



# Army Energy Security













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Caveat: Comments are those of the presenter and do not reflect official Army policy.



## Leadership Supports Energy Initiatives



**“We're making our government's largest ever investment in renewable energy – an investment aimed at doubling the generating capacity from wind and other renewable[s]... “ 9/23/09**



- President Barack Obama

**“...[T]he Army is actively supporting advanced technologies and increases in energy efficiencies at our installations, in our weapon systems, and in operations.” 10/09**

- SMA, CSA, SA signed Army Energy Awareness Month Letter

**“As long as we're dependent on those fossil fuels, we're dependent on the Middle East. If we are not victims, we're certainly captives.”**



- John McHugh,  
Secretary, U. S. Army

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# ENERGY SECURITY





SURETY

SUPPLY

SUFFICIENCY

SURVIVABILITY

SUSTAINABILITY

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# Vision and Mission



## Army Energy Security Vision

An effective and innovative Army energy posture, which enhances and ensures mission success and quality of life for our Soldiers, their Families, and Civilians through Leadership, Partnership, and Ownership, and also serves as a model for the nation.

## Army Energy Security Mission

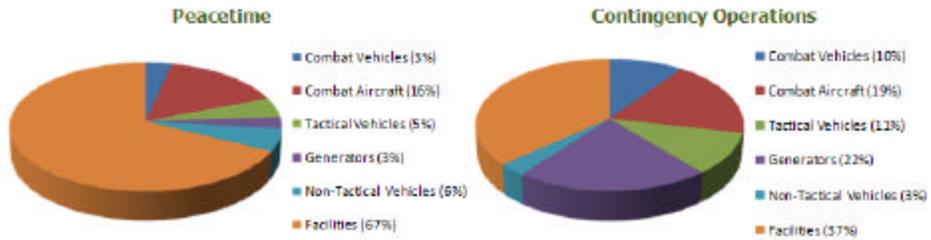
Make energy a consideration in all Army activities in an effort to reduce demand, increase efficiency, seek alternative sources, and create a culture of energy accountability, while sustaining or enhancing operational capabilities.



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# Army Energy Consumption



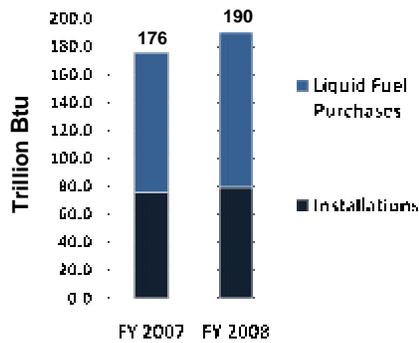
Sources: Defense Science Board, More Fight – Less Fuel (February 2008); Department of the Army FY07 Annual Energy Management Report (December 2007)



# ARMY ENERGY CONSUMPTION & COST

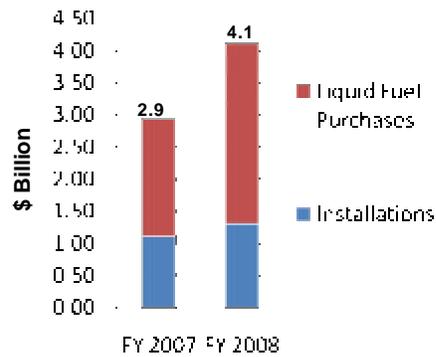


## Consumption & DESC Purchases

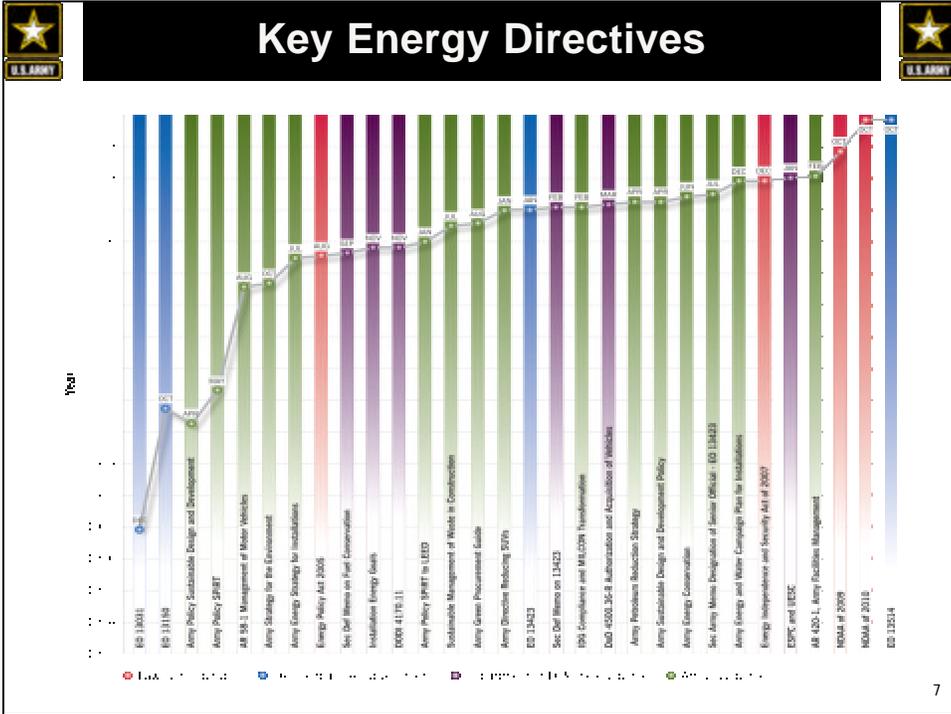


FY 2007 – 2008 Trillion Btu Increase = 8%

## Cost

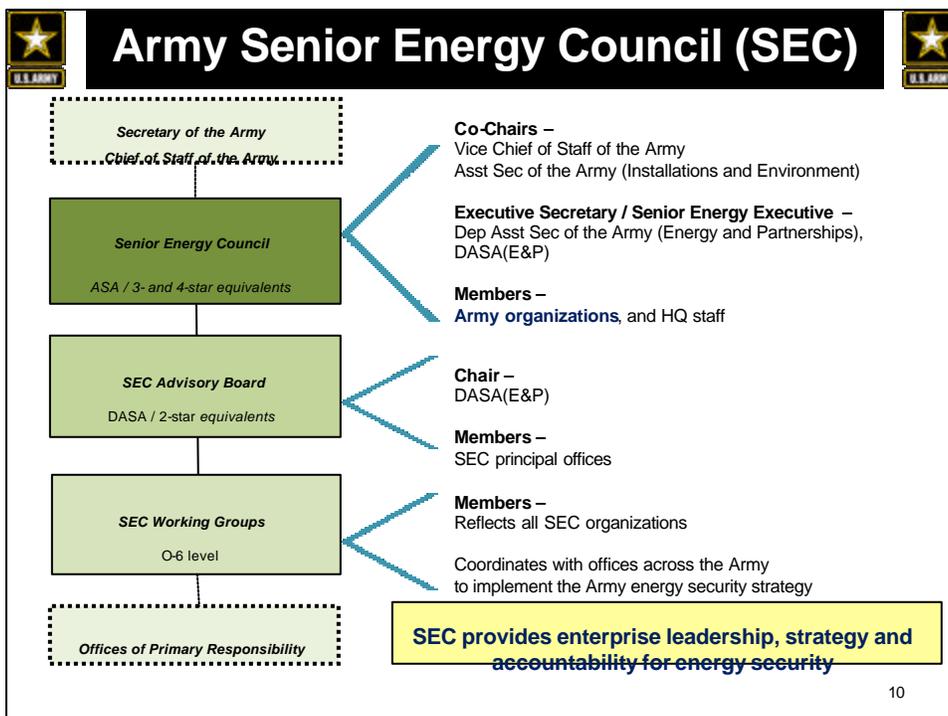
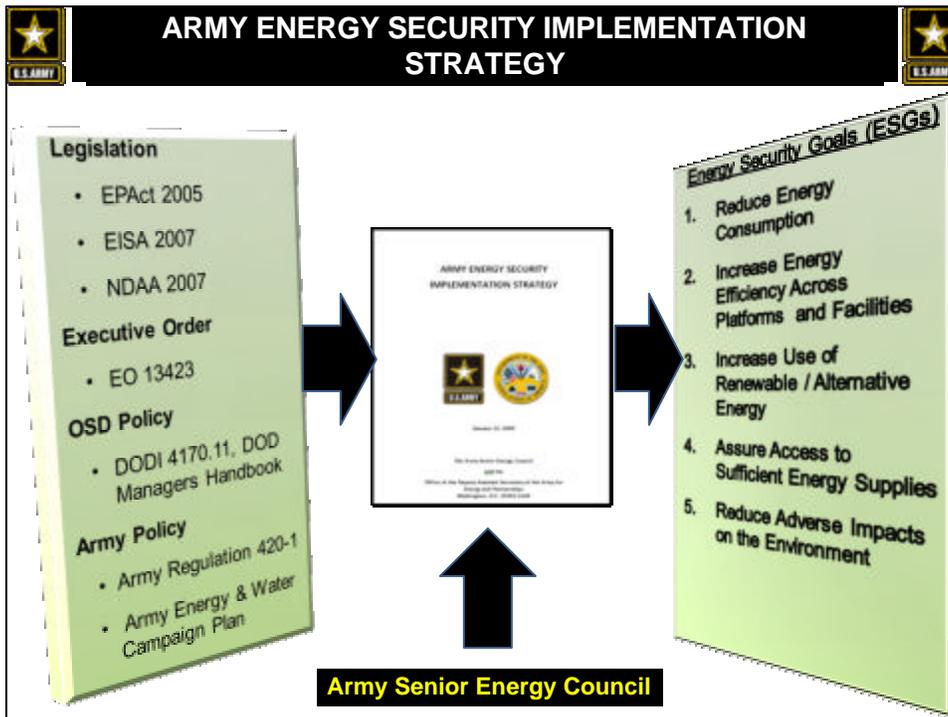


FY 2007 – 2008 Cost Increase = 40%



## Example Directives and Metrics

Directive Topic	Energy Performance Target [Source]
Installations energy use	Reduce by 30% by 2015 from 2003 baseline [EO 13423 / EISA 2007]
Non-tactical vehicle (NTV) fuel consumption	Reduce 2% per year through 2015, 20% by 2015 [EO 13423]
Electricity from renewable sources	A "Sense of Congress" goal - 25% by 2025 [EISA 2007 / NDAA 2007]
Fossil fuel use in new/renovated buildings	Reduce 55% by 2010; 100% by 2030 [EISA 2007]
Hot water in new/renovated buildings from solar power	30% by 2015 if life cycle cost-effective [EISA 2007]
Non-petroleum fueled vehicles use (ethanol, natural gas)	Increase by 10% annually [EO 13423]
Energy metering for improved energy management	Meter electricity by Oct 2012 [EPA Act 2005] Meter natural gas and steam by Oct 2016 [EISA 2007]





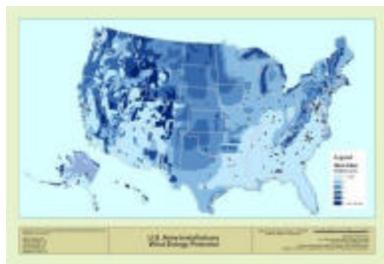
# Renewable Energy Potential



SOLAR



GEOHERMAL



WIND



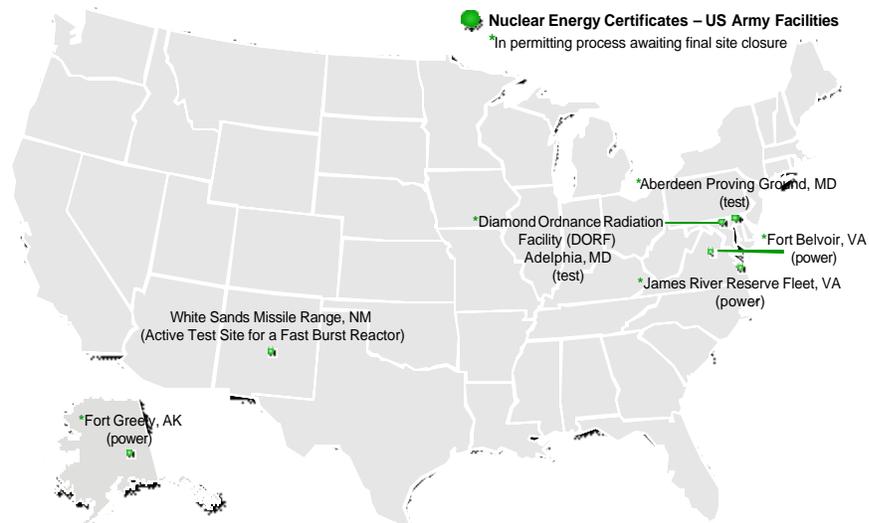
BIOMASS

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# US Army Facilities – Nuclear Energy



NDAA 2010 - SEC. 2845. STUDY ON DEVELOPMENT OF NUCLEAR POWER PLANTS ON MILITARY INSTALLATIONS.

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# Major Army Energy Initiatives



### Acquisition of Electric / Hybrid vehicles

- Army Order of 502 hybrid vehicles
- Acquisition of 4000 Low Speed Electric Vehicles (LSEV)
- One of the Largest Federal Electric & Hybrid fleets



### Build 30 MW Geothermal Power Plant at Hawthorne Army Depot, NV

- Meet all of Hawthorne's electrical power requirements
- Releases essentially no greenhouse gas emissions
- Available 24/7
- Partnership with Navy and USACE



### Develop 500 MW Solar Thermal Energy Plant at Fort Irwin, CA

- Supports Energy Security for the Installation
- Estimated \$20.8M utility cost reduction to Army over 25 years
- Partnership with Industry through Enhanced Use Lease (EUL) and Power Purchase Agreement (PPA)
- Developer Announced July 09



# Existing Renewable Projects



Ft. Drum Solar Wall



Ft. Huachuca Photovoltaic Roof



Ft. Jackson Fuel Cells



Ft. Carson Solar Array



### Renewable Energy Project 2009 Summary

#### Electricity Generation (40)

Solar .....34  
 Wind .....05  
 Hydro/Ocean .....01

Natural Gas (1)  
 Landfill / Biomass

#### Thermal Energy (25)

TOTAL PROJECTS – 66

363 Million Btu = Renewable Energy Generation  
 (23.8 GWH = Renewable Electricity)

Note: Source: FY 2009 Army Energy Mgt Data Rpt

- 2 Megawatt array generates ~3,200 MWh/year  
 - Ground-mounted, fixed-tilt, ~12 acres on former landfill



## Fort Knox Ground-Coupled Heat Pumps



A typical example of many large ground-coupled heat pump projects constructed at Fort Knox. This 5-building complex (140K sq ft) was disconnected from natural gas and connected to a geothermal ground-coupled heat pump system (containing 130 500-ft deep wells)



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## Fort Knox Renewable Methane Gas



Fort Knox is utilizing renewable Devonian shale methane gas in lieu of fossil fuel natural gas. Methane gas is collected from wells on Fort Knox property.



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## Fort Knox Solar



### Solar Arrays

100kw Solar Photovoltaic (PV), Bldg 1730



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## AMERICAN RECOVERY & REINVESTMENT ACT PROJECTS



- ✍ Energy Conservation Investment Program (ECIP)
  - ✍ 17 Projects; 13 Installations
  - ✍ \$32M
  
- ✍ Sustainment, Restoration, And Modernization (SRM)
  - ✍ 280+ Projects
  - ✍ \$385M; \$222M NGB
  
- ✍ Research, Development, Test and Evaluation (RDT&E)
  - ✍ 7 Research Topics
  - ✍ \$75M

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## ENERGY RELATED STIMULUS PROJECTS



### Energy Conservation Investment Program (ECIP) - \$32M

TX	Install 8,000 Motion Sensors
AK	Facility Energy Improvements
VA	High Eff. Lighting, Ph III
NM	Install Direct Digital Controls
VA	ECIP - High Efficiency Lighting (Phase III)
OK	Solar Water Preheater
NY	Install Solar Walls, Energy Improvements
AK	Wind Turbine & PV Panels
NJ	Install 1.5 MW Wind Turbine
NC	EMCS
IA	GSHP & PV for Bldg 100-101
KY	Replace A/C with GSHP, Efficient Boilers
KY	Barracks GSHP, Ph 5
KY	Barracks GSHP, Ph 6
UT	Solar Walls on 14 Buildings
NV	Geothermal Test Wells, Phase 2
KY	Solar Walls & Day Lighting

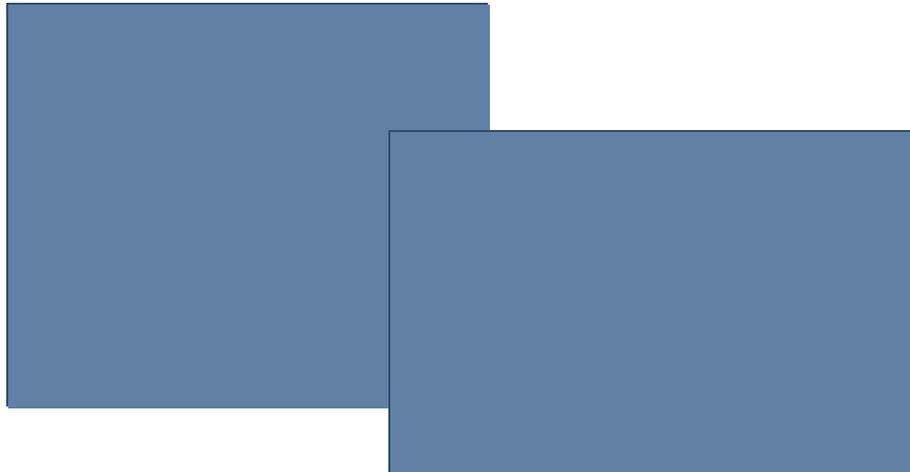
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## ENERGY RELATED STIMULUS PROJECTS



### SRM Funds for "Energy" Projects



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## American Reinvestment and Recovery Act



Provides \$75 million of RDTE funding for improvements in energy generation and efficiency, transmission, regulation, storage, and for use on military installations and within operations forces, to include research and development of energy from fuel cells, wind, solar, and other renewable energy sources to include biofuels and bioenergy

Army RDTE ARRA Efforts	Amount
Advanced Power Electronics Ground Systems Testbed Equipment	\$14,580,000
High Temperature Silicon Carbide (SiC) Power Semiconductors (Applied Research)	\$12,150,000
High Temperature Silicon Carbide (SiC) Power Semiconductors (Adv. Tech. Development)	\$12,150,000
Ultra Low Energy Community Systems	\$2,916,000
Energy Security Audit & Islanding Methodology	\$6,804,000
Lightweight, Flexible, Cost Effective Solar Energy Photovoltaics	\$14,580,000
Develop smaller, lighter cogeneration and absorption environmental control systems	\$6,318,000
Micro-Grid Field Scaled Demonstration	\$3,402,000
Small Business Innovative Research/Small Business Technology Transfer	\$2,100,000

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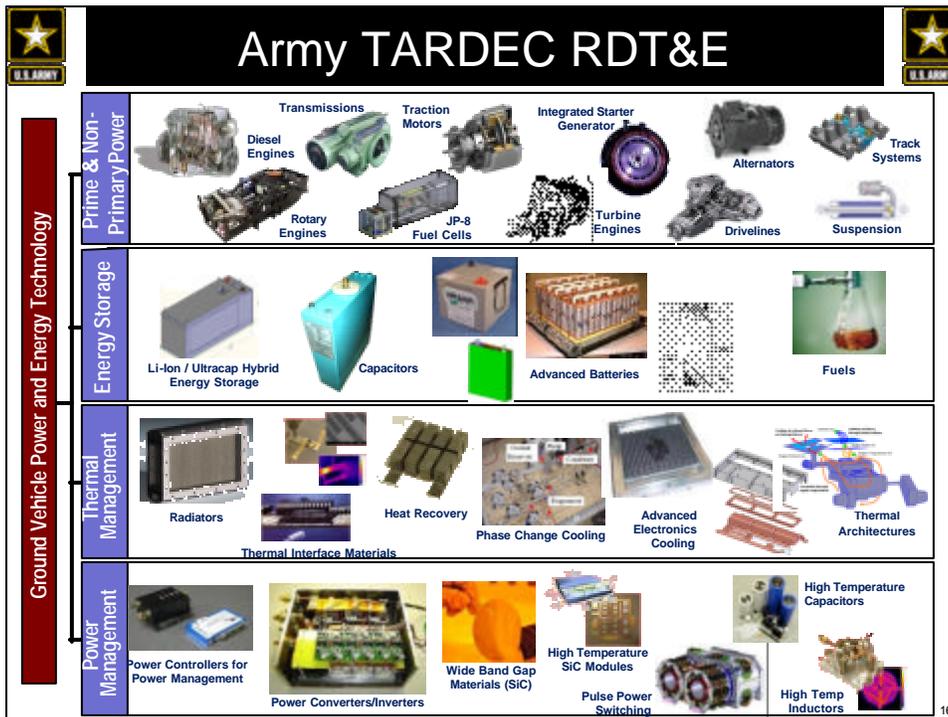
## Microgrid field scale demonstration - Fort Sill, OK



- Development of hardware, software, and controls to perform field scale micro-grid implementation at a subset of buildings
- Demonstration of capabilities, operator training, and documentation of results
- Provide secure and high reliability energy and environmental performance in an islanded mode for a minimum of 30 days
- Increased energy security
- Electric demand peak-shaving capability
- Enabling integration of existing and future renewable energy sources



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**ASA(ALT) Memo – 7 January 2009**

**U.S. Army Weapon Systems:  
Acquisition Policy & Energy Productivity**

- All new Army acquisition programs with end items that consume energy shall include the fully burdened cost of energy (FBCE) needed to operate the system in their total ownership cost analysis.
- Applies to all acquisition category levels programs, including information systems
- Energy Productivity is the level of output we can achieve from the energy we consume and it provides:
  - Measure for considering alternative energy supply sources,
  - Improving the energy efficiency of our systems,
  - And reducing energy demand.

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# Fort Bliss Energy Security Tiger Team



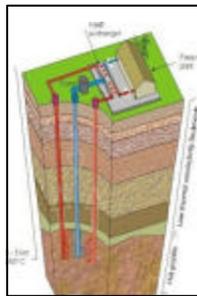
- Post Expansion
  - Installation will become the nation's 4<sup>th</sup> largest in population
  - 260% total population growth (from 2005 to 2012)
  - More than \$4B in construction doubling building space from 10 to 20 million sq. ft.
- Opportunities Explored
  - Improve energy services
  - Efficient energy use
  - Energy security

Recommendation Topic Areas	Time Frame*
New Construction	Mid-term
Renewable Power and Energy	
Solar Hot Water	Near-term
Solar Photovoltaic Power Plant	Near-term
Geothermal Power Plant	Long-term
Integrated Municipal Solid Waste/ Concentrated Solar Power Plant	Long-term
Wind Farm Power Plant	Long-term
Transportation Planning and Energy Use	
Installation Energy Management	Mid-term
Installation Energy Surety and Critical Infrastructure Planning	Near-term
Existing Infrastructure	Near-term

\* Near-term = FY 09-10, Mid-term = FY 09-12, and Long-term = FY 09-15.



# Geothermal Example – Ft Bliss



- The best evaluated in the Army renewable assessment
- 1996 test wells found 170° - 190°F water
- Minimized environmental impacts
- Takes the base camps and other training camps off the grid
- Cost effective – once implemented, price is fixed
- Great potential for PPP venture



## Deployed Operations – “Beans, Bullets and BTUs”



### The Challenge

- Fuel logistics, management and protection are key for contingency operations

### Key Energy Opportunities

- Distributed Generation
- Tactical Grid Management
- Renewable/Alternative Power
- Lightweight, Flexible, Structural, or Integrated Solar
- Alternative Fuels
- Standardized Deployable Kits
- High Efficiency Systems
- Leveraging Local Opportunities



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## NDA 2010 Energy Sections



- Authorizes \$5M for the Director of Operational Energy Plans and Programs Office. (Sec. 331)
- Requires SecDef to identify and address areas in which electricity needed to carry out critical missions could be vulnerable to disruption and to work with appropriate State and local governments and private entities to address such vulnerabilities. (Sec. 335)
- Establishes reporting requirement for DoD's efforts to develop and implement plans and strategies to meet energy efficiency requirements established by applicable statutes and Executive Orders. Provision intended to help Congress and DoD gain visibility on installation renewable energy projects and determine if existing funding mechanisms are sufficient. (Sec. 332)
- Requires DoD to show a procurement preference, subject to cost and tactical exceptions, for electric and hybrid vehicles. (Sec. 2844)

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## EO 13514 – October 2009



- Agencies provided to CEQ and OMB a Scope 1 and 2 absolute GHG emissions reduction goal for 2020 from 2008 baseline – 34%.
  - Scope 1 – Direct emissions by an agency.
  - Scope 2 – Direct emissions from electricity, heat, or steam purchased by an agency.
  - Scope 3 – Emissions from "sources not owned or directly controlled by a Federal agency but related to agency activities.
- Excluded direct emissions from vehicles, vessels, aircraft, and non-road equipment used in combat support, combat service support, tactical or relief operations, or training for such operations.
- Subject to the exemption authority described in Section 18, emissions from combat and tactical vehicles will need to be included in the inventory.
- DOD Senior Sustainability Officer is USD (AT&L)

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## Thank You



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