World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:12, No:05, 2018

Toward Sustainable Building Design in Hot and Arid Climate with Reference to Riyadh City, Saudi Arabia

Authors : M. Alwetaishi

Abstract : One of the most common and traditional strategies in architecture is to design buildings passively. This is a way to ensure low building energy reliance with respect to specific micro-building locations. There are so many ways where buildings can be designed passively, some of which are applying thermal insulation, thermal mass, courtyard and glazing to wall ratio. This research investigates the impact of each of these aspects with respect to the hot and dry climate of the capital of Riyadh. Thermal Analysis Simulation (TAS) will be utilized which is powered by Environmental Design Simulation Limited company (EDSL). It is considered as one of the most powerful tools to predict energy performance in buildings. There are three primary building designs and methods which are using courtyard, thermal mass and thermal insulation. The same building size and fabrication properties have been applied to all designs. Riyadh city which is the capital of the country was taken as a case study of the research. The research has taken into account various zone directions within the building as it has a large contribution to indoor energy and thermal performance. It is revealed that it is possible to achieve nearly zero carbon building in the hot and dry region in winter with minimum reliance on energy loads for building zones facing south, west and east. Moreover, using courtyard is more beneficial than applying construction materials into building envelope. Glazing to wall ratio is recommended to be 10% and not exceeding 30% in all directions in hot and arid regions.

Keywords : sustainable buildings, hot and arid climates, passive building design, Saudi Arabia
Conference Title : ICEADS 2018 : International Conference on Environmental and Architectural Design for Sustainability
Conference Location : London, United Kingdom
Conference Dates : May 14-15, 2018