

Seasonal Solar Power Generation Potential for Electricity Supply in the Dry Zone of Sri Lanka

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Solar radiation is an important climate element and the largest energy input in the world. Sri Lanka is largely dependent on thermal energy and hydropower for its electricity needs. The solar radiation is the most abundant natural energy and it has great potential to meet the energy requirement of Sri Lanka. Solar-powered photovoltaic (PV) panels convert the sun's rays into electricity by exciting electrons in silicon cells using the photons of light from the sun. Being located close to the equator with the benefit of having sunlight for more than 12 hours per day, using solar systems to generate electricity is truly beneficial for the country. The main objective of this study was to calculate the seasonal solar radiation flux in the Dry Zone of Sri Lanka. The daily solar radiation data was collected by the Silicon Pyranometer for the period from July 2009 to June 2010 from the automatic weather station at Mahailuppallama Agro-Meteorological station. According to the daily average figures, the lowest average daily solar irradiance of 12.6 MJ m^{-2} was received in the month of December, whereas the highest average daily irradiance of 21.7 MJ m^{-2} was received in the month of March. According to the seasonal records, the highest solar radiation of 21.4 MJ m^{-2} received during the First Inter-Monsoon period from March to April and in the South West Monsoon from May to September shows also reasonably high solar radiation of 19.3 MJ m^{-2} , because this period, the airflow generally flows from southwest to northeast direction with less moisture to the Dry Zone. The Second InterMonsoon from October to November, solar radiation was recorded as 17.0 MJ m^{-2} and in the North East Monsoon period from December to February, the solar radiation was recorded as 16.6 MJ m^{-2} . North East Monsoon is a climatologically rainy season in the Dry Zone because incoming solar radiation and rainfall are associated with low solar insolation. The study shows that there is a high potential for solar power generation in the Dry Zone of Sri Lanka. The establishment of the solar power plants in the Dry Zone can make a significant contribution to the National Grid of Sri Lanka.

Keywords: Dry zone, Electricity, Potential, Seasonal, Solar power generation