

ECO-TOWNSHIP: THE NEW ERA OF SCIENTIFIC APPROACH TOWARDS A HEALTHY AND SAFE COMMUNITY

Subhro Chakraborty¹, Md. Iqbal Ahmad², Nirban Charaborty³, Prasun Kumar Guchhait⁴,
Saikat Paul⁵, Tapas Bera⁶, Rupak Gumta⁷, Kaustav Saha⁸ and Intekhab Alam⁹

¹Civil Engineering Department, University Of Engineering And Management, Jaipur, India

²Mechanical Engineering Department, University Of Engineering And Management, Jaipur, India

³Electrical Engineering Department, University Of Engineering And Management, Jaipur, India

^{4,5,6,7,8,9}3rd Year B.Tech, Civil Engineering Undergraduate Student, University of Engineering And Management, Jaipur

Abstract—Eco-township is of great importance for making countryside beautiful. Achieving regional balance development between rural and urban areas to protect and improve environment in accordance with environment planning and guidance. So, in this project we aim to look at greener technology rather than just using traditional engineering solution like green building architecture (according To IGBC). Demands for energy, water supply, safe waste disposal and transportation management will drive towards eco friendly infrastructure. We should improve drainage system to minimize wastage and reuse it in other ways and use the energy of the sun to give the optimum heating and cooling effect in a room during different season, saving electricity. There is a small scale waste water treatment plants for purifying the sewer water and reuse it for gardening and washing purposes. We will design green township rating system naturalizing preservation of environment. To meet the needs of healthy society in urban area, there is huge burden of resources. Thus eco-friendly and environmental sustainable practices are important tools in sustainable development. More over this project not only provides facility to the residence, it also provides employment to the inhabitants.

Keywords: Green Building Architecture, Eco-friendly Infrastructure, Energy Efficiency, Drainage System, Small Scale Waste Water, Sustainable Development, Green Township Rating System.

1. INTRODUCTION

Township Defined:

A township is combination of several communities which is combination of several sectors, several township from a city. Township ranges in sizes & land uses. Township can be predominately commercial, industrial or retail but should necessarily comprise of residential components. At least 25% of the total build-up area (in sq.m) within the township should be ear marked for residential use. Introduction of cities are the important components for social and economic growth of a country. The urban sector contributes nearly 50-60% to the nation GDP. Rising of population growth, traffic congestions

and improper waste management have resulted in a decrease level of quality of life and environment in urban areas. Indian Green Building Council has launched IGBC Green Township rating system. The rating system is an important tool which enables the design engineer to apply the Green concept to reduce the environmental impacts. However, it is to be noted that the rating system is not applicable for individual building and land parcel.

Benefits of Green Township

Benefits of green township application of IGBC Green Township rating system in large developments would address national priorities leading to benefits, such as efficient land use, habitat preservation and restoration, effective transport management, efficient use of resource and enhanced quality of life for the occupants.

1.2.1 Efficient Land Use

Now a day, development has become synonymous with physical expansion or growth. There is anteed for significant changes in the pattern of land use and construction that will provide communities with better quality of life and at the same time conserve natural resources. Green Township rating system address the impacts of urban sprawl by encouraging compact, mixed-use developments and promotes higher urban densities without affecting the quality of life.

1.2.2 Habitat Preservation & Restoration:

Conventional development is generally insensitive to natural environment. Such developments may scar the landscape; take prime agricultural land out of production or destroy biodiversity and natural habitats. The Green Township rating system is designed to facilitate restoration and preservation of the natural environment by encouraging strategies that aid interface between the built environment & natural

environment. This approach will not only enhance the fabric of the planned development but also provide environments conducive for living and working.

1.2.3 Efficient Transportation Management:

Traffic congestion, long distance commuting, rising levels of air and noise pollution are pressing issues in today's cities. Efforts to relieve congestion such as, constructing flyovers, road widening etc., are good initiatives but may not address issues such as fossil fuel consumption and associated emission, 'Green Townships' rating system addresses these issues by encouraging effective and efficient transportation management strategies. Such strategies include increasing opportunities for bicycling, encouraging pedestrian friendly network; reduction in the number of automobile trips, promoting public transportation and use of alternative vehicles.

1.2.4 Efficient Use of Resources:

Perhaps the most challenging problem facing our cities today is to meet the ever-rising demand for power, water supply and waste management. Meeting this demand requires enormous amount of investments infrastructure. Efficient and effective use of resources is thus vital in augmenting the existing infrastructure.

1.2.5 Water Efficiency:

Most of the Asian countries are water stressed, and in countries like India, the water table has reduced drastically over the last decade. Green township encourage use of water in a self-sustainable manner through reducing, recycling and reusing strategies and can save potable water to an extent of 30-50%.

1.2.6 Energy Efficiency:

Green Townships can reduce energy consumption of infrastructural equipment through energy efficient street lighting, motors, pumps etc. The energy savings that can be realised by adopting this rating programme in infrastructural equipment can be to the tune of 20-30%. Further, on-site power generation using various renewable energy technologies and other clean fuels can significantly reduce the load on grid power supply.

1.2.7 Waste Management: Green townships encourage effective waste management strategies by facilitating the segregating of waste at source and promoting the reuse / co-processing of products and materials.

1.3 The essential building blocks of a Smart city are:

- Development of effective broadband networks that support ICT and digital applications throughout the city.

- Deployment of embedded system, smart devices, sensors and actuators for real-time data management, alerts and information processing for the city administration.
- Providing Smart urban spaces that leverage ICT to deliver sustainable services like electric car charge points energy-efficient buildings and Wi-Fi hotspots & information kiosks.
- Implementation of online services across different sectors including city environment, energy and transport services, security services, education and health services etc.

IGBC PLANNING GUIDE LINES

The following guidelines are used as reference guidelines in India for planning of eco town

1. Site selection & planning

- Avoid Development of inappropriate sites
- Do not develop buildings, roads or parking areas on portions of sites that meet any one of the following criteria:
- Within 150 m of any wetland or restrict development from wetlands as per regulation laid by state /central authority.
 - Land whose elevation is lower than the maximum observed flood levels or 100 year flood level, whichever is higher.

❖ Soil erosion and control

Adopt measures listed below to control erosion, during construction and post occupancy:

- Implement soil erosion control measures conforming to best management practices highlighted in national building code of India.
- For area where the top soil is fertile, remove ,stack & protect the top soil from the development areas and reuse for landscaping. For areas where the top soil is not available, provide a detailed narrative justifying the site condition.

❖ Preservation existing trees & water bodies

- Preserve at least 25% of the existing trees within the project.
- For every tree that is uprooted, plant at least 10 new saplings.
- In sites having water bodies, protect and restore 100% of the existing water bodies.
 - Retain natural topography

- Retain at least 25% of the total site area with natural topography.

- Local fruits & vegetable produce

Create growing spaces for fruit & vegetable requirements to cater the community needs.

- Urban heat island effect
 - For footpaths, pathways, roads, surface parking and other non-impervious areas within the township, provide tree cover (within 5 years) or use light coloured/ high albedo materials (reflectance of at least 0.3) or open grid pavements.

❖ Land use planning

❖ Land use optimisation

- Design residential & non-residential to meet the FSI/FAR prescribe by the existing local bye-laws. Wherever permissible under the law, explore opportunities to exceed the required FSI/FAR.
- Earmark at least 25% of the total built up area within the township as residential areas.

❖ Basic amenities within the community

- For residential areas, provide minimum basic amenities as listed below, within 800 meters from the centre of the residential sector:
 - Super market/grocery & stationary shop
 - ATM
 - Medical clinic
 - Laundry
 - Electricity/water bills payment centres
 - Parks with walking tracks
 - Sports club/ fitness centre
 - Coffee shop / restaurant
 - Internet cafe
 - Beauty salon
 - Hardware shop
- Provide minimum 4 basic amenities as listed below, within 2km from the boundary of the sector:
 - Bank
 - Post office/courier service
 - Fire station
 - Police station
 - Library

- School
- Community hall

❖ Housing typologies

- Provide at least two of the following housing typologies within each sector:
 - High income group(HIG)
 - Middle income group(MIG)
 - Low income group (LIG)

❖ Green buildings

- Design green buildings within the project with appropriate green building rating system, such as IGBC and LEED India.

❖ Transportation planning

❖ Long term transportation plan

Develop and implement a long term transportation plan that includes the following:

- Planning measures to control future traffic volumes.
- Measures to mitigate the impacts due to vehicular emissions.
- Strategies to incorporate public transportation facilities such as MRT, bus service etc.

❖ Public transportation facilities

- Provide bus stops within a distance of 1.0 km from the centre of the sector
- All bus stop facilities should be sheltered with adequate seating capacity and display of bus routes & timetables.
- Provide restroom(toilets)at alternate bus stop.

❖ Eco-friendly transportation services

- Provide 100% intra-city eco-friendly public bus shuttle services.
- Provide eco-friendly refuelling facilities (CNG, bio-fuel etc.).

❖ Pedestrian network

- Design pedestrian network between local transit facilities, residential, commercial and other developments.
- Provide shades for footpaths and pathways through tree cover for comfortable pedestrian access.

IGBT Green New Buildings Rating System

IGBT has set up the Green New Buildings Core Committee to develop the rating programme. This committee comprised of key stakeholders, including architects, builders, consultants, developers, owners, institution, manufacturers and industry representatives. The committee, with adverse background and knowledge has enriched the rating system, both in its content and process.

The rating system has been developed based on materials and technologies that are presently available. The objective of IGBC Green New Building Rating System is to facilitate a holistic approach to create environment friendly buildings, through architectural design, water efficiency, effective handling of waste, energy efficiency, sustainable buildings, and focus on occupant comfort & well-being.

Some unique aspects addressed in this rating system as follows:

- Recognition for architectural excellence through integrated design approach.
- Recognition for passive architectural features.
- Structural design optimisation with regard to steel and cement. This is a developmental credit. Projects are encouraged to attempt this credit, so as to help IGBC in developing baselines for future use.
- Water use reduction for construction. This is also a developmental credit.

❖ Prospectus of a township to achieve sustainable development:

- The aim to attain eco-friendly Township is to provide urban transportation, solid waste management and sewer water recycling. Energy efficient processes include climate responsive design practices, reducing dependence on natural resources, identifying the levels of minimum energy consumption and increased the use of renewable power. Energy costing should include life cycle costing with an attempt to achieve 40%-60% reduction in energy cost. The water management for sustainable township comprise of water conservation and net water positive projects. Use wastage material in place of construction material to utilize the agriculture and industrial waste.

❖ Benefits of eco-friendly construction

The advantage of eco-friendly construction over the traditional construction methods – more efficient use of energy and reduction of human impact on the environment. There will a continue rise of energy consumption which is exclusively depends on the burning of fossil fuel. There are sustainable and environmentally friendlier sources of energy too, however, less than one fifth of global energy is obtained from renewable sources. Reduced energy consumption automatically reduces their carbon footprint and helps reduce the human impact on the environment. In addition, green construction typically uses environmentally friendly materials and construction methods which are good for both the environment and human health. Eco friendly buildings are a safer and healthier place to live in, while their renovation or demolition reduces or eliminates exposure to potentially hazardous materials. The only disadvantage of eco friendly construction is perhaps initially higher investment, especially if opting for the type that includes generation of energy on-site. However, the initially higher investment for an eco friendly construction pays off in the long term and it is less expensive to own an environmentally friendly than a conventionally built home. There are, of course, less expensive eco friendly construction methods too and an environmentally friendly home is not necessarily a significantly costlier than conventionally built homes.

❖ Concluding Remarks

The term eco-cities or sustainable cities have broad definition based on the principle of sustainable development. The IGBC green township rating system promotes the creation of diverse, connected, affordable, safe and healthy communities that enhance social interaction and ownership. This paper has discussed about the way of developing a eco -town. By waste management, finding efficiency and limiting use of natural resources an individual can increase the sustainability.

REFERENCE

- [1] IGBC Green Township Manual
- [2] IGBC Green New building rating system (version 3.0)
- [3] Benefits%20of%20Eco%20Friendly%20Construction.html
- [4] Planning sustainable settlements