CAREER POINT UNIVERSITY HAMIRPUR

CPUH-Research Journal: **2018**, *3(2)*, 65-68
ISSN (Online): 2455-6076
http://www.cpuh.in/academics/academic_journals.php

Green Building Solution and Sustainable Design

Manoj Dhurwey, Vedprakash Patel, Binit Kumar Ekka,
Akshay Kumar Lakra, Ahsan Rabbani*
Department of Civil Engineering, Kalinga University, Raipur (C.G)-INDIA
**Email: rabbani.ahsan@gmail.com*

ABSTRACT: Green building also known as sustainable building refers to both a structure and the application of process that an environmentally responsible and resource efficient throughout a building life cycle from planning to design construction, maintenance, and renovation. In this research work cement is replaced by fly ash, because cement releases CO_2which is harmful for human and environment. LED lights are used which are more energy efficient. Bamboo used for the construction of boundary wall, partition wall, garden wall and entry gate. For heat insulation purpose green or blue color paints used in the building. Large amount of solar system used to reduce consumption of electricity. Cross ventilation are provided on each room of the building so that outdoor air can reach inside the room very easily. Gardening is done near the building. Rain water harvesting is done on the top of the roof and the stored water is utilized for watering in the garden, washing the floors of the building and in washroom. Fulfilling the needs of today giving priority to tne needs of tomorrow. This noble concept of sustainable development is practised through green buildings. Green buildings are thus tomorrow's needs and not todays luxury.

Keywords: Green Building; renewable; renovation; sustainable

INTRODUCTION

Buildings account for more than 40% of all global carbon dioxide emission, one of the main culprits implicated in the phenomenon of global warming in which India comes on 144th position (1.4 metric ton) in carbon emission rating in the world. Green building is the practice of constructing or modifying structures to be environmentally responsible, sustainable and resource-efficient throughout their life cycle. This includes efficiently using energy, water and other natural resources, protecting occupant health, improving employee productivity and reducing waste, pollution and environmental degradation. Green buildings accounts for improving environmental foot print by reducing energy use by 30-5-%, CO2 emissions by 35%, waste output by 70% and water usage by 40%.

Since the early nineties (Kibert, 2012; Yudelson, 2007), green or sustainable building has attracted a worldwide attention from both researchers and practitioners (Li, Yang, & Lam, 2013). The Green Building approach, unlike the conventional (non-green) building approach, aims at designing, constructing, and operating a building with minimal use of resources (Kubba, 2010; Wedding, 2008; Zigenfus, 2008). Hong Kong Green Building Council (HKGBC) (2015) wrote that the main idea behind GB is to minimize unfavorable impacts of buildings on the environment through three underlying processes: lifecycle planning of a building, efficient use of resources, and environmental waste and pollution reduction. Additionally, Sangster (2006) emphasized that the main objectives of GB are to: minimize environmental disturbances and waste generation; minimize energy and other resources utilization; boost renewable energy usage; and improve human health and comfort. Usually, principles such as sustainable site development, water-efficiency, energy-efficiency, reduced material resources consumption and indoor environmental quality are used to judge GBs (Gou, Lau, & Prasad, 2013). From the above definitions, it is clear that "GBs are examples of applied ecology, where designers understand the constitution, organization, and structure of ecosystems, and the impacts of architecture are considered from an environmental perspective" (Zhai, Wang, Dai, Wu, & Ma, 2008, p. 1904). As Ahmad, Thaheem, and Anwar (2016) suggested, energy-efficiency, reduced maintenance and operation costs, and extended lifespan of GBs are the main factors driving their adoption. These definitions suggest that GB presents a promising contractual approach for the construction industry to contribute to sustainable development.

Public concerns about the impacts of the construction industry on human health and energy use, and global climate change have made GB a popular field of research (US Green Building Council (USGBC) Research Committee, 2008).). In the literature, the terms green buildings (GBs), sustainable buildings, high-performance buildings, sustainable construction, green construction, and high-performance construction are interchangeably used (Kats, Alevantis, Berman, Mills, & Perlman, 2003; Kibert, 2012; USGBC Research Committee., 2008; Woolley, Kimmins, Harrison, &Harrison, 2002), and with numerous definitions (Comstock, Garrigan, & Pouffary, 2012; Kibert, 2007).Reduction of the effects or rather the sides effects of the stucture the environment. Improving and enhancing the health condition of the occupants in a structure.Saving and returns on investment to the investor and the community.Life cycle consideration during the planning and development process. Con-

struction industry is one of the most rapidly developing processes.
LEED, or Leadership in Energy and Environmental Design, is the most widely used green building rating system in the world. Available for virtually all building, community and home project types, LEED provides a framework to create healthy, highly efficient and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement.

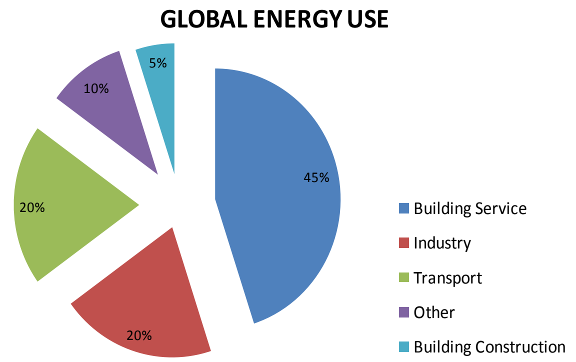

Fig.1 Global energy use

In global energy use 45% energy is used in building serviece, 20% energy in industry, 20% used in transport, 5% used in building construction and rest of the 10% energy used for other purposes.

MATERIALS AND METHODS

In this project we are use timber and fly ash brick, green concrete

Timber

Timber is very cheap building material as compare to concrete content. Cement contains carbon contents which are hazard human health and environment. Timber provides a varied and flexible material for many industries. It's primarily used in construction as structural support, for internal fixtures and external cladding. However, the immense flexibility of this material means it's got a great many other uses.

Fig. 2 Timber house

Fly Ash Brick

Manufactured by mixing Quarry Dust / River Sand , stone aggregates less than 6mm in Size, Cement and Fly Ash (Fly Ash quantity will be 10% to 20% of Cement). Normally the actual cement quantity required will be replaced with 10% to 20% Fly Ash. Any brick contains cement will increase the heat inside building. For the production of one Metric Ton of Cement equal quantity of CO2 (Carbon di Oxide) will also get generated, so polluting the atmosphere.

Fig.3 Fly Ash Brick

Green concrete

Geo-polymer concrete, or green concrete, is part of a movement to create construction materials that have a reduced impact on the environment. It is made from a combination of an inorganic polymer and 25 to 100 percent industrial waste. Green concrete gains strength faster and has a lower rate of shrinkage than concrete made only from Portland cement. In order to make Portland cement–one of the main ingredients in ordinary cement–pulverized limestone, clay, and sand are heated to 1450 degrees C using natural gas or coal as a fuel. This process is responsible for 5 to 8 percent of all carbon dioxide (CO_2) emissions worldwide. The manufacturing of green concrete releases has up to 80 percent fewer CO_2 emissions. As a part of a global effort to reduce emissions, switching over completely to using green concrete for construction will help considerably.

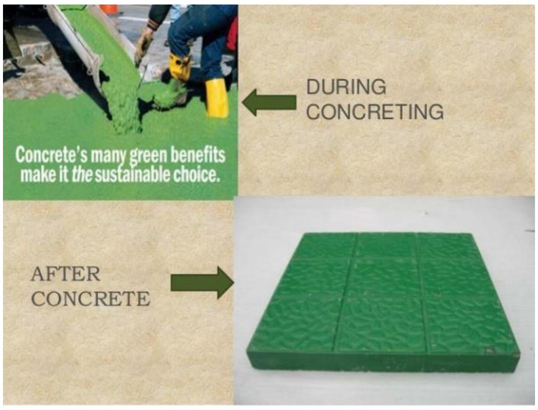

Fig.4 Green concrete

In this project we use three methods using sustainable construction materials, green architecture with cross ventilation, cool roofs.

Using sustainable construction materials

The construction of buildings consumes large volumes of resources, which is why integrating biodegradable, recycled and sustainable materials makes a huge difference. Biodegradable materials such as natural paints, which are void of the volatile organic compounds (VOCs) typically found in their traditional counterparts, eliminate indoor pollution and decompose naturally without contaminating the earth. Green construction materials are also great alternatives to prevent exhausting already depleted natural resources. Take, for example, steel beams that are made from recycled metal. Aside from eliminating the need to fell down trees for wood beams, recycled steel offers more resistance to severe weather conditions.

Green architecture with cross-ventilation

In some cases, simply tweaking a building's design can save on energy use and benefit occupants by taking advantage of on-site light and air. For instance, one of the growing trends for buildings and condominiums in cities and business districts in the Philippines is DMCI Homes' Lumiventt Technology. Taken from the words "lumen" meaning light and "ventus" meaning wind, this green architecture design allows the free flow of natural light and air into high-rise condominiums. The Lumiventt Technology incorporates three-story high garden atriums every five floors and vents at both sides of the building, translating the basic principles of airflow into a breathable building design technology.

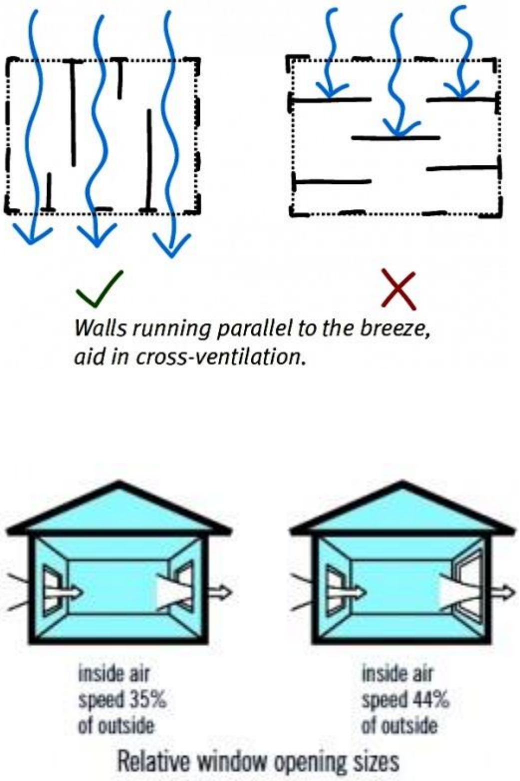

Fig.5 Cross ventilation in doors and windows

Cool roofs

Like low- emittance windows and smart glass, cool roofs reflect sunlight and heat away. Made of special tiles and reflective paint, cool roofs have high levels of solar reflectance and thermal emittance, which work together to absorb less heat. This keeps the buildings beneath cooler, thereby lowering energy use and bringing comfort to occupants. On the collective level, cool roofs help reduce the heat island effect in urban areas. Also, because of the reduced energy consumption, cool roofs decrease the amount of greenhouse gas emissions.

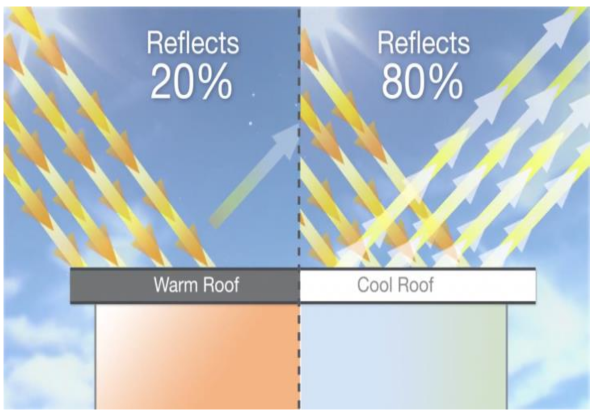

Fig.6 Cool roofs

Advantages

With new technologies constantly being developed to compliment current practices in creating greener structures, the benefits of green building can range from environmental to economic to social by adopting greener practices, we can take maximum advantage of environment and economic performances green construction methods when integrated while design and construction provide . Reduce operating cost, Improve occupant productivity, Create market for green product and service. Reduce wastages of water, Conserve natural resources, Improve air and water quality, Protect biodiversity and ecosystem. Improve quality of life, Minimize strain on local infrastructure, Improve occupant health and comfort

Disadvantages

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

CONCLUSIONS

Green and sustainable buildings are naturally different from conventional buildings. They require special materials and building practices as well as management commitment to sustainability. Sustainable and green building requires a client who is sympathetic to this ideal, user who understands and values the concepts and designers and contractors who as a team evolve the design with a sustainable outlook.

REFERENCES

[1]. Comstock, M., Garrigan, C., Pouffary, S. (2012). Building design and construction: Forging resource efficiency and sustainable development, a report produced under the coordination and supervision UNEP-DTIE.

[2]. Gou, Z., Lau, S. S. Y., Prasad, D. (2013). Market readiness and policy implications for green buildings: Case study from Hong Kong. Journal of Green Building, 8(2), 162-173.

[3]. Kats, G., Alevantis, L., Berman, A., Mills, E., & Perlman, J. (2003). The costs and financial benefits of green buildings. A Report to California's Sustainable Building Task Force.

[4]. Kibert, C. J. (2012). Sustaination: Green building design and delivery (3rd ed.). Hoboken, New Jersey: John Wiley and Sons, Inc.

[5]. Kibert, C. J. (2007). The next generation of sustainable construction. Building Research & Information, 35(6), 595-601.

[6]. Kubba, S. (2010). "Green" and "sustainability" defined. Green construction project management and cost oversight (pp. 1e27). Boston, MA: Architectural Press.

[7]. Sumitha, A., Sarvana Raja Mohan, K. (2014-15). Compressive strength of Fly Ash Brick with Addition of Lime, Gypsum and Quarry Dust, SASTRA UNIVERSYITY, India. 34.

[8]. USGBC Research Committee. (2008). A national green building research agenda.

[9]. Woolley, T., Kimmins, S., Harrison, R., & Harrison, P. (2002). Green building Handbook: Volume 1: A guide to building products and their impact on the environment.

[10]. Zhai, X. Q., Wang, R. Z., Dai, Y. J., Wu, J. Y., & Ma, Q. (2008). Experience on integration of solar thermal technologies with green buildings. Renewable Energy, 33(8), 1904-1910.