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Power Surge

How the Department of Defense Leverages Private Resources to Enhance Energy Security and Save Money on U.S. Military Bases

January 2014

Pew Project on National Security, Energy and Climate

- Multi-year tracking of military energy innovation
- 2010: Re-energizing America's Defense – Introduction to DOD energy
- 2011: From Barracks to Battlefield – Operational energy
- Power Surge – Installation energy

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Methodology

- Consultation with DOD experts
- Site visits
- Data collaboration with

NAVIGANT RESEARCH

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Our Approach

1. Rationale for DOD's focus on installation energy
2. Base energy strategies
3. Progress and results
4. Key findings

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Rationale

Mission Assurance

- Growing base roles and responsibilities requiring power for essential operations 24/7

Budget Savings

- Opportunity to reduce $4 billion installation energy bill

Compliance

- Required to meet Congressional laws, Executive Orders and military goals

Photo courtesy of Lockheed Martin

At a Joint Task Force Civil Support meeting in Suffolk, VA, military and emergency response leaders discuss and synchronize the role military responders' play in missions of defense support.

Installation Energy Strategies

Reduce Energy Demand

Increase On-Site Generation with Renewables

Enhance Energy Management

Test Innovations

El Paso Times

Officials from the Army, the Department of Defense and Lockheed Martin cut the ribbon on the Army's first integrated microgrid power system at Fort Bliss. The system will allow the dining facility where it is located to save 10 to 20 percent on its energy costs,

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Financing Mechanisms

Appropriations

General operating accounts and dedicated initiatives

- *Energy Conservation Investment Program (ECIP)*
- *Installation Energy Test Bed (IETB)*

Third-party Financing

Efficiency

- *Energy Saving Performance Contracts*
- *Utility Energy Service Contracts*

Renewables

- *Power Purchase Agreements*
- *Enhanced Use Leases*

U.S. Navy photo

In October 2012, representatives from the Navy and SunPower turn on the switch for the 13.78-megawatt photovoltaic solar power plant at NAWS China Lake. The installation was the first long-term power purchase agreement to be executed by the military.

Progress and Results

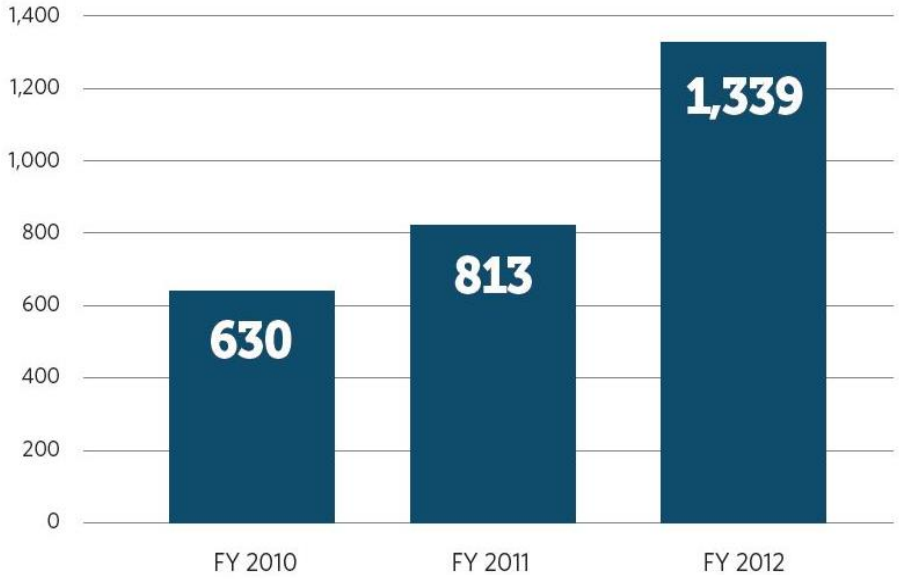
Efficiency progress (FY2010-12)

- Appropriations
  $422 million ➡ $907 million
- Number of efficiency projects 630 ➡ 1,339
- Third-party financing
  $323 million ➡ $459 million

Results

- Building energy intensity in 2012 down 17.7% from 2003 baseline

Number of Energy Conservation Projects on U.S. Military Bases



Source: Department of Defense, Navigant Research

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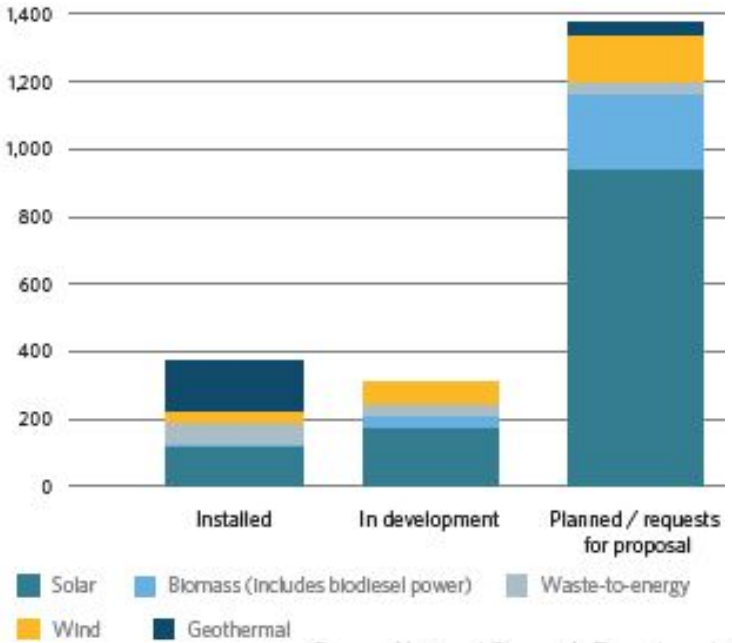
Progress and Results

Renewable Energy

- Consumption up 29 percent in 2012 over 2011 levels
- Number of projects increased from 454 in 2010 to 700 in 2012
- 384 MW installed capacity as of mid-2013
- 322 MW in development and 1.4 GW planned through 2018

DOD Renewable Energy Capacity by Technology (megawatts)



Source: Navigant Research, Department of Defense

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Key Findings

Clean Energy is a Policy Priority

- All branches have a concrete plan
- Growing expertise at HQ and bases

DOD Leveraging Private Sector Expertise and Resources

- Critical in era of budget austerity and with emerging technologies and financing models
- Projects are complex, and it will take time to establish precedents and procedures

One of two wind turbines under construction at Cape Cod Air Force Station. The 3.2 MW project is expected to be completed later this month and will save the Air Force an estimated $600,000/year on its energy bill.

Key Findings

Base Clean Energy Efforts Accelerating

- Clear progress in efficiency and renewable energy deployment over last three years
- Pipeline of initiatives will drive future progress
- Public-private partnerships expanding
- Changing culture and engaging personnel up and down the chain of command key to future success

U.S. Marine Corps

In November 2013, Members of the Energy Team at Marine Corps Logistics Base Albany in Georgia were given EPA's Energy Star Combined Heat and Power Award for the base's highly efficient CHP systems, which increase the reliability of the electricity supply.

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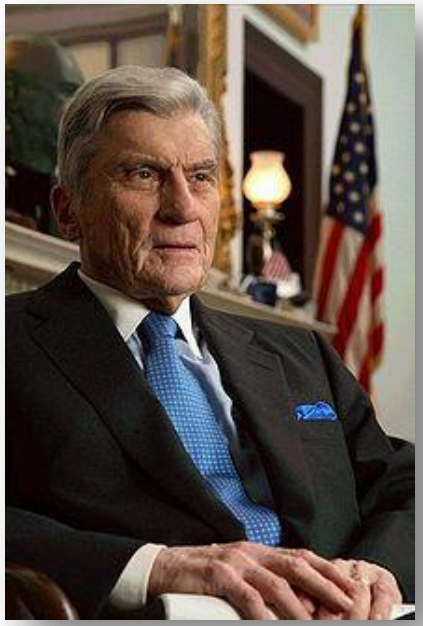

SENATOR JOHN WARNER

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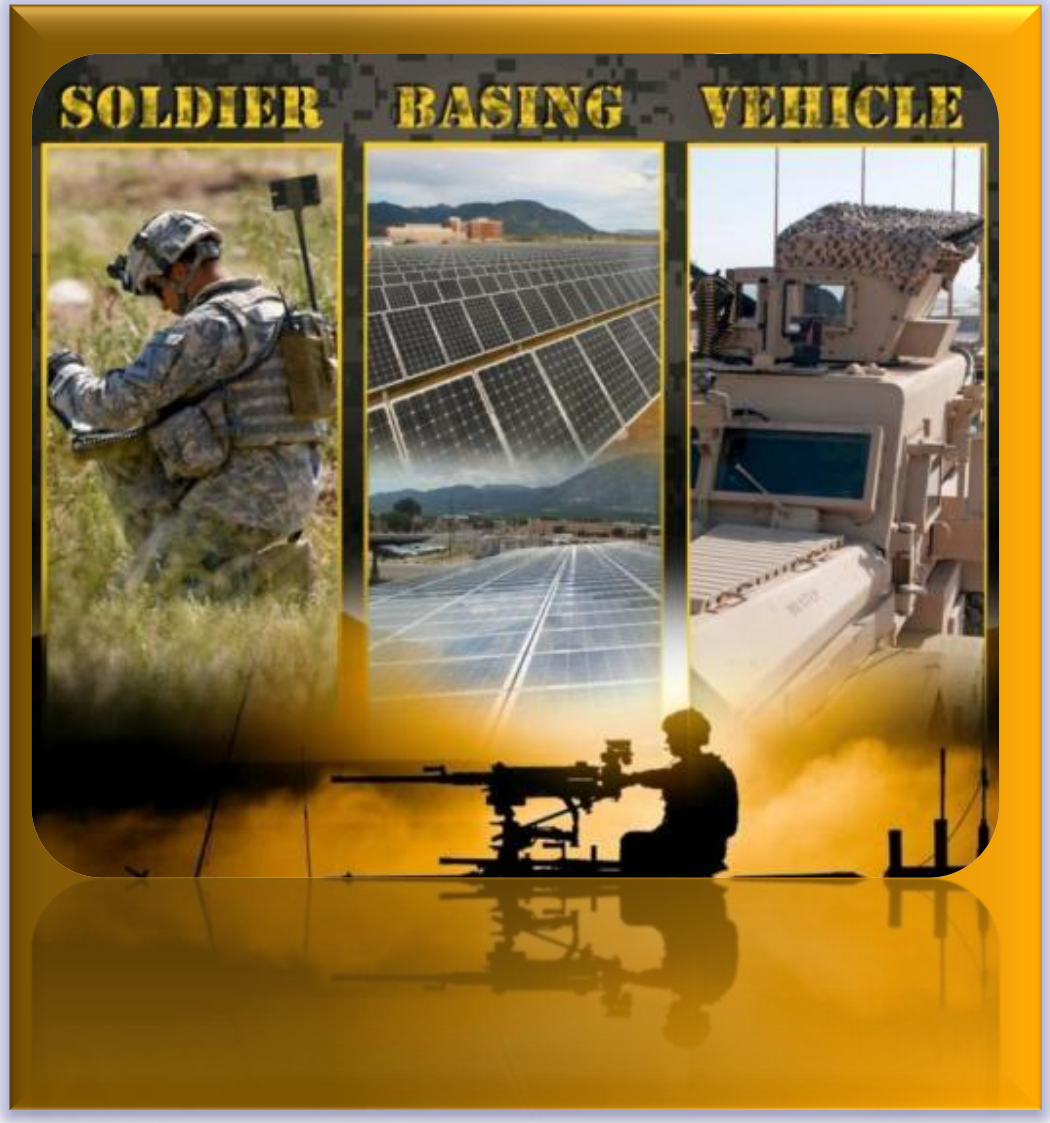
Army Power and Energy



Assistant Secretary of the Army for Installations, Energy and Environment

HON Katherine Hammack

Presentation to the Pew Charitable Trusts
16 January 2014

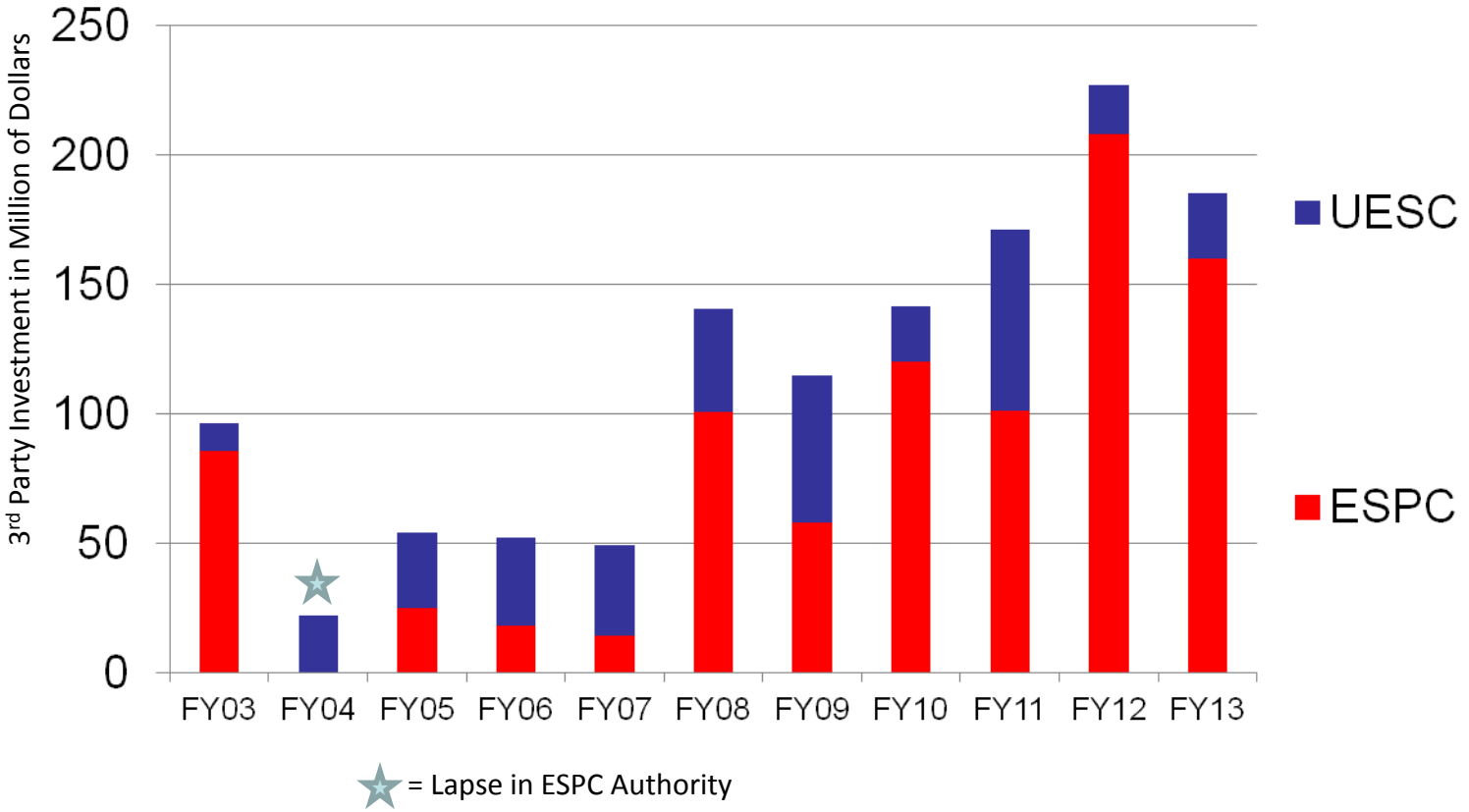
Installation Energy

We are increasing the mission assurance and resiliency of Army installations by implementing an effective energy program.

- Manage People/Change culture
- Improve Energy Efficiency
- Expand Renewable Energy
- Incorporate Science and Technology

Third Party Financing

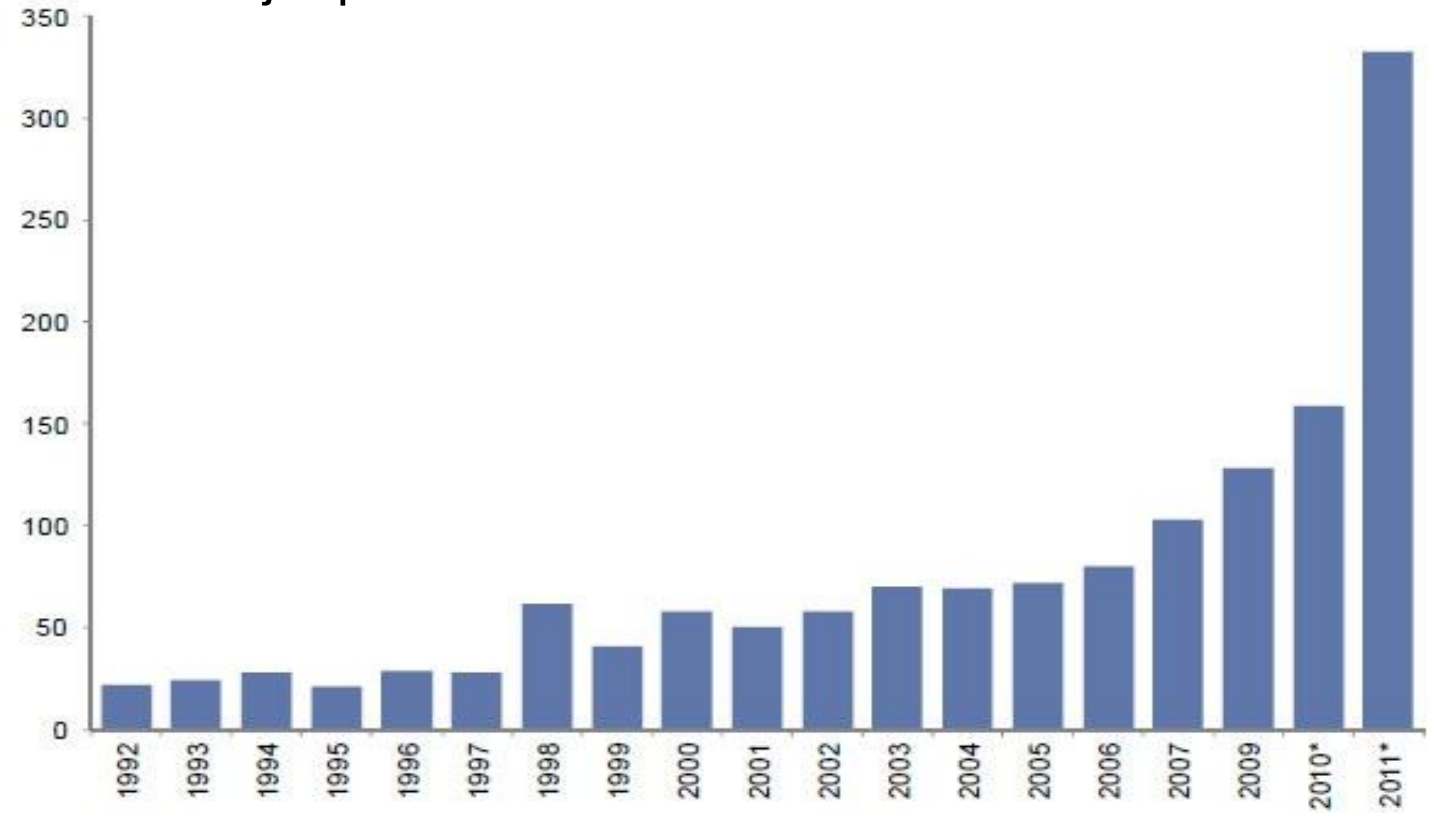
Energy Savings Performance Contracts (ESPC) / Utilities Energy Services Contracts (UESC)



Energy Supply Risk

Power outages have risen sharply over the last decade

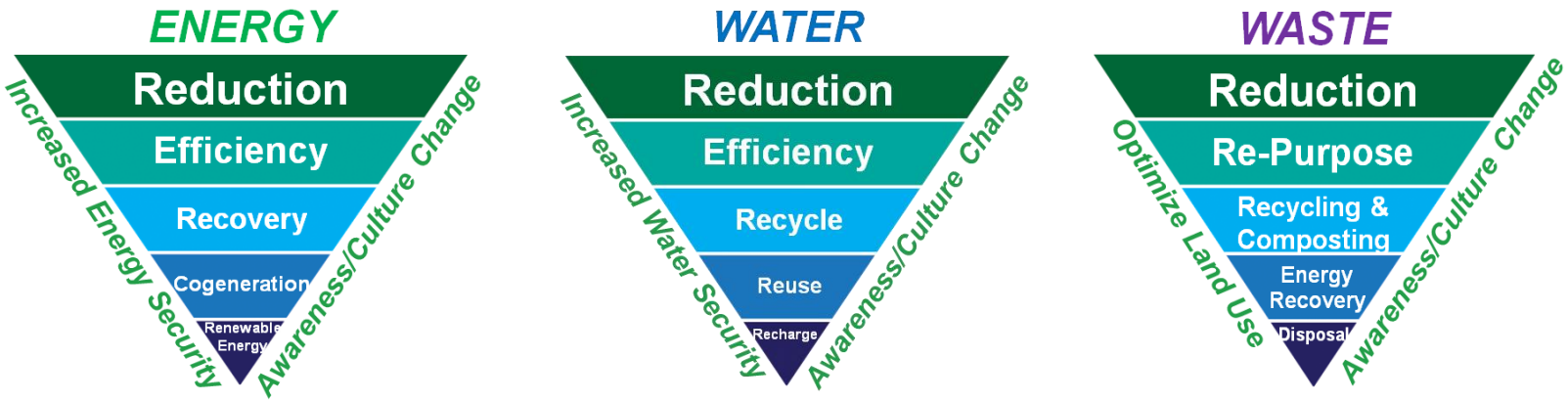
Major power disturbances in North America



*Note: * NERC equivalent data estimated based on the trends seen in the Eaton Blackout tracker for number of outages affecting over 50,000 people.*

Source: NERC, Eaton Blackout Tracker, Goldman Sachs Research estimates.

Net Zero Energy, Water and Waste



- **Net Zero ENERGY:** Reduce overall energy use, maximize efficiency, implement energy recovery and cogeneration opportunities, and then offset the remaining demand with the production of renewable energy from on-site sources, such that the Net Zero energy installation produces as much renewable energy as it uses over the course of a year.
- **Net Zero WATER:** Reduce overall water use, regardless of the source; increase efficiency of water equipment; recycle and reuse water, shifting from potable water use to non-potable sources as much as possible; and minimize inter-basin transfers of any type of water, potable or non-potable, such that a Net Zero water installation recharges as much water back into the aquifer as it withdraws.
- **Net Zero WASTE:** Reduce, reuse, recycle/compost, and recover solid waste streams, converting them to resource values, resulting in zero landfill disposal.

Net Zero Way Ahead

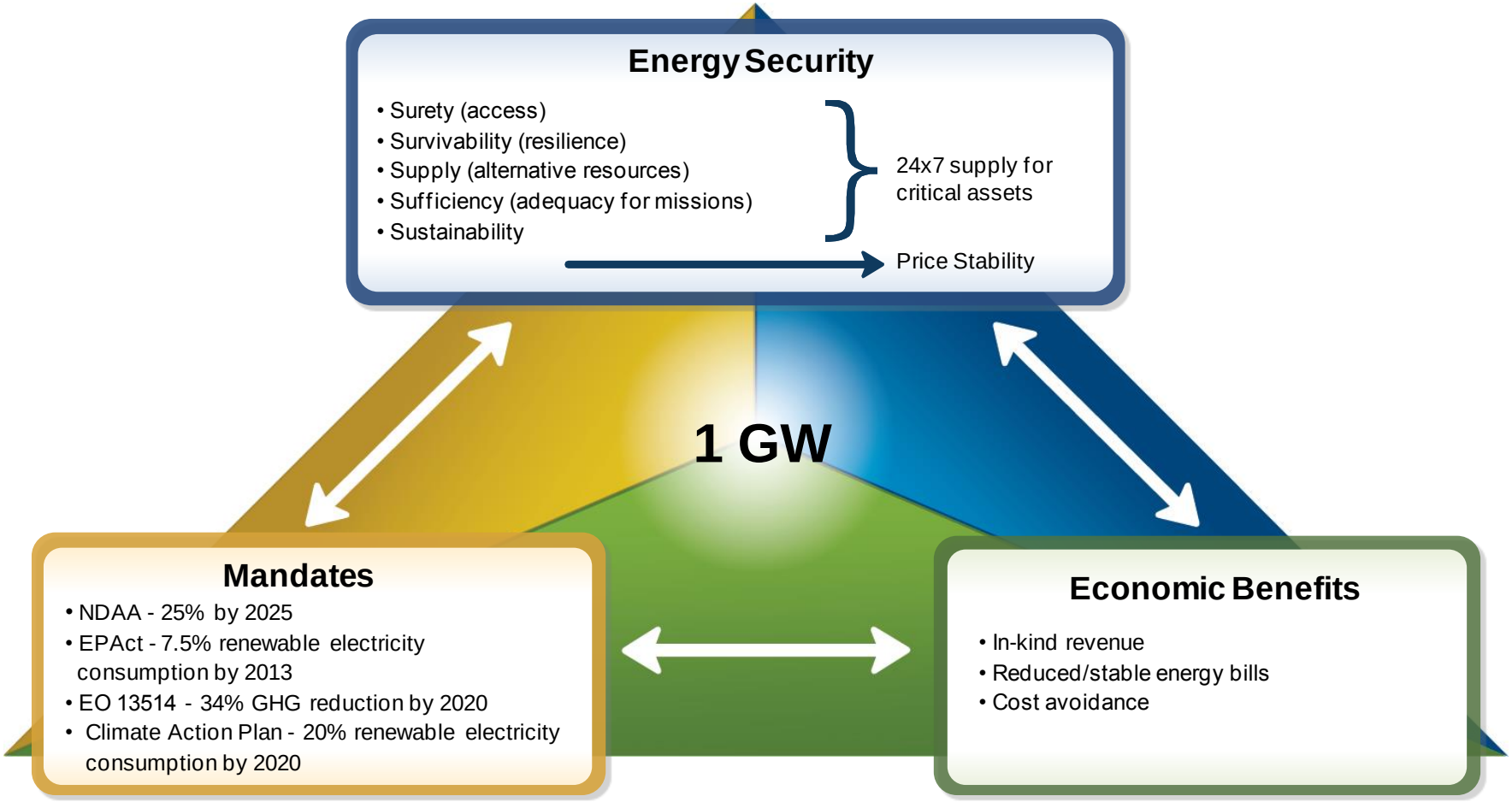
Net Zero Pilots

Road Maps

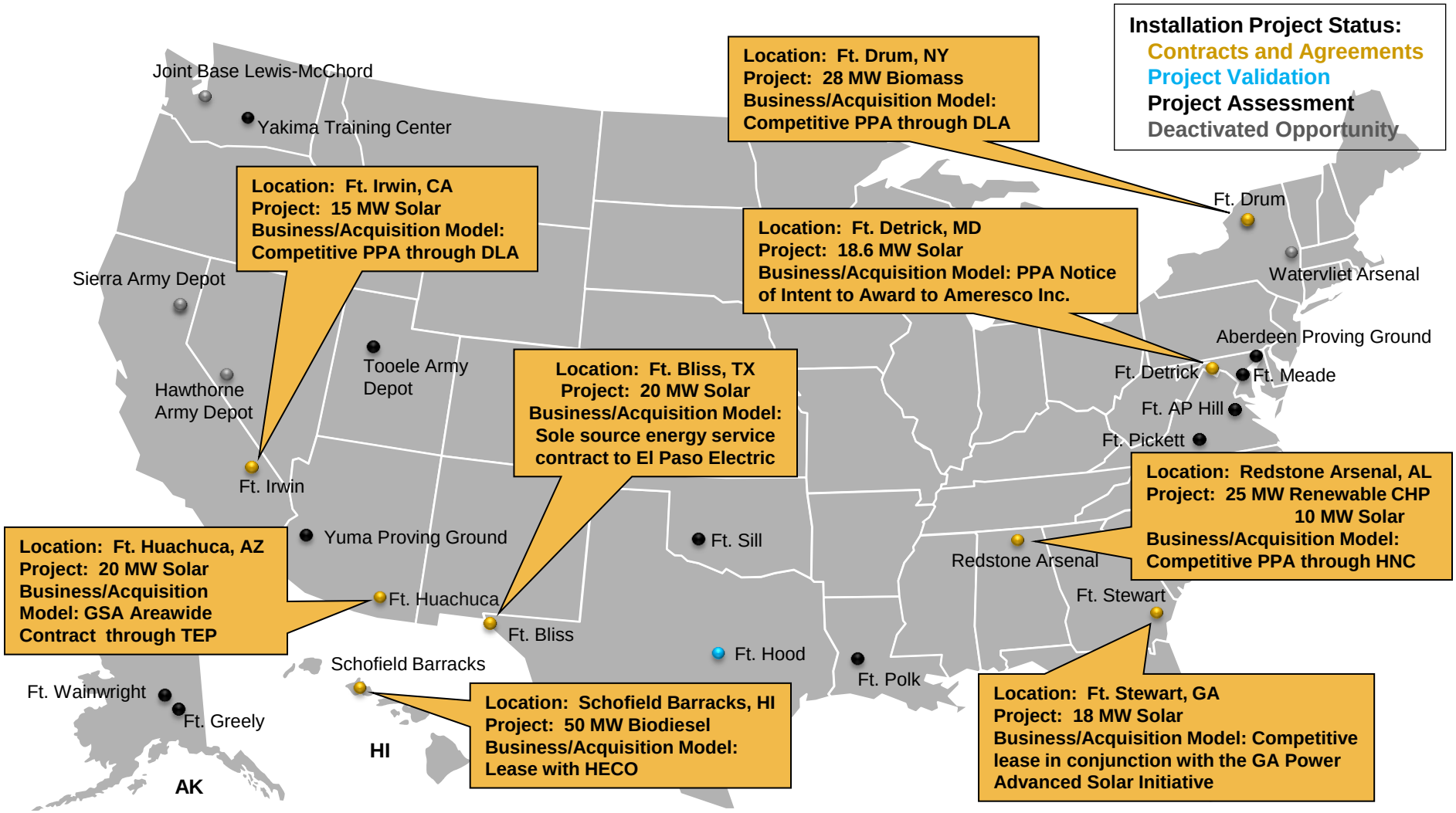
- Baselines
- Assessments
- Strategies / Master Plans
- Implementation

Renewable Energy

Army seeks to create a balanced pipeline of opportunities that will serve three driving principles

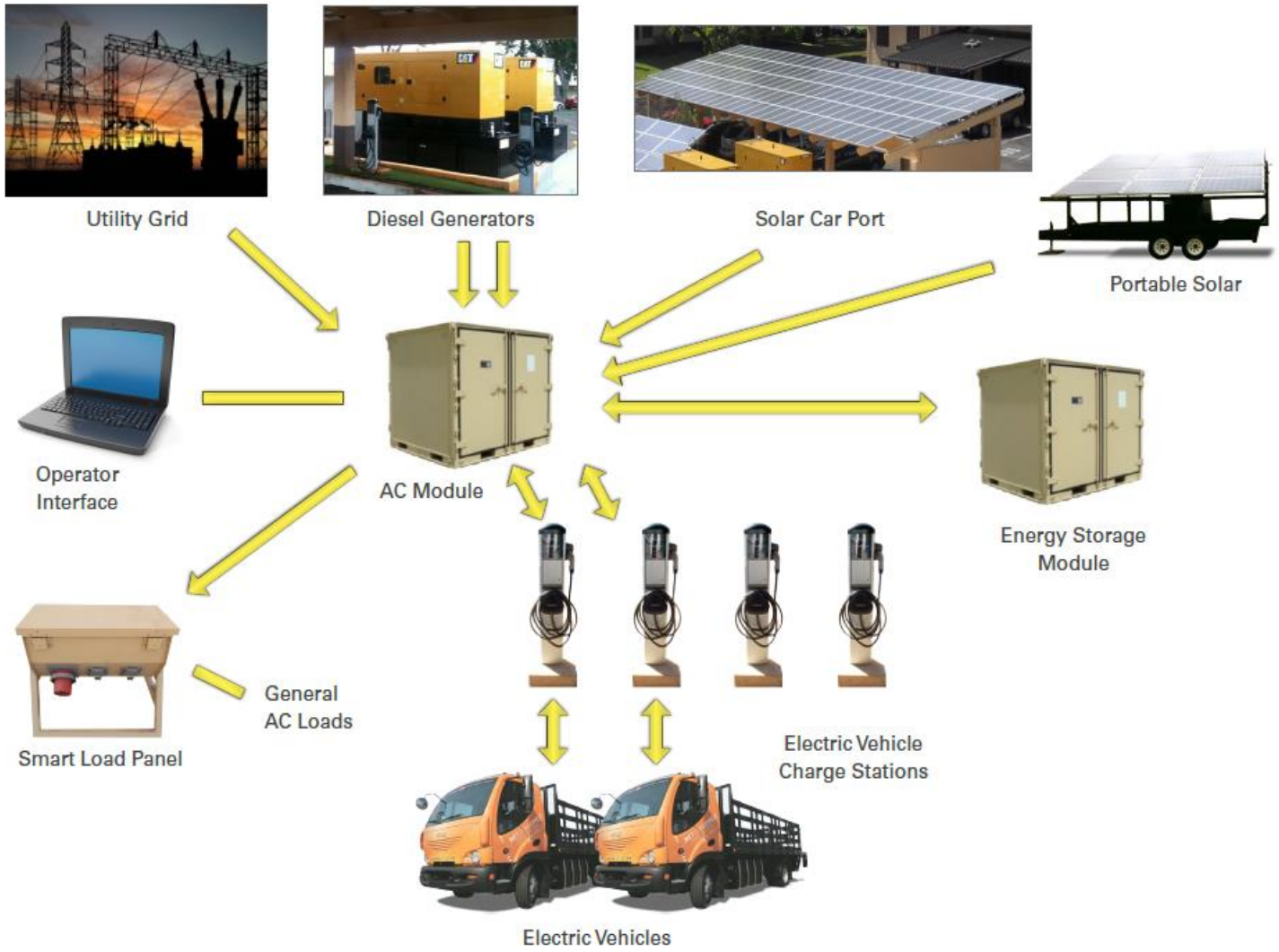


Current EITF Large-Scale Renewable Energy Opportunities



Assistant Secretary of the Army (Installations, Energy & Environment)

Smart Charging Microgrid




ARMY STRONG

Power Surge: How the Department of Defense Leverages Private Resources to Enhance Energy Security and Save Money on U.S. Military Bases

Scott Provinse
Director of Government Programs

SunEdison Overview

We develop, build, finance, and operate turnkey solar at predictable and competitive prices.

One of the largest solar energy service providers in the world

- SunEdison has interconnected over 1.1 GW of solar
- Operate and maintain of over 1.6 GW of solar
- Experienced with DoD and Federal Projects (completed and in dev)

  - **2MW – NREL/DOE (4 PPAs)**
  - **14MW – Nellis AFB (PPA)**
  - **16MW – DM AFB (PPA)**
  - **1 MW – USMC 29 Palms (PPA)**
  - **300MW – Edwards AFB (EUL)**
  - **276kW - DOL NJ (PPA)**
  - **1.2MW - GSA Denver (Turnkey)**

Demonstrated track record with financial institutions

- Over $5 billion in project financing experience
- Systems operating at 103% of underwritten investment

Pioneer provider of solar systems and services

- Founded in 2003 to make solar energy a competitive alternative
- First to provide solar PPA - commercial turnkey solar power plants

SunEdison

SunEdison's DoD Engagement

- **Early and long-term partner with the Government**
- **Advocate PPA is best value**
  - Real hurdles to broad implementation
  - Engaged in creative solutions
  - Collaborate with Federal Agencies
- Ongoing need for strong working partnerships

DoD Perspective:

- The seed
  - 2922a-the path to PPAs
  - Policy driving growth
- The tree is growing
  - Real leadership and resources
  - Infrastructure being created
  - Hurdles are being eroded
- The fruit will come
  - First with much effort
  - Later with more ease
  - Much later we will forget it was ever difficult

SunEdison

Policy Matters - At All Levels

- Administration and Congressional Policies
  - Supports DoD drive for RE with real mandates
  - Conflicting goals
    - More onsite solar vs. more restrictive procurement rules
- DoD Policies: Ambitious goals and real leadership
  - Need to value additional benefits
  - Need REC policies that enable projects
  - Need shared definition and value of energy security
- Local-PUCs and state incentives move fast and can make or break opportunities

Davis Monthan Air Force Base

- **16MW PPA in Tucson**
  - Largest DoD solar project
  - Largest Distributed Generation PV
  - Over 3 years to develop
- **Success required:**
  - Trust, innovation and collaboration
  - Deep knowledge of DoD
  - Significant tax relationships
  - Unwavering commitment
  - Resources to endure and execute

SunEdison

Summary

- DoD still in early stages
  - DoD finding success in tough environment
  - DoD creating infrastructure for long term
  - Policy solutions can help increase deployment
- Policy and Leadership will bear fruit (eventually)
  - Continue to implement enabling policies
  - Seek modern regulatory and legislative changes
- True partnership and collaboration enables success
  - Commitment
  - Knowledge
  - Capability
  - Collaboration

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Resources for Small Businesses

U.S. Department of Defense
Office of Small Business Programs:
http://www.acq.osd.mil/osbp/
(571) 256-7791
For information on programs and procedures to help small businesses contract with the DOD, and links to Small Business Offices in each of the service branches.

Small Business Administration
http://www.sba.gov/
(800) 827-5722
For various forms of assistance to small businesses, including resources to help navigate working with the U.S. government.

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