

IMPROVING THE PERFORMANCE OF EXISTING COMMERCIAL BUILDINGS ACCORDING TO THE GREEN BUILDING GUIDELINES IN SRI LANKA

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DECLARATION OF THE CANDIDATE AND THE SUPERVISOR

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ABSTRACT

In recent years, there was a notable rise in global energy consumption due to rapid development. The significant energy usage was closely tied to a nation's economy and had detrimental impacts on the environment. Today, the entire world is facing an energy crisis due to the inability to supply energy according to future power and demand. It is worth noting that huge amounts of energy are wasted due to inappropriate consumption practices. Energy consumption of buildings is increasing every year due to the increasing demand for human comfort and services. Hence, prioritizing energy conservation has become imperative to mitigate energy expenses and environmental repercussions. In this respect, the necessity of increased environmental awareness in the process of sustainable development was realized by governments, corporations, organizations, and individuals alike. A component of the idea of increasing sustainability is the design of green buildings. The health, comfort, and productivity of employees all increased because of green buildings' more efficient use of vital resources like electricity, water, and land. It is also clear that green construction has a favorable effect on the building structures' long-term financial gains. A movement known as 'green building' gained momentum as the environmental impact of construction activities became more evident. This approach, rooted in sustainable construction principles, emphasized the need for environmentally friendly building practices. The Leadership in Energy and Environmental Design (LEED) program identifies six core principles of green building: sustainable siting, water efficiency, energy efficiency, use of materials and resources, indoor environmental quality, and efficient commissioning, operation and maintenance. The objective of this study is to investigate the opportunities to improve the performance of existing commercial buildings in Sri Lanka by complying with green building standards. Implementing a building energy management system is a sophisticated way to monitor and optimize building energy consumption. By implementing such a system, valuable benefits could be achieved. Considering all the objectives, the main goal is to reduce the energy demand of buildings as much as possible and then adopt sustainable energy practices while improving the performance of all existing commercial buildings in line with Sri Lanka Green Building Guidelines. This study describes the key procedures for creating

an energy baseline and conducting an energy audit on a commercial building to improve its energy efficiency. A building evaluation tool is also available to help increase building energy efficiency and fulfill the Green Building Council's basic energy standards.

Keywords: Commercial Buildings, Green Buildings, Energy Efficiency, Energy Management, Sustainable Development, GREENSL rating system.

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TABLE OF CONTENTS

DECLARATION OF THE CANDIDATE AND THE SUPERVISOR	i
ABSTRACT	ii
ACKNOWLEDGMENT	iv
TABLE OF CONTENTS	v
LIST OF FIGURES	viii
LIST OF TABLES.....	ix
LIST OF NOMENCLATURE.....	x
CHAPTER 1	1
1 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Research Problem	4
1.3 Aim	4
1.4 Objectives	4
1.5 Introduction to chapters	5
Chapter 2 – Literature Review	5
Chapter 3 – Methodology.....	6
Chapter 4 – Results and Discussion	6
Chapter 5 – Conclusion	6
CHAPTER 2	7
2 Green Building Concept and Green Building ratings system	7
2.1 What is a Green Building?	7
2.1.1 The seven components of green building.....	7
2.1.2 The green Building Rating System	9
2.2 Sri Lankan context of green building construction and energy consumption in commercial buildings in Sri Lanka.	11
2.2.1 Barriers to Sri Lanka's green building construction.....	12
2.2.2 Energy consumption in Sri Lanka.....	13

2.2.3	Energy Audit.....	15
2.2.4	Establishing Energy Baselines for improved building performance.....	16
2.2.5	Energy Consumption Benchmark for Commercial Buildings in Sri Lanka.....	17
2.3	Renewable energy technologies and energy efficiency application for an existing commercial building.....	18
2.3.1	Renewable energy application for existing commercial buildings	18
2.3.2	Renewable energy resources and technologies	19
2.3.3	Energy Efficiency	20
2.3.4	Benefits of Energy Efficiency	21
2.4	Importance of green rating in Sri Lanka and eQuest Software for Green Building Design 21	
2.4.1	Importance of Green Ratings in Sri Lanka	21
2.4.2	The GREENSL Rating System for existing buildings.....	22
2.4.3	Platinum Rated Green Buildings (70 points or higher).....	23
2.4.4	Gold Rated Green Buildings (60-69 points)	23
2.4.5	Silver Rated Green Buildings (50-59 points).....	24
2.4.6	Certified rated green buildings (40-49 points)	24
2.4.7	Future with Green Building Rating in Sri Lanka	25
2.4.8	eQuest Software for Green Building Design	25
CHAPTER 3		26
3	Methodology	26
3.1	Objective 01 – Literature review on Green Rating Systems and Building Energy Performance measures in local and international context	26
3.1.1	Objective 02 - Estimate the energy consumption patterns of existing commercial buildings in Sri Lanka.	28
3.1.2	Objective 03 - Recommend the method of improving the efficiency of existing buildings to meet the minimum energy standard set by the Green Building Council....	33
CHAPTER 4		34
4	RESULTS AND DISCUSSION	34
4.1	Objective 01- Assess the penetration of green building concept in Sri Lanka.....	34

4.2	Objective 02- Estimate the energy consumption patterns of existing commercial buildings in Sri Lanka.	43
4.2.1	Analyze utility bill data & set energy utility index	43
4.2.2	Calculate the Energy Use Intensity	50
4.2.3	Objective 03 - Recommend the method of improving the efficiency of building to meet the minimum energy standard set by the Green Building Council.....	52
4.3	Points and check list evaluation for selected buildings.....	55
CHAPTER 5		69
5	CONCLUSION	69
REFERENCE		71

LIST OF FIGURES

Figure 1: Sri Lanka's primary energy consumption by Source, 2022	13
Figure 2: Sri Lanka Electricity production by source, 2022	14
Figure 3: Specific electricity consumption – kWh/m ² .year	18
Figure 4: The demonstration showed how combining energy efficiency and renewable energy strategies significantly reduced total building conventional energy use. The source was the National Renewable Energy Laboratory [2].....	19
Figure 5: The GREENSL Rating System for Built Environment Certifications	24
Figure 6: Procedure for energy audit.....	29
Figure 7: Annual Electricity consumption for total building area in selected 15 years old buildings.....	44
Figure 8: Annual Electricity consumption for total building area in selected 10 years old buildings.....	45
Figure 9: Annual Electricity consumption for total building area in selected 05 years old buildings.....	46
Figure 10: Average Electricity Consumptions for all the buildings.....	47
Figure 11: Average Energy Consumptions for All the buildings.....	49
Figure 12: e Quest Simulation results for KP projects Building.....	52
Figure 13: eQuest simulation results for Dickwella Medical Center	53
Figure 14: eQuest simulation results for Novel wall Company	54
Figure 15: eQuest simulation results for North Sail Company	55

LIST OF TABLES

Table 1: Points distribution based on Category - LEED.....	10
Table 2: Specific energy consumption levels for commercial buildings [20].....	17
Table 3: Energy Consumption Benchmarks for Commercial Buildings [20].....	17
Table 4: Discussion of categories.....	26
Table 5: Details of selected buildings	30
Table 6: All selected buildings energy consumption breakdown.	48
Table 7: Calculation of EUI for Selected Buildings	50
Table 8: Check list and points of GreenSL Rating system for Existing Buildings	55
Table 9: Selected Buildings for 10 year old category Check list and Points	58
Table 10: Recommendations for Achieving Green Building Certification for 15, 10 & 5 year old buildings in Sri Lanka	67

LIST OF NOMENCLATURE

Abbreviation	Description
NREL	National Renewable Energy Laboratory
CEB	Ceylon Electricity Board
TTF	Thermal Test Facility
GWP	Global Warming Potential
HVAC	Heating, ventilation, and air conditioning
EEM	Environmental and Energy Management
LED	Light Emitting Diode
CBECS	Commercial Building Energy Consumption Survey
GBCSL	Green Building Council Sri Lanka
LEED	Leadership in Energy and Environmental Design
GREENSL	Green Sri Lanka
USGBC	United States Green Building Council
VRF	Variable refrigerant flow
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning