

IN DEPTH: Ionic Gasifier Opens Up Door to Small-Scale Waste to Energy

Virginia-based firm Cogent Energy Systems' ionic gasification technology could be the perfect fit for small-scale waste to energy applications and even stabilize decentralized microgrids.

By [BEN MESSENGER](#)



Virginia-based firm Cogent Energy Systems,' new ionic gasification technology could be the perfect fit for small-scale waste to energy applications and even stabilize decentralized microgrids with dispatchable power.

Large waste-to-energy facilities have existed for decades, but technology that allows for economic recovery of energy from waste on a small scale – less than five tons per day, for instance – has remained elusive. Founded back in 2012, Cogent Energy Systems has spent the past five years developing a process to do just that, and they're nearing the finish line in their effort.

"We came upon a technology at Idaho National Laboratory that was being used to create nano-particles," explains Douglas Russell, Chief Business Development Officer at Cogent Energy Systems. "It was a modular hybrid plasma technology that formed the core of that gasifier application, and through discussion with the inventor, Dr. Peter Kong, we came to realize that the same basic concept could be applied to gasify waste materials for energy recovery applications. We saw an unserved market – how do you turn biomass or virtually any waste into usable products – at a small scale."

The resulting proprietary ionic gasification process – embodied in the company's HelioStorm Gasifier – involves the direct-contact processing of waste inside an active plasma field at temperatures of 3,000 to 10,000 degrees Celsius. According to the firm the result is a clean, high-energy synthesis gas (or "syngas") that can be used to make many valuable end products including electricity, hydrogen, liquid fuels, and chemical precursors.



COGENT ENERGY SYSTEMS DOUG RUSSELL TALKS TO
WMW ABOUT THE TECHNOLOGY

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"We use multiple stacked modules to create a long, stable plasma processing zone that completely fills the interior of the gasifier," Russell tells WMW. "Feedstock drops directly into the ultra-hot reaction zone where it is vaporized into a clean carbon monoxide-hydrogen syngas. Third party verified tests showed that it is almost entirely free of long-chain hydrocarbons and contaminant chemicals."

Russell continues: "The modular design of the system enables an energy cascade that reduces power consumption and results in surplus power. This is critical because previous attempts at small-scale WTE have often fallen victim to high electricity requirements sapping their output levels."

According to Russell there are no signs of furans, dioxins or similar pollutants, and the oxygen starved process prevents the formation of nitrogen and sulfur oxides that could cause problems for downstream equipment. He also says that there is little need for cleanup of the gas beyond a dry scrubber, depending on its end use.