

Strategic Decision Making For Zero Energy Buildings in Jordan

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ABSTRACT

This paper presents the results of combined economic and computational study of different integrated passive and active design strategies for the Jordanian residential building sector. A representative house prototype, located in Amman is selected as a case study for the zero energy design and performance objective. The aim of the study is to investigate the potential of achieving thermal comfort and delivering thermal and electrical energy demands for existing buildings on site for different Jordanian Cities. Jordan has a semi-arid climate with an annual total irradiation above 2000 bankable kWh/m² per year with approximately 2000 hours of full sunshine. Therefore, different passive and active design strategies are discussed and compared to reach an annual net zero energy demand for the existing building stock. In order to achieve zero energy buildings certain strategies are examined. For example, internal loads reduction, envelope insulation in addition to the installation of solar water heater and photovoltaic. Based on a month-by-month demand analysis, internal loads and envelope performance are analyzed in order to explore the existing economical potential. Simulation software DesignBuilder is used to examine the strategies proposed to achieve annual net zero energy performance for a prototype. The final result of this study compares the potential and constraints of each strategy and assesses them based on economical feasibility. For the considered location and weather conditions the prototype can provide thermal comfort for occupants and meets the zero energy objectives. The research also proves that some strategies are cost effective rewarding with a payback period ranging from 3 to 9 years.