Global Gateway

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IMPACT SHEET: BUILDING Energy Efficiency in Nepal (BEEN)

Transforming Nepal's Building Sector towards a Low-Carbon and Climate-Responsive Pathway

BEEN Advancing Building Energy Efficiency Agenda in Nepal

3 GOOD HEALTH AND WELL-BEING
5 GENDER EQUALITY
7 AFFORDABLE AND CLEAN ENERGY
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION

PROJECT BACKGROUND

Nepal is among the fastest-urbanizing countries, with around 100,000 homes built every year. However, most buildings are designed without considering local climate, leading to occupant discomfort, high energy use and a large carbon footprint from high-embodied building materials. While structural safety has improved due to earthquake concerns, climate-responsive design, energy efficiency, and standards for energy-efficient construction and retrofitting remain largely neglected. To address this gap, the BEEN project, funded by the European Union under the SWITCH-Asia Programme and led by the University of Innsbruck, Austria, in partnership with MinErgy Pvt. Ltd., Nepal, Greentech Knowledge Solutions Pvt. Ltd., India, and The Spanish Association for Standardization, Spain, was implemented in 60 municipalities across four bio-climatic zones of the Bagmati, Lumbini, and Gandaki provinces.

CHALLENGE

Energy consumption for thermal comfort in Nepal's building sector has been rising rapidly, primarily due to buildings being designed without consideration of the local climate, resulting in uncomfortable indoor living conditions. The lack of technical expertise among building designers, service providers, and building material producers combined with limited public awareness of the benefits of energy-efficient buildings among general public is hindering the adoption of energy efficiency in building sector. In addition, absence of supportive policies mechanism and availability of financial incentives is further fueling the growth of energy inefficiency and carbon intensity in Nepal's building sector.

PROJECT OBJECTIVES

To promote the adoption of energy-efficient (EE) design and construction practices, including the integration of renewable energy (RE) in Nepalese building sector, thereby supporting the growth of a low-carbon and resource-efficient building sector for climate change mitigation and adaptation.

The specific objectives include:

- Build capacities of supply chain actors across the building sector through trainings, and technical support.
- Raise awareness of Building-MSMEs and end users, and strengthen market systems for promotion of RE and EE in buildings.
- Work with government bodies to develop policies, regulations, and standards for energy-efficient buildings.
- Partner with financial institutions to develop instruments/ loan packages promoting EE and RE-integration in buildings.

TARGET GROUPS

- Design MSMEs (Architects, Engineers)
- Construction MSMEs (Builders, Real estate companies, Contractors, Petty contractors, Masons)
- Material producers (Hollow brick and Block Producers)
- Service providers (HVAC, RE, Door and Window, Insulation)
- Federal government agencies
- 60 partner municipalities of Bagmati, Gandaki, and Lumbini Provinces
- Commercial Banks
- MSME Associations
- House owners and general public

PROJECT ACTIVITIES

Capacity Building

Increase capacities of Building MSMEs to adapt or transform their services and product offerings for energy efficient building.

- Develop passive design guidelines, manuals, tools and training programs
- Capacitate MSMEs throughout the value chain of building sector to offer EE services and/or products
- Collaborate with MSME associations to develop master trainers and carry out training activities

Marketing and Awareness

Increase awareness of end-users on EE design and construction services or products through promotional and marketing efforts.

- Support building MSMEs to develop and execute innovative marketing strategies for business growth
- Support design, construction, retrofitting and performance monitoring of showcase buildings for establishing proof of concept.
- Reach end users through innovative marketing strategies to promote EE and RE in buildings.

Financial Instruments

Increase availability of financing to home owners and building MSMEs to overcome investment gaps to adopt EE and RE in buildings.

- Collaborate with commercial banks to develop subsidized green financial instruments.
- Develop capacity of banks to assess and roll out green financial instruments.
- Connect home owners and building MSMEs with commercial banks to access green financial instruments.

Policy Instruments

Increase capacity of local, and federal government institutes to devise and implement policies/ standards to promote EE in buildings.

- Develop evidence-based policies and guidelines
- Support targeted municipalities to adopt EE and RE policies (by laws or standard operating procedures)
- Support federal government agencies to draft and adopt policies or guidelines

LESSONS LEARNED

EE in buildings was not a national priority at the initial phase of the project. There were no guiding policies at the federal level to promote EE and RE in buildings which hindered the adoption of EE related policies at the municipal level. In those circumstances, rather than replicating policies from other countries, the project focused on developing context-specific, evidence-based policies tailored to local climatic conditions. This approach helped build confidence among municipalities and facilitated faster adoption of EE policies.

The project was initially designed to intervene in 60 municipalities across three provinces, grouping geographically close municipalities into clusters for efficient implementation. However, following a request from the national government to include at least one municipality from every district within those provinces, the project's coverage became more geographically dispersed, placing additional pressure on financial and human resources. To address this challenge, the project introduced the concept of a Municipal Focal Person (MFP), a dedicated consultant based in one partner municipality and responsible for supporting three to four nearby partner municipalities. Architects or engineers with prior experience in building construction and existing professional links with the assigned municipalities were selected as MFPs. This approach significantly reduced travel and operational costs, while also strengthening institutional relationships that would otherwise would have been difficult.

A systemic approach that simultaneously addresses all four components of market development - capacity building, marketing & awareness raising, financial mechanism and policy instruments, is inherently challenging to implement. However, these components are mutually reinforcing and when implemented together, significantly accelerate the adoption of the project objectives. Well-studied, evidence-based, and contextualized policy solutions that align with the local needs and existing municipal frameworks are more readily accepted and adopted. Leveraging digital platforms proved to be an effective approach for reaching a large target audience at both national and global levels.

PROJECT ACHIEVEMENT

The project successfully achieved most of its targeted outcome indicators while all output indicators were met, with several indicators exceeding their target, making substantial progress in institutionalizing energy-efficient and renewable energy practices within the Nepalese building sector.

- 298 EE buildings built, exceeding the target of 200.
- On an average 40% energy savings achieved, exceeding 25% reduction target.
- 40 municipalities approved EE building policies, exceeding 30 initial targets.
- 3 national policies developed incorporating EE building agenda.
- 948 MSMEs trained, more than double the target, on EE building design and services.
- More than 2 million end users reached through awareness activities.
- 2 banks are offering incentivized loan package for EE buildings.

Daniel Neyer
University of Innsbruck

"We did not copy-paste solutions from Europe or India, rather we supported Nepal to transfer the methodology and know-how in a way that local stakeholders can develop their own tools and policies suited to the country's context. It is the conclusion of a four-year journey, but it is also the beginning of continued efforts toward mainstreaming energy efficiency in Nepal's building sector. We have demonstrated how transformation can happen but blind copy-paste may lead to the dissemination of wrong practices during this transition phase, which could risk the achievements made so far.

Bina Kumari Bhattarai
Deputy Mayor, Thakurbaba Municipality

Municipalities like ours experience summer temperatures above 40° C. The situation has worsened with frequent heat waves in recent years. This disproportionately affects poor and marginalized families. Hence, energy efficiency is essential to improve thermal safety and create a healthier living environment. Together with BEEN, we have demonstrated in our social housing project that energy-efficiency can reduce indoor temperatures by 9–10°C. We have already scaled this learning to 10 schools, and next year we plan to scale up to an additional 100 houses for poor and vulnerable families."

Long-term sustainability

Integration of policies at the national and municipal levels ensures institutional ownership and necessary legal framework for its continuity beyond the project period. Training programs have been implemented in collaboration with MSMEs' associations, embedding knowhow within these associations and ensuring availability of expertise within the country. These trained actors will continue to apply and disseminate EE practices within their respective sectors, creating a self-sustaining ecosystem of skilled service providers and manufacturers. In addition, the digital marketing platform (mobile application named BEEN-Connect developed under the project will remain operational after project completion, supporting ongoing promotion, market linkage, and access to EE products and services for both suppliers and consumers.

Financial mechanisms established during the project further strengthen sustainability. Two of Nepal's largest commercial banks have approved and launched subsidized loan packages that will continue beyond the project period. The availability of these concessional loans will encourage homeowners to adopt energy-efficient practices, thereby ensuring the continued construction of EE buildings.

Project contributions to Climate Change Mitigation and SDGs

The project contributed to climate change mitigation by reducing energy demand in the building sector through the promotion of energy-efficient design, construction practices, and technologies. These interventions were calculated to reduce operational energy demand by 40 percent on an average, thereby contributing in lowering greenhouse gas emissions. In addition, the project also supported the production and use of low carbon and resource efficient building materials as alternative to conventional fired bricks. Production of alternative materials such as hollow fired bricks, hollow concrete blocks and compressed stabilized earth blocks consumed lower amount of coal compared to fired bricks resulting in reduced CO_2 emission.

BEEN project promoted the production and consumption of resource and energy efficient construction materials thereby contributing directly in realization of SDG 12. Further, the project has capacitated 900+ building MSMEs and reached over 2 million people via digital and non-digital platform to encourage the adoption of EE practices or materials and influence behavioral change, thus supporting sustainable consumption pattern during building construction and operation.

Beyond its core focus on SDG 12 – Responsible Consumption and Production, the project generated significant environmental and socio-economic co-benefits, contributing to several other Sustainable Development Goals. By reducing building energy demand by approximately 40 percent, the project lowered household operational energy costs. In parallel, the integration of renewable energy technologies in building design improved access to clean and reliable energy solutions. Together, these efforts directly contributed to SDG 7 – Affordable and Clean Energy. The promotion of EE and RE measures also improved indoor thermal comfort, creating healthier and more livable spaces. Enhanced thermal comfort further strengthened the adaptive capacity of building occupants against climate-induced stresses such as heatwaves and cold waves, directly supporting SDG 3 – Good Health and Well-Being and SDG 13 – Climate Action.

The project promoted inclusive participation by ensuring the engagement of women at multiple levels, from decision-making roles to active involvement in capacity-building programs. This approach advanced SDG 5 – Gender Equality. Poor and marginalized households are disproportionately affected by climate impacts and often lack the financial means to invest in appliances for thermal comfort. By demonstrating EE measures in affordable housing, the project enabled these households to achieve improved comfort with lower energy consumption and reduced utility costs, thereby contributing to SDG 10 – Reduced Inequalities. Furthermore, by encouraging the adoption of low-carbon technologies and resource-efficient manufacturing processes, the project stimulated industrial innovation and supported sustainable infrastructure development, advancing SDG 9 – Industry, Innovation and Infrastructure.

Impacts at a Glance

Economic Impact	• Estimated Rs 2.16 billion (Euro 13.1 million) investment leveraged • 298 additional energy-efficient buildings designed/built during project period • 57% of 961 trained MSMEs providing EE services and products
Environmental Impact	• 7% water, 14% clay, 25% coal usage reduction through introduction of hollow and perforated bricks that consumes less water, clay and coal while reducing air pollution and GHG emissions • Promotion of low embodied carbon materials (hollow concrete blocks, sheep wool) • Promotion of climate-responsive design approach that reduce operational energy demands
Social Impact	• MSMEs introduced to the concept and measures of thermal safety to reduce health risk occurred due to heat and cold stress. The thermal risks and impact of inappropriate building designs on health and productivity on different demographics (age-wise, income status, physical abilities) have been incorporated in the knowledge product that has been and will be used in training and guideline for MSMEs and Municipality Engineers. • 16% women and 57 % youth (aged 16 to 39 Years) are trained among the MSMEs.
Climate Benefits	• 1,481 tonnes of CO_2 emissions reduced by MSMEs during project period through production of resource-efficient walling materials as alternative to solid fired bricks • 40% of energy reduction for space conditioning • Introduction of climate-responsive building design approach to MSMEs • Training, awareness, business promotion through market matchmaking and linkage to finance
Green Finance	• About 1.7 Million Euro for Preferential Green Home Loan channeled to the end users through 2 commercial banks • 46 building owners benefitted from better access to finance
Target Group Engagement	• 961 MSMEs trained • 27 outreach events including exposure trips, training, engagement of government in project decision-making process, engagement of business associations in execution of project activities - training and awareness • Stakeholders engaged include business associations, media, federal and local governments, financial institutions, development partners, NGOs
Policy Development	• 44 new policies, regulations or standards defined based on recommendation from project: 40 by-laws and Standard Operating Procedures at municipal and provincial level, 3 Norms and Specifications, National Building Guideline, Target setting in Nationally Determined Contributions 3.0 at National level

FUNDING

EUR 2,714,915
(EU Contribution: 90%)

DURATION

Mar 2022 - Feb 2026

PARTNERS

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MinErgy Pvt Ltd (Nepal)

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