Coimbatore, India

Reducing carbon emissions while improving Coimbatore's municipal public services

ICLEI Local Governments for Sustainability

Coimbatore undertook a citywide energy assessment in 2008 to identify sectors with the highest energy consumption and carbon emissions. The assessment revealed the largest share within municipal energy consumption in the water supply and street lighting sectors. Between 2008 and 2010, the city undertook a series of projects to improve the efficiency of these services, while at the same time raising awareness about renewable energy and enegy efficiency in the community.

111 ICLEI Case Studies June 2010

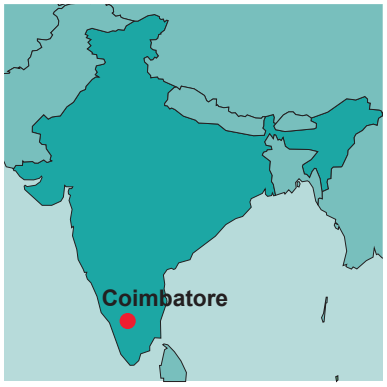
Abstract

The citywide energy assessment undertaken in 2008 revealed that the water supply and street lighting sectors accounted for nearly 75% of municipal sector carbon emissions. The Coimbatore Municipal Corporation (CMC), with the assistance of the Coimbatore Renewable Energy and Energy Efficiency Resource Center (REEERC), identified a range of interventions to reduce this impact while at the same time improving the scope and efficiency of these services.

Pilot projects and large scale overhauls of the two systems were proposed and undertaken: ranging from improvement of the energy efficiency of Coimbatore's street lighting system to installation of a wind-solar PV hybrid system at a corporation-owned bus stand were undertaken in the period from 2008 to 2010.

Substantial energy savings were achieved through the projects: the street lighting energy efficiency project resulted in a 30% reduction in electricity consumption from the pre-project scenario.

The main benefits of these projects have been an improvement in municipal services, a substantial reduction in the energy consumption and emissions produced by these services, and increased awareness in the community about the importance of renewable energy and energy efficiency in a growing city.



Population / Land area
930,882 (2001) / 106 km²

Municipal budget
3.59 billion INR (€ 59 million) (2010-11)

Local economy
Industry, manufacturing

Role of city in region
Educational and industrial center

The importance of taking the lead

After identifying potential areas of improvement through the citywide energy assessment, the Coimbatore Municipal Corporation (CMC) realized that in order to spread the message of renewable energy and energy efficiency effectively within the community, it was important for the corporation to take the lead. The interventions undertaken by the CMC were of significance because they improved municipal services while serving as successful examples of renewable energy and energy efficiency. The success of these projects will in turn allow the CMC to set a vigorous course of action for achieving reduction targets once they adopt the city energy policy in 2010.

Local Renewables — An ICLEI Initiative

ICLEI supports and strengthens local governments which promote the generation and supply of renewable energy and energy efficiency in the urban environment.

Case Study

The Coimbatore context

Also known as Kovai, Coimbatore is the second largest city after Chennai in the state of Tamil Nadu in southern India. One of the fastest growing cities in India, it also has a highly developed industrial sector, with a large number of small scale and large scale industries located in and around the city. Historically known in India's colonial period for its many textile factories, Coimbatore was, and still is, known as the Manchester of South India. In more recent times, Coimbatore has continued in the development of its industries and today has a strong manufacturing base. It is also developing into a center of excellence for education in the region.

Photo: ICLEI SA

A street in Coimbatore, India

Reducing carbon emissions while improving Coimbatore's municipal public services

The Coimbatore Municipal Corporation (CMC) has a strong commitment to providing superior public services to its residents while at the same time ensuring the development of cleaner and more efficient energy technology. The citywide energy assessment undertaken in 2008 revealed sectors of the highest energy consumption and carbon emissions – within municipal services and at the wider city level. With the water supply and street lighting sectors in Coimbatore together accounting for nearly 75% of the municipal sector carbon emissions, interventions have been identified to reduce this impact while at the same time improving the scope and efficiency of these services.

An energy savings project for Coimbatore's street lighting system: The Coimbatore Municipal Corporation provides street lighting facilities throughout the city with 34,000 lights. The annual electricity costs amount to about INR 60 million (approximately 1 million EUR) for an annual consumption of about 10 million kilo-watt hours (kWh). At the municipal level, improvements in the

The Local Renewables project

The Local Renewables Model Communities Network (or Local Renewables project) aims to support and strengthen local governments in promoting sustainable energy and to become model cities in their national and regional contexts.

This international project (2005-2010) connects leading cities to cooperate in sharing their expertise and experience in the fields of renewable energy (RE) and energy efficiency (EE). Thus, the project is a key component of ICLEI's Local Renewables Initiative.

Special support for participating model communities in India (Bhubaneswar, Nagpur and Coimbatore) and Brazil (Betim and Porto Alegre) was possible due to generous funding from the German Federal Ministry for Economic Cooperation and Development (BMZ) through the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH.

The European Resource Cities of Bonn, Freiburg, Milan, Växjö and Malmö have highly developed renewable energy and energy efficiency strategies which they were happy to share.

The ICLEI offices for South Asia (Delhi), Brazil (Sao Paulo) and Europe (Freiburg) gave continuous guidance and organized the exchange among the cities.

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performance of the city's street lights can result in substantial reductions in green house gas (GHG) emissions. The existing street lights within the city account for over 50% of total emissions from municipal services.

The CMC partnered with an energy service company to implement a large scale energy savings project for Coimbatore's street lighting system. This is the first innovative step taken by the CMC at a citywide level to reduce energy consumption and also to reduce GHG emissions. Automatic timers, dimmer equipment and electronic meters have been installed in the street lighting system.

Tubewell energy audit: In 2009, the total amount of fresh water supplied to Coimbatore was 151 million liters per day (MLD), which is far below the level of demand. The CMC resorts to pumping out ground water through bore wells (or tube wells) across the city in order to:

- reduce the gap between demand and supply of drinking water;
- avoid the usage of costly drinking water for non-revenue, essential purposes, such as washing and cleaning at parks, the zoo and other public places and the maintenance of public toilets; and
- supply water for washing and cleaning at slums and low income group (LIG) colonies.

In 2009, there were over 700 such tubewells around the city.

The CMC is concerned about the cost of operating and maintaining these tubewells. Therefore, the CMC requested ICLEI South Asia to carry out a pilot study of the energy efficiency of the corporation's tube wells through an energy audit in two wards of the CMC. This pilot study was completed in January 2010. Recommendations for improvement of performance varied from upgrading machinery to regularization of operations and billing procedures. The pilot audit found that a reduction in carbon emissions of 1 to 5 tons annually per tube well was possible. The CMC is now making preparations to undertake a comprehensive audit for all their tube wells in the second half of 2010.

Photo: ICLEI SA

An external consultant visited tube wells in Coimbatore while conducting the pilot energy audit of the system in 2009.

City energy report to understand Coimbatore's energy consumption patterns

Coimbatore has been a part of the ICLEI-facilitated Local Renewables Model Communities Network project (Local Renewables project) since 2008.

As a part of the project, the CMC undertook a comprehensive citywide energy assessment in 2008. Energy consumption data was collected from sectors including street lighting, transportation, water pumping, residential, commercial and industrial sectors. Using the energy consumptions levels of 2007-08 as a comparison baseline, data from 2-3 years prior to the time of the audit enabled the city to analyze trends and prioritize actions. This data was compiled by the municipal corporation as a city energy report in the Local Renewables project.

This data collected in Coimbatore was also used for a Carbon Emission Inventory and a City Energy Status Report, published in the report 'Energy and Carbon Emissions Profiles of 54 South Asian Cities' (2009).

The report was published by the ICLEI South Asia Secretariat under a project implemented in Coimbatore and 53 other South Asian cities within the framework of the 'Roadmap of South Asian Cities and Local Governments for the post-2012 global climate agreement and actions' project.

For more information, please contact ICLEI SA or the CMC.

Photo: ICLEI SA

A worker puts finishing touches to the wind-solar PV hybrid system that will serve as a power back up to the Mettupalayam road bus terminal in Coimbatore. The installation was completed in 2010.

Energy efficient lighting at new bus terminal: Coimbatore has four bus terminals for inter-city passenger travel. To reduce congestion of traffic at these terminals, a new bus terminal is under construction at Mettupalyam Road exclusively for north-bound buses. Connecting to the popular hill stations of Ooty and Coonoor, this bus terminal is expected to be a major travel point for tourists. With a capacity of 25 bus bays, and other facilities such as a restaurant and cloak rooms, the original lighting and cooling design for the bus station included 40 watt (W) fluorescent tube lights and 80 W ceiling fans, with a total energy load estimated at 79 kilo watts (kW).

Based on a proposal by ICLEI South Asia, the CMC decided in 2010 to rework the lighting and cooling plan to incorporate energy efficient fittings. The redesign proposed the usage of 36 W CFLs and 25 W tube lights in place of the original 40 W fluorescent lights. The number of ceiling fans was also reduced by over a hundred in the new design. These energy efficient light fittings are expected to save around 136,000 kilo-watt hours (kWh) per year.

The fittings resulted in a reduced energy demand of the bus station of 55 kW: a reduction of 24 kW. The entire redesign has been funded and implemented by the CMC in 2010.

Installation of a wind-solar hybrid system at Coimbatore's new bus terminal: In April 2010, the CMC completed installation of a 3.5 kWp capacity wind-solar hybrid RE system at Coimbatore's new Mettupalayam Road bus terminal. This system will act as the primary power back up for the bus terminal during times of power shortage. The wind-solar hybrid system was inaugurated by the Deputy Chief Minister of Tamil Nadu in June 2010 who heralded the system as a good investment by the CMC.

Solar photovoltaic power back up system at the Coimbatore Renewable Energy and Energy Efficiency Resource Center: To demonstrate the use of solar power in the CMC premises, the Coimbatore Renewable Energy and Energy Efficiency Resource Center (REEERC) installed a solar photo voltaic (SPV) power back up system in December 2009. After a preliminary energy audit and a feasibility study were prepared by an external consultant, the power pack was procured for not only the REEERC, but also to power the adjacent offices of the assistant engineer and the births and deaths department of the CMC. Consisting of two 0.56 kilo watt peak (kWp) systems, the SPV pack is used to power 35 tube lights, 15 fans and 3 computers, with an expected payback period of just over 6 years. It will also back up deficiencies in the grid power supply.

A city energy policy for Coimbatore in the making

Coimbatore has also formed an energy policy committee to generate an energy policy at the city level to promote renewable energy and energy efficiency activities and also to reduce greenhouse gas emissions in its municipal activities and facilities and in the community as a whole. The city will formulate and adopt a city level RE-EE policy in 2010 which will set reduction targets in energy consumption for the city.

Results of the project

Street lighting energy saving project: The expected energy savings will be approximately 30% of the total consumption. Presently, street lights contribute a major share of 900,000 tons of CO_2 equivalent per year. This figure is expected to be reduced considerably, also resulting in monetary benefits.

Tubewell energy audit: It has been estimated that emissions of approximately 1 to 5 tons CO_2 equivalent can be reduced at each tubewell annually by saving

Photo: ICLEI SA

Solar panels on the roof of the Coimbatore resource center. These panels are connected to a power back up system that provides electricity to the resource center and other municipal departments during a power cut.

energy. Energy saving measures suggested by the pilot audit include replacement of inefficient machinery and improving operations and maintenance procedures.

Bus terminal energy efficiency: The energy savings expected after switching over to energy efficient CFL and T5 fluorescent light fittings are around 136,000 kWh per year and the amount of monetary savings will be around 444,000 INR per year.

SPV power pack at CMC: The solar panels prevent the escape of 12,096 kg carbon dioxide emissions every year.

Lessons learned

Energy assessments help give the city a framework to work within: The citywide energy assessment that was conducted for Coimbatore in 2008 enabled the CMC authorities to get an over-arching view of the city's energy scenario. They were then able to identify priority areas for reductions and begin programs to achieve savings.

It is important for the local government to take the lead in energy issues: the interventions outlined by the CMC allowed the corporation to achieve energy reductions as per their vision, while at the same time serving as high visibility awareness programs to inspire citizens to emulate them. The city then hoped that higher awareness in the city about energy efficiency and renewable energy would allow them to set higher reduction targets.

Interventions with multiple benefits are best: The water sector energy audit enabled the CMC to identify methods of energy conservation while at the same time improving their services and providing services to a greater population.

Building a clean and energy efficient Coimbatore

As one of the 63 mission cities selected under the Jawaharlal Nehru National Urban Renewal Mission (JnNURM), the city of Coimbatore has joined ICLEI's Urban Climate Project (UCP) in 2009 under the Asia Pacific Partnership (APP), which aims for a comprehensive and multi sector clean development strategy backed by real investment capital mainly targeting the JnNURM scheme. The UCP Project also targets the implementation of 15 clean development measures through 10 interventions with technical and implementation support. Through this project the city aims to implement infrastructure projects by including cleaner and more efficient technologies and also to monitor GHG reductions to showcase benefits. Possible interventions have been identified in the water supply, sewage and transportation sectors.

Photo: ICLEI SA

A model of a hybrid wind-solar PV system educates visitors to Coimbatore's REEERC.

Importance of an external consultant for each project: External consultants lend a transparency to the process of conducting an audit. External consultants allow cities to see their operations from a different perspective, bringing up innovative solutions that may not be immediately apparent.

Replication

Coimbatore is committed to the process of assessment before action.

Photo: ICLEI SA

The CMC and NMC engineers in discussion during a city exchange visit facilitated by the Local Renewables project in Coimbatore in 2010.

Understanding their energy consumption scenario enabled the city to identify the most appropriate interventions and helped with priority setting of the interventions required. Thus, in its logical and sound approach the program is easily replicable by other local governments.

Learning from others: In April 2010, an exchange event was held for the cities of Nagpur and Coimbatore in Coimbatore as part of the Local Renewables Model Communities Network project. During this time, the cities were able to exchange information and experiences about various initiatives being undertaken by each in the field of renewable energy and energy efficiency. The NMC's experiences of the water sector energy audit were of great interest to Coimbatore, and helped to further shape their tubewell energy audit. The exchange meeting was organized by the Coimbatore Resource Center.

Budget and finances

The various projects were funded by different sources. Complementing the funds provided by external agencies, the CMC showed their commitment by undertaking efficiency projects with their own funds: for example, at the Mettupalayam Road bus stand, where the energy efficient fittings were financed solely by the CMC. The solar power back up system at the CMC was funded entirely by the Local Renewables project for a total cost of 539,600 INR (7972 EUR), while the wind and solar PV hybrid system at the new bus stand was funded by two agencies – the US DoS funded Urban Climate project, and the GTZ/ BMZ funded Local Renewables project – for a total cost of 531,000 INR (8,586 EUR).

Local Renewables project materials

India

Bhubaneswar, Nagpur and Coimbatore City Completion Reports
Case Study # 108: Pioneering renewable energy and energy efficiency application in India's municipal health sector in Bhubaneswar
Case Study #109: Installation of energy efficient lighting at the Lord Lingaraj Temple in Bhubaneswar
Case Study # 110: Water sector audit enables efficient use of water and energy resources in Napgur
Case Study # 111: Reducing carbon emissions while improving Coimbatore's municipal public services

Brazil

Betim and Porto Alegre City Completion Reports
Case Study # 112: Solar heaters in low income housing: Energy and financial savings in Betim
Case Study # 113: Stakeholder involvement groups for Local Renewables in Betim and Porto Alegre
Case Study # 114 Portuguese: Energia Solar é Incentivada em Lei sobre Compensação Vegetal em Porto Alegre
Case Study # 115 Portuguese: Cemig leva Eenergia Elétrica elétrica chega à a comunidade de baixa renda com apoio do CRER Betim

Global

Case Study #104: Freiburg, Germany: Long-term strategies for climate protection in Green City Freiburg
Case Study # 116: Växjö, Sweden: Becoming Fossil Fuel Free with citizen and stakeholder involvement
Case Study # 117: Milan, Italy: Improving the district heating system with RE and EE

Further case studies about energy efficiency and renewable energy in India, Brazil and the European Resource Cities, as well as city completion reports for the Local Renewables project are available on the project website.
www.iclei.org/local-renewables

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*taking over from the former International Training Center which was the Local Renewables project manager.

Sources

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- 'JnNURM Mission Overview', Ministry of Urban Development, Government of India, 2006
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- http://www.iclei.org/index.php?id=8337
- 'Energy efficient lighting system: Mettupalayam road bus stand', ICLEI SA, 2009
- 'Renewable energy system for Coimbatore public bus stand', ICLEI SA, 2010
- 'Rooftop solar power back up for Coimbatore Municipal Corporation', ICLEI SA, 2009
- 'Report on pilot energy audit of tube wells', ICLEI SA, 2010

Acknowledgements

We would like to thank:

- Mr. Anshul Mishra, Municipal Commissioner and Mr. Lakshmanan, Executive Engineer, CMC for their contributions towards information in this case study and for their enthusiastic involvement in the Local Renewables project in Coimbatore;
- the staff at Coimbatore Municipal Corporation, including the Honourable Mayor and the Municipal Commissioner for their enthusiastic support and interest in the entire Local Renewables project; and
- the German Federal Ministry for Economic Cooperation and Development (BMZ) through the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH.

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