

OFFICIAL ABSTRACT and CERTIFICATION

Comparing the Effects of a Building's Glass Type, Size, and Location on Its Average Annual Energy Usage Through BIM Software

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Studies have utilized Building Information Modeling (BIM) software to understand a building's peak energy times and to predict a building's future energy consumption. While BIM software can help optimize the energy savings of an individual building, it has not been used to simulate the effects on a building's energy loads at the global scale. This study investigated the effects of a building's glass type, size, and location on its annual energy usage. Using Autodesk Revit, ten, twenty, and thirty story office buildings were modeled and simulated in 141 cities. In Autodesk Insight, each building's facade was changed between Single Clear, Double Clear, Double Low-E, and Triple Low-E glass and the building's energy unit intensity (EUI) was recorded in kBtu/sq.ft/yr. The study found that there was a strong relationship between the latitude of the building and the building's energy saving potential from using more thermally resistant glass. The results included that buildings located inland had greater EUIs than buildings in coastal cities. Additionally, the research discovered that for buildings North of about 53° N, the energy saving potential of replacing Single Clear glass with Double Clear glass surpassed the energy saving potential of using Triple Low-E glass instead of Double Low-E glass. The results can help building professionals and governments around the world understand how to develop or retrofit buildings that are more energy efficient, contributing to a reduction in global energy use, the need for resources, and the emission of carbon dioxide into the atmosphere.

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