

## Optimization of a Hybrid PV-Diesel Minigrid System: A Case Study of Vintim-Mubi, Nigeria

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**Abstract :** This study undertakes the development of an optimal PV-diesel hybrid power system tailored to the specific energy landscape of Vintim Mubi, Nigeria, utilizing real-world wind speed, solar radiation, and diesel cost data. Employing HOMER simulation, the research meticulously assesses the technical and financial viability of this hybrid configuration. Additionally, a rigorous performance comparison is conducted between the PV-diesel system and the conventional grid-connected alternative, offering crucial insights into the potential advantages and economic feasibility of adopting hybrid renewable energy solutions in regions grappling with energy access and reliability challenges, with implications for sustainable electrification efforts in similar communities worldwide.

**Keywords :** Vintim-Nigeria, Homer, renewable energy, PV-diesel hybrid system

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