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Wind Energy Potential in Local Areas

Rural regions are largely reliant on non-renewable energy sources and frequently experience energy shortages. Alternative renewable energy sources like wind energy must be investigated to lessen dependency on fossil fuels and advance sustainability in these areas. This study evaluates wind energy potential in nearby locations by examining wind speed, direction, and flux data gathered using a weather station and eddy covariance flux tower. The aim was to determine the viability of small-scale wind energy plants. The demand for renewable energy sources has increased and has intensified global interest in wind energy as an effective alternative to fossil fuels. Wind energy is also environmentally beneficial, which makes it a very important component in the shift to sustainable energy systems. Wind energy has become an intense alternative to non-renewable energy systems. If wind energy is effectively used, it can supply a substantial amount of the world's electrical needs because it is abundant, renewable and not polluting. The analysis shows small-scale projects are possible and whether the local wind conditions are appropriate for wind energy generation. It might also draw attention to the seasons or environmental factors with the most significant potential for wind generation. The study recommends small-scale wind energy systems in appropriate locations considering the findings. The best sites and wind turbine parameters should be investigated in further detail. Policymakers must incorporate wind energy into regional energy planning plans to promote sustainable growth. The need to minimize greenhouse gas emissions, the finite nature of fossil fuel resources, and growing concerns about environmental sustainability have all changed the global energy landscape. Even though wind energy is becoming more popular, few region-specific evaluations still consider both technical and meteorological considerations.

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Primary authors: MURIEL, Matumba Rotondwa; TAKALANI, Lufuno (University of Venda); RANWAHA, Tshifhiwa (University Of Venda); MALUTA, Eric Nnditshedzeni

Presenter: MURIEL, Matumba Rotondwa

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