POTENTIAL FOR DEVELOPING NET ZERO ENERGY HOUSING IN SRI LANKAN URBAN SECTOR

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Degree of Master of Engineering

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Thesis submitted in partial fulfillment of requirements for the degree Master of Engineering in Energy Technology

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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

Energy has become a fundamental need of humans in the world to fulfill their day today requirements. Mainly primary energy is supplied by Fossil fuel (Oil, Natural Gas, Coal), Nuclear, Hydro and other renewables. Among these energy sources, Fossil fuel contribution for the total energy supply is around 82% out of the total energy supply in 2012. But according to the current available data, all fossil fuel will run out before end of this century. And also other main concern in between environmental scientist is the global warming due to the greenhouse gas (GHGs) emissions which are mainly released at the fossil fuel burning. So definitely, renewable energy sources will be the only option to get required energy as much as possible as an alternative for the fossil fuel and also to reduce the GHGs emission.

In Sri Lanka this figure is slightly different. Biomass is the major energy supply source. In connection with the electricity generation Sri Lanka, thermal electricity generation has the highest contribution to total generation. As well the generation from renewable energy sources has increased year by year. In connection with the electricity consumption, domestic sector consumes 38% out of total energy consumption while commercial sector consumes 26% and industrial sector 34%. So it can be seen that the domestic sector is the highest electricity consumer. From this thesis, the potential for net zero energy home in Sri Lankan urban sector will be discussed. If this is successful, 38% electricity consumption can offset from the renewable energy generation at the each home including rural sector also. Then the thermal generation can be minimized while using renewable energy sources as much as possible to cater the demand of industrial sector and also commercial sector. Hence massive expenses for oil and coal can be reduced and then it will be a significant contribution for reduction of GHGs emission as well.

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LIST OF ABBREVIATIONS

Abbreviation	Description
NZEH	Net Zero Energy Home
GHG	Green House Gas
USA	United State of America
UK	United Kingdom
SLSEA	Sri Lanka Sustainable Energy Authority
SEA	Sustainable Energy Authority
EU	European Commission
IEA	International Energy Agency
CEC	California Energy Commission
CPUC	California Public Utility Commission
NZSE	Net Zero Site Energy
NZSE	Net Zero Source Energy
NZEC	Net Zero Energy Cost
NZEE	Net Zero Energy Emissions
NIST	National Institute of Standard and Technology
CUF	Capacity Utilization Factor