EuroSciCon

2nd Edition of Global Summit on

Renewable Energy & Emerging Technologies

October 05-06, 2018
Barcelona, Spain

Istvan Lazar et al., Trends in Green chem 2018, Volume 4
DOI: 10.21767/2471-9889-C3-014

EFFECTS OF MICRO CLIMATIC AND LOCAL FACTORS ON ELECTRICITY PRODUCTION OF DIFFERENT PHOTOVOLTAIC SYSTEMS

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Rapid technical development of photovoltaic systems makes possible to convert solar energy into electricity in a way that is much more effective than decades before. However, there are many factors that can reduce the effectiveness of the functioning of photovoltaic (PV) systems. From the numerous factors we deal with climatic ones are in the frame of the present study. Climatic factors can act on local and micro climatic scale. Local scale refers to processes occur in the atmospheric bubble over the settlements called urban boundary layer (UBL). Air pollution leads to a significant (one, or in extreme cases two orders of magnitudes) increase in the atmospheric aerosol concentrations what causes increasing optical depth within the UBL. This process leads to a decrease in solar irradiation by upto 20%. Microclimate scale factors appear within the closest (100 meters wide at a maximum) environment of the mounted solar panel systems. First one to mention is sky view factor (SVF) that represents the ratio between the visible sky and a hemisphere centered over a point on the surface of the earth, trees, buildings etc., can reduce SVF remarkably in the environment of PV systems that result in lower electricity production. Other micro scale issue is the thermodynamic behavior (warming up) of the closest environment of the solar panels which can result in great differences in the performance of PV systems mounted on roofs and on ground. Disadvantageous combinations of technical parameters and climatic factors can lead to a decrease of 30-40% of the performance of solar panel systems elongating the payback time of the investments.

Recent Publications

1. **Scarpa F, Bianco V and Tagliafico L A (2018) A clear sky physical based solar radiation decomposition model. Thermal Science and Engineering Progress 6:323-329.**
2. **Valle B, Simoneanu T, Sourd F, Pechier P, Hamard P, Frisson T, Ryckewaert M and Christophe A (2017) Increasing the total productivity of a land by combining mobile photovoltaic panels an food crops. Applied Energy 206:1495-1507.**
3. **Belaid S and Mellit A (2016) Prediction of daily and mean monthly global solar radiation using support vector machine in an arid climate. Energy Conversion and Management 118:105-118.**
4. **Van Dam O (2001) Forest filled with gaps, effects of gap size on water and nutrient cycling in tropical rain forest: a study in Guyana. ISBN: 90-5113-046-5. Georgetown.**

Biography

István Lázár has completed his PhD at the University Debrecen. He is Senior Lecturer in Faculty of Science and Technology in Department of Meteorology at University of Debrecen. He has published more than 30 papers in reputed journals. His research topic is wind and solar energy and wind climatology. He is a member of many professional organizations like Hungarian Meteorological Society, European Association of Geographers and Hungarian Academy of Science (Meteorological Committee, Atmospheric Energy Subcommittee).

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