Modeling and Assessment of Renewable Energy Systems for Decarbonization in Perhentian and Tioman Islands

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Abstract:

This project focuses on developing a sustainable energy system utilizing renewable resources to address the power generation needs of Perhentian Besar Island and Tioman Island. Due to the remote location of many areas on these islands, electricity supply from the main grid is limited, leading to reliance on diesel generators. However, diesel-based power generation releases substantial pollutants, underscoring the need for a rapid transition to cleaner energy sources. This work proposes an integrated renewable energy solution incorporating solar, wind, and hydro resources to meet the islands' energy demands. An Energy Storage System (ESS) with an inverter will be included to provide backup power during low generation periods. Optimal configurations of renewable energy systems for each island will be analyzed using Homer Pro software, and a sensitivity analysis on diesel-based systems will be conducted to identify the most cost-effective renewable energy system for these remote island communities.

Keywords:

Energy storage system, Renewable energy system, Renewable resources, Optimal configuration.