“NATIONALLY APPROPRIATE MITIGATION ACTIONS (NAMA) IN THE CONSTRUCTION SECTOR IN MONGOLIA”

PROJECT

ENERGY EFFICIENCY
SUSTAINABLE CITIES
HEALTHY ENVIRONMENT
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 construction sector through three components:

**Component 1:**
Establishment of baseline energy consumption & GHG emission in the construction sector;

**Component 2:**
Development & implementation of NAMA in the construction sector;

**Component 3:**
Measurement, Reporting and Verification (MRV) system for NAMA in the construction sector;

**PROJECT SNAPSHOT:**

- **Project period:** 2017-2020
- **Executing entity:** Government of Mongolia
  - Ministry of Construction and Urban Development
  - United Nations Development Program
- **Implementing partners:** Ministry of the Environment and Tourism,
  - Energy Regulatory Commission,
  - Construction Development Center
- **Project fund:** Global Environment Facility (GEF) - 1,269,863 $,
  - United Nations Development Program - 100,000 $
- **Construction sector:** All buildings in Ulaanbaatar, Darkhan and Erdenet cities that are connected to the central grid system
- **Demonstration sites:** Ulaanbaatar, Jargalan soum in Gobi-Altai and Erdenedalai soum in Dundgobi provinces
- **Beneficiaries:** The main beneficiaries of the project are the public-sector entities including the Ministry of Construction and Urban Development (MCUD), Ministry of Environment, Nature and Tourism (MET), Energy Regulatory Commission (ERC), Construction Development Center (CDC); and private sector entities including the construction companies, building developers, banks and private investors. In addition, 9,824 people will be benefitting from the five demonstration projects that are being financed and implemented by NAMA project, under its Output 2.4.
GLOBAL BENEFITS:
- Direct cumulative emission reduction by EOP: 10,709 tCO₂eq
- Direct emission reduction over project lifetime: 64,219 tCO₂eq

NATIONAL BENEFITS:
- Long term reduction of energy cost to households help lessen household expenditure and improve their financial conditions;
- Reduced energy usage contributes to lower demand from coal fired heat-only boilers and power plants, hence, significantly reducing air pollution. This leads to improvements in health benefits for the entire population;
- Improved living comfort and quality of life of building occupants;
- Reduced GHG emissions thereby reducing the long term risk of climate change;
- Increased demand of EE construction materials/technologies which will support local manufacturers and businesses leading to better employment prospects and eventually improved local economy;
- Improved access to energy efficiency financing in the construction sector leading to EE investments;
- Enhanced capacities and skills of people, specifically women, employed in the construction sector

SUSTAINABLE DEVELOPMENT GOALS

- 7 Affordable and Clean Energy
- 11 Sustainable Cities and Communities
- 13 Climate Action
- 17 Partnerships for the Goals
The energy sector is by far the largest contributor with almost 52% of total GHG emissions in 2012 (MEGD, MARCC-2014). At current rates, Mongolia’s GHG emissions is expected to increase four times the 2006 levels by 2030 and account for approx. 82% of the total to 51.2 Mt CO$_2$-eq.

Construction sector consumed 8,641 GWh of energy that resulted in 4.94 million tCO$_2$eq greenhouse gases in 2015. If this BAU outcome continues, projection shows that GHG emissions in Mongolia construction sector will increase to approximately 5.45 million tones CO$_2$eq in 2020 and 6.66 million tones CO$_2$eq in 2030. This is based on growth of energy consumption in construction sector to meet the expected demands from 9,526 GWh in 2020 and 11,636 GWh in 2030.
With an increase in housing demand from economic growth and a surging rural to urban migration, the construction sector had been thriving reciprocally over the past decade. The projection of housing demand based on the population growth rate indicates approx. 140,000 apartment units will be constructed between 2020 and 2030, which translates to around 14,000 new units annually. As the building stock continues to grow, energy demand simultaneously escalates.

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 and ongoing shift away from less-efficient biomass heating fuels (GGGI, 2015).

What is Nationally Appropriate Mitigation Actions (NAMA)?

NAMA, firstly used in the Bali Action Plan, under the UNFCCC, Dec 2007, refers to a set of policies and actions that countries undertake as part of a commitment to reduce GHG emissions. NAMA recognizes that:

- Different countries, different NAMAs on the basis of equity and in accordance with common but differentiated responsibilities and respective capabilities
- Developing countries will effectively implement national action depends on the effective implementation of the commitments by developed countries in provision of financial resources and transfer of technology
- NAMAs shall be based on MRV framework
Component 1. ACTIVITIES

Design and complete capacity building development programs for decision makers and agencies on data collection and sustainable operation of the GHG inventory systems

Establish and operationalize energy consumption and GHG inventory system for the construction sector with improved data availability and methodology

Define and establish reference baseline on energy consumption and GHG emission for the construction sector

EXPECTED RESULTS AND INDICATORS:

- 10,709 tCO\(_2\)eq cumulative emissions reduced by EOP;
- 18,722 MWh cumulative heat and electrical energy savings by EOP;
- 100% of new buildings fully or beyond in-compliance with BCNS by EOP;
- 50 people gainfully employed on EE in the construction sector;
- Energy consumption and GHG emission inventory system became operational and adopted for the construction sector NAMA by Year 3;
- 6 individual EE interventions that constitute construction sector NAMA by Year 4;

- MRV system for construction sector emissions set up and operational by Year 2;
- 4 public and private sector entities supporting the sustainable operation of GHG inventory system by EOP;
- 3 identified fully capable and qualified private/public entities that are interested in funding prioritized NAMA projects by Year 4;
- 2 institutions adopting and operationalizing MRV systems of the Pilot NAMA, by Year 3;
- 3 construction sector NAMA case studies using the approved MRV framework and incorporated in policy document by EOP;
RESULTS:

1. GHG inventory methodology is developed

GHG inventory methodology is developed with modifications from the CDM methodology AMS-II.E, for estimating emissions from the building sector in Mongolia. 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. Moreover, the modified methodology can be used for the development of the standardized baseline. Furthermore, the methodology will be reviewed by an inter-ministerial science and technological committee of MCUD, MET and MOE and approved by a decree by the minister of urban development and construction to legalize and operationalize its application.

2. GHG inventory web-based system is developed

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 programmes that will be implemented in the construction sector in the future. This will enable the government and the private sector to access to funds from international donor funds on climate change. It will also help to create a public awareness on building energy efficiency.

www.ghgconstruction.gov.mn

3. Training

Training modules targeting decision makers and technical staff on the imperative of data collection, establishment and operation of 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 international consultancy team and supported by the national consultants and the PMU. As a result of the training, participants gained knowledge on essential concepts on inventory, QA/QC concept, data requirements and equations for calculations of emissions from buildings and associated data providers. From a knowledge perspective, the participants have acquired very good understanding on the estimation of emission reductions from implementing the NAMA in the building sector.
Component 2. ACTIVITIES

- Develop framework for evaluating appropriate climate change mitigation interventions; and identify priority climate change mitigation actions
- Complete operational structure for coordination among government agencies and key stakeholders for NAMA
- Complete capacity development of private and public-sector actors on successful development and implementation of NAMAs; and in the supportive identification of financing options
- Develop and implement construction sector pilot NAMA
- Develop financial tools that support the implementation of NAMA in the construction sector

RESULTS:

Methodology and the tool on marginal abatement cost curves (MACC) was developed

Detailed marginal abatement cost curves were developed for the EE technologies identified through the TNA report (MET, 2013). These include high efficiency boiler, improved insulation, triple glazed windows, improved ventilation with heat recovery system, solar panel and efficient lighting. With some limitations, preliminary findings from the MACC model shows that efficient lighting and ventilation systems are the most economically viable technologies, however their emission reduction potential was not significant to compare with the improved insulation measures.
Energy Efficient Demonstration projects
The project executive board approved on May 30th, 2018 the list of 5 prioritized NAMA in the construction sector to be supported and implemented by the project as energy efficient demonstration projects. The selected demonstration projects are:

1. School building retrofit in Gobi-Altai province, Jargalan soum. EE measures are roof renovation and indoor heating system renovation;

2. Construction Development Center laboratory building retrofit. EE measure is outer wall insulation;

3. Soum central heating system renovation in Dundgobi province, Erdenedalai soum. EE measures are high efficiency boiler, insulation of heating pipeline, installation of the water softener equipment, heat meters, pump and its frequency convertor controlling systems;

4. MUST new laboratory building. EE measures are triple glazed windows, installation of mechanical ventilation system with heat recovery, solar panel, collector system with automated and adjusted valve, heat meter and automate to the heating substation;

5. ERC new office building. EE measures are solar panel module with smart system, triple glazed window with Low-E on the glass facade and shading systems.

Training modules on the MACC tool and EE financing schemes were developed
The capacity building trainings were organized on 20-22 March 2018 and 16 August 2018. The training has 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. Furthermore, it has helped the participants to brainstorm the perspectives on how to make investment in energy efficiency in buildings a priority and how to (1) develop projects in this sector and (2) make them bankable.
Energy Efficiency Demonstration project №1

- **Project title:** School Building Retrofit in Gobi-Altai province, Jargalan soum
- **Project host:** School of Jargalan soum, in Gobi-Altai province
- **Implementation period:** August 2018
- **Project funding amount:** 160 million MNT
- **Energy Efficiency measures:** Rooftop insulation and indoor heating system renovation
- **No of Beneficiaries:** 153 pupils, 36 teachers and staff, total 189 people

**Results:**

- **Coal saved:** 34.1 ton/year
- **Saved energy:** 160.8 MWt/year
- **Reduced GHG emissions:** 58.3 ton CO₂-eq/year
- **Reduced heat loss:** 81%
- **Cost effectiveness:** 6.1 million MNT/year

**Economic and Social Benefits:**

- Lifetime of building increased by 10 years.
- Working and studying condition for pupils and teachers were improved significantly.
- Potential impact on reduction of air pollution.
Define key indicators (GHG and non-GHG) to be monitored for the selected mitigation actions

Develop and implement accurate MRV system for the construction sector NAMA

Design and complete capacity development in the implementation and institutionalization of the MRV system

RESULTS:

Key GHG and non-GHG parameters and indicators were identified and agreed on five required indicators for construction sector NAMAs as:

1. GHG emission reduction in buildings (tCO₂ eq/year);
2. Specific CO₂ emissions for the whole building (tCO₂/m²/year);
3. Primary energy use (kWh/m²/year);
4. Indoor environment quality (CO level, Indoor air temperature, humidity, installed ventilation system);
5. Gender and children (number of children, females and males).

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 PMU. The training helped the participants to gain knowledge on essential concepts on MRV system and offered a platform for discussion on the institutionalisation of inter-institutional cooperation to enable monitoring and reporting in the building sector. Participants were able to identify relevant institutions/ministries for sourcing the data and reporting on the results of the NAMA.
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