

Smart Solutions to Smart City's Housing for Urban Poor

Under Integrated Housing & Slum Development Programme in India A Case Study in Solapur City

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Abstract - Towards the Smart Cities mission, the aim is to promote cities that provide core infrastructure and give a decent quality of life to its citizens. The core infrastructure elements in a smart city would include adequate water supply, sanitation, electricity, strong public transport, housing for urban poor, IT connectivity, sustainable environment, health and education, good governance and safety & security of citizens. Housing for urban poor is very important need of urban India as the population increasing rapidly in urban areas. The luxurious housing in urban areas is on the far side of affordability of majority of population belongs to middle-income and low-income groups. Affordable housing is vital to have social integration and alleviating urban poverty. Simultaneously we should focus on a clean and sustainable environment while delivering the affordable housing. This paper suggests provision of housing for urban poor which is sustainable in nature and should not create undue cost burden on citizens. Smart solutions are very much needed to provide more and more affordable houses in future smart cities of India.

Key words – Affordable Housing, Smart Cities, Sustainable Environment, Urban Poor

I. INTRODUCTION

The study of Housing for urban poor project under IHSDP Scheme at New Jagjivanram Zopadpatti, Modikhana Solapur is undertaken to compare it with incorporating Green Building Features and prepare comparative statement on the basis of Cost & Benefits. The scheme provides houses at Affordable costs for EWS, LIG & MIG population.

Under IHSDP Scheme total 1490 housing units are sanctioned from the Central Government with Rs.18,24,73,230 funds approved for the development of slums in various urban areas of Solapur City. Till date 88 housing units are constructed and handed over to beneficiary at Jagjivanram Zopadpatti. Another 372 housing unit construction is in progress at various Slum areas in Solapur.

The study carried out in this housing society and tabulated the major findings of the housing scheme. The various aspects of Affordable Housing are studied in this scheme. As per IHSDP guidelines, provision of physical amenities like Water Supply, Sewers (Drainage Line), Storm Water Drains, Widening and Paving the existing Lanes, Street Lighting and Open Space are provided in this housing project. Social amenities like Pre-School Education, Adult Education,

Maternity and Primary Health Care are available nearby project.

TABLE 1: IHSDP Project Overview

Sr. No.	Particulars	Remarks
1	Name of Project	Integrated Housing Slum Development Programme (I.H.S.D.P.) Construction of Residential Complex, (Ground + First Floor)
2	Location	Jagjivanram Zopadpatti, Modikhana, Solapur
5	Project Area	4710.28 Sq. m.
6	Total Built Up Area (G.F. + F.F.)	4710.28 Sq. m.
7	Area Under Construction	2355.64 Sq. m.
8	Size of Each Plot	3.58 M. X 7.00 M.
9	Total No of Housing Units	88

II. GREEN BUILDING FEATURES FOR IHSDP HOUSING SCHEME

India is facing vast growth in construction development. As the sector growing rapidly, preserving the environment is a biggest challenge. Indian Green Building Council (IGBC) continuously works to provide tools that facilitate the adoption of green building practices in India. With the cost consideration we incorporated only five credits from the IGBC New Building Rating system which include Sustainable Architecture & Design, Site Selection and Planning, Water Conservation, Energy Efficiency and Building Materials & Resource. Green building features are going to provide in IHSDP housing project are discussed here:

A. Sustainable Architecture & Design

The IHSDP housing project has to involved team members from multi-disciplinary fields for effective decision making and enhanced building performance, start from conceptual stage to completion of project. Housing project should retain 20% of the existing topography or landscape, without any disturbance and should hand over to ULB for public use.

B. Site Selection and Planning

All local building bylaws should be followed in the housing project. Project should get completion certificate and Environmental Clearance Certificate from respective authority. Soil erosion control measures should be taken before, during and post construction activities on project site. Site selection should be such that basic amenities like Hospital/Clinic, School, Market, Bank, Parks and Playground are within walking distance of 1 to 2 Km. Housing project located such that it should within walking distance or 1 km from one of the nearest Bus stops or any other public transport.

C. Water Conservation

Effective rainwater harvesting enhances ground water table and reduces municipal water demand. Housing project should have on site Wastewater treatment plant to handle 100% of waste water generated in the buildings as per guidelines and reuse treated water for gardening. Housing project should demonstrate sub metering system for municipal water line and treated water consumption for better results.

D. Energy Efficiency

On site renewable energy like solar energy is used for street lighting system. From solar energy source around 2% to annual energy consumption should generated on site.

E. Building Materials & Resource

Housing project should have separate bins to collect dry waste (Paper, Plastic, Metals, and Glass etc.) and wet waste (organic) at all the floors & common area of buildings. Use materials certified by IGBC, which are recycled and it cost at-least 10% of total building cost. These materials are manufactured locally within minimum distance which kept transportation cost low.

III. BENEFITS FROM GREEN BUILDING FEATURES

A. Water Conservation

The rain water harvesting and wastewater treatment plant can save potable water to an extent of 60% and increase ground water table.

B. Energy efficiency

The use of Solar panel for street lighting has more than 25 years of power generation capacity and saves 50 to 60 % electricity yearly. Environmental friendly 100% powered by sun and reduce fossil fuel consumption, pollution.

C. Handling Consumer Waste

The only city of India has success in converting waste into energy without harming the environment. Solapur has a waste-to-energy plant and daily generate 3 MW of eco-friendly power for last two years. Separate bins provided in various locality definitely help in segregation of waste easily and efficient working of power plant.

D. Reduced dependency on Virgin Materials

Fly-ash bricks which are product of waste from thermal power plant i.e. Fly-ash and gives same strength as Mud bricks. It proves cost effective also. Overall green building features discourage the use of virgin materials.

E. Reduced use of Fossil Fuels

Green building practices encourages the use of public transportation instead of personal vehicle use. This reduces vast use of fossil fuel for personal vehicle and become source of pollution.

F. Health and Well – Being of Occupants

It can be achieved by ensuring adequate ventilation, day-lighting and well being facilities. Location of project plays very important role in well being facilities such as Schools, Clinics and Markets etc. The recognize measures like Tobacco smoke control maintain indoor air quality.

IV. COST ASSOCIATED WITH GREEN BUILDING FEATURES

Housing for Urban Poor means it has emphasis on cost of housing which can affordable for common man. Green building features for Housing is basically costly practice. Cost associated majorly with water conservation, energy efficiency and building materials & resources.

A. Water conservation

Cost incurred in this is basically for Rainwater Harvesting setup, Waste Water Treatment Plant and Water Meter. Refer Table 2 for detail of cost incurred in water conservation.

TABLE 2: Cost Associated with Water Conservation

Sr. No.	Particulars	Total Cost in INR	Share of Dweller in INR
1	Rainwater Harvesting	362900	4125
2	Waste Water Treatment Plant	10,00,00	5000
3	Water Meter	1,42,560	1620
Total		1505460	10750

B. Energy Efficiency

Energy efficiency is achieved in this project by providing Solar panel Street Lighting. Cost incurred in solar street lightning is considered for the comparison. Refer Table 3 for detail of cost incurred in Energy efficiency.

Table 3: Cost Associated with Energy Efficiency

Sr. No.	Particulars	Total Cost in INR	Share of Dweller in INR
1	Solar Panel Street Lighting	3,36,000	3820

C. Building Materials & Resources

Cost associated with this are Segregation of Waste and Green Building Material. For the segregation of waste post occupancy needs separated bins to collect dry waste and organic waste separately. Green Buildings Materials we selected fly ash blocks and green paint instead of mud bricks and normal paints respectively.

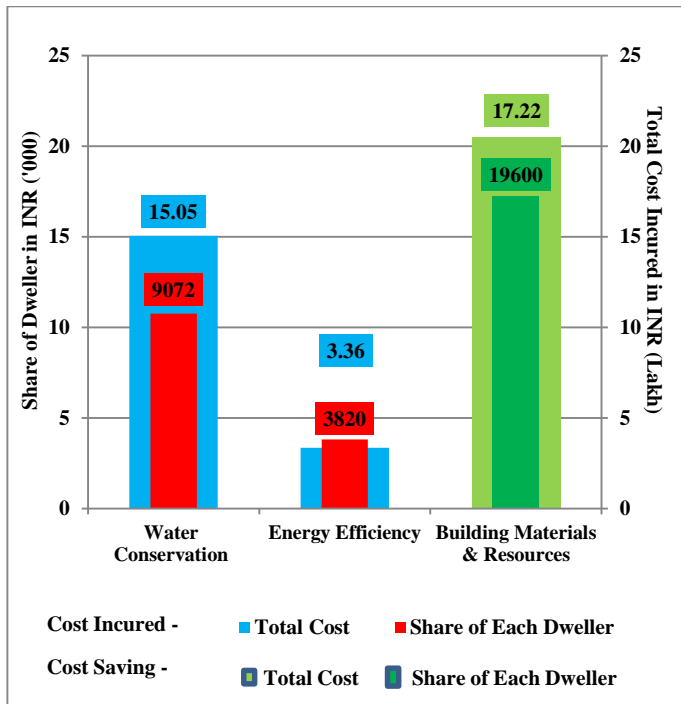
Table 4: Cost Associated with Building Materials and Resource

Sr. No.	Particulars	Total Cost in INR	Share of Dweller in INR
1	Waste Bins	9800	120
2	Fly Ash Bricks	11,51,340	13090
3	Green Paint	5,61,600	6390
Total		17,22,740	19600

Table 5: Cost Saving in Green Building Materials

Sr. No.	Particulars	Cost of Material Used In INR	Cost of Green Material proposed in INR	Difference in Cost INR
1	Brick Work	17,27,010	11,51,340	5,75,670
2	Paints	7,84,000	5,61,000	2,23,000

From the findings it can be seen that some of green building features are economical than conventional practices. This cost cutting is helpful in providing some other green features for the project. Refer Table 4 and 5 for details of cost savings in Building materials.



Graph 1: Cost Associated with Green Building Features

V. CONCLUSION

This research presents the slum rehabilitation model with green building features and its benefits and cost associated with it. The problem of Housing for Urban Poor in urban India is being reviewed with great concern in recent years. Rapid urbanization, decreasing household size, migration from within state and other state are some of the reasons behind need for Housing in the Solapur City.

From the study carried out on IHSDP housing project with incorporating green building features, following are the concluding remarks:

- For the green building features to be incorporated in project, it needs approximately share of Rs. 14700/- from each household. Households are currently shares only 10% of housing cost. So from the survey it seem that majority of population can bare additional cost for the green building. The total amount is very less and approximately 15% of their average period of income which essential for purchasing a house (i.e. 3 years income).

- On the other hand using green building materials, we can curtail the total cost required for housing project by 10%. Materials such as fly ash blocks and green paints are cost savings. This gives tremendous savings and can further utilized for other development in housing project.
- Use additional FSI of 1.5 or 2.0 for delivering more affordable housing. This helps homeless population to find appropriate house.

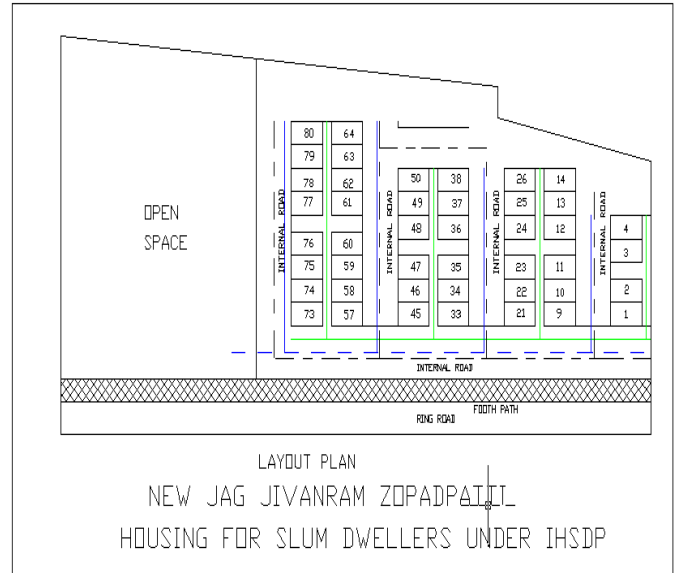


Figure 1: Layout Plan of Jagjivanram Zopadpatti

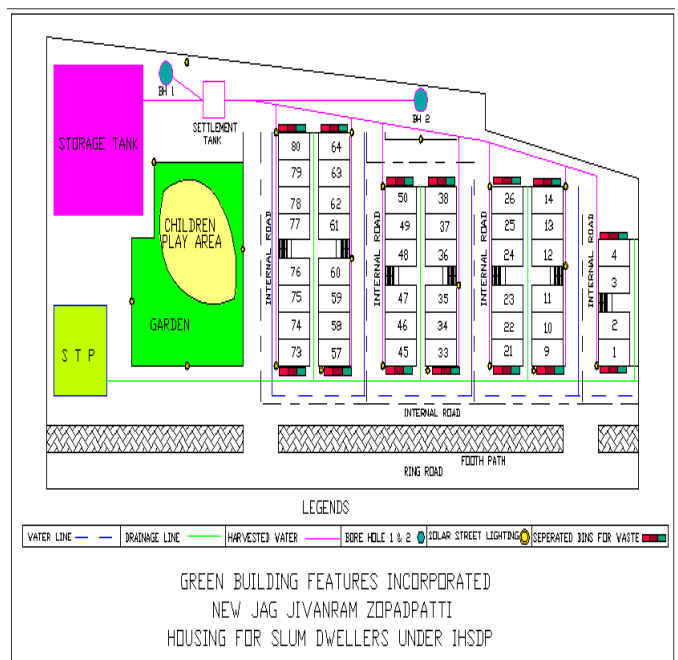


Figure 2: Layout Plan of Jagjivanram Zopadpatti with Green Building Features

VI. RECOMMENDATION

Study of IHSDP housing scheme with Green Building practice are plays very important role. To enable Housing for Urban Poor which are less harmful to environment we should adopt green building practices. Provision of Green Affordable Housing is biggest need of century.

India is in developing stage and this is the right time to work on sustainable development. Government has undertaken numbers of IHSDP housing projects all over the country. If government adopted this sustainable development, surely we can develop Smart Cities in India.

Above recommendations in IHSDP scheme have various benefits for both citizen as well as Government.

- Bring order to chaos. Slum rehabilitation gives proper, well manner and overall development of area.
- Restore environment. Green housing surely helped in what we have to owe to environment and have sustainable development.

FUTURE SCOPE

Green building features which are discussed in this paper can get Certified or Silver level certification from Indian Green Building Council (IGBC), which represents good or best practices in construction.

We can further go for such project with in Partnership with Private Players.

Government should provide subsidies to those existing societies who incorporate green building features for their societies.

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