***RECORD VERSION***

**STATEMENT BY**

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**PRINCINPAL DEPUTY ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS, ENERGY AND ENVIRONMENT)**

**BEFORE THE**

**SENATE ENERGY AND NATURAL RESOURCES COMMITTEE**
**UNITED STATES SENATE**

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**ARMY AND NET ZERO WATER**

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## INTRODUCTION

Madam Chairwoman and members of the Committee, it is a pleasure to appear before you to discuss the Army's water related programs, particularly our efforts to create net zero installations. We are especially grateful for this Committee's continued support for the Army's energy and water reduction programs. The Committee's on-going efforts, coupled with the President's vision for sustainability, marked by increased energy and water efficiencies, and reductions in the generation of solid waste, will ensure that our installations are able to accomplish their world-wide missions now and into the future without disruption.

## BACKGROUND

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 at home and abroad. Addressing sustainability is operationally necessary, financially prudent, and essential to mission accomplishment. The goal is to manage our installations not only for water efficiency, but also energy efficiency, and solid waste reduction. 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 making investments on our installations by improving efficiencies in energy, water, and reducing waste for the benefit of the Nation and, provide current and future Soldiers with the maximum amount of flexibility possible to address the Nation's security needs.

**ARMY INSTALLATION WATER PROGRAM**

In addition to our installation to become net zero initiative, our water security mission makes water a consideration in all Army activities in an effort to increase efficiency, reduce demand, seek alternative sources, and create a culture of water accountability while sustaining or enhancing operational capabilities. For example, in the Installation Management Command, which manages the majority of Army installations one of their strategic goals is to maintain water efficiency by holding users accountable to modernize facilities, install new technologies, and leverage partnerships that can provide an increased level of water security. This will lead to increased sustainability, a more resilient water-related infrastructure, and enhanced mission assurance. The trend in our installation water intensity (Gallons/Gross Square Foot), 2007 - 57.6, 2008 - 54.0, 2009 - 58.2, and 2010 - 48.8, has decreased over the last four years for which data are available. The Army is a leader amongst all Federal Agencies in regards to meeting the water intensity reductions in the Energy Policy Act of 2005. In fact, based on data from the Federal Energy Management Program, were it not for the Army's superior performance with water intensity

reductions in the last two years, the Federal Government as a whole would not have met its Congressionally mandated water intensity targets.

To meet the challenges of limited and stressed potable water sources, we will continue to plan and implement, particularly net zero, that recognize water as a strategic resource. Enhancing water conservation and management, and creating awareness are basic responsibilities of every Army Soldier and civilian. Success depends on individual and organizational accountability for improved performance through implementation of solutions to meet current and future water security challenges. Changing our behavior in how we view and use water is central to our continued success.

**NET ZERO WATER**

Earlier this year, we asked for nominations from throughout the Army for installations that were interested in being becoming net zero energy, water, and/or waste pilot. We received applications from 60 installations. For net zero water, we evaluated 23 applications from across the U.S. and across multiple Army commands. A total of eight installations were identified as net zero water pilots including Aberdeen Providing Ground, Maryland; Camp Rilea, Oregon; Fort Buchannan, Puerto Rico; Fort Riley Kansas; Joint Base Lewis McChord, Washington; Tobyhanna Army Depot, Pennsylvania; Fort Carson, Colorado; and Fort Bliss, Texas and New Mexico. While each installation is unique and has specific needs based on their location and function, the net zero water pilot initiative brings them together to share information and strategies, and will

provide a model for other installations that are working on their own sustainability efforts.

The net zero water strategy balances water availability and use to ensure a 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 areas. 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 is reducing the need for municipal water, exported sewage, or storm water.

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 using gray 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.

**MULTI-AGENCY COLLABROATION**

While the Army possess a significant amount of in-house expertise in water, including offices within the U.S. Army Corps of Engineers that we are working with including the Construction Engineering Research Laboratory in Champaign, Illinois, and the U.S. Army Engineering and Support Center in

Huntsville, Alabama, there is considerable expertise elsewhere in the federal government that we are also drawing on.

We have reached out to the federal Environmental Protection Agency's Office of Research and Development to assist the Army with the net zero initiative. Ms. Katherine Hammack, the ASA(IE&E) and Dr. Paul Anastas, the EPA's Assistant Administrator for Research and Development, and the Science Advisor to the Administrator, signed a Memorandum of Understanding on 28 November 2011 to formalize the collaboration. We will work jointly to advance the development of new applications and technologies that can be used as we strive towards net zero energy, water, and waste. We will explore technologies and approaches that (1) increase efficiency and recovery of energy, water, and materials, (2) incorporate design and use of Green Infrastructure, (3) address the energy/water nexus, (4) addresses social and behavioral components, (5) aid in our understanding of water, energy, and material flows and interactions, and (6) incorporate water and energy security and climate-ready solutions.

We are also working with the Department of Energy's Pacific Northwest National Laboratory (PNNL) within the context of the Department of Defense and Department of Energy's Memorandum of Understanding to draw on PNNL's expertise in water efficiency. PNNL will begin by performing a water balance assessment for each of the net zero water pilots. A water balance (Figure 1) compares the total water supplied to the installation to the actual water consumed by equipment and processes such as industrial, landscaping, and

residential use. The water balance will identify the largest water consumers and assist in identifying problem areas such as high leak rates in the water distribution system.

Background information will be collected on an installation's overall water supply, wastewater discharge, and building inventory. This information provides historic installation water use trends and specific trends in water use at the building level. Following the background information collection, building and process walk-through audits will be conducted to provide information to estimate water use by end-use. These data are then used to develop the water balance providing an estimate of water use by major end-use category.

Based on results from the water balance, a strategic project road map will be created (Figure 2). The road map will identify net zero water projects that will have the greatest affect on overall water demand reduction and will move the installation towards net zero. Projects will include a mix of efficient technologies and projects that target alternate water sources, such as gray water, that will replace the use of freshwater resources, such as those that draw raw water from rivers or lakes. There will be an emphasis on demand reduction and then alternate water source projects. After completion of the economic analysis of the net zero water projects, the road map will provide a list of projects to be programmed into the Army budgets and will assist in identifying other possible funding sources. Each installation's master planning activity will

be part of the creation of the road map so that the installations current master plans are well integrated into their net zero water program.

**Contingency Base Water**

In parallel to the net zero water pilot initiative, the Army is also examining ways to reduce water use in contingency operations. Reducing water use directly decreases the threats to our convoys because 70 to 80 percent of our resupply weight or convoy weight is fuel and water. Less water means, fewer convoys which means fewer Soldiers are placed at risk. As with our U.S. based installations, we know that our budgets are going to be coming down and we are strategizing how to do more with less. Deploying technology at our contingency bases that makes the Army more efficient, such as the Shower Water Reuse System (SWRS), demonstrates our commitment to use resources more efficiently and directly enhances the mission.

The SWRS works by taking waste or graywater and recycling it for future use. To accomplish this, the SWRS takes the soiled shower water and runs it through a series of filters, membranes, and chemicals. The water distributed from this system is within potable quality standards, although while technically potable, the Surgeon General has only approved it for reuse within the shower.

The SWRS can treat up to 12,000 gallons of water per day and returns 75 percent of it for reuse. When the system is used at full capacity, 9,000 gallons of water are saved per day. Spread over an entire year, the Army could recognize a

potential savings of more than 3.2 million gallons of water in just one shower facility.

Most contingency bases are not near accessible water supplies and need to be constantly resupplied. The cost of water per gallon in a war zone is extremely high. Once all factors are added up, one gallon of water delivered to a base in Afghanistan can cost anywhere from $5 to $30. This is what makes the SWRS such a force multiplier. By drastically reducing the amount of water needed to be resupplied, it returns more Soldiers to the field and lessens the burden on combat forces due to the coming drawdown.

The SWRS is currently undergoing additional field testing at the Army's recently opened Base Camp System Integration Laboratory (SIL) at Fort Devens, Massachusetts. The SIL is designed to enable the Army and the joint services to evaluate future technologies in a live Soldier environment, providing solutions to reduce the energy and water demand and logistical burden on base camps in Afghanistan.

The four-acre SIL is fully instrumented to measure water, fuel, and power use, forging the path for increased energy efficiency and base camp commonality. While the SWRS has already undergone two years of mission testing, evaluation at the SIL will be slightly different. We are currently working with Pennsylvania State University to create a way to filter laundry water in the same water reuse unit. If successful, the laundry water filter will be added on to the SWRS in the field. By Spring 2012, 54 SWRSs will be fielded to units in

Afghanistan. Each SWRS system costs roughly $170,000. If used at its full capacity, the Army could realize a potential savings of millions of dollars per unit each year. It is this type of innovation that the Army is implementing to enhance capability and do more with less.

**CONCLUSION**

Through our installation water goals, the net zero initiative, and technologies such as the Shower Water Reuse System, the Army is researching innovative technological solutions coupled with changes in culture to achieve greater efficiencies in water. Thus, throughout the Army, we are focused on identifying ways to decrease the Army's water footprint across its entire global mission. From the net zero water pilots and contingency basing initiatives, we will be collecting best management practices and lessons learned throughout and will seek to share these across the Army, other Services, other federal agencies, and any other organizations that might find these practices useful for their own sustainability programs.

Madam Chairwoman, this concludes my statement. Thank you again for the opportunity to appear before you today. I look forward to your questions.

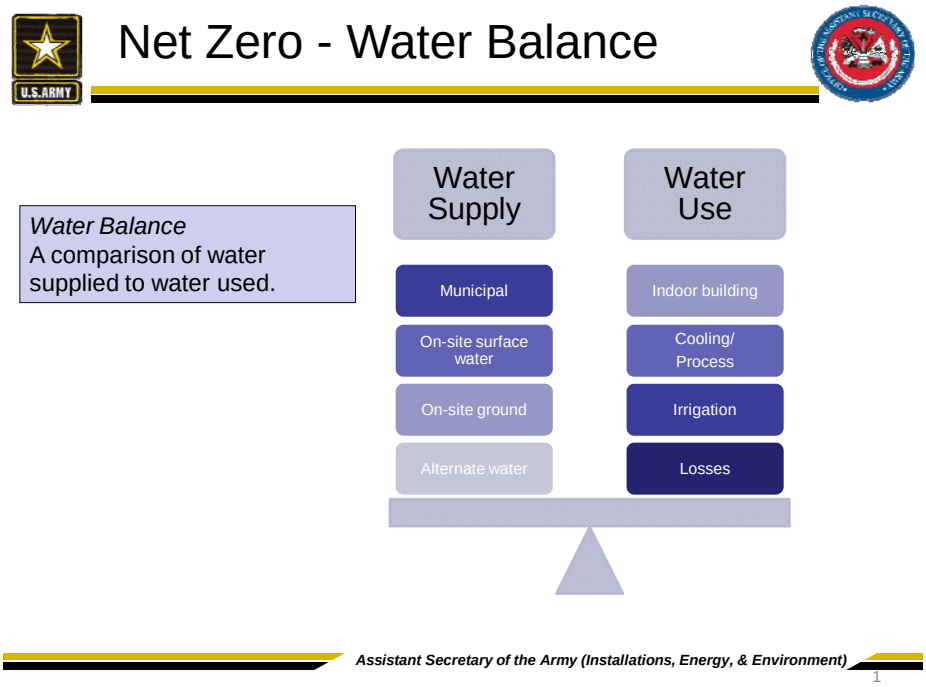


Figure 1. Water balance

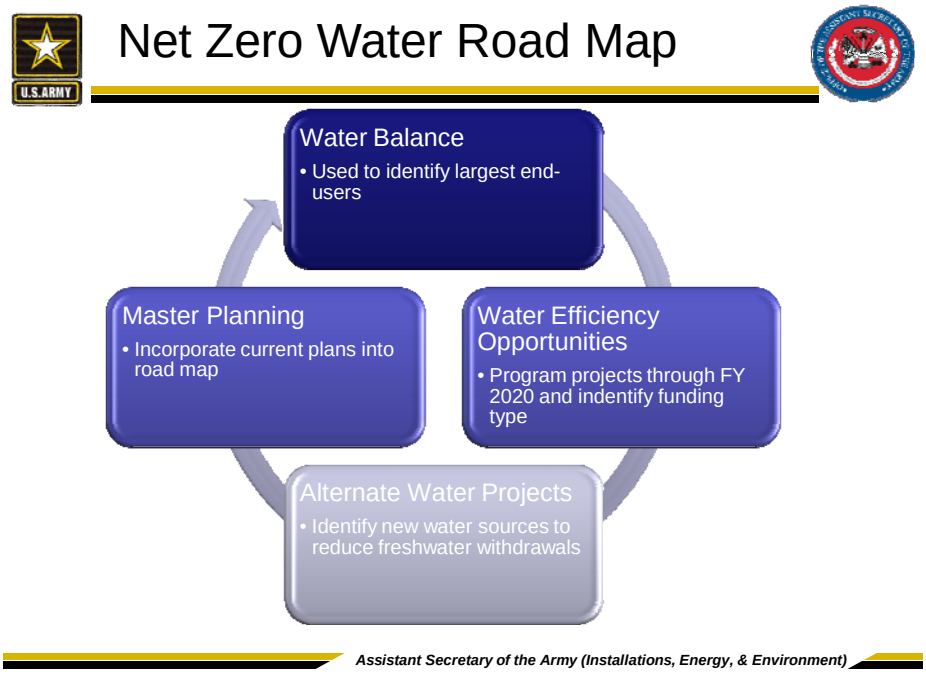


Figure 2. Road map