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 (higher-level outcomes)*

The TE Team has the opinion that the Project, although a medium-sized GEF project, has managed to contribute to laying a basis for market transformation for energy efficiency in the construction sector:

- Preparing the ground for demonstration of technologies and approaches in a number of pilot buildings (related to Outcome 2)
- Inform policy-making by providing assessment (GHG inventory) and standards methodologies (GHG methodology and GHG monitoring and verification (related to Outcomes 1 and 3). 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;
- Facilitate behavioural change through knowledge enhancement and information dissemination (Outcome 1 and 2)

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

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

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.

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.