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| **Title:** | Optimizing Hybrid Energy Systems for Off-Grid Communities: A Case Study of Chalan Beel under the Rajshahi Division of Bangladesh | | |
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| **Abstract:** |  |
| Abstract— This paper presents a comprehensive investigation into the feasibility and economic viability of a hybrid energy system for Chalan Beel under the Rajshahi Division, Bangladesh using the HOMER optimization model. Given its remote location and limited access to conventional power sources, this region offers a promising case study for integrating renewable energy sources into off-grid communities. The study focuses on the potential of solar photovoltaic (PV) technology in conjunction with a backup diesel generator to meet the local energy demand sustainably. Key factors considered in the analysis include solar irradiation levels, energy demand profiles, economic assessments, and environmental impacts. The findings of the HOMER software simulation results offer valuable insights for policymakers and energy planners seeking to promote renewable energy adoption in offgrid settings. Our results demonstrate that this hybrid configuration is the most effective and cost-efficient solution for this remote location, providing a blueprint for other isolated villages in Bangladesh to achieve energy independence. | |