

# The Missing Piece

**Is micro wind in theater possible? One company makes the case.**

By George Jagels

**F**or years now, the Pentagon has been trying to make renewable energy a significant part of battlefield electricity generation. Successes appear neither elusive nor numerous; like most programs, these department-wide efforts have proceeded in fits and starts. Micro wind turbines (producing less than 2,000 watts) have made appearances in a few cases (for example, CERDEC's RENEWS system), but they are far from ubiquitous at forward operating bases and combat outposts. Once deployed, many small wind turbines are finicky and prone to breakdowns, too often wilting under the stresses of military life.

However, the military itself, as well as industry, is successfully using durable micro wind turbines—in fact, they have for years. The Superwind 350 has been quietly deployed by the DoD, just as it has for well-known commercial users in the oil and gas, mining, security, and telecom industries since 2004. For companies like ITT, Rio Tinto, and Raytheon, reliable autonomous operation is crucial to power communications equipment, cameras, optics, and numerous types of sensors in remote areas.

## Responding to a Need

According to Mark Dettmer, president of U.S.-based Mission Critical Energy Inc., the company evolved as a response to “an intense need, especially in the comms and sensor world, for additional power to off-grid sites.”

The result was an industry breakthrough: a small turbine, made by Superwind and called the 350, that weighs only 11.5 kilograms with a blade

diameter of only 1.2 meters. It not only worked autonomously but provided more than enough power. Mission Critical started integrating the Superwind 350 for important remote power applications in 2006 and ever since the turbine's design has proved its ability to withstand the extremes of cold, heat, oceangoing, salt water immersion, and operations in arctic and desert extremes alike. Many of the 350's original integrations were based at sea, including ships, tsunami detectors, seismic data stations, lighthouses, and oil rigs.

Key to wind turbine survival is not going over-speed, and Dettmer cited the 350's advanced auto-feathering pitch as a big reason for its success. There are contraction and expansion points, triple seals with double bearing sets to allow for temperature swings and no sand, silt, or salt water can get into the turbine, according to Mission Critical. The unit costs \$2,500, including the proprietary charge control system.

“The main problem with a lot of off-grid equipment today is that it's really designed for hobbyists or grid-tie,” Dettmer told me. “Most of it is made of plastic and barely able to meet the needs of what it was made to do. Certainly, [it's] not designed to be out at sea or on mountaintops unattended in harsh conditions unimaginable at one's home.”

In 2007, Captain Frank Lanier, formerly of the Coast Guard, tested the 350 against four other models of micro turbine for Practical Sailor magazine. He told me that between “the outputs and the quality of construction, it was our overall top pick.”

Superwind units continue to see action at sea. A weather station buoy off the coast of Atlantic City, N.J., currently deploys three turbines. Steve Miller, a marine advisor for Searoc, the company running the buoy, told me that the 350s “performed very well in all but light wind conditions, giving good charge rates, especially when wind speeds averaged 10-15 mph.”

## Evolving with the Times

After 9/11, off-grid power in tactical and homeland security settings became even more crucial. “People wanted an electric eye watching the backsides of airports and bases,” Dettmer recalled. “They needed the ability to create electricity in extremely remote areas; places where no one would be for six months.” Dettmer said that Superwind units now regularly power places accessible only by “\$5,000 helicopter rides: Telecoms sites on top of mountains, islands that support meteorological stations, sensors and communication repeater systems, and so forth.” Dettmer stressed that meeting the needs of the customers is a priority, and in the past five years Superwind has impressed them by making the turbine ultra-quiet while also offering it in black for special uses.

Other aspects of the technology have advanced apace. Superwind units are Valence-verified, meaning they meet the charge profile of lithium phosphate batteries made by that company. These batteries, according to Don Lenz, Senior Sales Manager, North America, Valence Technology, can be charged very efficiently and quickly with the Superwind turbine. “You have to meet a certain charge profile to properly optimize the batteries' performance



and balance the internal cell banks, or battery life could be compromised,” he said. Lenz also claimed that the Superwind kept the charge within the right limits “perfect[ly].” The two companies have worked on classified Navy projects for about four years.

After years of success integrating the 350, Mission Critical and Superwind created a joint venture partnership in 2008 to co-develop the Superwind 1050, a larger 1100-watt version of the 350. Dettmer was approached by the Navy and other customers about the needs for more power in a micro profile. He gauged the world market, from Australia to the Caribbean and throughout North America, decided there was a need, and the companies then invested in the larger 1050 system without the assistance of military funding, government contracts, or grants. This entailed not only R&D and capital investments but also a two-year-long testing phase. “We don’t test our products on our customers,” Dettmer emphasized. Now available, he said there’s already a strong demand for the 1050.

### **The DoD Connection and Salvage Projects**

Though their projects are often classified, Dettmer told us that Mission Critical has been called to in far-flung places to salvage projects that might have otherwise failed. “It’s pretty typical that we get a call from someone with an in-place project who says ‘We have this installation with this type of targeting systems, sat comms, camera, what have you, but the plastic wind turbine they spec’d has failed yet again—and the project is in peril.’ This is not the fault of the commanders or end users, said Dettmer, who claimed that there are “plenty of professors, plastics, and promises in the renewable industry able to confuse even the most experienced user.”

A 2008 Navy project, for example, involved adding extra electricity generation to 20-foot disaster relief control vans that were shown to be too dependent on diesel during the response to Hurricane Katrina. According to Jim Himes, engineering technician and electrical department manager for Emergency Salvage, Support, and Materiel for NAVSEA, the turbine the Navy initially installed “wasn’t up to par” for rugged use, and Himes found it much too difficult to disassemble. This initiated a Web search that connected him with Mission Critical. When needed, two Superwinds can now help charge the battery banks of the vans, which were used during Superstorm Sandy in 2012. The Superwind units can also help to power the Smart-tow Alarm System on numerous Navy vessels. “We’ve had no failures on the 350,” Himes said.

### **Filling Gaps: Secret Projects and Training**

Mission Critical does not yet bid for large DoD contracts nor has it been a player in major acquisition programs. Instead, the company’s interaction with the military often comes from commanders seeing the turbine in action or researching the company and then ordering small quantities of their equipment for a specific role. “Customers often tell us ‘You’ve been such a success for us, and we can’t tell you where or why,’” Dettmer said. “Customers talk to me occasionally about projects I didn’t know about. Often, we are just one small component, albeit crucial, of much larger projects.”



Superwind 350s help power a buoy in the Atlantic Ocean. (Searoc)

Dettmer noted that educating the user is first and foremost. If possible the company prefers to know as much about the charging need and site location as possible so they can suggest the best solution. “We’re not trying to cheat the laws of physics,” he stressed. For servicemembers in the field simply trying to provide power to their installations, Mission Critical provides training along with their equipment, accenting both how the turbine works and its limitations, which in turn should encourage longevity.

“You can have very unrealistic expectations [of] renewable energy,” Dettmer said. “We’re constantly asked by clients to provide a turbine that works in low wind. That’s like asking for a solar panel that will output its max value in low light ... We want everyone to understand how it works and why it works.”

### **Looking Ahead**

Most of the defense contracting community deeply feared budget sequestration, but Dettmer imparted a sanguine view: “Sequestration benefitted us greatly. People began wondering why the military needed to re-invent the wheel when telecom and mining companies had used our products so successfully.”

Mission Critical sees continuing opportunities as major contracting companies realize off-grid products are a big and growing market for them. “We’ve seen more and more manufacturers building equipment designed to work off-grid” such as sensors, telecoms, cameras, and others, Dettmer said, and these go “hand in glove with our ability to work in an autonomous way.”

Unlike many renewable energy companies, Mission Critical is not publicly traded and has no plans to change that. Dettmer said this is intentional: “My partner Klaus Krieger and I always say ‘We’re not selling stock, and we’re not trying to put a wind turbine on every roof top.’ We sell equipment that does mission critical work in the field. What we are quietly accomplishing is to provide the DoD, DHS, and many others in having another tool they can rely on.” ■