



Solar Microgrid Deployment in Senegalese Villages: Energy Access and Economic Evaluations

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Abstract

Solar microgrids are increasingly deployed in off-grid villages to enhance energy access and economic development. A mixed-methods approach combining surveys and econometric analysis was employed to assess the effectiveness of solar microgrid deployments. Solar microgrids provided an average of 70% coverage across surveyed households in terms of daily electricity generation, with significant reductions in kerosene usage (35%) observed. The implementation of solar microgrids has led to substantial improvements in energy access and economic activities in Senegalese villages. Continued support for microgrid maintenance and expansion is recommended to sustain the benefits. solar microgrid, off-grid village, energy access, economic impact, econometric analysis Model estimation used $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \sum_{i=1}^n (y_i - f(\theta; \xi))^2 + \lambda \|\theta\|_1 \}$, with performance evaluated using out-of-sample error.

Keywords: African Geography, Microgrids, Renewable Energy, Econometrics, Development Economics, GIS, Sustainability Studies

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