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ENERGY EFFICIENCY IN GREEN BUILDING TO ACHIEVE COMPANY SUSTAINABILITY

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Abstract - Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. Energy efficiency is the key to achieve sustainability in green building. This project will identify the benefits of energy efficiency; explore the methods to apply energy efficiency and the obstacles in attaining energy efficiency in green building. Energy efficiency can contribute to main benefits in the environment such as reduced greenhouse gases emission and lower the air pollution problem, and energy saving. This can be implemented by electrical feeding and sensor system in lighting system, passive design, and cross ventilation to achieve energy efficient buildings. Thus, green building design provides solutions to many environmental issues and contributes in keeping the environment clean and green. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

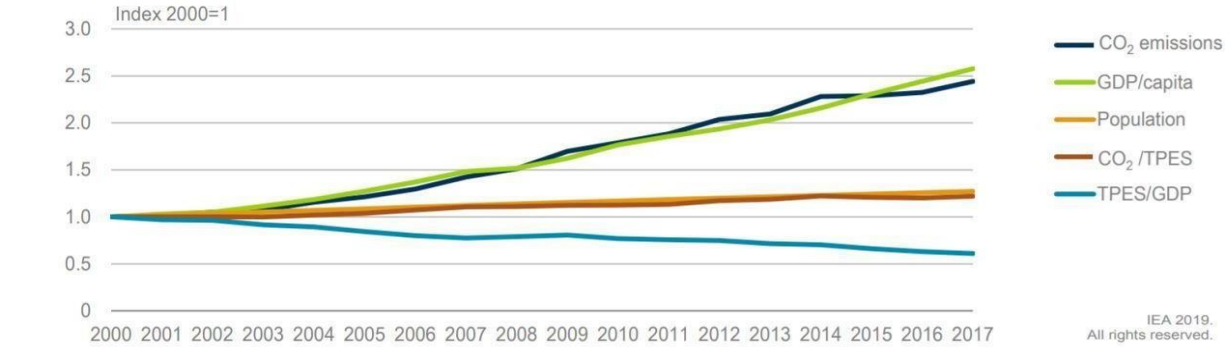
1. INTRODUCTION

In this fast-growing world, the dwellings and habitats are universally linked to construction of buildings as pleasant, appropriate and aesthetically pleasing to every individual. According to the International Energy Agency, buildings represent approximately 40% of the energyand about 75% of the electricity consumption in the world. The construction sector is growing rapidly by investing approximately 30% to 40% of total global basic resources. Energy-related CO2 emissions have more than doubled since 2000, driven by strong economic growth, increasing population and higher carbon intensity in the energy supply as shown in Figure 1.1.

Although energy consumption from building operations has remained steady year-on-year, energy- related carbon dioxide (CO_2) emissions increased by 9.95 Giga tonnes in 2019. This increase was largely due to a shift away from the direct use of coal and oil and towards electricity, which has a higher carbon content due to the high proportion of fossil fuels used in generation. When adding emissions from the building construction industry on top of operational emissions, the sector accounted for 38% of total global energy-related CO2 emissions. In the fiscal year 2019-2020, CO_2 emissions in India fell by an estimated 30 million tonnes of CO_2 as shown in Figure 1.2. This was the first- time emissions had fallen in the country in four decades. Although factors such as renewable energy growth and economic slowdown affected these figures, measures

such as lockdowns, implemented to slow the spread of the novel corona virus (COVID-19) had a big impact in early 2020.

Figure 1.1 Energy related CO_2 emissions and main drivers, 2000-17



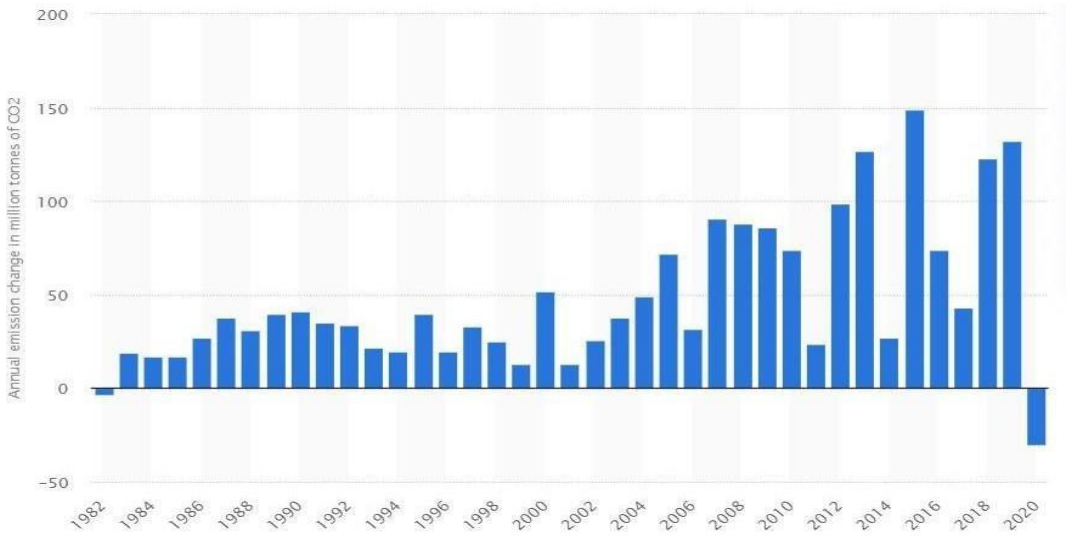
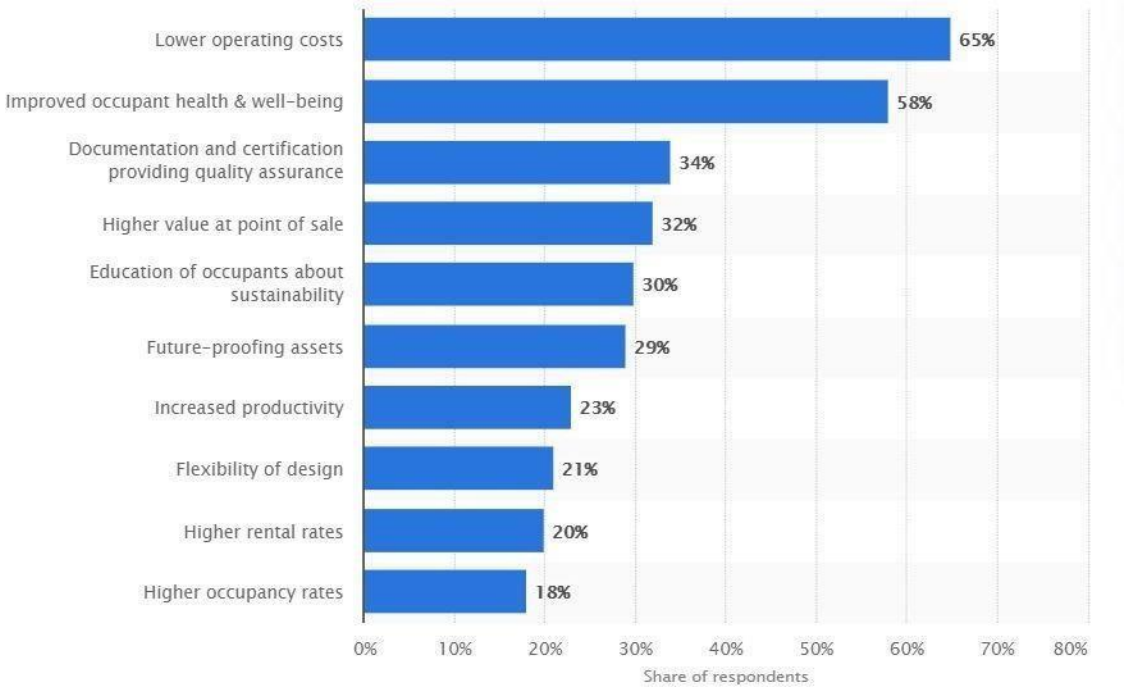


Figure 1.2 Annual change in carbon dioxide (CO2) emissions in India from 1982 to 2020

The need to adopt sustainable green building design approach is the ultimate solution to reduce the energy demand of the building. Over usage of conventional building materials not only cause global warming but also affects the natural resources. Green or sustainable building use key resources like energy, water, materials, and land more efficiently than buildings that are just built conventionally. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity



Benefits of implementing green buildings worldwide

Energy efficiency is an important factor to achieve sustainability in green building. It can be maximized by utilizing materials and systems that help reduce energy consumption in buildings and facilities. Energy efficiency bring a number of benefits to society, is a key and important point to attain sustainability in green buildings and organizations. It also assists to manage the increasing energy costs, reduce environmental impacts such as lower the greenhouse gas emission, and add the value and to enhance competitiveness of green buildings.

The building sector can significantly reduce energy use by incorporating energy-efficient strategies into the design, construction, and operation of new buildings and undertaking retrofits to improve the efficiency of existing buildings. It can further reduce dependence on fossil fuel derived energy by increasing use of on-site and off-site renewable energy sources.

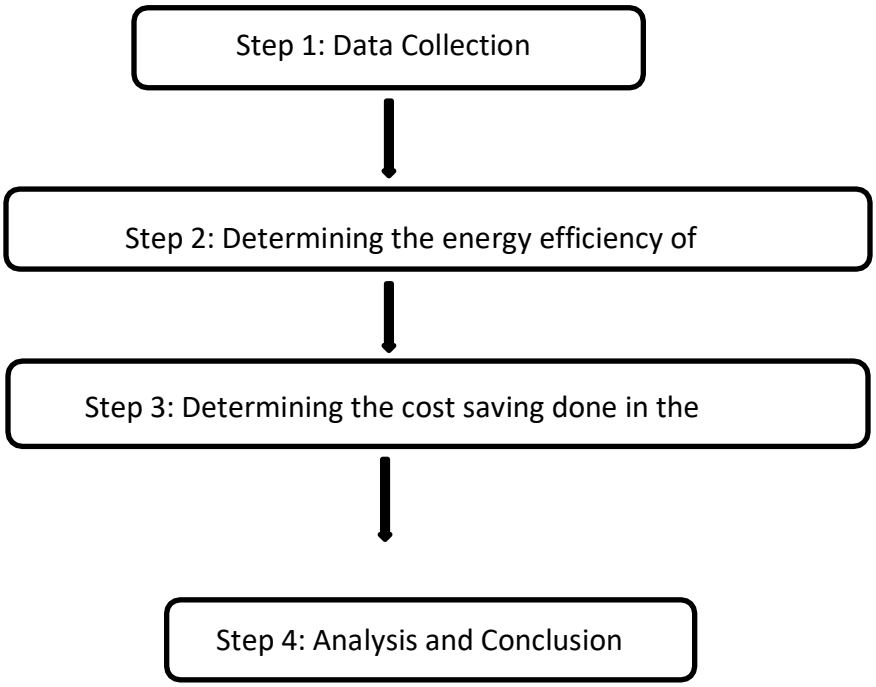
METHODOLOGY-Green buildings often include measures to reduce energy consumption both the embodied energy required to extract, process, transport and install building materials and operating energy to provide services such as heating and power for equipment.

As high-performance buildings use less operating energy, embodied energy has assumed much greater importance and may make up as much as 30% of the overall life cycle energy consumption.

To reduce operating energy use, designers use details that reduce air leakage through the building envelope. They also

specify high-performance windows and extra insulation in walls, ceilings, and floors. Another strategy, passive solar building design, is often implemented in low-energy homes. Designers' orient windows and walls and place awnings, porches, and trees to shade windows and roofs during the summer while maximizing solar gain in the winter. In addition, effective window placement can provide more natural light and lessen the need for electric lighting during the day. Solar water heating further reduces energy costs.

Onsite generation of renewable energy through solar power, wind power, hydro power, or biomass can significantly reduce the environmental impact of the building. Power generation is generally the most expensive feature to add to a building.



3.1 Methodological Framework

Step 1: It is the data collection which is the process of gathering quantitative and qualitative information of case study with the aim of evaluating outcomes or gleaning actionable insights. It involves the collection of data regarding the energy efficiency systems (HVAC, Lighting, cladding, metered systems) used in Brigade Triumph.

Step 2: Determining the energy efficiency of the project. An energy audit is carried out, which primarily provides a detailed overview of the building's energy consumption and can also include data on annual energy costs, the survey and analysis of the actual structural condition of the building, and its energy systems as well as proposals for the measures for

complete energy-related feasibility analysis.

Step 3: Determining the cost saving done in the project. It provides the figure of the cost savings done by using the energy efficiency systems used the building. Green buildings, on average, are 14 percent less costly to operate than traditional buildings, with most new builds today achieving significantly more energy savings.

Step 4: Analysis and conclusion. By analyzing the data collected above regarding the energy efficiency systems reduction in the cost incurred during the operation of the building is obtained. The conclusion of amount of energy and cost saving will be obtained.

CONCLUSIONS

- The initial body of research focused on the cost and benefits of sustainability; with further studies providing quantitative analysis on certified green buildings and the positive impact on rentals and value.
- The various justifications on the benefits of green buildings, has created greater awareness within the real estate industry and provided sufficient drivers for stakeholders to increasetheir involvement in the sustainable agenda.
- From a valuation perspective, the use of performance-based tools, such as cost-benefit analysis and economic assessments are not appropriate measures of market value. Research further evolved to more analytical approaches on valuation with some proposing to modify traditional valuation methods, to incorporate the risk premium of green buildings in property valuation.
- Traditionally, property value has always been evaluated on a few key parameters, namely, location, size, condition, design. For sustainability to be assessed not only should a relationship between sustainability and market value be identified, improved valuation tools and methodologies are

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