



New Atmospheric Research Facility at NARL

Location	: Gadanki, Andhra Pradesh
Site Area	: 1750 m ²
Built up Area	: 1300 m ²
Air-conditioned Area	: 1105.1 m ²
Non Air-conditioned Area	: 558.2 m ²
Typology	: Institutional
Energy consumption reduction	: 73.63% reduction in energy consumption compared to GRIHA benchmark
Energy Performance Index (EPI)	: 36.91 kWh/m ² /year
Renewable Energy	: Rated capacity of solar PV installed is 50 kWp
GRIHA provisional rating	: 4 Stars
Year of Completion	: 2014

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

🌱 Sustainable Site Planning:

- 3 meters high barricading was constructed all around the site to prevent air pollution.
- All the 5 existing mature trees were preserved and 6 new native species of trees were planted.
- Major portion of the habitable areas of building were oriented along North and East façade to maximize thermal comfort.
- Systematic site management practice was followed for construction activities ensuring minimum damage to the existing topography of site.
- The building levels followed the natural site contours, thus minimizing cut and fill on site.

💧 Water management:

- Reduction of 59.87% from the GRIHA base case has been demonstrated in building water use by installing water efficient flush and flow fixtures.
- Reduction of 46.33% from the GRIHA base case has been demonstrated in landscape water demand through use of native shrubs and trees, drip irrigation system and minimizing turf area on site.
- Construction water consumption was reduced by use of wet hessian clothes for curing of RCC members and ponding technique for curing of slabs during construction.

⚡ Energy Optimization:

- Rat trap bond walls were constructed using clay blocks which are thermally breathable ensuring reduced conduction of heat from the building.
- Window to wall ratio has been maintained at 16%.
- Glass installed in the building has a low Solar Heat Gain Coefficient value of 0.37 which in combination with the shading devices has reduced the heat gain into the building. The corresponding Visual Light Transmission of the glass is 48% which helps in bringing in diffused daylight into the living spaces.
- 73.1% of the habitable spaces are day lit and meet the daylight factors as prescribed by the National Building Code of India.
- Lighting power density has been reduced against ECBC prescribed values with the use of efficient lighting fixtures like T5 and LEDs ensuring reduction in lighting consumption while emitting less heat in turn reducing the air conditioning consumption.
- 50 kWp solar PV panels have been installed on site which meets 69.6% of connected load (lighting and HVAC).
- 75725 kWh of energy is generated annually by the renewable energy system which meets 100% of the energy requirement of internal building lighting.

🏠 Sustainable building materials:

- Rat trap bond technique has been adopted to optimize the amount of building materials used in wall construction, thus reducing embodied energy of the building.
- All the paints and adhesives used in the project have low volatile organic compound content.
- Insulation, refrigerant and fire-fighting system used in the building have no ozone depletion potential components.

Integrated Design Team:

Client	: National Atmospheric Research Laboratory
Project Coordinator	: National Atmospheric Research Laboratory
Principal Architect	: Indian Space Research Organization
Landscape Architect	: Indian Space Research Organization
Project Management Consultant	: National Atmospheric Research Laboratory
Structural Consultant	: Indian Space Research Organization
Electrical Consultant	: Indian Space Research Organization
Green Building Design and Certification	: The Energy and Resources Institute