

The Challenges of Converting Opportunities Into New Initiatives

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Origins of Energy Systems and Technology Validation Lab Concept

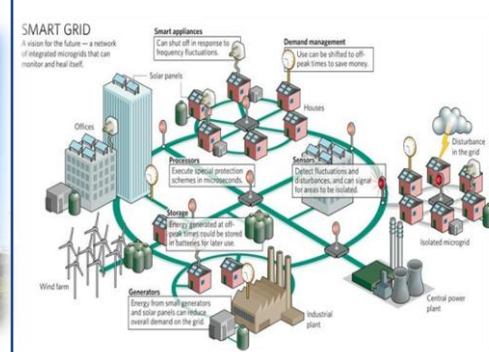
- Request from leadership of Tennessee Valley BRAC – energy initiative to position Redstone for the future – summer of 2010
- Huntsville Region SBA Proposal for Advanced Defense Technology Cluster – Fall 2010
- Chamber includes Energy Innovation in 2011 Federal Agenda Package
- Interactions with the Northern Alabama Energy Initiative – informal coalition -- assess regional capabilities
- Mayor Battle Leads Regional Energy Innovation Activity – Planning Activity
- The Region’s highly prized reputation for rapidly responding to Warfighter needs
- Interactions with DOD and DOE wherein it was clear – lab has mutual benefits
- Emergence of Policy Documents, White Papers, Legislation, Lessons Learned
 - DOD Facilities Energy Conservation Policies and Energy Efficiency Legislation
 - Executive Order 13423 – Strengthening Federal Environmental, Energy and Transportation Management
 - Pending Military Energy Security Bill (MESA)
 - Report of the Defense Science Board Task Force on DOD Energy Strategy – “More Fight – Less Fuel”
 - New Brookings, AEI, Breakthrough Institute Report – “Post Partisan Power”
 - “Reenergizing America’s Defense” – PEW Research Center Project
 - Proposed Project Submission to DOD and SBA as part of ADTC Project

HUNTSVILLE ADT CLUSTER INITIATIVE



7 Technology Focus Areas: Small Spacecraft, Environmental Monitoring, ISR, Robotics & Interoperable Systems, **Innovative Energy Applications**, Cybersecurity, Communications and IT (Includes Modeling, Simulation, Visualization)

Initial Concept: HSV Energy Initiative



Project/Program Thrust

- Use of alternative fuels, displacement of petroleum based products for Army assets
- Green UAVs/UAS Program Fuel Cell APUs – trucks and tanks – next gen batteries – higher efficiency generators, autonomous vehicles, etc
- Hybrid propulsion/systems with alternative fuels for Army Aviation
- New light weight, more energy efficient power systems for the warfighter
- Individual power management systems (ipower) – as well as vehicle, FOBs, etc.

Technology Validation, Verification, Demonstration Thrust

- Demonstration and certification of energy technologies with US Army applications: field units facilities, projects, programs
- New facility – operated with alternative energy systems. Facility serves as under writers lab. If technology meets specification and DoD requirements – approved for DoD acquisition with AMC
- Funding as DOD's Operational Test Agency for Energy Technologies
- A "Consumer Reports" of DOD Energy Technologies with user feedback loop

Energy Pilot Plant Thrust

- One new dedicated 125 MW facility for Redstone
- New natural gas power plant – green and clean – expedited permitting – eliminates disposal issues – lowest option for fully burdened power cost
- Or a new small modular nuclear reactor that capitalizes on the R&D initiative and testing at ORNL

Energy Efficiency and Conservation

- Expand community activities related to energy conservation and energy efficiency
- Identify programmatic initiatives that capitalize on regional capabilities, e.g. a Regional Smart Grid that covers the entire TVA Corridor
- Support local initiatives in collaboration with Redstone such as Municipal Waste to Power projects and facilities

ADTC Project – Concept Presented to SBA and DOD – Energy Systems and Technology Validation Lab – Integrate AMRDEC with NSRDEC

GREENstone Arsenal

Pilot Project

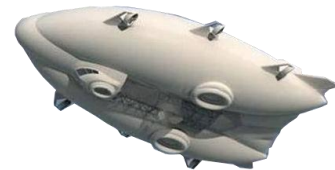
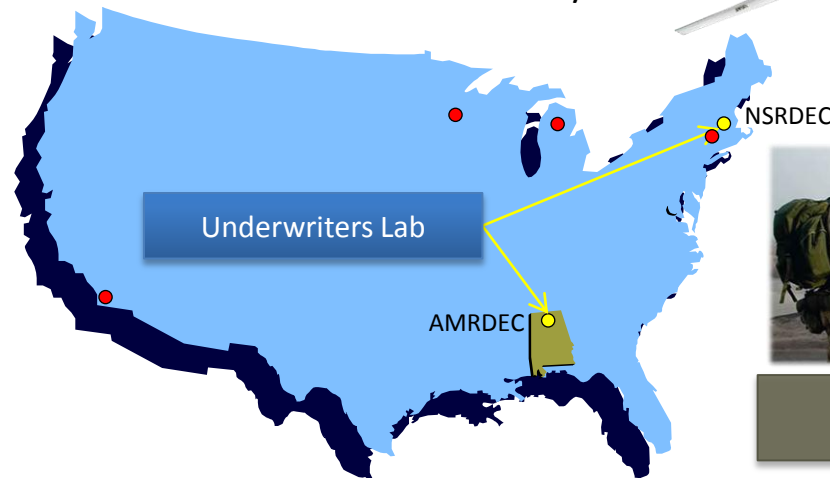
- Develop Energy Systems and Technology Validation Lab – Test Initial Systems

Layering/Leveraging

- Lightweight, more efficient “ubiquitous batteries” for warfighter
- Fuel Cell APUs in trucks/tanks
- Propagation of autonomous ground vehicles
- Hybrid propulsion systems with alternative fuels for Army Aviation
- All Redstone managed programs “Go Green”
- “Underwriters Lab” for energy technologies

Cluster Collaborations

Underwriters Labs – MA/AL



Other Markets

- Public Transportation
- Fleet Vehicles/Freightliner trucks
- Homes and Buildings
- Electronics
- Distributed Power
- Border Security
- First Responders

- San Diego Advanced Defense Cluster (Autonomy and Cyber)
- Defense Alliance of Minnesota (Energy Systems/Storage)
- CT Center for Advanced Technology (Hydrogen-Fuel Cells)
- Upper MI Green Aviation Coalition

Reduce Logistics Requirements and Fully Burdened Cost Associated With Petroleum Supply

Regional Benefits

- Further enhances image of region as technology center of excellence and enables compliance with EPA standards
- New job creation aligned with experience of displaced NASA and DOD workers – systems engineering and testing
- Address critical gap in current value chain for regional innovators
- Responsive to key DOD requirement – lowers the acquisition cost of fuel and power – reduces the logistics requirements for the warfighter – reduces demand for petroleum based products
- Attracts manufacturers of energy systems and technologies to region – capitalize on suite of platforms, facilities and test beds at Redstone
- Linkage with other key regional and state initiatives – cyber security, aerospace and defense, small spacecraft, interoperable systems, smart grids, electric vehicles, etc.
- Key topics of interest have transportability to other sectors – auto/transportation (fuel cells and batteries), housing (smart grids), military (green technologies for aircraft, UAVs, vehicles...) First Responders

Candidate Technologies To Establish Model and Validate Test Procedures

- Based on the initial activities of the Team – the following are representative of the type of systems that could be tested and validated – becoming candidates for DOD procurement. The Team is also working to attract key technologies from other energy clusters – CT and MN – as well as other key research organizations:
 - Organic Batteries – Hudson Alpha and CFRDC
 - Fuel Characterization Sensor Technologies – Polaris Sensor Technologies
 - Advanced Energy Efficiency Control Units or Advanced Technology Energy Efficiency Management Systems for FOB – Rocky Research
 - Hybrid Advanced Microgrid Power System – Radiance
 - Advanced Fuel Cell Powered Generator – Battelle
 - High Capacity Lithium Ion Battery -- CFRDC
 - Potential AMRDEC/NSRDEC Candidate Technologies/Systems
 - Half Size Battery
 - Soldier Conformal Battery
 - Soldier Power Manager
 - FOB Micro Grids
 - Fuel Cell Powered UAVs

Unique Regional Opportunity

- During the course of the last two years, leading policy and decision makers have come to realize that the path to commercialization and market entry for emerging energy technologies could be via DOD energy technology validation, adaptation and utilization
- The State of Alabama, the Tennessee Valley Corridor and Huntsville are extremely well-positioned to play a key role in this process based on:
 - the presence of key national assets including the systems engineering and test capabilities of AMRDEC,
 - the responsibility for critical energy intensive systems and platforms being deployed to the warfighter by Redstone,
 - the co-location of the Army Material Command
- Over the course of the last four months, a limited concept for an Energy Systems and Technology Validation Lab has been vetted with AMCOM, AMRDEC, RDECOM, EUCOM, NORTHCOM, and SBA and it was well received by all parties.
- SBA facilitated a meeting with the Assistant Secretary of DOD
- RDECOM is working to facilitate other key meetings
- The Team is now working to determine the feasibility of submitted a Joint Capability Technology Demonstration Proposal to the Deputy Secretary of the Army for R&E