Promoting Sustainability through Net Zero Strategies

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EPA Net Zero Communities Workshop
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FY14 Army Universe

Land Acreage (Summary Data)
- United States 13,482,669
- Europe 133,906
- Asia 27,491
- Other Overseas 1,361

Roads (paved and unpaved)
- 55,308 Lane Miles

Paved Area (excludes roads)
- 267,033,417 Sq. Yards

Railroads
- 2,252 (Miles)
- 57,742 (LF Bridges)

Buildings (Square feet)
- United States 680,159,316
- Europe 105,867,428
- Asia 42,549,120
- Other 3,204,439
- Leased 37,746,313
- Privatized 120,507,597
- WWII Wood 16,524,530

1 Billion Square Feet

Utilities (Systems)
(Electric, Gas, Water, Wastewater)
- Army-Owned 210
- Privatized 144

Army Installations
- IMCOM 66
- Army Reserve 3
- AMC 27
- DLA 5
- National Guard 48
- ARCENT 3

TOTAL 152

152 Small Cities

FY13 Army Demographics
59% total married
(8.7% dual military married)
6.2% single parents
837,052 family members

Environmental Clean-up Remaining
(Installation Restoration Program & Military Munitions Response Program)
- Active Sites 1,392
- BRAC Sites 275
- Formerly Used Defense Sites 1,717

Army End-Strength
- Active 532,506
- USAR 198,209
- ARNG 358,735
- Civilians 255,566
- Retired 834,674

2.2 Million People

Aviation
- Multi-use 60
- Heliport 28

Family Housing Units
- Owned 16,009
- Leased 6,432
- Privatized 86,277

108,000 Homes

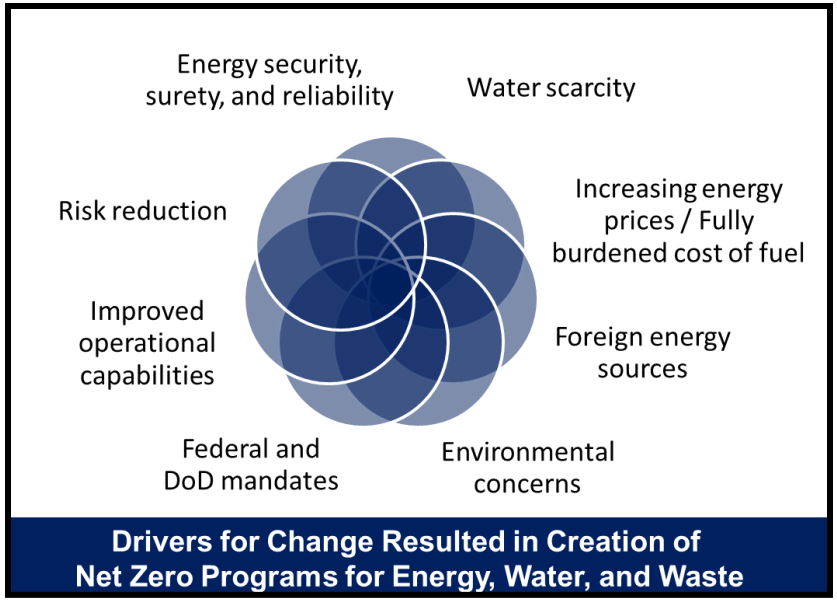
Adequate Barracks
- Permanent Party 127.2K
- Training 148.4K

Plant Replacement Value
- $304.4B

FY13 Installation Management Resources = $18.9B

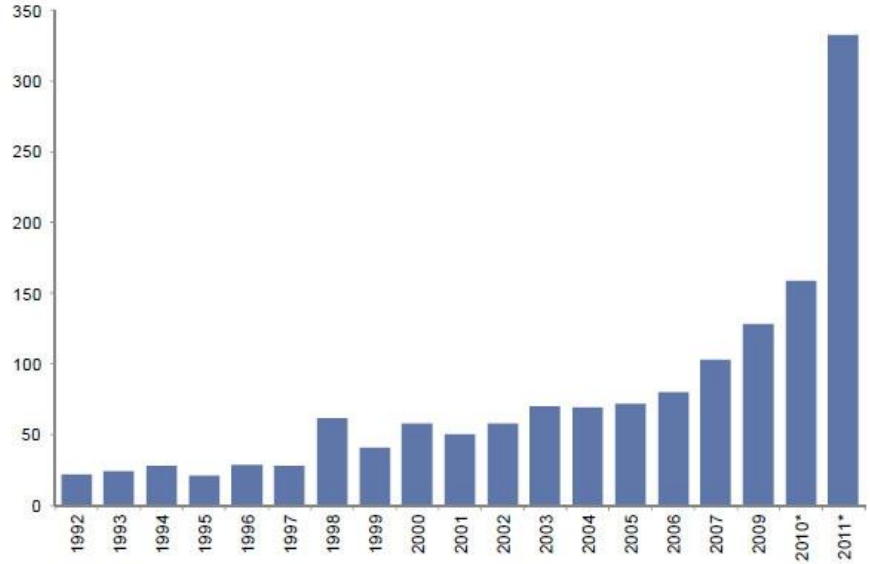
Drivers of Change

Risk factors and competing priorities include:



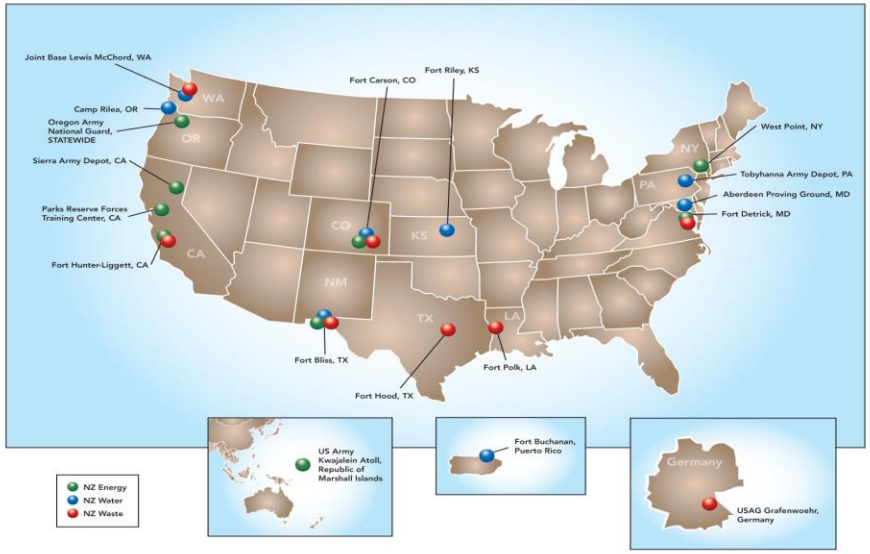
Drivers for Change Resulted in Creation of Net Zero Programs for Energy, Water, and Waste

Power outages have risen sharply over the last decade:

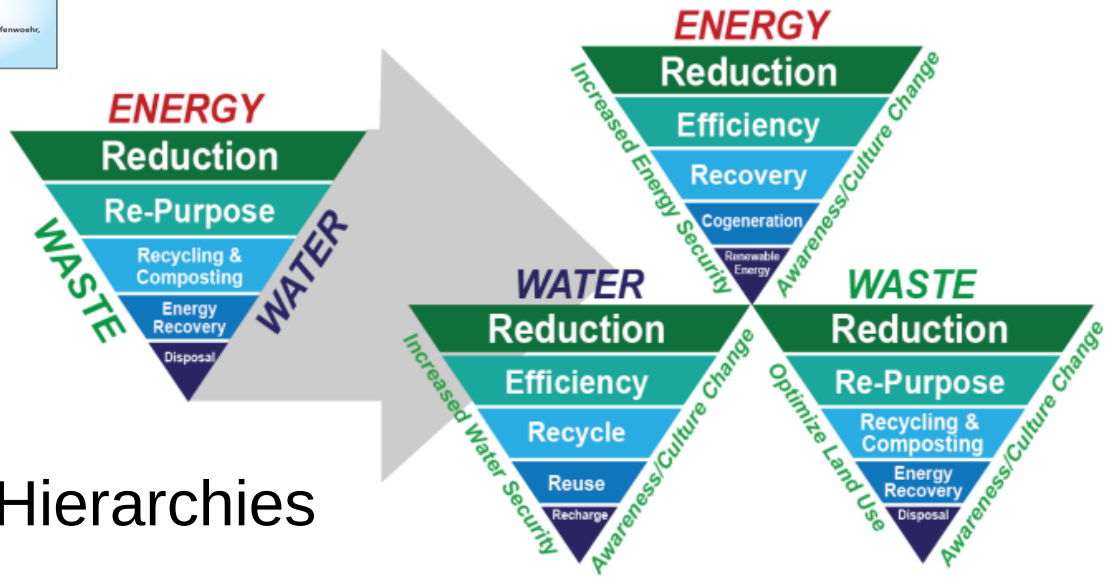


*Note: * NERC equivalent data estimated based on the trends seen in the Eaton Blackout tracker for number of outages affecting over 50,000 people.*
Source: NERC, Eaton Blackout Tracker, Goldman Sachs Research estimates.

Evolution of Army Net Zero

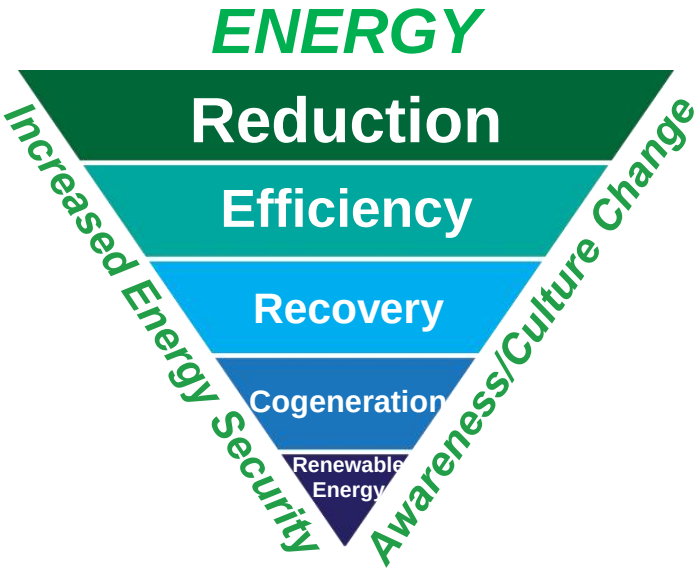


17 Net Zero Pilot Installations



Evolution of Net Zero Hierarchies

Net Zero Energy



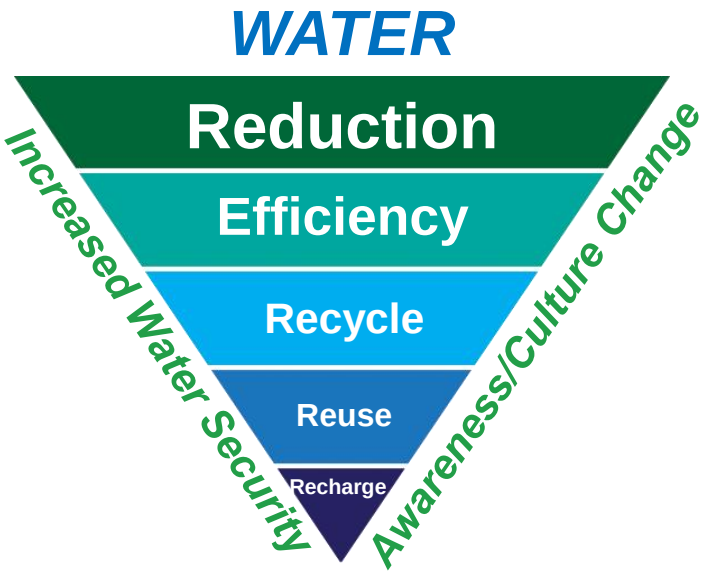
Net Zero ENERGY:

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

Holistic Approach Includes:

- Demand-side energy use reduction
- Energy generation technologies and strategies that also increase energy security
- Building clusters served by smaller central utility plants and microgrids
- Flexible implementation strategies

Net Zero Water



Net Zero WATER:

Reduce overall water use, regardless of the source; increase use of technology which uses water more efficiently; 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

Holistic Approach Includes:

- Water conservation and efficiencies
- Water reuse strategies
- Water security and reliability strategies

Net Zero Waste

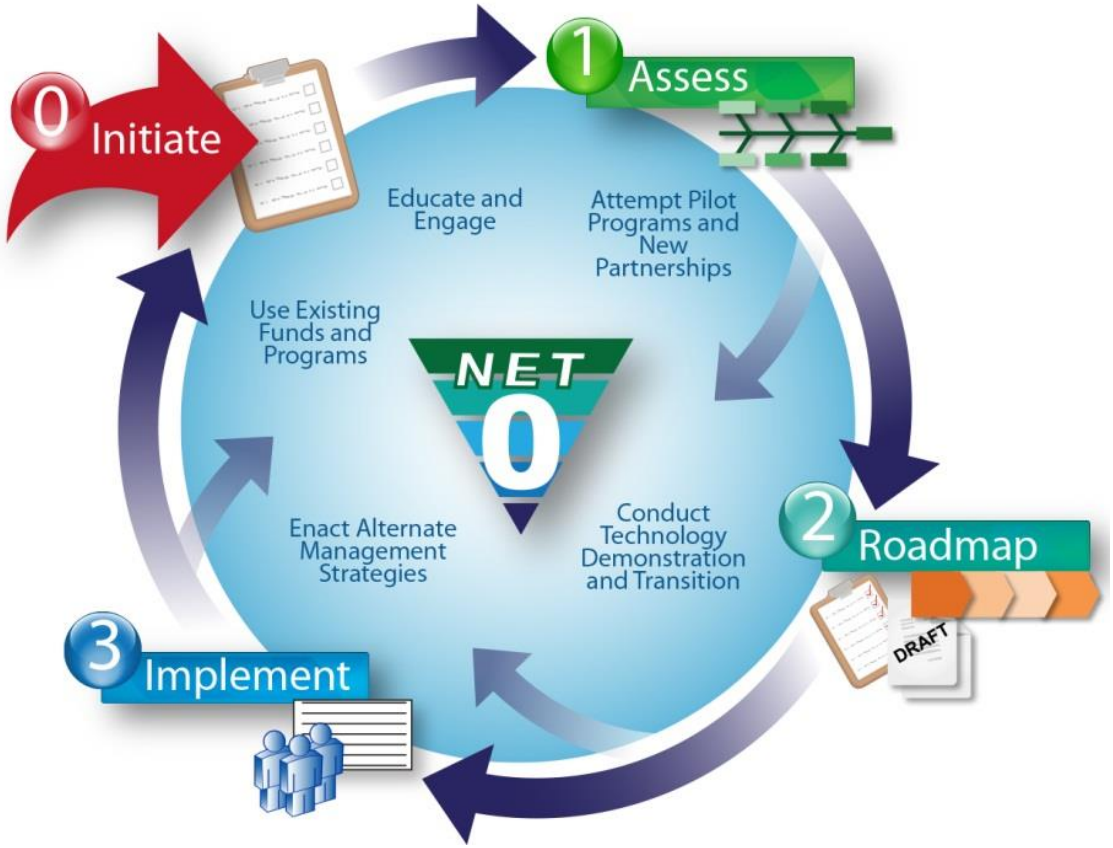
Net Zero WASTE:

Reduce, reuse, recycle/compost, and recover solid waste streams, converting them to resource values, resulting in zero landfill disposal

Holistic Approach Includes:

- Improved purchasing practices
- Recognition that waste is a resource
- Increased recycling and composting
- Energy recovery

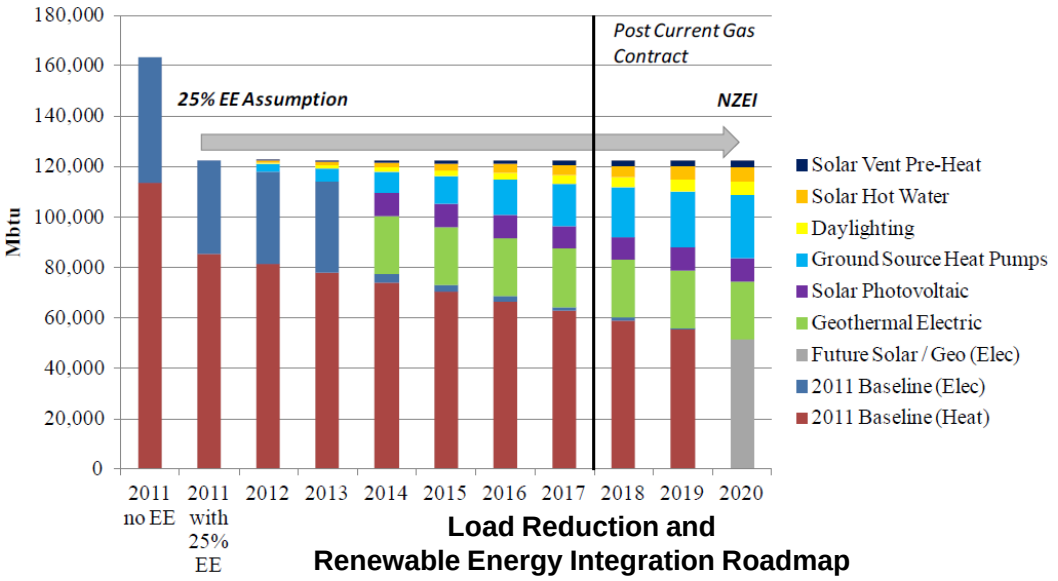
NZ Implementation Approach



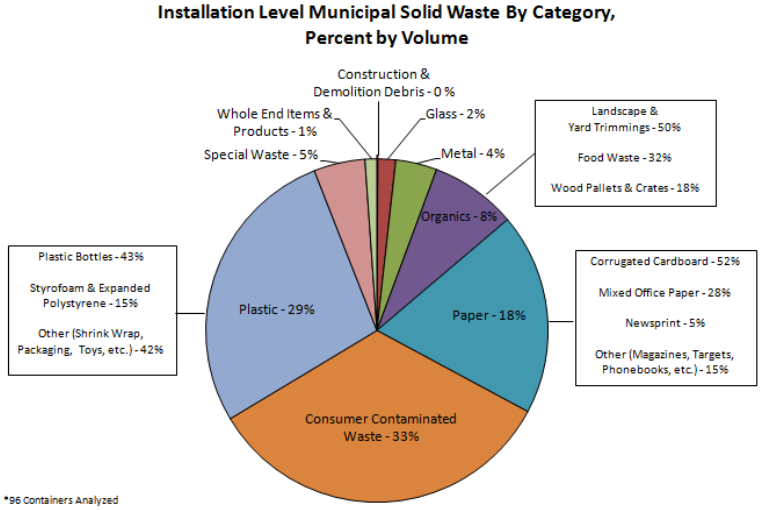
This graphic captures the overarching actions to be taken in implementing NZ at Army Installations: **Initiate, Assess, Roadmap and Implement**

Implementation Activities

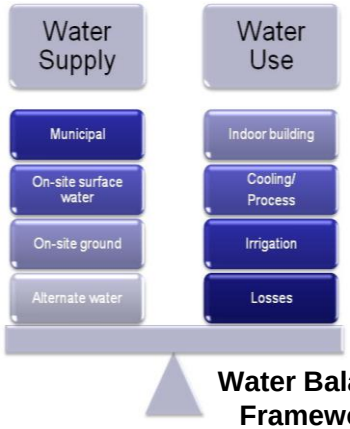
- Establish your baseline
- Assess your potential
- Integrate the results into existing programs
- Collaborate



Load Reduction and Renewable Energy Integration Roadmap



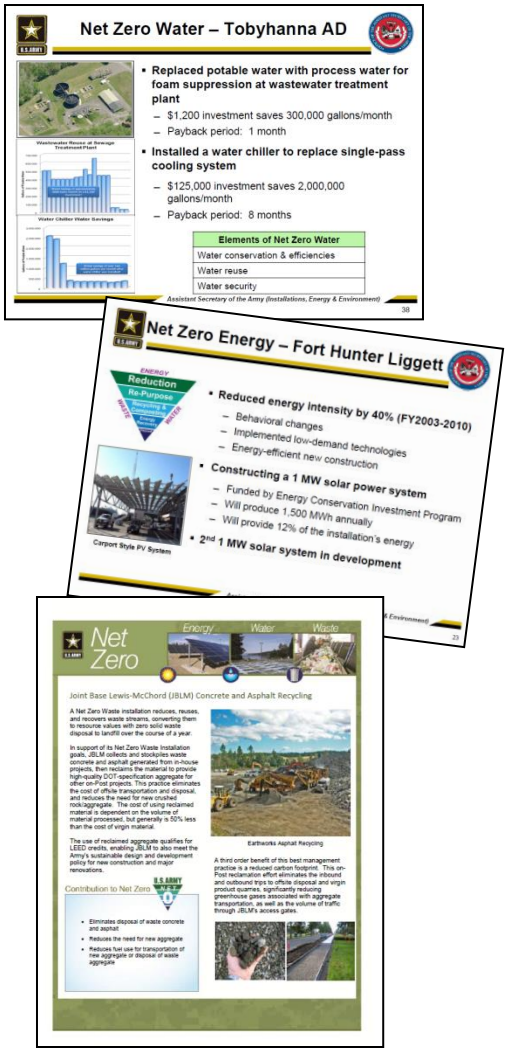
Material Flow Analysis



Water Balance Framework

Internal Collaboration

- Share and document lessons learned
- Build cross-functional Net Zero teams
- Assist each other with challenges
- Conduct monthly calls and periodic progress meetings



External Collaboration

- Local and regional authorities
- Federal Government
- Public-private partnerships

Puget Sound

Collaboration – EPA

- Based on a 2011 Memorandum of Understanding (MOU), the Army and EPA are collaborating to identify potential technology demonstration and behavior change projects
- Objective: Leverage the Army's needs through demonstration of technologies and approaches within EPA's current Office of Research and Development research portfolio
- Fort Riley, KS

United States Environmental Protection Agency

Dr. Paul Anastas of EPA and HON Katherine Hammack, ASA(IE&E)

Collaboration – DOE

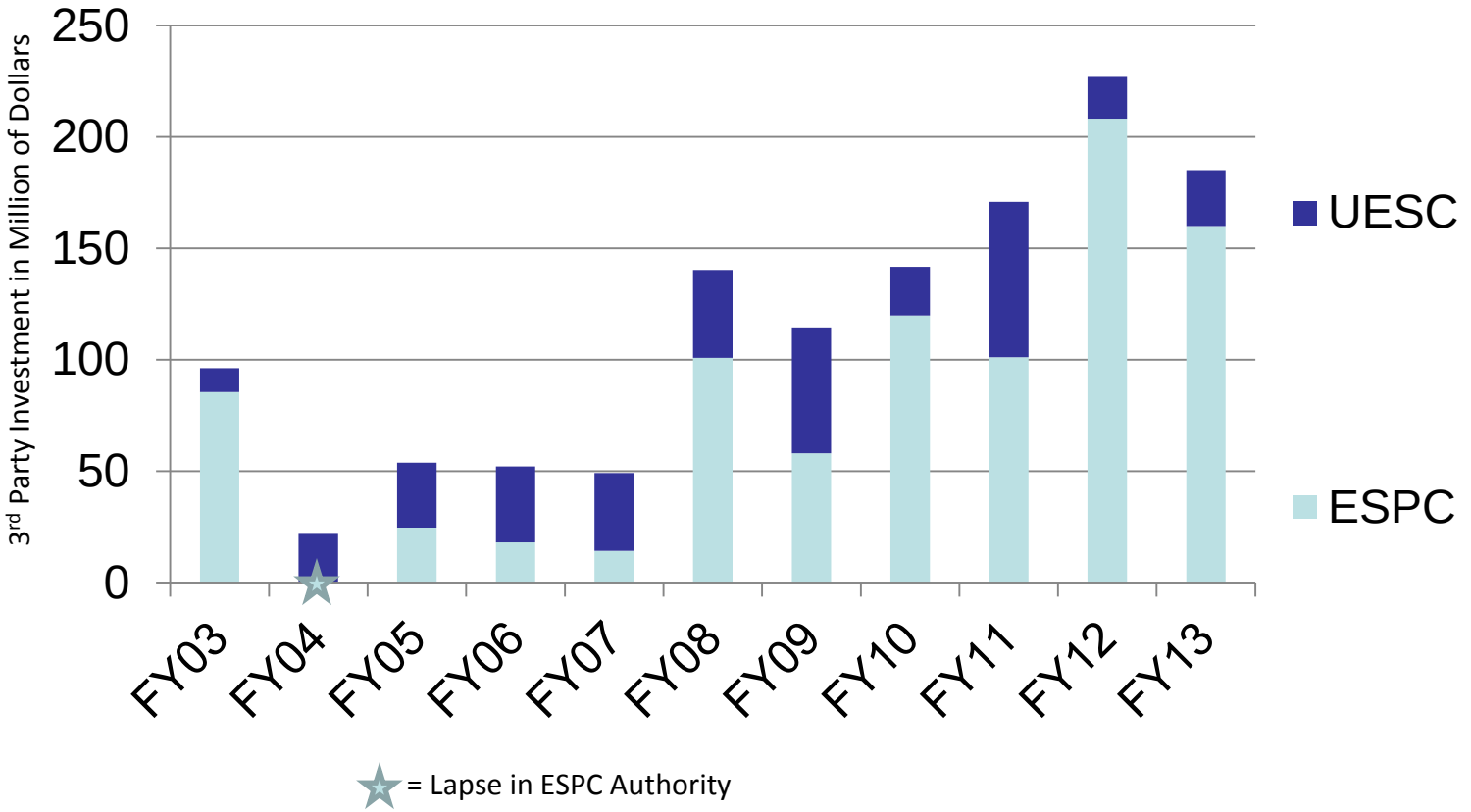
- Based on a 2010 MOU, DOE labs are providing direct support to NZ pilot installations
- Objective: Leverage highly specialized or unique capabilities in DOE's Government Owned Contractor Operated laboratories
- National Renewable Energy Laboratory and Pacific Northwest National Laboratory

Collaboration – GSA

- Objective: Test Federal Green Building Performance
- Examine how well specific green features, technologies, and approaches are working in practice
- Fort Carson, Colorado

Third-Party Financing

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



NZ Energy – Ft Hunter Liggett

Jolon, CA
Location

2 million ft²
Total building sq. footage

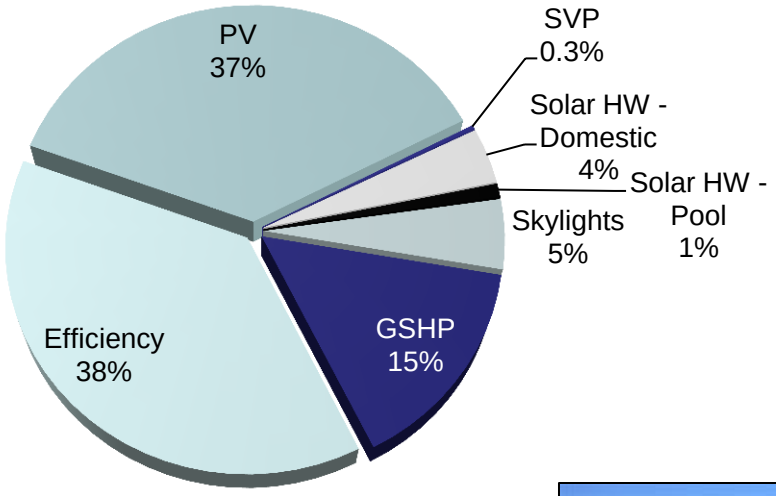
161,900 acres
Installation area

PG&E
Utility provider

$0.11/kWh, $26.11/MMBtu
Avg. energy costs in FY12
(electricity, thermal energy)

60 Mbtu/Ksf
2012 reported energy use

PV, Grid Energy Storage
Current RE projects



FHL NZ Energy Solution

Carport Style PV System

NZ Energy – Oregon ARNG

Christmas Valley
Solar Project

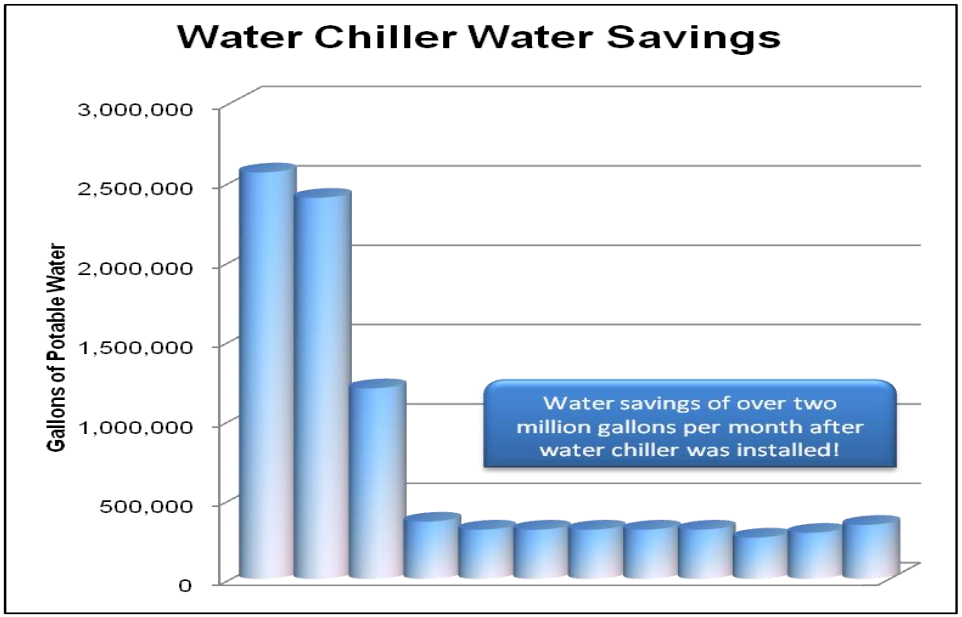
Ontario PV System

Ontario Geothermal Heating

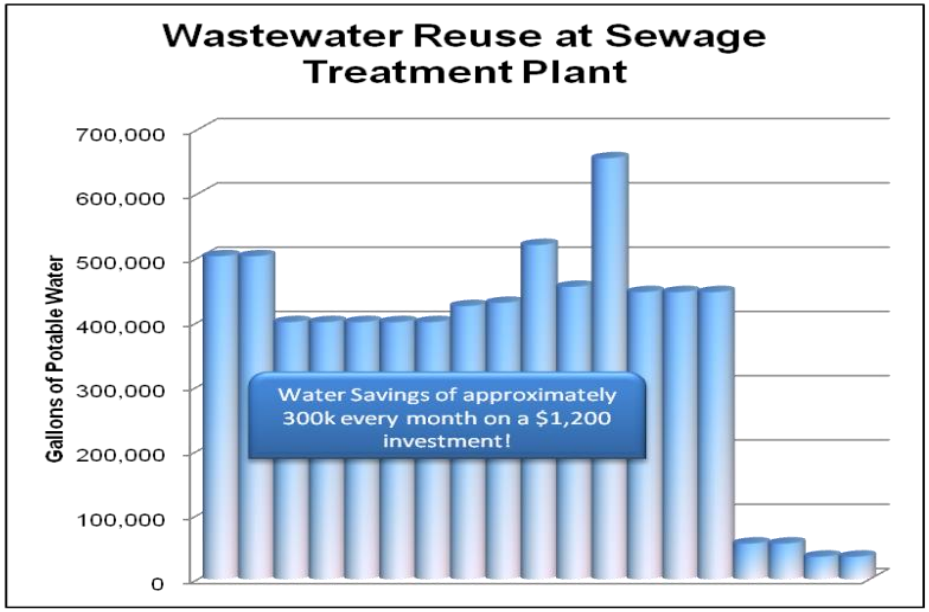
Camp Rilea Wind Project

NZ Water – Tobyhanna Army Depot

Installed a water chiller to replace an inefficient single pass cooling system that used potable water for cooling



Replaced the use of potable water with process water for foam suppression at its wastewater treatment plant



NZ Water – Camp Rilea

Primary Lagoon for Waste Water Treatment Plant (WWTP)

WWTP Rapid Infiltration

Class A Recycled Water Plant

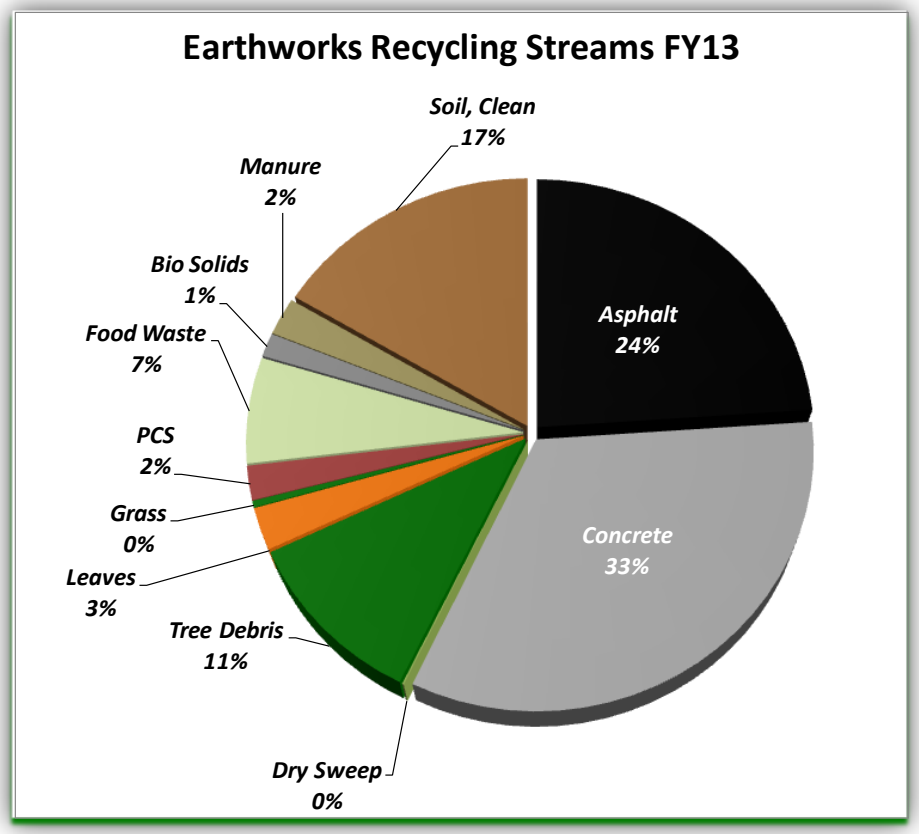
Water Supply Storage Reservoir

NZ Waste – Fort Carson

- Green Procurement Program
- Reuse efforts
- Recycling efforts

NZ Waste - Lewis-McChord

Earthworks Recycling Streams



Joint Base Lewis-McChord Earthworks Soil, Asphalt, & Concrete Recycling

NZ Best Practices

Net Zero ENERGY:

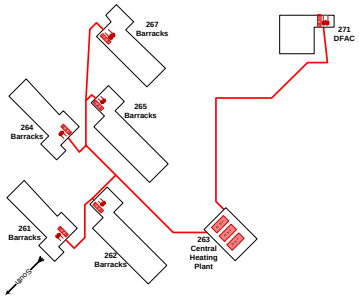
- Conduct thermal building envelope analysis
- Reduce energy use through energy management control systems
- Hire resource efficiency managers
- Pursue alternative financing mechanisms
- Conduct energy master planning

Net Zero WATER:

- Maximize the use of xeriscaping
- Implement leak detection on the potable water distribution system
- Maximize water recycling
- Install purple pipe
- Maximize use of alternate water sources

Net Zero WASTE:

- Establish a Qualified Recycling Program
- Characterize waste flows
- Improve purchasing practices
- Repurpose and reuse material through
- Recycle and compost waste



Xeriscape Conversion

Composting at JBLM

Net Zero Way Ahead

Army Net Zero
http://www.asaie.army.mil/Public/ES/netzero/index.html


ARMY STRONG