Theme 1: Research Highlights of Energy and Wetlands Research Group

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SOLAR HOTSPOTS OF INDIA

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The geographic location of India in the solar belt (40 N to 40 S latitude) makes it a strong candidate for harnessing solar energy. Presently the cumulative capacity addition from renewables is only 10.9% (18,155) while solar energy accounts for only 0.01 % (18 MW) of this share. With an ambitious National Solar Mission launched in January 2010, the Indian Government promises to add solar energy based power of 1,000MW by 2013 and 20GW by 2022. The output from a solar appliance depends on the incident solar energy, design and point of installation. For example Solar PV systems specify global insolation value before installation but Concentrated Solar Power Systems (CSP) have a threshold yearly average of direct insolation, which is generally found in arid and semi-arid areas. While solar technology is improving, it is imperative to estimate the solar energy incident (insolation) over the land surface. We have only 45 solar radiation stations spread across the vastness of the country to give authentic ground measurement of insolation. This sparse network cannot provide insolation data for the whole country. In the process of analyzing its solar potential, we obtained high spatial and temporal resolution insolation data from NASA. The NASA Surface Meteorology and Solar Energy (SSE) datasets provide monthly averaged insolation data for each 1 x1 grid for a period of 22 years (July 1983 to June 2005). Solar potential maps depicting the monthly variations over the topography of India have been obtained using Geographical Information System (GIS) software. It is found that the regions with high insolation like Karnataka, Gujarat and Rajasthan promise economically viable solar power generation throughout the year while regions with average insolation like Andhra Pradesh, Jharkhand, Kerala and Uttar Pradesh can be preferred for domestic solar energy applications like solar cooker and solar water heater. The study helps in regional selection of solar appliances for domestic as well as massive power generation projects. With the help of solar energy we can reduce the dependence on other countries for energy security and at the same time uplift the society particularly rural India by providing them with employment opportunity. The installations may also help reduce greenhouse gases emission by thermal power plants and thereby decreasing the overall carbon footprint.

Keywords: Solar energy, India