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Haiti Wind And Solar

Haiti has had more than its share of catastrophes in the last decade; the January 2010 earthquake that hit the country left hundreds of thousands dead and many more homeless and lacking the basic necessities for life.

Even before that devastating earthquake, Haiti had one of the lowest rates of electricity access in the world, with only 12.5 percent of the country's nine million people connected to the grid. One result the earthquake is that the country's institutions and facilities lack access to a reliable source of electricity.

At Tennessee Tech, William Hafner-Burton and Peter Nelson, with manufacturing and engineering technology chairperson Ahmed ElSawy as faculty adviser, saw the opportunity to help in Haiti. Together, the team started drawing up plans for a lightweight, portable power generator using wind and solar power. Haiti has near-constant breezes from trade winds, as well as more than 3000 hours of sunlight per year, making it a prime candidate for wind and solar power generation. Hafner-Burton, Nelson and ElSawy saw smaller clinics as an ideal test bed for their wind and solar concept, while answering a direct need.

A steady supply of electricity is literally a matter of life and death in hospitals and clinics. Despite over $100 million in aid, hospitals and clinics in Haiti are still in dire need of consistent electric power; much of the country's electricity now comes from burning biomass, resulting in deforestation.

The team's goal was to be able to produce enough electricity to power lights, a suction machine, heart monitor, anesthesia equipment and a cauterizing machine without running out of power. In addition, the entire setup had to be simple, inexpensive to produce and small enough to ship in a 45-foot steel shipping container.

The answer was a three-bladed vertical turbine, running on zero-friction magnetic bearings and contained in a steel cage for safety. The team designed the device using 3D computer drafting, then machined and fabricated it entirely in-house. The generator was also designed and built at TTU, while the solar panels for the installation came from a third party.

The cost analysis showed a total outlay of roughly $24,000 for parts and manufacturing; considering the service life of the wind turbine is 10 to 15 years, it can more than pay for itself in electric usage over that time period. By comparison, it's estimated to cost $2.5 million to run a gasoline generator to power the same facility over the same time period, with gasoline in Haiti at over $6 per gallon.

Together, Hafner-Burton, Nelson and ElSawy have shown that Haiti can reduce greenhouse emissions, stop deforestation and build a reliable electric supply, one building at a time. The strategy is to start on this small scale, then build larger-scale designs for bigger buildings and grid-connected setups for communities.

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