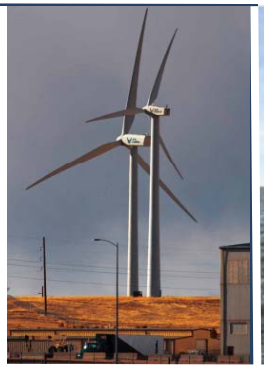










Washington Energy Summit 2011: Powering Cities of the Future

Dorothy Robyn
Deputy Under Secretary of Defense
(Installations & Environment)

September 28, 2011

Key Points

- Military installations confront the same challenges as cities, and some installations are as big as small cities.

- Like many cities, DoD has made energy a priority not to be “green” but to improve our effectiveness as warfighters.

- As a technology leader, DoD is well-positioned to play a key role in the energy innovation space.

I. *Military bases face the same challenges as cities*

II. *Like many cities, DoD has made energy a priority*

III. *DoD can play a key role in energy technology innovation*

Attracting Retail Development

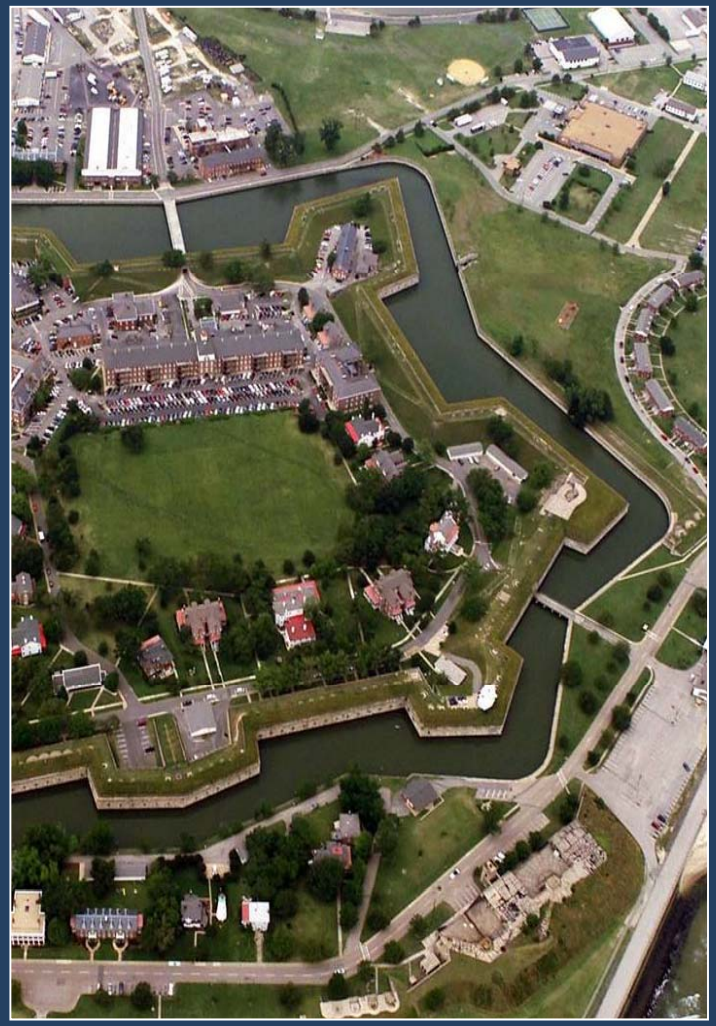
Acquisition, Technology and Logistics


MARKETPLACE


PX


1618
shamROCKS
irish pub

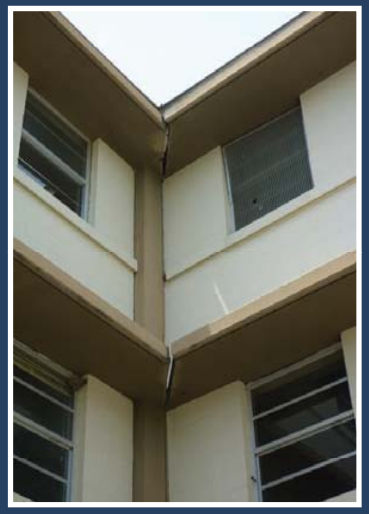
Preserving their Rich History



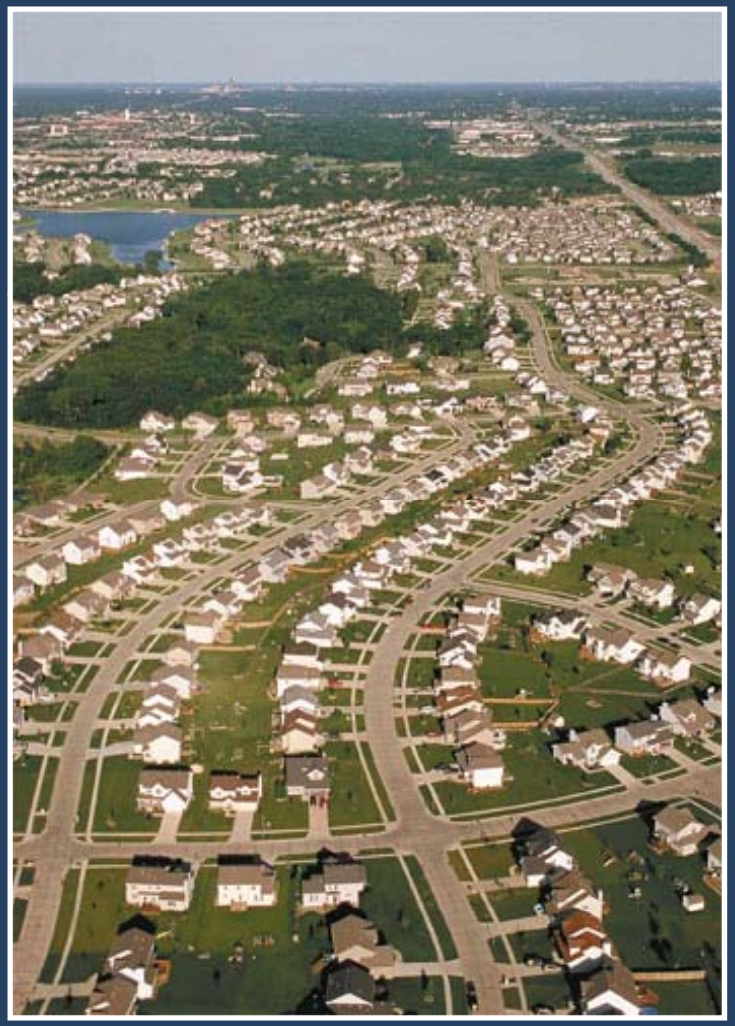
Maintaining a Diverse Building Inventory

Acquisition, Technology and Logistics

Addressing Aging Infrastructure and Occasional Natural Disasters



Contending with Sprawl and Congestion



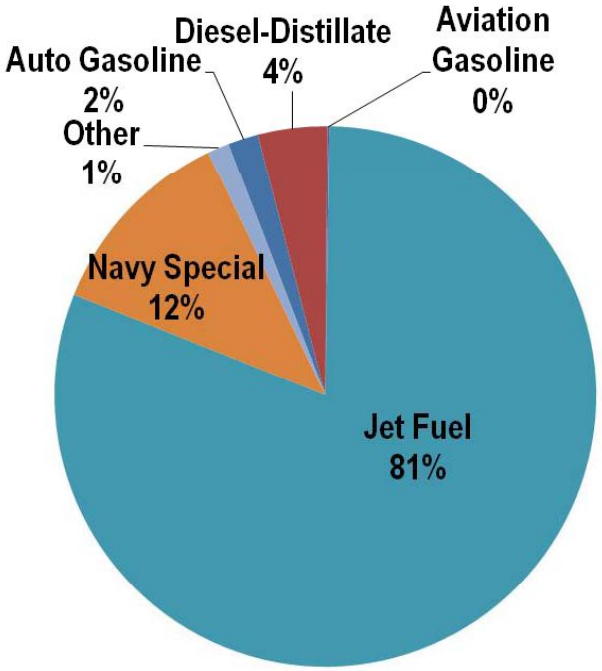
Providing Adequate Housing

I. *Military bases face the same challenges as cities*

II. *Like many cities, DoD has made energy a priority*

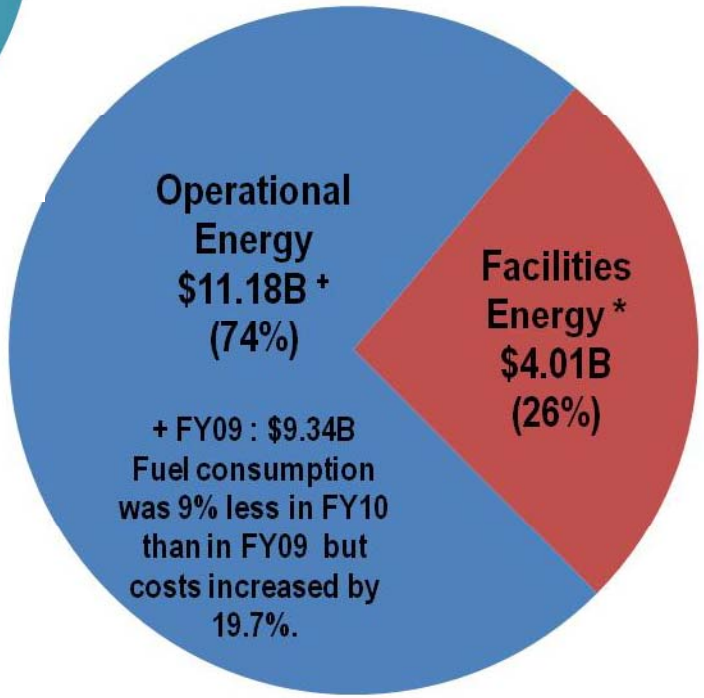
III. *DoD can play a key role in energy technology innovation*

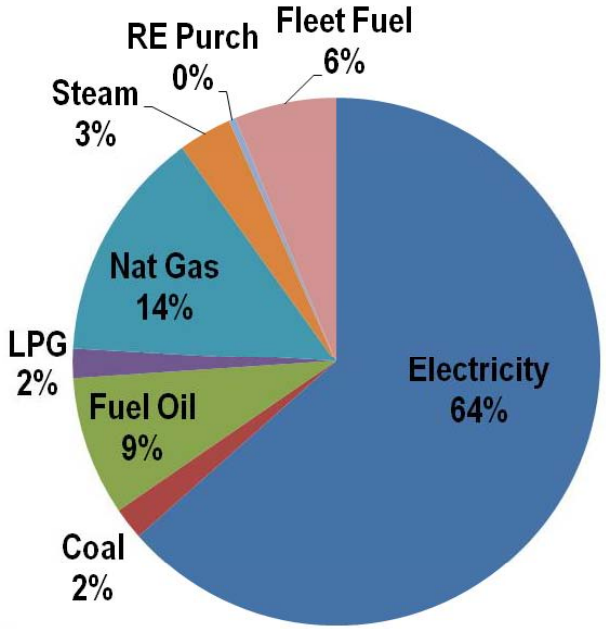
DoD Energy Costs, FY2010



Operational

DoD Energy Costs
FY10: $15.2B
FY09: $13.4B



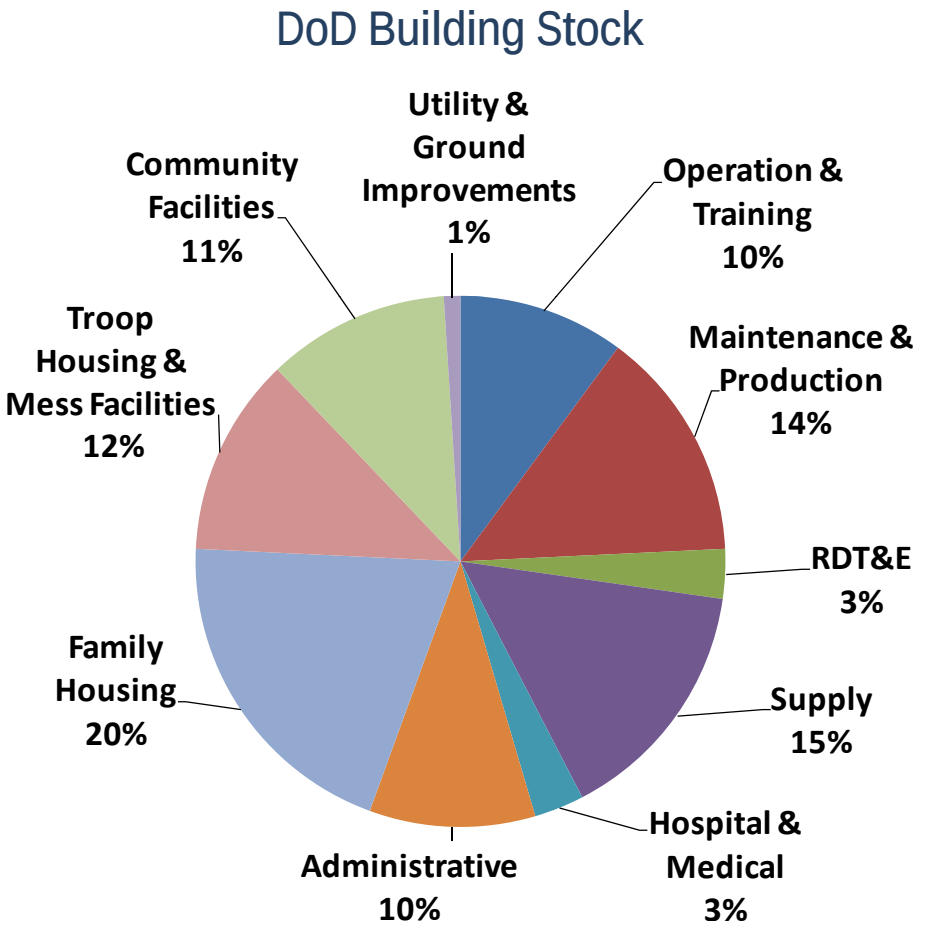


Facilities

* $4.01B in facilities energy costs include non-tactical vehicle fuel
$3.76B – facilities energy
$0.25B – non-tactical vehicle fuel

DoD Built Infrastructure

- 539,000 Facilities (buildings and structures)
  - 307,295 buildings
    - 2.2 billion square feet
- Comparisons
  - GSA: 1,500 government buildings
    - 176 million square feet
  - Wal-Mart US: 4,200 buildings
    - 687 million square feet
- 160,000 Fleet Vehicles

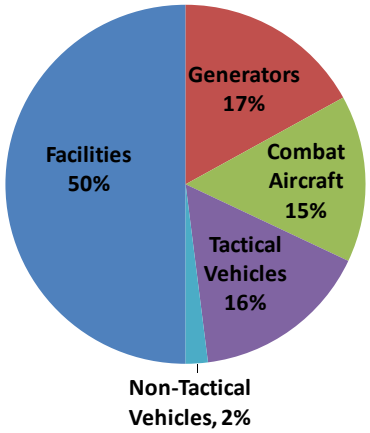


Why Facilities Energy Matters

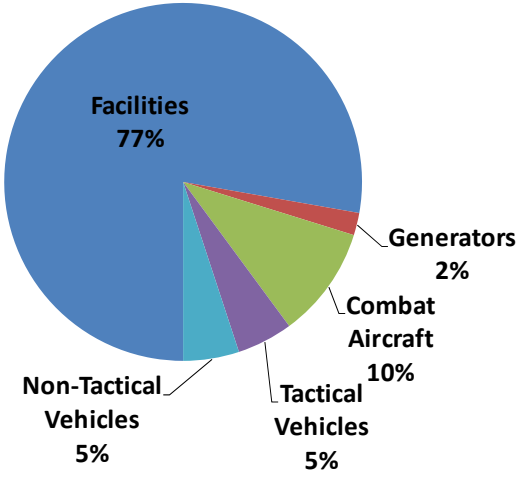
- Significant Cost
  - FY09: $4.0 billion (26% of total DoD energy costs)
  - Cost likely to increase (reduced presence in Iraq and Afghanistan, improved QoL)
- Environmental Impact
  - Contributes a disproportion share (~ 40%) of GHGs
- Mission Assurance/Energy Security
  - DoD's reliance on a fragile commercial electricity grid places continuity of critical missions at serious and growing risk [1]

[1] Defense Science Board, "More Fight – Less Fuel," February 2008

Army CO_2 Emissions Today

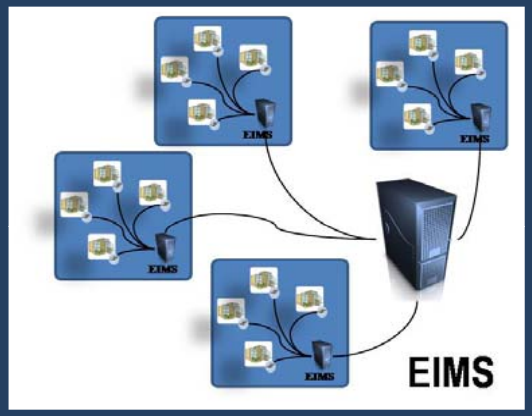


Army CO_2 Emissions Future?



Facilities Energy Strategy: Reduce Demand

- *Reduce Demand* – energy efficiency/conservation
  - Use SRM (sustainment, repair and maintenance) budget ($8.8B) to retrofit existing buildings
  - Use MilCon budget ($14.8B) to improve new construction
    - LEED Silver (40% of points from energy and water)
    - 30% above ASHRAE standards
  - Private financing (ESPCs) also key



"Energy efficiency is the fruit laying on the ground." –Steve Chu

Facilities Energy Strategy: Increase Supply

DoD Renewable Energy Projects

- Electricity Generation - 287
  - Solar - 279
  - Wind - 25
  - Hydro/Ocean - 1
- Natural Gas - 6
  - Landfill / Biomass/MSW
- Thermal Energy - 261

TOTAL PROJECTS – 443

- Renewable Energy Generation: 5,806 BBTU
- Renewable Electricity: 1,530 GWh

Nellis AFB
Solar Array (14 MW)

Fort Huachuca
Photovoltaic Roof

Marine Corps Base
Hawaii
Solar Hot Water
Heating

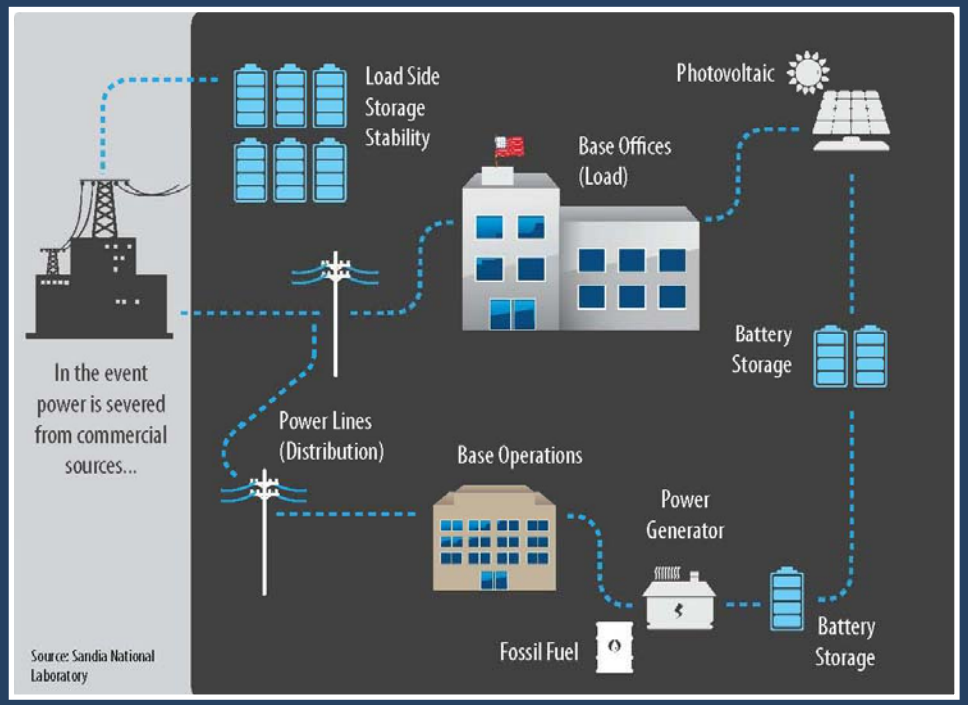
China Lake
Geothermal Power Plant
(270 MW)


JOIN THE ARMY!
We've got the LAND
and the DEMAND!

T&E Species: A Challenge for Renewable Energy Siting

Facilities Energy Strategy: Improve Security

- *Improve Energy Security – focus on grid disruption*
  - Risk mitigation plans
  - Micro-grid demonstrations
  - Net Zero Energy Installation initiatives



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Installation Energy Test Bed

- Emerging technologies hold the promise of dramatic improvements in building energy performance but face major impediments to commercialization and deployment
  - Building industry is highly fragmented
  - First user bears significant costs
  - A&E firms face liabilities but do not share in savings
  - Lack of operational testing deters potential adopters
- DoD is uniquely positioned to help overcome these barriers
  - It is in DoD's self interest given the size of our inventory (Wal-Mart has its own energy test bed but it is limited to big-box stores)
  - DoD's built infrastructure is unique for its size and variety— it captures the diversity of building types and climates in U.S.
  - Military has 150 years of experience as a sophisticated first user of new technology and an early, market-creating customer (jet engines, aircraft, integrated circuits, GPS, internet)

Installation Energy Test Bed

- Use DoD Facilities As Test Bed For Innovative Energy Technologies
  - Validate performance, cost, and environmental impacts
  - Transfer lessons learned, design and procurement information across all Services and installations
  - Directly reach out to private sector for innovations
  - Leverage DOE investments
- Develop, Test & Evaluate For All DoD Facilities
  - Advanced components to improve building energy efficiency
  - Advanced building energy management and control
  - Smart microgrid and energy storage to improve energy security
  - Tools and processes for design, assessment and decision-making for energy use and management
  - Renewable energy generation on DoD installations

BIPV Roofs

DESCRIPTION

- Validate whether BIPV roofs can endure weather conditions as well as conventional roofs
  - Luke AFB, MCAS Yuma, NAS Patuxent
- Verify whether a roof integrated solar photovoltaic system can perform as a cost effective energy efficient roof
- Promote adoption of BIPV roof technology within DoD through the Unified Facilities Guide Specification (UFGS)

BENEFITS/METRICS

- Demonstrations will document energy savings, costs, reliability and applicability to DoD roofs
- Effectively low cost per Watt installed

PERFORMERS

- NAVFAC ESC
- Lawrence Berkeley National Laboratory
- ERDC- CERL
- SEI Group, Inc

Continuous Building Commissioning

Acquisition, Technology and Logistics

DESCRIPTION

Objectives are to demonstrate whole-building modeling and monitoring systems capable of:

1) identifying, classifying, and quantifying energy and water consumption deviations from design intent or optimal,
2) identifying the causes of those deviations, and
3) recommending, prioritizing, and implementing corrective actions.

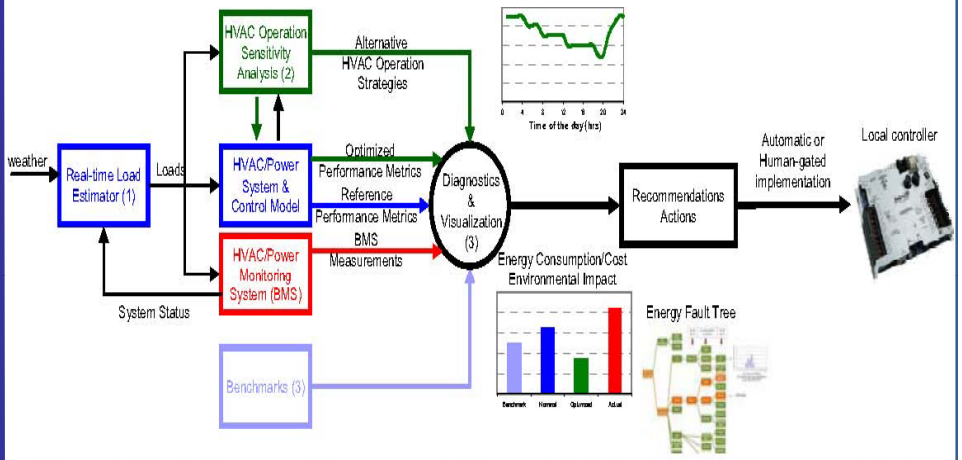


Figure 1. Block diagram of the proposed Advanced Building Energy Management Systems

BENEFITS/METRICS

- Demonstrations will document energy savings, costs, reliability and applicability to DoD buildings.
- Successful implementation of this technology will enable reduced energy consumption, peak electric demand, and water use in DoD buildings by providing actionable information to facility managers and building operators.

PERFORMERS

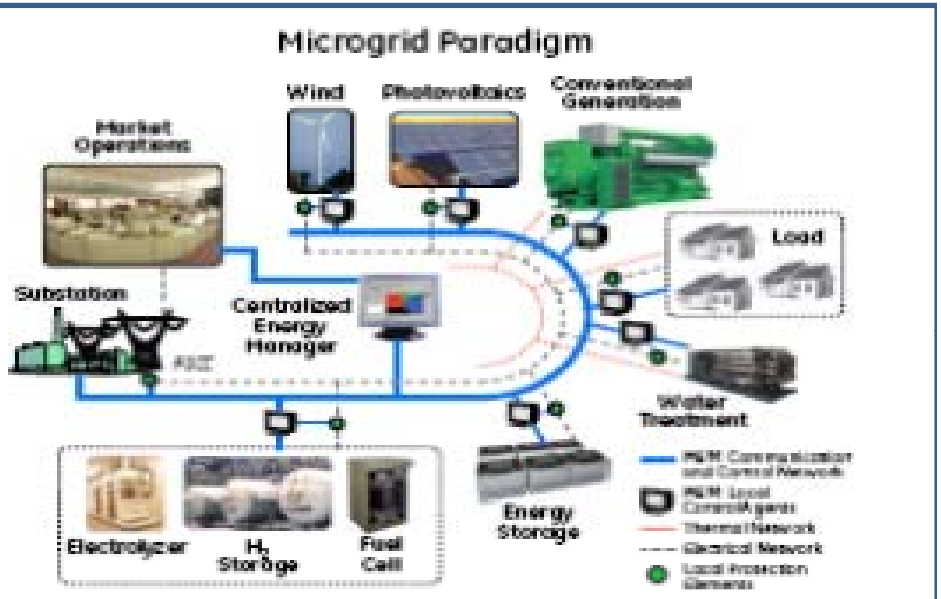
- United Technologies Research Center
  - Lawrence Berkeley National Laboratory
  - University of California, Berkeley
- Multiple Projects
  - Model based performance of single buildings
  - Scalability through reduced order models
  - Campus scale

Smart Microgrids

Acquisition, Technology and Logistics

DESCRIPTION

- Enhance and demonstrate an advanced micro grid technology for DoD installations
  - Microgrid design
  - Optimal dispatch
  - Load shedding
  - Intentional islanding
  - Energy management
- Demonstrations at 29 Palms and Ft. Bliss



BENEFITS/METRICS

- Allow secure islanding of DoD installation and reduce costs of electricity
- Increase use renewables, energy efficiency and improve power quality

PERFORMERS

- GE Global Research
  - 29 Palms
- Lockheed Martin
  - Ft. Bliss
- FY 2012 BAA
  - TBD

Low-BTU Landfill Gas Capable Microturbine

DESCRIPTION

- Establish economics, reliability, and applicability of the technology to a variety of DoD installations.
- Demonstrate the ability of a unique micro-turbine to generate electrical power from Landfill Gases.
- Demonstration at Ft. Benning

BENEFITS/METRICS

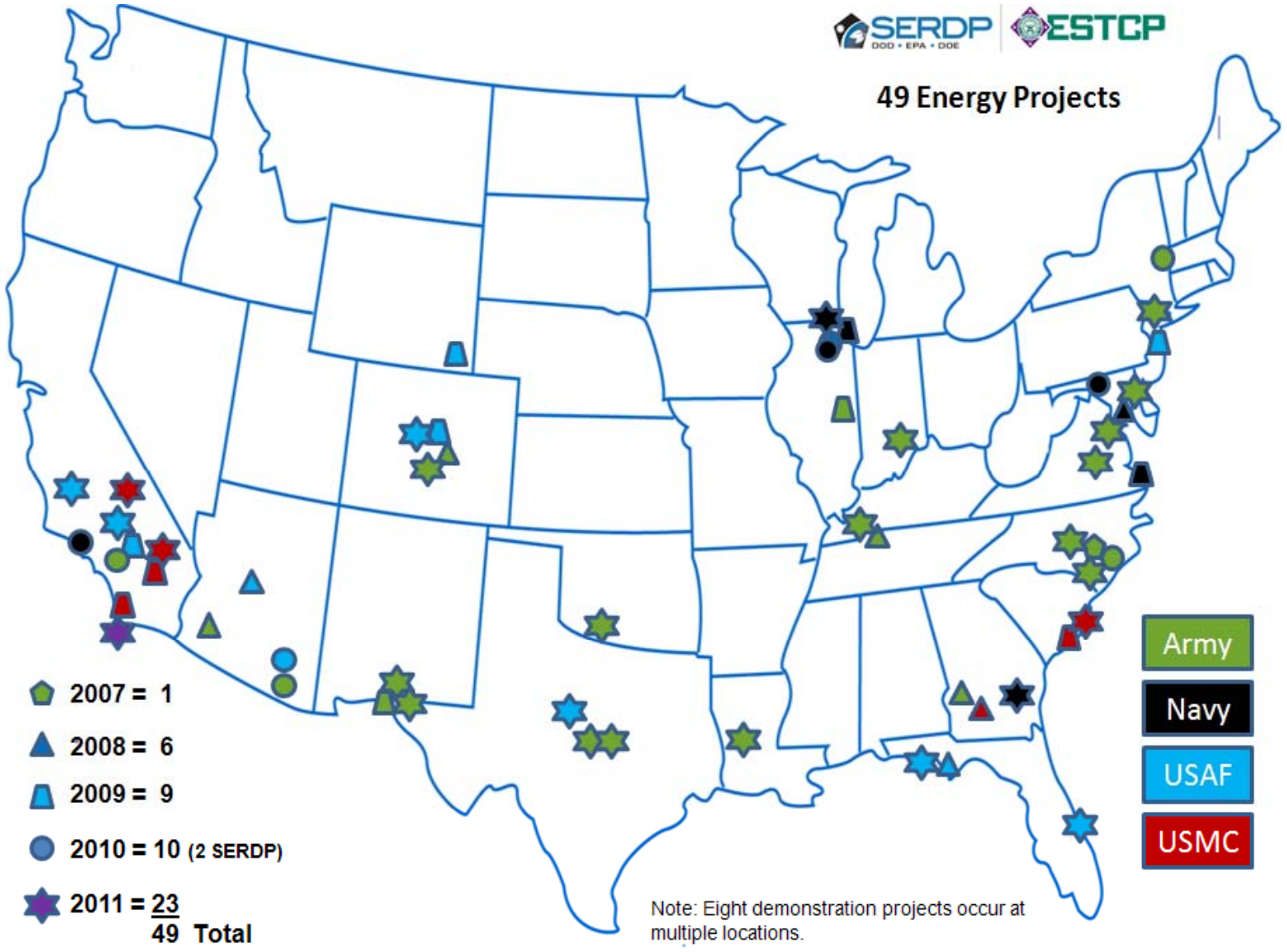
- Landfill gas energy capture technology will reduce the cost of DoD facility energy.
- High number of landfills on DoD installations, implementation of these technologies can yield enormous cost savings and energy security.

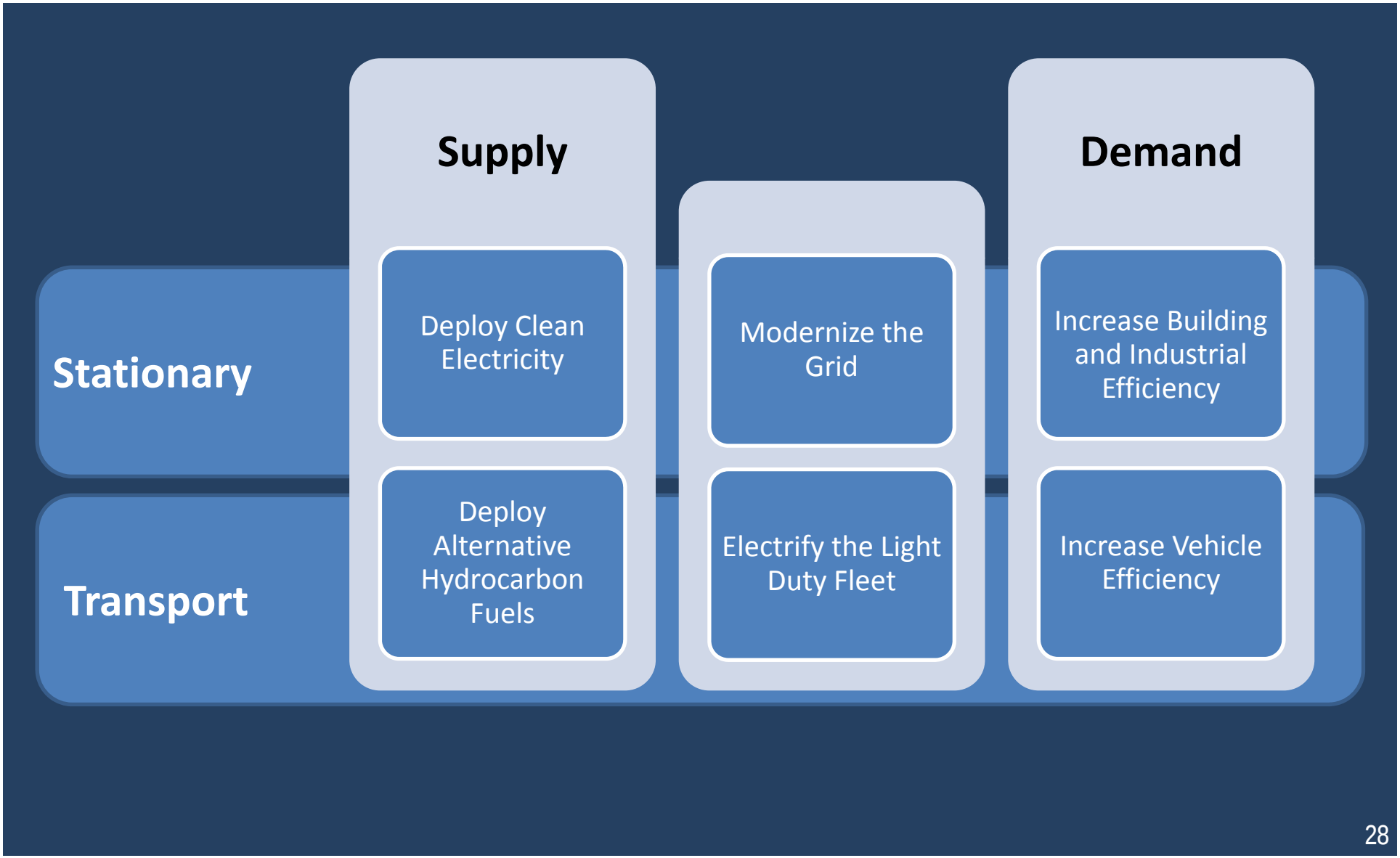
PERFORMERS

- Southern Research Institute
  - Greenhouse Gas Institute
- Flex Energy
- SCS Engineers
- Integrity Air Monitoring

Facilities Energy Test Bed Project Locations

Acquisition, Technology and Logistics




Supply
Demand
Stationary
Transport
Deploy Clean Electricity
Deploy Alternative Hydrocarbon Fuels
Modernize the Grid
Electrify the Light Duty Fleet
Increase Building and Industrial Efficiency
Increase Vehicle Efficiency

Conclusion

- DoD is committed to cutting our energy consumption because a military force that uses less energy is stronger today and in the future
- Energy is increasingly a consideration in all of DoD's key functions—operations, logistics, R&D, acquisition, military construction and installation management
- Improving energy efficiency can serve as a force multiplier, making us more effective warfighters
- As a technology leader, DoD can be a "solutions multiplier" in the country's critical effort to reduce GHGs

Back Up

Key Energy Goals

- Legislation and Executive Orders
  - EPAct 2005, EISA 2007, NDAA
  - EO 13423, EO 13514
- Key Targets
  - Facility Energy Efficiency
    - Reduce facilities energy intensity by 30% by 2015 and 37.5% by 2020 (2003 baseline)
  - Renewable Energy
    - Consume 7.5% of electric energy from renewable resources by 2013
    - Produce or procure 25% of facilities energy from renewable sources by 2025