



# ARMY VISION FOR NET ZERO

## NET ZERO IS A FORCE MULTIPLIER



*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.*

*--Ms. Katherine Hammack, DoD Bloggers Roundtable, 10 October 2010*



The Army's vision is to appropriately manage our natural resources with a goal of net zero installations. Today the Army faces significant threats to our energy and water supply requirements both home and abroad. Addressing energy security and sustainability is operationally necessary, financially prudent, and essential to mission accomplishment. The goal is to manage our installations not only on a net zero energy basis, but net zero water and waste as well. We are creating a culture that recognizes the value of sustainability measured not just in terms of financial benefits, but benefits to maintaining mission capability, quality of life, relationships with local communities, and the preservation of options for the Army's future. The Army is leveraging available authorities for private sector investment, including using power purchase agreements (PPA), enhanced-use leases (EUL), energy savings performance contracts (ESPC), and utilities energy service contracts (UESCs) as tools to achieve these objectives. The Army must invest in its installations and improve efficiencies in energy, water and waste for the benefit of our current and future missions.

### **NET ZERO: AN EVOLUTION**

#### **Net Zero Energy**



A Net Zero Energy Installation (NZEI) is an installation that produces as much energy on site as it uses, over the course of a year. To achieve this goal installations must first implement aggressive conservation and efficiency efforts while benchmarking energy consumption to identify further opportunities. The next

step is to utilize waste energy or to "re-purpose" energy. Boiler stack exhaust, building exhausts or other thermal energy streams can all be utilized for a secondary purpose. Co-generation recovers heat from the electricity generation process. The balance of energy needs then are reduced and can be met by renewable energy projects. More information on NZEI can be found in the DOE publication: "Net Zero Energy Military Installations: A Guide to Assessment and Planning,

<http://www.nrel.gov/docs/fy10osti/48876.pdf>.

#### **Net Zero Water**



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 and quality over the course of a year.

The net zero water strategy balances water availability and use to ensure sustainable water supply for years to come. This concept is of increasing importance since scarcity of clean potable water is quickly becoming a serious issue in many countries around the world. The continued draw-down of major aquifers results in significant problems for our future. Strategies such as harvesting rain water and recycling discharge water for reuse can reduce the need for municipal water, exported sewage or storm water. Desalination can be utilized to convert briny, brackish or salt water to fresh water so it is suitable for human consumption or irrigation.

To achieve a net zero water installation, efforts begin with conservation followed by efficiency in use and improved integrity of distribution systems. Water is re-

purposed by utilizing grey water generated from sources such as showers, sinks, and laundries and by capturing precipitation and storm water runoff for on-site use. Wastewater can be treated and reclaimed for other uses or recharged into groundwater aquifers. Several Army installations are already well down the path to reaching net zero water goals.

*The Army's NZEI strategy is to identify and work with five installations to be net zero by 2020 with the goal to have 25 installations achieve Net Zero Energy by 2030.*

## Net Zero Waste



The approach to creating a net zero waste installation is similar to creating a net zero energy installation. A net zero waste installation is an installation that reduces, reuses, and recovers waste streams, converting them to resource values with zero

landfill over the course of a year. The components of net zero solid waste start with reducing the amount of waste generated, re-purposing waste, maximizing recycling of waste stream to reclaim recyclable and compostable materials, recovery to generate energy as a by-product of waste reduction, with disposal being non-existent.

Every day, more recycling strategies are developed moving beyond metals, paper and cardboard to include mattresses, glass, plastics, batteries, computer printers and motor oil. The best strategy is to consider the waste stream when purchasing items, reduce the volume of packaging, reuse as much as possible, and recycle the rest. A true cradle-to-cradle strategy considers the end state at the time the purchase decision is made. A net zero waste strategy eliminates the need for landfills, protects human health, optimizes use of limited resources and keeps the environment clean.

## Net Zero Hierarchy

The Army net zero approach is comprised of five interrelated steps: **reduction**, **re-purpose**, **recycling and composting**, **energy recovery**, and **disposal**. Each step is a link towards achieving net zero. Reduction includes maximizing energy efficiency in existing facilities, implementing water conservation practices, and eliminating generation of unnecessary waste. Re-purpose involves diverting energy, water or waste to a secondary purpose with limited processes. Recycling or composting involves management of the solid waste stream, development of closed loop systems to reclaim water, or cogeneration where two forms of energy (heat and electricity) are created from one

source. Energy recovery can occur from converting unusable waste to energy, renewable energy or geothermal water sources. Disposal is the final step and last resort after the last drop of water, the last bit of thermal energy and all other waste mitigation strategies have been fully exercised.

## Opportunity

The net zero vision is a holistic approach to addressing energy, water, and waste at Army installations. An approach that is a force multiplier enabling the Army to appropriately steward available resources, manage costs and provide our Soldiers, Families and Civilians with a sustainable future. In an era of persistent conflict, with a mission of stabilizing war-torn nations, a true stabilizing factor can be that of appropriate resource management. The Net Zero vision ensures that sustainable practices will be instilled and managed throughout the appropriate levels of the Army, while also maximizing operational capability, resource availability and well-being.

## Net Zero Hierarchy



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