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Residential Wind Turbine Design Decision Support System

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Abstract: Homeowners in Virginia pay on average $130 monthly for electricity and show a standard deviation of $54 with rates projected to rise at 0.7%, causing financial uncertainty. Electricity from solar panels is limited to daylight hours, direct sunlight availability, and the legality of residential use. Residential wind turbines provide an alternative means to generate electricity in specific locations with large wind potential (e.g. adjacent bodies of water or urban canyons) to reduce costs and variability of homeowner's utility bills. A Decision Support System was developed to assist consumers in the selection of an appropriate wind turbine for power generation for a specific location. The model combines: a micro-climate wind profile with, power generation, and an economic cost model. Analysis can be used to identify specific wind turbine properties that can be used for each specific location and match them to an existing inventory of models with a return-on-investment.

Keywords: Wind Turbine, Decision Support System, Micro-Climate, Residential, Wind, Renewable Energy, Electricity