**Office of the Secretary of Defense (OSD)**
**Assistant Secretary of Defense (Research & Engineering)**
**12.1 Small Business Innovation Research (SBIR)**
**Proposal Submission Instructions**

## Introduction

The Assistant Secretary of Defense (Research & Engineering) SBIR Program is sponsoring topics in the Energy and Power technology focus areas in this solicitation.

The Army and Air Force are participating in the OSD SBIR Program on this solicitation. The service laboratories act as OSD's Agent in the management and execution of the contracts with small businesses. The service laboratories, often referred to as a DoD Component acting on behalf of the OSD, invite small businesses to submit proposals under the Small Business Innovation Research (SBIR) Program Solicitation.

In order to participate in the OSD SBIR Program, all potential proposers should register on the DoD SBIR Web site at http://www.dodsbir.net/submission as soon as possible. Follow the instructions for electronic submittal of proposals. It is required that all proposers submit their proposal electronically through the DoD SBIR/STTR Proposal Submission Web site at http://www.dodsbir.net/submission. If you experience problems submitting your proposal, call the SBIR/STTR Help Desk (toll free) at: 1-866-724-7457.

Refer to Section 1.5 of the DoD Program Solicitation for the process of submitting questions on SBIR and Solicitation Topics. During the Pre-release period, proposers have an opportunity to contact topic authors by telephone or e-mail to ask technical questions about specific solicitation topics, however, proposal evaluation is conducted only on the written proposal. Contact during the Pre-release period is considered informal, and will not be factored into the selection for award of contracts. Contact with the topic authors by telephone or e-mail after the Pre-release period is prohibited. To obtain answers to technical questions during the formal Solicitation period, please visit http://www.dodsbir.net/sitis. Refer to the Program Solicitation for the exact dates.

**OSD WILL NOT accept any proposals that are not submitted through the on-line submission site.** The submission site does not limit the overall file size for each electronic proposal; however, there is a **25-page limit**. File uploads may take a great deal of time depending on your file size and your internet server connection speed. If you wish to upload a very large file, it is highly recommended that you submit your proposal prior to the deadline submittal date, as the last day is heavily trafficked. You are responsible for performing a virus check on each technical proposal file to be uploaded electronically. The detection of a virus on any submission may be cause for the rejection of the proposal.

Firms with strong research and development capabilities in science or engineering in any of the topic areas described in this section and with the ability to commercialize the results are encouraged to participate. Subject to availability of funds, the ASD(R&E) SBIR Program will support high quality research and development proposals of innovative concepts to solve the listed defense-related scientific or engineering problems, especially those concepts that also have high potential for commercialization in the private sector. Objectives of the ASD(R&E) SBIR Program include stimulating technological innovation, strengthening the role of small business in meeting DoD research and development needs, fostering and encouraging participation by minority and disadvantaged persons in technological innovation, and increasing the commercial application of DoD-supported research and development results. The guidelines presented in the solicitation incorporate and exploit the flexibility of the SBA Policy Directive

to encourage proposals based on scientific and technical approaches most likely to yield results important to DoD and the private sector.

**Proposal Submission**

Refer to Sections 3.0 and 6.0 of the DoD Program Solicitation for program requirements and proposal submission. Proposals shall be submitted in response to a specific topic identified in the following topic description sections. The topics listed are the only topics for which proposals will be accepted. Scientific and technical information assistance may be requested by using the SBIR/STTR Interactive Technical Information System (SITIS).

**Description of the OSD SBIR Three Phase Program**

Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas submitted under the SBIR Program and will typically be one half-person year effort over a period not to exceed six months, with a dollar value up to $150,000. OSD plans to fund three Phase I contracts, on average, and down-select to one Phase II contract per topic. This is assuming that the proposals are sufficient in quality to fund this many. Proposals are evaluated using the Phase I evaluation criteria, in accordance with Section 4.2 of the DoD Program Solicitation. Proposals should concentrate on research and development which will significantly contribute to proving the scientific and technical feasibility of the proposed effort, the successful completion of which is a prerequisite for further DoD support in Phase II. The measure of Phase I success includes technical performance toward the topic objectives and evaluations of the extent to which Phase II results would have the potential to yield a product or process of continuing importance to DoD and the private sector, in accordance with Section 4.3 of the DoD Program Solicitation.

Subsequent Phase II awards will be made to firms on the basis of results from the Phase I effort and the scientific and technical merit of the Phase II proposal in addressing the goals and objectives described in the topic. Phase II awards will typically cover two to five person-years of effort over a period generally not to exceed 24 months (subject to negotiation), with a dollar value up to $1,000,000. Phase II is the principal research and development effort and is expected to produce a well defined deliverable prototype or process. A more comprehensive proposal will be required for Phase II.

For Phase II, no separate solicitation will be issued. Only firms awarded Phase I contracts, and that have successfully completed their Phase I efforts, may be invited to submit a Phase II proposal. Invitations to submit Phase II proposals will be released approximately at the end of the Phase I period of performance. The decision to invite a Phase II proposal will be made based upon the success of the Phase I contract to meet the technical goals of the topic, as well as the overall merit based upon the criteria in Section 4.3. DoD is not obligated to make any awards under Phase I, II, or III. For specifics regarding the evaluation and award of Phase I or II contracts, please read the front section of this solicitation very carefully. Phase II proposals will be reviewed for overall merit based upon the criteria in Section 4.3 of this solicitation.

Under Phase III, the DoD may award non-SBIR funded follow-on contracts for products or processes, which meet the Component mission needs. This solicitation is designed, in part, to encourage the conversion of federally sponsored research and development innovation into private sector applications. The small business is expected to use non-federal capital to pursue private sector applications of the research and development.

This solicitation is for Phase I proposals only. Any proposal submitted under prior SBIR solicitations will not be considered under this solicitation; however, offerors who were not awarded a

contract in response to a particular topic under prior SBIR solicitations are free to update or modify and submit the same or modified proposal if it is responsive to any of the topics listed in this section.

**Phase II Plus Program**

The OSD SBIR Program has a Phase II Plus Program, which provides matching SBIR funds to expand an existing Phase II contract that attracts investment funds from a DoD acquisition program, a non-SBIR/non-STTR government program or Private sector investments. Phase II Plus allows for an existing Phase II OSD SBIR contract to be extended for up to one year per Phase II Plus application, to perform additional research and development. Phase II Plus matching funds will be provided on a one-for-one basis up to a maximum $500,000 of SBIR funds. All Phase II Plus awards are subject to acceptance, review, and selection of candidate projects, are subject to availability of funding, and successful negotiation and award of a Phase II Plus contract modification. The funds provided by the DoD acquisition program or a non-SBIR/non-STTR government program must be obligated on the OSD Phase II contract as a modification just prior to or concurrent with the OSD SBIR funds. Private sector funds must be deemed an "outside investor" which may include such entities as another company, or an investor. It does not include the owners or family members, or affiliates of the small business (13 CFR 121.103).

**Fast Track Policy**

The Fast Track provisions in Section 4.0 of this solicitation apply as follows. Under the Fast Track policy, SBIR projects that attract matching cash from an outside investor for their Phase II effort have an opportunity to receive interim funding between Phases I and II, to be evaluated for Phase II under an expedited process, and to be selected for Phase II award provided they meet or exceed the technical thresholds and have met their Phase I technical goals, as discussed Section 4.5. Under the Fast Track Program, a company submits a Fast Track application, including statement of work and cost estimate, within 120 to 180 days of the award of a Phase I contract (see the Fast Track Application Form on www.dodsbir.net/submission). Also submitted at this time is a commitment of third party funding for Phase II. Subsequently, the company must submit its Phase I Final Report and its Phase II proposal no later than 210 days after the effective date of Phase I, and must certify, within 45 days of being selected for Phase II award, that all matching funds have been transferred to the company. For projects that qualify for the Fast Track (as discussed in Section 4.5), DoD will evaluate the Phase II proposals in an expedited manner in accordance with the above criteria, and may select these proposals for Phase II award provided: (1) they meet or exceed selection criteria (a) and (b) above and (2) the project has substantially met its Phase I technical goals (and assuming budgetary and other programmatic factors are met, as discussed in Section 4.1). Fast Track proposals, having attracted matching cash from an outside investor, presumptively meet criterion (c). However, selection and award of a Fast Track proposal is not mandated and DoD retains the discretion not to select or fund any Fast Track proposal.

**Follow-On Funding**

In addition to supporting scientific and engineering research and development, another important goal of the program is conversion of DoD-supported research and development into commercial (both Defense and Private Sector) products. Proposers are encouraged to obtain a contingent commitment for follow-on funding prior to Phase II where it is felt that the research and development has commercialization potential in either a Defense system or the private sector. Proposers who feel that their research and development has the potential to meet Defense system objectives or private sector market needs are encouraged to obtain either non-SBIR DoD follow-on funding or non-federal follow-on funding, for Phase III to pursue commercialization development. The commitment should be obtained during the course of Phase I performance, or early in the Phase II performance. This commitment may be contingent

upon the DoD supported development meeting some specific technical objectives in Phase II which if met, would justify funding to pursue further development for commercial (either Defense related or private sector) purposes in Phase III. The recipient will be permitted to obtain commercial rights to any invention made in either Phase I or Phase II, subject to the patent policies stated elsewhere in this solicitation and awarded contract.

**Energy and Power Technology Focus Area**

Technology advances in electric power generation, distribution, and use are enabling new, transformational military capabilities. Advanced energy and power technologies are providing the critical concepts, architectures, and systems to enable this revolutionary warfighting advantage. Integrating and distributing power on manned and unmanned ships, aircraft, ground vehicles and other platforms leads to significant enhancements in platform flexibility, survivability, lethality and effectiveness. The Army's transformation challenge is to develop a smaller, lighter, and faster force, utilizing hybrid electric drive, electric armament and protection, and a reduced logistical footprint. The Navy is developing future ships that integrate electric power into a next-generation architecture which enables directed energy weapons, electromagnetic launchers and recovery, new sensors, as well as supporting significant fuel, maintenance, and manning reductions. The Army and Air Force need electric power to replace complex mechanical, hydraulic and pneumatic subsystems, and also enable advanced electric armament systems. Improved batteries/power sources will support the individual soldier by permitting longer mission durations and reduced weight borne by the soldier. Space based operational capability improvements include a more electric architecture for responsive and affordable delivery of mission assets, and powering space based radar systems.

More electric and all-electric systems have distinct technological advantages but are coupled with inherent disadvantages – principally, the need for more power generation and a marked increase in waste heat generated by ever smaller electronic components. The use of solar power at forward operating bases reduces the need for supply convoys transporting batteries and liquid fuels into war zones. Quiet systems minimize risk of discovery during field operations. Warfighting capabilities are optimized when energy and power systems are quiet, efficient, lightweight, and easy to use, and require minimal logistical support.

The Energy and Power Technology topics are:

| | |
|---|---|
| OSD12-EP1 | Fuel Flexible Reformer |
| OSD12-EP2 | Solid Waste Remediation System (SWRS) for Small Contingency Base Camps |

## OSD SBIR 12.1 Topic Index

OSD12-EP1 TITLE: Fuel Flexible Reformer

TECHNOLOGY AREAS: Ground/Sea Vehicles, Human Systems

OBJECTIVE: To provide a portable, high energy source with fuel flexible capability that offers a reduced weight burden and improved supply logistics for the dismounted soldier.

DESCRIPTION: Dismounted soldier power allows for operation of portable electronic equipment and is critical to mission capabilities. Together with industry, the US Army has developed 25-300 W portable fuel cell systems based on methanol and propane fuels for battery charging applications. The state of the art fuel processors include short contact time micro-reformers, and autothermal refomers based on high surface area microlith catalysts. These reactors are coupled with purification devices such as palladium membranes for reformate purification or utilize high temperature fuel cells with increased contaminant tolerance. While offering significant benefits, a major deployment challenge to existing state of the art portable fuel cell systems is the single fuel type requirement. A potential solution is a portable power system capable of converting a variety of fuels to electricity providing logistical advantages. Fuels of interest include: JP-8, JP-5, diesel, synthetic fuels such as hydroprocessed renewable jet (HRJ), gasoline, higher alcohols (C2+) and biofuels, as well as methanol and propane.

Consistent with the final goal of a portable fuel flexible power system, the deliverable of this award is the demonstration of the viability of a fuel flexible processor with a product stream suitable for a fuel cell as identified by the offerer. Building on the state of the art systems, the processor should:
• Demonstrate mean time between failures ≥ 1200 hours, providing high mission availability.
• Capable of integration with a ≥; 300 W fuel cell system. Consideration for portability should be made when selecting the net output power of the system.
• An energy density of ≥; 65 Wh/kg (based on fuel cell battery charging system and fuel for 4 h mission9)
• Multi-fuel capability and performance are key parameters for identification of the appropriate fuel flexible platform for the soldier portable power system. At minimum, the system should be capable of processing low sulfur (<15 ppm sulfur ) variants of the potential fuel choices with the objective of being able to handle fuels with up to 3000 ppm (wt.) sulfur .
• Other critical attributes include operational safety, ease of use, lifetime and cost.

PHASE I: Selection of processor design (SMR, ATR, POX, membrane reactors etc) and associated fuel cell (PEM, SOFC etc). This phase should identify potential fuel cell systems compatible with reformate product specifications. Based on the mass and energy balance on the process design, an estimated system efficiency including fuel feed inputs and system output power should be completed. Identification of key processor components including catalysts, metallurgy and heating mechanism should also be completed. Unless submitting organization has demonstrated OEM fuel cell capabilities for similar applications, partnering with an appropriate fuel cell OEM is desirable. End of phase 1 requires demonstration of concept feasibility to achieve targets.

PHASE II: The phase consists of fabrication of portable processor for evaluation. Verification of design targets such as product throughput, efficiency, composition and cost validation. Characterization and evaluation of processor operational parameters including start up time, tolerance to impurities and lifetime. Analysis of aged catalyst and metallurgy to identify and predict modes of failure should be completed. Delivery of a TRL 4 level multi fuel prototype for ARMY/CERDEC evaluation.

PHASE III: Integration of fuel flexible processor with Fuel cell and BOP for system integration. Demonstration and qualification for military environment (MILSTD810) leading to sale of equipment to military organizations. Successful technology development provides opportunities for transitions into PM - MEP 6.4 / 6.5 program plans developing the next generation of Small Tactical Quiet Generators (STEP) scheduled for procurement in FY17.

DUAL-USE COMMERCIALIZATION: Potential commercial applications for a mobile man portable power system that is fuel flexible provides for fuel conversion to electricity for supporting emergency / disaster relief

operations and operations in nations lacking a robust power infrastructure. This includes power for temporary mobile hospitals, distribution centers and police stations.

REFERENCES:

1. J. Novoa, S. Shah, M de Jong, M. Dominick, JJ Kowal, US Army CERDEC Field Evaluation and Testing of Soldier and Man-Portable Fuel Cell Power Sources, 2009 Fuel Cell Seminar & Expo – Palm Springs CA -19 Nov 2009

2. A.S. Patil, T.G. Dubois, N. Sifer, E. Bostic, K. Gardner, M. Quah, C. Bolton, Portable fuel cell systems for America's army: technology transition to the field, J Power Sources 136 (2004) 220

3. J. Hu, Y. Wang, D. VanderWiel, C. Chin, D. Palo, R. Rozmiarek, R. Dagle, J. Cao, J. Holladay, E. Baker, Fuel processing for portable power applications, Chem. Eng. Journal 93 (2003) 55

4. Jamelyn D. Holladay,* Yong Wang, and Evan Jones, Review of Developments in Portable Hydrogen Production Using Microreactor Technology, Chem. Rev. 2004, 104, 4767-4790

5. S Roychoudhury, M Lyubovsky, D. Walsh, D Chu, E Kallio, Design and development of a diesel and JP-8 logistic fuel processor, J Power Sources 160 (2006) 510

6. Ø Hatlevik, S K. Gade, M K. Keeling, P M. Thoen, A.P. Davidson, J. D Way, Palladium and palladium alloy membranes for hydrogen separation and production: History, fabrication strategies, and current performance, Separation and Purification Technology 73 (2010) 59–64

7. V P. McConnell, High-temperature PEM fuel cells: Hotter, simpler, cheaper, Fuel Cells Bulletin Dec. 2009

8. W. A. G. McPhee, L. Bateman, M. Koslowske, M. Slaney, Z. Uzep, J. Bentley, T. Tao, Direct JP-8 Conversion Using a Liquid Tin Anode Solid Oxide Fuel Cell, LTA-SOFC for Military Applications, J. Fuel Cell Sci. and Tech. AUG. 2011, (8)

9. M300-CX Portable battery charger and APU, http://www.protonex.com/downloads/products/Protonex-Military-Spec-Sheet_M300-CX_8.2-1110.pdf

10. J Rice (ULTRA/AMI), Solid Oxide Fuel Cells to Reduce the Logistics Burden, 2011 Joint Service Power Expo, Myrtle Beach, SC, 2 – 5 May 2011

11. ENVIRONMENTAL PROTECTION AGENCY 40 CFR Part 80 [EPA–HQ–OAR–2007–1158; FRL–9147–4] RIN 2060–AO71 Regulation of Fuels and Fuel Additives: Alternative Affirmative Defense Requirements for Ultra-Low Sulfur Diesel and Gasoline Benzene Technical Amendment Federal Register / Vol. 71, No. 168 / Wednesday, August 30, 2006 / Rules and Regulations

12. MIL-DTL-83133E DETAIL SPECIFICATION TURBINE FUELS, AVIATION, KEROSENE TYPES, NATO F-34 (JP-8), NATO F-35, AND JP-8+100

KEYWORDS: Reformer, flexible fuels, JP8, Methanol, Gasoline, Alcohol, Fuel Cell, Diesel, Logistics, APU, Portable Power, Dismounted Soldier, Sulfur

OSD12-EP2 TITLE: Solid Waste Remediation System (SWRS) for Small Contingency Base Camps

TECHNOLOGY AREAS: Ground/Sea Vehicles, Materials/Processes

ACQUISITION PROGRAM: PM Force Sustainment Systems

OBJECTIVE: To develop a practical and efficient system for onsite disposal of the solid waste generated by a Patrol Base (PB) or a Combat Outpost (COP), ideally exporting useful energy for the camp.

DESCRIPTION: Deployed forces generate enormous amounts of solid waste that is typically disposed by burning in open burn pits, burn boxes, or trucked to landfills. Any of these methods consume fuel and have negative environmental and force protection consequences. Burning waste creates operational and maintenance burdens, operational security concerns, safety and health issues, is environmentally harmful, and wastes energy. Backhauling waste is expensive, places Warfighters in harm's way, and also consumes fuel. However, for any military camp, the majority of the solid waste steam is carbonaceous and thus could be remediated onsite and/or converted into an energy source.

For contemporary campaigns in Iraq and Afghanistan, the logistical support (and associated force protection) of base camps and combat outposts is of great concern. In some cases, more than two-thirds of the force is devoted to supporting and maintaining the camp. Logistical reductions help reduce the support structure and thus overall force requirement to perform the mission. Although solid waste in particular is not a commander's primary concern as a new base or outpost is secured and built up, it eventually becomes a problem that can no longer be ignored, and is frequently cited as one of the most pressing concerns for established camps.

To put things in perspective, recent Army Central Command infrastructure data showed about 800 base camps in Iraq, most of them 50-150 man outposts. Briefings from commanders revealed that these camps were frequently not well equipped with respect to organizational force sustainment equipment, and improvised solutions were the rule rather than the exception. A Contingency Basing initiative is underway to improve this type of situation by supporting small bases with billeting, kitchen, laundry, shower, latrines, and wastewater treatment. This topic seeks to extend that concept through development of an appropriately sized solid waste remediation capability.

At the larger battalion scale, multiple efforts are already underway to demonstrate solid waste remediation via conversion of a camp's solid waste into useful energy. Small air-blown gasifiers and pyrolysis systems have been shown to have great potential for small-scale waste to energy conversion. However, these net energy producing systems are not trivially scalable to the platoon or company scale, in part due to the size, weight, and power requirements of feedstock sizing and densification subsystems. Given that waste destruction is of higher priority than efficient energy conversion, opportunities arise for different approaches at the COP scale. Small commercial off the shelf incinerators are being explored as expedient solutions, but are energy consumers that require substantial fuel. Better solutions are sought that will minimize fuel use and be energy neutral or energy exporting.

The target for SWRS is a 50-man PB to 150-man COP. Waste generation rates and characterization will vary significantly, but educated guesses can be made from the data in the referenced documents, and much of it is from foodservice operations. It is expected that a 300-600 lbs/day mixed waste capacity will satisfy the intent of this topic, and that systems could be doubled up if necessary for larger COPs. SWRS would best be packaged in a 6.5'×8'×8' triple container (TRICON) for compatibility with transportation assets, although such integration is not the primary thrust of this topic. The system should include all necessary processing equipment and pollution control systems, should be rugged and low-maintenance to minimize operational costs, should have few consumables to minimize logistical requirements, and should not generate emissions or effluents requiring permitting, monitoring, or special handling. In accordance with a "Zero Footprint" philosophy, any wastes or residues must be benign to the environment and safe for equipment operators, ideally usable within the camp (e.g., roads, erosion control). Concepts will be evaluated largely on practicality and perceived return on investment. All else being equal, and understanding that trade-offs will have to be made, the following characteristics are desirable: minimal system cost (threshold $250K) and weight (threshold 10,000 lbs); maximized waste destruction and fraction of waste stream that can be processed; minimal manpower (objective 1 part time operator) including operation and any waste handling or segregation; self-powered operation or better in terms of JP-8 fuel and electric power; and production of useful energy (electric power and/or heat) for use within the camp.

PHASE I: Establish the technical feasibility of a system concept that meets the operational requirements stated in the topic description by conducting research to demonstrate that the approach is scientifically valid and practicable. Mitigate risk by identifying and addressing the most challenging technical hurdles in order to establish viability of the technology or process. Perform proof-of-principle validation in a laboratory environment, and characterize effectiveness (including destructive energy requirements, heating value of the fuel gas, and energy balance) through

experimentation with simulated field-feeding waste. Address environmental regulations, safety, and human factors concerns, and provide credible projections of size, weight, energy requirements, and cost of a system suitable for fielding.

The Phase I proposal shall detail a specific approach leading to a tangible proof of concept (i.e., it shall not be a paper study or multiple approaches requiring down-select). It should provide metrics, including energy balance, of current and projected capabilities, and key claims should be strongly substantiated, including citations, to ensure credibility. The Offeror should demonstrate knowledge and expertise closely related to the proposed work.

PHASE II: Refine the concept and fabricate a prototype system that meets all operational, effectiveness, and reliability requirements and is sufficiently mature for technical and operational testing, limited field-testing, demonstration, and display. Address manufacturability issues related to full-scale production for military and commercial utilization. Observe strict attention to safety and human factors. Provide user manuals and training to support government testing of the equipment.

PHASE III DUAL-USE APPLICATIONS: The initial military application for this technology will be a system that remediates solid waste to eliminate open burning or backhauling to landfills. The transition from research to operational capability will involve technology demonstration at representative sites, follow-on development work in coordination with Army Product Manager Force Sustainment Systems, and ultimately fielding as an organic asset for small camps. This basic waste processing technology targets primarily military field waste, but can also support emergency response and disaster-relief activities. Potential commercial application will vary considerably with the technological approach, environmental impact, and return on investment, but may include outdoor events such as fairs, carnivals, and camps, as well as indoor foodservice such as lunchrooms, cafeterias, and restaurants. If capable of net energy production, the technology would offer attractive opportunities for distributed waste processing and fuel or power generation.

REFERENCES:
1) Ruppert, W. H., et al. Force Provider Solid Waste Characterization Study. NATICK/TR-04/017. U.S. Army Natick Soldier RD&E Center. Natick, MA. August 2004. http://handle.dtic.mil/100.2/ADA427565

2) Rock, Kathryn, et al. An Analysis of Military Field-Feeding Waste. NATICK/TR-00/021. U.S. Army Natick Soldier RD&E Center. Natick, MA. January 2000. http://handle.dtic.mil/100.2/ADA383583

3) Department of the Army. Solid Waste Generation Rates at Army Base Camps. TB 200-1-51. U.S. Army Corps of Engineers. Washington, DC. April 2008. http://www.wbdg.org/ccb/ARMYCOE/PWTB/pwtb_200_1_51.pdf

4) Cosper, Stephen. Installation Waste Quantity & Characterization. Briefing at ARO Installation Waste to Energy Workshop. U.S. Army Engineer Research and Development Center. Champaign, IL. May 2008. http://dodfuelcell.cecer.army.mil/rd/WTE_Workshop/Cosper-ERDC.pdf

5) Canes, Michael E., et al. Costs and Benefits of Transforming Military Waste Into a Battlefield Resource. Draft technical report. U.S. Army Natick Soldier RD&E Center. Natick, MA. 2008.

6) Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. Report of the Defense Science Board Task Force on DoD Energy Strategy: "More Fight – Less Fuel." Washington, DC. February 2008. http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf

KEYWORDS: field waste, solid waste, waste remediation, waste processing, waste to energy, gasification, pyrolysis, incineration, alternative energy