

## LESSONS IN ENERGY EFFICIENCY IN BUILDINGS

The building sector is a significant energy consumer and, consequently, a high emitter of greenhouse gases. Energy efficiency measures are a critical first step towards decarbonising the building sector. Energy efficiency cost-effectively delivers critical services such as cooling, lighting, and cleaner air to building occupants while helping achieve climate change mitigation and adaptation targets. UNEP and the GEF have implemented various programmes and projects in the last decades to assist countries in decarbonising the building sector.

The Evaluation Office of UNEP selected a sample of recent terminal evaluations of projects related to energy efficiency in buildings to assess and consolidate insights on best practices and lessons learned. The six selected projects were implemented between 2011 and 2021. Three were global-level interventions, two were regional-level projects, and one was a country-focused intervention. This brief aims to support UNEP in its design and implementation of similar future projects.

Project ID	Project Title	Dates
GEF 9947	The SE4ALL Building Efficiency Accelerator: Expanding Local Action and Driving National Change (BEA II)	2018-20
GEF 9320	Increasing Investments in District Energy Systems in Cities: A SE4All Energy Efficiency Accelerator (DES)	2017-21
GEF 9329	Scaling up the Sustainable Energy for All Building Efficiency Accelerator (BEA I)	2016-17
GEF 4171	Energy for Sustainable Development in Caribbean Buildings	2013-20
GEF 4167	LGGE Promoting Energy Efficiency and Renewable Energy in Buildings in Jamaica	2013-20
GEF 3788	Promoting Energy Efficiency in Buildings in East Africa	2011-17



Net-Zero Energy Building, University of the West Indies, Mona, Jamaica.  
Source: UNEP, 2017.

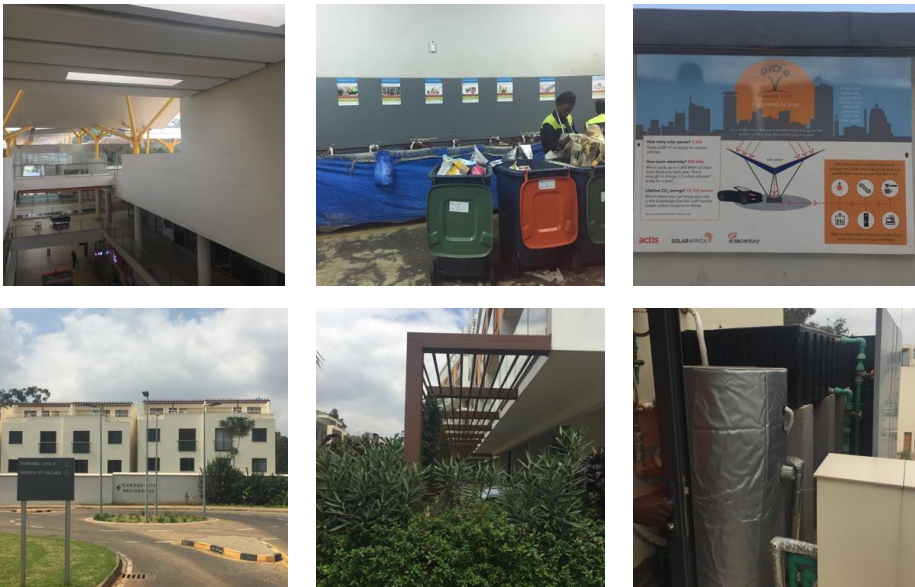
### KEY PROJECT ACHIEVEMENTS

- Commitment from more than 50 cities (and some states) to building energy efficiency actions, including through the adoption of policies, regulations, and building codes. (BEA I and BEA II projects)
- Implementation of energy efficiency demonstration projects, primarily building retrofits and new constructions, including the building of the first Zero Net Energy Building in a tropical environment. (Jamaica project)
- Increased awareness about, and capacity of, the energy efficiency sector, including through the adoption of financial and market-based mechanisms and legal frameworks to support energy efficiency actions across many regions. (Caribbean and East Africa projects)

For more information on each of the projects, see the “Portfolio Study of UNEP’s Recent Work on GEF-Funded Energy Efficiency in Buildings”. The full portfolio study was conducted by an external evaluator under the guidance of the Evaluation Office of UNEP.

## HOW WERE RESULTS ACHIEVED?

**Effective knowledge management systems** were crucial to enhancing building energy efficiency project performance, according to most project evaluations. These systems helped projects successfully disseminate tools and resources and allow replication of project actions across cities, leading to higher likelihoods of sustainability. The BEA I and BEA II projects were successful largely because the projects were able to share a multitude of materials on platforms such as websites, databases, and brochures. In both projects, this facilitated quality engagement of partners and contributed to attaining significant project success, including helping cities exceed planned targets. In the Jamaica project, an effective knowledge management platform facilitated sharing resources for policy, planning, and developmental activities. For best results, knowledge management platforms should be easily accessible to all relevant project stakeholders during, and especially beyond, the implementation of the project.



Photos from the East Africa evaluation (GEF ID 3788), from left to right: 1) Garden City Mall, Nairobi: Natural ventilation and lighting; 2) Garden City Mall: Recycling area; 3) Garden City Mall: Solar PV installation; 4) Garden City Village, Nairobi; 5) Sun shading 6) Solar water heater tank (collector plate on roof) with insulated pipes.

**Active public sector participation** was also found to be crucial for the successful implementation of many projects. Public sector institutions such as city and state planning departments played a critical role in facilitating the construction of energy distribution networks in the District Energy Systems (DES) project. Political interest and government support were also major factors contributing to the success of the BEA I and II projects. For instance, the BEA I project was able to leverage the support of 30 cities, resulting in 24 building efficiency policies, along with the commitment of 26 civil society organizations, 10 private businesses, and 4 international bodies to building efficiency actions. The BEA II project found that the strong performance of various cities was largely driven by local and national government support. The East Africa project also saw an increase in voluntary activity at the local government level in Kenya and Tanzania to accelerate the deployment of building efficiency technologies.

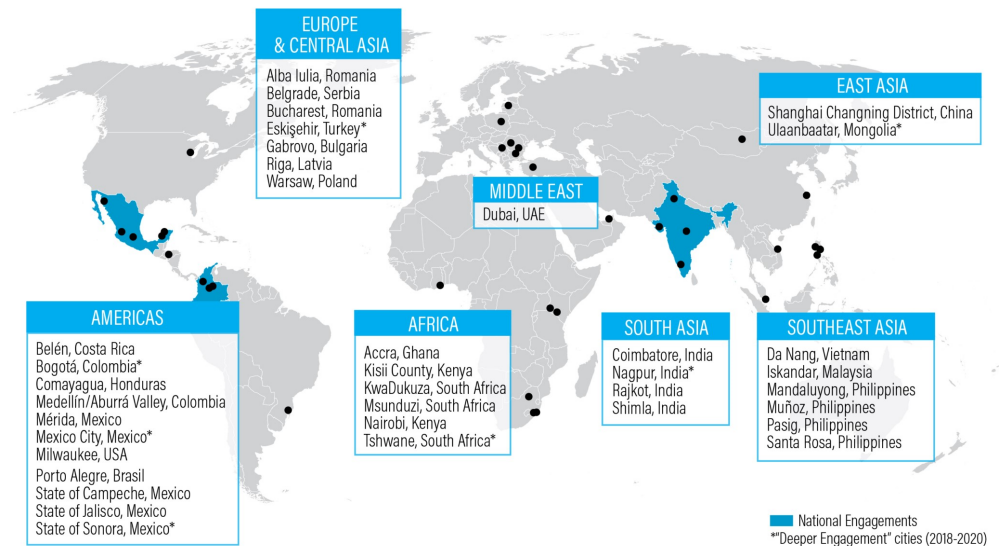
**Active private sector participation**, especially from banks and financial institutions, was critical for the success of projects that required significant financing, such as the construction of modern District Energy Systems (DES) or retrofitting of buildings. Private sector partners can also provide much-needed financial resources for developing, operating, and maintaining energy efficient systems. Private sector participation was a key factor contributing to the success of the DES project, particularly in countries such as Serbia and Chile. The Caribbean project emphasized the need for future energy efficiency initiatives to focus on development banks for financing. For best results, private sector engagement should transcend beyond global actors to leverage local private sectors and foster a sense of local ownership.

**An integrated approach to building efficiency actions** was found valuable to the success of project performance. This included integrating energy efficiency actions in buildings with other climate policies or infrastructure development programmes of cities or national governments. This integration process requires creating appropriate synergies with other sectors, such as wastewater management and renewable energy technology adoption. By adopting an integrated approach to project scoping, it is possible to maximize resource efficiency and leverage existing relationships from ongoing city and national government efforts.

**Cities clearly defining policy and project priorities** was found to be an important element in successfully achieving energy efficiency actions. In the BEA I project evaluation, cities with clear definitions of priorities in policy and demonstration projects were more likely to successfully achieve outcomes. The evaluation found that centralized financial resources, such as GEF funding allocations, were not enough to influence policies and support projects. Although cities can use local funds when grant funding is not sufficient, they often face significant barriers in finding sustainable finance approaches to address project pipelines adequately. Clear city policy and project priorities made it easier to bring on board different stakeholders who could contribute in cash or in-kind to implement these priorities. For best results, cities should identify realistic policies and feasible demonstration projects before implementation.

### WHICH AREAS COULD BE IMPROVED TO BETTER ACHIEVE RESULTS?

**Clearly determining projects' emission reduction contributions.** This was a fundamental objective of the projects. However, it was difficult to track and estimate actual greenhouse gas (GHG) emissions savings resulting from the projects' activities. This was due to a lack of capacity and the relatively short duration of the projects. Monitoring and verifying energy savings and emission reductions accurately can be challenging especially when doing so after the fact without having a baseline for comparison. Officials involved in the BEA I and II projects, and the DES project had underdeveloped capacity for effectively conducting impact monitoring using monitoring, reporting, and verification (MRV) frameworks. This was due to weak local capacities and poor localisation of assessment methodologies in cities. In the East Africa project, several data collection tools and instruments for tracking indicators, including emissions, were not implemented. This made it difficult for the project to quantify the impact of activities under some project components. Without accurate data on emissions reductions, it becomes challenging to assess the impact and effectiveness of energy efficiency interventions in buildings, and make informed decisions for future projects.



Locations of Building Efficiency Accelerator (BEA) Phase 1 project cities. Source: BEA.

**Improving monitoring plans and capacity to track key indicators.** The evaluations revealed that this was a challenge for all the projects. The M&E plan for the Jamaica project was poorly designed, and several data collection tools and instruments for tracking various indicators were not implemented in the East Africa project. The evaluation for the Caribbean project found no formalized support for monitoring energy consumption post-installation of demonstration buildings, resulting in a failure to establish an assessment and monitoring system for energy efficiency in buildings. In the BEA I, BEA II, and DES projects, officials' ability to effectively conduct impact monitoring using Monitoring, Reporting, and Verification (MRV) frameworks was observed to be the most under-developed capacity. Effective M&E frameworks and strong local capacities are necessary to track project impacts and report progress in energy efficiency actions.

## Improving gender inclusivity and responsiveness to the needs of vulnerable groups.

Despite gender empowerment being a critical dimension of sustainable development, the evaluations found it difficult to substantiate the gender-disaggregated impacts of the various interventions. Most projects did not disaggregate performance by gender, or disaggregation was limited. None of the projects had targets for gender inclusivity, and even when the projects tried to collect gender diversified data, there was no basis for evaluating the effectiveness of gender action and strategies proposed at design. For some projects, information on gender participation and the involvement of indigenous and local people were limited or nonexistent. Ensuring the participation and inclusion of women and marginalized people is a critical dimension of sustainable development, including building efficiency projects.

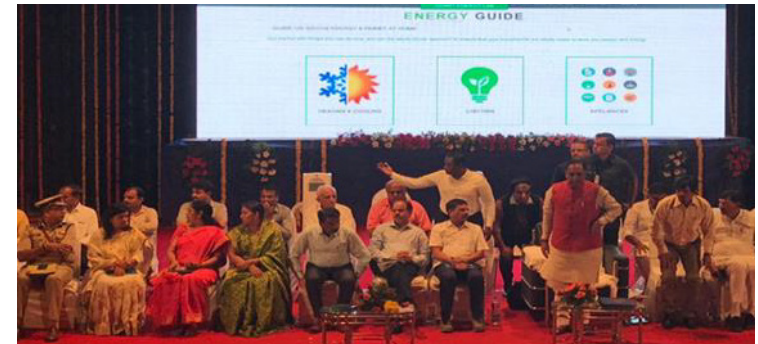
## OPPORTUNITIES FOR UNEP TO CHAMPION

Given the strengths demonstrated by the evaluated energy efficiency in buildings projects, UNEP is well-positioned to champion several critical issues in this area. Leveraging its global influence, expertise, and networks, UNEP can advocate for the widespread adoption of energy efficiency initiatives in buildings at both local and international levels.

- UNEP can lead efforts to promote stronger stakeholder engagement and facilitate the formation of public-private partnerships to accelerate the deployment of energy-efficient technologies and practices worldwide.
- UNEP can advocate for the development and implementation of comprehensive monitoring frameworks to systematically track and assess the effectiveness of energy efficiency interventions, thereby enabling evidence-based decision-making and policy formulation.
- By promoting the identification of cities' policy and project priorities and advocating for sustainable financing mechanisms, UNEP can play a pivotal role in driving the scaling up of energy efficiency actions in buildings.

## GUIDANCE FOR FUTURE INTERVENTIONS

- UNEP should ensure that projects measure, quantify, and monitor progress in reducing emissions from the building sector across cities. Project teams could consider creating synergies with existing frameworks and tools in each country to track emission reductions from the various investments in building efficiency. Where local capacities are limited, projects should employ strategies to outsource this activity to global or regional experts or leverage scientific and building sector research to develop simple tracking tools and methods.
- UNEP should enhance gender sensitivity and responsiveness to the needs of vulnerable people in building energy efficiency projects. Future projects should have clear gender and social justice plans that include indicators and methods to measure progress towards targets. Gender actions should include strategies to encourage the participation of women in project actions and leadership and ensure that female heads of households are an active part of local action. Building efficiency actions should be examined and designed to ensure that they are sensitive to the needs of marginalised and vulnerable groups. These plans and strategies should be proposed at project design and thoroughly inspected before project approval.



Stakeholders participate in the launch of a SMART Energy Lab Website in Rajkot, September 2017  
Source: UNEP, 2018

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