Indian Institute of Technology

Location: Kanpur, Uttar Pradesh
Site area: 17345 m²
Built-up area: 4240 m²
Air-conditioned area: 1912 m²
Non Air-conditioned area: 2328 m²
Energy consumption reduction: 41% reduction from GRIHA benchmark
Water consumption reduction: 70% reduction from GRIHA benchmark
EPI: 45.43 KWh/ m²/year
Renewable energy installed on site: 13.86 KW
GRIHA rating: 5 Stars

The following strategies were adopted to reduce the impact of the proposed building on natural environment:

 Sustainable Site Planning:
  • Dust screens provided around construction area to prevent air pollution.
  • Top soil stored and preserved for later use.
  • Existing trees preserved & protected on site.

 Reduction in water consumption (compared to GRIHA benchmark):
  • Existing trees preserved & protected on site.
  • 62% reduction in building water consumption by use of low-flow fixtures.
  • 50% reduction in landscape water consumption by minimizing lawn area and planting native species of trees and shrubs.
  • Only 17% paved area to promote water percolation and reduce heat island effect.
  • Rain water harvesting system designed for reuse and recharge.
  • Waste water treated and reused for landscape water requirement.

 Reduction in energy consumption (compared to GRIHA benchmark) while maintaining occupant comfort:
  • For achieving visual comfort
    • 40% window to wall ratio for optimal natural lighting.
    • External shading and efficient glazing systems to reduce solar heat gain and glare-free day-light.
    • ECBC compliant energy efficient artificial lighting design.
    • Day lighting in common circulation areas through integration of skylights.
  • For achieving thermal comfort
    • Day lighting in common circulation areas through integration of skylights.
    • Optimization of building design as per local climate of Kanpur via sun path analysis, predominant wind direction, and existing vegetation.
    • ECBC compliant building envelope to reduce space conditioning loads in AC spaces and to meet thermal comfort in non-AC spaces.
    • Natural ventilation in common areas through integration of ventilators.
    • Roof shaded by bamboo trellis and solar panels to reduce direct solar heat gain.
    • Water cooled chiller as per system efficiency recommended in ECBC
    • VFD (Variable Frequency Drives) installed in AHUs (Air Handling Units)
    • Low energy strategies include integration of external water body to cool condenser water loop, integration of thermal energy storage and earth air tunnels to reduce chiller capacity.

 Renewable energy technologies installed on site:
  • 30% annual energy requirement for internal artificial lighting met by solar energy.
  • 100% annual energy requirement for hot water met by solar thermal hot water systems.
  • Use of low-energy/green materials:
    • Portland Pozzolona Cement with fly-ash to reduce embodied energy of the building

Integrated Design Team:
Architect: Kanvinde Rai and Chowdhury Architects and
Landscape Design: Mr Yogesh Kapoor
Mechanical/Electrical/Plumbing: Kanwar Krishen Associates Pvt. Ltd.
Green Building Design & Energy Consultant: The Energy and Resources Institute
HVAC consultant: Gupta Consultants and Associates