

Converting Landfills and Solid Waste to Energy at Fort Riley

U.S. Army Staff Notes

"Landfills to Energy" is a concept that is currently being demonstrated at Ft. Riley through the use of a "Plasma Enhanced Melter" or PEM™ to in effect "destroy" solid waste and produce a gaseous material that can be used in energy production. A PEM unit developed and designed by Integrated Environmental Technologies, and built by Tepas LLC has been quietly converting municipal solid waste from Ft. Riley into electrical energy since March 12, 2007. The PEM™ unit currently being demonstrated is a mobile unit mounted on a tractor trailer and with the addition of a gasifier can process up to 3 tons per day of municipal solid waste, construction debris and tires.

The premise of the PEM™ is to use electricity to create "plasma" or ionized gas in a very high temperature environment where waste is converted into glass and a hydrogen rich gas known as "Syngas". The process was originally designed for hazardous waste and medical waste but has proven highly effective on household garbage and other types of waste that traditionally would go into a landfill.

The PEM™ system produces near total destruction of organic materials in terms of a large reduction in volume and weight and very low emission of hazardous air pollutants. The system is also capable of creating commercially valuable products from waste in the form of energy using Syngas as a fuel. The PEM™ also produces a material that looks like a black volcanic glass or obsidian that can be recycled and used in building materials such as roofing shingles, concrete blocks and other construction-related products.

Air emissions from PEM™ systems are virtually eliminated because wastes are processed by high temperature plasma heating. As a result, undesirable products associated with incineration, such as dioxin and furans, are virtually eliminated. Metal air emissions including mercury are also greatly reduced as compared to conventional incineration technology.

Hydrogen-rich gas Syngas created by gasification is cleaned prior to use in energy generation and other uses. Any Syngas not used in energy production can be converted into ethanol or methanol, both of which



Truck mounted pilot plant. Photo courtesy of CREO

can be used in motor fuels.

While the truck mounted unit at Fort Riley is a small 3 ton per day processor, a standard PEM™ can process up to 110 tons of municipal solid waste per 24 hour day, and the units are scalable. Many of the mechanical aspects of this process are the same for 3 tons per day as for 110 tons per day. Larger systems are in the works for operation overseas and for disaster relief. Ft. Riley is considering a 250 ton per day facility that will offer economic and environmentally safe waste processing to Ft. Riley and the surrounding communities. The new unit could process current waste streams while potentially "mining" the old landfill sites within the facility, all the while providing the facility with a valuable source of ethanol to power the non-tactical vehicles at Ft. Riley.

PEM™ technology is an environmentally friendly way of dealing with solid waste issues today rather than burying them and dealing with them tomorrow. "Any waste management process that economically reduces the harmful effects of landfills, produces clean energy, and uses all of the by products as construction materials is good," says Ken Harris, CEO of Tepas. "It is good for the community. It's good for the nation. It is just the right thing to do."



Glass-like solid waste residue. Photo courtesy of CREO