# A CASE STUDY ON MODULARGREENBUILDINGS

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ABSTRACT

Development is gradually converting the bio diverse habitat in to a concrete jungle whichconsists of an impervious cover to landscape resulting into a lack of woodland habitat andconservation of the most precious element on the earth "WATER". The vast canvas of built environment necessitates a greener color into it picture. Sustainable development isadevelopment that "meets the needs of the present without compromising the ability of futuregenerations to meet their own needs" Sustainable construction tries to incorporate the general sustainable development concepts into conventional construction practices. One of the waystoachieve sustainable construction is the Green Building Design, which is the core areaofattention for greener built environment. Green Building Designs have environmental considerations as a basic scrutinizing criteria which attempts to integrate and achieveconcepts of energy efficiency, water conservation and recharge, solid waste management, exploration of renewable energy resources, use of ecofriendly materials and to minimizethenegative impact on the nature, plant and animal species, nonrenewable material conservationand preserve resources and processes that prevail in nature. Several Green BuildingRatingSystems have been developed to objectively evaluate energy and environmental performancethat spans the broad spectrum of sustainability. In developing country like India wherepopulation increase squares the value every year, which had made her a potential global market leading to rapid urbanization and increased standard of living resulting intoanupswing in construction activities

1.1 INTRODUCTION The buildings in which we live, work, and play protect us fromnature's extremes. Yet they also affect our health and environment in countless ways. The design, constructionoperation, maintenance and removal of building take enormous amount energy water andmaterials generates 7elan quantities of waste air and water pollution.

As the environmental impact of building becomes more apparent, a concept calledgreenbuilding is gaining momentum. Green or sustainable building is the practice of creatinghealthier and more resources efficient model of construction, renovation, operation, maintenance and demolition research and experience increasingly demonstrate that whenbuildings are designed and operated with their lifecycles impacts in mind, they canprovidegreat environmental, economic and social benefits. Worth noticing is that most of us talkabout energy consumption and pollution because of industry and transport when at least 40%of thetotal energy produced is consumed by buildings.

2. PERCAPTIONS AND REALITIES

Having covered on the benefits it is also important to know that people have different perceptions on green building, some are correct and some are otherwise.it is important tolookat these;

GREEN BUILDING ARE COSTLIER


3. LITERATURE REVIEW

3.1 LEED RATED GREEN BUILDING PROJECTS

Platinum rated green building

1. CII-Godrej green Business Centre Hyderabad

2. ITC Green Centre, Gurgaon

3. Wipro Technologies Gurgaon

4. Hiranandani BG building Mumbai

5. Spectral services consultants Private Limited Noida

6. ABN amro Bank Ahmedabad

Gold rated green building

1. Grundfos pumps India Private Limited Chennai

2. NEG Nikon India Private Limited, Chennai

3. Technopolis Kolkata

4. Olympia technology park Chennai

5. K Raheja Corporation C 30 BKC 15elang

6. Enercon India Private Limited Mumbai

Silver rated green building

3 L & T EDRC 1 Chennai

4 Hyderabad Institute of Technology and Management ,Hyderabad

5 HSBC, 15elangana

6 World bank building Chennai

ENERGY EFFICIENCY OF GREENBUILDING

4.1 BASIC CONCEPT

The importance of energy efficient buildings has assumed great urgency today. In light of fast depletingenergy resources, energy scarcity and increasing environmental pollution, innovative ways t cut downenergy consumption are necessary. The construction industry is one of the largest energy consumingsectors. In modern buildings significant amounts of energy are also consumed to keep the buildingenvironment comfortable. The residential, Commercial and institutional building sector consumes 31percent of global energy and emitted 1900 megatons of carbon in 1990. By 2050, its share is expectedtorise to 38 percent and 3800 mega tons respectively [IPCC 1996]. In India, estimates suggest that about 20to 25 percent of total energy demand is due to manufacturing materials required in the building sector, while another 15 percent goes into running needs of the building. The Ministry of Power estimates that about 20 to 25 percent of the total electricity consumed in government buildings in India is wasted becauseof inefficient design parameters of buildings, which results in an annual energy related financial loss of about 1.5 billion Rupees. In developing countries like India, rising population, increasing standards of living and rapid urbanization result in an increase in building construction activities. This wil demandalarger share of the energy available in an already strained energy supply scenario. As most of the requiredenergy is currently derived from during fossil fuels, the building sector has emerged as a major factor impacting on the environment protection, eco-sensitive buildings or `green buildings' that

utilize their resources judiciously, minimize their emissions and have efficient waste management systems, shouldbeconsidered and designed.

DESIGN PRINCIPLES 5.1

PREDESIGN CONSIDERATION FOR GREEN HOTELS

Forming a Design Team:

1 Many building design teams consist only of the architect, the owner, and anengineer.This narrow perspective seriously limits the ability for any environmental designinitiative from being implemented.

2 Assemble an interdisciplinary design team before the site selection process. That includes client, users if possible, engineers, landscape, maintenance staff, etc. Collecting Data The purpose of collecting data is to identify the assets and liabilities of each site. Eachof thepotential sites should be assessed in a manner. Analyze all the proposed sites to determinesitecharacteristics that will influence building design.

1. Study how the solar altitude, microclimate, and the topography will affect design(i.e. solar orientation, wind loading, floor elevations, potential for passive solar/daylighting)

2. Consider the climatic zone of the site. Each climatic zone (cold, temperature, hot-dry, hot-humid) have designed strategies to maximize the overall design (i.e. Passive solar vs. shading, deciduous vs. coniferous vegetation).

3. Perform soil and groundwater testing. Avoid building on soils that are contaminatedwithagricultural or industrial chemical residues. Establishing a clean source of groundwaterisimportant if the building is to be self-sufficient. Contaminated groundwater is likelyanindication of nearby pollution that may impact the building operation environmentallyand economically.

4. Test soil suitability for bearing strength, additional slope structures, and infiltration. Test the native soil for bearing, compaction, and infiltration capacity. Assess the addedcost ofimporting fill to the site to make the soil suitable for development.

5. Evaluate ecosystems for existence of wetlands and endangered species. Assessandidentify any areas that may not suit building development or require special preservationor restoration.

6. Examine existing vegetation to inventory significant plant populations. Denote vegetationthat may require special protection during construction. Identify species and populationssuch that the landscape designers can later mitigate any damaged areas withoriginal elements.

7. Avoid stream channels, flood plains, wetlands, steep erodible slopes, andmaturevegetation. Evaluate whether the interstitial spaces (i.e. between channels, plains, etc.)are enough for the proposed building footprint.

8. Map all natural hazard potentials. Disclude the site if there is evidence of significant past disturbances (i.e. 100-year flood level, slopes prone to slides, wind-damage, avalanchepotential). Consider discluding a site if it is within the 100-year flood level (many jurisdictions provide or require the purchase of flood insurance for development withinthe 500-year flood level).

9. Diagram existing pedestrian and vehicular movement and parking to indentifypatterns. Determine whether existing patterns fit the proposed design plan. Take advantageofexisting patterns to reduce environmental impacts and infrastructure costs, or consideradifferent site.

10.Review the potential of utilizing existing local transportation resources. Attempt toshareexisting infrastructure (i.e. Parking facilities, shuttle buses) with neighboringdevelopments to reduce overall costs and increase site efficiency.

**SOLAR PANELS USED**

VERMI COMPOSTING IN ORCHID HOTEL

SAWDUST HANGER USED IN ORCHID HOTEL

FUTURE SCOPE OF THE PROJECT

Buildings commercial, industrial and residential account for about 40 per cent of theworld's greenhouse gas emissions. Governments everywhere are exploring ways totacklethis. The task involves incorporating energy-efficient measures in various aspects of construction. To ensure India doesn't lag behind, the prime minister's council on climatechange cleared the Urban Habitat Mission under the National Action Plan on ClimateChange. This will make it mandatory for new office buildings to conformto energy-savingcodes in three years' time. Since only 700 buildings have so far implemented these norms, it's clear all builders won't voluntarily go green. This is not surprising, since many tendtoflout even basic fire safety norms. The Centre's decision will require states to amendmunicipal bye-laws to qualify for JNNURM funds. India's construction industry is growingat an annual rate of over 30 per cent. For this growth to be sustainable, energy-efficiencyisa must. This is all the more so given inadequate power a'd water resources in the country. Though initial investment is high, green buildings mean su'stantial savings in energyinthelong run. Green design norms including use of right materials, appropriate orientation, insulation and shading can help conserve up to 50 per cent

of buildings' energy costs. As adeveloping country, India needs to create urban infrastructure using precious resources inenergy-efficient ways. It's already ahead of Australia and close behind the US in adoptinggreen building designs, with future opportunities to export green-building technologies. Finally, the process of certifying green buildings mustn't turn into a regulatory maze that creates scope for corruption. To help tile green building initiative, cut the red tape. Greenbuildings are a happy Sign of the times, with a carbon emissions. It doesn't growinawtake much to make a building green: utilize locally available material, make the best useof sunlight and natural air currents, harvest rainwater and recycle corporation water, andmanage waste efficiently. The initial infrastructure cost may be a bit steep, but this is offset by low electricity and water bills. If such green features were to be made mandatoryfor all new constructions, and incorporated into the sanctioned plans, it would go a long wayincooling our environment and keeping a water famine at bay. Green buildings are fast catching the imagination of the people. Though the penetration level is just around 5%, theIndian Green Building Council (IGBC) is happy the residential sector is coming upwithsuch buildings. Going by industry prediction, the residential sector both independent housesand residential apartments are set to outnumber commercial buildings by 2030 inIndia. Maharashtra tops the national figure with the highest number of green buildings, followedby the National Capital Region. Tamil Nadu holds third position. According to figures withIGBC, there are 1,909 registered buildings in the country For the next one year, Grover will be reaching out to 10,000 students of architecture, initiating them to the green cause, callingit the 'Students Green Movement'. The aim of the mission is to encourage the youngarchitects to promote green buildings.

## CONCLUSION

From the data collected and the case studies we conclude the following savings and estimates:

### WATER CONSERVATION

Water conservation for Rodas Hotel & Orchid is 293 liter/day & 222 liter/day per thousandsqft respectively. On an average 257 liter/day of water is saved. POWER SAVED

Power saved for Rodas Hotel & Orchid Hotel is 7919 kW/year &9000kw/year per thousandsq. ft. respectively. Average power saved per thousand sq ft. is 8459 kw/year. Amount savedon power for Rodas Hotel & Orchid Hotel is Rs.54115/year & Rs.63000/year per thousandsq ft. Average cost saved per thousand sq ft. per year is Rs.58557/year. AERATORS

Cost of aerators for Rodas Hotel & Orchid Hotel is RS.1.1 lakh & Rs.0.83 lakh per thousandsq ft. Average cost of aerators per thousand is sq ft. RS.0.965 lakh. ELECTRIC APPLIANCE FOR ENERGY SAVING

Cost of electric appliance for energy saving in Orchid Hotel & Rodas Hotel is Rs.5.86lakhand Rs.5.27 lakh respectively. Average cost is per thousand sq ft. is Rs.5.5 lakh. a) CHILLER PLANT

Cost of chiller plant for Rodas Hotel & Orchid Hotel per thousand sq ft. is Rs.1.46lakh&Rs.0.611 lakh respectively. Average cost of chiller planter thousand sq ft. is Rs.3.25 lakh. b) CFL & PL LAMPS

A cost of CFL & PL Lamps per thousand sq ft. is Rs.2.27 lakh & Rs.2.22 lakh respectively. Average cost of CFL & PL Lamps per thousand sq ft. is Rs.2.2 lakh

PLUMBING

Cost of plumbing for Rodas Hotel & Orchid Hotel per thousand sq ft. is Rs.1.46lakh&Rs.0.61 lakh. Average cost of plumbing per thousand sq ft. is Rs.1.035 lakh. As themodernization and technological advancement are gaining momentumin the self buildindustry in the world, the eco-friendliness is taking a back seat. The sudden spurt oftechnological advancement sans care for the nature is doing more harmthan good. Actually, the process should be the reverse. We should be more concerned about the environment byconstructing environmentally friendly and sustainable structures. In response to growingawareness of the building environment's effect on the natural environment, architects andbuilders, activists and government agencies are increasingly championing an alternativemethod of designing and construction. It's an approach called Green building. The essenceofgreen building is creating structures that are far more efficient in their consumption of energyand water and less wasteful in their use of materials than conventional buildings. Once a movement on the architectural fringe, green design principles are starting to appear in everything froma newgeneration of government buildings and corporate offices to single family homes and apartment complexes. Green building can often cost more than conventional construction. But proponents sayhigher up-front costs will pay for themselves in the long run. A recent study reports that 2 percent additional cost in a green building's design translates into savings of up 20 percent in energy costs over the life span of the building. And all these combine to make a more comfortable, more effectivetooperate, and yet highly cost-effectively space. Thus, in all, it can be said that Construction of Ecofriendly Structures has become the need of the day