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The Review of Sustainability, Architectural Topology and Green Building

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ABSTRACT

Recently, in the world, sustainable architectural concept has been discussed. We also know the concept of sustainable architecture as green architecture or green building. Sustainable Green Architecture Buildings Must: Minimize the use of non-renewable resources by upgrading the natural environment and minimizing or eliminating toxins. Provide all their water and energy needs. Compatible with all types of climate characteristics and adapt to changing conditions. Work without pollution and do not produce any waste thing which is not useful for environment. Promote the health and well-being of all residents as a healthy ecosystem.Include energy efficient integrated systems which maximize productivity and comfort. Improve the health and diversity of the local ecosystem rather than reduce it. Be beautiful and inspire dream designs.
Keywords: Green-building systems; sustainable buildings; natural buildings; living Architecture; environmental architecture; natural architecture

1. INTRODUCTION

Introduction

Green buildings are divided into four categories:
1. Sustainability and development on the site,
2. the choice of the material,
3. Optimal energy consumption
4. The quality of interior ventilation

It is necessary to know that the site should have a little impact on the environment. And orientation of the building should be receives the maximum heat radiation to reduce the pattern of wind and shadow which have thermal and cooling loads.

We should also use the durable and recyclable materials to reduce the negative impacts on the environment. And we should use the design that is optimized in terms of energy consumption to provide a peaceful environment. We ought to design well to improve the quality of the interior to promote greater health and efficiency, reduce waste materials in building and make recycling possible. The following points summarize key principles, strategies and technologies which are associated with the five major elements of Green building design which are: Sustainable Site Design; Water Conservation and Quality; Energy and Environment; Indoor Environmental Quality; and Conservation of Materials and Resources. This information supports of the use of the USGBC LEED Green Building Rating System, but focuses on principles and strategies rather than specific solutions or technologies, which are often site specific and will vary from project to project (USGBC).

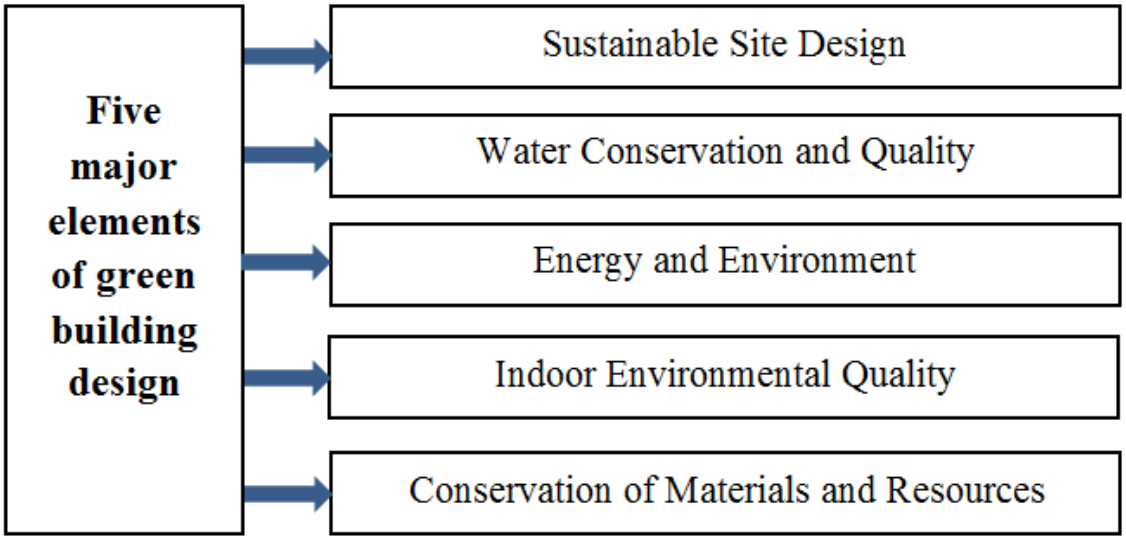

Fig. 1. Elements of green building design by author (USGBC).

The process of green building design with complexities and beauties it is uniquely definable and the essence of strategy and technology in Green building include:
Sustainable site design,
Optimal consumption and storage water,
Energy and environment,
Protection of materials and
Environmental resources.

The advantage of green buildings is:
Comfort, economy, aesthetics and environmental friendliness.
Principles of Green Architecture
1. The principle of energy conservation

Each building should be designed and constructed to minimize the need for fossil fuels or natural resources.

2. The principle of working with climate

Buildings should be designed to be able to use local resources and energy sources.

3. The principle of reducing the use of new resources

Each building should be designed to minimize the use of new resources and at the end of its useful life, create a resource for other structures.

4. The principle of respect for users

Green Architecture respects everyone who uses the building. in a professional building, safety, materials health and shape of the building processes are as important as the workers and users of the building.

5. The principle of respecting the site

The building that consumes energy generates pollution and it is unfamiliar with consumers, never touches the ground lightly.

6. The principle of holism

All green principles require a holistic process to build an artificial environment

Water Systems: Water - often called the source of life. According to Art Ludwig in Create an Oasis out of greywater, only about 6% of the water we use is for drinking. There is no need to use potable water for irrigation or sewage. The Green Building Design course introduces methods of rainwater harvesting, grey water systems, and living pools (BCKL, 2009).

Natural Building: The basis of natural building is the need to lessen the environmental impact of buildings and other supporting systems, without sacrificing comfort or health. To be more sustainable, natural building uses primarily abundantly available, renewable, reused or recycled materials. The use of rapidly renewable materials is increasingly a focus.

Passive Solar Design: Passive solar design refers to the use of the sun's energy for the heating and cooling of living spaces. The building itself or some element of it takes advantage of natural energy characteristics in its materials to absorb and radiate the heat created by exposure to the sun. Passive systems are simple, have few moving parts and no mechanical systems, require minimal maintenance and can decrease, or even eliminate, heating and cooling costs (BCKL, 2009).

Green Building Materials: Green building materials are generally composed of renewable rather than non-renewable resources and are environmentally responsible because their impacts are considered over the life of the product. In addition, green building materials generally result in reduced maintenance and replacement costs over the life of the building, conserve energy, and improve occupant health and productivity.

Living Architecture: The environment like our bodies can metabolize nutrients and waste. Living Architecture focuses on these processes, integrating ecological functions into the buildings to catch, store, and filter water, purify air, and process other nutrients.

Green roofs: serve several purposes for a building, such as absorbing rainwater, providing insulation, creating a habitat for wildlife, increasing benevolence and decreasing stress of the people around the roof by providing a more aesthetically pleasing landscape, and helping to lower urban air temperatures and mitigate the heat island effect (Vandermeulen, 2011) There are two types of green roof:

1. Intensive roofs, which are thicker, with a minimum depth of 12.8 cm, and can support a wider variety of plants but are heavier and require more maintenance.
2. Extensive roofs, which are shallow, ranging in depth from 2 cm to 12.7 cm, lighter than intensive green roofs, and require minimal maintenance (Volder, 2014).

Green Walls: Also known as vertical greenery is actually introducing plants onto the building façade. Comparing to green roof, green walls can cover more exposed hard surfaces in the built environment where skyscrapers are the predominant building style (Jonathan, 2003).

According to Ken (Ken,2008), if a skyscraper has a plant ratio of one to seven, and then the façade area is equivalent to almost three times the area. So, if the building is covered two thirds of the façade, this have contributed to doubling the extend of vegetation on site. So a skyscraper can become green, thus increasing the organic mass on the site (Wilmers, 1990).

There are three types of Green Walls: The green walls can be

1.Wall-climbing Green wall
2.Hanging-down Green Wall
3.Module Green Wall

CONCLUSION

There is some suggestion according to this paper answering this question:
How we can use green architecture in a building?
In term of Energy and etc.
Due to there is high level of economic growth and increasing population.
When designing new houses in order to improve the energy performance of building, follow the fundamental laws of climate-responsive design, as well as vernacular materials.
In order to achieving both low U-value and high thermal inertia of construction, use sufficient insulations with good properties in wall and roofs.
Use energy-efficient appliances and lighting equipment (e.g. use of fluorescent lights instead of incandescent lamps).Based on this study's findings, it is recommended that at least 70% of the building's lighting should be of the fluorescent type.
When there is a high level of solar irradiation use the largely amount of available inutile area on the roof of the building, to use solar PV panels could be fitted in order to supply amount of household electricity and heating.
Not only using the rough and translucent surfaces to prevent reflection of irradiation on external walls but also using dark colors to absorbing thermal energy of the environment during the days and releasing it during the nights which it has beneficial effect on practical design.
By recognizing the useful winds through the environment which can be used in optimum usage on formation and direction of a building.
Using double glazed windows and fit external shading devices in order to shade building and environment.
Position of these devices not only is important to reduce solar gain but also put to use natural light.
The use of free cooling to reduce electric load of air conditioning system by the aim of wind-fans in Badgirs and integrate with other zero-carbon technology such as pumping.

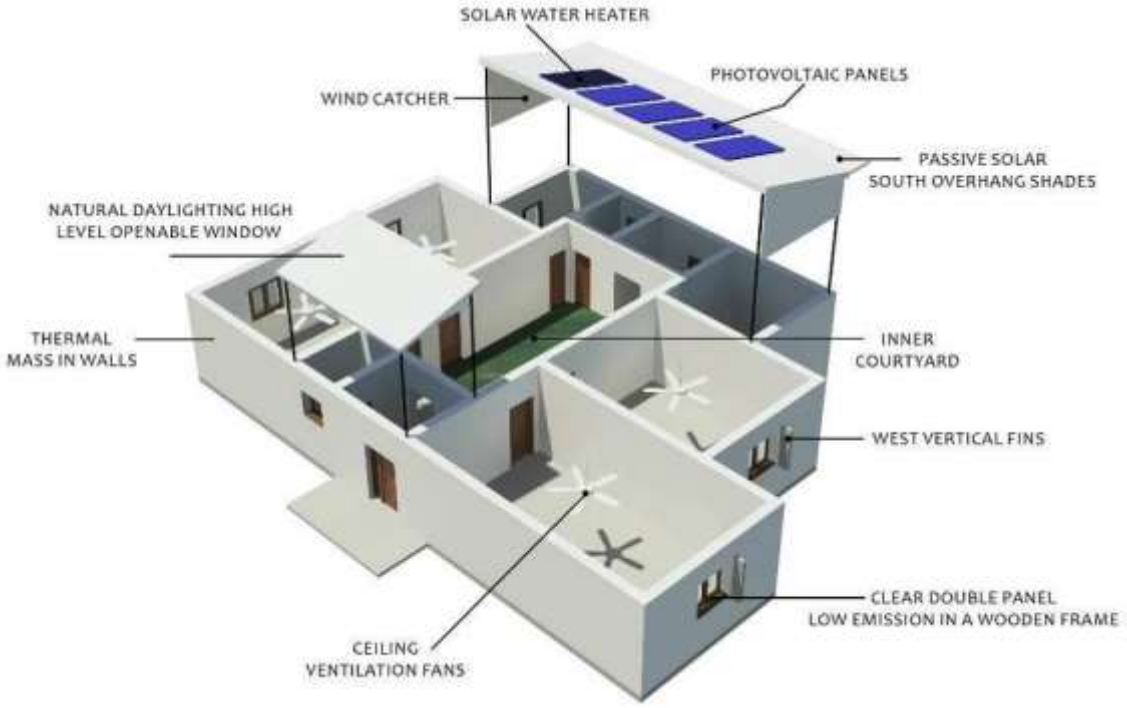

Fig. 2. 3D model of the suggested prototype by author (Amany, 2013)

• Biogas Plant production. Biogas is one of many renewable energy systems that provide greater independence at very low cost. Produced gas from anaerobic digestion of organic material will usually be piped from the top of the tank to a biogas cooking stove and/or biogas lights.
• Photovoltaic (PV array). Photovoltaic panels are installed on south-facing roof which is inclined with an angle to maximize the amount of electricity produced.
• Solar domestic hot water. Solar hot water systems are used to collect energy from the sun in panels or tubes to produce domestic hot water used in the house.

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