



Solar-Powered Water Supply Systems in Ethiopian Rural Communities: Economic and Social Impacts

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Abstract

Solar-powered water supply systems (SWSSs) are increasingly being implemented in rural communities to address water scarcity and improve hygiene. A mixed-method comparative study was conducted using surveys, interviews, and case studies across three regions in Ethiopia. SWSSs were found to reduce water-related costs by an average of 25% among participating households ($n = 100$). Community participation rates ranged from 60% to 80%, with significant improvements in hygiene practices observed. The study highlights the effectiveness and acceptability of SWSSs as a sustainable rural development tool, particularly in socioeconomically diverse regions. Implementing community-led projects and integrating SWSSs into existing water management frameworks can maximise benefits and sustainability. Solar-Powered Water Supply Systems, Rural Ethiopia, Economic Impact, Social Benefits

Keywords: *Ethiopia, Geographic Isolation, Participatory Research, Renewable Energy, Community Empowerment, Sustainability Models, Water Access Studies*

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