

Scope of Solar Energy in Rural Electrification: A Global Perspective with Special Reference to India

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Abstract: *Over 1.06 billion people worldwide lacked access to electricity as of 2016, with the majority of those people being located in rural areas in developing countries in South Asia and Sub-Saharan Africa. Solar photovoltaic (PV) technology represents one of the most viable and scalable solutions for providing electricity to rural areas; due to the rapidly decreasing cost of this technology, the ability to be built in modular/scalable sizes, and because it operates independent from centralized grid infrastructure. The purpose of this paper is to review the status of solar energy deployment globally in rural electrification, focusing on India's national solar programmes such as the Jawaharlal Nehru National Solar Mission (JNNSM) and Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY). Key technologies that will be discussed are Solar Home Systems (SHS), Solar Mini-Grids and Solar Pumping Systems as routes to rural electrification using solar energy. Global and India-specific data related to installed capacity, levelised cost of energy (LCOE), employment created and socio-economic impacts will be analysed. The major barriers to solar rural electrification will be highlighted as financing barriers, technical sustainability of systems and policy gaps; along with suggested future research directions.*

Keywords: Solar energy, rural electrification, solar photovoltaic, solar home systems, mini-grids, JNNSM, India, renewable energy, energy access, sustainable development