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Micro-level Integrated Renewable Energy System Planning

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Abstract

The gap in supply and demand of energy can be met by optimal allocation of energy resources. Seventy percent of India's population lives in villages and their main source of livelihood is agriculture. For the socio-economic development, energy allocation at the rural level is gaining importance these days. Integrated Renewable Energy System (IRES) in rural context aims at optimal resource allocation, thereby reducing dependence on commercial energy and reducing associated environmental hazards, and opening new avenues for employment generation. This paper describes development of IRES in rural context of India using multi-objective goal programming model. Using this model, optimum allocation of energy resources, taking into account present energy requirement is demonstrated for a region in Northern parts of Rajasthan, India. The critical parameters for optimum allocation of energy resources are energy, demand, cost, efficiency, potential, reliability, emission, social acceptance, and employment factor. The existing values of these parameters define constraints for optimum allocation problem, which can be solved by the model. The results indicate that biomass electricity generation should be encouraged for electrical end-uses. For cooking end-use biomass, LPG, biogas and solar thermal should be promoted.