ENERGY PERFORMANCE BENCHMARK ANALYSIS OF SUPERMARKET BUILDINGS IN SRI LANKA

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ABSTRACT

In the recent past, the energy consumption in Sri Lanka has been drastically increased due to the rapid urbanization, improved living standards and the change of consumption patterns of the people, resulting in a long-term sustainability issue for the people. A report published by Sustainable Energy Authority (SEA) of Sri Lanka has indicated that, in 2020, 67.6% of electricity was consumed by the domestic and commercial buildings. Because they utilize air conditioning and refrigeration equipment more frequently than other commercial buildings, retail facilities like supermarkets also require a lot of energy. Each and every other store in Sri Lanka is dependent on the grid power supply, even though relatively few supermarket companies produce electricity using solar photovoltaic systems.. Increasing the number of supermarkets in par with the demand, increasing the load on the national grid also escalates. So far, Sri Lanka has developed and published the energy benchmarks for commercial sector, hospitality sector, tea processing sector and the apparel sector. Therefore, it is crucial to quantify and establish the energy benchmark for retail supermarket sector in Sri Lanka to understand and regulate the energy performance of those buildings. In this study the electrical energy consumption was the only energy type considered as other energy sources like LP gas and gasoline use were negligible and past data for five years were unable to access. The average specific energy usage, or average Energy Use Intensity (EUI), of the Sri Lankan supermarkets assessed was discovered to be 817 kW/m2.year for supermarkets with air-conditioned sales spaces and walk-in cold rooms (heavy electrical energy usage) and 244 kW/m2.year for government-owned stores with the least amount of air conditioning (nominal use of electrical energy). Hence energy benchmarking of the retail supermarkets is crucial as it is complex to understand their energy performance with comparative to other type of buildings. Moreover, during this study the energy consumption breakdown for Sri Lankan supermarkets with walk in cool rooms and air conditioned sales area was calculated. The energy consumption percentages are, refrigeration 48%, space cooling

19%, ventilation 3%, exterior lighting 4%, miscellaneous use 23% including electrical appliances in kitchen and bakeries.

Keywords: Benchmarking, Specific Energy Consumption, Modelling, Supermarket

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Abbreviation	Description
EUI	Energy Use Intensity
CEB	Ceylon Electricity Board
LECO	Lanka Electricity Company
BCA	Building Construction Authority
SEASL	Sustainable Energy Authority of Sri Lanka
BEE	Bureau of Energy Efficiency
EPI	Energy Performance Index
BEI	Building Energy Intensity
TFA	Total Floor Area
SFA	Sales Floor Area
GDP	Gross Domestic Product
LPG	Liquid Petroleum Gas
GHG	Green House Gases
HVAC	Heating Ventilation and Air Conditioning
LP	Liquid Petroleum
MVAC	Mechanical Ventilation and
BEI	Building Energy Intensity
GFA	Gross Floor Area