Municipal Corporation Shimla, India

Urban Low Emission Development: The adaptation and mitigation nexus

Shimla is participating in the Urban-LEDS project to reduce its vulnerability to both potential climate impacts and health risks currently faced by its inhabitants. Building staff capacity and exploring integrated planning across the different departments of the Municipal Corporation Shimla (MCS) will help to identify pathways for low emission development in sectors such as water supply and sanitation, transport, tourism, and waste management.

176 ICLEI Case Studies April 2015

Summary

The hillside town of Shimla in Northern India is highly vulnerable to the threats posed by potential climate change scenarios and the pressures of rapid urbanization. It is building resilience to these threats by becoming one of the first cities in India to undertake work which integrates climate adaptation priorities with urban low emission development. This is supported through the Urban-LEDS project ("Promoting Low Emission Urban Development Strategies in emerging economy countries"), which is funded by the European Commission and jointly implemented by ICLEI and UN-Habitat. As part of this project, Municipal Corporation Shimla (MCS) is building the capacity of municipal staff to work across departments and plan for the city's development by incorporating a low emissions development approach, while also incorporating the climate change adaptation priorities identified by the Municipal Corporation. This process will help Shimla to target its capacities towards identified priority areas, and subsequently become a more energy-efficient and resilient city.

Low emission development as an effective strategy for climate resilience approach in Shimla

The continued growth of Shimla's population is placing excessive demands on urban services and infrastructure. An assessment of Shimla's vulnerability to climate change scenarios indicated that its urban systems are already under strain; in particular, water, transport, and tourism related services are likely to be impacted by the effects of climate change. In addition, local officials also recognize the importance of low emission solid waste management to maintaining the health and wellbeing of citizens and visitors alike. Effective expansion or improvement of these urban systems to meet the demands of an increasing population requires municipal staff to understand both future climatic impacts (projections), as well as how to plan cross-sectorally for integrated, low emission development. As noted by Deputy Mayor Mr. Tikender Singh Panwar, integrated urban planning presents a new challenge for Shimla city planners, requiring new planning approaches and improved capacity.

The Urban-LEDS project provides a pathway to merge Shimla's climate resilience journey into its development process. In Shimla, the project aims to improve the capacities of staff to explore the benefits of a mitigation and adaptation nexus by mainstreaming climate change considerations into their development planning.

Facts & Figures

Population / Land area
170,000 / 20.00 km² (2011)

Municipal budget
$9.20 million (2014)

Greenhouse gas inventory
2008-2009

Total GHG emissions (CO_2e/year)
295,000 (2008-09)

Energy consumption per inhabitant
2.06 MWh per person (2008-2009)

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Shimla has been a member of ICLEI since 2005, and is one of the eight Indian cities participating in the Urban-LEDS project.

Shimla in context

Shimla is the capital of Himachal Pradesh, perched in the South-Western ranges of the Himalayas of Northern India. It is built over several hills and connecting ridges, occupying an area of approximately 20km^2. Formerly the British "summer capital" of India, today it constitutes one of the most popular tourist destinations in the state for Indian and international travelers alike. In addition to tourism, Shimla boasts a strong services-oriented local economy and is home to various state and district-level governmental bodies.

The city's popularity has led to a rapid increase in population; far greater than the city's infrastructure can bear. According to the 2011 census, the Municipality of Shimla has a population of 169,760 and has experienced a growth rate of approximately 20.5 percent over the last decade. Additionally, large influxes of tourists during the holiday seasons significantly increase the demand for services infrastructure and heavily influence the built urban environment.

Several geographic factors influence Shimla's climate risk profile. The Shimla district (within which MCS is situated) is the catchment area for three rivers, including that of the Sutlej River, which is located only 21 km from Shimla city. To supply local demand, Shimla's water supply is pumped to the city at a significant and increasing cost to the Municipal Corporation. Yet in recent years, in spite of increased heavy rains and the associated risk of landslides, mountainside development has continued.

To safeguard the health of its citizens and maintain its status as a desirable tourist destination, development in Shimla needs to be sensitive to the environmental limitations of the area. This sensitivity requires new knowledge, skills and expertise for municipal staff. A comprehensive urban low emission development strategy can help achieve this locally sensitive development while strengthening internal capacity.

City profile indicators from "at a glance"	
Solid waste generation per inhab. (kg/hab/year)	**0.43 kg per capita per day (2008-09)**
Water consumption per inhab. (m³/hab/year/)	**135 L per day** (Source: Centre for Science and Environment, 2010)
% of pop. served by sewerage system	**90% of the municipal area is served by the sewerage system, which services 80% of the population**
Public transportation modes available	**Bus,** **Regional rail to-and-from the city center,** **Lift for vertical transport between Circular Road and Mall Road**
Modal split (ref. year)	**Percentage of trips made by *local residents*, 2011:** **Walking: 42%** **Bus: 49%** **Private vehicles: 9%** (Source: Urban Mass Transit Company Ltd., 2012)
Commitments	
Mexico City Pact signed? (Y/N; date signed)	**No**
Durban Adaptation Charter signed? (Y/N; date signed)	**Yes; June 1, 2013**
Other Climate Change political commitments (Y/N; date signed)	**Yes; Earth Hour City Challenge (2013-2014 candidate, 2014-2015 contestant)**
Carbonn Cities Climate Registry reporting city?	**Yes**

All figures courtesy of the Shimla Solar City Master Plan, unless otherwise noted.

History of policies and work to date

Supportive frameworks from national and state level government

The Government of India (GOI) continues to support local governments with policies that focus on energy efficiency and renewable energy initiatives. This can be observed through the GOI's enacted legislation to improve energy conservation in the country, as well as the National Action Plan on Climate Change (NAPCC). The NAPCC, released in 2008, outlines eight core "national missions" to address climate mitigation and adaptation through a range of policies and programs. Additionally, the Energy Conservation Act (2001) and the Energy Conservation Amendment Act (2010) detail numerous measures to address energy efficiency and renewable energy implementation across the country.

In parallel, the Jawaharlal Nehru National Urban Renewal Mission (JnNURM), launched by the Government of India in 2005, provides resources and support to over 60 cities through an extensive urban modernization scheme. Shimla is one of the cities that has benefitted from support under this scheme.

At the state level, Himachal Pradesh has recently released a comprehensive State Strategy and Action Plan on Climate Change (SAPCC). This plan was prepared to be inline with the spirit of the NAPCC and has been endorsed by the National Steering Committee on Climate Change. Himachal Pradesh is also the only state in India to have an Environment Master Plan.

Combined, these state plans and national level missions and legislation are positively impacting Shimla's development and encouraging resource efficiency across the areas of sanitation and waste, water, transport, housing, and energy management.

Figure 1: Rooftop rainwater tanks

Photo: Helen Scott

Solid waste management: In the area of solid waste management, Shimla is undertaking a JnNURM project to implement a sanitary solid waste landfill site which meets the demands of its increasing population. Additionally, the City established a comprehensive "door-to-door" household waste collection service, wherein collected waste is segregated into recyclables, organic, and residual waste. The waste reduction efforts are supported by a community education project that promotes Shimla as a zero waste zone ("0Wzone"). This project falls within the parameters of the EU sponsored SUNYA – Towards Zero Waste in South Asia Project, which is being implemented by ICLEI South Asia and other regional partners. Shimla is one of two pilot cities in India chosen for the SUNYA project.

Water and wastewater: A variety of projects are planned in the water and wastewater sectors, including decentralized wastewater treatment for areas in Shimla that are lacking sewage infrastructure. To guide this work, a City Sanitation Plan was developed with the assistance of the German Development Cooperation (GIZ).

Currently, Shimla uses energy to pump fresh water up the mountainside to the city center to meet the local demand for water. The cost of delivering water is far greater than the price at which the MCS sells the water, and this is proving to be an economic burden for the City. To ease the pressure on Shimla's water infrastructure, the City has enacted a mandate requiring all new buildings to incorporate rainwater collection by placing cisterns or catchment tanks on rooftops (as depicted in Figure 1, previous page).

Transportation: To ease transportation challenges such as congestion, Shimla, together with a private consulting firm, recently developed a City Mobility Plan that has yet to be approved by relevant state government authorities. The plan includes initiatives such as Bus Rapid Transit (BRT), defined walking and cycling paths, and a system of trolley cars and escalators which help to move people more efficiently around the hillside town.

Energy efficiency and renewable sources: The City has prepared a Solar City Master Plan to implement a range of renewable energy and energy efficiency (demand-side) measures. Initiatives outlined in the Plan include the installation of 1000 LED street lights, solar street lights and mandatory solar water heaters for new development projects. Additionally, 5,000 solar panels are planned for installation on Shimla homes, with a significant subsidy provided by the Government of India.

Table 1: Detailed current status of city (for relevant sectors)

Energy and GHG emission profile	
Energy consumption per inhabitant (MJ/hab/year)	**2.06 MWh per person (2008-2009)***
Total energy consumption of Shimla City* (not following GPC protocol)	**30.16 ktOe (2008-2009)***
Annual community energy use in the Residential Sector:	**14.54 ktOe (2008-2009)***
Annual community energy use in the Commercial & Institutional Sector:	**8.54 ktOe (2008-2009)***
Community's total GHG emissions in t CO_2e/year:	**295,000 CO_2e (2008-2009)***
Annual community emissions in the Residential Sector:	**295,000 tCO_2e**
Annual community emissions in the Commercial & Institutional Sector:	**65,520 tCO_2e**
Percentage of overall community GHG emissions from local government operations:	**1% of total (2008-2009)***
Total annual emissions of the local government:	**2340 tCO_2e**
What energy source provides the largest part of the energy supply?	**Electricity***
Percentage of primary energy need covered by renewables:	**0%**

All figures courtesy of the Shimla Solar City Master Plan, unless otherwise noted.

Table 2: Renewable energy and energy efficiency targets for

Target local government emissions in Shimla by 2020	
CO_2 reduction target baseline year	**Baseline year 2008-2009 (to be revised for 2012-2013)**
CO_2 reduction target :	**43,215 tCO_2e (from 2012-13 to 2018-19)**
Method used for calculation (BAU vs. below the baseline year reported value):	**% reduction of "business as usual" projections**
Renewable energy target - target year:	**Cumulative – 36,593MWh (2018-19)**
Renewable energy target - method:	**% reduction of "business as usual" projections**
Energy efficiency targets:	
Energy efficiency target - target year:	**Cumulative – 14,249 MWh (2018-19)**
Energy efficiency target - method:	**% reduction of business as usual projections**

All figures courtesy of the Shimla Solar City Master Plan, unless otherwise noted.

Climate change adaptation: Shimla has made pioneering inroads in the climate resilience area by undertaking an integrated planning exercise to develop a Climate Resilience Strategy for the City. The process, led by ICLEI, is called the ICLEI-ACCCRN process (a six-phase process summarized in 'Shimla's Climate Adaptation Journey' on page 8). Priority actions that emerged from the process include water and sanitation, transport, and tourism sector initiatives.

These plans and activities establish a sound foundation for the City's involvement in the Urban-LEDS project. Shimla has a unique opportunity to integrate and implement their climate resilience priorities and energy efficiency efforts through the Urban-LEDS project. They will be able to initiate pre-feasibility studies and attract financing for potential climate resilience projects with the help of the ADAPT climate finance project.

The MCS aims to reduce CO_2 emissions by 43,215 tCO_2e between 2012-2013 and 2018-2019. This is to be achieved-in-part through a targeted 10 percent reduction in energy use compared with 'business as usual' projections (from a 2012-2013 baseline), and the increase of renewable energy production to 36,593MWh by 2018-2019 (from a 2012-2013 baseline).

Figure 2:
Shimla's mountainous topography

Photo: "Shimla Southern Side of Ridge" by Bjørn Christian Tørrissen, Wikimedia Commons

Low Emissions Development SWOT: Potentials for mitigation and adaptation	
Strengths	**Weaknesses**
• Existing renewable energy potential assessments and energy efficiency opportunities: MCS has participated in the Solar City Program, which includes an analysis of renewable energy and energy efficiency potentials. As a result, this data and associated strategies are available to the City. • MCS participated in the ACCCRN Urban Climate Resilience project and has prepared a Climate Resilience Strategy. This involved collaboration across departments and considered the future threats posed by climate change for Shimla, as well as establishing appropriate responses. • Shimla has been successful in attracting both funds and expertise from international donors (such as GIZ) to implement initiatives.	• Human resources and skills available: There is limited in-house expertise (in terms of trained professionals with the skills to implement renewable energy and energy efficiency initiatives) within the MCS. • Staff turnover: Staff who participated in the Climate Resilience planning process are no longer at the MCS, so this institutional knowledge is no longer available to the organization. • There have been very few renewable energy systems actually installed in the city, so there is a limited base of knowledge and experience to draw from in the local area • Existing renewable energy potential assessments show there is negligible bio-mass for power available (only wood chips from the surrounding protected forest area) • There is limited waste to energy potential from bio-methanation of kitchen waste (from commercial and industrial sector), and limited capacity to generate power from current sewerage treatment plants. • There is no wind energy capacity.
Opportunities	**Threats**
• Existing renewable energy potential assessments: Although there is less solar radiation than some of the other areas of India, there is still substantial potential for solar PV applications across residential, commercial, and industrial sectors. • Energy savings analyses: There are significant energy efficiency opportunities across residential, commercial, industrial and municipal service sectors. • Human resources and skills available: Due to the interest in the area from international and national donors, consulting expertise has been mobilized to the area by such organizations as GIZ, UNDP, Netherlands High Commission, ADAPT Asia Pacific-USAID and CDIA.	• Energy savings analyses: There is little understanding of the potential benefits of energy efficiency, limited education programs and apparent cost barriers are impeding uptake of energy efficiency initiatives by residential, commercial, industrial and municipal sectors. • Human resources and skills available: Importing staff to the region to meet international (or national) funding obligations does not necessarily translate to the building of local skills, thus potentially affecting local buy-in for projects.

Shimla has significant potential to improve energy efficiency across residential, commercial, industrial and municipal service sectors. Energy efficiency is seen as an area where relatively little attention has been focused, and thus, where great gains can be achieved. The renewable energy potential for Shimla is mainly in solar photovoltaics (PV). Although Shimla has less PV potential than in other areas of India that have higher levels of solar radiation, there are nevertheless opportunities for both small residential systems and larger systems for commercial application, such as for hospitals. These include both off-grid applications and grid-connected opportunities.

The main gap that becomes apparent from the SWOT analysis above relates to MCS staff capacity and technical skills. Any technical initiatives will need to be supported by extensive skills training, information, and behavior change programs. This is because the current understanding of energy efficiency opportunities is perceived to be quite limited.

The main weakness that MCS needs to address is its lack of internal expertise in regard to developing and implementing policies and projects across the municipality. Moreover, the City's leaders have acknowledged that staff turnover and lack of relevant skills are an issue for implementing both the Climate Resilient City Plan and the Solar City Master Plan.

Table 3: Indicative Stakeholder Involvement in each step of the GreenClimateCities Methodology

PHASE 1: ANALYZE	
Commit and Mobilize	• Engaging elected representatives, executive management, senior staff in relevant departments to secure initial commitment • Establish Core Climate Team (as part of institutional governance arrangements) • Map relevant stakeholders, and establish Stakeholder Committee (with internal and external representatives)
Assess Frameworks	• Determine general awareness of local leaders and relevant stakeholders • Data collection – involving both internal and external stakeholders and data holders
Identify Development and Climate Priorities	• Engage experts to explore links between socio-economic development and climate change • Identify priorities (this may be through a workshop process with stakeholders) • Consult with relevant stakeholders to help develop priority areas further • Recommended strategies should be ratified by key stakeholders, to gain a mandate for further action
PHASE 2: ACT	
Develop Action Plan	• Development of potential LED solutions/initiatives with relevant stakeholders, that meet development and climate priorities previously identified. • Fine tuning of LED solutions/initiatives with relevant stakeholders, including cross-sectoral experts and department heads • Establish targets and key performance indicators with relevant stakeholders
Prepare and Approve	• Undertake detailed planning of priority projects with experts and department representatives, ensuring a clear business case is developed • Presentation to Elected Body for approval – clear communications with and by stakeholders at this stage
Implement	• Long term capacity building with staff and other stakeholders • Form alliances and partnerships with stakeholders to deliver projects
PHASE 3: ACCELERATE	
Monitor	• Monitoring in collaboration with relevant stakeholders, including developing an appropriate Monitoring, Reporting and Verification process
Evaluate and Report	• Reporting and communicating results and achievements, through stakeholder networks
Enhance	• Involve stakeholders in a bi-annual review of the GHG inventory and priority actions

Figure 3: ICLEI's GreenClimateCities Methodology

Shimla's Climate Adaptation journey

The Municipal Corporation of Shimla was one of the first Indian cities to pilot the 6-phase ICLEI-ACCCRN climate resilience planning process.Shimla has completed the first 4 phases to date, and have produced a Climate Resilience Strategy.

- Phase 1. Engagement: Political commitment, Institutional set-up, Identification of perceived threats, past practices and opportunities.
- Phase 2. Climate Research and Impact Assessment: Assessing and identifying existing fragile urban systems and impacts of climate projections on fragile systems, Prioritization based on risk assessment.
- Phase 3. Vulnerabilities Assessment: Identification of vulnerable areas, vulnerable social groups, data gaps.
- Phase 4. Resilience Strategy: Resilience actions identified, Actions prioritized based on resilience indicators and feasibility criteria
- Phase 5. Implementation: Identifying funding options, feasibility and project planning, monitoring framework and implementation.
- Phase 6. Monitoring and Review: Performance indicators and reporting system, monitoring and review.

As Shimla's transformation from a small, predominantly rural town into a city continues, new skills and knowledge are required of the MCS staff to meet the urban planning demands of the present and future. Both the Deputy Mayor, Mr. Tikender Singh Panwar, and the City's Municipal Engineer perceive capacity building and an increase in urban planning expertise to be important mechanisms to ease the City's transition from a rural to urban community. Deputy Mayor Mr. Tikender Singh Panwar has singled out "capacity building [as being] very important."

Urban-LEDS: Building capacity for climate action and connecting the dots between adaptation and mitigation

The ICLEI Urban-LEDS project will support MCS personnel in identifying priorities and implementing climate action plans through a structured process which utilizes the Green Climate Cities (GCC) methodology (see Figure 3, previous page). This process facilitates the building of internal staff capacity, brings departments together to share their knowledge and findings, and introduces external experts into the process to bolster the City where assistance is needed.

ICLEI's GreenClimateCities program has a 3 phase methodology (see Table 3, previous page). The GCC methodology, building on ICLEI's 25 years of experience in working with cities on climate action, was recently revised and modernized to address emerging trends, and aims to assist cities' development agendas in a less energy intensive way. It now enables cities to capitalize on "green" and "low emission" technology and opportunities; for many cities, including Shimla, this provides a mechanism for putting theory into practice.

Two significant planning strategies that the MCS has recently developed include the Solar Cities Master Plan and the Shimla Climate Resilience Strategy. The Shimla Climate Resilience Strategy was developed in collaboration with ICLEI South Asia using a process that brought different departments together to increase awareness and knowledge of future cross-organizational climate impacts. A component of this included the identification of processes for analyzing relevant data, and identifying vulnerable urban systems and communities. A number of initiatives developed through the Climate Resilience process will ideally be enhanced through Shimla's participation in the Urban-LEDS project; thus bringing low emissions development and climate change resilience together.

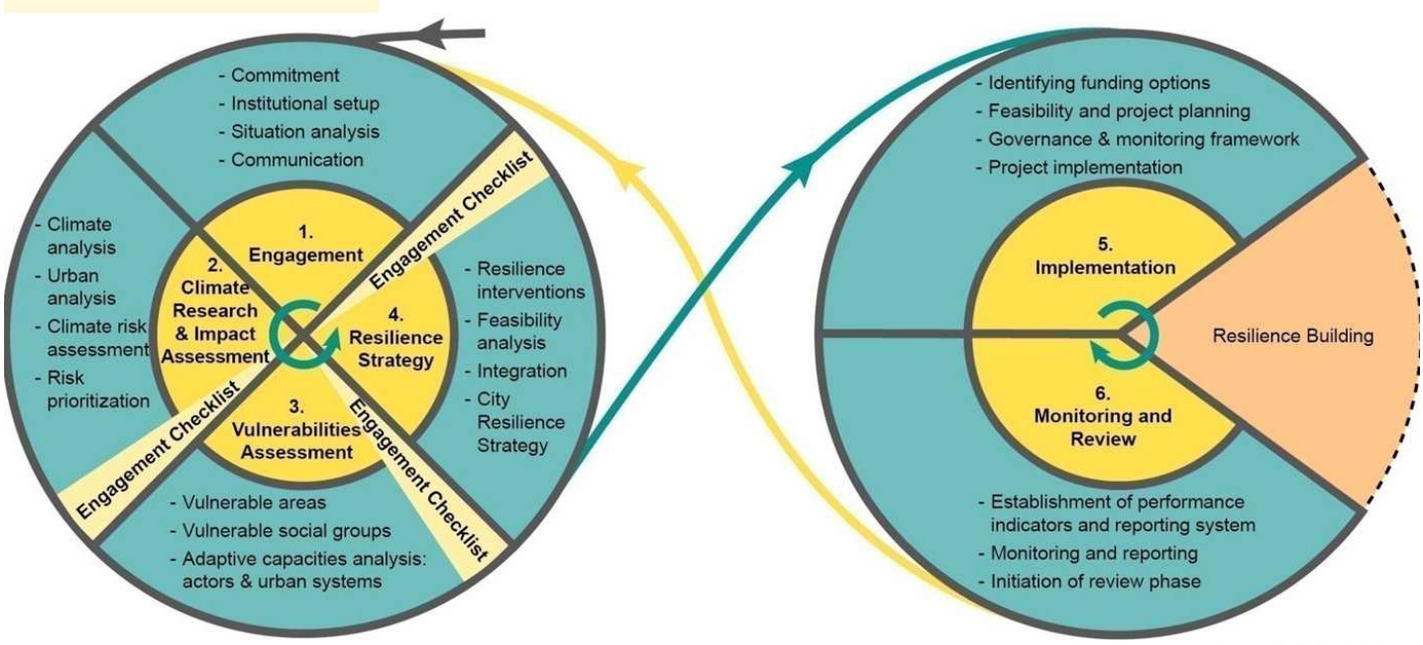

Image: ICLEI South Asia

Expected results and implementation

It is anticipated that the Urban-LEDS project will help build MCS staff capacity to actively engage on topics in climate change, renewable energy, and energy efficiency; therein creating an alternative development trajectory for the city. Specifically, the intended outcome is to increase technical skills (including management and operational capacity) as they relate to the implementation of strategic urban planning initiatives. The hope being that these technical skills will positively influence low emission development (climate change mitigation), while building resilience to climate change.

Key sectors of the City to be brought into focus through the Urban-LEDS project include water supply and sanitation, transport, tourism, and solid municipal waste.

Costs and financing

The Urban-LEDS project provides funds for training, capacity building, and dissemination of documented information. Other MCS actions and initiatives mentioned in this case study have individual project budgets from various national, international, state, and municipal sources.

Lessons learned

- **Cities are typically eager to connect climate change mitigation and adaptation measures** (i.e. their low emission development efforts and climate-related risk reduction and resilience). Cities understand the benefits of low emission development such as cost savings and improved quality of life, and wish to incorporate these in their plans and strategies. Moreover, there are synergies between low emissions development efforts and resilience that can come out in scoping analyses (whether climate resilience planning or energy potential assessments) when departmental staff are aware and trained to look out for them.
- **Limited staff capacity and expertise is a major barrier**. When external consultation is brought in for specific projects, it is crucial that this is used to build capacities and skills of local government staff. As the Shimla experience demonstrates, this capacity building is vital to avoid progress being stalled due to the loss of institutional knowledge experienced during staff turnover. To this end, mitigation and adaptation measures should be institutionalized and integrated into planning procedures and local government operations.

This case study provides a baseline analysis of MCS's climate-related initiatives, and lays the foundation for exploring the adaptation and mitigation nexus in Shimla by developing staff capability at each of phase of the GCC process in order to facilitate ongoing local climate action. At the completion of the Urban-LEDS project in 2015, this case study will be revised with specific 'lessons learned' from Shimla.

Questions to consider for the case study update:

- How well are both climate change adaptation and mitigation integrated, and how has the Urban-LEDS project in Shimla contributed to these processes?
- Was the capacity of the municipal organization to undertake low emissions development improved throughout the Urban-LEDS project and beyond? Is it embedded into the municipal process and structure?
- Was the capacity of individuals enhanced? Did the staff consistently attend sessions?

The Urban-LEDS Project

An Urban Low Emissions Development Strategy (Urban LEDS), or Low Emissions Urban Development Strategy, defines a pathway to transition a city to a low emission, green and inclusive urban economy, through its integration into city development plans and processes.

The Urban-LEDS project, funded by the European Commission, and implemented by UN-Habitat and ICLEI, has the objective of enhancing the transition to low emission urban development in emerging economy countries by offering selected local governments in Brazil, India, Indonesia and South Africa a comprehensive methodological framework (the GreenClimateCities methodology) to integrate low-carbon strategies into all sectors of urban planning and development.

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- How was capacity measured? What was the response of participants in the project?
- Did staff turnover within the organization negate capacity gains?

Replication

In principle, there is a need for an integrated approach to climate change addressing both mitigation and adaptation. This is, however, a new concept for many local governments. The case of Shimla will be monitored, and replication recommendations will be provided at the end of the Urban-LEDS project.

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