Living and Sustainability: An Environmental Critique of Design and Building Practices, Locally and Globally

Abstract / Initial Proposal Form:

1. Paper / Proposal Title:

Simulation Modelling of Energy Performance in Saudi Arabia

2. Format:

Verbal presentation

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5. Abstract (300 words):

The kingdom of Saudi Arabia is characterized by its hot climates and is renowned for its high energy consumption due to its abundance of oil and gas reserves. An increase in population and the development of the country over the past 50 years with massive government spending on infrastructure, residential and commercial buildings, industrial expansion, education, and healthcare has all contributed to increased energy demand. Today Saudi Arabia is faced with a domestic energy crisis as energy consumption in the

form of electricity, has increased sharply over the last two decades. This increase is due to the rapid development of the economy in the absence of energy conservation policies. Current patterns of domestic energy demand is escalating and electricity supply struggles to keep up with demand in summer, which rises by as much as 50%. Saudi Arabia's Central Department of Statistics and Information estimates that the country's population will grow by 2.6% in 2017 to more than 30 million residents, further increasing energy demand. This high energy consumption sheds light on the size of the problem in Saudi Arabia and indicates the urgent need to adopt a strategy to reduce the excessive use of energy in residential buildings. By utilizing the Design of Experiment (DOE) methodology, energy simulation for this research has been conducted using Rivet and IES-VE simulation software tools in order to comprehensively study of the energy consumption of residential buildings in different cities across Saudi Arabia. Elements of the building envelope such as architectural design (form), building envelope design, construction materials (fabric) such as the design of external walls, roofs, floors and external glazing were assessed as these affect the energy consumption of the residential buildings. The energy simulations conducted advocate substantial energy consumption reductions, offering potential cost-effective solutions for energy efficient residential buildings. With this in mind, a framework is proposed which will involve energy policies specifically tailored to the local climate of Saudi Arabia and consist of sustainable building regulations for the design phase of all new residential buildings with the aim of maximizing energy efficiency and enhanced energy performance for Saudi Arabia and the broader Middle East Region.

6. Author(s) Biography (200 words each):

PhD student at Teesside University. Energy performance in residential building case study of Saudi Arabia. Architect worked a lot of construction project in major companies in Saudi Arabia, master of project management