DATA-DRIVEN BENCHMARKING FOR LPG CONSUMPTION IN RESIDENTIAL CONDOMINIUMS: A GUIDE TO SUSTAINABLE ENERGY MANAGEMENT

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Degree of Master of Science in Building Services Engineering

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DECLARATION OF THE CANDIDATE AND THE SUPERVISOR

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Prof S. Witharana

ABSTRACT

Residential condominiums have become popular in Sri Lanka as a modern and handy housing option. Additionally, employing LPG as an energy source has become a viable option for energy-efficient and sustainable residential buildings. The optimization of resource usage has emerged as a critical frontier, particularly in the complex ecosystem of residential condominium structures. The goal was to establish a sustainable energy management paradigm that addressed the unique issues of residential condominiums, ushering in a new era of efficiency, environmental responsibility, and resilient community living. This included an assessment of current literature, regulations, and rules governing LPG use in Sri Lankan residential condominium complexes and other similar situations. The technical aspects of LPG use in residential condominium buildings were researched, including LPG use intensity, utilization rate, per capita energy consumption from LPG use, and carbon content of the LPG combustion process. This study's significance extends beyond academic exploration, connecting with the practical concerns of industry practitioners, building designers, facility managers, and other stakeholders involved in the condominium sector. As a result, the purpose of this thesis was to develop a benchmark for household LPG consumption in a Sri Lankan condominium complex by looking at technical, economic, and environmental factors.

Keywords: Sri Lanka, Residential condominium, Liquified Petroleum Gas (LPG), Sustainable energy, Benchmark.

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LIST OF NOMENCLATURE

Subscripts	Description
BTU	Amount of Energy needed to Cool or Heat
MJ	Energy
R^2	Coefficient of Determination
kW	Power
kg	Weight
g	Weight
mm	Length
m^2	Area
ft^2	Area
m^3	Volume
h	Time
°C	Temperature
%	Percentage

Abbreviation	Description
BMS	Building Management System
BR	Bed-Room
C	Carbon
CIDA	Construction Industry Development Authority
CMA	Condominium Management Authority
EC	Elemental Carbon
EMSI	Extra-Metabolic Scholander-Irving model
Eq.	Equation
H	Hydrogen
HC	Hydrocarbon
HVAC	Heating, Ventilation, Air conditioning, and Cooling
KPIs	Key Performance Indicators
LPG	Liquefied Petroleum Gas
LPGN	Liquefied Petroleum Gas Network
NFPA	National Fire Protection Association
PM	Particular Matter
RB+	Randomized Benchmarking
SLS	Sri Lanka Standard
SLSI	Sri Lanka Standards Institution
SLSEA	Sri Lanka Sustainable Energy Authority
#N/A	Not Available