Research Paper

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Green Buildings – A Case Study on Green Technology

Engineering

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ABSTRACT

In the recent days living organisms face severe harmful issues such as global-warming, it is clear that the engineer has a significant role to play in preventing the future of our planet and environment. Globally, the construction industry is one of the main contributors to the depletion of natural resources and a major cause of unwanted side-effects such as air and water pollution, solid waste, deforestation, health-hazards, global-warming, and other negative consequences. In order to stay safe and to meet upcoming challenges, environmental regulations and customer requirements, designers have a key role in designing civil infrastructure so that it is environmental-friendly and sustainable. These factors have compelled the engineer to design with greater care with respect to the environment. This paper focuses on the concept of eco-efficiency, eco-friendly and sustainability of environment in Infrastructure Design. Engineers need to focus at greener-technologies rather than just using traditional-engineering solutions.

INTRODUCTION

All the things that surround us are known as Environment. Environment to an "Engineer" would mean a set of standards and recommendations that he must comply with and threshold the values that must not be exceeded. His technical solutions would be developed keeping in mind that the inevitable outputs as noise nuisance, waste or effluents should not hamper or affect the living and working conditions that he is designing or operating. But, environment would also mean that he should pay attention on safeguarding the natural resources by using as much as possible of the renewable energy sources and recycled materials, to achieve a long-lasting development which mainly focuses the "Green and Sustainable Environment".

OBJECTIVE

- This paper mainly focuses on the
- Changing role of engineers in designing any infrastructure in favour of the environment.
- Introduction of environmentally and ecologically conscious design for maintaining a friendly environment.
- Green-infrastructure solutions amongst engineers by establishing a common language and standard of measurement.
- Awareness of green engineering benefits and the environmental impact of consultants design decision, in order to reduce the environmental impact of development.

GREEN-BUILDING AND GREEN-TECHNOLOGY

There are large amounts of materials and energy that are consumed during the construction and operation of an average building, the implementation of green technology in construction of buildings for more energy efficient and less impact on the natural environment reduce the impact on environment. The world's population has grown exponentially since the Second World War, and there is currently pressure on available land and natural resources. As a result, we will eventually face the depletion of our most widely used source, the non-renewable resources. We can reduce consumption of these non-renewable resources in many ways, such as developing new types of vehicles, energy sources, recycled materials, and designing environmentally friendly buildings. These environmentally friendly buildings which focus on the green environment and sustainable development is known as "Green-buildings" and the technology which helps to build these buildings is known as "Green-Technology".

DIFFERENT SUBSTANCES TO BE INSTALLED IN GREEN BUILDING TO MAINTAIN SUSTAINABLE DEVELOPMENT AND GREEN ENVIRONMENT

- **Solar panels** are installed in windows of skyscrapers to harness solar-energy for generating electricity during the day. The excess energy is used to produce hydrogen through hydrolysis which in turn can be used to power at night through fuel-cells. Thus electricity is generated at all time, reducing its restrictions and preventing natural resources.
- **Aero generators** harness the wind energy in more efficient way than other wind turbine. It spins on its axis combating the current limitations of the traditional three-blade horizontal axis turbines. Its rigid aero-foils generate-lift rotates the arm at 3rpm. Aero generators of 600KW will generate electricity at 690V tension at half the weight of equivalent-conventional-wind-turbine design.
- **Piezoelectric pads** are used to harness energy resulting from mechanical strain. When piezo-crystals are compressed or stretched they produce an electric-field. Piezo-cells have small, positively-charged particles at their centre. Whenever force is exerted on the crystal, this small particle is forced to move and create a charge. This electric-field can be harnessed to produce voltage. It can be put in areas like discos, exercising pads and parking-place to generate electricity.
- Practice of high-performance **Hydroponic Greenhouse** and **Vertical farming** systems on buildings to exploit relation between the built environment and agriculture.

ROLE OF ENGINEERS IN CHANGING THE DESIGN OF INFRASTRUCTURE

Increasing demands for energy, drinking water, clean air, safe-waste-disposal, and transportation is gradually driving the environmental protection, alongside infrastructure-development. Engineers have an important role to play to achieve sustainable development. Engineers will have to be the initiator of development ensuring the conservation of the resource from supply through distribution, issues of innovation, technology, design, management will be crucial for the engineer in meeting future challenges. Civil engineering projects and designs can have significant site-specific and cumulative impacts on our ecological balance and social systems if they are not correctly planned, designed and implemented. Thus when any design is being made it should be made without affecting the environment and ecological-balance.

IMPLEMENTATION OF GREEN TECHNOLOGY ON DIFFERENT CIVIL ENGINEERING PROJECTS

Mainly Civil-engineering designs and projects have significant site-specific and cumulative impacts on our ecological and social-systems if they are not correctly planned designed and implemented. In the area of sustainability, there is an urgent need to apply technologies and methods that deliver better and more sustainable and flexible performance and economical. Relatively few designers have explored the transformative potential of ecological design and have preferred to remain unconcerned with the distributional impacts of design as they affect the health of humans and ecosystems. Infrastructure elements can result in loss of eco-balance and biodiversity. Improvement in the awareness of eco-efficiency concepts is needed among

policy-makers, planners and decision-makers as this is an urgent need to save our environment.

INDIAN GREEN BUILDING COUNCIL (IGBC)

This council was formed mainly to prevent the planet earth and its environment from different hazardous-affects like Global-Warming, pollution, harmful-diseases etc. The main-objectives of IGBC are:

- Bringing Green-building revolution in India.
- Making India as one of the leading country in the world in "Green-Building".
- Decreasing the rate of pollution and other harmful-effects.

INVOLVEMENT OF DIFFERENT LEVEL OF PEOPLES IN GREEN-BUILDING-MOVEMENT

Sl. No.	Criteria	2001 to Till Date
1	CEO and Senior people	50-2000
2	No. of professionals	10-3000
3	No. of registered Green buildings	1-140
4	Built-in area (sq.ft.)	0-67 Million
5	Green building products and equipment's	5-50
6	IGBC membership	0-141

ADVANTAGES OF GREEN BUILDING OVER CONVENTIONAL BUILDING

Green buildings:

- Operational savings is more.
- Focuses on human-comforts and indoor-environment.
- Prevents the environment from any harmful-effects.
- Minimises the pollution-rates.
- Reduces the operating-cost.
- Fully focuses on sustainable-development.
- Saves 40-50% of the energy.
- Saves 20-30% of water.
- Reduces the initial-investments.
- Reduces impact on environment.
- Focuses on health and safety-benefits by enhancing the occupant's-comforts.

BENEFITS EXPERIENCED IN GREEN BUILDINGS

Buildings	Sq.ft	Normal-building (kwh)	Actual-building (kwh)	% Reduction	Annual Energy Savings(in lakhs)
Wipro	1,75,000	48,00,000	31,00,000	40%	102
ITC	1,70,000	35,00,000	20,00,000	45%	90
CII-Godrej GBC	20,000	3,50,000	1,30,000	63%	9

ADVANTAGES IN IMPLEMENTATION OF ECO APPROACH TO INFRASTRUCTURE DESIGN

Green-infrastructure technologies contribute in greenways, green-corridors and provide linkages between habitats and wetlands. Green-technologies have a number of environmental, economic-benefits and community-benefits. Some benefits are as follows:

- Conservation of natural resources.
- Reduction of ecological-footprints of roads, sewer, storm-water, water, allowing ecosystems to function more naturally.
- Uses energy-efficiency systems and materials.
- Minimises surfaces reducing soil-erosion.
- Enhance and protect-ecosystems and biodiversity.
- Conserves and reuses-water and treats storm-water runoff on-site.
- Recharged ground-water flow for streams, conserving water-supplies.

CONCLUSION

A new pattern for infrastructure-design is required in order to maintain environmental sustainability. Engineers need to look at green-technologies rather than just using traditional-engineering-technologies. By using this green-approach, sustainable-design of infrastructure services can be achieved by the consideration of resources, environmental impacts of ecologically sensitivity of design-decisions, innovation, maintenance and materials, at the initial design stage of a project. As seen in this paper, there is no. of opportunities for improving eco-efficiency in infrastructure-design; Green-techniques provide benefits for a wide range of circumstances, by conserving, reusing, promoting groundwater-recharge, and reducing surface-water-discharges that could reduce flood. In this way if we can construct any infrastructure using the method of green-technology then the threats on the environment like global-warming, pollution etc. can be minimised or reduced and hence we can save our planet earth as well as the environment for long period of time.

REFERENCE

1. Wikipedia | 2. The importance of sustainability in engineering education: A toolkit of information and teaching material. | 3. http://www.naturaledge project.net/Documents/ICDPaper-Final.pdf | 4. Green building handbook. | 5. Handbook of sustainable development and appropriate design. | 6. P.Dasgupta, Human well-being and the natural environment. Oxford: Oxford University Press, 2002. | 7. Handbook of Concept of Sustainability. |