

## Enhancing 'Livability' through Urban Low Emission Development

The Rajkot Municipal Corporation is utilizing forward-thinking low-carbon strategies to guide its growth and development. Under the Urban-LEDS project supported by the European Union, Rajkot is mainstreaming 'green climate considerations' into its planning and policies, using ICLEI's GreenClimateCities methodology framework to develop and implement a Low Emissions Development Strategy for the city.

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### Summary

Through the Urban-LEDS project, the Rajkot Municipal Corporation (RMC) has built on its previous accomplishments in climate change mitigation and created a pathway for transitioning to a green and inclusive urban economy. The GreenClimateCities methodology (GCC) allowed for the City to identify priorities, engage a wide range of stakeholders, and to further the implementation of several pioneering plans, including the Solar City Master Plan and the Low Carbon Mobility Plan, reflecting Rajkot's desire to maintain its status as a 'livable' city.

The GCC process has guided the formation of a stakeholder committee for cross-departmental collaboration that will empower Rajkot on its climate journey. This breaking down of institutional siloes will be accompanied by efforts to mainstream climate considerations within the municipality.

The Urban-LEDS project helped Rajkot to identify potential priority sectors and to implement three pilot projects thereby achieving the replacement of 291 existing High Pressure Sodium Vapor (HPSV) lights with energy efficient light emitting diode lights on pre-selected roads; 20 kWp Solar Photo Voltaic (SPV) installations on a municipal school and a 100 KLD Decentralized Waste Water Treatment System (DTS) plant to treat waste water being discharged into the local Vokhda (open drain). Rajkot is upscaling these successful demonstration projects through several of its planning, policy and infrastructure initiatives to move towards a sustainable, healthy and livable city.

### Rajkot: Balancing livability and growth

Rajkot has a strong and growing economic sector, largely based on manufacturing and metalwork. Additionally, it is the administrative center for the Rajkot District, and is therefore home to many government and executive bodies. Rajkot contends with several of the issues commonly associated with rapid urban development, including: water scarcity, transportation and service provision, and energy supply and demand concerns. In 1998, the city limits were expanded to include three nearby villages. Augmented by this territorial expansion, the city's population has grown by 28.3 percent over the past decade, making it the fourth largest city in Gujarat State.

Despite these challenges, Rajkot is considered to be a very 'livable' city, and the municipality intends to maintain this mantle as the city grows. In 2012, in order to facilitate the city's low emission development while maintaining its 'livability', the RMC started developing several strategies to ensure that low emission development priorities are incorporated into municipal planning and project implementation.



### Facts & Figures

#### Population / Land area

13.2 (2012-2013) / 105 km<sup>2</sup>

#### Municipal budget

\$53.1 million USD (2012)

#### Greenhouse gas inventory

Yes (2007)

#### Total GHG emissions (tCO<sub>2</sub>e/year)

2,735,400 (2012-2013)



Rajkot has been a member of ICLEI since 2006, and is one of the eight Indian cities participating in the Urban-LEDS project.

**Table 1: City profile indicators**

% of population with access to electricity	<b>100%</b>
% of population with access to municipal water system	<b>89%</b>
% of population served by municipal drainage system	<b>58%</b>
% of population served by municipal solid waste collection	<b>100%</b>
Extent of segregation of municipal solid waste (%)	<b>15.7%</b>
% of population living in slums	<b>20%</b>

Statistics: ICLEI South Asia

## Rajkot's context and motivation for action

Over much of the past decade, the RMC has proactively sought to govern Rajkot in an environmentally responsible and efficient manner. To this end, it has been supported by enabling national frameworks, as well as a supportive policy framework at the state level, especially in regards to energy efficiency and renewable energy initiatives. Moreover, the Government of India (GOI) has enacted legislation to benefit energy conservation initiatives and released a National Action Plan on Climate Change (NAPCC). Most recently, it has started its SMART City Mission, an urban renewal and retrofitting program by the Ministry of Urban Development (MoUD), with the mission to develop 100 Smart Cities all over the country making them citizen friendly and sustainable.

Gujarat State also has a strong enabling framework in place, which allows Rajkot to implement energy efficiency protocols and renewable energy initiatives. This framework includes policies such as: the Gujarat Wind Power Policy (2007) and Solar Policy (2009).

At the city-level, there are two organizations which are responsible for governance in Rajkot: the Rajkot Municipal Corporation (RMC) and the Rajkot Urban Development Authority (RUDA), which is chaired by the Commissioner of the RMC. The RMC administers the urban center of Rajkot, while the RUDA governs the development and planning of the 54 villages surrounding the center, and is responsible for the future growth of the city.

At the onset of the Urban-LEDS project in 2012, the RMC's ambitious low-emission priorities were building upon a series previous accomplishments and pre-existing plans whose directives, however, had only been partially fulfilled.

## Rajkot's leading work in sustainable energy

Rajkot is a national leader in sustainable energy development (Table 2), having made its first foray into renewable energy in 2002 following its participation in the Asia Pro-Eco Programme, which resulted in a solar energy education program for Rajkot to raise awareness of the solar energy potential of the city. In 2006, the RMC began its involvement in ICLEI by participating in the Local Renewables Initiative, which led to the development of the Solar City Master Plan and the creation of Rajkot's first greenhouse gas (GHG) inventory in 2007. In 2009, Rajkot was identified as a 'Solar City'

**Table 2: Actions and initiatives related to energy efficiency and renewable energy action in Rajkot**

- **The Asia Pro-Eco Programme** (2002) developed a framework to undertake renewable energy initiatives and promote sustainable development through partnerships and citizen involvement, and to develop awareness of less energy intensive development pathways through renewable energy and energy efficiency.
- The RUDA designed **Building Bylaws - General Development Control Regulation Act** (2004) required the installation of solar water heaters (SWH) in new developments (for a regulated set of building types). Approximately 30,000 SWHs have been installed in Rajkot since 2004. Within the urban center of Rajkot, the property tax for existing properties (both residential and commercial) is subsidized if a SWH is installed.
- **The Solar City Master Plan** was developed in 2007–2008 with the assistance of ICLEI South Asia, and accepted by the Government of India in 2012. It targets a 10% reduction in conventional energy demand through increased energy efficiency and use of renewable energy sources.
- **The Renewable Energy Resource Assessment** was undertaken as part of Rajkot's Solar City Master Plan investigating solar, wind, biomass and waste-to-energy opportunities for the City.
- The **Low Carbon Mobility Plan**, implemented in 2013, was developed with funding provided by UNEP.
- Became the second city in Gujarat to devise and implement an **Energy Conservation Building Code**.
- **A Municipal Solid Waste processing plant** has been built to create Refuse Derived Fuel for use in the nearby cement and oil industries.

by the National Ministry of New and Renewable Energy (MNRE), and the municipality completed its Solar City Master Plan with the assistance of the ICLEI South Asia Secretariat including a range of energy efficiency and renewable energy initiatives to achieve a 10 percent reduction of energy use in Rajkot by 2013.

## Rajkot: accelerating climate action one GCC step at a time

In order to demonstrate the potential of low emission development principles in a tangible and practical manner, the Urban-LEDS project supported the implementation of three selected pilot projects in Rajkot. These complemented the strategic planning activities that led to the key outcome of a Low Emissions Development (LED) Strategy based on the GreenClimateCities (GCC) methodology. This case study describes Rajkot's journey through the GCC process, as well as the pilot project implementation and other important achievements of Rajkot's LED strategy described in the section on "Outcomes of the Urban-LEDS project in Rajkot" below.

### Mainstreaming climate considerations using the GCC

The mainstreaming of low emission development into the planning and policy actions of local government is a key directive of the Urban-LEDS project. Mainstreaming implies that climate considerations should no longer be dealt with by a single department or person in the local government; rather, they should be embedded throughout all policies, strategies, and practices. To facilitate the mainstreaming of low emission urban development, the Urban-LEDS project used ICLEI's GCC methodology to engage the RMC and ensure a shared responsibility and ownership of the initiatives undertaken across various departments. Efforts had been made to integrate the methodology in decision making and to ensure that it will be used in the future for promoting LEDS.

### Fast-tracking the GCC process in Rajkot

Since Rajkot has already undertaken several climate mitigation initiatives, many steps in the GCC could be fast-tracked, with active support by the RMC (see Figure 2 on the right for an overview of the GCC steps).

### Phase 1 of the GCC: "Analyze" - breaking institutional silos in Rajkot

**Step 1 of the GCC "Commit & Mobilize"**, takes cities through the process of gaining commitment from senior management and elected officials, establishing appropriate institutional frameworks to manage the implementation of LED strategies, identifying and engaging stakeholder groups, and assessing the relevant framework conditions. At the outset of the project, the RMC had already undertaken much of this work through the implementation of the Solar City Master Plan.

The guidance of the Urban-LEDS project (and GGC methodology) led to the formation of a stakeholder committee to empower Rajkot on its climate journey. This Stakeholder Committee brings together representatives from various departments and sectors (ranging from municipal government - RUDA and RMC - to state government, from environment to health, land development to administration), and external stakeholders from relevant industry sectors. The Committee incorporates stakeholders who were part of the Solar City Committee, as well as several new stakeholders who have been

## GreenClimateCities Methodology

The GreenClimateCities methodology (GCC) underpins the Urban-LEDS project. It incorporates nine steps across three phases: Analyze, Act, and Accelerate.

As a city that has already undertaken significant climate action work, Rajkot was supported through the Urban-LEDS project to streamline previous practices according to the steps of the GCC methodology



Figure 2: ICLEI's GreenClimateCities Methodology

## Political commitment for Rajkot's LEDS

At the beginning of the Urban-LEDS project, the RMC Commissioner Mr. Ajay Bhadoo commented that “... **all plans must have an underlying theme of being energy efficient, sustainable and environmentally friendly**”, showing the level of political commitment and willingness to take action against climate change.

The present Commissioner, Mr. Vijay Nehra (IAS), also indicated his commitment to Low Emissions Development in the Bonn Climate Talks at UNFCCC, “It is important that for global change **we need local actions and for low emission local actions, it is important that local city government acts in coordination with communities, to be able to demonstrate [implementation of] low emission development plans in a concrete manner on ground level**”

This Solar PV array, on one of Rajkot's municipal offices, helps to reduce their primary energy usage.



Photo: Helen Scott

invited to participate. The RMC is represented on the Committee by its highest levels of office; both the Mayor and the Commissioner who support the development of a 'Low Emissions Development Strategy' for Rajkot.

To enhance collaboration and mainstream climate considerations, the priorities, plans and strategies from the pre-existing City Development Plan, Solar city Master plan and Low Carbon Mobility plan were closely considered in the GCC processes

In addition to the Stakeholder Committee, a Core Climate Team has been tasked with developing a strategy that ensures that the climate change agenda in Rajkot is carried on beyond the lifespan of the Urban-LEDS project. This team consists of RMC staff across different departments, including (but not limited to) water works, housing, planning, solid waste management, health, and transportation.

**Outcomes of the GCC Phase 1 "Analyze":** A detailed study of the internal workings of Rajkot was conducted. The result was a thorough assessment of the governance framework, the local capabilities, and financial resources that bind the scope of action of the RMC - including the identification of the city's specific developmental challenges and priorities (economic, social, environmental and institutional). Further, as part of the Urban-LEDS project (2012-13) Rajkot's GHG inventory developed during the Solar City Master Plan process was updated using ICLEI's HEAT+ online GHG emissions inventory tool, which complies with the Global Protocol for Community-scale GHG Inventories.

This allowed the identification of priority sectors with high mitigation and development potential, following discussions held with core teams and key stakeholders to identify priority areas with respect to LED. Moreover, it reflected the vision of Municipal Commissioner, Mr. Vijay Nehra (IAS) to make Rajkot the state's first Carbon Neutral Municipal Corporation by 2020 .

### Phase 2 of the GCC: "Act"

In this phase, priority sectors and potential LED solutions were selected in stakeholder consultation meetings by assessing their multiple impacts and feasibility. This included detailed discussions among the core team and stakeholders on the key applicable low carbon solutions for the most energy and GHG emission intensive sectors.

A selection of three key projects was prioritized by the City for pilot implementation using Urban-LEDS project grants: The construction of a decentralized waste water treatment system (DTS), the replacement of HPSV street lighting with energy efficient LED lights, and the installation of solar photo voltaic (SPV) systems in municipal schools. Further details on these pilot projects and the energy savings and emissions reductions that were achieved are given in the "Outcomes of the Urban-LEDS project in Rajkot" section below.

Further, Phase 2 included the preparation of the Low Emission Development Strategies Action Plan for Rajkot City. The implementation of the Action Plan has the potential to reduce GHG emissions by 433,690 tonnes of CO<sub>2</sub>. The Plan includes proposed actions under the Residential (38%), Commercial/institutional (2%), Manufacturing industry and construction (2%), Mobile units-Transportation (3%), Waste (49%) and Municipal operation (6%) sectors.

### Phase 3 of the GCC: "Accelerate"

In order to evaluate the achievements of the selected pilot projects, and further down the line accelerate their replication



and progress on the overall LED strategy, Monitoring and Evaluation system were specified for each of the pilot projects before their implementation. The established Core Team is to continue overseeing the Monitoring and Evaluation after the project implementation period, with other relevant individual departments of the RMC assigned the responsibility of implementing the process of measuring, reporting, and verifying (MRV).

The LEDS Action Plan also provided a framework for collaboration between national, provincial, and municipal governments and the private sector to reduce the city's emissions. A strong collaboration was established through a "Project Advisory Group" to receive inputs and feedback on the Urban-LEDS project and its activities. These advisors come from various organizations including UN-Habitat, GIZ, European Union delegation to India, Schneider Electric India Pvt. Ltd, KFW, UN-Habitat, Swiss Development, Planning Commission, etc.

The pilot project implementation details, action plan and results achieved are available and updated regularly on the RMC website. The information is also reported in the carbonn Climate Registry® (cCR) to ensure global recognition and dissemination of the efforts taken, as well as knowledge sharing. RMC officials are also trained on reporting in cCR website through Earth Hour City Challenge (EHCC) project participation.

RMC is set to review the LEDS Action Plan at regular intervals and make suitable changes to suit the need of the hour and set priorities. RMC is also involved throughout the pilot project implementation, which has provided hands-on experience of implementing different phases of LED projects. Based on the derived learnings, RMC is planning to upscale the pilot projects and implement action plans proposed as part of the LED strategy.

## Outcomes of the Urban-LEDS project in Rajkot

There are three major outcomes that Rajkot has achieved by participating in the Urban-LEDS project.

**Firstly, the Low Emissions Development Strategy has been developed.** ICLEI's GreenClimateCities methodology supported the development and implementation of Rajkot's urban low emission development strategy. The Urban-LEDS project has further augmented the implementation of the Solar City Master Plan through development of the LED strategy. The LED strategy has also considered the priorities identified as part of the City Development Plan, and the Low Carbon Mobility Plans to formulate the LED action plans.

**Secondly, the internal RMC staff capacity has been strengthened to continue the implementation of LED action plans** and maintain Rajkot's recognition by its inhabitants as a "SMART and Livable City". The GCC methodology has identified capacity building needs of local city staff and brought local government representatives and relevant stakeholders together to collaboratively determine priorities.

The cumulative potential GHG emission reduction from the actions proposed across the various sectors for the Community and for Municipal operations stands at 434,158 tons of CO<sub>2</sub>e, aggregating to about 24.82% of Rajkot City's baseline annual GHG emissions in the year 2012-13. The proposed actions would reduce the city's GHG emission by 12.60% as compared to annual GHG emissions under the business as usual scenario in the year 2019-2020. A total of 250.48 Million kWh of electricity, 6,212 kiloliters of diesel and petrol, and

### Rajkot's GHG emissions inventory (following GPC)

Rajkot city has prepared a city level GHG emissions inventory as part of the Urban-LEDS project for the year 2012-2013, compliant with the Global Protocol for Community-scale Greenhouse Gas Emission inventories (GPC, V2.0)

#### Annual energy consumption (2012-13)

Annual community energy consumption: 16,694,598 GJ

Annual Local government/ municipal energy consumption: 227,594 GJ (1.36% of total)

#### Annual Greenhouse gas emission (2012-13)

Annual Community (City) emissions: 1,704,376 tCO<sub>2</sub>e per year

Annual Local government/ municipal emissions: 47,934 tCO<sub>2</sub>e per year (2.81% of total)

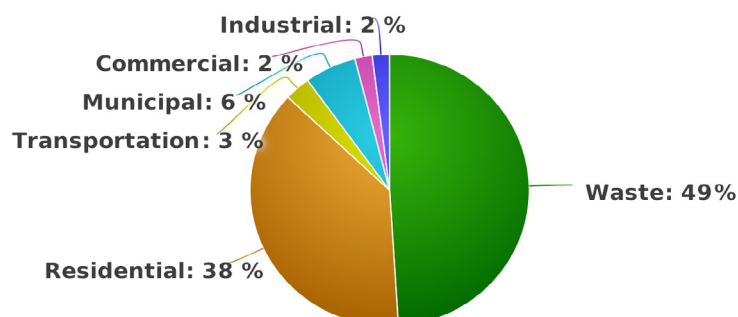


Figure 6: Emission reduction measures proposed in Rajkot's LED strategy (by sector)

**Table 4: Details of Pilot project implementation in RMC**

Pilot Project	Energy saving	GHG emissions reduction potential	Plans to upscale
Replacement of 291 existing HPSV lights with LED lights on preselected roads	70,000 Units of electricity per year	59.83 tCO <sub>2</sub> e per year	RMC has proposed to replace all existing 52,000 number of HPSV lights with LED lights based on ESCo model in Rajkot
20 kWp roof top SPV on a Municipal school – Sarojini Naidu School	30,000 Units of electricity per year	24.68 tCO <sub>2</sub> e per year	RMC has proposed 175 kWp rooftop SPV system on 3 municipal buildings and 3 swimming pools
100KLD decentralized treatment plant at Jilla garden	4000 Units of electricity per year Biogas generation potential is 8,212 m <sup>3</sup> per year, which can replace 3942 kg LPG.	15 tCO <sub>2</sub> e per year	RMC has proposed two more DTS plants in the 2016 municipal budget. RMC has introduced SMART society schemes and identified 115 civic society associations, which will implement DTS plants for sewage treatment.
Prefeasibility Study and Business Plan for Public Bicycle Sharing System in Rajkot City	Potential fuel savings due to implementation of public bicycle sharing system as suggested in prefeasibility report in Rajkot is 867KL per year.	<b>2,072 tCO<sub>2</sub>e</b>	RMC has started a public cycle sharing pilot project with four prime locations (5 cycles in each location) of the city. Presently, thanks to the effective efforts of the municipal corporation, more than 25 hotels have put cycles for their guests. The RMC has also put a total 60 cycles in all 18 BRTS stations and 15 cycles in corporation zonal offices, which is used by more than 700 people per week. After huge response to public cycle sharing scheme, prefeasibility study for PBS system in Rajkot has been done under Urban-LEDS.

650,430 kg of LPG can be saved by implementing the proposed priority actions across different sectors.

The project has also provided clarity on the development of cost effective proposals, tailored technical support for RMC, training and capacity building opportunities for RMC staff, robust monitoring, reporting and verification processes, and increased networking opportunities.

**Thirdly, Rajkot has identified potential priority sectors and implemented three pilot projects resulting in great electricity and fuel savings and emission reductions.** The pilot projects implemented in Rajkot city under Urban-LEDS project included the replacement of 291 existing HPSV lights with energy efficient LED lights on preselected roads; 20kWp SPV installation on a municipal school, and a 100KLD Decentralized Waste Water Treatment System (DTS) plant to treat waste water being discharged into the local Vokhda (open drain). Together these projects have resulted in an annual electricity savings of 106,629 kWh and reduced emissions by approximately 100 tCO<sub>2</sub>e per year. Prefeasibility Study and Business Plan for Public Bicycle Sharing System in Rajkot City prepared under Urban-LEDS project has 867KL fuel saving potential and 2072 tCO<sub>2</sub>e GHG emission reduction potential per year (see Table 4 below).

## Costs and financing

Within the Urban-LEDS project, funding was made available for training, capacity building, and dissemination of documented information, with the overall aim of creating a 'Model City'. RMC has received financial assistance of 156,000 Euros for the implementation of pilot projects.

RMC has made budgetary provisions for the implementation of the LED strategy and its action plans. The successful implementation of the DTS has encouraged RMC to approve the technology for future implementations. RMC has made provision of 0.13

million euros for 2 additional DTS plants in their budget, 2016-2017. Under its "SMART Society" scheme (see below) RMC has plans to up scale the DTS plants along with other initiatives across the city. RMC is also considering mandating the implementation of DTS plans in the upcoming development in peri-urban area of the city.

## Replication and upscaling

Following the successful implementation of 291 number of LED lights, it has been proposed to replace all 52, 000 HPSV lights in the City by adapting the ESCo model. Budget provision has been made in Rajkot Municipal Administrative budget, 2016-2017. The implementation will result in annual electricity savings of 6.26 MU and reduces GHG emission by 5,146 tCO<sub>2</sub>e. The tender document preparation is underway and the implementation is expected to begin in 2016.

The introduction of net metering in the Gujarat Solar Power Policy has resulted in an increase of rooftop SPV in Rajkot. Following the successful implementation of the 20kWp SPV system in a municipal school, RMC's LED strategy includes a proposal to install 175 kWp SPV systems on two civic centers (50 kWp), a central zone office building (75kWp) and three public swimming pools (50kWp). The implementation would result in annual electricity savings of 0.26 MU and reduces GHG emissions by 215 tCO<sub>2</sub>e per year.

The Government of India's SMART Cities Mission is a challenge designed to inspire and support local authorities as they develop smart proposals to improve livability in cities. In 2015, because it is shortlisted as one of the 100 Smart Cities under the mission, RMC will receive funding totalling € 66 million over a period of 5 years. RMC has strengthened its focus on LED actions to achieve the low carbon path and has integrated this approach into the Smart City Plan, thus adopting the underpinning concept of the GCC.

RMC has introduced its SMART Society scheme which can help local citizen participation in the planning process in order to ensure a sustainable environment. The overall aim of the SMART society scheme is to develop Public Private Partnerships to achieve zero waste and reduce GHG emissions from societies. RMC has selected 115 civic society associations to implement DTS, waste to compost plants and rain water harvesting systems for which it will provide funding support. Going forward RMC plans to select 100 such societies each year and to use the network to implement low carbon action plans.

## Lessons learned

Rajkot is well placed to maintain its 'livability' as the city continues to grow. The RMC has been proactive in taking advantage of programs which provide resources and skills that considerably benefit planning for a low carbon city. Continual assessment of how Urban-LEDS assists Rajkot in mainstreaming low emissions development has yielded important lessons which include:

**Development and implementation of pilot/demonstration projects had tremendous benefits for Rajkot and can help overcome hesitations regarding new technologies.** Local authorities are cautious in deploying new technologies. But based on the successful implementation and results in terms of savings and emissions reductions from the pilot projects, RMC has taken initiatives to replicate such project in their planning process.

**ICLEI's GreenClimateCities methodology** supported the development and implementation of the urban low emission development strategy and helped identify

## The Urban-LEDS Project

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

The Urban-LEDS project (March 2012 - March 2016), funded by the European Union, was jointly implemented by UN-Habitat and ICLEI. It supported local governments in emerging economy countries (Brazil, India, Indonesia, South Africa) and in Europe to transition to urban low emission development using ICLEI's GreenClimateCities methodology, comprehensive process guidance, to integrate low emission strategies into all sectors of urban planning and development.

For more information, please visit: <http://urban-leds.org/>

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capacity building needs of local city staff.

### At every step in the GCC process the RMC has derived key learnings, including:

- Better understanding of Energy data categorization, streamlining data collection procedures and maintenance of baseline energy consumption records;
- Preparation of Community and Local government GHG emissions inventory using GPC and HEAT+;
- Training on cCR reporting platforms to report LED actions for wider dissemination and to explore finance possibilities; and
- Developing Measuring, Reporting and Verification (MRV) processes and project-based monitoring reports.

As part of the Urban-LEDS project, RMC officials took part in several knowledge exchange programs, webinars, and interactions with City officials from India and other countries; several international networking events helped to share and exchange knowledge on best practices. The GCC methodology, this knowledge sharing network, the tools adopted and other key lessons learned will help RMC implement identified low carbon actions to become a Carbon neutral and SMART city.

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