ENERGY PERFORMANCE INDICATORS AND MODELLING FOR CARIBBEAN BUILDINGS

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Abstract

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This thesis examines the feasibility of energy efficiency as a short term solution to the Caribbean's energy problems which emanate primarily from high dependence on expensive fossil fuels and increasing consumption.

The study uses Stochastic Frontier Analysis (SFA) to estimate the lowest observed building energy consumption. It analyses primary data on energy consumption at the lowest level across various structures and identifies energy performance indicators (EPIs) for use as inputs in a predictive theoretical model.

In considering energy consumption across a tertiary institution, selected office buildings and hotels, the main objectives were to improve the established selection criteria for EPIs which may be used to monitor energy performance in buildings, and to demonstrate how a single EPI may be used to determine the energy efficiency of typical Caribbean commercial office buildings. Multiple EPIs were also used to model energy consumption and efficiency based on an estimated frontier.

The selected methodology was based on energy audits which provided the granularity for exploring several types of analysis and yielding accurate results. In addition to quality and availability, impact and appropriateness were shown to also warrant consideration in the selection of EPIs. Measurement of energy consumption per square foot proved to be useful in commercial buildings. Results showed that consumption was not only related to physical space, equipment and technology, but also the management and operations of the specific building.

The predictive model developed allows for rapid and accurate assessment of consumption and efficiency in specific areas of hotel operations. Given the critical nature of the tourism industry, and interest in energy management, this tool has potential for expediting problem detection. Furthermore, for those energy professionals engaged in design, policy formulation and management, the baseline data produced in this study may assume critical significance in helping to formulate appropriate energy efficiency solutions.

Keywords: Elliot Erwin Edwards; Energy; Energy Efficiency; Energy Indicators; Energy Consumption; Energy Performance; x-efficiency.