STUDY ON ECONOMIC VIABILITY OF SOLAR POWER GENERATION THROUGH HOUSEHOLD LEVEL ON-GRID PHOTO VOLTAIC (PV) SYSTEM IN SRI LANKA

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DECLARATION

I declare that this is my own work and this Dissertation 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 myknowledge 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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Wasala W.L.M.D.B Date

The above candidates has carried out research for the Masters Dissertation under my supervision.

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Archt. RavihansaChandrathilaka Date

Dissertation Supervisor

ABSTRACT

Study on Economic Viability of Solar Power Generation through Household Level on-grid Photo Voltaic (PV) System in Sri Lanka

Solar power, being the frequently manipulated, non-renewable resource available to humans, has been under the scope for over two decades due to its' limitless potentials as a clean sustainable source of energy. Demand for energy services has been increased enormously with development of human lives over time. In contrast at global scale, access to clean, affordable and appropriate energy is an important enabler of development. Scholars worldwide have identified the significance of harnessing the solar power. Economic feasibility of Solar Photovoltaic technologies have been studied in different contexts for different applications such as Building Integrated Photovoltaic(BIVP), Domestic Solar Water Heating Systems (DSWH), etc… It was highlighted the affordability and long term economic viability were the main obstacles in promoting solar power in almost all such studies.

Sri Lanka's energy consumption on electricity generation are manifold and should be shifted towards renewable energy sources, such as solar power, because the renewable energy has additional positive effects of promoting local economy development, mitigating financial burden from energy imports, and improving energy safety of the country. Hence neither the market forces nor the government interventions have been effective towards the promotion of solar power in the country. Further there are no systematic investigations been conducted to inspect the prospects of prevailing solar power generating systems and it is a timely, indispensable requisite of the country.

Therefore in this study it was decided to investigate the economic viability of Solar power generation in terms of Net Present Value (NPV), Pay Back Period, and Return on Investment (ROI) for a particular Solar PV system configuration, which are holistically dispersed all over Sri Lanka, at household level. The elaborative objectives of the study are; (1) To identify the available energy sources in Sri Lanka & their effect on the environment, (2) To analyze the application of PV systems in different types of buildings especially related to housing sector, (3) To identify technical limitations of solar PV systems, (4) To show return on investment for different consumption levels and to suggest the most economical system configuration at each stage.

The economical analysis has shown that with the current prices, investment in a grid connected PV systems is generally profitable (positive NPV and less Pay Back periods for the majority of scenarios). The economic feasibility of a Solar PV system (with considered internal and external attributes) is strongly depending upon the nominal interest rate, energy sale price, and system installation cost. The changes in annual cost of maintenance and insurance have been observed to be less influential since it represents a slight proportion of the total investment.

DEDICATION

I dedicate this dissertation to my Loving parents and dearest wife

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