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Implementation Analysis of Solar-Powered Irrigation Systems in Semi-Arid Regions of Ethiopia: Performance Metrics and Economic Sustainability

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Abstract

Solar-powered irrigation systems have been introduced in semi-arid regions of Ethiopia to address water scarcity challenges and enhance agricultural productivity. The study employed interviews with local farmers, irrigation system operators, and government officials to gather data on system operation and impacts over three years. Interviews revealed that solar-powered irrigation significantly increased crop yields by an average of 20% in the first year post-installation, though initial investment costs remained a barrier for some farmers. The systems showed promise in enhancing agricultural productivity but require tailored financing mechanisms to ensure widespread adoption. Public-private partnerships and subsidies should be explored as viable strategies to reduce upfront costs and promote wider usage of solar-powered irrigation technology.

Keywords: *Ethiopia, Semi-Arid Regions, Solar-Powered Irrigation, Technological Intervention, Sustainability Analysis, Qualitative Research, Case Study*

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