Impact Assessment of Community Solar Energy Projects on Livelihoods in South African Commuter Towns

Sibusiso Magagula[1]**, Barnabas Mafuza**[2]**, Piet Nkabinde**[1,3]**, Naledi Khumalo**[2,4]

[1] Mintek

[2] Department of Artificial Intelligence, Nelson Mandela University

[3] Department of Artificial Intelligence, University of KwaZulu-Natal

[4] Department of Cybersecurity, Mintek

Author notes

Sibusiso Magagula is affiliated with Mintek and focuses on Computer Science research in Africa.
Barnabas Mafuza is affiliated with Department of Artificial Intelligence, Nelson Mandela University and focuses on Computer Science research in Africa.
Piet Nkabinde is affiliated with Department of Artificial Intelligence, University of KwaZulu-Natal and focuses on Computer Science research in Africa.
Naledi Khumalo is affiliated with Department of Cybersecurity, Mintek and focuses on Computer Science research in Africa.

Abstract

Community solar energy projects have emerged as a promising solution to address energy poverty in South Africa's commuter towns, where access to reliable electricity is often limited. A mixed-method approach combining quantitative surveys with qualitative interviews was employed to gather data from a representative sample of residents involved in community solar projects. Participants reported an average increase of 30% in household income due to the reduction in energy costs associated with using solar power, and over half expressed increased satisfaction with their energy supply reliability. While initial results suggest a positive impact on livelihoods, further longitudinal studies are recommended to substantiate these findings. Communities should be encouraged to adopt community-based solar projects through tailored policy interventions designed to enhance project sustainability and participation. Model estimation used $\hat{\theta} = argmin\{\theta\} \, sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert\, 2^2$, with performance evaluated using out-of-sample error.

Keywords: *African Geography, Community Development, Renewable Energy, Poverty Alleviation, Social Impact Analysis, Sustainability Metrics, Participatory Evaluation*

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