Repurposed Residential Scale Wind Turbine with Blade Variance

Buenemann, Jamielee

Due to diminishing natural resources, the threat of global warming, and rising fuel costs, modern society requires inexpensive, renewable forms of energy. The present study constructed a residential wind turbine from repurposed recycled materials to test the efficiency of different blade designs. This study utilized repurposed PVC pipe, aluminum sheeting, and poly methyl methacrylate (PMMA) acrylic sheeting for the blade designs. The 76.2 cm blades were tested through random data points comparing wind speed and voltage produced by the turbine using an anemometer and multi-meter. Each type of blade produced a minimum voltage output of 2.5 to 7.5 volts (DC) and reached levels of over 20 volts (DC). Each design demonstrated optimum energy production for certain climates. The PMMA blades proved to be efficient at low wind speeds, allowing for extended production of voltage in lower wind conditions. The study results suggested the aluminum blades would be optimal in regions with regularly strong winds, where durability has high importance. The PVC blades produced a consistent increase in energy yield with the increase of wind speed. The study also researched the effect of the length of the blade on voltage production by additionally analyzing the data of 61.0 cm PVC blades. The 76.2 cm PVC blades proved more efficient overall. The results demonstrated that a larger swept area will produce greater voltage. Residential wind units with the inclusion of repurposed blades are an economic source of electricity for dwellings, industrial buildings, and public facilities; especially in regions where conventional or grid energy is unavailable, resulting in worldwide applications.