



Research on the Application of Green Building

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ABSTRACT

Green building has an important impact on building design, so it should be emphasized. The application of the green building design concept to housing design can better improve the design effect. But the use of the green building design concept needs to follow certain principles, to better serve the construction industry. According to the related concepts in the development of green building design, and combined with practice, this paper briefly analyzes the application of the green building concept in housing design. It provides some references for the development of the construction industry.

1. Introduction

Green buildings are structures having positive impacts on our environment. These buildings are eco-friendly and contain non-toxic materials. Materials used in Green buildings are obtained from natural, renewable resources that have been managed and harvested sustainably. Sustainable development is to make the world a better place for everyone without destroying the possibilities for the next generation.

2. Concept of green building

Green building is a whole-systems approach for designing and constructing buildings that conserve energy, water, and material resources and are more healthy, safe, and comfortable. Many think of solar panels when they think of “green” buildings. The reality is that environmentally sustainable building goes far beyond energy consumption. Building materials and the use of landfills during construction can have detrimental effects on volunteers, homeowners, and the environment.

Green building offers a response to the realization that the way we have been building everything from houses to skyscrapers is not sustainable. Many health problems today stem from or are aggravated by poor indoor air quality and exposure to toxic substances contained in commonly used building products. Green building practices can eliminate these health-damaging conditions.

3. Why Do We Need Green Building Technologies?

We are a country of 1.2 Billion People and counting ... 31% percent of the Indian population lives in Urban Areas 700% increase in commercial energy consumption in the last four decades and the numbers are growingEnergy consumption in India will touch 4 trillion units by 2030 There is a shortage of average 225 million liters water per day in major Indian Cities, and an alarming 21 Indian cities are estimated to run out of water by 2030 Startling facts, aren't they? Well, undoubtedly, Green Building Construction presents one big solution to this unsustainable growth. By now we all know, that a green building is a structure that is designed, built, renovated, operated, or reused in an environmentally friendly and resource-efficient manner. In addition to that, these buildings are designed to meet certain critical objectives like:

3.1 Protecting Occupant Health

3.2 Improving Employee Productivity

3.3 Conservation of Energy, Water, And Other Fast Depleting Resources

3.4 Reduce the Use of Energy, Water, And Other Fast Depleting Resources

3.5 Lower Carbon Footprint

3.6 Reducing the Overall Impact to The Environment

3.7 Green building technology can help in efficiently achieving these objectives.

4. Different Types of Green Building Technologies

4.1 Net zero Concepts

A net-zero energy (NZE) building relies on renewable sources to produce as much energy as it uses, usually as measured over a year. Net-zero energy buildings start with energy-conscious design. Many features work without an energy source. For example, in cold climates, south-facing buildings with large expanses of windows on that side can produce well over 50% of their heat through passive solar gain. On the cold north side of the building, smaller windows can angle to wider openings, permitting more light while limiting heat loss. In warmer seasons, passive ventilation systems can pull cool air up from the lower levels and vent it through the building's highest point. Rooftop systems can collect rainwater to reduce the usage of treated water. Solar panels, heat recovery systems, geothermal heating, and wind turbines are among the other technologies used to achieve net-zero status.¹ Net Zero Concepts

4.2 Low-Emitting Materials

Selecting low emitting materials and products not only improves human health but also goes long way in protecting the overall environment. In addition to that, it also helps the building projects achieve Green building credits from agencies like LEED, IGBC, and GRIHA, hence it is an important consideration in today's design and construction world.

In general, low-emitting materials credit applies to a very wide range of building products which include the following:

1. Interior paints and coatings applied on-site
2. Interior adhesives and sealants applied on-site
3. Flooring
4. Composite wood
5. Ceilings
6. Walls

Thermal and acoustic insulation In addition to the above, it also applies to the commercial and residential furnishings which later fill the living spaces. The reduction or no use of low emitting materials is better for the environment, for indoor air quality, and is approved for use around people with environmental sensitivities.

One of the best examples of low emitting building materials used is Wienerberger's environmentally friendly yet technologically advanced specialized clay bricks under the brand Porotherm. The design of the product itself has been made keeping sustainability in mind with optimal usage of natural resources and energy with a very high level of automation enabling large-scale production to cater to the growing demand from this segment.

4.3 Cool Roofs

The effect a roof can have on energy is often ignored, the impression of which can be momentous. In winter, inadequate or damaged roof insulation allows heat to easily escape and during summers, heat gained through the roof not only upsurges the cooling load but also increases the electricity demands.

A cool roof is one sustainable green building technology that aims at reflecting the heat and sunlight away. It helps largely in keeping the buildings at standard room temperatures by depressing heat absorption and thermal emittance. Simply put, they reflect more of the sun's rays than average shingle roofs and avert the warm/cool air inside the home from escaping through the top of a building.

The typical design of cool roofs makes use of special tiles and reflective paints which absorb less heat and also reflect most of the solar radiation away. Typically, cool roofs easily reduce temperatures by more the 50 degrees Celsius during the summer months. Cool roofs help in

minimizing the dependence on air conditioning systems, which in turn helps in reducing the energy use and lowering greenhouse gas emissions that result from powering our heating and cooling.

Cool roofs can be constructed with several materials, including special reflective paint and cool roof shingles and tiles. Check out Wienerberger's Clay Roof Solution, it's one of the most environmentally responsible roofing materials

4.4 Solar Power

As a kind of clean and pollution-free renewable energy, solar energy has fully demonstrated its superiority and is receiving more and more attention. Reasonable use of solar energy can effectively save non-renewable energy, slow down the speed of global climate warming, and reduce environmental pollution.

4.4.1 Active Solar Power – This system is the use of functional solar systems which absorb the sun’s radiation to provide heating and electricity provision. It helps in reducing the need for gas or electricity. While the upfront installation costs are higher in such systems, in the long run, it saves on energy bills and also aids in reducing greenhouse gas emissions from non-renewable energy sources like fossil fuels.

4.4.2 Passive Solar Power – This design uses the sun’s rays to warm homes through the strategic placement of windows and the use of heat-absorbing surfaces. The windows allow energy in and the heat absorbed reduces the need for warming the house during the cold winter months.

According to EnergySavers, the more we demand solar for our energy needs, the fewer greenhouse gases we will produce from using non-renewable energy sources. Note, that the efficiency of the solar panels varies largely based on the size of the system and also on the local climate. But again, if given the correct conditions, a solar system will make up for all the up-front costs of installation in the long run with years of free energy

5. Advantages of green buildings

5.1 Cost: The construction costs are the same as a standard building and sometimes they cost a little bit more as they require special materials to be built. However, regular building costs won’t stop after its construction since money will always be spent on maintenance, renovation, operation, or even demolition.

This doesn’t mean that green buildings won’t need maintenance, renovation, operation, or even demolition as well, but are built of natural resources all that re-doing stuff will take ages till done as they are not damaged that fast hence, investing in green building is 10 times more profitable than standard ones.

5.2 Efficiency: This here is divided into the following:-

5.3 Water efficiency: Green buildings don’t know the meaning of “wasted”, they recycle rainwater and grey water and use them for toilet flushing for instance.

Energy Efficiency: These buildings save energy more than those built out of bricks. They only depend on all renewable energy resources such as solar power, hydro-power, and wind power which are used for heat and electricity and help improve the indoor air quality.

Material Efficiency: Green buildings are built from natural, non-toxic and recycled materials that don’t cost much and are Eco-friendly such as bamboo, straw, recycled metal, or concrete

5.4 Preserving infrastructure: Being efficient in both energy and water supply, these buildings stretch the capacity of local infrastructure greatly.

5.5 High ROI rates: Considering that these buildings are all-natural, they have a huge return on investment rates and properties in these buildings sell at high prices.

6. Disadvantages of green buildings

6.1. Location: Since these buildings depend on the sun for energy, they need to be located in a position that will have the best sun exposure which may demand placing them opposite other neighborhood homes.

6.2 Availability: The materials to build such buildings can be hard to find especially in urban areas where preserving the environment is not the people’s first option. So, shipping these materials can then cost a lot more than a standard building.

6.3 No air-cooling features: These buildings run on heat to generate power, so they are not designed for hot areas as they do not have any ventilation systems, so air conditioners will be required which will make these buildings anything but Eco-friendly.

6.4 A long time to construct: Buildings require a longer time to be built and designed: Green building designs adopt a special method that takes into account the surrounding environmental conditions.

7. CONCLUSION

The environmental benefits of Green construction are obvious, but there are other compelling reasons to implement green building technologies which may not immediately come to mind. One example is – Additional business opportunities that come from appealing to an ever-growing pool of environmentally conscious consumers.

Green buildings make a lot of business sense, as it starts paying off good ROI within 3-4 years. Well, though the use of new technology might look like some additional effort and investments, the rewards of these are far higher and more satisfying.

The use of Green building technology aids the green efforts, benefiting the workforce and society as a whole, reducing operating costs, and elevating your brand value.

8. References

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