

Contingency Basing S&T: What we need from Industry

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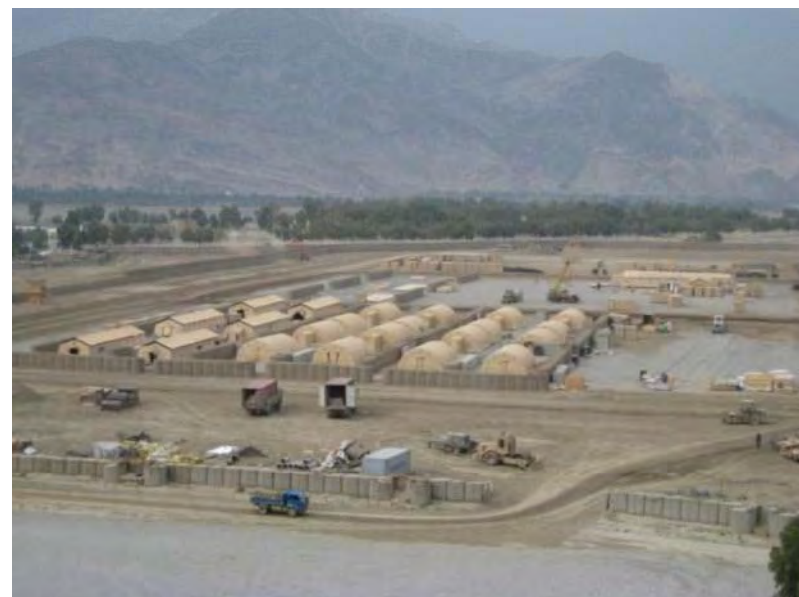
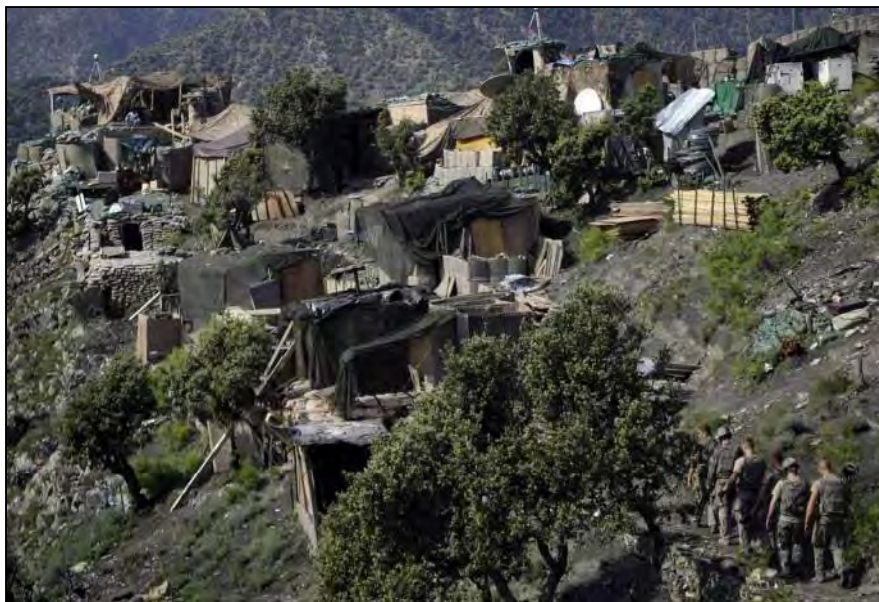
- Update the JOCOTAS community on the current situation of Contingency Basing
- Identify the high priority Contingency Basing science and technology challenges
- Make Industry aware of the opportunities to work with DOD to address these challenges
- Initiate brainstorming and collaboration to address Contingency Basing



- Contingency Basing: Current Problem
- Results of the Current Problem
- Current Status of Contingency Basing
- Vision for the Future
- Program Overview
- S&T Focus Areas & Technical Challenges
- Program Strategy & Plan
- Summary

Expeditionary Base Camp: Current Problem

- Current base camp systems are focused on company level and above, forcing small combat units to **improvise the establishment of base camps** in austere environments with little to no organic resources, no construction or handling equipment, often **under enemy threat**.
- **More than 800 base camps** have been identified in theater – all of various sizes and fidelity, the majority **consisting of a combination of standard and non-standard equipment**. This equipment is typically inefficient, unreliable, cost prohibitive, not integrated or interoperable, not supportable and not environmentally friendly.





- ***Operational effectiveness, Warfighter safety and cost effectiveness suffer from the lack of holistic base camps***
- ***The Tactical Small Unit is forced to establish camps and combat outposts in austere environments with little/no resources/equipment and often under enemy threat***

	Current State
Water	Battalion-size camp: • Consumes 22,000 gals/day • 19,000 gal/day of gray water • 3,500 gals/day of black water
Power & Energy	• Battalion-size camp: • Consumes 2,200 gals/day of fuel • 1MW average power demand
Waste	• 4,000 lbs/day of solid waste • Disposed in landfills, incinerators and burn pits → health and safety risks

Excessive cost of \$40-\$80M per year for fuel, water, waste logistics support in theater per Force Provider 550-man module



- Contingency Basing has become an Army and DOD priority
- Army Maneuver Support Center of Excellence is establishing requirements and standards for base camps
- Line of effort recently conducted to identify readily available products to increase efficiencies and effectiveness
 - Market surveys and request for information from Industry
- Multiple Communities of Practice established
 - Joint Serve, ASAALT, Army G-4, RDT&E
- Plan and preparation to being a robust S&T program starting in FY12
- Significant progress and momentum has been made, but there is still much to be done
 - Significant inefficiencies exist in base camps in the field, specifically associated with fuel consumption, water demand, waste reclamation, and manpower requirements
 - Advanced capabilities exist in technologies among Industry and Academia, yet need to be designed for Contingency Basing applications
 - Trade-offs must be made to balance capabilities with logistics, supportability and system-level impacts

Future Vision



Purpose:

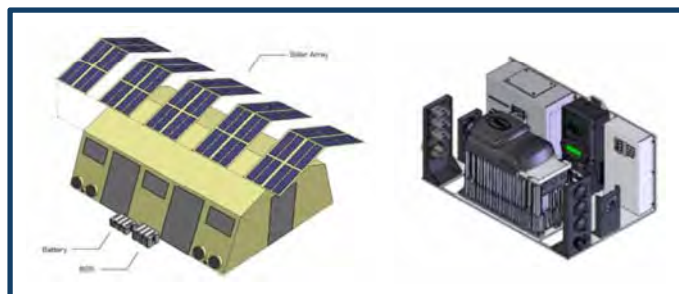
To research and create integrated system designs for mission focused, relocatable and rapidly deployable base camp components and integrated holistic capabilities to enable the Tactical Small Unit operating in a wide range of environments. Harvest ongoing government and industry investments to leverage existing technologies and capabilities.



Gasification Technology



Reverse Osmosis
Shower Water
Reuse



Power Management System Reduces
Sustainment Fuel Requirements

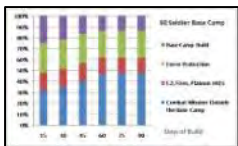
Results/Products:

- Integrated, open architecture that enables mission-specific plug-and-play systems optimized for protection, ease of sustainment, situational awareness and manpower requirements
- Increased survivability
- Interoperability with current and emerging mission command systems
- Novel energy & water systems for self-sustaining capabilities
- Systems analysis and modeling tools for force protection, power, water reuse, and waste reduction technologies.

Warfighter Payoff:

- Provide a force projection platform that is a combat enabler for the Tactical Small Unit in a broader range of operations
- Multiple threat protection integrated into a tailorable system solution
- Greater troop availability for mission operations
- Enhanced physical and cognitive performance through reducing loads on the individual

Identify Needs/Gaps



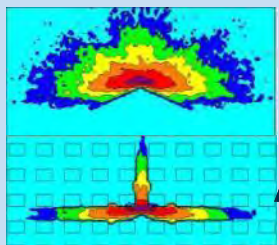
Troop to Task Ratios



Analyze & Prioritize Capability Gaps

- TRADOC
- FORSCOM
- JCIDS

Material Technology & Modeling



Develop Materiel Solution Concepts

- NSRDEC
- ERDEC/CERL
- RDECOM

EBC Community of Practice

Habitation

Energy

Water

Waste



Mature/Test Technologies, Integrate Systems

- Community of Practice

System Optimization

- Full Spectrum Operations
- Open-architecture design
- Reduced training burden

TRADE OFFS

- Efficiency
- Effectiveness
- Human Interface
- Technical Risk

Optimize Designs and System Prototypes

- NSRDEC
- Community of Practice

Warfighter Payoff

Operational Force Projection Platform Established in 24 Hours

- 50% increased troop-to-task ratio
- 50% reduction in fuel consumption
- 75% reduction in water resupply demand
- 50% reduction in waste generation

Force Projection Platform for the Small Combat Unit

- PEO CS & CSS
- PEO Integration
- JPEO CBD

Systems Approach

Enterprise Architecture

Problem: Lightweight, rapidly deployable shelters do not offer Warfighters a habitable environment for optimized performance.

Objective: Enhanced Warfighter performance through increased habitability and reduced burdens.

- Technical Challenges

- Reducing weight, packing volume and manpower requirements without sacrificing durability.
- Optimizing for thermal efficiency and addressing thermal weaknesses such as ducting, windows, doors, etc.
- Creating portable, lightweight materials and structures that can mimic habitability features of permanent buildings.
- Overcoming the lack of durability and strength in high performance thermal barriers for military shelter applications.
- Making additional features integral to the shelter, such as lights, power distribution, shading or camouflage.
- Optimizing environmental control for efficiency and the application.



Rapidly Deployable Structures



Shelters & Latrines



Billeting Shelter



Advanced Materials

Problem: Base camps consume excessive water, which makes up 40-60% of daily resupply requirements. Base camps also generate vast quantities of grey and black water waste.

Objective: Enable a 75% reduction in water resupply requirements by providing water reclamation and water generation capabilities.

- Technical Challenges

- Overcome the cost, high maintenance requirements and complexity of current membrane pre-treatment systems.
- Provide the capability to measure water quality continuously.
- Overcome the high size, weight and power requirements of water purification, reuse and generation systems.
- Develop the ability to adapt to widely varying load conditions of feed water.
- Establish the capability to filter micro-particles, enabling full reuse



Super Critical Oxidation



Reverse Osmosis



Membrane Bio-Reactor

Problem: Base camps consume excessive amounts of fuel, requiring resupply, which increases security convoy demand and diverts Warfighter efforts.

Objective: Achieve 50% reduction in (non-vehicle) fuel consumption and provide renewable energy capabilities.

- Technical Challenges

Supply

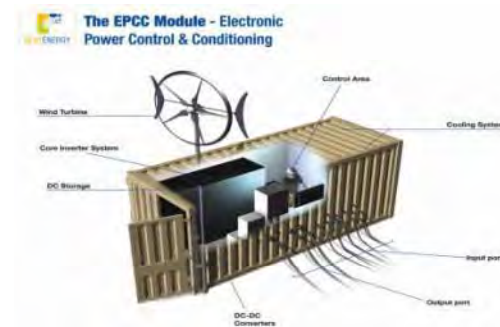
- Current generator design does not allow parallel or synchronous operation
- Improve the low conversion efficiencies and militarize alternative and renewable energy technologies
- Reduce size and weight as well as increase energy density of energy storage solutions

Demand

- Lack of ability to convert waste heat to useable energy
- High cost and manufacturing challenges of very high efficiency lighting
- Inefficient thermal management



Shelter with Wind & Solar Power



Advanced Insulation & Lighting



PowerShade (1 - 3KW) also blocks 90% of radiant heat

Problem: Base camps produce excessive amounts of waste, which is disposed of in landfills in host nations or burned under potentially hazardous circumstances.

Objective: Reduce solid waste disposal by 50%. Use waste generated as a source of energy.

- Technical Challenges

- Meet durability, shelf life and other requirements with less or alternative materials
- Address the size, cost and feed stock restrictions of waste to energy technologies
- Reduce the high power requirements of waste and waste water reduction and management systems
- Develop modular, scalable systems
- Eliminate health and environmental hazards



Burn Pit



Pyrolysis



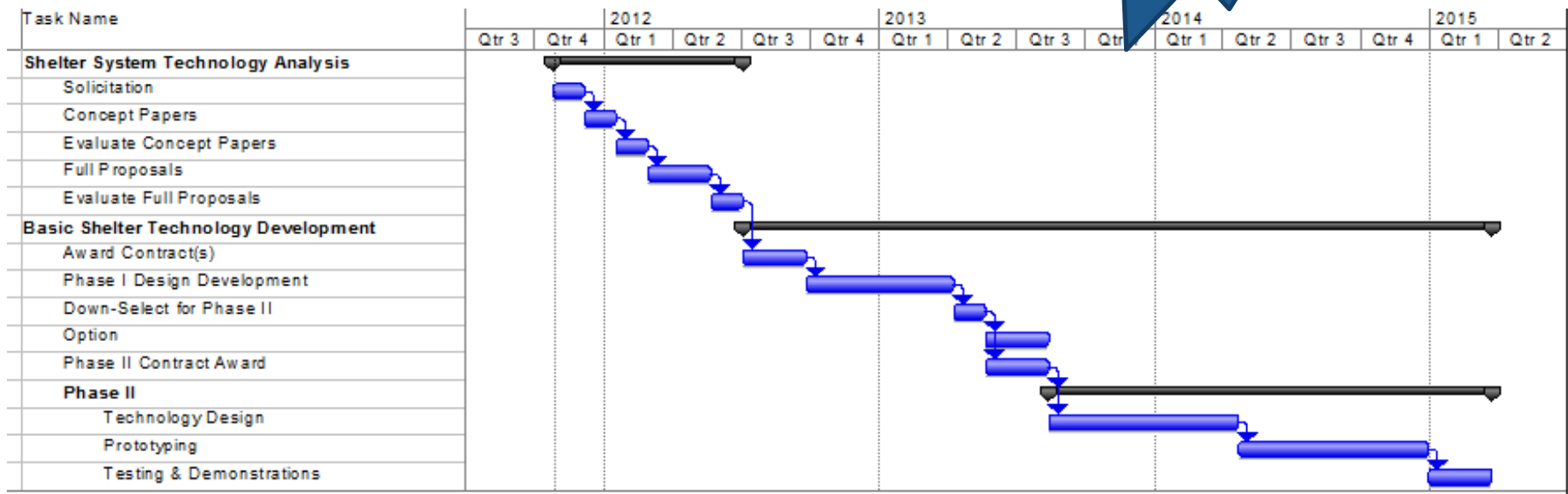
Bio-Catalytic Reactor



Gasification

- Two Phase Approach
 - Phase I: Multiple Design Approaches
 - Phase II: Prototype, Demonstrate, Validate
- Notional Schedule

Keep an eye
on NSRDEC
BAA and
FedBizOpps



- Current state and results
- Challenge areas
 - Habitation, Water, Power & Energy, Waste
- Program Plans
 - Two phase approach addressing the challenge areas
- How you can be involved
 - Solicitation under FedBizOps forthcoming – anticipated for release by the end of Nov, 2011
 - Seeking concept papers focusing on futuristic, forward-thinking base camp technologies
 - Submission through the NSRDEC Broad Agency Announcement (BAA) (<https://www3.natick.army.mil/ssbaa.html>)
 - Additional details will be provided within the solicitation
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