustainable operation of the GHG inventory systems 1.2. Established and operational energy consumption and GHG inventory system for the construction sector with improved data availability and methodology 1.3 Defined and established reference baseline on energy consumption and GHG emission for the construction sector	The GHG inventory methodology has been developed and received approval by Ministerial order. The GHG inventory methodology is developed with modifications from the CDM methodology AMS-II.E and allows for reductions in emissions from mitigation measures to be quantified. The modified methodology has been used for the development of the standardized baseline, which is planned to be submitted to UNFCCC. The GHG inventory is web-based (http://ghgconstruction.gov.mn) and will continue to be hosted by the Construction development Center post-project (under agreement with MCUD). The establishment of the GHG inventory was accompanied by the training of decision-making and technical staff.
Outcome 2 Prioritized NAMA in the construction sector developed and funded for implementation	
Indicators and end-of-project (EoP) target:	
d) Number of prioritized NAMA pilots in the construction sector developed and funded for the implementation by the project Target: one by EoP	Six pilot (demonstration) projects identified were approved by the and started implementation during 2018-2020: ERC (rooftop solar system); CDC Lab (insulation); UB Municipality (installation of heat meters); Soum heating system (high-efficiency boiler in Dundgovi *aimag*, Erdenedalai *soum,* School building retrofit in Gobi-Altai *aimag,* Jargalant *soum* (roof renovation and indoor heating system renovation); MUST (rooftop solar system).
e) No. of individual EE interventions that constitute the construction sector NAMA pilot Target: six by Year 4 (up from in one baseline	The following type of EE measures are installed at the demo sites: 1. Roof insulation; 2. Indoor heating system renovation; 3. EE heat-only-boiler; 4. Pre-insulated pipes; 5. Water softener; 6. automated heat pump; 7. Rooftop PV; 8 Three-glazed windows; 9. Heat meters
f) No. of identified fully capable and qualified private and/or public sector entities that are interested in funding prioritized NAMA pilot projects: Target: three by Year 4 (up from one in the baseline)	Three private sector entities including XAC Bank, Arig Bank, and Mongolian Green Credit Fund are identified as the potential institutions that can adopt green financing schemes for EE buildings. with support from the NAMA Facility, the Municipal Government of Ulaanbaatar will implement the Mongolia – Energy Performance Contracting for Residential Retrofitting in Ulaanbaatar City, supported by Global Green Growth Institute (GGGI) and ICLEI. Retrofitting of residential building was prioritized as a NAMA under Mongolia's NDC
Outputs:	
2.1 Developed framework for evaluating appropriate climate change mitigation interventions; and identified priority climate change mitigation actions	Detailed marginal abatement cost curves (MACC) were developed by the project for a subset of the technologies mentioned in the TNA, namely high-efficiency (HE) boiler, improved insulation, triple-glazed windows, improved ventilation with heat recovery system, solar panels and efficient lighting. The findings from the MACC modeling show that efficient lighting and ventilation systems are the most economically viable technologies (in terms of abatement cost), however, the emission reduction potential of HE boilers and insulation measures is much larger.
2.4 Developed and implemented construction sector pilot NAMA	The MACC-described EE and other technologies, as well as rooftop PV, have been installed in six pilot projects that have been supported by the NAMA (in which the pilot could be supported by a maximum of 20% of investments costs): 1. School building retrofit in Gobi-Altai *aimag*, Jargalan *soum* (EE measures are roof renovation and indoor heating system renovation); 2. CDC Laboratory Building retrofit (EE measure: three-glazed windows and basement wall isolation); 3. Soum central heating system renovation in Dundgobi *aimag*, Erdenedalai *soum* (EE measures: HE boiler, insulation of heating pipelines, installation of the water softener equipment, heat meters, pump and its frequency convertor controlling systems);

Outcome indicators and outputs	Achievement
	4. ERC new office building (EE/RE measures: solar panel module with smart metering system) The following projects started implementation during Q1 2020: 5. Municipality building (installation of heat meters in 24 buildings). 6. MUST new laboratory building (rooftop solar panels).
2.2 Completed operational structure for coordination among government agencies and key stakeholders for NAMA	The Project contributed to the development of State policy on the Construction sector by providing inputs on low-carbon urban development issues. The project has supported the update of Building Code, Norms and Standards (BCNS)23-02-09 on building energy efficiency aspects. A report on BCNS update and development of a roadmap of BCNS was developed in March 2018, although the updated BCNSs have not been officially adopted.
2.3 Completed capacity development of private and public sector actors on the successful development and implementation of NAMAs; and in the supportive identification of financing options 2.5 Developed financial tools that support the implementation of NAMA in the construction sector	A number of capacity building trainings were organized in 2018 and 2019 on GHG inventory and databases, use and interpretation of MACC, and awareness on financial instruments for energy efficiency in buildings with participants from government entities, developers, housing associations, construction, and financial sector. The project investigated financing opportunities that will enable the adoption of energy efficiency technologies in the construction sector. Guidance for financial institutions on conducting pre-and post-evaluation of EE activities is provided in the report "Financial Schemes for Energy Efficient Buildings in Mongolia". Financial instruments are risk mitigation tools that help to mobilize private capital for investment. The tool proposed is a partial risk guarantee, which is designed to make a project 'bankable' by reducing project risk, lowering the cost of capital and extending tenors. The tool can be used in the building sector in Mongolia
Outcome 3 Effective climate change mitigation policies strengthened by NAMA impacts ascertained through the established MRV system	
Indicators and end-of-project (EoP) target:	
g) MRV system for construction sector emissions set up and operational Target: one by EoP	Five key GHG and non-GHG parameters and indicators were identified and agreed on to be monitored as part of the NAMA. The MRV methodology and guidelines have been developed
h) No of institutions adopting and operationalizing MRV systems Target: two in year 3	Developed and implemented measurement of GHG emission reduction from three demo projects (Jargalan school and Erdenedalai *soum* heat supplier to which CDC Lab was added in Oct 2019) as part of the MRV system for the construction sector NAMA. MCUD, financial institutions, project developers as well as energy auditors will be able to adopt and use the MRV system
i) Number of construction sector NAMA case studies using the approved MRV framework and incorporated in policy documents. Target: three by EoP	MRV activities have been conducted at two construction-completed demo sites with enough info to formulate case studies. The results have been incorporated in the finalization of the MRV Guidebook (published Oct 2019)
Outputs:	
3.1 Defined key indicators (GHG and non-GHG) to be monitored for the selected mitigation actions 3.2 Developed and implemented an accurate MRV system for the construction sector NAMA 3.3 Designed and completed capacity development in the implementation and institutionalization of the MRV system	The MRV methodology and guideline developed; assessed and discussed through the Experts' council at CDC. Key GHG and non-GHG parameters and indicators were identified and agreed on 5 required indicators for construction sector NAMAs: 1) GHG emission reduction in buildings (in tCO2eq/year); 2) Specific CO2 emissions for the whole building (in tCO2/m2/year); 3) Primary energy use (MWh/year); 4) Energy cost savings (MNT/year); 5) Room temperature (°C); Gender and children. The output from MRV of the first demo projects has been fed into the GHG database system. The MRV system developed and implemented for demo projects, accompanied by capacity building and institutionalization with the Minister's order legalizing measuring and reporting of mitigation measures in the construction sector.

Conclusions and summary of ratings

Based on the above-given description of achievements, implementation, design, and strategy, sustainability and relevance, the Terminal Evaluation Team comes to the following ratings:

1. Monitoring and Evaluation	*rating*	2. IA& EA Execution	*rating*
M&E design at entry	S	Quality of UNDP Implementation	S
M&E Plan Implementation	S	Quality of Execution - Executing Agency and PIU)	HS
Overall quality of M&E	*S*	*Overall quality of Implementation / Execution:*	*S*
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance	R	Governance and financial	L
Effectiveness	S	Socio-economic	ML
Efficiency	S	Environmental:	N/A
Overall Project Outcome Rating	*S*	*Overall likelihood of sustainability:*	ML

Ratings for Outcomes, Effectiveness, Efficiency, M&E, IA&EA Execution

6: Highly Satisfactory (HS): no shortcomings
5: Satisfactory (S): minor shortcomings
4: Moderately Satisfactory (MS)
3.Moderately Unsatisfactory (MU): significant shortcomings
2. Unsatisfactory (U): major problems
1. Highly Unsatisfactory (HU): severe problems

Additional ratings where relevant:
Not Applicable (N/A)
Unable to Assess (U/A)

Sustainability ratings:

4. Likely (L): negligible risks to sustainability
3. Moderately Likely (ML): moderate risks
2. Moderately Unlikely (MU): significant risks
1. Unlikely (U): severe risks

Relevance ratings
2. Relevant (R);
1. Not Relevant (NR)

Impact Ratings:
3. Significant (S);
2. Minimal (M);
1. Negligible (N)

Relevance
The project is fully in line with several energy (efficiency) and climate change mitigation policies and strategies and has addressed some barriers to the more widespread dissemination of EE interventions in the Construction sector.

- *Attainment of outcomes and the objective; effectiveness*

With most of the demo projects operating and installation of the last two to be started soon, it has been estimated that the energy savings from these projects will lead to satisfactory energy savings and thus GHG emission reduction. The 'soft assistance' has resulted, as planned, in the development of a methodology for the GHG inventory in construction (which will be hosted, web-based by CDC), MACC curve development, design of development of MRV methodology and tools, accompanied by capacity strengthening and training activities.

- *Overall implementation and execution; efficiency*

The project is being adaptively managed, guided by the UNDP Country Office, and implemented in a cost-effective manner. The PIU has effectively engaged with all stakeholders relevant to the project and managed to get a strong commitment from the MCUD. The project start was delayed with almost one year after the signature of the Project document. However, the PIU has managed to implement the Project in a shorter implementation period (32 months) than originally planned (42 months) and with satisfactory results. Co-financing has been mobilized in large part linked with the realization of the demo projects.

- *Design logic and strategy*

Although the logical framework, in general, has been appropriately designed in terms of outcome, there has been confusion on the definition of "Nationally Appropriate Mitigation Actions". One might have expected the Project to result in a sector-wide NAMA, the TE Team observes that the Project itself has been 'the NAMA' with a GHG inventory, MRV system formulated and some pilots implemented (which confusingly were referred to as NAMAs). What has been missing in the design is the institutionalization of the NAMA concept; in particular, how GHG inventory and MRV methodology will be used systematically not only for a few demo projects but for EE and low-carbon interventions in the construction sector as a whole.

- *Sustainability*

The lack of NAMA institutionalization can be considered a missed opportunity in the project design. Nonetheless, sustainability seems guaranteed in the short-term (i.e. post-project) through cooperation agreements on GHG emissions in construction have been made between government entities. In the medium term, sustainability is likely as substantial financing has been mobilized for the construction sector and buildings in *ger* areas in programs to be undertaken by UB City, local banks and other Mongolian organizations (with financing support from Green Climate Fund and development

banks), while. Moreover, as part of the Nationally Determined Contribution development, a National Climate Change Committee has been set up which will ensure more institutional cooperation and info exchange as well as overall and inter-sectorial coordination of NDC development and implementation. Thus, there is no need for a separate NAMA institutional setup anymore. Mitigation and adaptation measures under Mongolia's NDC include NAMA-like measures, not only in the construction sector but also in other sectors. With a new project, UNDP will support the overall coordination of the NDC process and focus on providing sectoral inputs to the NDC in transport and construction (in the latter sector, building on the results of the NAMA in the Construction Sector project)[3]

Some barriers remain that will only be resolved in the longer term. The current tariff system does not encourage energy saving, as customers' bills are being based on payment per square meter (or volume) rather than actual consumption. Revised (energy-relevant) building codes have been drafted but political decision-making regarding approval has been slow and official approval still pending. To be effective, any revised energy building code would need to require (new) housing blocks to be prepared for consumption-based billing (CBB).

- Impact.

The TE Team has the opinion that the Project, although a medium-sized GEF project, has managed to contributed to market transformation for energy efficiency in the construction sector, in the sense that the info on demonstrations and GHG data and methodologies produced by the Project are now available for use by the relevant government agencies (e.g., MCUD, CDC, Energy, and UB Municipality) and some programs in the buildings and construction sector that are implemented with the support of other development partners.

Recommendations

UNDP and CDC

- Only two pilot projects have been analyzed fully according to the MRV methodology. Two projects were constructed recently in 2019 (ERC and CDC demos) and still need a full winter season of measurements, while the last two will only be installed in Q1 2020. The NAMA Project has recently been extended to the end of April 2020, so, the Evaluation Team proposes that this will enable the complete measurements of the winter season 2019-2020. Apart from this, another season of measurements could be undertaken, thus allowing to see differences between winters between one year and another. It also allows the last two demos (MUST building and UB City buildings) to be monitored during at least one whole winter season. The results (GHG inventory, MRV methodology, findings of the pilot projects, and other materials of the Project) should continue to be disseminated widely. An agreement should be made with CDC to continue the measurements, possibly with some UNDP support by the new UNDP project "Deepening efforts to accelerate NDC implementation and (also with CDC) on post-NAMA project information dissemination.

Government

- NAMAs formulation is not a one-off event but is a continuous process through which developing countries can expand the scope of activities over time. Several programs are being designed of which some are labeled 'NAMA' (such as the program *Mongolia – Energy Performance Contracting for Residential Retrofitting* with UB Municipality and GGGI) while other programs may have different labels and titles, but all construction and building sector will have some interrelation and can build and reinforce each other. An institutional oversight framework will be needed to promote coordination and cooperation, avoiding overlap and filling gaps. The newly established National Climate Change Committee (NCCC) can play such a role (or a subcommittee thereof), with NAMA and NAMA-type activities forming implementation of goals and strategies set out within the overall framework of Mongolia's Nationally Determined Contribution (NDC).
- The NAMA concept was introduced in 2007-2009 as part of the UNFCCC framework, referring to a set of policies and voluntary actions that countries undertake as part of a commitment to reduce greenhouse gas emissions. The Conference of Parties (COP) of the UNFCCC in 2015, held in Paris, introduced the (voluntary) Nationally Determined Contributions. The NDCs national climate plans highlighting climate actions, including climate-related targets, policies and measures governments. NAMAs can now be seen as a subset of NDC actions and from an institutional point of view, the TE Team recommends continuing climate change mitigation efforts within the NDC framework rather than separately institutionalizing the NAMA concept.

[3] *Deepening Efforts to Accelerate NDC Implementation in Mongolia* (2019-2021)

Lessons learned

- One lesson learned from the monitoring of energy consumption is that one has to be critical on data derived from purchase bills for monitoring, as the actual consumption of fuel (coal) may deviate substantially from the actual consumption, In general, there is a scarcity of data on energy consumption in (new) buildings, which are provided by two separate entities. As mentioned, data provided in forms are not always given correctly, either too large or too small or in wrong units. Not all buildings are equipped with hot water meters, which need to be added to a proper monitoring program.
- When designing NAMA preparation and support project it is important to have a common understanding among stakeholders on the definition of the NAMA concept and its priorities and expected goals. Apart from focusing on individual demo project interventions and defining GHG inventory and MRV methodologies and tools, setting up an institutional framework for NAMA development and registration is missing while this may be crucial for reaping the benefits of this and other future NAMA or NAMA-type of development projects and avoid that these will overlap, leave gaps or use mutually incompatible data collection, monitoring, and reporting systems.

EXECUTIVE SUMMARY (IN MONGOLIAN)

To be added

1. INTRODUCTION

1.1 Purpose of the Terminal Evaluation and objectives

1.1.1 Background

With an increase in housing demand from economic growth and a surging rural to urban migration, the construction sector has been thriving over the past decade. The projection of housing demand based on the population growth rate indicates about 140,000 apartment units will be constructed between 2020 and 2030[4]. As the building stock continues to grow, energy demand will simultaneously escalate. It is projected to rise at an average rate of over 10% from 2015 to 2035, reaching almost 130 petajoules by 2035[5]. During the long-lasting winter season in Mongolia, heating of homes, apartments, and offices is a necessary condition as air temperatures drop to as low as -40°C. The heating season lasts for eight months which exerts additional constraints on energy demand. This poses a challenge to both the local and global environment since coal remains the major fuel used to meet the demands. The energy sector is by far the largest contributor with almost two-thirds of the total greenhouse gas (GHG) emissions. Mongolia's GHG mitigation policy is primarily directed towards burning coal by more environmentally friendly technologies, as well as focusing on the efficient use of the electricity and heat produced from coal burning, using energy-efficient appliances and equipment and by reducing heat losses in buildings. The Government aims to reduce 20% of heat loss from buildings by 2020 and 40% by 2030 compared to 2014 levels

In this context, the Government of Mongolia recognizes Nationally Appropriate Mitigation Actions (NAMA) as a comprehensive instrument to translate the short- and medium-term targets into action. For this reason, the Ministry of Construction and Urban Development (MCUD) and the United Nations Development Programme (UNDP), with financial support from the Global Environment Facility (GEF) formulated the *Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia* Project (hereafter referred to as the 'NAMA Project').

1.1.2 Purpose of the Terminal Evaluation (TE)

With the NAMA Project's closure date approaching, a Terminal Evaluation (TE) needs to be undertaken of the project in accordance with the UNDP and GEF Monitoring and Evaluation (M&E) policies and procedures. The TE must be carried out by independent consultants, i.e. not previously involved in project design or implementation. In a competitive process, two experts were chosen to undertake the Terminal Evaluation, Mr. Johannes (Jan) VAN DEN AKKER and Mr. Jargal DORJPUREV, hereafter referred to as the "TE Team" or as the "Evaluators".

The evaluation has assessed the performance of the NAMA Project, based on expectations set out in the project logical framework (a.k.a. as results framework), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation has covered the criteria of relevance, effectiveness, efficiency, sustainability, and impact. The TE then assessed the key financial aspects of the project, including the extent of co-financing planned and realized. It assessed the extent to which the project was successfully mainstreamed with other UNDP priorities, including improved governance, and gender. The Evaluators also looked at the extent to which the project is achieving impacts or progressing towards the achievement of (intended or unintended) impacts.

[4] PowerPoint presentation by Project Implementation Unit (PIU)

[5] *Strategies for Development of Green Energy Systems in Mongolia (2013-2035)*; GGGI (2015)

1.2 Scope and methodology

Evaluation criteria

The terminal evaluation is based on the OECD-DAC[6] criteria of *relevance, effectiveness, efficiency, sustainability, and impact*. The rating has taken place according to the evaluation criteria using the rating scales recommended in the UNDP *Guidance for Conducting Terminal Evaluation of UNDP-supported, GEF-financed Projects* (2012)[7] and given in Box 1. Evaluation conclusions related to the project's achievements and shortfalls (comprehensive and balanced statements which highlight the strengths, weaknesses, and results of the project, based on the OECD-DAC criteria of relevance, effectiveness, efficiency, sustainability, and impact:

- Relevance: How does the project relate to the main objectives of the GEF focal area, and the environment and development priorities at the local, regional and national levels?
- Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved?
- Efficiency: Was the project implemented efficiently and cost-effectively, in line with international and national norms and standards?
- Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?

Box 1 Rating and rating scales for evaluation criteria in UNDP/GEF projects

1. Monitoring and Evaluation	*rating*	2. IA& EA Execution	*rating*
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		*Overall quality of Implementation / Execution:*	
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental:	
		Overall likelihood of sustainability:	

Ratings for Outcomes, Effectiveness, Efficiency, M&E, IA&EA Execution

6: Highly Satisfactory (HS): no shortcomings
5: Satisfactory (S): minor shortcomings
4: Moderately Satisfactory (MS)
3. Moderately Unsatisfactory (MU): significant shortcomings
2. Unsatisfactory (U): major problems
1. Highly Unsatisfactory (HU): severe problems

Additional ratings where relevant:
Not Applicable (N/A)
Unable to Assess (U/A)

Sustainability ratings:

4. Likely (L): negligible risks to sustainability
3. Moderately Likely (ML): moderate risks
2. Moderately Unlikely (MU): significant risks
1. Unlikely (U): severe risks

Relevance ratings
2. Relevant (R)
1. Not Relevant (NR)

Impact Ratings:
3. Significant (S)
2. Minimal (M)
1. Negligible (N)

[6] Organisation for Economic Cooperation and Development (OECD) – Development Assistance Committee (DAC)

[7] Other guidelines consulted are those presented in the UNDP *Handbook on Planning, Monitoring and Evaluating for Development Results*, *Updated Guidance on Evaluation* (2012), the UNDP Discussion Paper: *Innovations in Monitoring & Evaluating Results* (2013) and the GEF *Review of Outcomes to Impacts (ROTI) Handbook* (2009). Regarding gender aspects, the evaluation refers to the *Guide to Gender Mainstreaming in UNDP Supported GEF Financed Projects* (2016).

- Impacts: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental or other impacts?

The ratings in this report have been determined based on the project progress reporting and the analysis the Evaluators carried out of the available information and comparing these with observations from the mission (interviews with stakeholders and site visits) and checking with the information presented in project technical reports and policy and background documents. To gather empirical data and information relevant to the project, the evaluators carefully designed several instruments. They included a checklist and evaluative questions for use in collecting primary information. All tools were designed to address the key questions (grouped according to the before-mentioned OECD-DAC criteria) that were part of the Inception Report of the evaluation assignment. Annex D contains the matrix of evaluative questions.

Approach

The TE has been based on the following *sources of information*:

- Desk review of progress reports and project documents (listed in Annex C),
  - CEO Endorsement Request (CEO ER) and annexes; annual progress reports (PIRs, project implementation reviews); Mid-Term Review report and PowerPoints on project progress;
  - Overview of budget expenditures and realized co-financing; annual work plans
  - Project technical reports and description of outputs;

Box 2 Evaluation method and approach

  - Project or counterparts' websites; PowerPoints
  - National policy documents on (renewable and rural energy) as well as other relevant reports, PowerPoint presentations, and documents from counterpart organizations.
- An evaluation mission of 10 working days (from 06 to 16 January 2020) to meet UNDP, Ministry of Construction and Urban Development (MCUD), and the Project Team and to hold interviews with project partners and stakeholders in (see the mission itinerary in Annex B). The meetings and interviews helped the reviewers to obtain in-depth information on impressions and experiences and to explore opinions about the Project and their understanding and identify opportunities
- A presentation of the initial findings was made at the end of the evaluation mission (on 15/01/2020).

Regarding *data analysis and methods for analysis*, many relevant reports and documents were collected (where possible before the mission). The review of project and background documents (listed in Annex C) provided the basic facts and information for developing the terminal evaluation report, giving a basic insight into progress (target vs. progress) and reasons for under and over achievements were explored.

The evaluation mission served to verify these basic facts, get missing data and to learn the opinions of stakeholders. The mission basically consisted of conducting key informant interviews (in Ulaanbaatar) were made with the representatives of different sectors, such as (i) government ministries: MCUD; Ministry of Energy; Ministry of Environment and Tourism (MET); (iii) public entities, academia, and NGOs. To gather information from beneficiaries three pilot projects were visited in Ulaanbaatar (two) and Erdenedalai *soum*, Dundgobi *aimag* (province). Also, the Evaluators interacted closely with the UNDP Country Office and Project Management Unit staff (based at MCUD) in Ulaanbaatar to validate the information collected from the different sources.

Triangulation (interviews, and document analysis) have allowed validation of information through cross verification from two or more sources. In appraising the result-wise effectiveness of the program's major interventions, evaluators

thoroughly assessed targets against progress. To supplement this information, the evaluators used information provided by the Project Team[8] and later cross-checked with the documents and interview statements. These processes and methods helped evaluators to gather plenty of evidence about the outcomes of the project. Along with collecting information, evaluators reviewed data from the Project Implementation Reviews (PIRs) and other project-related documents. The evaluators then synthesized and analyzed the collected information in order to arrive at their preliminary findings, conclusions, and recommendations that were shared at a meeting of the Project Executive Board. A draft report was shared with the MCUD-based Project Implementation Unit (PIU) and UNDP in the agreed format and the report was finalized after incorporating feedback and suggestions.

1.3 Structure of the TE report

This report consists of the report body, executive summary, and annexes. The body of this report is structured around the following chapters: it starts with an introduction to the objectives, scope, and methodology of the terminal evaluation (Chapter One), description of the project context and a summary of project facts (such as start date, duration, the context in which the project started), its objectives and stakeholders (Chapter Two).

The assessment and formulation of the "findings" have been guided by the questions of the "evaluative matrix", of which a final draft was formulated at the inception stage of the assignment (see Annex D)[9]. The report follows the outline for terminal evaluations of UNDP/GEF projects[10] but has split the suggested chapter on "Findings" in three parts for practical reasons due to the chapter size and to permit a more reader-friendly presentation of the information. Findings on relevance, design, and formulation are in Chapter Three. Findings on project implementation and monitoring are presented in Chapter Four. An overview of progress regarding the achievement of outcomes and outputs is given in Chapter Five, which ends with a presentation of findings regarding replication effects and sustainability. Chapter Six presents the conclusions, recommendations, and lessons learned from the project. These include actions that might be taken (by the Government) to help ensure the sustainability and continuity of project achievements, as well as steps that can be taken by UNDP (and GEF) to help improve the design and implementation of future projects.

In development projects, 'results' are the describable or measurable development change resulting from a cause-and-effect relationship. These results include project outputs, short- to medium-term outcomes, and longer-term impacts, (including global environmental and development benefits).

The achievement of the results and the longer-term sustainability thereof is influenced by the:

- way project was formulated and designed (discussed in Chapter 3);
- way the project was implemented by the various project partners (discussed in Chapter 4);
- occurrence and impact of internal and external risks (discussed in Chapter 5).

Annexes at the end of the report include the Terms of Reference (Annex A), field visit details and list of organizations and people interviewed (Annex B), documents collected and bibliography (Annex C), evaluative questions and methodology (Annex D).

[8] PowerPoints, PIR, quarterly progress reports, minutes of meeting.

[9] See the *Inception Report* of the Terminal Evaluation (January 2020)

[10] See Annex F, 'Evaluation Report Outline' in the UNDP *Guidance for Conducting Terminal Evaluations* (2012)

2. PROJECT DESCRIPTION AND BACKGROUND

2.1 Context and problems that the project sought to address

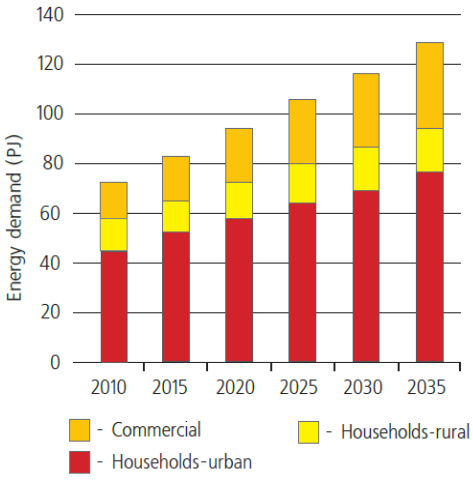
Building sector

The building sector in Mongolia is divided into three main subsectors according to the heating system they use. Heat supply in Ulaanbataar and the *aimag* centers to commercial and residential apartment blocks is in district heating through networks that provide hot water and heat, generated in combined heat and power plants (CHP). The second group consists of individual houses and blocks in Ulaanbataar and *soum* centers buildings with individual or small network systems in which energy is generated in heat-only boilers, which are often quite energy-inefficient. Individual *ger* residences in Ulaanbaatar's expanding peri-urban areas[11], in small cities and rural areas mainly on solid fuel-fired heating stoves (coal and wood). The *ger* is the traditional Mongolian dwelling (see picture).

The population grew from 2.8 million in 2010 to 3.1 million in 2016 and is expected to grow to 4.1 million in 2035 (UN 2013)[12]. Ulaanbaatar (UB) City has the highest number of building stock in Mongolia, about 31.0 million m^2 (85% of the national total) of residential apartments and 6.6 million m^2 of public/commercial buildings (45% of the national total) in 2010[13]. Ulaanbaatar currently accommodates 44.5% of the country's population[14], which is expected to increase to about 60% by 2035 (mainly due to the continuing migration of rural population to the city), creating an increased demand for housing. About 140,000 new apartment units are projected to be constructed between 2020 and 2030. The development of commercial and institutional dwellings is expected to increase in urban areas, especially in Ulaanbaatar (UB). This will increase the demand for energy in the building sector, as indicated in Box 3. During the long-lasting winter season in Mongolia, heating of homes, apartments, and offices is a

Box 3 Characteristics and energy demand in building sector

Growth driver	2010	2020	2035
Population	2.8		4.1
Households ('000)	742	945	1,186
• Urban	464	624	830
- Ulaanbaatar	312	418	581
- Other	152	206	249
• Rural	278	321	356
- Herders	185	171	142
- *Soum* centers	93	150	214
Building volume (million m^3)			
- UB	31.0	42	60
- Total, Mongolia	36.2		
Commercial buildings			
- UB	6.5		
- Total, Mongolia	14.6		



Compiled from *Strategies for Development of Green Energy Systems in Mongolia (2013-2035),* GGGI (2015). NAMA in Construction Sector, Project Document

[11] *Ger* areas account for 60% of Ulaanbaatar's population and 30% of the country's population. Household incomes are generally low to medium10 accounting for 25% of Mongolia's poor.

[12] Based on the United Nations Medium projection for population (2008) and National Statistical Office of Mongolia (2012); World Bank data (2017)

[13] Final Report *Heat Forecasts, Updating Energy Sector Development Plan*, ADB, 2013

[14] The urban areas of Ulaanbataar, Erdenet and Dakhan have about 64% of Mongolia's population

necessary condition as air temperatures drop to as low as -40°C. The heating season lasts for 8 months which exerts additional constraints on energy demand.

Energy sector

Mongolia's power and heat supply are dominated by coal-fired units. In 2012, 95% of electricity and more than 99% of district heat was provided by coal. Coal consumption in 2012 was 3,083 kilotons of oil equivalent (ktoe) and electricity consumption was 4 terawatt-hours[15]. Mongolia is a big producer of coal, which is mostly exported.

About 90% of the electricity and heat consumption in Mongolia in five relatively small, independent transmission grids, of which three are located in Ulaanbaatar (UB)[16]. All three UB combined heat-power (CHP) plants[17] (referred to as CHP2, CHP3, and CHP4) are coal-fired and generate electricity for the central electricity grid, steam for industrial purposes supplied through a separate pipe network, and hot water for the district heating system (DHS). The main network of the DHS consists of about 130 kilometers (km) of transmission pipelines with diameters from 15 centimeters to 1.2 meters that feed the main substations and distribution points. About 36% of the pipelines in the main network are aboveground. The remaining 64% are underground pipelines placed in concrete ducts, mainly along roadways[18]. The Ulaanbaatar District Heating Company (DHC) acts as a heat wholesaler, buying heat from the power plants and selling it in bulk to large industrial, commercial, public, and institutional building operators; to the various housing and communal services companies that belong to national[19] and local government[20] and smaller companies.

Greenhouse gas emissions

The energy sector is by far the largest contributor to total greenhouse gas (GHG) emissions in the country. According to the recent Third National Communication of Mongolia (2018), total GHG emissions in 2014 were 34,483 kt of $CO_{2\text{-eq}}$, of which 17,268 kt$CO_{2\text{-eq}}$ coming from energy. The building subsector alone contributes to over 11% of the overall carbon dioxide (CO_2) emissions, higher than that from the other sectors. In aggregate terms, the residential sector represents 40% cent of energy consumption, more than the industry and transport sectors combined. Urban household energy use dominates energy demand in the buildings sector, which is projected to nearly double between 2010 and 2035, despite the combination of energy efficiency improvements (source: GGGI, 2015).

Mongolia's GHG mitigation policy is primarily directed towards burning coal by more environmentally friendly technologies (including renewable energy). At the same time, it is focusing on the efficient use of the electricity and heat produced from coal-burning by using energy-efficient appliances and equipment and reducing heat losses in buildings. The residential building sector has great potential to reduce energy demand and ultimately to reduce CO_2 emissions. Mongolia's Green Development Policy (2014) and the Nationally Determined Contribution (NDC) document (2016, 2019) set out a goal to reduce building heat loss by 20% by 2020, and 40% by 2030.

Issues and options in the 'energy in buildings' sector

Supply-side interventions

The ESMAP-World Bank report *Paving the Way to a Sustainable Heating Sector* mentions that the district heating system is dilapidated, resulting from a lack of investments for needed rehabilitation and upgrading in past decades. Piping is typically quite old and corroded, resulting in heat losses that were 18.4% in 2014[21]. One reason is that the quality of

[15] Source: IEA Statistics. In 2017, electricity consumption had increased to 7 TWh and coal consumption to 3,518 ktoe

[16] The largest is the Central Electricity System (CES), covering 13 provinces along the Trans-Mongolian railway from Ulaanbaatar to Darkhan, accounts for about 80% of the country's installed power capacity.

[17] The three have a total electricity capacity of 910 MW and a thermal capacity of about 2000 Gcal per hour. Connected load is about 1625 Gcal per hour with annual sales of 500,000 Gcal per year.
Source: en.wikipedia.org/wiki/Energy_in_Mongolia. Given aging infrastructure actual output is less,

[18] *Completion Report, Mongolia: Ulaanbaatar Heat Efficiency Project*, Asian Development Bank (2008)

[19] Ulaanbaatar District Heating Company (UBDH), owned by MOE, Ministry of Finance and State Property Committee

[20] Housing and Public Utilities of Ulaanbaatar City (OSNAAUG), owned by Ulaanbaatar City

[21] For comparison, heat losses in district heating systems in cities with similar climatic conditions are much lower, e.g. Helsinki, 6%, Stockholm 7%, Harbin (China), 9%

replenishment water has not been adequately maintained to prevent corrosion and leakage. The Government aims at improving heat transmission capacity by means of network reinforcement and reducing heat losses to 12% by 2030[22].

Urban household energy use dominates energy demand in the buildings sector, which is projected to nearly double between 2010 and 2035 (see Box 3). New power supplies are needed to meet growing electricity demand. The Ministry of Energy has plans to expand the power supply in the coming years, including the construction of CHP5, a new 450 MW coal-fired CHP plant Tavantolgoi, as well as several other power plants, including plants generating power from renewable resources. The increase in production and transmission capacity of the central system will prevent the expansion of individual, smaller and less efficient, boilers.

Demand-side measures

The current tariff system does not encourage energy savings. The tariff structure reflects the heating sector's segregated structure and makes the tariff structure for various customers difficult to understand. The government subsidizes the cost of coal at the power plant to keep the heating tariff low. Importantly, customers' bills are being based on payment per square meter of floor area (or volume) and hot water is billed according to the number of people living in households rather than actual consumption. The absence of control valves on radiators prevents customers from controlling their heat consumption. Although heat energy meters are found in private housing at the building/staircase level, the meter readings are not used for billing purposes. Because the tariff level is relatively low[23] and not consumption-based, customers lack further incentives for heat savings.

Experience in similar systems in Eastern Europe and Central Asia, have shown that the introduction of consumption-based billing (CBB) can generate substantial energy savings (about 25-30% of the heat consumed)[24]. The introduction of CBB will meet regulatory and physical constraints. The introduction of such a billing system will require the installation of building-level heat meters and apartment-level hot water meters, which would require substantial investment. Moreover, Ulaanbaatar's housing stock is still dominated by pre-cast concrete panel buildings from the 1970s, 80s and the early 90s. More than 20% of the over 1 million city's population lives in these buildings. A total of over 500 (five to twelve story) pre-cast-panel buildings accommodate some 50,000 apartments. The buildings are in an inadequate state due to their age, poor or non-existent maintenance and lack of insulation[25]. The ESMAP report further mentions that "since the walls between apartments are not insulated, inaccurate measurements may question the economy of individual apartment-level metering. Old buildings with unbalanced piping and radiator systems distribute heat unevenly to apartments, which would lead to unfair billing of apartment owners. In short, the existing DH infrastructure in housing (i.e., single-string systems with multiple vertical risers) makes introducing apartment-level metering virtually impossible".

To improve demand-side efficiency, the Mongolian government has undertaken building EE improvement initiatives. In 2014, the Building Construction Norms and Standards (BCNS) were revised[26]. The Ministry issued guidelines for the buildings sector to adhere to updated BCNS in new construction. The CDC approves construction drawings and documents that comply with revised BCNS. The state inspection agency is involved in the inspection of commercial and residential buildings during different stages of construction to ensure that building construction is being carried out as per the approved plan and drawings.

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22 *DH in Mongolia –Energy efficient and cleaner heating in Ulaanbaatar,* PowerPoint by E. Agarjev (UBHC), Aprtil 2015

23 Residential heat tariff in Ulaanbaatar is MNT 460/m^2 and cost of hot tap water is MNT 1700-2550 person/month. Metered tariff (residential) is MNT 11,356 per Gigacalorie (Gcal). The average electricity price per consumer in the central grid system (CRIPG) is about MNT 151.44 per kWh (which is about 97% of the average estimated cost of power delivery of MNT 155.85/kWh. Source: ERC website

24 ESMAP report *Paving the Way for Sustainable Energy*

25 Case Study *Thermo-technical rehabilitation of public and apartment buildings,* NEXUS-GIZ

26 The previous UNDP-GEF Buildings Energy Efficiency Project (BEEP) was successful in developing technical and institutional capacity in adopting the energy code and updated 12 revised EE BCNS and In the area of (i) building energy efficiency performance modelling; (ii) methods for determining the total thermal resistance of parts of building; (iii) Thermo-technics of construction materials; (iv) methods of determining the thermal resistance of insulation materials; (v) space heating system energy efficiency; (vi) domestic hot-water system energy efficiency; (vii) thermal resistance of external walls; (viii) thermal resistance of ground floors, basements, and foundations; (ix) thermal resistance of roofs and insulated ceilings; (x) thermal resistance of windows; (xi) air tightness, leakage and ventilation; (xii) energy efficient lighting system

The restructuring of tariff systems and building energy codes is a political process that could take several years to realize the results, as policymakers need to balance the energy and environmental issues with the financial consequences for the State budget and costs for owners of apartments and houses.

Building energy efficiency (EE) measures will help reduce the demand, but may proceed quite slowly due to lack of incentives (as described above) and due to inadequate financing sources and modalities. Specific technical options include (i) improving the energy efficiency of the building envelope, e.g., via insulation of walls, roofs, attics, and basements; and repair or replacement of external doors and windows (as described in Box 17), (ii) improving operations and maintenance (O&M) practices, and (iii) installation of energy-efficient appliances in the buildings.

Barriers and project strategy

Several barriers restrict widespread adoption and investments of energy efficiency interventions (as described in Box 20) in the construction sector[27] occur across a range of areas that need to be strategically addressed to facilitate marked progress. Key barriers include (as mentioned in the Project Document):

- Insufficient EE policy implementation and coordination mechanisms
- Lack of systematic approach, comprehensive tools and capacity to inform EE policy measures
- Absence of effective financing models for EE Investments
- Unattractive economic benefits of EE investments for end-users due to subsidized heat and electricity tariffs
- Limited availability of high performing, advanced EE building materials
- Lack of credible information on EE construction materials, equipment and cost-effective state of art technologies
- Lack of tools and guidelines for monitoring and evaluation.

One barrier is that GHG savings and the cost-benefits of low carbon interventions in the building sector have not been systematically quantified in Mongolia and their benefits remained unclear and often assessed on an ad-hoc basis. There has been a dearth of data on energy consumption and GHG emission from end-uses. Major challenges persist in measuring and monitoring the energy consumption and identifying the reference baseline, and this becomes a barrier, particularly noticeable when having to formulate proposals to attract financing for investments in energy efficiency measures.

2.2 Project description and strategy

2.2.1 Objective, outcomes, and indicators

The NAMA Project was designed to provide the Government of Mongolia with opportunities to overcome the regulatory, institutional, technical, financial and social barriers for the scaling up of initiatives the construction sector by strengthen capabilities of its agencies, implementation of pilot (or demonstration) projects, and setting up a implement a robust and transparent GHG inventory and monitoring, reporting and verification (MRV) within a NAMA framework for meeting national GHG targets in the construction sector. For information on the 'NAMA' concept, the reader is referred to Box 4.

The **objective** of the project is to "facilitate market transformation for energy efficiency in the construction sector through the development and implementation of Nationally Appropriate Mitigation Actions (NAMA) in Mongolia". This objective will be achieved by removing barriers to increased adoption of energy efficiency technology in the construction sector through three **components**:

- Establishment of baseline energy consumption and GHG emissions in the construction sector;
- Development and implementation of NAMA in the construction sector;
- Measurement, Reporting, and Verification (MRV) system for NAMA in the construction sector

[27] In the Mongolian context, the "construction sector" refers to heavyweight, multi-storey commercial, residential apartment buildings and private houses (within or outside housing estates) since these are connected to water supply, sewage, district heating and domestic hot water systems. The *ger* areas surrounding the UB city centre without access to heat grid or other infrastructure facilities, are outside the scope of the 'construction sector'.

Box 4 What are NAMAs?

Under the aegis of the United Nations Framework Convention on Climate Change (UNFCCC), endorsed in 1992, over 190 governments have committed themselves to prevent a dangerous level of climate change. Energy efficiency (EE) can play a key role in mitigating climate change since it allows the combination of further economic growth with more efficient use of energy sources thus avoiding GHG emissions. **Nationally Appropriate Mitigation Action (NAMA)** refers to a set of policies and voluntary actions that countries undertake as part of a commitment to reduce greenhouse gas emissions. The concept of NAMA was first used in the Bali Action Plan as part of the Bali Road Map agreed at the UNFCCC in Bali in December 2007, and also formed part of the Copenhagen Accord issued following the United Nations Climate Change Conference in Copenhagen (COP15) in December 2009, which mentions that "Nationally appropriate mitigation actions seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support. Those actions supported will be added to the list in appendix II. These supported nationally appropriate mitigation actions will be subject to international measurement, reporting and verification in accordance with guidelines adopted by the COP".

The Paris Agreement (at COP21) introduced the **National Determined Contribution (NDCs**) by each individual country to achieve the agreed goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels; and to pursue efforts to limit the increase to 1.5°C. A NAMA can be seen as an operational vehicle for implementation for the NDC that sets and prioritizes targets on a more tactical level.

By definition, NAMAs will vary by country. While there is a general understanding that NAMAs aim to achieve a deviation from business as usual (BAU) emissions in developing countries, the definition of NAMAs has remained ambiguous, leaving ample room for different interpretations. This has led to diversity in submitted NAMA types. *Policy/strategy-type* NAMAs are actions at the policy/regulatory level and may have a national or sectoral level scope. Examples include energy efficiency building codes; labelling programmes, renewable energy feed-in tariffs. *Target-based NAMAs* focus on achieving a target (e.g. energy intensity, energy efficiency, renewable energy) against a baseline. *Project-type* NAMAs are specific investments, generally in cleaner infrastructure or machinery. An example, is the replacement of boilers with solar water heaters, double glazing and wall insulation, or of high-efficient motors, installation of rooftop PV, etc. The scope of a NAMA for a country could vary from a collection of specific individual actions to a national mitigation goal. Also, NAMAs formulation is not a one-off event, but is a continuous process through which developing countries can expand the scope of activities over time. Thus, countries could initiate with some individual actions, then change to NAMA with sectoral or economy-wide targets.

NAMAs are registered with UNFCCC (see https://www4.unfccc.int/sites/publicnama/SitePages/Home.aspx). in the sectors a) energy supply, b) buildings, c) transport, d) industry, e) agriculture, f) forestry, g) waste, and h) cross-sectoral The Registry lists NAMAs that have been recognized, NAMAs that need support (for their preparation, or for their implementation), and NAMAs that have received support. Information on NAMAs in various stages of UNFCCC submission (feasibility, under development, implementation) can also be found at the NAMA database (see http://www.nama-database.org/index.php/Special:RunQuery/QueryData) run by Ecofys that lists (currently) 259 NAMAs and 35 feasibility studies in 69 countries. Technical support for NAMA formulation and capacity building has been provided by UNDP (with GEF and other funding), NAMA Facility, and the Climate Technology Centre and Network (CTCN).

A well-formulated NAMA document encompasses several elements:

- *Technical:* current and future GHG emissions trends (Business-as-usual scenario), identification and prioritization of mitigation options; and cost estimates of mitigation options. This dimension provides a basis for required Measurement, Reporting and Verification (MRV);
- *National benefits:* links with national development priorities., including sustainable development, low-emission development and low-carbon strategies and NDC (Nationally Determined Contribution).
- *Description of actions,* i.e. mitigation measures and options (detailing actions with costs, duration, actors involved, GHG emission reduction or avoidance, and transformational impacts)
- *Institutional:* description of the decision-making process which can coordinate and reconcile diverse domestic interests, including task allocation of NAMAs formulation and implementation among appropriate ministries and other stakeholders;
- *Monitoring, registration and verification (MRV):* key elements in assessing GHG emission and other impacts, methodology to estimate these impacts, and arrangements for measuring and reporting. The reporting should be such that is fits in reporting requirements of NDCs and other UNFCCC reporting (e.g. Biennial Update Reports and National Communications)
- *Finance:* cost of the NAMA (incl. demo pilots, cost of MRV, technical and capacity building) and sources of financing)

Sources: From NAMAs to Low Carbon Development in Southeast Asia: Technical, Mainstreaming, and Institutional Dimensions (IGES, 2012); *Guidance for NAMA Design* (UNDP, UNEP; 2013); *Guidance for NAMA Design in the Context of Nationally Determined Contributions* (UNDP, UNEP; 2016)

The project concept (Project Identification Form) was approved in June 2014 and the project approved by the GEF for implementation in May 2016 and the Project Document signed in June 2016 to be implemented over 3 years and 4 months (proposed to be closed by 31 December 2019). However, Project Inception was delayed until April 2017, due to government restructuring after the 2016 parliamentary elections. A summary of the project framework with **objective, outcomes, outputs, and indicators** is provided in Box 5.

Box 5 Summary of the project objective, outcomes, and outputs

Project goal: Reduced GHG emissions in the construction sector Project objective:	**Indicators and end-of-project (EoP) target value** 1. Cumulative CO2 emissions reduced from the start of the project to EoP: 10,709 tCO_{2e} from baseline, 2,014 tCO_{2e}) 2. Cumulative heat and electrical energy savings due to the Project by EoP: 18,722 MWh, from baseline 3,521 MWh)
Project objective: To facilitate market transformation for energy efficiency in the construction sector through the development and implementation of NAMA	3. Number of construction sector NAMA developed and implemented: one 4. % of new buildings that are fully or beyond BCNS compliance by EoP: 100% from baseline 80% **5.** Number of people gainfully employed on EE in the construction sector in Mongolia: 50 (by EoP)

Component 1. Establishment of Baseline Energy Consumption and GHG Emission in the Construction Sector
GEF budget: USD 202,700 (TA). Co-financing: USD 796,153

Outcomes and indicators	Output and activities
Outcome 1: **Effective EE policymaking informed by robust energy consumption monitoring and reference baselines for the construction sector** *Indicators:* 6. Number of energy consumption and GHG emission inventory systems operational and adopted for the construction sector NAMA: one by Year 3 7. Number of MoU to operationalize the data collection frameworks for the energy consumption and GHG inventory system: one by EOP 8. Number of public and private sector entities supporting the sustainable operation of the GHG inventory system by EOP The following indicator was	**Output 1.1:** Designed and completed capacity building development programs for decision-makers and agencies on data collection and sustainable operation of the GHG inventory systems *Activities* • Develop training modules targeting decision-makers and technical staff on the imperative of data collection and GHG inventory system • Implement the training programs • Conduct post-training evaluation survey
	Output 1.2: Established and operational energy consumption and GHG inventory system for the construction sector with improved data availability and methodology *Activities* • Review existing national communications data inventory system to identify barriers, gaps, needs, lessons and challenges for data collection and compilation • Formulate GHG inventory protocols and procedures for the construction sector • Identify and select key focal points for the collection, compilation, and management of baseline data • Develop institutional arrangements, and coordinate procedures among a broad range of stakeholders engaged in the construction sector • Collect, compile, quality check and analyze data • Develop and test the inventory system and deploy a web-based data collection system • Develop and implement guidelines to regularly update and improve the inventory system • Develop and conduct training programs for data management staff to strengthen the data collection efforts for inventory at the energy end-use sectoral level
	Output 1.3: Defined and established reference baseline on energy consumption and GHG emission for the construction sector *Activities* • In partnership with national communication inventory team, define and develop

Outcomes and indicators	Output and activities
added during Project Inception: • Number and percentage of man and women that participated in the capacity building trainings	parameters for reference baseline and emissions boundary • Estimate the reference baseline for energy consumption and associated GHG emissions • Test, verify and establish reference baselines for energy consumption in different types of buildings and GHG emissions in UB

Component 2. Development and Implementation of NAMA in the Construction Sector

GEF budget: USD 324,500 (TA) and USD 490,000 (INV). Co-financing: USD 928,845 (TA) and USD 4,385,000 (INV)

Outcome 2: **Increased use and deployment of locally-produced high- quality LED lighting technologies** *Indicators:* 9. Number of prioritized NAMA in the construction sector developed and funded for the implementation by the project: one (by EoP) 10. No. of individual EE interventions that constitute the construction sector pilots ~~NAMAs~~[28]: six by Year 4 (up from in one baseline) 11. No. of identified fully capable and qualified private and/or public sector entities that are interested in funding prioritized NAMA projects: three by Year 4 (up from one in the baseline)	**Output 2.1:** Developed framework for evaluating appropriate climate change mitigation interventions; and identified priority climate change mitigation actions *Activity:* • Develop methodology/standardized approach for preparing and updating abatement cost curves • Develop detailed marginal abatement cost curves (MACCs) • Develop training program and annual budget on the use and management of MACCs • Develop and implement selection criteria for prioritization of the most cost-effective measures for inclusion in the NAMA • Conduct policy studies to recommend a concerted policy framework to support implementation of priority measures
	Output 2.2: Completed operational structure for coordination among government agencies and key stakeholders for NAMA. *Activity:* • Review and assess best practices and recommend options for institutional arrangements (IA) for NAMA development and implementation • Define roles and responsibilities of the entities that will be a part of the IA • Conduct stakeholder consultations to solicit feedback, refine and endorse the IA from supporting entities and stakeholders
	Output 2.3: Completed capacity development of private and public sector actors on the successful development and implementation of NAMAs; and in the supportive identification of financing options *Activity:* • Conduct need assessment and design of capacity development programs for private and public sector • Execute capacity development trainings for private and public sector participants to evaluate, formulate, implement and access financing for the NAMA
	Output 2.4: Developed and implemented construction sector pilot NAMA *Activities:* • Finalise demonstration projects and conduct detailed energy audits • Prepare detailed design and implementation plans for each demonstration host • Procure energy-efficient technologies and energy monitoring systems • Install and commission energy-efficient technologies/applications for demonstration projects • Evaluate the pilot NAMA and develop criteria for categorizing NAMA as supported or voluntary • Clearly document and disseminate results and lessons from the demonstration projects

[28] In the MTR report is was suggested to change the wording and remove the word 'NAMA' to avoid confusion between the pilot projects and the actual NAMA

	Output 2.5: Developed financial tools that support the implementation of NAMA in the construction sector *Activities:* • Detailed feasibility analysis on NAMA financing options • Design and implement financial instruments to support scaled EE investments and measures

Component 3. Measurement, Reporting and Verification (MRV) system for NAMA
GEF budget: USD 200,963 (TA). Co-financing: USD 530,769

Outcome and output:	Indicators:
3. Effective climate change mitigation policies strengthened by NAMA impacts ascertained through the established MRV system[29] 12. MRV system for construction sector emissions set up and operational: one by Year 2 13. No of institutions adopting and operationalizing MRV systems ~~of the pilot NAMA~~:[30] two by Q2 of Year 3 14. Number of construction sector NAMA case studies using the approved MRV framework and incorporated in policy documents: three by EOP	**Output 3.1:** Defined key indicators (GHG and non-GHG) to be monitored for the selected mitigation actions *Activities:* • Conduct in-depth assessment to determine key indicators and metrics for construction sector NAMA • Establish monitoring framework and define key parameters for demonstration projects to be measured, monitored, recorded and updated on the web-based inventory system in Outcome 1
	Output 3.2: Defined key indicators (GHG and non-GHG) to be monitored for the selected mitigation actions *Activities:* • Review best practices in MRV methodologies and guidelines based on established CDM methodologies, IPCC and UNFCCC NAMA guidelines and principles • Develop MRV standards and methodologies to measure, report and verify GHG and non-GHG indicators • Implement the MRV activities for the NAMA in prioritized and pilot demonstrations
	Output 3.3: Designed and completed capacity development in the implementation and institutionalization of the MRV system *Activities:* • Commission need assessment and design of capacity development programs for MRV practitioners • Execute capacity development trainings for MRV practitioners • Design and conduct a post-training evaluation survey of the trainees • Prepare communication and knowledge products highlighting the results of the MRV

2.3 Project partners and stakeholders

2.3.1 Main project partners and project implementation arrangement

UNDP is the GEF Implementing Agency with the Ministry of Construction and Urban Development (MCUD) as the Executing Entity and the Ministry of Environment, Green Development and Tourism (MEGDT), the Ministry of Energy (MOE), the Energy Regulation Commission (ERC) and the Construction Development Center (CDC) as key strategic partners.

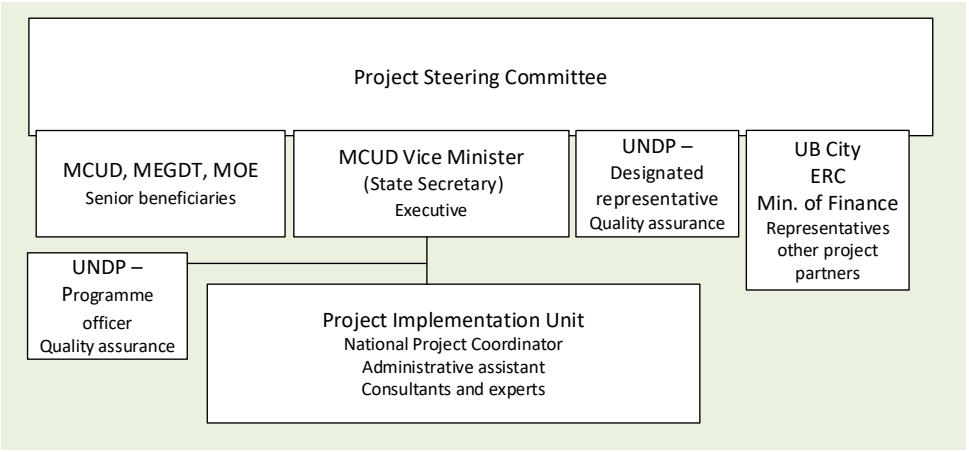
Day-to-day activities of the NAMA Project are managed by the Project Implementation Unit (PIU), housed within the premises of MCUD, which is responsible for planning activities and budgets, recruiting specialists, conducting training workshops and other activities to ensure the Project is executed as per approved work plans. The PIU reports to MCUD,

[29] Although not mentioned in the results framework, the following indicators on gender were added in the work plans: a) Percentage of women participated in the capacity building trainings, Baseline 0, Target 40%, b) 2. Number of female beneficiaries in the demonstration projects, Baseline 0, Target 20

[30] Ibid.

UNDP, and the Project Steering Committee (PSC). The PM has been headed by a National Project Coordinator[31] under the responsibility of the National Project Director, a senior official representing the implementing partner MCUD[32]. The primary functions of the PSC have been to provide the necessary direction that allows the Project to function and achieve its policy and technical objectives, to oversee the PIU, and to approve the annual Project plans and monitoring and evaluation (M&E) reports.

Box 6 Project management setup



Chaired by the MCUD State Secretary, members include United Nations Development Programme (UNDP), Ministry of Construction and Urban Development (MCUD), Ministry of Energy (MOE), Ministry of Environment, Green Development, and Tourism (MEGDT) as well as other members from, for example, non-government organisations.

UNDP also has had a role in project assurance. This role will be exercised by the UNDP Program Officer responsible for the project, based in the UNDP Country Office (CO) and the Regional Technical Advisor (RTA) based in the UNDP Bangkok Regional Hub[33].

2.3.2 Stakeholders

The Box below gives a description of the main stakeholders involved in the NAMA Project.

Box 7 List of project stakeholders

Category	Mandate, function, description	Role of stakeholder in the NAMA Project
Ministry of Construction and Urban Development (MCUD)	MCUD is responsible for implementing the Government's policies and regulations related to the construction sector;	MCUD has been the Implementing Partner for the GEF Project, being responsible for the overall management of the project including day-to-day project implementation, communication and coordination with UNDP and key partners, providing staff and administrative support, liaison with local governments, monitoring and project financial management. MCUD chaired the PSC
Construction Development Center (CDC)	Under MCUD, the Construction Development Center (CDC) is mandated to implement certain policies and some of the functions of the MCUD such as trainings, issuing construction permits and drawing expertise. As a result of certain level of privatization of the services that the CDC is	CDC has been involved in supporting the sustainable operation of the GHG inventory system. A MoU was signed among MCUD, CDC, ERC and the Ulaanbaatar City Mayor's Office. Also, CDC has hosted one of the 6 pilot projects (CDC old laboratory retrofit)

[31] Ms. Bayarlkham Byambaa (until 2019) and Mr. Khishigjargal Batjantsan (2019)
[32] Ms. Lkhagvatseden Orosoo
[33] Ms. Bunchingiv Bazartseren and Ms. Milou Beerepoot, respectively

	offering (building permits, construction safety checks, etc), the CDC is financially independent of the MCUD	
Ministry of Environment and Tourism (MET)	MEGDT is the leading government body for climate change mitigation activities and has the mandate to promote NAMA development and implementation in Mongolia	Of interest regarding employing and adapting GHG emission methodologies in the Mongolian context are the NAMA's the reference baseline survey and analysis for GHG inventory and MRV related activities.
Ministry of Energy (MOE)	The Ministry of Energy (MOE) is responsible for energy and energy efficiency policy development while the has the mandate for implementation. ERC regulates the generation, transmission, distribution, dispatching and supply of energy. It issues operational licenses, to review and approve the tariffs	MOE has assisted in energy-related data collection for establishing the baseline energy consumption in the construction sector
Energy Regulatory Committee (ERC)		ERC's mandate includes energy conservation. In particular, one of the demo projects (rooftop PV) has been on the new ERC Building
Ulaanbaatar City Government (UB City)	The Energy Conservation Law, approved in November 2015, defines the role of UB City under Article 7 to organize the implementation of legislation on energy conservation and decisions issued by the authority in charge in conformity with the Law, and develop a policy on energy conservation in their respective territories	In the GEF Project, the UB city has worked on improving the building stock data. In addition, the NAMA Project has supported one of the six demo projects with UB (installation of meters in 24 apartment buildings)
Housing and Public Utility Authority (HPUA)	HPUA is responsible for the provision of municipal services in UB including heating and electricity. HPUS supervises three public utility service enterprises owned by UB city and 18 Housing Companies	HPUA is important in providing data on building stock in UB city from its database as well as update of the database. HPUA has also participated in the capacity building to incorporate EE measures in its investment plan for the renovation of public utilities
Financial banks Mongolian Sustainable Finance Association (MSFA/ToC)	The Mongolian banking sector consists of 14 commercial banks. Mongolia's banks work together in the 'sustainable energy initiative'. Institutions, most active in the area of green financing, are Xac Bank[34], Khan Bank, Arig Bank, and Mongolian Green Credit Fund. Mongolia has a relatively well-developed mortgage market. For a country of just over 3million citizens, it boasts of over 72,000 mortgage holders, worth over MNT 34.3 billion (2018)[35]	Banks have participated in the Project to support the formulation and implementation of financial strategies and barrier removal activities to increase investment in the construction sector
Property developers (e.g. Normin Construction, Mongolian Properties)		Building developers have benefitted from capacity building, training, workshops, and seminars.
Mongolian University of Science and Technology (MUST); Supreme Council of Condominium Associations (SCCA); Mongolian Civil Engineers Association (MACE); Building Material Manufacturer Association.		Professional and industry associations are important in disseminating information and raising the awareness of different stakeholders on EE in buildings by using their current networks, and participate in the development of demonstration projects. MUST has implemented one of the 6 demo projects (rooftop PV).

[34] For example, Xac bank has specialized eco banking unit it has invested in energy efficiency building and retrofit projects for USD 5 million (2018). Arig Bank also has developed green loan products. The MGCF is set up by the Mongolian Bankers Association (MBA)

[35] *Final Report: "Financial Scheme for Energy Efficient buildings in Mongolia,* by B. Narandelger; 2019)

3. FINDINGS: PROJECT DESIGN AND STRATEGY

Next in this report follows an overview of the evaluation findings. Due to the size of the main text it has been divided over three chapters that cover a) project design & formulation, b) project implementation, and c) project results and sustainability. The findings are based on several evaluative criteria and questions (originally formulated in the Inception report and slightly re-formulated). The questions in the orange-coloured boxes in this and in other Chapters are taken from the Evaluative matrix (Annex D) as these correspond to the appropriate Section in this report. Here, the reader can make a link between the evaluative matrix and how the main text addresses these questions.

Chapter 3 looks first at the project relevance and country drivenness (at project design), and links with national and development. Second, it looks at the design logic (in the framework of outcomes and objectives to reach the objective) and how the design framework was formulated, including the indicators and target values for outcomes and outputs.

3.1 Relevance and design

Country priorities and relevance

- Is the project relevant to National priorities and commitment under international conventions?
- Relevance of the project's objectives, outcomes, and outputs to the different target groups of the interventions.
- Has it responded to the real needs and priorities of the targeted *aimags*?
- Relevance of the project's objectives, outcomes, and outputs to the different target groups of the interventions.

Relevance

Energy efficiency and government policies

The project is fully in line with the national policies and measures that aim directly or indirectly at mitigating greenhouse gas emission emissions:

- The *State Policy on Energy* (2015-2030) covers energy efficiency and renewable energy. Regarding energy efficiency, the Policy's objective is to "create a nation-wide legal environment for regulating energy efficiency and saving's measures".
- The *National Determined Contribution (NDC)* specifically mentions a target in the construction sector of reducing building heat loss by 20% by 2020 and 40% by 2030, compared to 2014 levels.
- The *Green Development Policy* (2014) has six strategic objectives[36], of which Strategic Objective #1 is to "Promote resource-efficient, low greenhouse gas emission and waste less in production and services". The *Action Plan* (2014) lists strategies and actions to ensure that the objectives are implemented. Actions relevant to the construction sector are listed in Box 8.
- The *Energy Conservation Law* (2015) mandates large energy consumers to undergo an energy audit and to report annually its energy consumption as well as its plans and activities to reduce their energy consumption. It also forms a basis for the creation of institutional mechanisms for energy conservation and legal environment of ESCO business
- The National Action Programme on Climate Change (approved by Parliament in 2011) intends to meet UNFCCC obligations and commitments, establishing national policy and strategy to tackle the adverse impacts of climate change and to mitigate GHG emissions. A first phase (2011-2016) aims at strengthening capacities and institutional structures, while a second phase (2017-2021) will focus more on adaptation and mitigation measures

[36] The formulation of the Green Development Policy benefited from the project "Strategies for Development of Green Energy Systems in Mongolia", involving the Global Green Growth Institute (GGGI), the Stockholm Environment Institute (SEI; making available the LEAP energy modelling software) and several Mongolian ministries. The LEAP model was used to develop several scenarios for energy futures from which the figures in Box 3 and Box 8 are taken.

Box 8 Action Plan, Green Development Policy

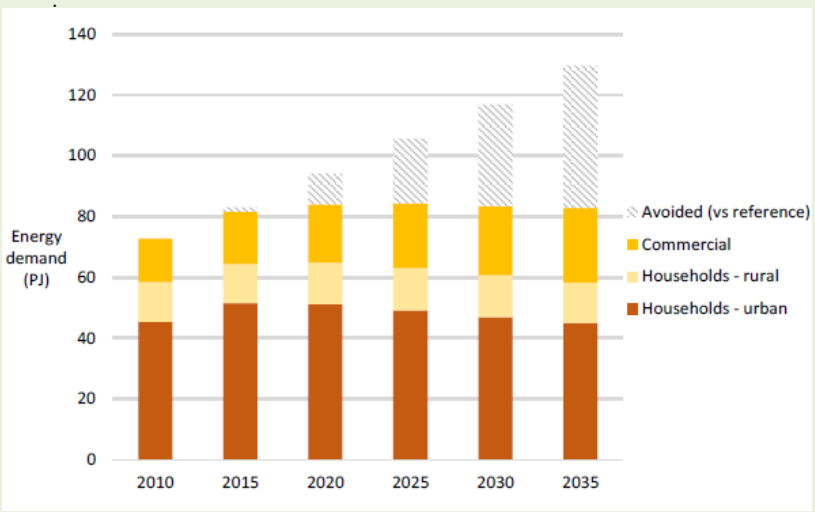
One *Strategic Objective* in the "Action Plan, Green Development Policy" is 'Promote a sustainable consumption and production pattern with efficient use of natural resources, reduced greenhouse gas emissions and waste generation' (#01). One approach to achieve this Strategic Objective is # 1.2 to "Reduce building heat losses by 20% by 2020, and by 40% by 2030" for which a number of implementation activities are proposed, as listed below

Implementation activity	*Main responsible* and other agencies	Funding sources
Develop and advertise/promote the national green building rating system and its methodology.	*MCUD* MEGDT	International org.
Organize activities to update local norms and standards for calculation of construction and energy efficiencies and heat losses, introduce international and EU norms and standards.	*MCUD* MEGDT, MOE, LG	State budget; International org.
Build human resource capacities of the construction sector in areas of planning, design, and construction of green buildings.	*MCUD* MEGDT	International org.
Create and implement the incentive scheme to promote green buildings and energy efficiency measures.	*MCUD, MOE* MEGDT	State budget
Implement systematic energy audit and measures to reduce energy and heat losses.	*MOE* MCUD	
Develop the green architecture and construction design for schools and kindergartens, and implement the model project.	*MEGDT* MECS, MCUD	International org.
Develop and implement green architecture for construction of the state funded public buildings	*MCUD* MECS, MHS, LG	State budget; Private sector
Implement projects and programs to reduce heat losses of existing concrete panel buildings.	*Private-public* MCUD, MEGDT	Internat. (GCF); Private sector
Study solutions of energy efficient, zero-waste and green buildings, such as Passive Zero Building, and implement pilot projects.	*MCUD* MEGDT	International; State budget

Notes: MEGDT: Ministry of Environment, Green Development and Tourism (now known as Ministry of Environment and Tourism, MET); MOE: Ministry of Energy; LG: local government (aimag and/or city governors); MECS: Ministry of Education, Culture and Science; GCF: Green Climate Fund

Compiled from *Action Plan, Green Development Policy* (2014)

The report *Strategies for Development of Green Energy Systems in Mongolia (2013-2035)* by GGGI (2015) presents four broad scenarios of how energy supply and demand could evolve in Mongolia through the year 2035. These have been used as input for the development of the Green Development Policy. The *reference* scenario reflects a continuation of largely coal-based energy supply in an economy driven largely by mining exports, especially of coal and copper. This scenario assumes relatively few changes in energy supply or the intensity of demand other than gradual improvements in some technologies (see Box 3). The *expanded green energy scenario* (see the figure below) describes a future where Mongolia makes an even stronger transition to renewable energy and implements extensive energy efficiency measures across its economy. The realization of this scenario will



- Energy retrofits of existing apartment buildings proceed rapidly at an annual rate of roughly 5% of the building stock, such that all of the remaining existing buildings are retrofitted by 2035 (better insulation and air sealing; phasing-in of heat metering);
- Higher energy standards for new apartment buildings and introduction of heat metering;
- Increased use of efficient stoves and better insulation (layers of felting) in *ger* areas);
- Transition to high-efficiency appliances and lighting for all grid-connected

- Mongolia's Second National Communication on Climate Change (to the UNFCCC) lists a number of strategies to reduce GHG emissions from the energy sector, including options to "improve building insulation and heating systems' (mentioning improved building insulation, improved heating systems in buildings and improved lighting efficiency)
- The *State Policy on Construction* (2019) has GHG emission reduction targets of 10.9 kilotons of CO_2 in 2021, 30.1 in 2015 and 53.7 ktCO_2 in 2029;
- At the local level, important relevant plans in the context of the NAMA project are the Affordable *Housing Strategy (AHS) for Ulaanbaatar*[37] and the *Ulaanbaatar City Master Plan.*

Sustainable Development Goals (SDGs)

The project document (ProDoc) does not explicitly refer to the SDGs, maybe because it was not a requirement to do so at the time of ProDoc formulation. The Evaluation Team can confirm that the NAMA Project addresses several SDGs both directly as well as indirectly, as indicated Box 9.

Box 9 Sustainable Development Goals with relevance to the NAMA Project

Sustainable Development Goals	Linkage with energy efficiency
Sustainable energy	
7.2 Increase substantially the share of renewable energy in the global energy mix 7.3 Double the global rate of improvement in energy efficiency	7a. Enhance international cooperation to facilitate access to clean energy research and technologies, including renewable energy, energy efficiency, and advanced and cleaner fossil fuel technologies, and promote investment in energy infrastructure and clean energy technologies 7b. Expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries
Other SDGs:	
11. Make cities and human settlements inclusive, safe, resilient and sustainable	Municipalities require careful electricity planning and efficient power distribution
12. Ensure sustainable consumption and production patterns	The residential and buildings sector is a key part of a future in which there is sustainable consumption of energy and products
13. Take urgent action to combat climate change and its impacts	The carbon-intensive energy sector (based on fossil fuels) is a key driver of climate change.
17. Partnerships for the goals	Partnerships between governments, the private sector and civil society to achieve green and low-carbon buildings

Compiled from *Transforming our World: the 2030 Agenda for Sustainable Development* (UN, 2015), *Indicators and a Monitoring Framework for the Sustainable Development* Goals, Sustainable Development Solutions Network (SDSN)

GEF and UNDP programming

The project results framework in the ProDoc refers to the following Outcome (# 1.3) as defined in the Country Programme: "Improved sustainability of natural resources management and resilience of ecosystems and vulnerable populations to the changing climate" with the corresponding Outcome Indicator "Change in energy intensity of economy and greenhouse gas emissions per capita.".

The project falls within the GEF-5 program area "GEF Climate Change Mitigation; Strategic Programme SP-2 "Promote Market Transformation in Industry and the Buildings Sector" with the Outcomes:

1.1 Appropriate policy, legal and regulatory frameworks adopted and enforced (Indicator: Extent to which EE policies and regulations are adopted and enforced;

1.2 Sustainable financing and delivery mechanisms established and operational (Indicator: Volume of investment mobilized)

1.3 Greenhouse gas emission avoided (Indicator: tons of $CO_{2\text{-eq}}$)

[37] The AHS is a long-term strategy approved by the Ulaanbaatar City Council, for the provision of affordable housing in Ulaanbaatar for families earning up to 140% of the median monthly household income. The UB Master Plan highlights the need for the technology upgradation and modernization of heating infrastructure as well as the development of new heating infrastructure in order to cater to the city expansion strategies and future demand.

Gender

Gender as such is not reflected in the results framework, because at the time of project conceptualization (2015) there were no clear guidelines on including gender-relevant indicators in the results framework. Only the most recent UNDP/GEF ProDoc template now includes a separate section dedicated to gender issues, while a gender action plan needs to be annexed). This does not mean that the Project has ignored gender issues during implementation. For example, the Project Document mentions on page 43 "Key indicators and metrics will be analyzed and determined for both GHG and non-GHG benefits (e.g. income generated, costs saved, employment created, *gender, considerations*, and so on)". On page 49 it is mentioned that "the project aims to put in dedicated efforts to strengthen and enhance equal participation from women and men in the technical design and implementation of EE measures in the construction sector through capacity development trainings. *Gender considerations* will be equally pronounced in key decision-making processes during project implementation".

A Gender Action Plan was formulated (2017), and, consequently, gender-relevant indicators were added to the logical framework at the inception of the project and reporting on participation in the Project's training course and workshop gives a breakdown per gender (see Box 18):

- Percentage of women participated in the capacity building trainings, Baseline 0, Target 40%.;
- Number of female beneficiaries in the demonstration projects, Baseline 0, Target 20

3.2 Conceptualization and results framework

- How were lessons of other similar or earlier projects (e.g. UNDP/GEF EE in Buildings project, 2009-2015) taken into account in the project design?
- Has the project's design (logframe) been adequate to address the problems at hand? Was the project internally coherent in its design (logical linkages between expected results and design (components, choice of partners; scope, use of resources)? Were any (major) amendments to the assumptions or targets been made or planned during the Project's implementation?

Previous efficiency in buildings project

With GEF financing, UNDP has supported the implementation of two projects, a) the Building Energy Efficiency Project (BEEP)[38], implemented during 2009-2015, and b) Commercialization of Super-Insulated Buildings in Mongolia, implemented during 2002-2006. One activity of the BEEP project has been the development of Energy Building Codes Norms and Standards (BCNS), as detailed in Section 2.1, for new buildings to comply with.

Analysis of the project results framework (logical framework or logframe)

The logframe consists of two parts, a) a description of outcomes, outputs and activities and b) a list of outcome indicators to measure progress with target values against. In the Project Document, the two are presented separately, but in Box 5 these are merged to have a clearer view of how one relates to the other. In general, the Evaluation Team's opinion is that these adequately describe the intended results of the Project.

The project strategy incorporates a holistic approach building off existing baseline initiatives, incorporating international experiences and best practices in the development of NAMAs, and providing guidance to the Government on best available technologies in energy efficiency in the construction sector to maximize GHG emission reductions. In addition, the Project has supported activities to implement pilot projects. Most importantly, the Project was to include the setup of a functional system for credible quantification of GHG emission reductions through a GHG inventory system and an

[38] Energy Efficiency in New Construction in the Residential and Commercial Buildings Sector in Mongolia

Box 10 Summary of the UNDP/GEF BEEP project

The project's main achievements have been:

1) *Mongolian Energy Efficiency Building Codes, Norms, and Standards Updated and Strengthened*
   - New EE standards developed covering – (i) building energy efficiency performance modelling; (ii) methods for determining the total thermal resistance of parts of building; (iii) Thermo-technics of construction materials; (iv) methods of determining the thermal resistance of insulation materials; (v) space heating system energy efficiency; (vi) domestic hot-water system energy efficiency; (vii) thermal resistance of external walls; (viii) thermal resistance of ground floors, basements, and foundations; (ix) thermal resistance of roofs and insulated ceilings; (x) thermal resistance of windows; (xi) Air tightness, leakage and ventilation; (xii) energy efficient lighting system
2) *Training and Awareness Program*
   - Officials trained in the operation and enforcement of the new BCNS energy efficiency provisions;
   - Technological studies covering the investigation of potential new environmentally friendly EE construction technologies available in local market, its design solution, durability, weather protection, EE engineering aspects
   - Strengthening the operation of Energy Conservation Centre (ECC) in Ulaanbaatar, Darkhan and Erdenet
   - Trainings and awareness campaigns
3) *Access to Energy Efficiency Financing facilitated*
   - Training courses for financial institutions (such as Xac Bank, Mongolia Mortgage Corporation) and workshops
   - Lending implemented fort EE housing by Xac Bank (about USD 126,000 in total)

Some conclusions coming out of the Terminal Evaluation (TE) were:

- Overall programme goals were met, and for components 1 and 2, the accomplishments of BEEP exceeded the targets defined in project results framework. The project made significant contribution to reduce key technical barriers and highlighted the importance of energy efficiency in the building sector;
- The project revised BCNS and addressed the availability of key building material by engaging building products manufacturers in the process of revising codes and standards, which ensured that these products are available in local market. At the time of the project, the non-availability of good quality construction materials such as insulation foam and triple glazed windows (to reduce the heat losses) in the local market hinders implementation of energy efficiency. BEEP worked with the associations of building materials, windows manufacturers and designed 'labels' for insulations, windows.
- MCUD would need additional support to fully implement BCNS in commercial buildings and ensure compliance.

Some recommendations of the BEEP TE Report include:

- Improving energy efficiency in Mongolia's building sector has huge potential for which MEGDT and MCUD will require technical assistance;
- Improve capacity of MCUD and its agencies to ensure all new commercial and residential apartments buildings are designed and constructed following new building codes norms and standard throughout the country
- Government funding towards EE in buildings should be designed (considering the new BCNS for two target end users - (a) retrofitting the government buildings, and (b) individual home owners and Ger dweller to avail bank financing for constructing EE houses)

MRV system. The NAMA project has helped to lay a foundation for climate policy development in the construction sector.

One flaw in the design relates to the interpretation of the NAMA concept, where a common understanding among all relevant stakeholders regarding what constitutes a NAMA has been missing. This may be because the concept of NAMA itself encompasses a range of options from project-type to sector-oriented to economy-wide NAMAs. The project document itself is not very clear and this has resulted earlier in an apparent interpretation that the individual demo projects are NAMAs (as indicated in the Mid-Term Review report).

One of the project objective indicators (see Box 5 and Box 19) is "number of construction sector NAMA developed and implemented" with as 'target' one. One might interpret this as developing a NAMA that could be considered as a new submission to the UNFCCC NAMA registry. However, such a NAMA document has not been elaborated. Instead, the

project has interpreted the indicator as implementation of the project itself to fulfill this indicator. As such, the Project is registered with the UNFCCC as NAMA[39].

Not surprisingly, it has been challenging to convey NAMA concepts with line ministries with regards to implementation and participation in the NAMA process. The MTR report mentions that these are "experiencing difficulties in the comprehension and rationale for NAMA as well as all the UNFCCC nomenclature associated with NAMAs as well as INDCs". There is no real institutional structure for the implementation of NAMAs. However, the experience of the NAMA Project serves as an example and enhance the understanding of all participating line ministries on the NAMA concept and on monitoring and reporting on GHG emission reductions at a sectoral level in general.

Another indicator and target under the Objective level refer to compliance with the Building Energy Code / BCNS, and the MTR report expresses concern about the achievement of the end-of-project target. Although the Project Document is referring to the Building Energy Code/BCNS as an important tool for realizing energy efficiency in new building development, none of the project activities are related to the strengthening of compliance with the Building Energy Code/BCNS. This means there seems to be a disconnect to this indicator and target on the one hand and the project design on the other hand. Therefore, the MTR report suggested to re-interpret the indicator on compliance with the Building Energy Code/BCNS towards an Action Plan for enforcement and compliance checking of BCSN as a mandatory requirement for receiving a building permit. The Project has indeed provided some inputs to MCUD and ERC on renewing the BCNS form an energy efficiency perspective

The Mid-Term Review (MTR) report (2018) has suggested the following changes in specific indicators:

Indicators as in the ProDoc/Inception Report	**Changes suggested in the MTR report** (in red)	**Evaluation Team's comments**
• Number and percentage of men and women participated in the capacity building trainings	This indicator was added during the Inception Phase following gender action plan	**See Box 17**
• Number of prioritised NAMA in the construction sector developed and funded for the implementation by the project by EOP	• Number of prioritised pilots in the construction sector developed and funded for the implementation by the project by EOP	Agreed
• No. of individual EE interventions that constitute the construction sector	• No. of individual EE interventions that constitute the construction sector pilots ~~NAMAs~~	Agreed, the individual demo (or pilot) projects, small in size, should not to be labelled NAMAs
• No of institutions adopting and operationalizing MRV systems of the pilot NAMA	• No of institutions adopting and operationalizing MRV system .	Agreed The MRV system should be generally applicable, not just for the demo projects.
• % of new buildings that are fully or beyond BCNS compliance by EOP	• Action Plan for enforcement and compliance checking of BCSN as a mandatory requirement for receiving a building permit.	Agreed

There is room for improvement in reporting the GHG emission reduction (although this may partly be caused by the fact that the PIR is not requesting this information due to an absent heading of Project Goal in the PIR). Also, only by 2019, the first pilots have been completed (four out of six), so that only now we can start saying something meaningful of the associated lifetime energy and GHG emission reduction savings. The Evaluation Team has added a table on expected direct GHG emission reduction in Box 19.

[39] NS-242 - Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia

3.3 Ratings for project design

The UNDP/GEF rating requirements and criteria for TEs do not include a '**rating on project design and formulation**', except for the item "M&E at design". This is surprising because we think that the 'design' is one of the main factors, alongside 'implementation' and 'external factors' that determine the achievement (or non-achievement) of 'results.

In the rating for 'design' of the NAMA project using a six-point rating scheme:

- Highly satisfactory (HS), no shortcomings
- Satisfactory (S), minor shortcomings
- Moderately satisfactory (MS), moderate shortcomings
- Moderately unsatisfactory (MU), significant shortcomings
- Unsatisfactory (U), major shortcomings
- Highly unsatisfactory (HU), severe shortcomings
- U/A = unable to assess.

Box 11 Evaluation ratings of project design and relevance

Evaluation item	Corresponding section	Rating
Design logic and approach; assumptions and risks	Section 3.2	S
Strategy: formulation of the log-frame (outcomes/outputs; choice and values of indicators)	Section 3.2	MS
Relevance	Section 3.1	R
M&E at design and entry	Section 4.1	S

Regarding '**relevance', the** rating is on a two-point scale with "R" meaning 'Relevant' and "NR" stands for 'not relevant'. The rating of the project design is strictly speaking is not part of the TE's Terms of Reference. However, the Evaluators have the opinion that the results of the NAMA Project (as described in Section 5) are partly based on the internal logic in the project design, hence the rating of 'S' for the design logic of outcomes and outputs (in terms of addressing barriers). The major flaw, however, is that the project design is very ambiguous regarding the purpose and goal of the "NAMA", which has created confusion on what constitutes a 'NAMA' in the context of the construction sector in Mongolia. Thus, the strategy behind the project design is rated as "MS".

4. FINDINGS: PROJECT IMPLEMENTATION

This part of the Evaluation Report describes the assessment and rating of the quality of the execution by the GEF Implementing Agency (IA), UNDP, and the Executing Partner MCUD. An assessment is made of the partnerships established and stakeholder interaction during implementation and the important role of adaptive management. The Evaluation Report presents an assessment and rating of the project monitoring and evaluation (M&E) at implementation. A special section is dedicated to the budget, expenditures, and co-financing of the NAMA Mongolia project.

4.1 Implementation and management

4.1.1 Management arrangements and adaptive management

- How efficient are partnership arrangements for the project?
- Did the project efficiently utilize local capacity in implementation?
- What have been management responses to issues and recommendations indicated in progress reports? Has the project produced results (outputs and outcomes) within the expected time frame?
- Whether the risks identified in the project document and progress reports were appropriate and corresponding risk management strategies/systems were adopted and implemented?

Management arrangements

The Project is executed under National Implementation Modality (NIM) in project management implementation guidelines agreed by UNDP and the Government of Mongolia. UNDP is the GEF Implementing Agency (IA) for the Project, and MCUD. The NAMA Project is managed by a Project Implementation Unit (PIU) that is led by a Project Manager who reports to the national Project Director within MCUD. The Project Steering Committee (PSC) mandate is to provide overall guidance for the NAMA Project. The PSC includes representatives from MCUD, MET, MOE, NGOs and UNDP. The PSC is chaired by the MCUD State secretary. For more details on the management arrangements, the reader is referred to Section 2.3.1.

The PSC has met about three times per year on average. The PSC meetings entailed detailed discussions on aspects of NAMA Project activities, including the selection of demonstration projects, resulting in proposed actions to support NAMA implementation and a compromise in the selection of demonstration projects. Thus, the PSC meetings appeared to be effective in the context of making key project decisions

Adaptive and risk management

UNDP has provided overall management and guidance from its Country Office in Ulaanbaatar and the Bangkok Regional Hub (BRH) in Bangkok and has been responsible for monitoring and evaluation as well as quality assurance for the project. UNDP has been responsive to the proposed changes when needed.

4.1.2 Monitoring and evaluation

- Was the information provided by the M&E system (annual work plans, PIRs, other) was used to improve performance and to adapt to changing needs; Are there any annual work plans?

M&E: design at entry

At Inception, a total of USD 54,000 was allocated, about 5%of the total GEF budget, which is sufficient given the size of the Project. In the M&E plan as formulated in the project documentation, the performance of the Project is monitored and assessed according to the goals defined and agreed in the AWPs, with outcome indicators (which are based on the logframe of the Project Document) and outputs. The ProDoc also gives a 'standard-type' of M&E Plan of which the main elements are:

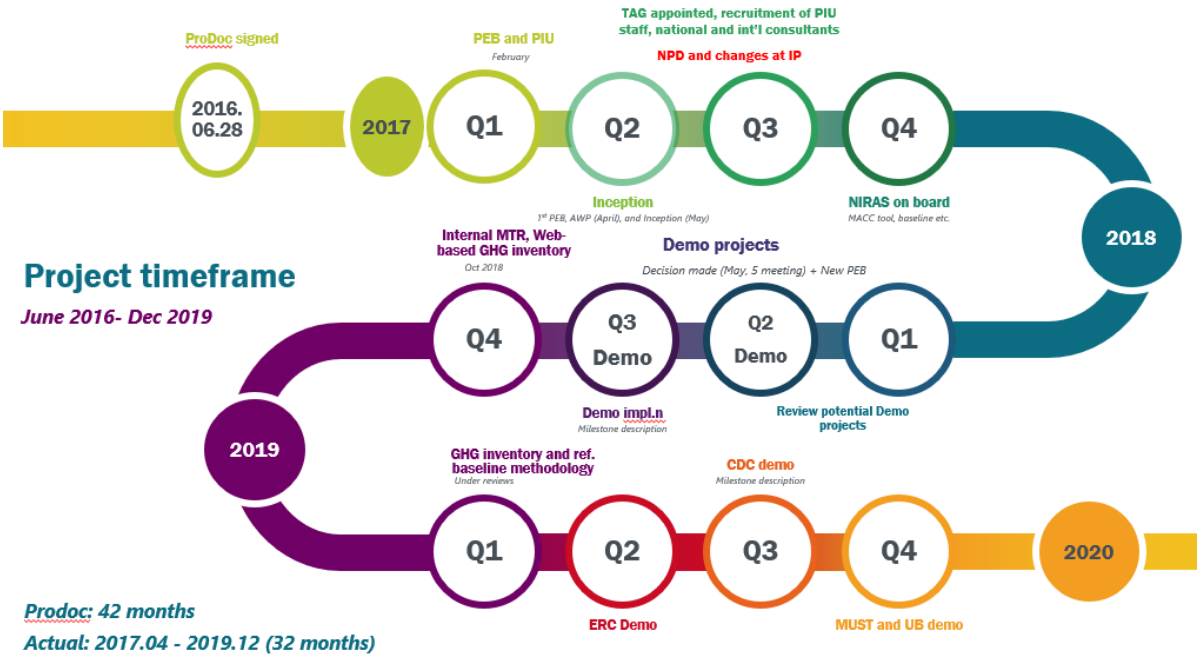
- Project Inception Workshop and Project Implementation Workplan:
- Quarterly monitoring of project progress (and update of risk logs in ATLAS); AWP and expenditure reports
- Project Implementation Report (PIR)
- Project Steering Committee (PSC) meetings
- Mid-Term Review and Terminal Evaluation
- Learning and knowledge sharing: results from the Project to be disseminated within and beyond the project intervention zone through existing information-sharing networks and forums.

M&E implementation; reporting

An Inception Report has been prepared, and as a result of the Inception Workshop, Regular quarterly progress reports have been prepared since Q3 of 2015 up to Q2 2019. The annual Project Implementation Reviews (PIR) for 2017, 2018, and 2019 have been prepared. The Completion workshop and reporting is still planned for.

PSC meetings have been used to monitor project progress and results, approve the next year's work plan and provide the orientation on the project implementation. PSC meetings have been held at least twice a year, of which the Minutes of Meeting including discussion points and agreements have been made available. PIU staff and UNDP officials did not make separate field visits to monitor progress periodically but to save cost the monitoring activities have been combined with or accompanying the project activities. The performance of the Project is monitored and assessed according to the goals defined and agreed in the AWPs, with outcomes and outcome indicators (which are based on the logframe of the Project Document) and reported in the before-mentioned PIRs.

Box 12 Timeframe of project implementation



Source: Project Implementation Unit (PIU)
TAG: Technical Advisory Group; NPD: National Project Director, MTR: mid-term review; NIRAS: main contracted consultant

Being a medium-sized project not needing an 'independent' Mid-Term Review (MTR), an 'internal' MTR was conducted in October 2018 by the UNDP Regional Technical Advisor (based in Bangkok). Some main conclusions and findings are:

- The NAMA Project has progressed well in the areas of identification of priority low carbon technologies (through MACC analysis), setting up GHG emission inventory. Demonstration projects are being developed to demonstrate the technology and MRV mechanisms required for monitoring GHG emission reductions from NAMAs Regarding progress towards results, the related outcomes are rated as 'satisfactory'. Being yet in an early stage, the outcome on developing MRV protocols was rated as 'moderately satisfactory'.
- Goal (GHG emission reduction related to pilot projects) was rated as 'moderately satisfactory' (as only one or two pilots were operational at that time) and objective (number of NAMA developed) as 'moderately satisfactory'. There has been some misunderstanding regarding the interpretation of the NAMA concept. A recommendation is to make sure that there is a common understanding of the NAMA concept among the relevant stakeholders involved in the project.
- On project design, several suggestions are being recommended to adjust the Project Results Framework target formulation (see Box 5)
- Concerning the interpretation of the NAMA concept and the sustainability of the project, it was found that an institutional framework for NAMA development and registration is missing while this may be crucial for reaping the benefits of this and other future NAMA development projects.

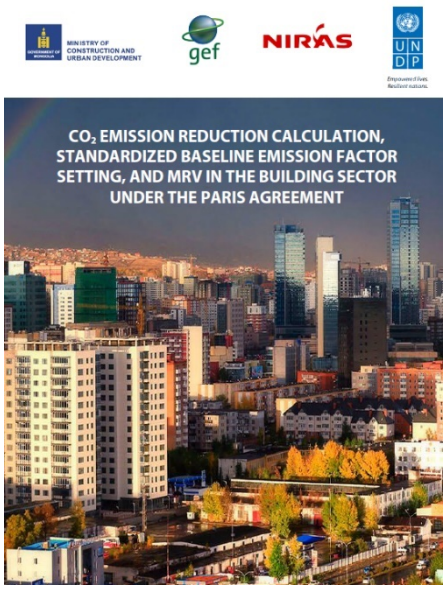
4.2 Stakeholder involvement and relations

- Whether or not national stakeholders participated in project management and decision-making have ownership for project outcomes and their further replication and scaling-up?

Stakeholder involvement

The Project has successfully facilitated partnerships with relevant stakeholders, all related to the efficient implementation of NAMA projects in Mongolia. The Energy Regulatory Committee (ERC), under the Ministry of Energy, is closely involved in the project by means of providing data for the GHG emission inventory system. The Ministry of Energy, in general, has shown less interest in the project. The Ministry of Environment and Tourism (MEGDT) has the responsibility for GHG emission inventory through the Environment and Climate Fund (ECF). The Construction Development Center (CDC) is considered a crucial partner in managing the GHG emission inventory database.

The project has also engaged partnerships with private sector stakeholders and CSOs, especially with Xac Bank, Mongolian Green Credit Fund (MGCF) and Arig Bank being consulted for their interest in developing financial mechanisms. The NAMA Project also has good communication with other donor projects within the sustainable development arena in Mongolia such as with GIZ and GGGI.



External communication

The project has considerably increased awareness on energy inefficiency of the commercial and public buildings, its impact on the increasing greenhouse gas emissions and air pollution among all the relevant stakeholders and the community as well through for example media coverage of the launch of the GHG inventory web-based system and the demonstration projects and by making available knowledge products

(example: see picture). The Project itself can be visited at http://www.mn.undp.org/content/mongolia/ en/home/operations/projects/ environment_and_energy/NationallyAppropriateMitigationActionsinthe ConstructionSectorinMongolia.html.

The Project has published articles, such as the one in Unread Toady (https://www.unread.today/posts/post/1499). A project brochure has been made.

4.3 Project finance and co-financing

- How efficient was the financial management of the project, including specific reference to the cost-effectiveness of its interventions and co-financing?

The GEF budget planned for disbursement of USD 1.27 million over a period of 42 months, of which the bulk actually has been spent in the shorter implementation period of 32 months (April 2017-December 2019). By the end of 2019 about USD 170,000 has remained which will be utilized for the last expenses (e.g. payment of terminal evaluation consultants, organization of the Completion workshop, and audit/spot check).

Box 13 UNDP/GEF budget and actual expenditures and co-financing data

GEF Budget (USD)	Planned	Disbursement			
		2017	2018	2019	Total
Outcome 1	202,700	92,054	125,902	16,212	
Outcome 2	814,500	68,979	317,437	195,186	
Outcome 3	200,963		71,551	171,266	
Project management	51,700	11,597	3,651	16,509	
Total	**1,269,863**	**172,630**	**518,542**	**399,174**	**1,090,346**

Co-financing (USD)	Planned			Realised	Realised	Total
	Cash	In-kind	Total	Cash	In-kind	
UNDP	50,000	50,000	100,000	50,000	60,000	110,000
MCUD	100,000	1,400,000	1,500,000	2,426,396	96,407	2,522,803
MOE	25,000	675,000	700,000		12,000	12,000
MEGDT	25,000	725,000	750,000	1,399,844	12,000	1,411,844
CDC		100,000	100,000	228,641	4,400	233,041
City UB		300,000	300000			0
Xac Bank	2,000,000		2,000,000		30,000	30,000
BEEC	50,000		50,000	7,466	3,100	10,566
MUST	1,400,000		1,400,000	3,247,638		3,247,638
Other			0	1,339,838		1,339,838
Total	**3,650,000**	**3,250,000**	**6,900,000**	**7,359,985**	**217,907**	**8,917,730**

Note: The data are compiled from the *UNDP ProDoc* and data provided by the PIU/UNDP. Data on UNDP cash contribution comes from the Combined Delivery Reports (DPR). In-kind co-financing comes from UNDP oversight and support. Other co-financing:

- MCUD: Co-financing of UB demo (USD 2.426 million) is included as MCUD cash co-financing (see Box 19)
- MEGDT: Cash co-financing includes "green Loan subsidy' (interest difference) budgeted by the Government of Mongolia to pay financial institutes (to Xacbank, State bank, and Khan bank), for loans provided to support energy efficiency in households.
- MUST: cash co-financing for rooftop PV (USD 3.248 million); see Box 19); CDC: cash co-financing (USD 0.229 million) for demo;
- Other: cash co-financing by ERC and Erdenedalai *soum* for demo project (see Box 19);

4.4 Ratings of project M&E and project implementation/execution

In assessing 'implementation and adaptive management' of the NAMA Project, a six-point rating scheme is used:

- Highly satisfactory (HS), Implementation of all components, 1) management arrangements, work planning, reporting, project-level monitoring and evaluation, 2) stakeholder engagement and communications, 3) finance and co-finance, is leading to efficient and effective project implementation and adaptive management. The project can be presented as "good practice".
- Satisfactory (S), implementation of most of the components is leading to efficient and effective project implementation and adaptive management except for only few that are subject to remedial action
- Moderately satisfactory (MS), implementation of some of the components is leading to efficient and effective project implementation and adaptive management, with some components requiring remedial action.
- Moderately unsatisfactory (MU), implementation is not leading to efficient and effective project implementation and adaptive, with most components requiring remedial action.
- Unsatisfactory (U), implementation of most of the components is not leading to efficient and effective project implementation and adaptive management.
- Highly unsatisfactory (HU), implementation of none of the components is leading to efficient and effective project implementation and adaptive management.
- U/A = unable to assess.

Box 14 Evaluation ratings of project implementation and execution

Evaluation item	Corresponding report section	Rating
Quality of UNDP implementation (adaptive management; finance)	4.1, 4.3	S
Quality of execution (MCUD-PIU), coordination; adaptive management; stakeholder involvement	4.1, 4.2, 4.3	HS
Overall UNDP implementation and implementing partner execution		**S-HS**
M&E plan implementation	4.1	S

5. FINDINGS: PROGRESS TOWARDS OUTCOMES AND OBJECTIVE

5.1 Introduction

- To what extent have the expected outcomes and objectives of the project been achieved?
- What outputs and outcomes has the project achieved (both qualitative and quantitative results, comparing the expected and realized end-project value of progress indicators of each outcome/output with the baseline value)?
- Were objectives, outcomes, and outputs achieved on time? How did the project contribute to GHG emissions reduction within the project implementation cycle and beyond?
- Were there any unplanned effects? Which external factors have contributed to or hinder the achievement of the expected results?

Chapter 5 presents progress towards results. For each of the three project components, as mentioned in Section 2.2, this section assesses the progress in the implementation of the project's outcomes and outputs, following the 'project results framework' format and as reported by the Project Implementation Unit (PIU) in the annual UNDP/GEF Project Implementation Reports (PIRs). The findings are further based on information and documents provided by the PIU to the Evaluators and on interviews with stakeholders. Section 5.2 describes the progress achieved in outputs and activities for each Component/Outcome, following the outline of outcomes and outputs of Box 5. Section 5.2 tries to provide a quantitative and descriptive overview of the achievements of outputs and outcomes. Section 5.3 provides an assessment of results in terms of attainment of the outcomes and outcome indicators. The baseline and target values of the indicators are taken from the project's logical framework (as reported in the Inception Report and PIRs), while the achievements (i.e. indicator value at project's end, is compiled from PowerPoint presentations made by the project team for the TE mission), supplemented by additional info obtained during the mission (provided by the Project Team) and analysis of the outputs and reports produced during 2015-2019. The greenhouse gas emissions reported have also been reviewed; these are discussed in Section 5.3.3. Section 5.3 ends with a summary of the Evaluators' ratings towards results. Section 5.4 discusses sustainability and replicability.

5.2 Progress in achieving outputs and outcomes

5.2.1 Outcome 1 Effective EE policymaking informed by robust energy consumption monitoring and reference baselines for the construction sector

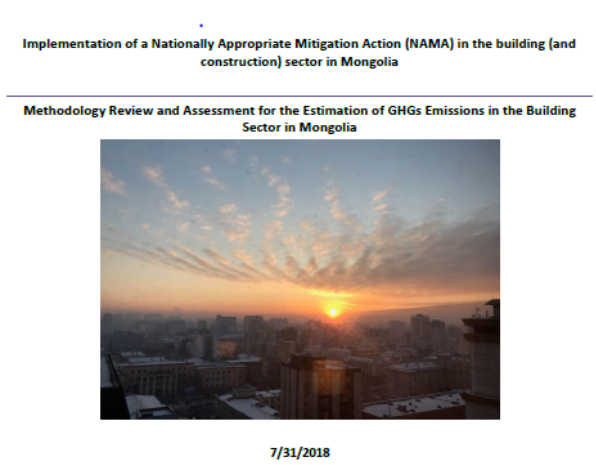
Indicator with end-of-project (EoP) target	Actual value or status of the indicator
Number of energy consumption and GHG emission inventory systems operational and adopted for the construction sector NAMA *Target:* one system by Year 3	The GHG inventory methodology was developed during 2017-2019. The methodology was reviewed by an inter-ministerial Science and Technology Committee of MCUD, MET, and MOE; and formally adopted by Ministerial Order. CDC will continue to host the GHG inventory after the Project's end
Number of MOU to operationalize the data collection frameworks for the energy consumption and GHG inventory system *Target:* one by EoP	A MOU between MCUD and ERC was signed on 4 January 2019. In addition, "conducting GHG inventory and MRV activities in the construction sector" is included in the State Policy on the Construction Sector (Clause No.5.3.2) and its Action plan, an official document approved by the government in February 2019. It also will support future climate change mitigation action in future policy documents, such as new versions of NDC
Number of public and private sector entities supporting the sustainable operation of the GHG inventory system *Target:* four by EoP	There are 7 entities already involved and supporting the GHG inventory system, directly and indirectly, including: • MCUD (direct) • ERC (direct) • Ulaanbaatar Electricity Distribution Company (indirect)

	• Ulaanbataar District Heating Company (indirect) • Housing and Public Utility Authority of Ulaanbaatar City (indirect) • Land Management Agency, MCUD (direct) • National Statistics Office (direct) • Three more entities are expected to be involved in the system, including CDC, ECF (MET) and NSO

Achievements

Output 1.1. Defined key indicators (GHG and non-GHG) to be monitored for the selected mitigation actions
Output 1.2. Established and operational energy consumption and GHG inventory system for the construction sector with improved data availability and methodology
Output 1.3 Defined and established reference baseline on energy consumption and GHG emission for the construction sector

The 'greenhouse gas (GHG) inventory system' comprises several interrelated outputs: a) GHG methodology, b) web-based data collection, c) appropriate institutional arrangements, d) capacity building, e) development of a standardized baseline for the construction sector.



The GHG inventory methodology has been developed and translated into Mongolian, reviewed by Experts' council at CDC and by the Science and Technology Committee at MCUD. The Committee recommended approving the GHG inventory methodology by Ministerial Order. The GHG inventory methodology is developed with modifications from the CDM methodology AMS-II.E[40], for estimating emissions from the building sector in Mongolia (see Box 15). Modifications consist of a simplified categorization scheme for buildings. The modified methodology allows the determination of baseline emissions from the sector, which can be used for the compilation of the inventory from the building sector. The methodology further allows the estimation of emissions after the implementation of mitigation measures. In order words, reductions in emissions from mitigation measures can be quantified.

The modified methodology has been used for the development of the standardized baseline. Reference baseline calculated and presented to the CDC experts council and MCUD Science and Technology Committee, along with the inventory methodology, for approval. Meantime, MCUD and donor organizations including GIZ and GGGI have been using and referring to the results for the development of their proposals. Thereafter, the official reference baseline will be submitted to UNFCCC upon approval of the methodology.

A web-based system was developed by local IT company with technical guidance and day-to-day consultation with the PIU and is accessible at http://ghgconstruction.gov.mn, The inventory web-system will be the main repository of GHG emission data from all buildings in Mongolia and MRV activities of EE projects and programs that will be implemented in the construction sector in the future.

[40] CDM AMS-II.E: *Energy Efficiency and Fuel Switching Measures for Buildings*. The methodology can be applied to a single building (residential, commercial, institutional, etc) or a group of similar buildings (such as school district) involving energy efficiency measures and/or fuel switch if the latter is part of energy efficiency measures within the building(s). In case, fuel switch is the primary measure, methodology AMS-III.B is applicable. Energy efficiency measures include improved insulation, efficient appliances to replace existing equipment or be installed in new facilities. the baseline emissions are determined by multiplying the baseline energy consumption by the applicable emission coefficient (electricity, fuels displaced)

Box 15 GHG calculation methodology for district heating and electricity consumption in the construction sector

The methodology consists of the following steps (based on the CDM methodology AMS.II-E in addition to using calculations outlined in the CDM methodology M0091l; see UNFCCC-CDM website):

1) Categorization of buildings: residential, hotels, offices, hospitals, retail, education

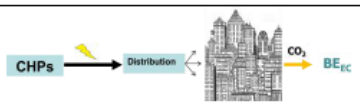
2) Conduct a baseline measurement survey (in accordance with sampling and survey guideline):

- Energy consumption data for electricity and fuels
- All independent variables affecting energy use
- Determination of sample size according to 'Simple Random Sampling'

3) Estimation of baseline emissions due to energy consumption

Electricity consumption

Buildings connected to grid



$BE_{EC,i,j,y} = BE_{EC,non-REcaptive,i,j,y} = EC_{BL,i,j,k,y} \times EF_{grid}$

- $BE_{EC,non-REcaptive,i,j,y}$ = *Baseline emissions from electricity consumption* of baseline building unit *supplied by grid* fossil-fuel-fired captive power plant(s) (tCO_2/yr) *for purposes other than hot water production.*
- $EC_{BL,i,j,k,y}$ = Electricity consumption (MWh/yr)
- EF_{grid} = Grid emission factor (tCO_2/MWh)

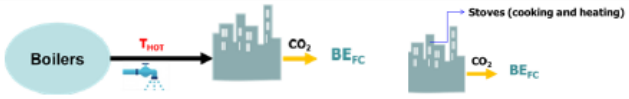
Hot water consumption

Buildings connected to District Heating Network

$BE_{WC,i,j,y} = \frac{WC_{BL,i,j,y} \times EF_{BL,WP,i,j,y}}{1-\eta_{BL,dist,l,y}}$ *(Equation 24)* and $EF_{BL,WP,i,j,y} = \frac{BE_{WP,EC,l,y}+BE_{WP,FC,l,y}}{WP_{BL,l,y}}$

- $BE_{WC,i,j,y}$ = Baseline emissions from hot water consumption of baseline building (tCO_2/yr)
- $WC_{BL,i,j,y}$ = Energy content of annual hot water consumption in baseline building (GJ/yr)
- $EF_{BL,WP,l,j,y}$ = Emission factor for production of hot water supplied to baseline building (tCO_2/GJ)
- $\eta_{BL,dist,l,y}$ = Average technical distribution losses of the hot water system *l* network serving baseline building
- $BE_{WP,EC,l,y}$ = Baseline emissions from electricity consumption of hot water system *l* (tCO_2/yr).
- $BE_{WP,FC,l,y}$ = Baseline emissions from fuel consumption of hot water system *l* (tCO_2/yr).
- $WP_{BL,l,y}$ = Energy content of annual hot water produced by hot water system (GJ/yr)

Fuel consumption



$BE_{FC,i,j,y} = \sum_k FC_{BL,i,j,k,y} \times COEF_{k,y}$ ***(Equation 23)***

- $BE_{FC,i,j,y}$ = Baseline emissions from fossil fuel consumption in baseline building unit (tCO_2/yr)
- $FC_{BL,i,j,k,y}$ = Quantity of fossil fuel type *k* fired in baseline building unit (mass or volume unit/yr)
- $COEF_{k,y}$ = CO_2 emission coefficient of fuel type *k* in year *y* (tCO_2/mass or volume unit)

j: building unit; i: building unit category; k: fuel type; y: year

4) Summation of all baseline emissions from all sources for each building → total baseline emission per building unit:

- $BE_{i,j,y} = BE_{EC,i,j,y} + BE_{FC,i,j,y} + BE_{WC,i,j,y}$

5) Dividing total baseline emission per building by gross floor area → specific baseline emission per building unit per unit area:

- $SE_{BL,i,j,y} = \frac{BE_{i,j,y}}{GFA_{BL,i,j,y}}$

6) Calculate specific emissions per building category per unit area:

- $SE_{BL,i,j,y} = \frac{\sum_j SE_{i,j,y}}{J_{i,y}}$

7) Multiply average specific emissions per building category per unit area by total gross floor area of NAMA building per category:

- $BE_y = \sum_i SE_{i,y} \times GFA_{PJ,i,y}$

8) Summation of all baseline emissions of each NAMA category → baseline emissions of NAMA buildings which represents the GHG inventory of the building sector:

- $BE_y = \sum_i SE_{i,y} \times GFA_{PJ,i,y}$

Source: *Methodology Review and Assessment for the Estimation of GHGs Emissions in the Building Sector, Mongolia* (NIRAS, 2018)

This will enable the government and the private sector to access funds from international donor funds on climate change. The web-based inventory system is housed at the Construction Development Centre (CDC). A working group meeting was held with CDC on and discussions are being finalized with MCUD on formalizing CDC's role in the GHG inventory process for the construction sector. CDC will host the inventory, while other organizations (ERC; Ulaanbaatar City Mayor's Office) will be involved by providing data and support the system.

Training modules targeting decision-makers and technical staff on the imperative of data collection, establishment and operation of the GHG inventory system were developed. The capacity building trainings were organized on 14-16 March 2018 and 27-28 June 2018 in Ulaanbaatar, led by NIRAS (the contracted consulting company) and supported by the national consultants and the PIU. As a result of the training, participants gained knowledge on essential concepts on inventory, quality assurance and control (QA/QC), data requirements and equations for calculations of emissions from buildings and associated data providers.

5.2.2 Outcome 2 Prioritized NAMA in the construction sector developed and funded for implementation

Indicator with end-of-project target	Actual value or status of the indicator
Number of prioritized NAMA pilots in the construction sector developed and funded for the implementation by the project *Target:* one by EoP	The six pilot projects identified were approved by the PSC and started implementation at various points in time during 2018-20: ERC (rooftop solar system); CDC Lab (insulation); UB Municipality (Installation of heat meters); Soum heating system (high-efficiency boiler) in Dundgovi *aimag* Erdenedalai *soum*, School building retrofit in Gobi-Altai *aimag*, Jargalant *soum* (roof renovation and indoor heating system renovation); MUST (rooftop solar system).
No. of individual EE interventions that constitute the construction sector pilots [41] *Target:* six by Year 4 (up from one in baseline)	The following type of EE measures are installed at the demo sites: 1. Roof insulation; 2. Indoor heating system renovation; 3. EE heat-only-boiler; 4. Pre-insulated pipes; 5. Water softener; 6. automated heat pump; 7. Rooftop PV; 8 Three-glazed windows
No. of identified fully capable and qualified private and/or public sector entities that are interested in funding prioritized NAMA projects: *Target:* three by Year 4 (up from one in the baseline)	Three private sector entities including XAC Bank, Arig Bank, and Mongolian Green Credit Fund are identified as the potential institutions that can adopt green financing schemes for EE buildings. With support from the NAMA Facility, the Municipal Government of Ulaanbaatar will implement the Mongolia – Energy Performance Contracting for Residential Retrofitting in Ulaanbaatar City, supported by Global Green Growth Institute (GGGI) and ICLEI. Retrofitting of residential building was prioritized as a NAMA under Mongolia's NDC

Achievements, demonstration projects

Output 2.1 Developed framework for evaluating appropriate climate change mitigation interventions; and identified priority climate change mitigation actions

Output 2.4 Developed and implemented construction sector pilot NAMA

The *Technology Needs Assessment* (TNA) report (MEGDT, 2013) lists several EE technologies in the residential and commercial sectors. Detailed marginal abatement cost curves (MACC) were developed by the project for a subset of the technologies mentioned in the TNA, namely high- efficiency (HE) boiler, improved insulation, triple-glazed windows, improved ventilation with heat recovery system, solar panels and efficient lighting. The findings from the MACC modeling show that efficient lighting and ventilation systems are the most economically viable technologies (in terms of abatement cost), however, the emission reduction potential was of HE boilers and insulation measures is much larger (see Box 15).

[41] The TE Team suggests to consistently refer to pilot (demonstration) projects not as 'NAMA" (as in the original results framework) but as 'pilots' or 'NAMA pilots' to make the difference clear between a set of EE intervention in a building and group of buildings and the NAMA concept as a whole.

The MACC-described EE and other technologies, as well as rooftop PV, have been installed in six pilot projects that have been supported by the NAMA (in which the pilot could be supported by a maximum of 20% of investments costs):

1. School building retrofit in Gobi-Altai province, Jargalan *soum* (EE measures are roof renovation and indoor heating system renovation);
2. CDC Laboratory Building retrofit (EE measure: three-glazed windows and basement wall isolation);
3. Soum central heating system renovation in Dundgobi *aimag*, Erdenedalai *soum* (EE measures: HE boiler, insulation of heating pipelines, installation of the water softener equipment, heat meters, pump and its frequency convertor controlling systems);
4. ERC new office building (EE/RE measures: solar panel module with smart system, triple glazed window with Low-E on the glass facade and shading systems);
5. Municipality building (installation of heat meters in 24 buildings).
6. MUST new laboratory building (rooftop solar panels).

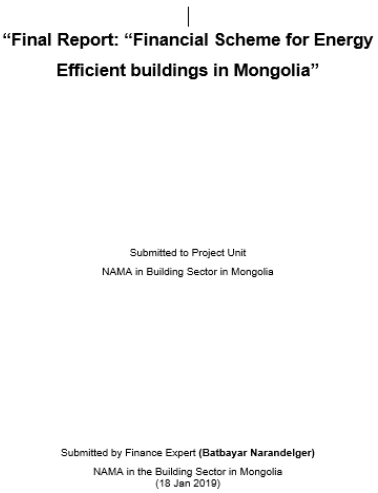
The MUST project has been lagging due to the slow process in securing the main funding for the construction of a new building, hence PSC decided to invest in two projects. The installation of the rooftop PV system as well as the sixth demo project (with UB Municipality) started in Q1 2020. The reader is referred to Box 19 for more details regarding energy savings and corresponding GHG emission reduction.

Output 2.2 Completed operational structure for coordination among government agencies and key stakeholders

To identify the project idea, construction sector mitigation actions were assessed and prioritized. The list of prioritized mitigation actions was reviewed by relevant stakeholders and delivered to MCUD for its submission to National Determined Contribution under the Paris Agreement. Among the mitigation actions, heat metering of public buildings and supporting the development and adoption of a revised heat tariff system was chosen as a potential new project proposal.

The Project contributed to the development of State policy on the Construction sector by providing inputs on low-carbon urban development issues. Similarly, the NAMA project provides inputs in the climate change policy formulation and strategies. The project has financially and technically supported the update of Building Code, Norms and Standards (BCNS)23-02-09 on building energy efficiency aspects. A report on BCNS update and development of a roadmap of BCNS was developed in March 2018.

Output 2.3 Completed capacity development of private and public sector actors on the successful development and implementation of NAMAs; and in the supportive identification of financing options
Output 2.5 Developed financial tools that support the implementation of NAMA in the construction sector


"Final Report: "Financial Scheme for Energy Efficient buildings in Mongolia"

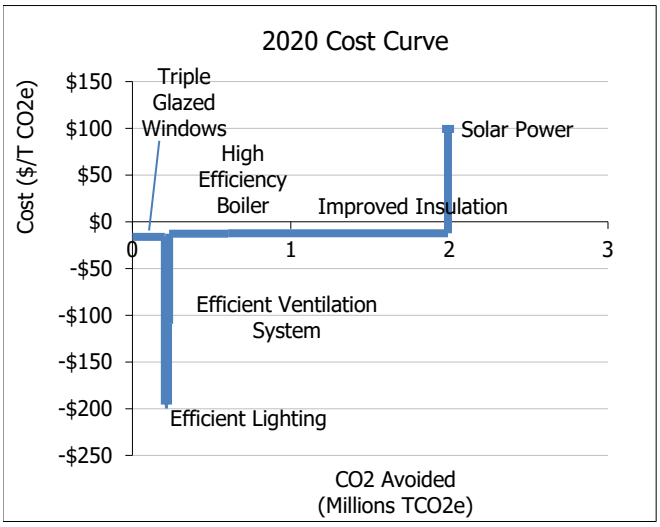
Submitted to Project Unit
NAMA in Building Sector in Mongolia

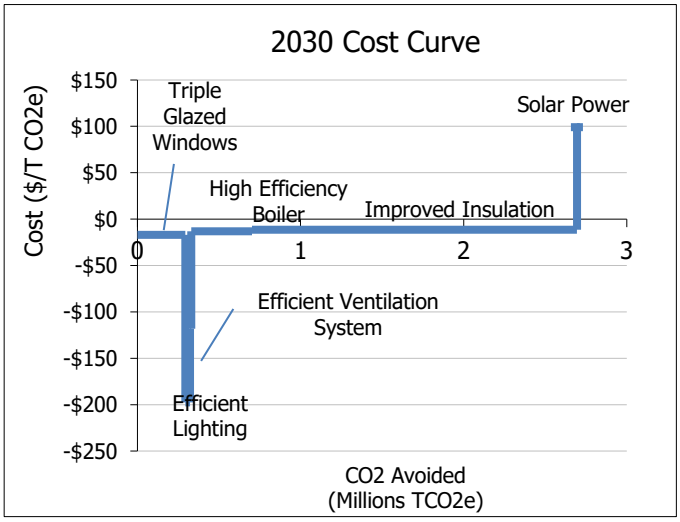
Submitted by Finance Expert (Batbayar Narandelger)
NAMA in the Building Sector in Mongolia
(18 Jan 2019)

Capacity building trainings were organized on 20-22 March 2018 and 16 August 2018. According to the PIU, the trainings have cultivated a technical understanding of the marginal abatement cost curve, how to use it and its value in the energy efficiency and buildings sector in Mongolia and raised an awareness of what the financial tools are for energy-efficient buildings and construction and how they can be used, including how they can be applied to the NAMA context. Participants came from government entities (e.g. MCUD and agencies), the financial sector (e.g. Arig Bank), and developers (e.g. Erel Group, Monbasalt).

Guidance for financial institutions on conducting pre-and post-evaluation of EE activities is provided in the report "Financial Scheme for Energy Efficient buildings in Mongolia". The report 1) identifies the capacity buildings of the key stakeholders in terms of knowledge of climate-related financing options; 2) makes an analysis of Mongolian mortgage market and to intend identifying sufficient financing scheme for EE buildings, and 3) assesses an appropriate financial scheme for EE buildings both high-rise residential and commercial buildings and its general terms and conditions.

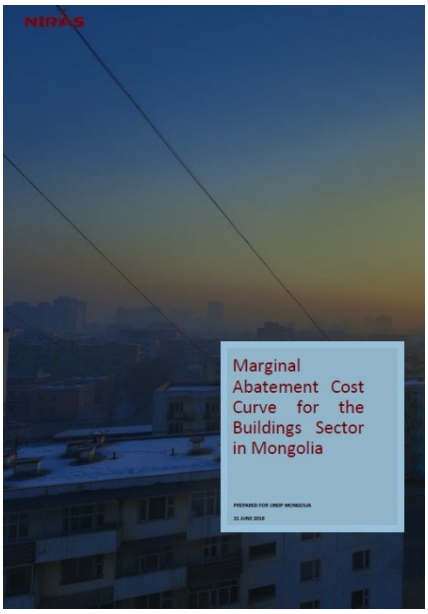
Box 16 Marginal abatement cost curve for six efficient technologies in buildings





Option Name	Million Tons CO2 Option Mitigation	Million Tons CO2 Cumulative Mitigation	$/Ton CO2 Cost of Saved CO2
Baseline	-	-	
Triple Glazed Windows	0.2	0.2	-$16
Efficient Lighting	0.0	0.2	-$196
Efficient Ventilation System	0.0	0.2	-$109
High Efficiency Boiler	0.4	0.6	-$13
Improved Insulation	1.4	2.0	-$12
Solar Power	0.0	2.0	$99

Option Name	Million Tons CO2 Option Mitigation	Million Tons CO2 Cumulative Mitigation	$/Ton CO2 Cost of Saved CO2
Baseline	-	-	
Triple Glazed Windows	0.3	0.3	-$17
Efficient Lighting	0.0	0.3	-$198
Efficient Ventilation System	0.0	0.3	-$118
High Efficiency Boiler	0.4	0.7	-$13
Improved Insulation	2.0	2.7	-$11
Solar Power	0.0	2.7	$99



A marginal abatement cost curve (MACC) illustrates the cost-effectiveness potential or technical improvements. Measures below the horizontal axis have a negative cost, i.e. they represent cost savings. Those above the horizontal axis have a net cost, i.e. they cost more than they save. The width of a block shows the volume of emissions reductions that can be achieved by investments. Also, the further right you go on the axis, the greater the lifetime cost of the technology intervention.

The majority of the six mitigation options (except for solar) have negative marginal abatement cost (MAC). This means they are economically viable. The most attractive investment option is the Efficient Ventilation System.

In addition, high efficiency boilers, triple-glazed windows, efficient lighting and improved insulation also present viable investment options that should be considered. Solar has a positive direct unit cost which means it costs more than it saves financially. It is therefore less of a reasonable investment versus the other technologies in this bundle (unless maybe if net-metering would be introduced in Mongolia).

The software used to carry out this analysis is called “GHG Mitigation Excel Tool”, developed by the Stockholm Environment Institute (SEI).

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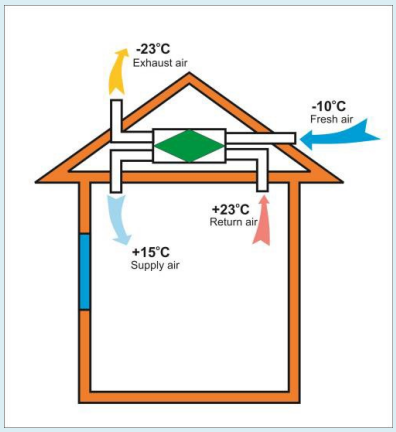
Box 17 Applicable building energy efficiency technologies

A number of EE technologies have been chosen in demonstration projects:

a) *Retrofit inefficient windows with triple-glazed windows*

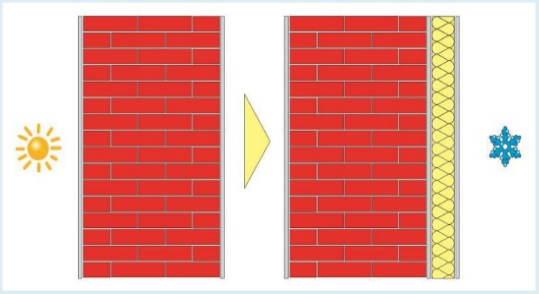
Triple-glazed windows consist of three glass windows separated by a vacuum or gas-filled space to reduce heat transfer across a part of the building envelope. The maximum insulating efficiency of a standard unit is determined by the thickness of the space, which can be 6 mm plus 12 mm or 9 mm plus 9 mm. The effectiveness of the insulation can be expressed by the 'U-value', typically < 1.8 W/(m^2.K). Double-glazed windows (with an air space between the windows of about 6mm has a higher U-vale (> 2.2 W/(m^2.K).



b) *Efficient ventilation*

Ventilation is the intentional introduction of outdoor air into a space and is mainly used to control indoor air quality by diluting and displacing indoor pollutants; it can also be used for purposes of thermal comfort or dehumidification. Natural ventilation is the intentional passive flow of outdoor air into a building through planned openings (such as doors, and windows). Mechanical ventilation uses fans to drive the flow of outdoor air into a building. An efficient mechanical system with well-controlled regulation system is more energy-efficient and with better indoor quality than conventional methods.

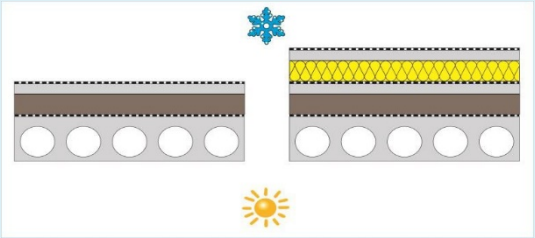
c) Wall insulation and roof insulation



An external wall insulation system is a thermally insulated, protective, decorative exterior cladding procedure involving the use of expanded polystyrene, mineral wool, polyurethane foam or phenolic foam, topped off with a reinforced cement based, mineral or synthetic finish.

The thickness of thermal insulation is dependent on whatever type is required in order to create a partition with a heat transmission factor of U=0.25-0.3 W/(m^2.K), in comparison with the U-value of non-insulated walls (about 1 W/(m2.K)).

Roof insulation with EPS or mineral wool and a thickness of 25 cm gives a U-value of 0.18 W/(m^2.K), in comparison will conventional methods in Mongolia with material thickness of 5-15 cm and a U-value of about 0.9 W/(m^2.K)



d) Retrofit Low Efficiency Heat-Only Boiler with High-Efficiency Models

Heat-only boilers be used to heat public buildings and housing complexes. The boiler will generate steam which is distributed to each building where it is used to make domestic hot water for human consumption or for air heating. The steam may be sold to each customer and billed through the use of a steam flow meter. Efficient boilers with automatic regulation are more efficient (> 75%) than older, manually regulated types (< 50%).

e) Efficient lighting

LED lamps are more efficient than other lamps and have a longer lifetime 20,000-60,000 hrs) compared to fluorescent lighting (6000-30,000 hrs)

The table on the right gives a cost-benefit analysis of selected technologies used in the NAMA Project pilots.

NAMA technology	Technology Cost (MNT)	Fuel reduction in (GJ)	Reduction in (KW/h)	Loan amount (MNT)
Triple Glazed Windows /per 1m2/	3,491	11.0	3,056	2,444
Efficient Lighting /1 bulb/	32	0.2	55	22
Efficient Ventilation System /1 unit/	10,004	97	26,828	7,003
High Efficiency Boiler /1 unit/	148,620	7,832	2,175,665	104,034
Improved Insulation /1 unit/	2,518	75	20,794	1,762
Solar Power /per kw/	5,300	3	908	3,710
Total	**169,964**	**8,018**	**2,227,306**	**118,975**

Source: Project Document ; Project Implementation Unit

Financial instruments are risk mitigation tools that help to mobilize private capital for investment. The tool proposed by the Project is a partial risk guarantee, which is designed to make a project 'bankable' by reducing project risk, lowering the cost of capital and extending tenors. The tool can be used in the building sector in Mongolia and deployed in future programs, including successor NAMA projects.

5.2.3 Outcome 3 *Effective climate change mitigation policies strengthened by NAMA impacts ascertained through the established MRV system*

Indicator with end-of-project target	Actual value or status of the indicator
MRV system for construction sector emissions set up and operational *Target:* one by EoP	Five key GHG and non-GHG parameters and indicators were identified and agreed on to be monitored as part of the NAMA. The MRV methodology and guidelines have been developed
No of institutions adopting and operationalizing MRV systems *Target:* two by Q2 of year 3	Developed and implemented measurement of GHG emission reduction from three demo projects (Jargalan school and Erdenedalai *soum* heat supplier to which CDC Lab was added in Oct 2019) as part of the MRV system for the construction sector NAMA. MCUD, financial institutions, project developers as well as energy auditors will be able to adopt and use the MRV system The MRV system development has been accompanied with capacity building and institutionalization with the Minister's order legalizing measuring and reporting of mitigation measures in the construction sector.
Number of construction sector NAMA case studies using the approved MRV framework and incorporated in policy documents *Target:* three by EoP	MRV activities have been conducted at two construction-completed demo sites with enough info to formulate case studies. The results have been incorporated in the finalization of the MRV Guidebook (published Oct 2019)

Output 3.1 Defined key indicators (GHG and non-GHG) to be monitored for the selected mitigation actions
Output 3.2 Developed and implemented an accurate MRV system for the construction sector NAMA
Output 3.3 Designed and completed capacity development in the implementation and institutionalization of the MRV system

The Monitoring, Reporting, and Verification (MRV) system comprises of multi activities including MRV methodology; key parameters and indicators; institutional arrangement; MRV implementation and reporting through a web-based system. The MRV methodology and guideline developed; assessed and discussed through the Experts' council at CDC. Key GHG and non-GHG parameters and indicators were identified and agreed on the following required indicators in the MRV for construction sector NAMAs as given below.

1. GHG emission reduction in buildings (in tCO_{2eq}/year);	Quantity of the emissions referred to reduced energy consumption, resulting from mitigation actions in the building. Emissions follow from electricity consumption (using the grid emission factor (tCO_2/MWh) in the grid system. Similarly, emissions from heat can be calculated using a hot water emission factor (tCO_2/GJ). Given Mongolia's dependence on coal both will be based largely on heating value (18.9 GJ/ton; IPCC value or national data) and emission factor of coal (0.0961 tCO_2/GJ; IPCC value)
2. Specific CO_2 emissions for the whole building (in tCO_2/m^2/year);	These (as well as the corresponding specific energy consumption in kWh/m^2/year) are important indicators for the efficiency of the building. The gross floor area (m^2) can be determined from buildings plans supplemented by on-site measurements
3. Primary energy use (MWh/year)	Energy carrier used for electricity and heat generation (see further)
4. Energy cost saving (MNT/year)	Cost savings as a result of the avoided energy consumption

In determining the energy consumption, the following indicators are used:

a. Electricity consumption (kWh/yr)	Measurements are based on kWh-meter readings (monthly) and recordings (continuously). The meter should be verified by the State Inspection Authority. Data should be aggregated annually
b. Heating (hot water consumption in GCal[42]/year or GJ per year)	Measurement by hot water meter (if not there, should be installed). The recording should be continuous with monthly readings, and aggregated on an annual basis.
c. Coal consumption (tons a year)	Monitoring by checking payment bills (when, quantity, sum) and/or surveys

Other indicators involve the indoor environment quality (with air temperature as indicator)[43] and gender aspects:

5. Room temperature (°C)	Monitoring by installed thermometers that should be checked weekly
6. Gender and children	Number of men (>18 yr), women (> 18 yr), boys (< 18 yr), girls (< 18 yr) that are living in or have activities related to the building (e.g. working, servicing). Monitored by checking registries, payrolls (on an annual basis)

Training module on the MRV system was developed and the capacity building training was conducted on 29 June 2018 in Ulaanbaatar, led by NIRAS, the international consultancy team and supported by the national consultants and the PIU. The training helped the 51 participants to gain knowledge on essential concepts on MRV system and offered a platform for discussion on the institutionalization of inter-institutional cooperation to enable monitoring and reporting in the building sector. The output from MRV of individual EE should be fed into the GHG inventory system so that this updated as 'real' data from the projects become available.

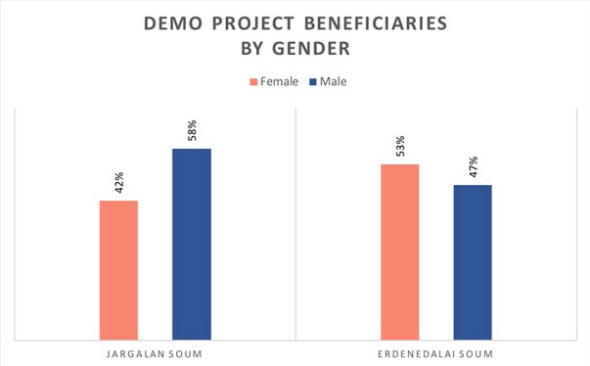
5.3 Progress towards the objective

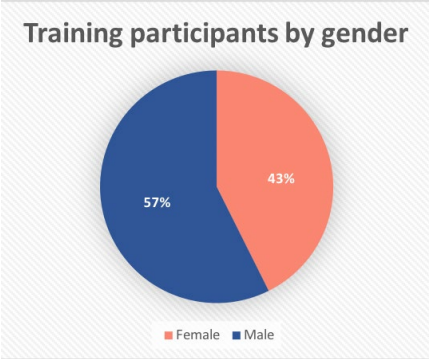
- Impact: how did the project contribute to GHG emissions reduction and socio=economic development within the project implementation cycle and beyond?
- To what extent the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

5.3.1 Gender and capacity building

The Project aimed to support the implementation of Gender Policy of Construction and Urban Development sector through capacity development trainings and in key decision-making processes. One indicator in the MRV system of the NAMA pilots concerns "Gender and children" (see Section 5.2.3). The indicator "Number of female beneficiaries in the demonstration project" was added after Project inception in the results framework, but subsequently not included in the PIR monitoring.

Box 18 Demo project and training beneficiaries by gender





[42] G= giga (10^9). 1 cal = 4.184 Joule

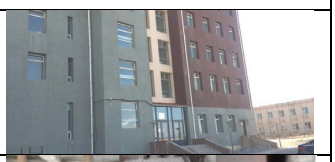
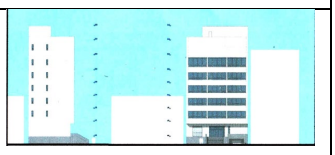
[43] Other indicators could be humidity or CO level, but are not measured

5.3.2 Objective and GHG emission reduction

GHG emission reduction

The implementation of the six pilot projects will result in energy savings and CO_2 emission reduction. The following pilots have been implemented:

Box 19 Direct GHG emission reduction estimates (pilot/demo projects)

	Investment (USD)		Energy savings (MWh/yr)	Emission reduction (ton CO_2/yr)	
	Total	GEF support			
School building retrofit in Gobi-Altai province (aimag), Jargalan soum. EE measures are roof renovation and indoor heating system renovation		59,003	210.3	102.7	
CDC laboratory building retrofit. EE measure is outer wall insulation	347,273	118,631	183.4	83.9	
Soum central heating system renovation in Dundgobi province, Erdenedalai district (soum). EE measures are high-efficiency boiler, insulation of the heating pipelines, installation of the water softener equipment, heat meters, pump and its frequency convertor controlling systems	291,168	71,205	8,341.4	2,838.5	
ERC new office building. EE measures are triple glazed window and shading systems. Project contribution to rooftop PV system only	1,192,427	72,551	160.0	164.8	
MUST new laboratory building. EE measures are triple glazed windows, installation of a mechanical ventilation system with heat recovery. Project contribution to rooftop PV system only (to be constructed)	3,276,537	28,899	22.8	19.6	
UB municipality. Meters in 24 buildings (to be installed)	2,457,459	31,063	to be updated	to be updated	
TOTAL	7,564,863	381,353	8,918	3,210	
Cumulative (14 year lifetime)			**133,769**	**48,143**	

It is not straightforward to compare these estimates with the calculation approach given in the Project Document. However, the amount of direct GHG emission reduction target, given in the ProDoc, is 9,355 MWh annually (in the period 2020-2025) with corresponding direct GHG emission reduction of 5,351 tCO_2 per year. Thus, the achieved direct emission reduction (due to investments in the six pilot projects during 2018-19) is less than targeted. However, the estimated emission reduction of the sixth pilot project has not been calculated yet (by PIU) and does not appear in the table. In the pilot projects in ERC and MUST buildings, only savings are counted due to investments in the PV systems. In fact, the building owners have implemented other sustainable energy measures. One can argue that these measures

(and GHG reduction benefits) could also be counted as contribution by the building owners of sustainable energy improvements as a whole in the building facility. Thus, the (cumulative) direct energy savings and GHG emission reduction will surpass the end-of-project targets in the ProDoc.

Air pollution

Although not an indicator as such in the Project's results framework, it should be noted that energy savings lead to less coal burning, and helps clean up the air in Ulaanbaatar. Apart from its climate change impact, coal-burning one of the major causes of dirty air. UB's air is less intensely polluted than Beijing, Karachi, Dhaka or Delhi when measured annually. According to UNICEF and WHO, extreme peaks in PM 2.5 (particulate matter) levels during the winter are unlike those seen anywhere else[44].

Project goal and objective

The table in Box 20 provides an overview of progress against the indicators reported in the project's results framework and a subsequent PIRs.

Box 20 Development progress (objective and indicators)

Project goal: Reduced GHG emissions in the construction sector	**Indicators and end-of-project (EoP) target value** • Cumulative CO2 emissions reduced from the start of the project to EoP: 10,709 tCO_{2e} from baseline, 2,014 tCO_{2e}) • Cumulative heat and electrical energy savings due to the Project by EoP: 18,722 MWh, from baseline 3,521 MWh)	**Realization (by Jan 2020)** **Note:** See Box 19 for an estimate of the CO_2 emissions and energy savings (based on data provided by the PIU)
Project objective: To facilitate market transformation for energy efficiency in the construction sector through the development and implementation of NAMA	• Number of construction sector NAMA developed and implemented (target: one). • % of new buildings that are fully or beyond BCNS compliance by EoP: 100% from baseline 80%. In MTR revised as *Action plan for enforcement and compliance checking of BCNS as a mandatory requirement for receiving a building permit* (target: one) • Number of people gainfully employed on EE in the construction sector in Mongolia: 50 (by EoP)	• The NAMA project is mentioned in the UNFCCC NAMA registry • Draft action plan for compliance checking for EE BCNS 23-02-19 developed; the Updated BCNS 23-02-19 has been approved by the Experts' council at CDC. • Apart from project staff at PIU, 50 more indirect jobs to be created through capacity building training on energy efficiency

Impact

The Project objective is "to facilitate market transformation for energy efficiency in the construction sector through the development and implementation of NAMA". The TE Team has the opinion that the Project, although a medium-sized GEF project, has indeed contributed to market transformation, in the sense that the data and methodologies produced by the Project are now available for use by the relevant government agencies (e.g., MCUD, CDC, Energy, and UB Municipality) and several programs in the buildings and construction sector that are implemented with the support of other development partners (which are summarized in the next Section 5.4).

[44] https://time.com/longform/ulan-bator-mongolia-most-polluted-capital/. In January 2018, a government-installed sensor reported a PM2.5 per cubic meter rate of 3,320 in parts of Ulan Bator. That's 133 times the level the World Health Organization (WHO) deems safe.

5.4 Sustainability

- To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results? How sustainable (or likely to be sustainable) are the outputs and outcomes? Are there any unaddressed barriers remaining?
- Is there an exit strategy that is well planned? What could be done to strengthen exit strategies and ensure the sustainability of interventions made?
- How do the main stakeholders plan to provide sustainability to the project's results in the future? Is there evidence financial resources are committed to supporting project results after the project has closed

Sustainability is generally considered to be the likelihood of continued benefits after the project ends. Consequently, the assessment of sustainability considers the risks that are likely to affect the continuation of project outcomes (discussed in detail in Section 5.2). Many risks are in one way or another related to the "barriers" mentioned in the Project Document). The occurrence of the "risks" and failure to implement risk mitigation, implies that it will be more difficult to lower corresponding "barriers" substantially, thus negatively affecting the likeliness of "sustainability" of the project's interventions. The critical "assumptions" then is that the "internal risks" (i.e. risks that can be mitigated or managed by Project management), and 'external risks' have a low incidence and/or impacts, in such a way that sustainability remains (moderately) likely. The quality of adaptive management (mentioned in Section 4.1) is determined by the mitigation response of Project management to these external and internal risk factors as these manifests themselves more intensely and/or more frequently than expected.

In assessing the 'sustainability' of the Project, a simple rating scheme is used:
• Likely (L): negligible risks to sustainability;
• Moderately Likely (ML): moderate risks to sustainability;
• Moderately Unlikely (MU): significant risks to sustainability; and
• Unlikely (U): severe risks to sustainability.

Governance and financial sustainability (likely)

Project level

Current risks to the sustainability of the NAMA Project are mainly related the sustainability of management and operation of the GHG emission inventory database, later to be combined with the MRV system. Recently, a Memorandum of Understanding (MOU) between MCUD and ERC to cooperate on the implementation of the National Energy Saving Program on 12 activities including the "facilitation of a system for collecting data and statistics of GHG emission in the construction sector". This implies working together on the operationalization of the data collection frameworks for the energy consumption and GHG inventory system.

The GHG emission calculation methodology developed by the Project was approved by the Minister's Order (BD 25-105-19). A web-based GHG inventory system is deployed and in operation (hosted by CDC). MCUD's role in the area of green buildings and climate change will be formalized by appointing an official as 'green buildings specialist' within its Dept. of Policy Development. Similarly, it was decided that the GHG inventory will continue to be hosted by CDC (for which purpose, a job description for a dedicated database specialist of CDC's Dept. of Public Utility will be modified in February 2020). Several public and private sector entities are supporting the sustainable operation of the GHG inventory system. Apart from the before-mentioned MCUD, CDC (host organization) and ERC (energy data provider), this includes the Agency for Land Administration and Management, of MCUD (providing building stock data based on geographic information system)

National level

With respect to the longer-term sustainability of energy efficiency in construction and buildings, it has been noted that the Government seems quite engaged in the subject. Under the Paris Agreement, Mongolia did commit in its Nationally Determined Contributions to reducing building heat loss by 20% before 2020 and 40% by 2030. Other relevant policies regarding EE in buildings are discussed in Section 3.1

In cooperation with international development partners (supplementing the Government's own resources) several programs are being designed and/or implemented that will bring in significant sources of funding for low-carbon buildings and green urban development. These are summarized below.

- With support from the NAMA Facility, the Municipal Government of Ulaanbaatar and Development Bank of Mongolia will implement the *Mongolia – Energy Performance Contracting for Residential Retrofitting in Ulaanbaatar City,* supported by Global Green Growth Institute (GGGI) and ICLEI. The NAMA Facility has provided financial and technical support for the detailed preparation of the NAMA proposal. The proposal aims at retrofitting 375 older apartment blocks (about one-third of the total of this type of 'older' apartment blocks). The project will have a budget of EUR 18 million (to which UB City will add 10%) and include a financial scheme for apartment owners to implement retrofit measures[45]. MCUD is planning/proposing to use the GHG and MRV methodology and regulation developed by the NAMA project for this new incoming project. So, in a way, this could ensure sustainability.
- The Municipal Government of Ulaanbaatar will implement the *Ulaanbaatar Green Affordable Housing and Resilient Urban Renewal Project* that is envisioned to support the development and construction of climate-resilient and low carbon eco-districts in polluting and substandard ger areas, by providing affordable housing in apartments (about 10,000 units) that are connected to the main urban infrastructure service networks. AHURP will leverage ADB and GCF finance to attract additional investments from commercial banks, as well as equity investments from real estate developers. It envisages grant and debt financing from GCF and Asian Development Bank (ADB) of up to USD 225 million. The aggregate value of the GCF grants and loans will be up to USD 145 million, which will finance about 26% of AHURP's total estimated cost of USD 540 million. The draft project budget allocates low carbon investments (street lighting, insulation, solar panels, metering, and monitoring systems) for social and market housing at an amount of about USD 63 million out of which about USD 50 million GCF loans and grants). Also, funds are made available for infrastructure and public facilities, adaptation investments (greenhouses) and policy environment and capacity strengthening[46].
- On the energy supply side, the European Bank for Restructuring and Development (EBRD) approved in Sep 2019 a USD 10 million loan to the Ulaanbaatar District Heating Company for (i) the rehabilitation and the replacement of selected sections of the district heating network, (ii) the installation of an energy-efficient booster pumping station, (iii) other auxiliary investments, such as upgrading of central heating substations or installing individual heating substations
- At Khan Bank, a *Green Economy Financing Facility (GEFF)* will be set up with a USD 45 million loan from EBRD and USD 15 million provided by the Green Climate Fund (GCF)[47]. With Xac Bank, another funding proposal is under preparation with GCF support for the *EE Consumption Loan Program* focusing on the *ger* areas. The USD 21.5 million program will support household EE lending, comprised of a USD 18 million facility with concessional loans to consumers purchasing EE heating appliances (USD 3 million of the facility) and EE housing solutions (USD 15 million of the facility) which includes EE housing insulation retrofits and EE housing construction. The facility will be co-financed by XacBank and the GCF (each committing USD 9 million), with USD 1 million in grant financing from the GCF to match the USD 2.5 million in grant co-financing from GERES, a French NGO.
- Mongolia lacks a market instrument that can facilitate the channeling of national-scale green financing aligned with the government's priorities. Administered through GGGI, GCF has provided 'readiness funding' (USD 350,000) to support the Government of Mongolia and the Mongolian Bankers Association in the establishment of the *Mongolia Green Credit Fund* (MGCF), a national financing vehicle to bring long-term finance to projects and programs that stimulate green growth in the four areas of energy, housing, waste management, and sanitation.
- The German GIZ implements the project *Thermo-technical rehabilitation of public and apartment buildings in Ulaanbaatar / Mongolia* from 2013-2016 making some USD 11 million available for measures in apartments (external wall insulation, roof insulation, basement ceiling insulation, replacement of windows and entrance doors, complete renovation of the heating system) and school-type buildings (schools, orphanages, and kindergartens). A successor project *Energy Efficient Building Refurbishment in Mongolia (EEP)* is being implemented (2019-2021) by

[45] Reportedly, loan applicants pay back about 45% of the funding provided over time on the utility bill (to which 20,000-30,000 MNT is added monthly

[46] The programme addresses the barrier of limited access to long-term and low-cost financing for the developers, constrained access to long-term and low-cost financing for the buyer (e.g. in the form of long-term affordable mortgages), and inadequate supply of affordable, climate resilient housing

[47] The operation will benefit from a technical cooperation component of USD 6 million (of which USD 2 million provided by GCF).

the UB Municipality with GIZ (and Swiss) support. A total of 20 public buildings such as schools and kindergartens will be renovated and equipped with energy-efficient technologies, while 10 energy-efficient homes in *ger* areas will be constructed. Citizens, especially parents and teachers, are trained to participate in public procurement, while guidelines for transparent, effective and gender-sensitive processes will be developed, and private-sector-oriented training will be provided. A local Energy Efficiency Action Plan for the construction sector will be adopted (Municipality, ERC, MCUD).

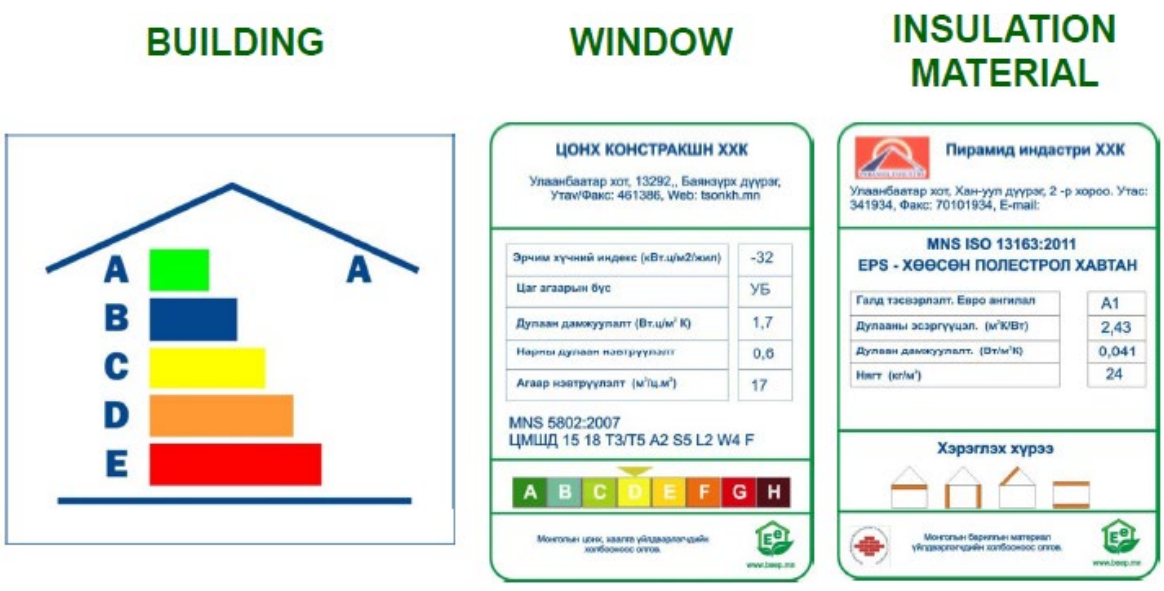
- Moreover, as part of the Nationally Determined Contribution development, a National Climate Change Committee has been set up which will ensure more institutional cooperation and info exchange as well as overall and inter-sectorial coordination of NDC development and implementation. Thus, there is no need for a separate NAMA institutional setup anymore. Mitigation and adaptation measures under Mongolia's NDC include NAMA-like measures, not only in the construction sector but also in other sectors.

Socio-economic sustainability (moderately likely)

The current tariff system does not encourage energy savings. Customers' bills are being based on payment per square meter of floor area (or volume) and hot water is billed according to the number of people living in households rather than actual consumption. In 2014, the Building Construction Norms and Standards (BCNS) were revised and new energy efficiency norms were developed to ensure that all new buildings are constructed in compliance with energy efficiency designs and principles. Other measures, such as introducing energy labels are under discussion (see Box 21).

To be effective, (future) revisions of the energy building code will need installations and housing blocks to be prepared for consumption-based billing (CBB). Even if introduced, CBB would meet physical constraints. Ulaanbaatar's housing stock is still dominated by pre-cast concrete panel buildings from the 1970s, and 1980s, accommodating at least 20% of UB's population. The buildings are in an inadequate state due to their age, poor or non-existent maintenance and lack of insulation. Old buildings with unbalanced piping and radiator systems distribute heat unevenly to apartments, which would lead to unfair billing of apartment owners if apartment-level metering would be introduced.

Box 21 Examples of Mongolian proposed energy labels



Source: *Project ideas in improving energy efficiency of buildings,* PowerPoint by B. Munkhbayar, UNDP/GEF BEEP

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 General conclusions

The UNDP/GEF Project "Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia" (here referred to as the 'NAMA Project' project consists of three Components:

Component 1: Establishment of baseline energy consumption and GHG emission in the construction sector
Component 2: Development and implementation of NAMA in the construction sector
Component 3: Measuring, reporting and verification (MRV) system for NAMA.

The Project objective is "to facilitate market transformation for energy efficiency in the construction sector through the development and implementation of NAMA". The TE Team has the opinion that the Project has indeed contributed to market transformation. To be able to appreciate the Project's achievements, the following table gives an overview of barriers the Project was designed to address, what results have been regarding lowering of barriers, and describes barriers remaining.

Box 22 Achievements of NAMA Project in addressing barriers to energy-efficiency in the construction sector

Barriers the Project has sought to address (as mentioned in the ProDoc)	**Contribution by the NAMA in Construction Sector Project**
Lack of systematic approach, comprehensive tools and capacity to inform EE policy measures: • Data on building stock is categorized in different units to serve respective agencies' purposes, e.g. floor area in m^2, or the number of occupied rooms for hotels and hospitals. Likewise, there has been no systematic approach in consolidating, maintaining and regularly verifying detailed data on historical and current energy consumption in the Construction sector. Agencies such as District Heating Company, MOE, MET are separately engaged in compiling energy consumption data but there is no collaborative approach to compile, analyze and share the data to fulfill various purposes such as establishing reference baselines, benchmarking and for comparisons	*Outcome 1: Effective EE policymaking informed by robust energy consumption monitoring and reference baselines for the construction sector* • The GHG Inventory methodology for the Construction sector has been developed and adopted legally by Ministerial Order. Meantime, MCUD and donor organizations (such as including GIZ and GGGI) are reportedly using and referring to the results for the development of their proposals. • Recently, a MOU was concluded between MCUD and ERC with the objective to cooperate on the implementation of the National Energy Saving Programme, including working together on the operationalization of the data collection frameworks for the energy consumption and GHG inventory system. • Web-based GHG emission Inventory system operationalized and adopted for the construction sector NAMA and will be hosted post-project by CDC and support by several government entities. • In general, the capacities in technical subject areas have been strengthened, such as concepts on inventory, QA/QC, data requirements, calculation of emissions from buildings
Lack of tools and guidelines on monitoring and evaluation: • Local building practitioners and construction sector professionals do not have sufficient tools or guidelines to help them understand the significance of monitoring and evaluating energy savings accrued from EE measures	*Outcome 3: Effective climate change mitigation policies strengthened by NAMA impacts ascertained through the established MRV system* • Key GHG and non-GHG parameters and indicators were identified and agreed on five required indicators for construction sector NAMAs.; • MRV methodology and guidelines were developed and have been used for MRV of two demonstration projects
Lack of credible information on EE construction materials, equipment and cost-effective state of art technologies: • Although the UNDP/GEF BEEP project has been very instrumental in generating widespread awareness on EE, there is still a compelling need to propagate more information, for instance, on EE construction	*Outcome 2: Prioritized NAMA (pilots) in the construction sector developed and funded for implementation* • The Project has carried out cost-benefit analyses and developed the methodology with an Excel-based tool for marginal abatement cost curves (MACC) of the following technologies (which were used in the pilot projects): high-efficiency boiler, improved insulation, triple glazed windows, improved ventilation with heat recovery system, solar panel, and efficient lighting;

materials and equipment, list of professional services and suppliers. Real-life demonstrations of cost-effective, best available technologies and practices to fully comply with and further go beyond the proposed updated building codes are also limited.	• Four demonstration projects (pilots) have been implemented, namely 1) ERC (rooftop solar system); 2) CDC Lab (insulation); 3) Soum heating system (high-efficiency boiler), 4) School building retrofit in Gobi-Altai (roof renovation and indoor heating system renovation), while 5) construction of the rooftop solar system at MUST and 6) insulation of heat meters in by UB municipality in buildings will start in the coming months.
Absence of effective financial models for EE Investments: • A lack of financial ability to target end-users and limited financial capabilities of construction companies has been restraining the propagation of EE technology. If developers are not able to recoup the incremental investment in energy-efficient properties, they will be unwilling to further invest in such business propositions. Suitable and effective financial mechanisms and fiscal products (e.g. off-balance-sheet financing, tax incentives) to support EE building designs and investments are hardly available.	• In the report "Financial Scheme for Energy Efficient buildings in Mongolia" (commissioned by the Project) an assessment is made of the capacity buildings of the key stakeholders in terms of knowledge of climate-related financing options and status of the Mongolian mortgage market and proposes a financing scheme for high-rise residential and commercial buildings. This activity of the Project has been accompanied by meetings with key financial stakeholders, such as Xac Bank, MBA, and Arig Bank; • The report furthermore describes financial instruments appropriate for the building sector in Mongolia (and could be deployed in buildings NAMA). The instrument proposed is a partial risk guarantee. Partial risk guarantees are designed to make a project 'bankable' by reducing project risk, lowering the cost of capital and extending tenors.
Insufficient EE policy implementation and coordination mechanisms	Project contributions: • The Project contributed to the development of State policy on the Construction sector (reflecting low-carbon urban development issues and with GHG reduction targets) • Recently, a MOU was concluded between MCUD and ERC to cooperate on the implementation of the National Energy Saving Program, including working together on the operationalization of the data collection frameworks for the energy consumption and GHG inventory system. • Work on the renewed thermal performance of building code and norms BNbD 23-02-09 (has continued from the previous UNDP/GEF BEEP project. However, the Building Energy Code is still not a mandatory requirement for building permits. Thus, addressing building code compliance (as originally mentioned in the ProDoc) have not been carried out, instead, the Project has provided inputs for the elaboration of compliance and other requirements Project strategy and design: • In the project design, there has been confusion about the NAMA concept. The ProDoc seems to have a narrow definition of the individual pilots as 'NAMAs' rather than as the preparation phase for a sectoral NAMA proposal that could have laid a basis for an institutional framework for NAMA development and registration; • On the other hand, there are several programs being developed (notably with GCF support and by development banks) in the buildings and construction sector by MCUD, UB City and local banks with support from development partners (such as GIZ and GGGI), so this is a positive development regarding the medium-term sustainability of the NAMA Project's efforts
Unattractive economic benefits of EE investments for end-users due to subsidized heat and electricity tariffs	• The current tariff system does not encourage energy savings. Customers' bills are being based on payment per square meter of floor area (or volume) and hot water is billed according to the number of people living in households rather than actual consumption. On the longer-term policy would need to shift towards consumption-based billing (CBB), starting in new buildings under a renewed building code that requires these to be prepared for CBB

Box 23 Evaluation ratings of the NAMA Project

Evaluation item	Rating MTR	Rating TE	Comment / correspondence with sections in the report
Design logic; Strategy; Attainment of the project goal	N/A MS	S MS S	See Section 3.2 and 3.3 Although the logical framework in general has been appropriately designed in terms of outcome, there has been confusion on the definition of "Nationally Appropriate Mitigation Actions". One might have expected the Project to result in a sector-wide NAMA, the Project itself has been 'the NAMA' with a GHG inventory, MRV system formulated and some pilots implemented (which confusingly were referred to as NAMAs). What has been missing in the design is the institutionalisation of the NAMA concept. Fortunately, follow up will be given post-project to the above-mentioned outputs by 'NAMA-like' initiatives undertaken by UB City, local banks and other Mongolian organisations (see 'Sustainability'), while cooperation agreements on GHG emissions in construction have been made between government entities. Also, a new UNDP-supported project on NDC Implementation (see Box 23) will build on the NAMA Project, so, in this sense, the Project 'goal' can be judged as to have been achieved and be rated as 'satisfactory',
Relevance	N/A	R	See Sections 3.1 and 3.3 The project is fully in line with a number of energy (efficiency) and climate change mitigation policies and strategies and has addressed some barriers to the more widespread dissemination of EE interventions in the Construction sector
Efficiency and overall implementation and execution	N/A	S-HS	The project is being adaptively managed and implemented in a manner that is cost-effective. The PIU has effectively engaged with all stakeholders relevant to the project and managed to get strong commitment from the Ministry of Construction and Urban Development (MCUD). Despite initial delays, the PIU has managed to implement the Project with satisfactory results in a shorter implementation period (32 months) than originally planned (42 months). Co-financing has been mobilized in large part linked with the realization of the demo projects of Outcome 2.
• Outcome 1	S	S	Section 5.2.1. The GHG inventory methodology was developed (in 2018) and a web- based system was launched in October 2018, while sustainability of the scheme is supported by agreements between entities involved (MCUD, MEGTD, ERC, UB City)
• Outcome 2	S	S	Section 5.2.2 The MACC curve analysis was conducted, while 4 out of 6 pilot projects have been completed with the other two demo installation/construction starting soon and expected to be completed by end of April 2020.
• Outcome 3	MS	S	Section 5.2.3 The MRV methodology and tools has been designed and used for MRV of the first demo project, while the first data of these projects has been used to help finalise the MRV methodology
Overall project outcomes	N/A	S	Based on the rating of the Outcomes 1 to 3
Attainment of the objective; Effectiveness	MS	S	Section 5.3. With most of the demo projects operating and installation of the last two to be started soon, it has been estimated that the energy savings from these projects will lead to satisfactory energy savings and thus GHG emission reduction. The 'soft assistance' activities will have a multiplier effect, so indirect emission could be several times more the direct emission reduction results
Financial and institutional (medium-term)	N/A	L	With respect to the longer-term sustainability of energy efficiency in construction and buildings, it has been noted that the Government seems quite engaged in the subject. Under the Paris Agreement, Mongolia did commit in its Nationally Determined Contributions to reducing building heat loss by 20% before 2020 and 40% by 2030. In cooperation with international development partners (supplementing the Government's own resources) several programmes are being designed and/or implemented that will bring in significant sources of funding for low-carbon buildings and green urban development
Socio-economic (longer-term)	N/A	ML	Some barriers remain that will only be resolved on the longer term. The current tariff system does not encourage energy saving, as customers' bills are being based on payment per square meter rather than actual consumption. Revised (energy-relevant) building codes have been drafted but political decision-making regarding approval has been slow and official approval still pending. To be effective, any revised energy building code would need to require (new) housing blocks to be prepared for consumption-based billing (CBB)
Likelihood of sustainability	N/A	ML	Per instruction in GEF Evaluation manual, the lowest rating should be chosen for the overall sustainability rating

Note to the table:

- (HS) Highly Satisfactory: Project is on track to exceed its end-of-project targets, and is likely to achieve transformational change by project closure. The project can be presented as 'outstanding practice'.
- (S) Satisfactory: Project is on track to fully achieve its end-of-project targets by project closure. The project can be presented as 'good practice'.
- (MS) Moderately Satisfactory: Project is on track to achieve its end-of-project targets by project closure with minor shortcomings only.
- (MU) Moderately Unsatisfactory: Project is off track and is expected to partially achieve its end-of-project targets by project closure with significant shortcomings. Project results might be fully achieved by project closure if adaptive management is undertaken immediately.
- (U) Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets by project closure. Project results might be partially achieved by project closure if major adaptive management is undertaken immediately.
- (HU) Highly Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets without major restructuring.
- (U/A) Unable to assess; N/A: not assessed

Sustainability

- (L) Likely: negligible risks to sustainability.
- (ML) Moderately Likely: moderate risks.
- (MU) Moderately Unlikely: significant risks.
- (U) Unlikely: severe risks.

Relevance

- (R) Relevant; (NR) Not Relevant (NR).

Impact Ratings:

- (S) Significant; (M) Minimal (M); (N) Negligible (N).

The Project's goal is "reduced GHG emissions in the construction sector". Based on the first five (demo) projects the lifetime (taken conservatively as 14 years) energy savings and GHG emission reduction are 134 GWh and 48,140 tCO_2. Direct emission reduction will actually be higher of the last demonstration project (to be finalized by April 2020) is also taken into account.

6.2 Recommendations

UNDP and CDC

Only two pilot projects have been analyzed fully according to the MRV methodology (see Box 25). Two projects were constructed recently in 2019 (ERC and CDC demos) and still need a full winter season of measurements, while the last two will only be installed in Q1 2020. The NAMA Project has recently been extended to the end of April 2020, so, the Evaluation Team proposes that this will enable the complete measurements of the winter season 2019-2020. Apart from this, another season of measurements could be undertaken, thus allowing to see differences between winters between one year and another. It also allows the last two demos (MUST building and UB City buildings) to be monitored during at least one whole winter season. The results (GHG inventory, MRV methodology, findings of the pilot projects, and other materials of the Project) should continue to be disseminated widely. An agreement should be made with CDC to continue the measurements, possibly with some UNDP support by the new UNDP project "Deepening efforts to accelerate NDC implementation" (described in Box 23) and with CDC on post-NAMA project information dissemination.

Government

NAMAs formulation is not a one-off event but is a continuous process through which developing countries can expand the scope of activities over time. Several programs are being designed of which some are labeled 'NAMA' (such as the program *Mongolia – Energy Performance Contracting for Residential Retrofitting* with UB Municipality and GGGI) while other programs may have different labels and titles, but all construction and building sector will have some interrelation and can build and reinforce each other. An institutional oversight framework will be needed to promote coordination

Box 24 Deepening efforts to accelerate NDC implementation in Mongolia

As a part of the global programme on NDC support, UNDP with MCUD will implement this Project (in cooperation with MEGDT) that aims to address the gap in the NDC partnership plan and ensure the parallel processes are well coordinated. The Project Document was recently signed in October 2019 with a total budget of USD 540,000 and will be implemented from Oct 2019 to June 2021. A close partnership of the NDC working group and SDG thematic working groups will be facilitated. The objective of the project is to ensure a well-coordinated NDC process that would result in an actionable plan with a robust financing strategy fully aligned with the SDGs and Mongolia's 2030 Vision document that was approved in 2016. The objective will be achieved by two interlinked outputs (and activities):

1. Efforts coordinated for effective implementation of NDC and Partnership plan
   - 1.1 Align the NDC processes with SDG planning and implementation
   - 1.2 Establish a platform for NDC implementation and coordination
   - 1.3 Strengthen coordination capacity of the newly established National Climate Change Committee.
   - 1.4 Develop the NDC document consolidating sectoral inputs and validate for submission
2. Inclusive sectoral transformation towards NDC implementation supported
   - 2.1 Improve national GHG inventory methodology and data collection in the transport sector
   - 2.2 Set up a national MRV system in construction and transport sectors
   - 2.3 Undertake cost-benefit analysis (CBA) and financial needs assessment for key mitigation actions in the transport and construction sectors
   - 2.4 Develop capacities of national stakeholders to access climate finance

and cooperation, avoiding overlap and filling gaps. The newly established National Climate Change Committee (NCCC)[48] can play such a role (or a subcommittee thereof), with NAMA and NAMA-type activities forming implementation of goals and strategies set out within the overall framework of Mongolia's Nationally Determined Contribution (NDC).

The NAMA concept was introduced in 2007-2009 as part of the UNFCCC framework, referring to a set of policies and voluntary actions that countries undertake as part of a commitment to reduce greenhouse gas emissions. The Conference of Parties (COP) of the UNFCCC in 2015, held in Paris, introduced the (voluntary) Nationally Determined Contributions. The NDCs national climate plans highlighting climate actions, including climate-related targets, policies and measures governments. NAMAs can now be seen as a subset of NDC actions and from an institutional point of view, the TE Team recommends continuing climate change mitigation efforts within the NDC framework rather than separately institutionalizing the NAMA concept.

6.3 Lessons learned

1) One lesson learned from the monitoring of energy consumption is that one has to be critical on data derived from purchase bills for monitoring, as the actual consumption of fuel (coal) may deviate substantially from the actual consumption, as is explained in Box 24.

   The report *CO2 Emission Reduction Calculation, Standardized Baseline Emission Factor Setting, and MRV in the Building Sector under the Paris Agreement* mentions challenges regarding data collection and implementing GHG inventory and MRV methodologies too. In general, there is a scarcity of data on energy consumption in (new) buildings, which are provided by two separate entities (and data. As mentioned, data provided in forms are not always given correctly, either too large or too small or in wrong units. Not all buildings are equipped with hot water meters.

[48] Set up in May 2019, the role of the NCCC will include create an enabling environment for and oversee NDC implementation, establishing working groups and taskforces and defining their scope of work, providing support, guidance to and approval of NDC & NDC-related policy, action plan, and programmes and monitoring and evaluation of the above.

2) When designing a NAMA preparation and support project it is important to have a common understanding among stakeholders on the definition of the NAMA concept and its priorities and expected goals. Apart from focusing on individual demo project interventions and defining GHG inventory and MRV methodologies and tools, setting up an institutional framework for NAMA development and registration is missing while this may be crucial for reaping the benefits of this and other future NAMA or NAMA-type of development projects and avoid that these will overlap, leave gaps or use mutually incompatible data collection, monitoring, and reporting systems.

Box 25 Monitoring of GHG emission reduction in the demo projects in buildings

Measurements and data collection and calculation of energy savings (and GHG emission reduction) has been carried out for the first two demo/pilot projects over the period November 2018-November 2019

Emission reduction in School building retrofit in Gobi-Altai

Energy use	Measured energy consumption (in MWh)	Corresponding GHG emission reduction (tCO_2)
Baseline	511.91	291.85
Project	333.13	113.93
Savings	178.78	101.92
Coal saved	83 tons	

Soum demonstration project – Erdenedalai, Dundgobi

Energy use	Type of data		Corresponding GHG emission reduction (tCO_2)
Baseline	Coal consumption (purchase bills) Estimated by heat mater	3,222.0 tons 6,184.3 MWh	6,148.3 1,425.3
Project	Coal consumption (purchase bills) Estimated by heat mater	710.0 tons 2,083.3 MWh	1,362.0 950.2
Savings	Coal consumption (purchase bills) Estimated by heat mater	2,512.0 tons 1,388.9 MWh	4,786,3 475,1

Interesting in this case is the wide discrepancy between GHG emission value based on coal purchase bills and value based on heat meters. From the measured values we can deduce that the actual coal consumption is much less than what can be derived from heat meter measurements. With reported coal consumption much higher than the actual, one can conclude that much purchased coal 'disappears' for uses other than for the *soum* boiler system!

TERMS OF REFERENCE

INTERNATIONAL CONSULTANT FOR TERMINAL EVALUATION OF THE NAMA IN THE CONSTRUCTION SECTOR IN MONGOLIA PROJECT

INTRODUCTION

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a terminal evaluation upon completion of implementation. These terms of reference (TOR) sets out the expectations for a Terminal Evaluation (TE) of the Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia (PIMS 5315).

The essentials of the project to be evaluated are as follows:

PROJECT SUMMARY TABLE

Project Title:	Nationally Appropriate Mitigation Actions in the Construction Sector in Mongolia			
GEF Project ID:	5830		*at endorsement (US$)*	*at completion (US$)*
UNDP Project ID:	5315	GEF financing:	1,269,863	1,269,863[1]
Country:	Mongolia	IA/EA own:	100,000	
Region:	Asia and the Pacific	Government:	3,350,000	1,446,633.25[1]
Focal Area:	Cimate Change	Other:	3,450,000	
FA Objectives, (OP/SP):	CCM2 for GEF 5: Promote market transformation in the energy efficiency industry and building sector	Total co-financing:	6,900,000	
Executing Agency:	Ministry of Construction and Urban Development	Total Project Cost:	8,169,863	
Other Partners involved:	Ministry of Environment and Tourism, Energy Regulatory Commission, Construction Development Center	ProDoc Signature (date project began):		June 28, 2016[2]
		(Operational) Closing Date:	Proposed: December 31, 2019	Actual: December 31, 2019

OBJECTIVE AND SCOPE

The project was designed to facilitate market transformation for energy efficiency in the construction sector through the development and implementation of NAMA in Mongolia. This objective will be achieved by removing barriers to increased adoption of energy efficiency technology in construction sector through three components;

i. establishment of baseline energy consumption and GHG emission in the construction sector
ii. development and implementation of NAMA in the construction sector
iii. measuring, reporting and verification (MRV) system for NAMA.

This project was implemented over a 32 months period (originally planned to implement over a 40 months period) and is expected to achieve GHG emission reductions through the displacement of electricity heat generation from coal power plants and CHPs. Direct GHG emission reduction over the lifetime of the project is estimated to be 64,219 tCO2e. The estimated range of potential indirect emission reduction is 57,435 to 438,926 tCO2e that is cumulative for a 10-year period after.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects.

The objectives of the evaluation are to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

EVALUATION APPROACH AND METHOD

An overall approach and method[3] for conducting project terminal evaluations of UNDP supported GEF financed projects has developed over time. The evaluator is expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact**, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (*Annex C*) The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The evaluator is expected to follow a participatory and consultative approach ensuring close engagement with government counterparts, in particular the GEF operational focal point, UNDP Country Office, project team, UNDP GEF Technical Adviser based in the region and key stakeholders. The evaluator is expected to conduct a mission to Ulaanbaatar, Mongolia including the field visit the project sites (Erdenedalai soum in Dundgobi Province, Jargalan soum in Gobi-Altai province, Energy Regulatory Commission, Laboratory of Construction Development Center, Mongolian University of Science and Technology). Interviews will be held with the following organizations and individuals at a minimum:

- Ministry of Construction and Urban Development (MCUD)
- Ministry of Environment and Tourism (MET)
- Ministry of Energy (MOE)
- Energy Regulatory Commission
- Construction Development Center
- Local Government Authorities and beneficiaries (Dundgobi and Gobi-Altai aimag)
- Ulemj Khurd LLC, Dundgobi province

[1] To be completed upon the commencement of the TE

[2] Although project document was signed on this date, actual project inception took place in April 2017 due to the restructuring of the government resulted from 2016 parliamentary election.

[3] For additional information on methods, see the Handbook on Planning, Monitoring and Evaluating for Development Results, Chapter 7, pg. 163

- National focal Point for UNFCCC
- GGGI
- General Authority for Specialized Inspection (GASI)
- Ulaanbaatar City Government (UB City)
- Housing and Public Utility Authority (HPUA)
- XacBank
- School of Civil Engineering and Architecture, Mongolian University of Science and Technology (MUST);
- Supreme Council of Condominium Associations (SCCA);
- Mongolian Civil Engineers Association (MACE);
- Building Material Manufacturer Association

The evaluator will review all relevant sources of information, such as the project document, project reports – including Annual PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the evaluator considers useful for this evidence-based assessment. A list of documents that the project team will provide to the evaluator for review is included in Annex B of this Terms of Reference.

EVALUATION CRITERIA & RATINGS

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework (see Annex A), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance, effectiveness, efficiency, sustainability and impact.** Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in Annex D.

Evaluation Ratings:			
1. Monitoring and Evaluation	***rating***	**2. IA& EA Execution**	***rating***
M&E design at entry		Quality of UNDP Implementation	
M&E Plan Implementation		Quality of Execution - Executing Agency	
Overall quality of M&E		Overall quality of Implementation / Execution	
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental:	
		Overall likelihood of sustainability:	
Environmental Status Impact Improvement			
Environmental Stress Reduction			
Progress towards stress/status change			
Overall Project Results			

PROJECT FINANCE / COFINANCE

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator(s) will receive assistance from the Country Office (CO) and Project Team to obtain financial data in order to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing (type/source)	UNDP own financing (mill. US$)		Government (mill. US$)		Partner Agency (mill. US$)		Total (mill. US$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants	50,000							
Loans/Concessions								
• In-kind support	50,000		3,350,000		50,000			
• Other					3,400,000			
Totals	100,000		3,350,000		3,450,000			

MAINSTREAMING

UNDP supported GEF financed projects are key components in UNDP country programming, as well as regional and global programmes. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

IMPACT

The evaluators will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) establishment of baseline energy consumption and GHG emission in the construction sector, b) development and implementation of NAMA in the construction sector, and/or c) measuring, reporting and verification (MRV) system for NAMA[4].

CONCLUSIONS, RECOMMENDATIONS & LESSONS

The evaluation report must include a chapter providing a set of conclusions, recommendations and lessons. Conclusions should build on findings and be based in evidence. Recommendations should be prioritized, specific, relevant, and targeted, with suggested implementers of the recommendations. Lessons should have wider applicability to other initiatives across the region, the area of intervention, and for the future.

IMPLEMENTATION ARRANGEMENTS

[4] A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROtI) method developed by the GEF Evaluation Office: ROTI Handbook 2009

The principal responsibility for managing this evaluation resides with the UNDP CO in Mongolia. The UNDP CO will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team. The Project Team will be responsible for liaising with the Evaluators team to set up stakeholder interviews, arrange field visits, coordinate with the Government etc.

EVALUATION TIMEFRAME

The total duration of the evaluation will be 27 days according to the following plan:

Activity	Timing for international consultant	Timing for national consultant	Expected completion date
Preparation	4 days	*8* days	*Starting from the contract commencement date.*
Evaluation Mission	14 days	*14* days	*After acceptance of inception report*
Draft Evaluation Report	7 days	*7* days	*After the evaluation mission*
Final Report	2 days	*7* days	*After comments and feedback received on draft report.*

DUTY STATION

The international and national consultants will be home-based and carry out One mission to Ulaanbaatar, Mongolia. It is expected that the mission will be conducted around late November or early December and will not count for more than 14 days in total, which include not more than 5 days of in-country travel. Local travel cost shall be covered by the project based on UNDP policy or UN-EU cost-norm.

EVALUATION DELIVERABLES

The evaluation team is expected to deliver the following:

Deliverable	Content	Timing	Responsibilities
Inception Report	Evaluator provides clarifications on timing and method	No later than 2 weeks before the evaluation mission.	Evaluator submits to UNDP CO
Presentation	Initial Findings	End of evaluation mission	To project management, UNDP CO
Draft Final Report[5]	Full report, (per annexed template) with annexes	Within 3 weeks of the evaluation mission	Sent to CO, reviewed by RTA, PCU, GEF OFPs and IP
Final Report*	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.

[5] National Consultant must ensure that Draft Report and Final Report are translated into Mongolian language, in order to obtain comments and feedbacks from national counterparts

TEAM COMPOSITION AND RESPONSIBLITIEIS

The evaluation team will be composed of 1 international and 1 national evaluators. The consultants shall have prior experience in evaluating similar projects and possess a demonstrable senior evaluation expertise coherent with the requirements of this assignment. Experience with GEF financed projects is an advantage. The international consultant will be designated as the team leader and will be responsible for finalizing the report. The evaluators selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities.

Both consultants will be responsible for conducting the evaluation as described in this ToR. They will apply the approach and methods proposed in the inception report. The Team members will participate in briefing and debriefing meetings, discussions, field visits, and will contribute to the evaluation with written inputs and oral presentations. The Evaluation Team shall collaborate on a single document for each of the four main deliverables (inception report, presentation on preliminary findings, draft report and final report). The Team Leader will be responsible for coordinating the inputs and ensuring all deadlines are met; the National Consultant will be responsible for local-level engagement.

The Team Leader is expected to:

- Lead, organize, and supervise the work of the Evaluation Team, ensuring a division of labour that is commensurate with the skills profiles of the individual team members. He/she will have overall responsibility to produce deliverables, the evaluation report, and is ultimately accountable for its quality.

Specifically, the international expert (team leader) will perform the following tasks:

- Lead and manage the evaluation mission;
- Guide the national expert in collecting data and information and preparation of relevant sections in the report
- Design the detailed evaluation scope and methodology (including the methods for data collection and analysis);
- Conduct an analysis of the outcome, outputs and partnership strategy (as per the scope of the evaluation described above);
- Draft related parts of the evaluation report; and
- Finalize the entire evaluation report.

The National Consultant is expected to:

- lead the organization and facilitation of meetings and discussions with key stakeholders.
- ensure that all deliverables are translated and available in English and Mongolian languages.

Specifically, the national expert will perform the following tasks:

- Documentation of evaluation and data gathering and consultation meetings;
- Contributing to the development of evaluation plan and methodology;
- Conducting specific elements of the evaluation determined by the International Lead Consultant;
- Contributing to presentation of the evaluation findings and recommendations at the evaluation wrap-up meeting;
- Contributing to the drafting and finalization of the evaluation reports, notes of the meetings and other related documents prepared by the international consultant

- Performing translation for the international consultants during meetings with various stakeholders and necessary documents discussed during the international consultant's mission.

QUALIFICATIONS OF THE SUCCESSFUL EVALUATORS

The International consultant must present the following qualifications.

For International Consultant (Team Leader)

- Advance university degree (Master's) in project management, energy efficiency, construction, climate change, environmental sciences or relevant fields.
- At least ten (10) years of international experience in the areas of project development, implementation, and evaluation for donor-funded development projects in developing countries.
- Recent experience with results-based management evaluation methodologies;
- Demonstrated experience working with the GEF or GEF-evaluations;
- Demonstrated experience from evaluations of similar types of GEF financed projects, using guidance and approaches proposed by UNDP and the GEF.
- Project evaluation/review experiences within United Nations system will be considered an asset;
- Work experience in climate change mitigation, energy efficiency projects in developing countries in Asia is an advantage;
- Experience applying SMART indicators and reconstructing or validating baseline scenarios; Experience applying participatory monitoring approaches;
- Good interpersonal and analytical skills and ability to work under diverse/varied cultural environments;
- Demonstrated command over writing professional reports in English.

EVALUATOR ETHICS

Evaluation consultants will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the UNEG 'Ethical Guidelines for Evaluations'

PAYMENT MODALITIES AND SPECIFICATIONS

%	Milestone
10%	Upon receiving and accepting inception report
40%	Following submission and approval of the 1ST draft terminal evaluation report
50%	Following submission and approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report

ANNEX B. ITINERARY OF THE EVALUATION MISSION

No	Time	Organization	Name	Position	Meeting contents	Venue and Focal Points
Monday, 06 January 2020						
1.	9:00 - 12:30	**PIU Team** **Project Terminal evaluation team (PTE)**	- Mr. Khishigjargal - Ms, Bayarmaa - Mr. Munkhbayar - Ms. Natsagbadam - Ms. Khongorzul - Mr. Van den Akker - Mr. Dorjpurev	- NPC - Project officer, Comp.1 - Project officer, Comp 2 - Project officer, Comp 3 - Communications and outreach - Team leader - Team member	• Briefing of overall results and per Component	MCUD Meeting Room
Tuesday, 07 January 2020						
2.	9:00 – 10:30	**MCUD** **PTE**	- Ms. Lkhagvatseden - Mr. Bayarbat - Ms. Misheel - Mr. Jan van den Akker - Mr. Dorjpurev.	- NPD (Head of Public Utilities Sector Policy Implementation and Coordination Department, MCUD) - MCUD (Policy and Planning Department); PSC member - Officer, MCUD - Team leader - Team member	• Relevance to national priorities and international commitments (State Construction Policy, the State Housing Policy and the contribution to the Paris Agreement) • Follow-up (GGGI is beginning project for insulation of old concrete panel buildings. MCUD is cooperating with support • Project achievement (methodology for calculation of the GHG emissions from the construction sector, methodology for calculation of GHG emission reductions and establishment of MRV system; detailed survey of 32 different type of buildings connected to the central heating system)	MCUD Meeting room
3.	11:00-12:00	**PIU Team** **PTE**	- Ms. Bayarmaa - Mr. Jan van den Akker - Mr. Dorjpurev	- Project officer, Comp.1 - Team leader - Team member	• Establishment of baseline GHG emission and inventory (GHG emission calculations; Web-based GHG inventory system; Formalization of MCUD's and CDC role in GHG inventory' • MoU between MCUD and ERC on Ministry of Construction and Urban Development and Energy Regulatory Commission on National Energy Saving Program within 12 activities including GHG inventory in the Construction Sector	PIU (MCUD)
4.	14:00-15:30	**Environment and Climate Fund** **PIU**	- Ms. Tegshjargal - Mr. Batjargal - Mr. Jan van den Akker - Mr. Dorjpurev	- CCPIU, ECF-MEGDT (specialist for GHG inventory) - PCC; Focal Point, NCF, UNFCCC - Team leader - Team member	• Difference between national GHG inventory (top-down analysis using IPCC methodology and) NAMA project sectoral inventory (bottom-up; CDM methodology) • Activities of other development partners (Green Climate Fund; Japan Joint Credit Mechanism	ECF Office
5.	16:00-17:00	**ERC** **PTE**	- Mr. Atjargal - Ms. Tsolmen - Mr. Van den Akker	- Director, ERC - Building expert - Team leader	• Visit to Demo site (rooftop solar PV with a capacity of 30 kW. The total investment cost for the new building including solar PV is 3 billion MNT (of which project support of 195 million MNT for the roof solar PV)	ERC office

No	Time	Organization	Name	Position	Meeting contents	Venue and Focal Points
			- Mr. Dorjpurev	- Team member	• New ERC building (with rockwool insulation and other EE measures) is 2-4 times more efficient than the old building • Solar panels can give electricity to the central grid during low power consumption time. There is an electricity meter to calculate electricity consumption. However, at present, the regulations and tariffs for electricity supply have not been approved	
Wednesday, 08 January 2020						
6.	10:00-11:00	**PIU Team** **PTE**	- Ms. Matsagbadam - Mr. Jan van den Akker - Mr. Dorjpurev	- Project officer, Comp.3 - Team leader - Team member	• MRV methodology and calculation tool • Status of calculation MRV for (three) demo projects (Dundgovi Erdenedalai HOB, Govi-Almai Jargalant insulation of school building and Laboratory CDC) • Issues in data collection and measurements	PIU (MCUD)
7.	14:30-15:00	**MOE** **PTE**	- Mr. Bavuudorj - Mr. Van den Akker - Mr. Dorjpurev	- Head, Renewable energy Division; PSC member - Team leader - Team member	• Role and importance of NAMA project • Cooperation MOE and ERC MoE and ERC con setting up tariff system (incl. net-metering) for rooftop PV system • RE Law update	MOE office
8.	16:00-17:00	**GIZ** **PTE**	- Mr. Tuvshinkhuu - Mr. Van den Akker - Mr. Dorjpurev	- Senior officer - Team leader - Team member	• Status of the "Energy-efficient building refurbishment in Mongolia" • Joint GIZ-NAMA project study on actual energy consumption and compare with design capacity or design consumption for 32 buildings (schools, kindergartens and other buildings). A study conducted by "Tumen building research" company. Total cost of the study was about 100 million MNT (NAMA: MNT 20 million)	City Center (GIZ Office)
Thursday, 09 January 2020						
		Travel to Mandalgobi **Travel to Erdenedalai soum**				

No	Time	Organization	Name	Position	Meeting contents	Venue and Focal Points
9.	13:00-17:00	**Erdenedalai soum** **PTE** **PIU**	- Mr. Munkhbatar - Mr. Lkhagvasuren - Mr. Van den Akker - Mr. Dorjpurev - Mr. Munkhbayar - Ms. Natsagbadam	- Governor - Director kindergarten - Team leader - Team member - Project officer - Project officer	• Project site visit to Demo site: Erdenedalai soum heating. Observations: HOB is working properly. The capacity of the HOB is 2 MW. About 2 tons of coal is consumed per day. In winter, the high-quality coal from Tsogt tsetsii is used in winter. In the spring and autumn, the low quality (3000 kcal / kg) coal from the Tuvshiin Gobi is used. Flue gas temperature is 240 degrees Celsius. It is important to use the flue gas temperature for increasing feed water temperature by 10 degrees. The efficiency of the boiler is estimated at 80%. However, no measurements were taken. Consumers are charged in m3. The total budget is MNT 680 million. From this amount, 180 million MNT are from NAMA project. • The Kindergarten has over 330 children. The old 4 buildings had 4 heating boilers. There was a bad condition. Ignition of 4 furnaces was very difficult. The old four furnaces burned about 70 tons of coal. After connection to centralized heating, the working environment is much better.	Soum centre; kindergarten
	.	***Stay overnight in Mandalgobi*** ***Thursday morning: travel back to UB***		.		
Friday, 10 January 2020						
10.	12:00-13:00	**CDC laboratory** **PTE** **PIU**	- Ms. Enkhtuya - Mr. Van den Akker - Mr. Dorjpurev - Mr. Munkhbayar - Ms. Natsagbadam	- Head of Construction materials testing and analysis Lab - Team leader - Team member - Project officer - Project officer	• Project site visit to Demo site: CDC laboratory. The building was constructed with poor quality in 2013. Thereafter, the basement and left side walls were insulated. All windows have been replaced by triple glazing. All insulation works completed in September by contractor Saksai Ugruu. MNT 247 million provided by the NAMA Project.	CDC Lab building
Saturday-Sunday, 11-12 January Reporting						
Monday, 13 January 2020						
11.	10:30-11:30	**Mongolian Finance Association (ToC)** **PTE** **PIU**	- Ms.Nandin-Erdene - Ms.Oyungerel - Mr. Van den Akker - Mr. Dorjpurev - Ms. Khongorzul	- Project & partnership manager - Project & partnership manager - Team leader - Team member - Project officer	• Exchange information about Sustainable Finance condition of energy efficiency and green development projects in Mongolia and role of ToC	ToC office

No	Time	Organization	Name	Position	Meeting contents	Venue and Focal Points
12.	12.30-13.30	**UNDP**	- Ms. Bunchingiv	- Programme analyst	• UNDP activities in climate change mitigation • NAMA implementation and follow up	UNDP CO
13.	17:00-18:00	**Mongolian Association of Construction Designers** **PTE**	- Mr. Gantulga - Mr. Dorjpurev	- CEO - Team member	• NAMA project developed a procedure for counting, recording and reporting GHG emissions. More training and publicity are needed	Association office
14.	17.00-18.00	**UNDP – Regional hub** **PTE**	- Ms. Beerepoot - Mr. Van den Akker	- RTA - Team leader	• Discussion on findings mid-term review report	Via skype
Tuesday, 14 January 2020						
15.	10.30-11.30	**Ulaanbaatar City government** **PTE**	- Mr. Gantimir - Mr. Altangerel - Mr. Otgonbat - Mr. Van den Akker - Mr. Dorjpurev	- General manager - Senior officer - Senior officer - Team leader - Team member	• Discussion on Demo site (in 2019, 24 prefabricated houses with high heat loss were insulated (exterior walls). Installation of heat meters on these insulated buildings was carried out with the support of the Construction NAMA project). Constant monitoring of meter readings will be done by the association of apartment owners • Another new NAMA project will be implemented with GGGI support, focusing on 362 block buildings (out of 1077 block buildings in total). A grant of €18 million will be raised by the International NAMA and €1.8 million from the city. Users will then pay in addition to the monthly fee of 20-30,000 MNT.	UB City office
Wednesday, 15 January 2020						
16.	09.00-10.00	**CDC**	- Mr. Enkhbold	- Vice-Director and Chief Engineer	• CDC cooperated with NAMA project on GHG inventory database in 2018 and in the Demo site (insulation of the CDC lab building: walls, windows at an investment of MNT 220 million) • MCUD will decide on the continuation of work on GHG inventory	CDC office
17.	16.00-17.00	**UNDP** **PTE** **PIU**	- Ms. Nashida Sattar - Ms. Bunchingiv - Mr. Van den Akker - Mr. Dorjpurev - Ms. Lkhagvatseden - Mr. Mr. Khishigjargal - Ms. Khongorzul	- DRR (Deputy Res. Rep) - Programme analyst - Team leader - Team member - NPD - NPC - Project officer	• Debriefing with presentation of preliminary findings	UNDP CO

ANNEX C. LIST OF DOCUMENTS COLLECTED AND REVIEWED

Project design documents and progress reports

- NAMA Construction, UNDP Project Document
- NAMA Construction, CER (CEO Endorsement Request) document
- Inception Report (June 2017)
- Project Implementation Reviews (PIR) 2017, 2018, 2019
- Project brochure
- Mid-term Review Report (by M. Beerepoot, 2018)
- Gender Action Plan (2017)
- Project Steering Committee minutes of meeting

Project technical reports

- *Methodology Review and Assessment for the Estimation of GHGs Emissions in the Building Sector in Mongolia* (NIRAS, 2018)
- *Marginal Abatement Cost Curve for the Buildings Sector in Mongolia* (NIRAS, 2018;2019)
- *CO_2 Emission Reduction Calculation, Standardized Baseline Emission Factor Setting, and MRV in the Building Sector under the Paris Agreement (UNDP, Niras, MCUD; 2019)*
- *Final Report: Financial Scheme for Energy Efficient buildings in Mongolia* (by N. Batbayar; finance expert; 2019)
- GHG Mitigation Excel Tool, 2020 and 2030
- Excel sheet, Cost-benefit analysis of NAMA – 6 technologies

National policy and planning documents; reports, articles

- *Mongolia Second Assessment Report on Climate Change 2014* (MEGDT, 2014)
- *Intended Nationally Determined Contribution (INDC) Submission by Mongolia* (2016)
- *The Report: Mongolia 2015* (Oxford Business Group). Chapters on "Construction and Real Estate" and "Energy"
- *Action Plan, Green Development Policy of Mongolia* (2014)
- *Energy Sector of Mongolia, Sustainable Development Policy,* PowerPoint by Yeren-Ulzii (Ministry of Energy), 2016
- *In-Depth Review of Energy Efficiency Policies and Programmes: Mongolia,* Energy Charter Secretariat, 2012
- *Paving the Way to a Sustainable Heating Sector A Roadmap for Ulaanbaatar Urban Heating,* World Bank/ESMAP
- *Strategies for Development of Green Energy Systems in Mongolia (2013-2035),* GGGI (2015)
- *Financing Household Clean Energy Solutions, Ulaanbaatar, Mongolia,* UNEP – Frankfurt School Centre (2018)
- *Intended Nationally Determined Contribution of Mongolia,* MEGDT (2015)
- *Technology Needs Assessment, Volume 2: Climate Change Mitigation in Mongolia,* MEGDT (2013)
- *Mongolia: Readiness for Climate Finance* (GIZ, 2012)

Project documents and concepts

- GCF, EBRD *GEFF Regional - Mongolia - Khan Bank* (approved 2019)
- GCF, ADB *Ulaanbaatar Green Affordable Housing and Resilient Urban Renewal Project (AHURP),* funding proposal
- GCF, UNEP, *Scaling-up of Implementation of Low-Carbon District Heating Systems in Mongolia,* readiness proposal
- GCF, Xac Bank, *Energy Efficient Consumption Loan Programme,* funding proposal (2018)
- GCF, GGGI, *Green Credit Fund (MGCF),* readiness proposal (2017)
- GIZ, *Thermo-technical rehabilitation of public and apartment buildings in Ulaanbaatar / Mongolia,* project design document (2013)
- NAMA Facility, *Energy Performance Contracting for Residential Retrofitting in Ulaanbaatar City* (GGGI-ICLEI, UB City and Development Bank of Mongolia, Preparation phase (2016)

ANNEX D. QUESTIONNAIRE AND EVALUATION MATRIX

Contents	Model evaluation criteria and/or questions	Indicator(s)	Means and sources of information	Sources of verification
1. Findings: Relevance and design • Relevance and country drivenness • Stakeholder involvement • Assessment of logframe and M&E design	**Relevance:** • Is the project relevant to National priorities and commitment under international conventions? • Relevance of the project's objectives, outcomes and outputs to the different target groups of the interventions. • Has it responded to the real needs and priorities of the targeted aimags? Relevance of the project's objectives, outcomes, and outputs to the different target groups of the interventions. **Design:** • How were lessons of other similar or earlier projects (e.g. UNDP/GEF EE in Buildings, 2009-2015) taken into account in the project design? • Has the project's design (logframe) been adequate to address the problems at hand? Was the project internally coherent in its design (logical linkages between expected results and design (components, choice of partners; scope, use of resources)? Were any (major) amendments to the assumptions or targets been made or planned during the Project's implementation?	**Relevance:** • Extent to which Project supports national energy priorities, policies, and strategies • Coherency and complementarity with other national and donor programmes • Extent to which the GEF climate change focal area is incorporated • Degree to which the project supports aspirations and/or expectations of stakeholders **Design:** • Degree of involvement of government partners and other stakeholders in the Project design process • Number and type of performance measurement indicators (SMART)	• Desk review of project design and technical documents; Documents from GEF; national policies and strategies; • Interviews with project staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff	• Interviews with project partners and stakeholders and analysis thereof • Document and report analysis
2. Findings: Results and effectiveness • Assessment of outcomes and outputs (cf. with baseline indicators) • Effectiveness • Global environmental and other impacts	**Results and effectiveness** • To what extent have the expected outcomes and objectives of the project been achieved? • What outputs and outcomes has the project achieved (both qualitative and quantitative results, comparing the expected and realized end-project value of progress indicators of each outcome/output with the baseline value)? • Were objectives, outcomes and outputs achieved on time? How did the project contribute to GHG emissions reduction within the project implementation cycle and beyond? • Were there any unplanned effects? Which external factors have contributed or hinder the achievement of the expected results?	**Results and effectiveness:** • Level of achievement (as laid out in the logframe) • Achievement of outputs (qualitative, quantitative) and description of activities • Evidence of adaptive management and/or early application of lessons learned	• Desk review of project design and technical documents other relevant docs • Interviews with project staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff	• Interviews with project partners and stakeholders and analysis; • Document and report analysis • Check with publicly available information

Contents	Model evaluation criteria and/or questions	Indicator(s)	Means and sources of information	Sources of verification
	• Has the project produced results (outputs and outcomes) within the expected time frame Is the project proactively taking advantage of new opportunities, adapting its theory of change to respond to changes in the development context? Are there any unaddressed barriers remaining?		• Interviews with project experts (national and international)	
3. Findings: implementation, processes and efficiency • Management and administration; role of UNDP • Monitoring and evaluation systems • Stakeholder engagement and communications • Budget, expenditures, and co-financing; procurement	**Implementation and management** • How efficient are partnership arrangements for the project? • Did the project efficiently utilize local capacity in implementation? • What have been management responses to issues and recommendations indicated in progress reports? • Was the information provided by the M&E system (annual work plans, PIRs, other) was used to improve performance and to adapt to changing needs; Are there any annual work plans? • Whether the risks identified in the project document and progress reports were appropriate and corresponding risk management strategies/systems were adopted and implemented? • Whether or not national stakeholders participated in project management and decision-making have ownership for project outcomes and their further replication and scaling-up? • How efficient was the financial management of the project, including specific reference to the cost-effectiveness of its interventions and co-financing?	**Implementation and management** • Extent to which project partners committed time and resources to the project • Extent of the commitment of partners to take over project activities • Evidence of clear roles and responsibilities for operational and management structure **M&E** • Actual use of the M&E system to change or improve decision-making/adaptive management • Share of M&E in the budget • Quality and quantity of progress reports **Stakeholders and communications** • Extent to which project partners committed time and resources to the project • Extent of the commitment of partners to take over project activities **Financial planning** • Extent to which inputs have been of suitable quality and available when required to allow the Project to achieve the expected results;	• Desk review of project design and technical documents (incl, PIRs; data on budget; other relevant docs; media coverage, official notices, and press releases • Interviews with project staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff • Interviews with project experts (national and international)	• Interviews with project partners and stakeholders and analysis thereof • Document and report analysis

Contents	Model evaluation criteria and/or questions	Indicator(s)	Means and sources of information	Sources of verification
4. Findings: sustainability and impact • Risks and external factors • Replication	**Sustainability** • To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results? How sustainable (or likely to be sustainable) are the outputs and outcomes? Is there an exit strategy that is well planned? Are there any unaddressed barriers remaining? • What could be done to strengthen exit strategies and ensure the sustainability of interventions made? • How do the main stakeholders plan to provide sustainability to the project's results in the future? Is there evidence financial resources are committed to supporting project results after the project has closed? **Impact** • How did the project contribute to GHG emissions reduction within the project implementation cycle and beyond? • To what extent the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.	**Sustainability** • Extent to which risks and assumptions are adequate and are reflected in the project documentation • Extent to which project is likely to be sustainable beyond the project; • Extent to which main stakeholders plan to provide sustainability to the project's results in the future, including the commitment of financial resources	• Desk review of project design and technical documents (incl, PIRs; other relevant docs) • Interviews with project staff management, project partners (incl. former staff), stakeholders (local and national government entities, private sector, universities/NGOs) and UNDP staff	• Interviews with project partners and stakeholders and analysis thereof • Document and report analysis* • Check with international practices and publicly available information
5. Conclusions and recommendations • Conclusions on the attainment of objectives and results • Lessons learned • Recommendations	• Evaluation conclusions related to the project's achievements and shortfalls (comprehensive and balanced statements which highlight the strengths, weaknesses, and results of the project, including a summary of evaluation criteria[49]: ○ Relevance ○ Effectiveness ○ Efficiency ○ Sustainability ○ Impacts • What lessons can be learned from the project regarding efficiency • What recommendations, if any, can be made to follow up or reinforce initial benefits from the project; Proposals for future directions related to the main objectives	• Ratings of evaluation criteria • Lessons that have been learned regarding the achievement of outcomes and efficiency (implementation) • Recommendations for post-project and future actions	• Interviews with project staff and partners • Desk review of project docs and reports as well as external policy and other docs	• Interviews with project partners and stakeholders and analysis thereof • Document and report analysis

[49] Relevance: How does the project relate to the main objectives of the GEF focal area, and to the environment and development priorities at the local, regional and national levels? Effectiveness: To what extent have the expected outcomes and objectives of the project been achieved? Efficiency: Was the project implemented efficiently and cost-effectively, in line with international and national norms and standards? Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results? Impacts: Are there indications that the project has contributed to, or enabled progress toward, reduced environmental or other impacts?

ANNEX E. CONSULTANT CODE OF CONDUCT FORM

Evaluators/reviewers:

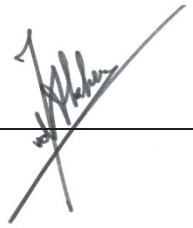
1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well-founded
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence, and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals and must balance evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners, and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study limitations, findings, and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Evaluation/reviewer Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: J.H.A. VAN DEN AKKER (Team Leader)
Name of Consultancy Organization (where relevant): _____
I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Westerhoven, Netherlands
Signature: _____



ANNEX F. ABOUT THE REVIEWERS

Mr. Jan van den Akker is a technology management scientist with a Master's degree from Eindhoven University of Technology (Netherlands), specializing in international development cooperation. He is an expert on sustainable energy policy and technologies. Mr. Van den Akker specializes in studies and analytical work, project design and development, project coordination and implementation, project monitoring and evaluation, knowledge management, capacity strengthening and public-private partnerships in the field of sustainable energy strategies, energy efficiency, energy technologies and supply, climate change and the Clean Development Mechanism. He has lived and worked abroad for over 7 years in Zambia, Mexico, and Thailand. In addition, has undertaken numerous short missions to about 45 countries in Africa, Latin America, and Asia & the Pacific.

In 2003/2004, he founded ASCENDIS, as an independent office, and has been providing consultancy on sustainable energy and climate change, specializing in development issues. ASCENDIS is based in Westerhoven, Netherlands, but offers services in Africa, Asia and the Pacific, Europe and Latin America & the Caribbean, often by associating itself with local freelance experts, professionals, and organizations. As a long-term expert with the United Nations system, Mr. Van den Akker has provided advice to governments and organizations on the design of investment and capacity building programs for UNEP, UNDP and UNIDO (mostly in GEF-funded activities), UNFCCC, European Commission and for NGOs/consultancy companies (e.g., Practical Action Consulting, Winrock, GFA) in the area of renewable energy, energy efficiency, and sustainable transportation.

As an independent consultant, he has reviewed and evaluated about 40 GEF-funded sustainable energy projects and assisted in the design of 42 sustainable energy projects, mostly for UNDP. He worked as UNDP Regional Technical Advisor on climate change mitigation (in Eastern and Southern Africa) during 2007-2009 and as Key Expert in the European Union Technical Assistance Facility for Sustainable Energy for All (2015-16). He also worked as Technical Advisor in the implementation of individual projects in Guatemala, Peru, and Malawi and as a renewable energy expert in the EU project on off-grid electrification in Zambia (2018).

Mr. Jargal Dorjpurev is a Director and Senior Consultant in Energy Environment Research and Consulting company - EEC Co., Ltd . He received his B.S. from Irkutsk Technical University in 1976 and his Ph.D from Leningrad Technical University in 1989.

Originally trained as an electrical engineer and energy economist, the author has been worked as a senior researcher on energy efficiency and energy planning at the Energy Research State Institute for 1976-1996. He has established Energy and Environment research and consulting company EEC in 2000.

His research and consulting have concerned a wide range of energy and environment studies including energy planning strategy, sustainable energy development, climate change, greenhouse gas emissions and its mitigation studies and energy efficiency in different areas of energy supply and consumption. He also has been working as Head of Renewable energy division at the Ministry of Fuel and Energy for 2006-2007.

He is a member of Mongolian Society of Engineers and Mongolia Energy Association.

ANNEX G. AUDIT TRAIL

Annexed in a separate document