

Bifacial Photovoltaics: New Opportunities for Solar Farms

Anisul Haque, Department of Electrical and Electronic Engineering, East West University
Dhaka 1212, Bangladesh

Abstract: Conventional PV modules accept solar irradiance from only one side. On the other hand, many of the emerging types of solar cells are bifacial in nature which has led to the development of bifacial PV modules. Market share of bifacial PV is steadily growing. Bifacial PV modules have opened up a variety of opportunities for solar farm designs and layouts in order to maximize power outputs or levelized cost of energy per unit land area. Some of these layouts are particularly suitable in special circumstances. In this presentation, we will discuss some of the studies conducted at East West University. It will be shown through simulation why AgriVoltaics with rice will always be profitable all around the world. The impact of bifacial PV module layout on the degradation of output due to soiling will be discussed. It will be found that even though clean vertical bifacial modules produce less energy than clean tilted bifacial modules, for longer module cleaning cycles, vertical modules perform better. We will also present the findings of an experiment in which the performances of ten different module configurations have been measured and compared. The overall increase in energy conversion efficiency due to increasing the ground reflectivity is seen to be not significant. The relative performances of a few of the configurations are observed to be contrary to the theoretical predictions existing in the literature.

Brief bio: Dr. Anisul Haque is working as a professor in the Department of Electrical and Electronic Engineering, East West University since 2006. Before joining East West University, he taught at the Electrical and Electronic Engineering Department, BUET for eighteen years. He has been a visiting faculty at Tokyo Institute of Technology, Japan, University of Connecticut, USA and Clarkson University, USA. Dr. Haque's research interests include the physics, modeling, simulation and characterization of nanoelectronic devices and photovoltaic devices and systems. He is also interested in engineering education. Dr. Haque is a recipient of the Bangladesh University Grants Commission Award in 2006 and the gold medal from the Bangladesh Academy of Science in 2010. Dr. Haque was an editor of *IEEE Transactions on Electron Devices* from 2010 until 2019. Currently he is serving as an associate editor of *IEEE Access*. He has been serving as an *IEEE Distinguished Lecturer* since 2009. Dr Haque is the current chair of the Subcommittee for Regions and Chapters, Region 10, IEEE Electron Devices Society. He also serves in the Board of Accreditation for Engineering and Technical Education (BAETE), Institute of Engineers, Bangladesh (IEB) as a board member.