Vaporizing Trash with a Compact Waste-to-Energy System that Runs at 10,000 Degrees C

Creare’s solid waste disposal system, which burns trash at up to 10,000 degrees Celsius. Creare

Just like any city or town, Sailors on ships or Marines ashore generate trash. Getting rid of rubbish isn’t always as simple as filling the dumpster in the back of the building or rolling the bins down to the curb once a week. The days of burning trash in smelly, smokey incinerators are over, and we no longer “dump all trash clear of the fantail.”

A small company, Hanover, New Hampshire-based Creare, Inc., has come up with a solution that turns the problem upside down.

The Navy Expeditionary Combat Command (NECC) and Navy Facilities Engineering Command (NAVFAC) expressed an interest in technologies applicable to a forward operating base (FOB) or a remote location to efficiently dispose of its garbage.

Dr. Jay Rozzi, Creare’s principal investigator for the effort, said “Solid waste disposal is an ongoing problem for the Department of Defense. So, we turned solid waste into useful energy.”

Creare partnered with Cogent Energy System of Merrifield, Virginia, which had developed an innovative and scalable gasifier to cleanly and efficiently process waste. Cogent’s Heliostorm uses multiple stacked electrodes to fill the 3,800 cubic-inch gasifier with an energized plasma field. Waste is fed directly into the plasma field that can reach up to 10,000

degrees Celsius – hotter than the surface of the sun.

The result is what Rozzi called “complete vaporization of the waste into its constituent elements,” resulting in the “full ionic conversion of waste into surplus energy.”

Unlike plasma-assisted gasification technologies, the Heliostorm produces very little residue because waste is placed in direct contact with the plasma. Glass and metals turn into inert slag that can be used as construction material. Everything else becomes a very pure syngas.

“Once conditioned, we have high-quality syngas containing only hydrogen and carbon monoxide for reformatting into electricity or hydrogen-based fuel,” Rozzi said. “We turn waste to value.”

Creare designed the waste handling system, which can handle between one and four tons of waste per day, as well as a way to capture the resulting syngas from the vaporization process to power a diesel generator that provides the electricity to run the system. The result is a compact waste-to-energy (WTE) system.

Creare has received funding from the Navy’s Small Business Innovation and Research program to develop the process. The company is seeking opportunities to conduct a demonstration at a military installation with an operational prototype. According to Paul Movizzo, Creare’s DoD business and commercialization development manager, the company wants to transition the system out of the lab and into a representative operating environment to better understand how much it costs to run, how many people are required to operate it, what the mean-time-between failure will be for the different components, and how to refine the design towards more compact production systems.