INVESTIGATION OF FACTORS AFFECTING SOLAR PHOTOVOLTAIC POWER GENERATION IN SRI LANKAN CONTEXT.

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Degree of Master of Science

Department of Mechanical Engineering

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree Master of Science/ Master of Engineering in Mechanical Engineering

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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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The above candidate has carried out research for the Master's thesis under my supervision.

Dr. Asanka Rodrigo: ……. Date: ……

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ABSTRACT

Due to the fossil fuel prices and depleting storage capacity, as well as growing concerns about global climate change, the use of renewable energy (RE) on a national scale has become essential for any country in the world. Within the Portfolio of Renewable Energy, Solar energy generation become a most popular in small, medium and large-Scale installation.

Presently, In Sri Lanka there are many solar PV installation program has announced to encourage both individual and nation scale consumers. Under the Ministry of Power "Soorya Bala Sangramaya" or Battle for Solar Energy was launched in 2016 to increase small scale solar PV installation capacity up to 1000MW in 2025. The ultimate target of Sri Lankan government is to set 100% renewable energy in 2050 as per report published in 2017 under Asian Development Bank, and United Nations Development Program. Accordingly, in 2050, Sri Lanka total PV installation capacity is expected to increase up to 16,000MW.

The aim of this study is to look into the role of solar energy in building electrification and evaluate the key factors affecting for solar PV generation and study their energy optimization and efficiency improving method. This will help general publics who are wish to install solar PV plant or already installed in their premises to acknowledge and improve their solar power energy generation units without expanding their current system or planned solar power plant. Moreover, this will not only help domestic level solar PV plant installer but also industrial or utility scale plant.

The research's findings provide valuable and useful knowledge for policy makers, solar PV consumers and utilities as Solar PV become most important part of Sri Lanka Energy generation Mix in present and future.

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PV	Photovoltaic
DC	Direct Current
AC	Alternating Current
CEB	Ceylon Electricity Board
LECO	Lanka Electricity Company
NREL	National Renewable Energy Laboratory
IEA	International Energy Agency
UNDP	United National Development Program
ADB	Asian Development Bank
ANOVA	Analysis of Variance
SPSS	Statistical Package for the Social Sciences
GW	Gigawatt
DNI	Direct Normal Irradiance
GHI	Global Horizontal Irradiance
DHI	Diffuse Horizontal Irradiance
REN	Renewable Now (Renewables Global Status Report)
HFO	Heavy Fuel Oil
NCRE	Non-Conventional Renewable Energy
STC	Standard Test Condition
AGM	Absorbent Glass Mat
MPPT	Maximum Power Point Tracking
PUCSL	Public Utility Commission of Sri Lanka
SEA	Sustainable Energy Authority
ROI	Return of Investment