



**EnerTech Environmental, Inc.**

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# Clean Energy From Solid Waste

## DESCRIPTION OF THE TECHNOLOGY

With support from the Environmental Protection Agency's (EPA) Small Business Innovation Research (SBIR) Program, EnerTech Environmental, Inc., successfully developed the SlurryCarb™ Process, an innovative process that chemically converts municipal sewage sludge (MSS), municipal solid waste (MSW), and other organic wastes into a high-energy liquid fuel (or slurry) that is cleaner to combust than most coals. Because the SlurryCarb™ Process eliminates the need to land apply, landfill, or incinerate organic wastes such as MSS and MSW, its use can help address current disposal problems (e.g., volatile organic compounds, disease vectors, dust, odor, hazardous air pollutants, methane and other greenhouse gases, landfill space, leachate, and heavy metals). In addition, this technology supports EPA's strategic goals of decreasing the quantity of waste requiring disposal, reusing waste beneficially, and utilizing renewable fuels.

SlurryCarb™ is a highly adaptive system that can stand alone or be used in combination with existing or planned waste disposal strategies. Simplicity of operation is key to the SlurryCarb™ Process. MSS or MSW is brought to a central manufacturing facility where it is converted into a uniform, pumpable slurry. The slurry can be created from a single waste stream such as MSS or a combination of wastes. The product fuel, known as "E-Fuel™," is a renewable fuel that can be utilized as a pellet or as a slurry by industrial or utility users. E-Fuel™ is consumed as a

supplement or substitute for conventional fossil fuels such as coal or oil. E-Fuel™ can produce up to 10,000 Btu/lb (as a dry pellet), and easily fired into coal boilers via conventional feed systems. In addition, the SlurryCarb™ Process removes more than 99 percent of the feed chlorine, greatly reducing HCl emissions and boiler corrosion. Without extensive air pollution control systems, the CO, NO<sub>x</sub>, trace metal, and dioxin emissions from the combustion of E-Fuel™ are well below EPA's New Source Performance Standards (NSPS) for municipal waste combustion, and the SO<sub>2</sub> emissions are comparable to the NSPS for extensive air pollution control systems.

## SIGNIFICANCE OF THE TECHNOLOGY

With the SlurryCarb™ Process, collected waste is processed as a fluid in continuous equipment, which provides savings in capital and operating costs. The feed waste is chemically altered so that it becomes a uniform, energy-dense fuel that can be used onsite or exported to a customer. In addition, waste stream components, which typically must be cleaned from the flue gas after combustion (i.e., chlorine, ash, sulfur, etc.), instead are removed during the front end of the process at a lower cost per ton of pollutant removed. The technical advantages of the SlurryCarb™ Process contribute to its excellent economics. A 100 ton per day sludge facility can operate profitably at a tipping fee of \$40 per as received ton (assuming the sludge enters the SlurryCarb™ system at 20 percent

## SBIR Impact

- ◆ EnerTech's SlurryCarb™ Process eliminates solid waste by converting municipal sewage sludge, municipal solid waste, and other organic wastes into a high-energy fuel that burns cleaner than most coals.
- ◆ Because the SlurryCarb™ Process eliminates the need to burn or landfill organic wastes, its use can help address landfill overcrowding and reduce air emissions from municipal incinerators and landfills.
- ◆ The economic and operational viability of the SlurryCarb™ Process has been successfully demonstrated at the 20 ton/day level using municipal solid waste as a feedstock.
- ◆ EnerTech negotiated with a consortium of companies to construct a 100 ton/day facility in the United States, which will springboard this technology into the U.S. commercial market.



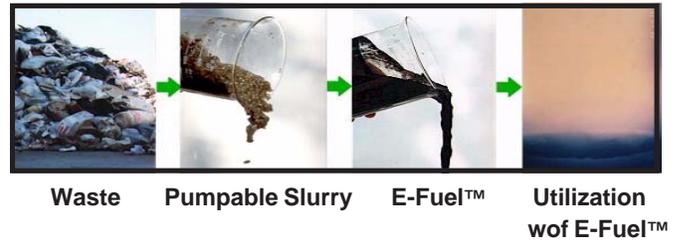
This 20 ton/day unit, which began operating in Japan in early March 1997, was designed as a fully integrated commercial-scale system for local MSW. The product fuel from the facility is co-fired in a pressurized gasifier for hydrogen production or co-fired in a cement kiln for heat production.

solids). Reduced-capacity units (i.e., 25-50 tons/day) have similarly strong economics.

In the United States alone, 8 million dry tons of MSS and 210 tons of MSW are produced every year. EnerTech's cost of disposal is below the average cost of conventional thermal disposal options for these wastes. Smaller communities now have available to them a clean and affordable method of MSS disposal that reduces landfill demands and eliminates the need for a combustion facility to burn wastes. Instead, the waste is converted to a valuable fuel and then exported to the marketplace.

#### COMMERCIALIZATION SUCCESS

Through an agreement with Mitsubishi Corporation, construction of a 20 ton/day (as received MSW) unit in Ja-



The SlurryCarb™ Process can generate a quality fuel from many low-grade fuels and wastes, including municipal sewage sludge and municipal solid waste.

pan was completed in early 1997. EnerTech has signed an agreement with a large water and wastewater company to build the first commercial plant for MSS. Having successfully piloted this technology in the United States, EnerTech is negotiating with a consortium of companies to construct a 100 ton/day facility in the United States, which will springboard the technology into the U.S. commercial market.

#### COMPANY HISTORY

EnerTech Environmental currently holds 12 U.S. patents for a number of combustion and high-pressure technologies, including the SlurryCarb™ process. In addition, it maintains international patent protection in 18 other countries, encompassing a population of 3.3 billion people.

## What is the SBIR Program?

EPA's Small Business Innovation Research (SBIR) Program was created to assist small businesses in transforming innovative ideas into commercial products. The SBIR Program has two phases—Phase I is the feasibility study to determine the validity of the proposed concept and Phase II is the development of the technology or product proven feasible in Phase I. EPA also offers Phase II Options to accelerate the commercialization of SBIR technologies and to complete EPA's Environmental Technology Verification (ETV) Program. For more information about EPA's SBIR Program and the National Center for Environmental Research, visit <http://www.epa.gov/ncer/sbir>.