Army Goes Green

Dr. Grace M. Bochenek
Director
U.S Army Tank Automotive Research, Development and Engineering Center
## Army Goes Green

Presented at the GreenGov Symposium, October 31 - November 2, 2011, Washington, DC
Strategic Relationships

• World-Class Automotive Engineering Universities at our Doorstep

• Defense Industry Ground Systems Hub

• Direct Linkage to World-Class Automotive Research and Development Centers

• Strategic Engagement with 1st, 2nd and 3rd Tier Automotive Supplier Network
Army Energy Initiatives

Fort Bliss solar panels

Transportable solar-powered tents

Combat boot add-on biomechanical energy harvesting device, SPaRK

Energy Harvesting Rectenna

Coal-Biomass-to-Liquids

Army Goes Green
November 2, 2011
Reducing the Fuel Logistics Burden

1 in 46 convoys suffered a casualty in 2010, leaving some 3,000 wounded or dead.

A 1% fuel savings will lead to 6,444 fewer Soldier trips in dangerous battlefield convoys.

1 in 46
1 in 46
1 in 46

Modeling and Simulation: Optimize the System

Research and Testing

Demonstrate Systems and Technologies

Fleet Management – Session 8
The Latest Scoop on R&D

Army Goes Green
November 2, 2011
Advancing Platform Energy Efficiency & System Knowledge

Key features

• Low-rolling-resistance tires increase fuel economy by about 7 percent
• Lightweight aluminum armored cab and underbody blast shield reduce load
• 4.5-liter inline 4-cylinder engine optimizes fuel economy
• 6-speed transmission shifts more precise

Accomplishments:

• +70% increase in fuel efficiency in both vehicles significantly exceeds original goal
• Fuel economy maximized within the bounds of cost, timing, threshold requirements
• Optimization improved through requirements, specifications, architecture
• Systems Engineering focus improves entire system, not component optimization
Army Efforts...Integral to Installation & Operational Energy Security

**Partnerships**
- Hawaii Tri-Service Advanced Vehicle Working Group
- PACOM/NORTHCOM SPIDERS JCTD
- State of Hawaii
- University of Hawaii-HNEI
- Hawaii Tri-Service Military Installations

**Army Involvement Achieves Goals**
- Supports the increase in renewable energy
- Military as an early adopter
- Develop a competitive & sustaining industry
- Army Hydrogen based Vehicles & Refueling
  - Army Aloha Microgrid 1
    - 250kW AC architecture
  - Army Aloha Microgrid 2
    - 450kW DC modular architecture

**Hawaii’s Energy from Oil**
- 90%

**Hawaii Imports 51 Million Barrels of Oil Annually**
- $7B

**Hawaii’s Supply of Oil (at any given time)**
- 14-21 Days
Fuel Efficiency Through Autonomy

Without Soldiers in a vehicle, extensive armor isn’t required – resulting in lighter, more fuel efficient vehicles.

Convoy vehicles can travel closer together, more precisely via robotics cutting down on the drag

• Makes entire Convoy more efficient

**Autonomous Platform Demonstrator (APD)**

• Will develop, integrate and test next-generation unmanned ground vehicle (UGV) technologies

• Technologies include hybrid-electric drive systems, advanced vehicle suspension systems, and lightweight chassis technologies on a single platform.

**Convoy Active Safety Truck (CAST)**

• Low-cost robotic convoy capability for current force tactical wheeled vehicles with the target cost of a robotic retrofit kit under $20,000 per vehicle
Army/DOE Sign Charter toAchieveVehicle Energy Efficiency

Advanced Vehicle Power Technology Alliance (AVPTA)
Breaking New Ground

AVPTA will move us toward reducing our reliance on fossil fuels.
Combines the intellect of the DA and the DOE to accelerate energy-related R&D initiatives.

Joint Technology Areas
- Advanced Combustion Engines and transmissions
- Lightweight Structures and Materials
- Energy Recovery and Thermal Management
- Alternative Fuels and Lubricants
- Hybrid Power Systems
- Analytical Tools

RESULTS:
The workshop resulted in:
- 37 Coordination opportunities
- 21 Opportunities for project integration
- 20 Potential joint endeavors (4 Quick Wins)
It’s All About the Warfighter


Fleet Management – Session 8
The Latest Scoop on R&D

Army Goes Green
November 2, 2011