Floating wind turbines bring electricity where it's needed

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Most wind turbine manufacturers are competing to build taller turbines to harness more powerful winds above 500 feet, or 150 meters. Altaeros is going much higher with their novel Buoyant Airborne Turbine: the BAT. The Altaeros BAT can reach 2,000 feet, or 600 meters. Credit: Altaeros Energies

It's a balloon that lifts a wind turbine. That's the easiest way to describe the technology being developed by Altaeros Energies, led by Ben Glass, inventor and CEO of the young company. Glass has reimagined the possibilities of balloon and airship technology to lift a wind turbine.

Aiming high

Most wind turbine manufacturers are competing to build taller turbines to harness more powerful winds above 500 feet, or 150 meters. Altaeros is going much higher with their novel Buoyant Airborne Turbine—the BAT. The Altaeros BAT can reach 2,000 feet, or 600 meters.

At this altitude, wind speeds are faster and have five to eight times greater power density. As a result, the BAT can generate more than twice the energy of a similarly rated tower-mounted turbine.

The BAT's key enabling technologies include a novel aerodynamic design, custom-made composite materials, and an innovative control system. The helium-inflatable shell channels wind through a lightweight wind turbine. The shell self-stabilizes and produces aerodynamic lift, in addition to buoyancy. Multiple high-strength tethers hold the BAT in place and a single conductive tether transmits power to a mobile ground station.

The BAT's automated control system ensures safe and efficient operation, the highlight of which is the capability to adjust altitude autonomously for optimal power output. The first BAT model is approximately 15 by 15 meters, is containerized, and does not require a crane or foundation for installation.

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Reaching customers

Diesel generators are the standard in power generation for rural and off-grid areas. However, diesel fuel is expensive to deliver to these locations, and diesel generators, though inexpensive to install, are expensive to operate and maintain.

As a result, remote customers typically pay more than 30 cents per

kilowatt-hour for electricity. The BAT has the potential to bring affordable wind energy to these communities and industries. The first model will provide enough electricity for a small community, or about a dozen American homes.

Combined with significant increases in energy output and the ability to install the unit in 24 hours, the BAT substantially reduces the cost of energy and time to reach customers' energy needs. In the future, Altaeros expects to deploy the BAT alongside first responders in emergency response situations when access to the electric grid is unavailable.

Remote customers typically pay over $0.30/kWh USD for electricity. The BAT has the potential to bring affordable wind energy to these communities and industries. The first model will provide enough electricity for a small community, or about a dozen American homes. Credit: Altaeros Energies

Much like other tethered balloons, the Altaeros BAT can lift communication, Internet and sensory equipment alongside the turbine to provide additional services for customers. The addition of payload equipment does not affect the BAT's performance.

Scaling up

Altaeros was founded in 2010 at the Massachusetts Institute of Technology. The company has received NSF Small Business Innovation Research (SBIR) grants (Phase I and Phase II) to test a novel low-cost, high-performance fabric suitable for the BAT's shell, and to develop its modular wind turbine for power performance and ease of installation.

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Altaeros recently received Series A funding of $7 million dollars for the continued development and commercialization of its technology.

"The new products being developed by the team at Altaeros are exciting because they have the potential to offer a new method for energy generation which is portable, reliable, quick to deploy, and environmentally-friendly," said Ben Schrag, NSF SBIR program director. "This technology has the potential to avoid many of the key challenges facing traditional wind turbines."

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