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POWERING EQUITY : SOLAR TRANSITIONS IN INDIA'S RURAL LANDSCAPES

Diksha Chaudhary

ABSTRACT

India is experiencing a significant reconfiguration of its energy system, with solar power playing a pivotal role in redefining pathways toward rural development, environmental sustainability, and energy access. Beyond its contribution to emission reduction, the expansion of solar energy in India reflects a broader shift in how energy infrastructures intersect with social relations, resource governance, and local livelihoods. Government-led renewable energy missions, combined with increasing private and institutional investments, signal a structural transition in the country's development paradigm. This study examines the implementation of a 110 kW agri-voltaic solar plant at the Krishi Vigyan Kendra (KVK) in Ujwa Village, Delhi, as a site where technological innovation converges with agrarian systems. Framed through the lens of Political Ecology, the research explores how access to renewable energy reshapes power relations, resource control, and environmental decision-making in rural contexts. The study further draws on Energy Justice theory to evaluate whether the benefits, risks, and decision-making processes associated with the solar project are distributed fairly among local stakeholders. Incorporating principles of Participatory Development, the analysis highlights the role of community engagement, institutional collaboration, and local knowledge in ensuring that renewable energy projects move beyond top-down deployment toward locally embedded solutions. Additionally, the Sustainable Livelihoods Framework is used to assess how the integration of solar infrastructure with agricultural practices influences livelihood assets such as income stability, skills development, and resilience to climate and market uncertainties.The paper interrogates whether the Ujwa solar initiative constitutes an inclusive and socially responsive energy transition, rather than merely a technological substitution. Drawing on insights from Ecological Governance and Green Growth debates, it illustrates how renewable energy systems can simultaneously support environmental objectives and strengthen rural socio-economic structures when embedded within local contexts.Based on structured surveys and stakeholder interactions, the findings indicate that the agri-voltaic solar project contributes to livelihood diversification, strengthens local adaptive capacity, and aligns with multiple Sustainable Development Goals (SDGs), particularly those related to clean energy, sustainable agriculture, and rural development. Scholars such as Baker et al. (2014)and Newell and

Mulvaney (2013), argue and demonstrate that energy transitions do not only involve (mere) technological change, but are highly embedded within political, institutional and socio-economic respective structures.

Keywords:- *Energy Justice , Just Transition, Participatory Development,Ecological Governance, Green Growth , Sustainable Development*