

**FINANCIAL IMPLICATIONS OF SOLAR
PENETRATION FOR ELECTRICITY GENERATION IN
SRI LANKA**

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Degree of Master of Science

Department of Electrical Engineering

University of Moratuwa

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Dissertation submitted in partial fulfillment of the requirements for the
degree Master of Science in Electrical Engineering

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DECLARATION PAGE OF THE CANDIDATE & SUPERVISOR

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The above candidate has carried out research for the Masters dissertation under my supervision.

Prof. W. D. A. S. Wijayapala

Date:

Dr. H. M. Wijekoon

Date

ABSTRACT

It is important to have an uninterrupted, economical, and reliable electricity supply contributing to economic and social development of a country. Due to the environmental impacts of fossil fuel based conventional power generation, the world is moving towards power generation from renewable sources like wind, solar, biomass etc. Solar is one of the fast growing and economical renewable power generation source. The intention of development of solar power generation is to promote clean energy while addressing the basic requirement of uninterrupted and reliable electricity supply.

Going with world trend, the Government of Sri Lanka promotes the development of solar PV based electricity through subsidies. Hence, the market graduated with many consumers willing to install solar rooftop and they were ably supported by solar power service providers. On the other hand, the utility is obliged to absorb the solar power generated as per the different subsidized schemes available. The benefit for the utility is that the expensive oil-fired generation during the daytime can be avoided, however in contrast, the utility needs to maintain sufficient capacity to compensate the intermittent and non-dispatchable electricity generation.

Extensive research had been carried out on technical challenges and opportunities due to the technical constraints of solar power generation. However, only a limited number of studies have been carried out examining the financial and economic impact of solar penetration to the national grid of Sri Lanka.

One-year historical system dispatch data for year 2019 and rooftop solar generation data for a period of 6 months of year 2019 considered for the analysis. The model compares the financials of two scenarios to estimate the impact to the utility. The base case scenario, which is business as usual with the already installed solar generation in the system. No solar scenario, which assume there is no solar in the system and therefore the demand is met by other available generation capacities in the system.

This research examines the two scenarios with careful calculations of how the system can still run without solar in the system. Daily demand patterns were analyzed and then expanded to months and summarized for the year. This research focuses the financial impact of solar electricity penetration to the national grid and how everyone can still be beneficial.

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