

**Strategic Environmental Research and Development Program
(SERDP)**

FY 2012 STATEMENT OF NEED

Weapons Systems and Platforms (WP) Program Area

**WASTE TO ENERGY CONVERTERS FOR
OVERSEAS CONTINGENCY OPERATIONS**

1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to develop innovative approaches to decrease the size and increase the efficiency of battalion-scale waste to energy converter (WEC) systems based only on gasification or pyrolysis processes. Proposals that include plasma arc, supercritical water, biological, chemical, liquefaction, or incineration technologies as the primary means of waste conversion will not be considered. Several small-scale gasification or pyrolysis systems have been in various stages of development and demonstration for the military, but they still do not meet the required size and efficiency goals. Although some WEC technologies have found successful application in commercial or industrial settings, these systems are typically large fixed installations, usually based on incineration technology. Such large systems can be relatively efficient because there are fewer constraints on optimizing functions such as feedstock shredding/sizing, material transport, gas cleanup, and power generation. Small-scale systems are less able to optimize the balance of the system and minimize parasitic energy requirements.

The performance criteria for a battalion-scale WEC, as established by PM Force Sustainment Systems and the Base Camp System of Systems Working Group, is to process 1–3 tons per day of non-hazardous mixed solid waste into exportable energy in the form of fuel or electricity, with a residual waste of only non-hazardous char and ash. The threshold efficiency is for the system to be self-sufficient in processing the waste without adding fuel or power. The objective is for the system to be 50% efficient in terms of net chemical energy recovered, accounting for parasitic energy requirements in all subsystems. System automation and labor minimization are key attributes, so manual waste segregation/separation, for example, is highly undesirable.

The focus of this SON is to advance the state of the art through research to develop the capability to package all components of a WEC, including feedstock conditioning and power generation, into a deployable system contained in only one (ultimate objective) or a maximum of two 8' × 8' × 20' ISO containers while also reducing parasitic losses and improving the overall system efficiency. With current prototype systems, the technical obstacles appear to be related more to the balance of system than to the primary reactor. Air-blown gasification systems have required significant feedstock conditioning pre-processing equipment, including sizing, drying, and densification. Pyrolysis systems have required a large secondary reactor and heat recovery / power generation subsystem.

Proposals should focus on demonstrating a scientific basis for the capability to reduce the size and increase the efficiency of gasification- and pyrolysis-based systems. They should include thermodynamic calculations that demonstrate the feasibility of conversion efficiencies and subsystem size reduction, and should include all assumptions. Proposals should not focus on engineering an entire system or reconfiguring an existing system.

2. Expected Benefits of Proposed Work

A military WEC will make solid waste management less resource intensive for base camps. It will reduce the labor hours needed for waste management/disposal and will decrease health risks associated with current waste management techniques. A military WEC will also supply base camps with useful energy in the form of heat, fuel or electricity to supplement the fuel that is transported by supply convoys over long distances. A military WEC has the potential to reduce the overall need for fuel convoys, which puts soldiers at increased risk of attack and displaces them from performing their primary mission. Each of these benefits has associated cost savings or cost avoidance.

3. Background

Large amounts of solid waste are produced during overseas contingency operations (OCO), including waste from kitchens, packaging, latrines, and soldiers' personal items. Large base camps tend to have better defined waste management systems due to factors such as manpower, location, space and funding. Conversely, smaller deployed camps lack the resources to effectively manage their solid waste. Methods commonly employed include contracting with local foreign nationals to haul waste away, utilizing rudimentary landfills or dump sites, and burning waste in open pits or piles. All of these methods are resource intensive and inefficient. Burning waste in the open produces toxic fumes that are hazardous for soldiers to breathe. Leaving the waste unmanaged at dump sites may increase the presence of disease-bearing organisms. Allowing contractors access inside the security perimeter may cause a security threat.

These smaller camps need a solution that reduces the volume of waste that must be disposed of, and if possible, produces a useful product in the process.

4. Cost and Duration of Proposed Work

The cost and time to meet the requirements of this SON are at the discretion of the proposer. Two options are available:

Standard Proposals: These proposals describe a complete research effort. The proposer should incorporate the appropriate time schedule and cost requirements to accomplish the scope of work proposed. SERDP projects normally run from two to five years in length and vary considerably in cost consistent with the scope of the effort. It is expected that most proposals will fall into this category.

Limited Scope Proposals: Proposers with innovative approaches to the SON that entail high technical risk or have minimal supporting data may submit a Limited Scope Proposal for funding up to \$150,000 and approximately one year in duration. Such proposals are eligible for follow-on funding if they result in a successful initial project. The objective of these proposals should be to acquire the data necessary to demonstrate proof-of-concept or reduction of risk that will lead to development of a future Standard Proposal. Proposers should submit Limited Scope Proposals in accordance with the SERDP Core Solicitation instructions and deadlines.

5. Point of Contact

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For Core Proposal submission due dates, instructions, and addition solicitation information, visit the SERDP web site at www.serdp-estcp.org/Funding-Opportunities/SERDP-Solicitations.