

Impact of Cool Roofs on Reducing India's Electricity Demand

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Project Motivation

Motivation:

- Many urban areas are characterized by higher temperatures (commonly referred to as urban heat islands) and consequent higher ozone concentrations.
- Summertime urban heat islands are caused primarily by darker (sun absorbing) urban surfaces (roofs and pavements) and lack of vegetation.

Demonstrated Solution:

- For North American cities, LBNL has demonstrated that the use of lighter, more reflective surfaces reduces air conditioning loads and increases occupant comfort.
- Further, LBNL has estimated, through air pollution modeling, that such measures retard the formation of ozone.



Project Objective

- Transfer heat island mitigation technologies and best practices to India
- Establish proof-of-concept in India
- Demonstrate air conditioning load savings through measurements in a building
- Conduct simulation studies to estimate reduction in urban temperatures in an Indian city -- Hyderabad



Demonstration of A/C Electricity Savings

- Goal
 - Demonstrate energy and peak demand savings
- Building choice
 - Two identical buildings at Satyam Training Centre with separate AC for top floor
- Demonstration activities
 - Monitor electricity use, heat flux, and surface temperatures in parallel and series experiments for (1) concrete to white, (2) concrete to black, and (3) black to white



Satyam Training Centre Result: Up to 20% reduction in air conditioning electricity use when switching from black to white roofs



Potential A/C Savings of Cool Roofs in India

- Median number of cooling degree days (CDDs) across 53 major Indian cities are about the same (3300 CDDs) as those for Hyderabad.
- Hyderabad experiment
 - Cool roofs can reduce AC load by about 15 kWh/m²/year
- Construction of shopping malls is projected to add
 - 7.3 million meter square of new space by 2008 in 15 major cities
- Cool roofs installed in these new malls could save
 - 7 - 16 MW, and 19 - 43 GWh/year.
 - The lower and higher values assume on average that 50% and 75% of the buildings are air conditioned and they are three- or two-storied respectively.
- Cool roofs installed on all commercial real estate could save
 - Between 75 - 170 MW and 190 - 450 GWh/year by 2010.



Thank You

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