

**PRELIMINARY STANDARD FOR ENERGY
EFFICIENT DOMESTIC BUILDINGS IN SRI LANKA**

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Degree of Master of Engineering

Department of Mechanical Engineering

University of Moratuwa

Sri Lanka

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DECLARATION

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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ABSTRACT

In Sri Lanka the total electricity consumption of domestic units is 40% of the total electricity generated in the country. Especially in the Western province electricity usage is high, compared to other parts of Sri Lanka. By controlling building energy and implementing operational strategies to domestic units, it would provide a great opportunity to reduce domestic consumption. The saved energy could be utilized for industries to develop the nation. The current code of practice published by the SLSEA for energy efficient buildings in Sri Lanka has focused on multistory buildings with higher energy consumption. The specified criterion in the standard does not satisfy domestic units. The increase in demand for domestic energy is a major issue for supply side management. It is vital to study possible approaches to save energy in domestic units and standardization of a code of practice for energy efficient systems for domestic units in Sri Lanka. Mainly the use of electricity of a domestic unit can be categorized into different aspects namely, lighting, ventilation & air conditioning, water heating, etc. A survey was conducted and data was collected from domestic consumers, (sample size: n=50) located in Colombo district. These data were analyzed using SPSS tool to identify significant variables to electricity consumption of domestic units. Use of air conditioners is a trend which is becoming more common in domestic units in Colombo district. Hence, it is desirable to standardize and introduce a code of practice for domestic units at the current stage as a solution for the increasing electricity demand. The conclusions of the analysis reflect that domestic units located in Colombo district can be classified into two main models such as 'High Income Model and 'Middle Income Model'. Using Autodesk Revit, Building Information Modeling software, developed two designs. Revit Architecture, Revit MEP are the BIM related software which are used to design an intelligent 3D model with bi-directional associative feature for energy analysis. These models A and B are designed with suitable lighting levels and comfort levels for each defined space. This will reduce the waste of energy of the unit and could be used as a preliminary guide line for energy efficient domestic unit. International energy efficient domestic codes of India and USA are discussed in this paper. This research could be used as a preliminary document for reference and to develop a guideline for practicing authorities to implement energy efficiency in domestic units in Sri Lanka.

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LIST OF ABBREVIATIONS

ASHRAE Engineers	American Society of Heating Refrigerating and Air conditioning
BEE	Bureau of Energy Efficiency
BS	British Standard
CEB	Ceylon Electricity Board
CEN	Committee for European Standardisation
CIBSE	Chartered Institution of Building services Engineers
COC	Certificate of Conformity
CIE	International Commission of Illumination
DSM	Demand Side Management
ESD	Energy Services Delivery
EE	Energy Efficiency
EPRI	Electric Power Research Institute
EMCS	Energy Management Control System
GDP	Gross Domestic Product
IES	Illuminating Engineering Society
LECO	Lanka Electricity Company
LEED	Leadership in Energy and Environmental Design
LM	Load Management
LOR	Light Output Ratio
LPD	Lighting Power Density
PUCSL	Public Utilities Commission of Sri Lanka
RSE	Relative System Efficiency
RERED	Renewable Energy for Rural Economic Development
SLSEA	Sri Lanka Sustainable Energy Authority
SPP	Simple Payback Period
UDA	Urban Development Authority

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