African Energy Access Studies (Interdisciplinary -

Methodological Evaluation of Off-Grid Community Systems in Kenya: A Randomized Field Trial for Cost-Efficiency Measurement,

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Published: 23 December 2003 | **Received:** 21 September 2003 | **Accepted:** 02 December 2003

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DOI: 10.5281/zenodo.18776035

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Abstract

This study examines off-grid community systems in Kenya to evaluate their cost-effectiveness through a randomized field trial. A randomized field trial was employed to assess the performance and cost-effectiveness of off-grid community systems in Kenya. Data collection included surveys and financial records from randomly selected communities over two years. In one-third (30%) of tested communities, the installed solar systems provided reliable electricity at a significantly lower average cost per household ($\frac{15}{mo}$ *compared ¿ conventional grid extensions . The randomized trial demonstrated that off − grid community syste* $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon\, \$\,, \wedge$ *inference is reported with uncertainty − aware statistical criteria.*

Keywords: *Kenya, Off-grid Systems, Randomized Trials, Cost-Benefit Analysis, Energy Access, Renewable Technologies, Policy Evaluation*

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