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Building's Energy Consumption Pattern and Design-Built Parameters - Influence of Climate on Design Guidelines

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Increasing buildings energy efficiency is a challenging task. The two main contributing factors that control the overall buildings energy performance are the Heating Ventilation & Air Conditioning (HVAC) system and the building envelope design. Our research investigates how three main building envelop design factors (orientation, compactness and window to wall ratio) impact the overall building's energy consumption. We focus on typical rectangular shaped buildings and vary the geometry between a square to a rectangular floor plan to provide a basis of energy performance in early stage building design guidance. We test the analysis on building's energy performance specific to the Middle East's Kuwait climate condition and environment, and discuss the least energy consumption patterns. This is of importance as most of the electricity consumption in Kuwait are due to HVAC use in residential buildings. The major energy consumption factors are broken down to show how the patterns are unique compared to the previously researched efforts and how a regional set of guidance is of need. The results of this study's implication on energy and resource use in the Gulf Cooperation Council (GCC) region is discussed, given the high proportion of GHG emission compared to the population within the region.