

# Comparative Study and Cost Analysis of Green Building and Conventional Building (Case Study) - A Review

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**Abstract**— Conventional buildings have major environmental impacts during their life inclusive of their construction phases. Resources such as ground cover, forests, water, and energy are dwindling to give way to buildings. Resource-intensive materials provide structure to a building and landscaping adds beauty to it, in turn using up water and pesticides to maintain it. Several building processes and occupant functions generate large amounts of waste, which can be recycled for use or can be reused directly. Buildings are thus one of the major pollutants that affect urban air quality and contribute to climate change. Hence, the need to design a green building, the essence of which is to address all these issues in an integrated and scientific manner. A green building depletes the natural resources to a minimum during its construction and operation. The aim of this project is to give the importance of green building design is to minimize the demand on non-renewable resources, maximize the utilization efficiency of these resources when in use, and maximize the reuse, recycling, and utilization of renewable resources. The study is focused on maximizing the use of efficient building materials and construction practices; optimizes the use of on-site sources; uses minimum energy to power itself; uses efficient equipment to meet its lighting, air conditioning, and other needs; maximizes the use of renewable sources of energy; uses efficient waste and water management practices; and provides comfortable and hygienic indoor working conditions. A green rated building and its features are selected for comparison with conventional type of building features which gives us the user benefit comparison and in some context of cost variations.

**Key words:** Green Building Project, Energy Conservation Building Code (ECBC), GRIHA

## I. INTRODUCTION

Due to urbanization, there is unprecedented demand for the construction of new buildings. The construction sector poses a major challenge to the environment. According to the World Business Council for Sustainable Development buildings are responsible for at least 40% of energy use globally. An estimated 42% of the global water consumption and 50% of the global consumption of raw materials is consumed by buildings when taking into account the manufacture, construction, and operational period of buildings. In addition, building activities contribute an estimated 50% of the world's air pollution, 42% of its greenhouse gases, 50% of all water pollution, 48% of all solid wastes and 50% of all chlorofluorocarbons (CFC) to the environment.

1) Now a day's construction projects involve more sub process than past, improving project complexity simultaneously.

2) Total duration of construction projects exceeds limits which have been quoted before.  
3) As new technology introduced in work cost and time requirement becoming more and more.

As we chart our developmental path, it is important for us to minimize the environmental damage that going to be create in upcoming years. It is extremely important to pause for a while and carry out necessary course correction for benefit of the Earth and our future. It is a well-established fact that green buildings offer immense potential to reduce consumption and regenerate resources from waste and renewable sources and offer win-win solution for user, owner and the environment.

## II. STUDY OVER THE CONCEPT OF GREEN BUILDING PROJECT

The global concern for climate change, global warming and increasing pollution has made in imperative for the policy makers through the world to devise green strategies for sustainable future. As a result, the buildings need to be go through green building sense.

### A. Meenakshi Sharma (2018)

Meenakshi Sharma analyzed the issues of green building and challenges of green buildings with the role of stakeholders, Government, Corporate, Developers, Buyers, private bodies influencing the green building adoption. The study used quantitative research design to verify the hypothesis and research framework. Questionnaire survey method was used for data collection.

The study concentrated on Indian green building scenario. The study has explained how the background of a number of environmental issued and challenges government of a country should develop.

### B. Youngcheol Kang

Youngcheol Kang explore pre project planning efforts for green and conventional building projects. The project progress data were categorized into four groups based on type of project and cost performance. Application of two-way ANOVA results that the green building projects tend to involve more pre project planning efforts as compared to conventional building projects. In further studies a comparison of the four groups, it was revealed that green building projects with superior cost performance invest in more pre project planning efforts than other groups.

The study gives two main obstacles for implementation of green building projects. The perception that green projects tend to cost overrun because of their complexity and lack of the understandings of sustainability. The findings of this study reveal that the relationship between pre project planning and cost performance for green projects is positive, and the relationship is stronger than the relationship is stronger than conventional building projects.

### C. Xiaosen Hou

Xiaosen Hou discussed the key issue of site planning and design for site sustainability in green building development. In this paper they made a questionnaire survey to investigate how the participants rated the importance and difficulty of site planning and design related variables and items. The Kendall concordance test and Mann-Whitney U test were used to analyze and were divided into two groups. They have also involved the importance of items in Site planning and design of green buildings and difficulties of items in site planning and design of Green building projects. They studied the important five variables impacting the site planning and design process which are Environmental management plan, Neighborhood Daylight access, Land use, Storm water management and Ecological value and protection.

### D. Srikant Misra (2016)

Srikant Misra highlighted the green building materials are superior than the conventional materials in terms of overall energy saving criteria as well as Eco-friendly nature of the material. A concept of whole building performance tool is an online tool to access conformance with the ECBC using the Whole Building Performance (WBP) method; which enable building developers and designers to test their building design using the energy simulation protocol. By using ECOnirman whole building performance tool they have shown that considering a simple parameter like window-wall ratio of a building, proper vertical and horizontal shading, proper window construction, seasonal schedule etc., energy requirement of the building can be minimized and can be made more efficient.

### E. Kanika (2016)

Kanika Presented the comparative study on green and conventional buildings by covering the two districts. Also, revealed the study as green buildings are far better than that of conventional buildings in every aspect of IEQ. Green and healthier environment anticipate less illness and therefore reduce absenteeism. This paper suggests that, more buildings to be promoted for green projects.

## III. ELEMENTS AND OBJECTIVES OF GREEN BUILDING PROJECT

Green building is now a days very big industry worldwide; It has acted as a catalyst in adoption of green construction, design across globe and has inspired innovations in product, material and process (WGBC, 2013). It is general belief that a Green Home will cost much more than a Conventional Home, but some middle way is required to be found out by analyzing the real situations & conditions in the market.

- 1) In these days, when everyone is talking about the Green construction, there is need of a way by which a common can afford a Green Home.
- 2) The growth and development of our communities has a large impact on our natural environment. The manufacturing, design, construction, and operation of the buildings in which we live and work are responsible for the consumption of many of our natural resources.
- 3) Seeking to lower all environmental impacts and maximize social and economic value over a building's

whole life-cycle: through design, construction, operation, maintenance, renovation, and demolition. The fragmented nature of the building industry value chain means we have long looked at parts of the life-cycle in isolation, but Green Building Councils are bringing the sector's whole value chain together through our members to build a wider vision.

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There are 4 elements of Green Building. That shows the main points required to be considered while designing any building:

- Smart Design
- Energy Efficiency
- Eco Materials
- Water Conservation

## IV. ENERGY CONSERVATION BUILDING CODE (ECBC)

Energy Conservation Building Code (ECBC) is one of the most effective tools to curb future energy demand growth, deliver significant cost energy savings to building owners and users, while improving comfort and air quality. While effective development, implementation and enforcement of ECBC require coordinated efforts of multiples stakeholders at different levels, enforcement and implementation of ECBC lies with the state and local governments.

The purpose of the Energy Conservation Building Code (Code) is to provide minimum requirements for the energy-efficient design and construction of buildings. The Code is applicable to buildings or building complexes that have a connected load of 100 kW or greater or a contract demand of 120 kVA or greater and are intended to be used for commercial purposes. Buildings intended for private residential purposes only are not covered by the Code. The provisions of this code apply to:

- Building Envelope,
- Mechanical systems and equipment, including heating, ventilating, and air conditioning, service hot water heating,
- Interior and exterior lighting, and
- Electrical power and motors, and renewable energy systems.

The aim of this paper is to define the importance of Green project buildings by comparing the data and cost analysis of some of major items contributing the building construction to make it Green project.

## V. RESEARCH METHODOLOGY

This research conducted collecting actual data with the project manager and Client i.e. Government organization of the site and collected information regarding the site layout, series of construction activities, site planning, construction and building materials, techniques used in building construction etc. Research went through the collection of study of green building concept, green building data, material used and comparing it with conventional data.

This research limited our research to a green building in Mumbai, India and focused on the similar type of sector as this region is having maximum number of projects which further can be consider through green buildings. A green rated building is taken for comparing with its current features of making it to green and comparing it with the same building without non-green features with standard operating procedure and comparing the techniques. This building is studied from all its stages i.e. Pre- construction stage, building planning & construction stage and Building operation & maintenance stage.

The major techniques are analyzed on the basis of cost as per the actual data collected. Also, collecting the actual data of the reduced energy consumption, water consumption etc. is done in the case study. As well as standard laws and codes has referred by the quality evaluation perspective only.

weighted performance of each activity in work package based on quality key performance indicators quality performance of that WP can find out. By adding the weighted WP performance of each WP accomplished at the as-of date, the quality project performance status can be evaluated.

## VI. OBJECTIVES OF STUDY

- 1) To understand the concept of Green building Project.
- 2) Collection of construction and building details from Green rated building.
- 3) Study and use of various features of green buildings and comparing it with conventional buildings.
- 4) cost analysis in Green building point with Conventional building project.

## VII. CONCLUSIONS

This research directs towards requirements of Green sustainability building projects to reduce the amount of energy required to provide products and services for project life cycle.

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