

## Simulation and Analysis of Passive Parameters of Building in eQuest: A Case Study in Istanbul, Turkey

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**Abstract :** With rapid development of urbanization and improvement of living standards in the world, energy consumption and carbon emissions of the building sector are expected to increase in the near future; because of that, energy-saving issues have become more important among the engineers. Besides, the building sector is a major contributor to energy consumption and carbon emissions. The concept of efficient building appeared as a response to the need for reducing energy demand in this sector which has the main purpose of shifting from standard buildings to low-energy buildings. Although energy-saving should happen in all steps of a building during the life cycle (material production, construction, demolition), the main concept of efficient energy building is saving energy during the life expectancy of a building by using passive and active systems, and should not sacrifice comfort and quality to reach these goals. The main aim of this study is to investigate passive strategies (do not need energy consumption or use renewable energy) to achieve energy-efficient buildings. Energy retrofit measures were explored by eQuest software using a case study as a base model. The study investigates predictive accuracy for the major factors like thermal transmittance (U-value) of the material, windows, shading devices, thermal insulation, rate of the exposed envelope, window/wall ration, lighting system in the energy consumption of the building. The base model was located in Istanbul, Turkey. The impact of eight passive parameters on energy consumption had been indicated. After analyzing the base model by eQuest, a final scenario was suggested which had a good energy performance. The results showed a decrease in the U-values of materials, the rate of exposing buildings, and windows had a significant effect on energy consumption. Finally, savings in electric consumption of about 10.5%, and gas consumption by about 8.37% in the suggested model were achieved annually.

**Keywords :** efficient building, electric and gas consumption, eQuest, Passive parameters

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