Case Study of Energy Efficient Building

Arpit Kumar

M.Tech, Hill Area Development Engineering, Department of Civil and Environmental Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur, Uttar Pradesh, India

Abstract: **- In India, there's excessive energy consumption in buildings with much less attention to building energy efficiency. All of these statistics prove that there are wonderful potentialities in power conservation. On account of this, this case study introduces multiple building energy-saving technologies at domestic and abroad, inclusive of the technologies for modern wall materials, exterior wall external insulation, heat insulation of window, utilization of solar energy, warmth storage and restoration as properly as the illumination energy saving technology. On the foundation of new buildings, this paper gives some suggestions on building energy efficiency. Meanwhile it raises energy conservation based on the existing building, for which it offers purposely the technologies and measures about energy saving transformation from 4 aspects energy, land, water and materials.**

Keywords: **- Building Energy Efficiency, solar energy, material, consumption, heat insulation**

I. CASE STUDY

Case study of energy efficient building " Architect's house, Gokhle Marg, Lucknow, u.p."

General information

Residence name: The architect's house

Location: Lucknow

Climate: Humid subtropical

Area of the building: 548.55 sqm

Building design features:

The building was conceived with the center idea of giving back to environment and developing a self-sustaining structure which can house all the comforts of a home.

- The key point taken in consideration:

1. Efficient site selection & planning.
2. Water conservation
3. Energy conservation
4. Material conservation
5. Enhancing the indoor environment quality

II. SITE PLANNING

2.1 South facade with air gap and stone cladding.

- Air gap is provided to south direction it passes the heat and airto reduces solar heat gain from south.
- Stone cladding in south direction will reduce the maximum heat gain in the interiors of building.

2.2 Central stair for the entire house.

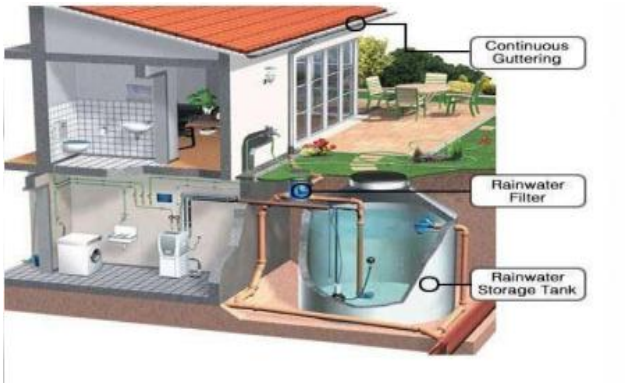
- Gap between the steps passes the air and light.
- It provides proper ventilation and helps in the reduction of consumption of electrical energy for lighting at this particular location.
- Keeps the lower floors of the house cooler.

2.3 Green Roof

- A **green roof** is a **roof** of a building that is partially or completely covered with grasses and a growing medium, planted over a water proofing membrane.
- Green roofs serve several purposes for a building, such as absorbing rainwater, providing insulation, pleasing landscape, and helping to lower urban air temperatures.
- Reduce air-conditioning costs.

III. WATER CONSERVATION

3.1 Rain Water Harvesting



- It is a system of catching rainwater where it falls. In rooftop harvesting, the roof becomes the catchments, and the rainwater is collected from the roof of the building. It can either be stored in a tank or diverted to artificial recharge system. This method is less expensiveand very effective and if implemented properly helps in augmenting the groundwater level of the area.
- Recycled water used for gardening and washing purposes.

IV. ENERGY CONSERVATION

4.1 Lightings and sensor

- LED lighting
- Automated sensor driven technology
  - A sensor is defined as a device that converts a physical stimulus into a readable output. The detection and measurement of some physical effect provides information to the control system regarding a related property of the system under control, which we are interested in regulating to within some ‘set point’ range.
  - The controller outputs a command to an actuator (a valve, for example) to correct for measured deviations from the set point, and the control loop is thereby closed.

60% reduction in lighting loads.

***4.2** Solar water heater*

Provides up to 500 L hot water per day

- We are using free energy! Solar energy is free and abundant (by cost)
- They are efficient. Approximately 80% radiation is turned into heat energy.
- We save money on fuel bills.

4.3 Low e- glass for glazing

This is where **low emissivity** (or **low-e glass**) coatings come into play. **Low-E glass** has a

- microscopically thin,
- transparent coating
- it is much thinner than a human hair
- that reflects long-wave infrared energy (or heat).
- Some **low-e's** also reflect significant amounts of short-wave solar infrared energy.

Reduces solar heat gain and keeps the interiors cool.

V. MATERIAL CONSERVATION

5.1 Use of foam concrete blocks (AAC blocks)

AAC blocks is a lightweight, precast, foam concrete building material invented in the mid-1920s that simultaneously provides structure, insulation, and fire- and mold-resistance.

- Eliminates the use of conventional fire burnt bricks.
- Larger size blocks leads to faster masonry work.
- Reduces the cost of the project
- Improved thermal efficiency reduces the heating and cooling load in buildings.
- Porous structure allows for superior fire resistance.

VI. PROJECTED SAVINGS

With the use of this given technology the use of energy consumption get reduces as well as the project become economical.

Savings are projected as follows….

1.

Criteria	capacity	%reduction (projection)	Annual energy saving (projected-INR)
Solar water heater	500 L/ day	100	40, 000 - 50, 000

2. 60% reduction in lighting loads.

3.

PROJECT	BUILT – UP AREA (m2)	NON – GREEN BUILDING(kWh / month)	GREEN BUILDING (projected energy consumption - kWh/ month)	% Reduction (projected)	Annual energy savings (projected INR)
RESIDENCE	548.55	2350	1650	30	50400

VII. CONCLUSION

The construction industry in India is one of the largest financial activities. As the area is developing rapidly, keeping the environment poses lot of challenges and at the identical time provides opportunities for more than a few humans involve in this industry. The sustainable construction is the advent and operation of a healthy, resource-efficient constructed surroundings based totally on ecological principles. Its control efficiency, environmental protection, and waste minimization. Energy efficiency is one of the simplest, quickest, cheapest, cleanest approaches to address resource and environmental challenges. Appropriate information and technology is handy for growing electricity environment friendly and green buildings but behavioral, organizational and financial boundaries want to be overcome for attaining preferred results.

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