Cameroon hydrogen energy storage

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In their investigation, He et al.21 identified the most effective combination of renewable energy resources capable of both mitigating CO2 emissions and ensuring a reliable electricity supply. The key influential factors include constraints imposed by land availability and penalties associated with carbon dioxide emissions. The optimization results unveiled a net present cost (NPC) of $1.02 million and a levelized cost of electricity (COE) amounting to 0.188 $/kWh. To ensure broader applicability, the study underwent sensitivity analyses.

Limited research has investigated the utilization of renewable energy-derived electricity for households in alignment with grid tariffs, as indicated by the existing literature and research deficiencies. Additionally, there is a scarcity of studies appraising the feasibility of on-grid renewable energy sources in varied global locations. Our research seeks to address several critical gaps in the current understanding of hybrid renewable energy solutions in the context of Douala"s grid-connected systems. Specifically, the authors identify the following research gaps:

Existing studies often lack comprehensive techno-economic analysis of hybrid renewable energy systems tailored to the specific socio-economic and environmental conditions of Douala.

The perspectives of key stakeholders, including policymakers, energy providers, and local communities, are often overlooked in the design and implementation of renewable energy projects in Douala.

There is a scarcity of in-depth case studies that examine the feasibility and viability of hybrid renewable energy solutions within the unique regulatory and infrastructural framework of Douala.

This study aims to address several critical gaps in the understanding and implementation of hybrid renewable energy solutions in Douala"s grid-connected systems. The key contributions of this research are as follows:

Conducted a detailed techno-economic analysis of hybrid renewable energy systems in Douala, incorporating capital costs, operational expenses, and environmental impacts.

Presented detailed case studies of hybrid renewable energy projects in Douala, highlighting technological innovations, regulatory frameworks, and socio-economic impacts.

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Determined optimal configurations of hybrid renewable energy systems based on residential energy demand patterns and solar PV potential in Douala, evaluating efficiency using metrics like Net Present Cost (NPC) and Cost of Energy (COE).

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