# Green Smart Building: Requisites, Architecture, Challenges, and Use Cases

Piiush Kanti Dutta Pramanik • Bulbul Mukherjee • Saurabh Pal • Tanmoy Pal • Simar Preet Singh

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## Abstract

Non-sustainable buildings have threatened the ecosystem globally, and this paper discusses how buildings can be made green and smart. It suggests merging green and smart technologies to have a green smart building (GSB) with the aim of offering the populations a smart and eco-friendly living. The GSB concept is discussed in detail, supported with architectural models and communication architecture. A few cases have been presented showing practical applications of Green and smart technologies in buildings.

## Key Factors of a Green Building

Making green building needs to consider certain key factors like the material used for construction, energy sources, and management. Each key factor has effective roles which are being discussed subsequently.

## What Is a Green Building?

A green building in generic could be said as one whose life-cycle focuses on reducing the negative impact on nature through better design, siting, construction, operation, maintenance, and better waste management.

## Energy Systems

The efficient design of the energy system is an important clause for making a building green. If natural light is utilized methodically, it can reduce the electricity cost and ameliorate the people's health and productivity. Low energy appliances, energy efficient lighting and also some renewable energy technologies can be incorporated in the green building.

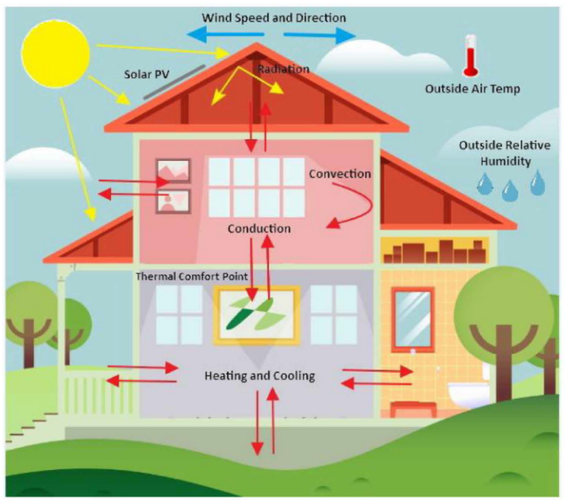


Figure 1. Heating and cooling effect in a building

## Passive Solar Design

The concept of passive solar design is used to heat, cool and light homes without the use of electrical or mechanical devices. Figure 2 shows a typical house model with sunshade, panels, heat absorbents, and skylights used to capture and distribute natural heat and light.

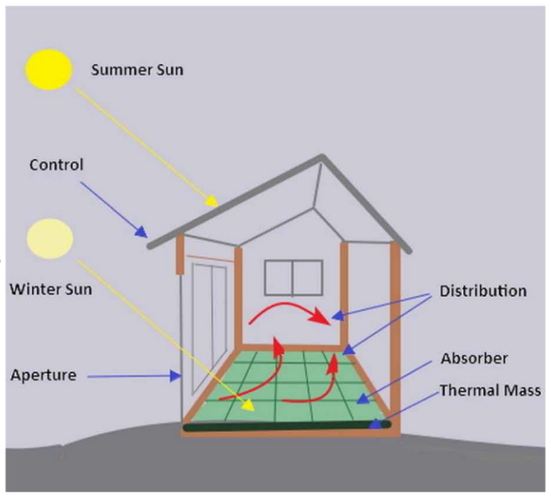


Figure 2. Elements of passive solar design

## Green Building Lifecycle

A building typically has four phases which correspond to different activities of the lifecycle of the building as shown below:

- Pre-Building Phase Design
- Building Phase Construction
- Post-Building Phase Operation and maintenance Demolition and disposal

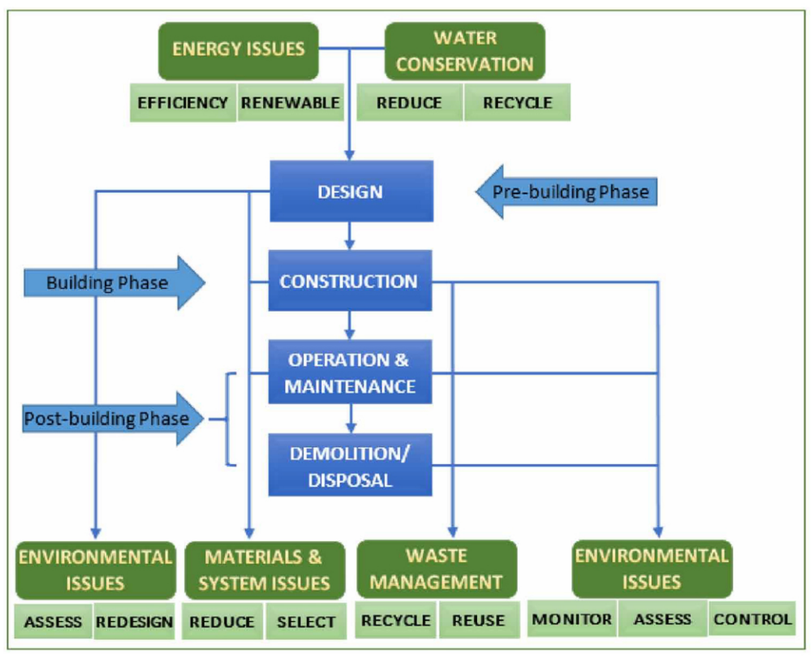


Figure 3. Lifecycle of a green building construction and management

## Benefits of Green Building

- Low Maintenance and Operation Cost
- Water Efficiency
- Material Efficiency
- Escalate the Indoor Environment Quality
- Health Benefits


Figure 4. Dimensions of sustainability of green buildings

## Methodology

The methodology of this research is based upon a general overview on applying "Green Architecture " as a concept of sustainability, specially in office building because the energy needs to operate this type is large.

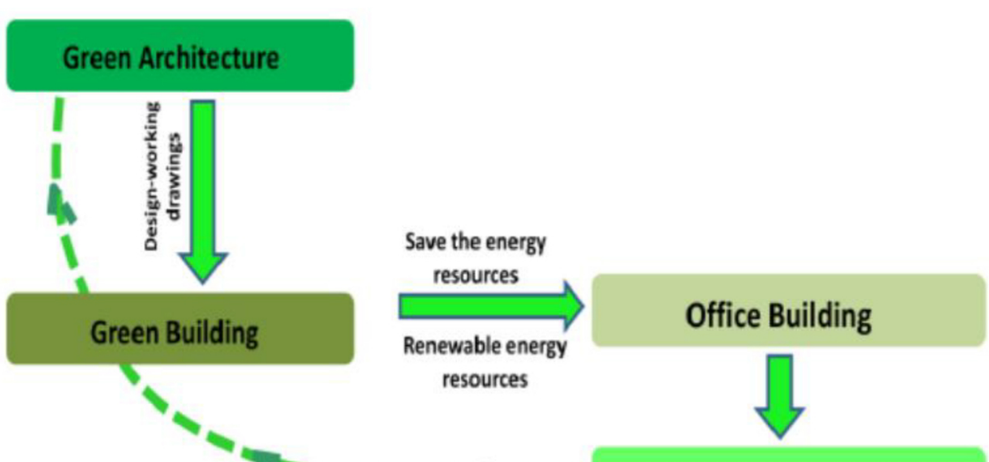


Figure 5. Methodology of the research

## Methods and ways to reduce energy consumption in the office building

Can be divided into two main components, namely work on the rationalization of energy consumption in buildings office operating through some architectural styles and treatments, as well as the exploitation of renewable energy sources on the site of the sun and wind and other renewable sources.

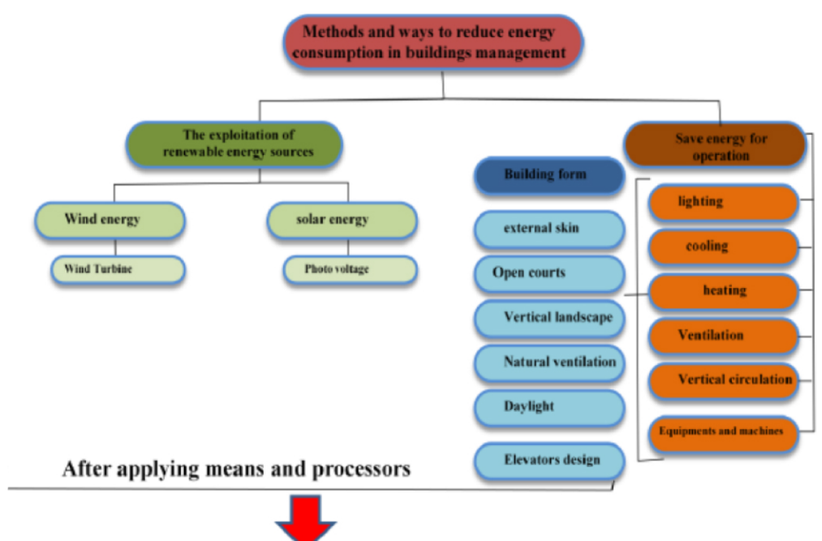


Figure 6. Methods and ways to reduce energy consumption in buildings management