DEVELOPMENT OF MINIMUM ENERGY PERFORMANCE STANDARD FOR LED LAMPS IN SRI LANKA

D.S.P. Edirisinghe

(139557 L)

Degree of Master of Science

Department of Electrical Engineering

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Dissertation submitted in partial fulfillment of the requirements for the degree Master of Science in Electrical Installations

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DECLARATION OF THE CANDIDATE & SUPERVISOR

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The above candidate has carried out research for the Masters dissertation under my supervision.

Prof. N. Wikramarachchi

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ABSTRACT

Keywords: LED, Minimum Energy Performance Standard, Sri Lanka, Energy Efficient Lamps

Among the different techniques available for demand side management, replacement of energy inefficient lamps with energy efficient lamps plays a major role.

Due to the huge market competition existing in between the competitors and as a consequence of some manufacturers prioritizing cost reductions over quality, present lighting market of Sri Lanka is flooded with low quality LEDs. At the same time, unlike the star rating system for CFLs, at present there is no proper guideline for the consumers to be used in their buying decision. Hence, this research was intended in developing a Minimum Energy Performance Standard for direct replacement type LEDs sold in Sri Lankan Market.

The market prices of LED lamps required for this study were obtained from a market survey by visiting a few vendors. Coincidence factor required for the cost-benefit analysis was derived based on a theoretical calculation using the available data from sources like SLSEA, CEB, and PUCSL & ADB Household survey on lighting.

Sensitivity analysis carried out during this study show how the minimum efficacy bar varies with the market prices under different coincidence factors.
However, it is suggested to perform a small sample survey to verify the accuracy of the coincidence factor taken.

Major Findings of this research include justification to values of technical parameters such as efficacy and power factor of an LED lamp decided in initiating Minimum Energy Performance Standard by the relevant authorities responsible and the payback period of such a national level replacement project. This study also reveals the cost incurred by an individual consumer per light output (in Lumens) when the inefficient lamps like incandescent bulbs of his household are replaced with LED lamps.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
CCT	Correlated Color Temperature
CEB	Ceylon Electricity Board
CFL	Compact Fluorescent Lamp
CLASP	Collaborative Labeling and Appliance Standards Program
CRI	Colour Rendering Index
CF	Coincidence Factor
C&F	Cost & Freight
DSM	Demand Side Management
EISA	Energy Independence and Security Act
EnMAP	National Energy Management Plan
HFO	Heavy Fuel Oil
HH	Households
IB	Incandescent Bulb
IEA	International Energy Agency
IPP	Independent Power Producers
LECO	Lanka Electricity Company
LED	Light Emitting Diode
LKR	Sri Lankan Rupees
MEPS	Minimum Energy Performance Standard
NCRE	Non-Conventional Renewable Energy
PF	Power Factor
PUCSL	Public Utilities Commission of Sri Lanka
RCL	Regional Center for Lighting
SLSEA	Sri Lanka Sustainable Energy Authority
TWh	Terra Watt Hours
UNEP	United Nations Environment Programme