

## A CASE STUDY ON THE IMPACT OF BUILDING ENVELOPE ON ENERGY EFFICIENCY IN HIGH-RISE RESIDENTIAL BUILDINGS

Diğer AYDIN <sup>a</sup>, Esmâ MIHLAYANLAR <sup>b</sup>

<sup>a</sup> Research Assistant, MSc Arch.; Trakya University, Faculty of Architecture, 22100 Edirne, Turkey

\*E-mail address: *dinceraydin@trakya.edu.tr*

<sup>b</sup> Associated Prof., PhD Arch.; Trakya University, Faculty of Architecture, 22100 Edirne, Turkey

\*E-mail address: *emihlayanlar@trakya.edu.tr*

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### Abstract

The building envelope, the most important element in the energy consumption of a building, gains more importance due to the large amount of the surface area of building's façade in high-rise buildings. The energy consumption of these buildings is increasing depending on their high transparency ratio as a result of decrease in the thermal resistance of the façade. The aim of this study is to show the importance of building envelope design in energy efficiency of high-rise residential buildings and to analyze the effect of the building envelope design on energy consumption. Turkey's highest residential building from 2010 to 2017 was selected for the case building. DesignBuilder program with the EnergyPlus simulation engine was used for energy analysis of the building. The energy consumption results were compared with the other study data in the literature. As a consequence of the simulation conducted according to the existing façade of the building, 25% of the energy is used for heating and 14% for cooling in total energy consumption. It has been found that the building envelope designed with double-layered air corridor can offer the maximum level of residential comfort to the occupants. This study shows that the building façade with air corridor also reduces energy consumption by 30% compared to the same sized buildings.

Keywords: BIM; Building envelope; DesignBuilder; Energy efficiency; High-rise residential buildings.