

Implementation of conventional resources- green skyscraper

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Abstract : This research includes utilization of plants in skyscraper design and stating its environmental effect. Plantation play very important role in energy conservation and efficiency using building. It also helps in improving the living quality into these vertical cities. This topic is studied to establish the necessity of planting into skyscrapers, for the good effects of our economy, society and the environment. Green skyscraper is constructed in various countries. There are many topics included in this topic out of which we will describe these two, Green roof, Green wall. Green skyscrapers also include the maximum utilization of unending sources like sun, wind, etc. The major endless source present in nature is sunlight. Solar energy is now utilized in almost every country. This unending source is best option over other ending sources like coal. For example green roof can reduce 50% of cooling load and can also produce electricity through solar panels; green wall can reduce 10 degree centigrade indoor temperature and also solar energy fulfills almost 65% of electricity need. Available technologies for green installments, like complete, modular and vegetated blanket system for green roof; modular, freestanding and cable-rope system for green wall and solar photovoltaic cells of generation of electricity. At the end the research shows that utilization of plants into skyscrapers can change the micro and macro environment, climate, can restore the ecology and benefited to the economy. Results are the noticeable decrease in urban heat island, rapid reduction of energy consumption and cost, refreshing air for a healthy environment. These all major things are responsible for healthy standard of living in urban areas.

IndexTerms-Green Skyscraper, integration of plants, green roof, green wall, photovoltaic cells, bio filter, ecological impact, climate, energy savings, indoor air quality, aesthetics, design technology.

I.INTRODUCTION

Nowadays, energy saving has become a very crucial and important topic as there is over utilization of fossil fuels, coal and other ending sources, therefore use of sustainable resources over ending sources has become very important part to be considered internationally. Major factor which affects the resource crises in almost all the nations is over population. Due to over population the demand of resources is increasing in large scale[1]. With the increase in urbanization, land acquisition is also increase in this sector . Due to over urbanization land under vegetation is reduced which is responsible for many adverse effects like climate change, air pollution, over uses of natural sources are limited in nature. Therefore there is strict need of implementation and adoption of various energy conserving and nature conserving methods[2]. Now will compare skyscraper and green skyscraper. skyscraper is a continuously tall heighted building that has more than 40 floors and is taller than approximately 150 m (492 ft). Historically, the term first high rise building with 10 to 20 floors in the 1880s. Green Skyscraper refers to both the practice and product of creating tall buildings which are better for our health, environment and economy it will also reduce our dependency on ending sources. It will be environmentally responsible and resource-efficient consumption and sustainable development have changed to the most common and important issues in the international conventions. furthermore, continuous increase in the world population has confronted the nations with the energy crisis more than ever and this oppress human's life[1]. Green skyscraper is better option which helps in maintaining ecological balance and also a better option from conservation point of view. There are some some examples which helps in study these types of structures.

- The construction of John Hancock Center in Chicago in 1969 marked a new phase in the evaluation of the skyscraper in United States
- United Nations Plaza in New York (1976)
- John Hancock Center in Boston (1976) by Pei Cobb Freed & Partners
- IDS Center in Minneapolis by Johnson & Burgee Architects (1973)
- The Mesiniaga in Malaysia (1992) is practical example of an ecological tall building.Minara.

Therefore the skyscrapers require a positive impact on environment. The reestablishment of “green” that was eliminated by its construction can be a possibility renovation the nature as well as improve the quality of living into it. Thus the planning and design of skyscraper influenced by a complex series of demands, where green plants can play a vital role for the energy conservation by the building as well as improving the living quality into the use of natural light in the interiors has been improved to create better quality work environment. And with the help of sunlight electric generation is possible which helps in conservation of energy and also improves standard of living and also is a major step in adaptation of future technology.[2] For generation of electricity through future technology we have to relate with some important terms like photovoltaic cells ,Photovoltaic cells are semiconductor devices that convert solar energy directly into electricity. Sunlight is comprised of photons, or particles of solar energy. So These photons contain various amounts of energy having different wavelengths of the solar spectrum which varies accordingly. PV cells respond

mainly to visible radiation(wavelengths of approximately 400nm to 700nm). When photons strike a PV cell, some of them are reflected, some absorbed, and some may pass right through the cell. However, only the absorbed photons generate electricity.[3]

II. RESEARCH METHODOLOGY

Many cities in the world are experiencing a rapid growth in recent years. This growth of cities is due to increase in population and migration of people from different areas. This all leads to over urbanization and it also has an adverse effect on environment[2]. The term green energy is specifically used for optimum utilisation of conventional resources over non conventional resources and it is also important for design construction and maintenance of green skyscraper from environmental engineering point of view. It includes the construction practices which minimise the negative impact on environment because green skyscrapers require large amount of energy[6]. Green skyscraper having various components are Green roof, Green wall, Bio-filter, Indoor potting plants. Green roof can be defined as a roof that contains plant or vegetation and it may be fully or partially covered on the roof and its an addition on a normal concrete decked roof. Green roof has several layers the top layer is the vegetation stratum, followed by growing medium or soil layer, irrigation layer, filter fabric layer, drainage layer, waterproofing membrane layer, and then the roof deck. Then Green-wall technologies, are also known as Vertical Greening Systems (VGS) or bio walls. They consist of vertical structures that spread vegetation that may or may not be attached to a building facade or to an interior wall. On the other hand, species used in outdoor living walls vary greatly depending on location, as well as site specific microclimate (sun and wind exposure, height, etc.). Traditionally, the green wall has acted as a "passive" Bio filter, but new approaches and technologies are moving towards the integration of living walls (both Indoor and outdoor) air conditioning and ventilation system. In Green wall various type of plant are used i.e Spider plant, Dracaena, Ficus, Peace lily, Boston fern, Snake plant, Bamboo palm. Then Biofilter act as a vegetated return air register. It is a vertical hydroponic green wall containing a range of specifically selected plants. The plants include ferns, mosses and a range of other flowering and foliage plants. Air is actively drawn through the green wall of plants and highly specialized beneficial microbes actively degrade pollutants in the air into their benign constituents of water and carbon dioxide. The clean air is then distributed throughout the space by a mechanical ventilation system. Then Indoor Air Quality (IAQ) is an international health issue, since city dwellers spend 90% of their time indoors. So, it has become necessity to improve the indoor air quality. Interior landscaping has become increasingly popular during the last 30 years. The main reason is, indoor plants look attractive – people get charmed by the graceful arch of palm leaves or the exotic beauty of orchids.[12]. Green skyscraper building constructed the solar photovoltaic cell which having a PV cell in system of solar then components of solar photovoltaic cell is PV panel, Power Conditioning Unit (PCU), Inverter, Maximum Power Point Trackers (MPPT), Kilowatt Hour Meter (2-way meter), Array DC disconnect, AC breaker panel (fuse), Protection devices. PV panel is a form of arrays on the roof. Power conditioning unit is a general term for devices that convert the energy derived from arrays to energy suitable for the building. Inverter is to convert DC into AC, because all of the appliances in the building work with AC. The inverter is designed to match with the wattage output of the solar panels and also for convergence of DC to AC. Maximum power point trackers (MPPT) These electronic devices track the maximum power at any time based on I-V curve characteristics. Array DC disconnect in this type of devices that allow halting of the flow of electricity from the array during system maintenance. In AC breaker panel A fuse is required for safety and protection of various appliances and other purposes. Protection devices are protection relays and devices used to protect the system from surge creation or overloading.

III. GREEN SKYSCRAPER AND ITS FEATURES

Green Skyscraper refers to both the Application and Green Skyscraper refers to both the Application and product of creating tall buildings which are better for our health, environment and economy. It will be environmentally responsible and resource efficient throughout its life-cycle, as well as a sustainable and high performance tall building for economy, utility, longevity, and comfort (EPA). Definitions of green skyscraper vary but the green movement has three main aims : • protect a healthy, productive indoor environment for occupants to work and inhabit • Prevent negative impacts to our environment and improve its health. • Reducing operating cost and increase profitability for building owners through energy and resource conservation.

Green Features: Through an integrated design approach which considers building location and aspects, site preparation, energy and water efficiency, material selection, and indoor environmental quality, green buildings will be part of building healthy, sustainable communities for our future.

Green building features include:

- Location near existing services.
- Natural lighting and solar energy.
- Excellent indoor air quality.
- Reduced or recycle content building materials
- Green or vegetated roofs, walls and indoors.

Beside the 'green movement' another typology of practicing green into skyscraper is introduced by Architect Ken Yeang, where the consideration of site's climate and ecology is the main focus for designing a 'Green Skyscraper' also known as 'Bioclimatic Skyscraper'. Bioclimatic skyscraper: A bioclimatic skyscraper is a tall building whose built form is configured by design, using passive low-energy techniques to relate to the site's climate and meteorological data, which result in a tall building that is environmental friendly, low-energy consumption and operations.

IV. SKYSCRAPER AND GREEN SKYSCRAPER

Skyscrapers in general mean more materials, more money, more time, and more risk. Due to all these factors skyscrapers go into negative impact of environment. Nonetheless, if building up is a necessity, these skyscrapers certainly are respectable and awe-inspiring[5]. Conventional skyscraper is the pile of floor spaces around or with a core area, stacked homogeneously and vertically, one over another, enclosed with glass façade, seeking to optimize net-to-gross area efficiencies. They are generally high energy consuming, polluting waste producing tall buildings. From their very invention, while made by concrete or steel the design of these tall buildings remains the same, through technology and engineering have become far better and much more sophisticated. On the other hand Green skyscraper is the practice of creating structures and using processes that are environmentally responsible and resource efficient throughout the building's lifecycle from sitting to design, construction, operation, maintenance, renovation and deconstruction[2]. These green skyscraper shaping the future of tall buildings, and utilizing green technologies on an entirely new scale[5]. These are the sustainable and high performance buildings [2]. The green skyscraper as energy-hungry parasites that feeds upon the city's surrounding ecosystems, the landscape and global resources.[1] These towers are shaping the future of tall buildings, and utilizing green technologies on an entirely new scale.[5]

V. PROBLEM FACED DURING CONSTRUCTION

Skyscraper though considered as a negative structure over the earth, will remain constructed as the population increased and so their demands. These tall buildings possess a lot of bad affects over our economy, environment and society by their excessive energy consumption, toxic materials using and destroying ecological balance. But as we cannot stop their construction all of a sudden, we need to search for alternative solutions to retrofit these harmful effects. The main problems that these skyscrapers are impacting are as follows:

1. A greater amount of energy consumption for its cooling as the effect of excessive heat gain by its exposed concrete roof, vast glass curtain and concrete wall façade.[2]
2. Poor indoor environment quality for using toxin materials which often emits Volatile Organic Components or VOCs. It also results for air tight situation for the air conditioning purposes.[2]
3. Negative impact on environment as its construction destroys the site's ecology, flora and fauna. Its highly reflective glass surface often confused the migrating birds with the reflection of sky and trees cause the bird's death as they try to fly into it.
4. The main design factors that are very important for achieving a high performance tall building or skyscraper are: site context, environment, structure and use of materials, energy consumption, use of water, ecological balance, community development, etc.[1]

VI. SPECIFIC AIM

To find out the possible ways to integrate plants into skyscrapers and assess how the utilization of plants into the skyscraper design can help to reduce the energy use, improve the environment and enhance the living quality.

VII. OBJECTIVES

- a. To find out the provisions of utilize plants into the skyscraper design.
- b. Analyze their impacts on energy consumption and living environment.
- c. Explore the procedures of structuring the different ways of incorporating plants.
- d. Suggest some alternative solutions to eliminate the drawbacks and propose some guidelines for good practice to make it viable economically, socially and environmentally.
- e. observe trends in the technology and other practices, in a local and a global factors.

VIII. CONCLUSION

The project consist of green skyscraper to enhance the environment aspects as well as to reduce energy use. there having four options of green skyscraper such as green roof, green wall, indoor potting plant to enhance the living system, environment, economy and society. exterior and interior planting require planning with nature and technology. for growing cities the green skyscraper building should be construct for increasing the planting as well as environment pollution should be control. high percentage of carbon is increases it should control by green skyscraper. economically green skyscraper is cost effective and future oriented with growing approval and increasing commercialization of society. Green skyscraper building included photovoltaic cell i.e it is renewable energy for electricity for urban environment. PV cell construct in Green skyscraper for generation of electricity places reduce. it is benefit for future scope.

IX. REFERENCES

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