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A Review Study on Design and Analysis of Net Zero Energy Residential Building

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ABSTRACT

The building can be designed by using AutoCAD and Revit Software. Engineers and the software allow users to design a building and its components in 3D annotate the model with 2D drafting elements and access building information from the building model's database. The Residential building has two floors. Our structure has ground floor and first floor. Staircase can be placed in between two floors. By using Revit Structure Analysis, The software which integrates with BIM workflows, is available only in architecture, engineering & construction collection. We have enough energy from the sun, solar panels provide energy to meet all the electricity requirements and build using alternate building materials an energy source. You need to choose the right material for getting the required efficiency.

It is reported that 30 to 40% of all of the primary energy used worldwide is used in buildings. This high energy use may directly or indirectly affect the environment. Also, it causes climatic changes, degrades the environment and increases the air pollution. Hence it is necessary to reduce the energy consumption in the building and necessary steps to be taken to make the buildings more environmentally sustainable. In recent years, zero energy building concepts is developed to overcome this problem. The zero-energy building uses natural energy sources to meet the energy requirements of the building. In this work, we have carriedout a study to analyze the performance of a zero-energy building and found that it is possible to have such building in India.

Key words: Revit software, BIM tools, Robot Structural analysis.

1.INTRODUCTION

There are numerous papers which outline how the total energy demand of a building is fully controlled by electricity demand, and consequently in the NZEB definition only electricity is considered. One of the reasons for this condition is simply the shortage of district cooling in many countries; however, this issue is not commonly mentioned in the definition, which makes it inaccurate. "A zero-energy house is defined as a house in which no fossil fuels are consumed, and the annual electricity consumption equals annual electricity production Buildings have a significant impact on energy use and the environment. Commercial and residential buildings use almost 40% of the primary energy and approximately 70% of the electricity in the United States. ZEB is not a single product or technology; but rather a combination of closely-integrated evolving technologies. Zero energy home is the term used for a home that optimally unites commercially available renewable energy technology with state-of-the-art energy efficiency construction techniques. In a zero-energy home, no fossil fuels are consumed and its annual electricity consumption equals its annual electricity production. A zero-energy home may or may not be grid connected. Without the various energy efficiency policies, which have been in effect since 1973, worldwide energy consumption would be 56% percent higher today.

2.LITERATURE REVIEW

In the literature dedicated to Zero Energy Building the authors frequently emphasize the lack of common understanding of what should be equal to 'zero'. This issue has been widely discussed in numerous publications however, the question: should "zero" refer to the energy, the exergy or the CO2 emissions or maybe energy costs, still has not been unambiguously answered.

In the report, **Torcellini (2006)**, authors use the general definition for ZEB given by The U.S. Department of Energy (DOE) Building Technologies Program: "A net zero-energy building (ZEB) is a residential or commercial building with greatly reduced energy needs through efficiency gains such that the balance of energy needs can be supplied with renewable technologies." However, they also point out clearly undefined zero': "Despite the excitement over the phrase "zero energy," we lack a common definition, or even a common understanding, of what it means."

Kilkis (2007) in his work refers to Torcellini (2006) however, his review on ZEB definitions, takes slightly another direction. Kilkis indicates that in balancing the 'zero' both quantity and quality (exergy) of energy should be taken into consideration. Kilkis, (2007), explains that: "…although ZEB definition seems logical, it falls short recognize the importance of exergy in assessing the complete impact of buildings on the environment.

Mertz (2007) distinguish two definitions for ZEB: a net-zero building or a net-zero CO2 (CO2 neutral) building. They are the result of resource limitation and environmental impact, respectively. Mertz (2007) describe a net-zero energy home "… as a home, that over the course of year, generates the same amount of energy as it consumes. A net-zero energy home could generate energy through photovoltaic panels, a wind turbine, or a biogas generator. The net-zero energy home in this paper uses photovoltaic panels (PV) to offset electricity purchased from the grid.

MATERIALS AND METHODOLOGY

In this work, we want to study and analyze the zero-energy building available in India. The study will be carried out based on the need of zero energy building and method of reducing the building energy consumption and energy conservation. We have identified zero energy building located the Indira Paryavaran Bhavan, New Delhi This building is energy sufficient building and uses renewable energy sources for heating. And a lso, we used AutoCAD and Revit software to construct and design the Net Zero Energy Residential Building. We used energy consuming materials like concrete hollow block, cool roof, floors, e- glass windows, natural ventilations, solar panel, orientation, shading, thermal mass and cavity wall.

INDIRA PARYAVARAN BHAVAN, NEW DELHI

CONCLUSION

In conclusion, we decided that for our Zero Energy Project using solar energy is the best energy source in regards to saving energy and cost efficiency. After brainstorming and researching we came to an agreement that photovoltaic solar panels are the best solution for generation of the electricity in Moradabad Institute of Technology. The installation of the solar panels initially would be costly, but in the long run the owner of the building would save money on their energy bill. More importantly, in the scarcity of natural resources we would be providing a self-sufficient, energy saving, non polluting, Zero Energy building. The solar panels that would be installed would be on the back side of the building, which would be faci ng south. This would allowfor the most direct sunlight to be absorbed by the panels.

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