



Environment, Energy Security & Sustainability Symposium & Exhibition



Leveraging Technology to Support the Army's Net Zero Installation Initiative 23 May 2012

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Current Mandates



Federal Mandate	Energy Topic	Energy Performance Target
Energy Policy Act of 2005	Electricity use for federal government from renewable sources	At least 3% of total electricity consumption (FY07-09), 5% (FY10-12), 7.5% (FY13 +)
Executive Order 13423	Energy use in Federal buildings	Reduce 3% per year to total by 30% by FY2015 (FY2003 baseline)
	Total consumption from renewable sources	At least 50% of required annual renewable energy consumed from "new" renewable sources
	Fleet vehicle alternative fuel use	Increase by 10% annually to reach 100% (Base line FY2005)
Energy Independence & Security Act of 2007	Total consumption from renewable sources	25% by FY2025 - "Sense of Congress"
	Hot water in new / renovated federal buildings from solar power	30% by FY2015 if life cycle cost-effective
	Fossil fuel use in new / renovated Federal buildings	Reduce 55% by FY2010; 100% by 2030
Executive Order 13514	GHG emission reduction	- DoD Goal: reduce Scope 1 & 2 GHGs by 34% by FY2020 - DoD Goal: reduce Scope 3 GHGs by 13.5% by FY2020
	Net zero buildings	All new buildings that enter design in FY2020 & after achieve net zero energy by 2030
	Water consumption	Reduce consumption by 2% annually for 26% total by FY 2020 (FY2007 baseline)
	Waste minimization	Divert at least 50% of solid waste & 50% of C&D waste by FY2015
National Defense Authorization Act, 2010	Renewable Fuels Use	Directs the Secretary of Defense to consider renewable fuels in aviation, maritime, & ground transportation fleets.
	Facility Renewable Energy Use	Produce or procure 25 % of the total quantity of facility energy needs, including thermal energy, from renewable sources starting in FY2025



Net Zero Hierarchy



“The primary goal is a focus toward net zero and when we talk about net zero, it's not only net zero energy, but it's net zero energy, water, and waste. When you look at the term "net zero" or a hierarchy of net zero you must start with reduction, then progress through repurposing, recycling, energy recovery, disposal being the last.”

— HON Katherine Hammack, DoD Bloggers Roundtable, 10 October 2010

- A Net Zero **ENERGY** Installation is an installation that produces as much energy on site as it uses, over the course of a year.
- A Net Zero **WATER** Installation limits the consumption of freshwater resources and returns water back to the same watershed so not to deplete the groundwater and surface water resources of that region in quantity or quality.
- A Net Zero **WASTE** Installation is an installation that reduces, reuses, and recovers waste streams, converting them to resource values with zero solid waste to landfill.
- A Net **ZERO** **INSTALLATION** applies an integrated approach to management of energy, water, and waste to capture and commercialize the resource value and/or enhance the ecological productivity of land, water, and air.



Pilot Installations





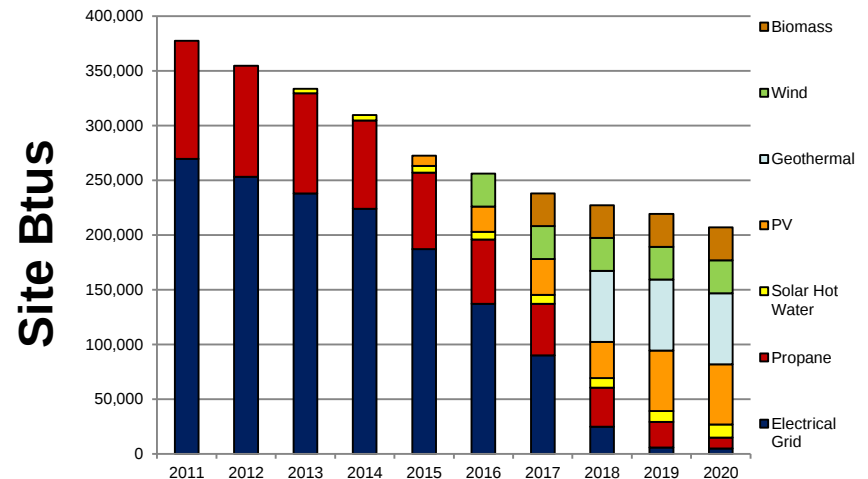
Net Zero Strategy



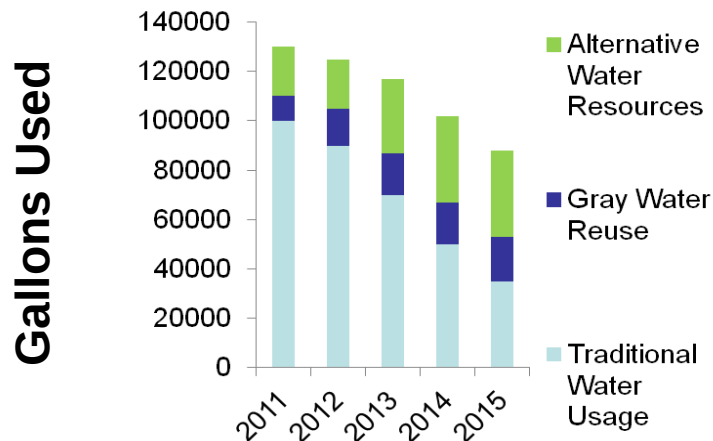
Net Zero Goals

- Improve energy and water security
- Reduce consumption
- Address efficiency and conservation
- Access/Develop alternative water sources
- Minimize solid waste generation
- Integrate into Master Planning
- Be fiscally responsible
- Incorporate behavioral change

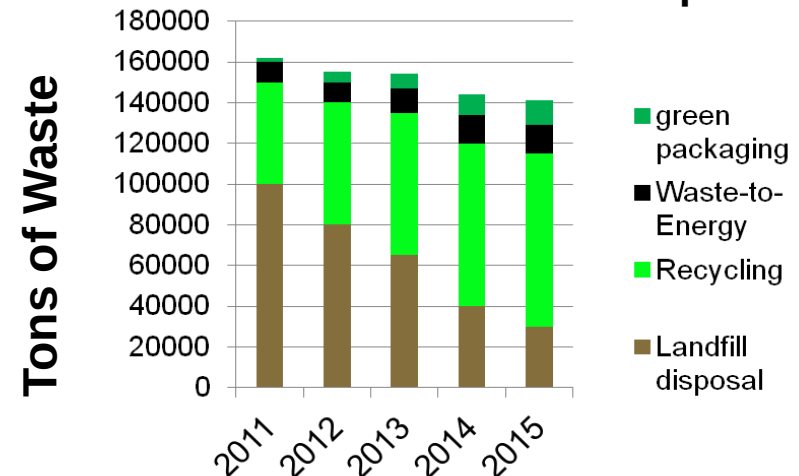
Net Zero Energy Roadmap



Net Zero Water Roadmap



Net Zero Waste Roadmap



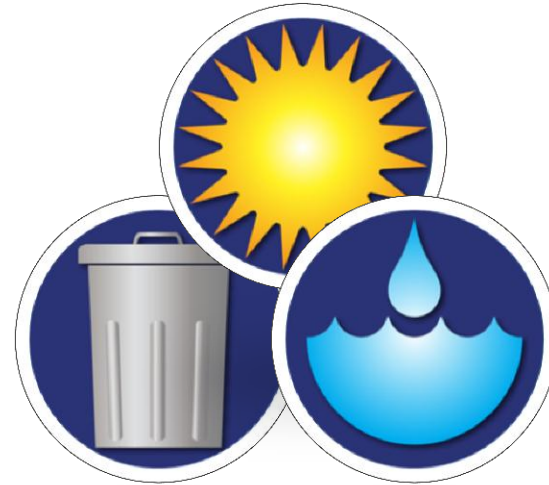


A Systems-of-Systems Approach



- **Interconnections**

- Energy and Water
- Water and Waste
- Waste and Energy



- **Net zero must be addressed holistically across energy, water, and waste**



Net Zero Energy Fort Hunter Liggett



- **Reduced energy intensity by 40% (FY2003-2010)**
 - Behavioral changes
 - Implemented low-demand technologies
 - Energy-efficient new construction
- **Constructing a 1 MW solar power system**
 - Funded by Energy Conservation Investment Program
 - Will produce 1,500 MWh annually
 - Will provide 12% of the installation's energy
- **2nd 1 MW solar system in development**



Carport Style PV System



Net Zero Energy Fort Hunter Liggett



- **Third 1 MW solar array planned for FY13**
- **Fourth 1 MW solar array planned for FY14**
- **Energy Efficiency Analysis of 28 buildings**
- **Assessing other renewable energy opportunities (solar, geothermal, waste-to-energy hydrogen production for fuel cells)**
- **Assessing microgrid for energy security after achieving net zero**

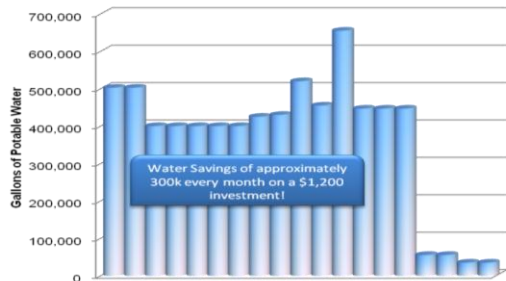




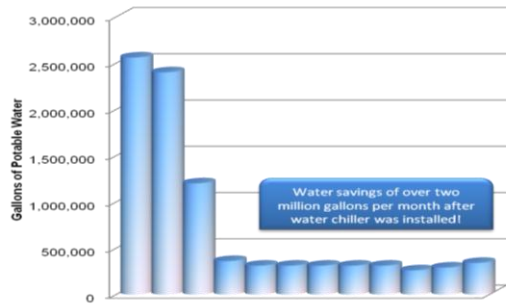
Net Zero Water Tobyhanna AD



Wastewater Reuse at Sewage Treatment Plant



Water Chiller Water Savings



- Replaced potable water with process water for foam suppression at wastewater treatment plant
 - \$1,200 investment saves 300,000 gallons/month
 - Payback period: 1 month
- Installed a water chiller to replace single-pass cooling system
 - \$125,000 investment saves 2,000,000 gallons/month
 - Payback period: 8 months



Net Zero Water Tobyhanna Army Depot



Leak Detection

- Acoustic leak detection survey identified six system leaks responsible for 26% of average daily water use.
- Leak detection sensors identified three minor leaks to date.



Monthly reviews are conducted on 54 leak detection sensors placed on TYAD water main valves

DOD Goal	Net Zero Area	FY10 Status	FY11 Status
Potable Water Use Target: 26% by FY2020 Baseline: FY2007	Potable Water Use Target: 26% by FY2015 50% by FY2020 Baseline: NA	14%	34%



External Collaboration



- **Federal agencies:**

- DOE: FEMP, NREL, PNNL on Net Zero energy & water
- EPA: technologies to support Net Zero Water
- GSA: HPSBs, Net Zero energy & water for multiple building complex

- **Local & Regional partnerships**

- Pilot installations are working with local communities to develop local & regional solutions (e.g., renewable energy, recycling, WTE)

- **Public-private partnerships**

- Targeted to implement large-scale renewable energy projects

The image features four soldiers in silhouette, standing in a line and holding rifles. They are positioned against a bright, hazy sky with warm, golden light, suggesting a sunrise or sunset. The soldiers are wearing helmets and tactical gear. The overall mood is one of strength and readiness.

ARMY STRONG