

Development of Energy Performance Benchmarking and Heating Seasonal Performance-Based Rating for Dura Residential Apartments

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ABSTRACT

Enhancing energy efficiency in apartment buildings is considered one of the main criteria for reducing energy consumption and demand. In Palestine, there is a need to contribute standards and propose energy efficiency indexes appropriately to fit the Palestinian residential building context and the local communities. This study relies on survey results representing the actual energy performance and use patterns in Dura residential apartments. The survey sets the scene to calculate the energy use intensity. This energy benchmark is essential to implement energy efficiency measures to reduce energy consumption and enhance the energy use intensity value. The survey was followed by a simulation-based approach to analyze the typical layout of current residential apartment buildings in Dura by proposing two representative benchmark models for the future use of building heating energy efficiency measures and simulation processes related to building heating energy performances and thermal comfort. The selection of the two representative models depends on the energy benchmarking survey results to ensure their relevance and representativeness within the local context and reflect the characteristics of heating energy consumption. The simulation processes were conducted to evaluate four distinct heating scenarios for each model, encompassing both space simple heater and air conditioning (AC), firstly within the context of actual existing operating conditions based on the input data from the survey and secondly within the enhancement conditions based on the typical standard operation settings data from the Palestinian Green Buildings Guidelines (PGBG), related to the usages of the HVAC systems, and building envelopes. The standard scenarios were regarded as a heating energy consumption benchmark, in which the standard settings consumed the least amount of possible energy and reflected the efficiency of enhancement conditions. The obtained results shed light on the efficiency and performance of each scenario's configuration, providing valuable insights for adopting new standards and contributing to developing the heating energy efficiency index. This index served as the basis for establishing the heating energy rating as an upgraded rating whenever there is updated data for new apartments.