

# Energy efficiency of Biological Sciences Laboratory building at IIT (Indian Institute of Technology), Kanpur

[Sponsor: Indian Institute of Technology, Kanpur]

## Executive summary

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This project involved energy consultancy services to the Indian Institute of Technology, Kanpur, for incorporating energy efficiency measures and renewable energy technologies in their Centre for Biological Sciences and Bio-Engineering building. M/S Kanvinde Rai and Chaudhury were the architects for the project. The building consists of laboratories for biosciences and engineering, faculty rooms, instrumentation rooms, offices, a seminar hall, and other support areas spread over three floors including a basement for services. The approximate covered area of the building is about 59 955 ft<sup>2</sup> (5570 m<sup>2</sup>) located on the campus of the Indian Institute of Technology, Kanpur.

The building was already under construction with the design approved and finalized when TERI (The Energy and Resources Institute) was involved to look into possible energy saving options. The primary objective of the study was to look into the options, which could reduce operating costs for the air conditioning and lighting systems, and yet meet the desired/recommended thermal and visual comfort levels. Within the given framework, the following emerged as possible interventions, which could be studied for their viability.

- Insulation of the exterior walls/corridor walls of the building and exposed roof surface
- Efficient glazing for exposed glazed surfaces
- Corridor ventilation by induced draft
- Appropriate shading of exposed walls
- Efficient lighting design with integrated daylighting
- Pre-cooling of fresh air input to AHUs (air handling unit) by solar passive techniques
- Efficient HVAC (heating, ventilation, air conditioning) system with controls

A 40% reduction over the initial estimated load was achieved by providing wall and roof insulation, energy efficiency lighting with integrated daylighting, efficient glazing system, and an earth air tunnel for pre-cooling ambient air. The estimated excess initial

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investment on account of energy efficiency measures was calculated on a payback period of one year only.

Building-integrated photovoltaic cells (3 kWp) are installed on the atrium's roof and cater to certain essential loads.