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**Energy, Water
and Waste**

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Stirling Solar Array at Tooele Army Depot will consist of 429 power units and is expected to provide 1.5 Megawatts of electricity. Complete article located on page 10.





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A Strategic Approach to Delivering Technical Expertise: The Regional Technical Centers of Expertise for Energy, Sustainability, and Life Cycle Cost Analysis

by James C. Dalton, SES

High performance sustainable design is both a driver and a challenge to the A/E/C industry. Over the past century, the built environment has undergone a drastic evolution in technology, design/construction delivery methods, and the quality of performance. These advancements require honed technical competencies as engineers, architects, and construction managers that have the experience and proficiency needed to implement the appropriate solution. Through the traditional role as the Army's technical expert for military construction and the Nation's technical expert for civil works, the U.S. Army Corps of Engineers strives towards innovations that will expand the boundaries of possibilities for our customer's future.

As the technical requirements for implementing sustainable technologies and processes advanced, it quickly became evident that the level of service provided to the customer was not always uniform. Some of our design teams have been leading their industry counterparts; while



Mr. James C. Dalton, P.E., SES, Chief of Engineering and Construction Division, USACE.

others have been confined by old standards and habits which have inhibited the application of improved solutions. From a strategic perspective this became an opportunity to raise the expectations and technical competencies, thus catalyzing

Acronyms and Abbreviations	
A/E/C	Architecture, Engineering, Construction
LCCA	Life Cycle Cost Analysis
MSC	Major Support Commands
OPORD	Operation Order
RECX	Regional Technical Centers of Expertise
USACE	United States Army Corps of Engineers

the U.S. Army Corps of Engineers as an agency to lead our customers toward universal high performance sustainable buildings. The result is a nexus of technical expert centers, acting as consultants, to be used on both military construction and civil works projects called Regional Technical Centers of Expertise (RECX) for Energy, Sustainability, and Life Cycle Cost Analysis.

RECX centers were established through OPOrd 2011-72 and are considered the technical expert for identified critical areas of concern in the fields of sustainability,



RECXs and Locations

High Performance Building Envelopes - Northwestern Division	Contracting Vehicles for Energy - Huntsville Center	Hydrology / Low Impact Development - North Atlantic Division
Energy Modeling - Pacific Ocean Division	Life Cycle Cost Analysis - South Pacific Division	Water Efficiency / Black Water - South Atlantic Division
Charettes/Conceptual Modeling - Great Lakes and Ohio River Division	District Energy - South Atlantic Division	Wind Energy - South Pacific Division
Ground Source Heat Pumps - Great Lakes and Ohio River Division	Solar Thermal - North Atlantic Division	Operations, Maintenance, and Renovations - SWD
Total Building Commissioning - North Atlantic Division	Lighting Design (Natural / Electric) - Pacific Ocean Division	Metering - Huntsville Center
Waste to Energy - Southwestern Division (Charette) - Great Lakes and Ohio	Waste Efficiency - Northwestern Division	Microgrid - North Atlantic Division
Sustainable & Energy Efficient Contingency Design - Transatlantic Division	Site Planning Charette (Eco-Charette) - Great Lakes and Ohio River Division	Microhydro - Northwestern Division
Solar Photovoltaic - South Pacific Division	<i>For additional information please contact Lyndsey Pruitt, LEED® AP BD+C, Engineering and Construction Sustainability Program Manager, HQ USACE, Lyndsey.N.D.Pruitt@usace.army.mil</i>	



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energy, and life cycle cost analysis. These centers are distinct and are charged and challenged to provide specific project guidance and to educate the project delivery team raising the collective organization's competency through hands-on experience. The centers are available to the Army for technical guidance and support to enhance achievement of mission objectives.

In addition to consulting on projects with sustainable technologies and processes, the centers are responsible for developing and reviewing policy, leading projects for technical advancement and adaptation into the U.S. Army Corps of Engineers technical processes, exposing and broadcasting the project successes and lessons learned for critical technologies and processes, and building technical

competency. To facilitate the creation and sharing of knowledge, all U.S. Army Corps of Engineers components are encouraged to include the appropriate center's technical representative. Through collaboration of the center, knowledge gained in discussions or execution of work is uploaded to the Sustainability and Energy website (<http://mrsi.usace.army.mil/sustain>). Information about related policies, example projects, research and studies, products, and the contact information for the RECX staff are provided on each center's page.

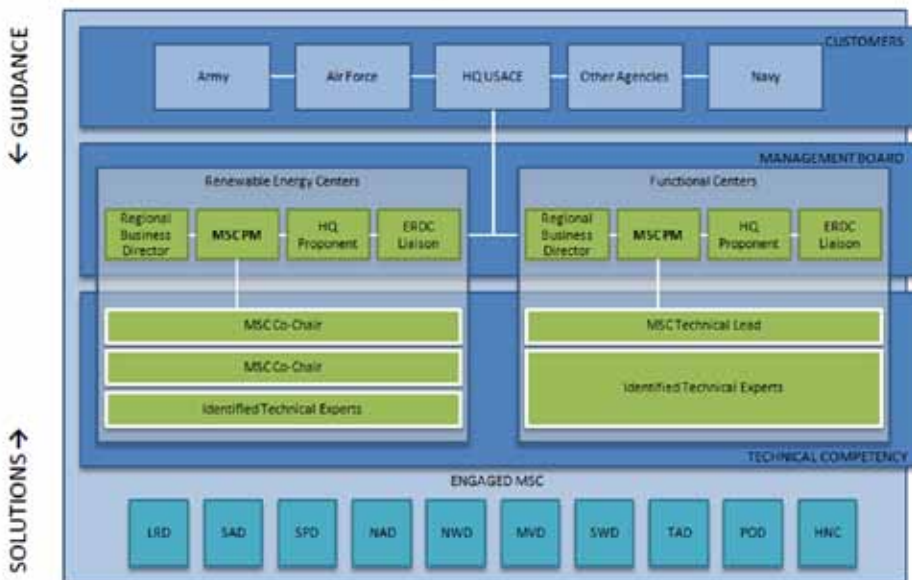
The RECX defines success as the availability of relevant and capable technical experts within the U.S. Army Corps of Engineers for the planning, design, and construction of high performance sustainable buildings and civil works projects. Energy security and conservation are national priorities that require focus, leadership and engagement

at all levels within our command. The RECXs are challenged by the energy targets set by law and methods and means to deliver these results through unknown, emerging and in some cases existing technology not before effectively applied through an enterprise approach. Industry is moving in parallel and the U.S. Army Corps of Engineers embraces the opportunity to lead. The RECX will accelerate learning and knowledge transfer to create a base level for each technical competency throughout the organization to deliver beyond the expectations of our military and civil works customers.

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RECX Organization Matrix



Customers provide guidance to the RECX Program Managers to direct the goals and priorities of the RECX Management Board. There are two types of centers: Renewable Energy Centers and Functional Centers. Renewable Energy centers are focused on a specific technology or process related to the design or generation of renewable energy sources. The Functional Centers are focused on a specific phase, process, or technology related to the planning, design, construction, or operation of high performance sustainable buildings.

Call for ARTICLES

The January/February/March 2014

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Master Planning, Housing and Barracks

Deadline is December 12, 2013

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Increasing Energy Efficiency and Consumption is Key to Reducing Utility and Energy Costs

by Qaiser Toor and Jeff Ward

The United States military is one of the nation's largest consumers of energy. In FY 2012 the Army alone spent over 1.25 billion dollars on utilities and energy costs. The Army and IMCOM now face a fundamentally different fiscal reality as our budgets are shrinking rapidly from previous years. Every dollar we spend on energy is one less for other installation services, operations and maintenance, and repair and replacement. The new fiscal reality challenges the Installation Management Community even more than ever to reduce consumption, increase efficiency, and make greater use of alternate and renewable energy sources.

IMCOM recently issued Operations Order (OPORD) 13-174, an update of our previous OPORD 10-257, which directs specific actions and energy conservation measures to help achieve cost reduction objectives. The updated OPORD will track current status of implementation of these action items at each IMCOM installation. Garrison Commanders must execute the Command directed program to aggressively and fully implement energy conservation measures that are low cost to no cost. Some of the action items that every garrison must implement are:

- Any program without the dedicated people resources cannot be successful. Therefore appointing, in writing, full time garrison Energy Managers (EM) in accordance with criteria in AR 420-1 (1 Energy manager per 5 million square feet of facilities) is



Mr. Qaiser Toor, Chief of the Energy and Utilities Division

paramount and should be the first priority for each garrison.

- Garrison leaders at all levels must hold users responsible and accountable for energy use in the facilities they occupy, live, work, and play. Include energy and water conservation responsibilities in position descriptions of commanders, directors and other key positions that impact energy management. Direct involvement of key leaders is an essential element to change the culture of energy conservation indifference. Leadership involvement will make a difference.
- Establish a garrison energy steering committee headed by the Garrison Commander or other senior leader and Command/leadership of major tenants. The committee should meet quarterly and get briefed on energy program/projects, review energy and water consumption and cost, evaluate goals and objectives, and develop improvement strategies to meet goals.
- Implement a robust Building Energy Monitor and Unit Energy Conservation Officer programs. Provide these folks training and meet with regularly. These are your eyes and ears in the field and a force multiplier. In addition as these folks transition to their next assignment they will take with them heightened energy



Mr. Jeff Ward, Chief of the Environmental and Sustainability Division

conservation awareness and help in the cultural change we are all trying to achieve.

- Provide at least quarterly energy training and awareness for installation and community personnel. Regularly publish energy articles and tips in your local paper. Take advantage of opportunities to promote energy conservation awareness through command channels and community activities during annual Energy Awareness Month, October of each year.
- Utilities and energy are the life blood of keeping your installation operational. As we deal with more and more natural disasters it is imperative that you develop an energy emergency and security plan and update these plans annually based on a review with your local utility operators and suppliers. During an emergency is not the time to plan.
- Analyze utility rate structures and track billing history. To control utility costs, it is necessary to fully understand how the demand and energy charges are calculated and how they affect facility operating costs. Work with your utility representative to control energy costs. Ask and look to see if you are on the most favorable rate, ➤

Acronyms and Abbreviations

AR	Army Regulation
EM	Energy Managers
ESPCs	Energy Savings Performance Contracts
FY	Fiscal Year
IMCOM	Installation Management Command
OPORD	Operations Order
UESCs	Utility Energy Savings Contracts



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- are there opportunities for demand side management and reduction, any incentives or rebates for equipment replacement. Maximize utility reimbursements, insure you are billing your reimbursable customers the correct amount and in a timely manner.
- Review all new construction and repair and renovation project plans and specifications for compliance with appropriate energy policies. Projects must include life-cycle cost-effective energy- and water-conservation measures. Ensure these projects incorporate sustainable design principles and reduce energy consumption by 30 percent below the levels established by American Society of Heating, Refrigeration and Air-Conditioning Engineers' Standard 90.1.
- With increasing pressure on our budgets, appropriated funds investments to accomplish energy and utility saving projects will likely be substantially reduced or zeroed out. Each garrison should be developing third-party financed energy saving projects through Energy Savings Performance Contracts (ESPCs) and, or, Utility Energy Savings Contracts (UESCs). These private sector investments will give us modernized facilities and infrastructure and help us achieve energy reduction goals. These are complex contracts and require full engagement by garrison staff, use your

best and brightest to champion these vehicles.

- As the Army transforms and down sizes, garrisons must insure that they perform space utilization surveys and consolidate as much as possible. Use the most efficient space you have and demolish or mothball resulting empty space and facilities. On what we keep, we must also prioritize and implement preventive maintenance and repair of energy related infrastructure and equipment with high energy consumption. Improper maintenance and tuning will lead to higher energy consumption and reduced equipment life.
- There are many low cost/no cost energy and water reduction measures that can contribute greatly to saving energy and reducing costs. There are 31 energy conservation measure identified in OPOD 13-174 and installations are expected to implement those measures that are life cycle cost effective for them and within existing budgets as rapidly as possible.

Net-Zero Strategy

Another component of the Army's energy security strategy is to appropriately manage our natural resources with a net-zero strategy. Current policy in draft form will require all installations to strive towards net-zero and report progress annually. A net-zero strategy addresses energy, water and waste at Army installations and comprises five interrelated steps:

- **Reduction** includes maximizing energy efficiency in existing facilities, implementing water conservation practices and eliminating generation of unnecessary waste.
- **Repurposing** involves diverting energy, water or waste to a secondary purpose with limited processes.
- **Recycling or composting** involves

Army Energy Security Vision


An effective and innovative Army energy posture, which enhances and ensures mission success and quality of life for our Soldiers, Civilians and their Families through leadership, partnership and ownership, and also serves as a model for the nation.

management of the solid waste stream, development of closed loop systems to reclaim water or cogeneration with which two forms of energy — heat and electricity — are created from one source.

- **Recovery** occurs from converting unusable waste to energy, from renewable energy or from 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.

Finally, there are many garrisons doing many great initiatives where the rubber meets the road and we want to thank all the hard work being done by our Public Works family. We encourage everyone to take advantage of opportunities throughout the year to recognize your energy champions. Take the time to nominate worthy projects, individuals and teams for Secretary of the Army Energy awards, Federal Energy Management Energy and Water Conservation awards, and other awards that are announced periodically throughout the year. Keep up the good work!

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Army Energy Security Mission

Make energy a consideration for all Army activities to reduce demand, increase efficiency, seek alternative sources and create a culture of energy accountability while sustaining or enhancing operational capabilities.



Army Energy Initiatives Task Force Celebrates Energy Awareness Month by Promoting Installation Partnerships

by John Lushetsky

As we have done each year since 1991 when October was first proclaimed “Energy Awareness Month”, our nation and our Army community (Soldiers, Family members, civilian employees, and contractors) have led by example to promote energy security and improve energy conservation during this important commemoration. In 2012, President Obama proclaimed October to be Energy Action Month, a time to show progress toward our Nation’s energy goals. The Army theme for Energy Awareness / Action Month 2013 is “Power through Partnerships.”

“Assuring sufficient and secure energy and water, in our operational missions and at our installations, is a key planning consideration for all Army activities,” said Ms. Katherine Hammack, Assistant Secretary of the Army for Installations, Energy and Environment. “We are working to ensure that the Army of the future has assured access to the resources it will need to perform its mission -- at a cost it can afford. Collectively, by making a difference today, we will continue to: reduce demand, increase efficiency, employ alternative sources, and create a culture of energy accountability.”

The Army’s Energy Initiatives Task Force (EITF) is creating “power through partnerships” by collaborating with mission, installation and garrison commanders and their staffs to develop large-scale renewable energy projects. Through these efforts the EITF has transitioned five projects totaling approximately 130 megawatts of power into the contracts and agreements phase of the acquisition process over the last year, the most progress in renewable energy in the history of America’s Army.

The benefits of partnering were never more apparent than when 170 representatives of the energy industry descended on Barstow, Calif. in June to

meet with representatives from the Fort Irwin staff, Defense Logistics Agency Energy (DLA Energy) and the EITF to discuss a Request for Proposals (RFP) on a renewable energy project at Fort Irwin, Calif.

“Fort Irwin is very excited about helping the Army meet identified renewable energy goals and to further enhance the energy security of the National Training Center,” said Muhammad Bari, Director of Public Works at U.S. Army Garrison, Fort Irwin. “We are proud to be working together with the EITF on this project.”

Installation energy security is a top priority for the Army and renewable energy is a key component of helping the Army achieve National Defense Authorization Act mandates to produce or procure 25 percent of its energy from renewable sources.

In coordination with Office of the Secretary of Defense and the White House, the Army also teamed with the Air Force and Navy to establish an internal goal to implement three gigawatts (GW) of renewable energy generation capacity (one GW for each Service) by 2025. This would generate about the same amount of electricity as you would get from burning three million tons of coal, according to President Obama’s June 25, 2013 speech at Georgetown University on climate change, where he re-emphasized the DoD goal. (<http://www.whitehouse.gov/the-press-office/2013/06/25/remarks-president-climate-change>)

The EITF, established by the Secretary of the Army in September 2011, serves as the central management office for partnering with installations to streamline processes and implement cost effective, large-scale renewable energy projects that are 10 megawatts (MW) or greater, leveraging private sector financing.

The EITF is a key resource for installation commanders and their staffs

Acronyms and Abbreviations	
Calif.	California
DLA Energy	Defense Logistics Agency Energy
DoD	Department of Defense
EITF	Energy Initiatives Task Force
GW	gigawatts
MW	megawatts
RFP	Request for Proposals

to assess the feasibility of, and implement, large-scale renewable energy projects at their installations. The EITF team provides broad experience and capabilities in acquisition, project finance, renewable technologies, real estate, utility regulation, grid integration and environmental permitting.

“The EITF is partnering with installations in developing large scale renewable energy projects by supplementing their limited resources to create a more secure and sustainable Army,” said Mr. John Lushetsky, Executive Director of the EITF. “Together we are working to achieve the Army’s renewable energy goals.” Five recent projects represent a total of 130 MW of production capacity, or about 10 percent of the Army’s goal to deploy one GW of renewable energy by 2025.

For more information on the EITF and to submit your installation’s 10MW or greater renewable energy project recommendation, visit the EITF online at www.armyeitf.com

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Fort Carson Receives Top Federal Energy Award

by Susan C. Galentine

Fort Carson, Colorado, received the Superior Program honor for the Army from the Federal Energy Management Program Awards, announced July 3, 2013.

The annual FEMP awards, sponsored by the U.S. Department of Energy in conjunction with the Federal Interagency Energy Policy Committee, recognize individuals and organizations making significant contributions to energy and water efficiency within the federal government.

The Mountain Post has a long energy and water conservation history tracing back to when Fort Carson adopted sustainability goals in 2002 and through its commitment in 2011 to become an Army Net Zero energy, water and waste installation by 2020. Through a number of energy and water projects, Fort Carson reduced its energy use 1.5 percent and its water use by 2 percent, between fiscal years 2011 and 2012, saving more than \$267,000 a year in utility costs.

“It is an honor to be recognized for the hard work of many on Fort Carson in reducing our energy and water use,” said Hal Alguire, DPW director. “The Army has made a commitment to be a strong steward of resources and Fort Carson through its ‘net zero’ energy, water and waste initiatives continues to look for innovative ways to save energy and water.”

Fort Carson is receiving recognition for its efforts in developing partnerships with organizations such as the National Renewable Energy Laboratories and pursuing demonstrations for new technologies through the Environmental Security and Technology Certification Program. These partnerships led to demonstrations of a concentrated solar heating and power dish and a woody biomass system that creates synthetic gas

to fuel a combined heat and power system. New construction including green building techniques, energy efficiency reduction projects and efforts to reduce water consumption were also key aspects of the award.

Specific projects cited in the nomination include:

- Certification of Fort Carson’s first (Army’s second) U.S. Green Building Council platinum-level Leadership in Energy and Environmental Design facility, the 4th Armored Brigade Combat Team Brigade and Battalion Headquarters. The headquarters features a 482 kilowatt ground-mounted tracking photovoltaic system; water efficient irrigation and fixtures, which contribute to a 41 percent reduction in water use compared to standard construction; solar hot water heating; and a highly efficient heating, ventilation and air conditioning system.
- Replacement of older lighting fixtures with more energy-efficient fixtures in 22 buildings. Facilities targeted for lighting replacement were older motor pools, gymnasiums, warehouses and a hangar. The project included adding lighting controls such as occupancy sensors and timers to further reduce energy consumption. The effort is anticipated to save the Post \$60,000 a year in reduced electrical costs.
- Expansion of the post’s energy management control system to 35 additional facilities. It is estimated the project, which allows set points to be established and monitoring of the energy systems for buildings, will save the Fort Carson \$73,000 per year in reduced natural gas and electricity costs.
- Completion of a water leak detection survey for more than 16 miles of water lines, approximately 20



Fort Carson’s first U.S. Green Building Council platinum-level Leadership in Energy and Environmental Design certified facility, the 4th Armored Brigade Combat Team Brigade and Battalion Headquarters, features a 482 kilowatt ground-mounted, tracking photovoltaic system. (Photo by Harry Weddington, USACE)

percent of the post. The survey focused on where the oldest water lines are located and discovered that 57,000 gallons a day were lost due to leaks. Savings from the repairs are estimated to save \$72,000 in water utility costs.

- Installation of a computerized weather-tracking irrigation system, which uses global positioning system technology and weather stations on post to apply the right amount of water based on current weather conditions. It is anticipated that eliminating water wasted irrigating landscaped areas will save Fort Carson over \$300,000 per year through a 20 percent water use reduction.

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Susan C. Galentine is the public relations and net zero outreach consultant at Fort Carson Directorate of Public Works.

Acronyms and Abbreviations	
DPW	Directorate of Public Works
FEMP	Federal Energy Management Program



Achieving Net-Zero Energy at Parris Island

by Fred Tarverdi, Ted G. Fery, and Stanley M. Mazza

Reprinted with permission from The Military Engineer Online. "Achieving Net Zero Energy at Parris Island," by Fred Tarverdi, P.E., Ted G. Fery, AIA, LEED AP BD&C, and Stanley M. Mazza, P.E., LEED AP. Copyright May 2012 Society of American Military Engineers. All rights reserved.

The newly-completed Child Development Center at MCRD, Parris Island, SC, has the unique ability to produce the electricity that it will use. The facility, which provides care for the children of some of the 2,500 Marines and Sailors permanently stationed supporting the basic training program, incorporates a host of innovative sustainability features and is currently pending a LEED "Gold" Certification.

The new Child Development Center (CDC) at MCRD Parris Island not only provides the latest advancements in child care, it is also the first structure on the base and possibly in the entire southeast United States with the ability to achieve the Net-Zero Energy status. The Department of Defense Education Activity (DoDEA) has the ambitious goal of reaching energy independence in their buildings in support of the Executive Order 13514 that requires all future Federal Government buildings to achieve Net Zero energy use by 2030. Navy's mandate, as established by the Secretary of the Navy in October 2009, is to have 50 percent of energy consumed in its installations, which include Marine Corps locations, to come from renewable sources by 2020. Although not a specific

requirement of this project, the importance of on-site renewable energy as a mean of reducing building electricity use became evident from the onset.

The design build team's attention, as influenced by the owner's energy vigilance, began with and remained focused on selecting the most cost effective and energy efficient systems the project could afford while achieving the highest LEED points possible. Test wells showed that the use of geothermal energy was a good starting point for implementation of on-site renewable energy into the project, which was later augmented by the addition of solar thermal and solar PV systems.

The new CDC is designed to blend with the historic architecture of Parris Island, employing brick detailing utilizing accent brick, corbelling and recessed panels that reflect the historic buildings constructed during WW1. The project is currently pending a LEED "Gold" Certification by the Green Building Certification Institute (GBCI). Sustainable features include water saving plumbing fixtures, high recycled product content and local and regionally manufactured materials. The building's mechanical systems include geothermal ground source water-to-water heat pumps for heating and cooling. Domestic water heating systems include a solar hot water system rated at 51 kW and a ground source heat pump water heating system. The building is equipped with photovoltaic panels rated at 275 kW, which are estimated to produce all of the building's electricity needs. Lastly, all activity rooms in the building are equipped with daylight harvesting systems to take advantage of the large windows and skylights by dimming the light fixtures during daylight hours. All rooms with skylights and exterior windows are equipped with daylight sensing/harvesting systems which automatically switch off lamps in fixtures when the lighting level exceeds normal set points. Switching off lighting also reduces the cooling load in the spaces for



the HVAC system. The exterior of the building and the parking lots is lit with LED fixtures. The fixtures are expected to save 10 to 20 percent more energy than traditional exterior lighting sources.

With the recent military budget reductions, the future of Net-Zero Energy goals may seem uncertain. However, any new CDC or school can be designed and constructed as "Net-Zero Energy Ready" with minimal impact to the initial building cost. In this manner, all passive energy saving features are designed and constructed into the original architecture of the building, and only construction of the infrastructure for addition of future on-site renewable energy options is included. The Parris Island CDC has exceeded all expectations and will become a showcase facility as the Marine Corps first net-zero energy building at Parris Island.

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Editor's note: content in this article has been reduced. To review complete article please see the original in SAME magazine.

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Acronyms and Abbreviations	
CDC	Child Development Center
DoDEA	The Department of Defense Education Activity
GBCI	Green Building Certification Institute
HVAC	heating, ventilation, and air conditioning
Inc.	Incorporated
LEED	Leadership in Energy & Environmental Design
MCRD	Marine Corps Recruit Depot
PV	photovoltaic
SC	South Carolina
WWI	World War I



Energy Conservation Investment Program

by Thomas B. Delaney, Jr.

The Energy Conservation Investment Program (ECIP) is an annual, OSD-funded program to provide energy reduction and renewable energy projects at DOD installations. The Office of the Assistant Chief of Staff for Installation Management (OACSIM) manages the ECIP for the Army, with oversight from the Deputy Assistant Secretary of the Army for Energy and Sustainability office. The U.S. Army Corps of Engineers (USACE) is the designated Department of Defense (DOD) Design and Construction Agent responsible for enterprise-wide national level program management, program integration, policy development, and performance assessment of the ECIP.

The program is funded with Military Construction (MILCON) funds appropriated separately from the Military Construction, Army (MCA) program. ECIP is a critical element of the Department of Defense's strategy to improve the energy performance of its fixed installations. ECIP has traditionally funded small projects that promise a significant payback in reduced energy costs. The Services budget for the majority of investments needed to reach the energy



Stirling Solar Array at Tooele Army Depot, FY12 ECIP Project. This is the first block of 64 concentrating solar power units at Tooele Army Depot (TEAD). Upon construction completion, the solar array will consist of 429 power units and is expected to provide 1.5 Megawatts of electricity, which equates to approximately 30% of TEAD's total annual electric energy need. (Photo by Chris Beauchamp, Infinia Corp.)

goals and manage larger programs aimed at reducing energy demand, expanding renewable energy supply, and integrating energy security considerations into investment decisions.

In agreement with the Department of Defense facility energy strategy, ECIP funds more holistic projects, leveraging the Services' larger investments that will produce "game-changing" improvements in energy consumption, cost, management and security. The following six overarching Program objectives guide this concept:

1. Dramatically change the energy consumption at an individual installation or joint base;
2. Implement a technology validated in a demonstration program such as the Environmental Security Technology Certification Program (ESTCP) or an innovative technology that represents significant improvement over existing technology.
3. Integrate multiple energy savings, monitoring, and renewable energy technologies to realize synergistic benefits;

4. Integrate distributed generation or energy storage in a way which improves supply resilience for critical loads;

5. Implement an energy security plan at a given installation especially when such an investment entails partnering with the Department of Energy (DOE); and,

6. Maximize contribution towards a Service's or installation's energy intensity, renewable energy and water consumption reduction goals put forth in the Department's Strategic Sustainability Performance Plan or a Service or Installation strategic energy plan.

ECIP projects must qualify as military construction projects and must meet certain savings-to-investment ratio (SIR) requirements. For energy conservation projects the SIR must be > 1.25, and for renewable energy and water conservation projects, the SIR must be > 1.0. For energy security projects a SIR is not required. Projects are developed at the installation level using the DD1391 processor and must contain a Life Cycle Cost Analysis, which calculates the SIR, and a mandatory measurement and verification

Acronyms and Abbreviations	
AEWRS	Army Energy and Water Reporting System
D.C.	District of Columbia
DOD	Department of Defense
DOE	Department of Energy
ECIP	Energy Conservation Investment Program
ESTCP	Environmental Security Technology Certification Program
HNC	U.S. Army Corps of Engineers Engineering and Support Center, Huntsville
MCA	Military Construction, Army
MILCON	Military Construction
OACSIM	Office of the Assistant Chief of Staff for Installation Management
OSD	Office of the Secretary of Defense
SIR	Savings-to-investment ratio
USACE	U.S. Army Corps of Engineers



IMCOM and USACE RecycleMatch Pilot Program

by Michael Andres

The Installation Management Command (IMCOM) G4 Facilities and Logistics Directorate, Sustainability and Environment Division in partnership with USACE-ERDC-CERL are launching a pilot /demonstration project at Fort Hood and Fort Carson starting in FY14. The project involves using a web based platform (RecycleMatch) to market and sell recyclables from the qualified recycling program (QRP).

RecycleMatch's Waste and Recycling Platform is a commercial off the shelf, subscription-based software-as-a-service (SaaS) and white-labeled marketplace. This is the first software technology that has been developed and commercialized to accommodate feedbacks from corporations like Kimberly-Clark, Shaw Industries, Progressive Waste Solutions and others. The software is cloud-hosted and accessible via the internet. Access to the platform will be available at this address <http://usarmyimcom.recyclematch.com>. The platform is rights managed, meaning that each individual has their own log-in and settings that allow them to see, edit and publish only the information relevant to their Installation and/or their roles and responsibilities. For example, each Installation may have

multiple users who may edit and publish only their Installations' materials, and a management role to see but not edit all of the transactions.

The main benefits of the RecycleMatch Waste and Recycling Platform identified in commercial use of the technology, and can be applicable to the US Army include:

- Ensure fair market value for commodity or higher value materials
- Accelerate discovery of new markets and new solutions for 'waste' diversion
- Research and discover new qualified buyers, and streamline process of collecting information and paperwork required based on the installation own requirements
- Reduce manual processes and establish consistent business processes
- Capture data in central repository for future reporting purposes


The RecycleMatch's unique technology and business model offers enterprise customers with the desired control to market and sell materials in a competitive, consistent and transparent manner and set

Acronyms and Abbreviations	
API	Application Programming Interface
CERL	Construction Engineering Research Laboratory
ERDC	Engineer Research and Development Center
IMCOM	Installation Management Command
QRP	Qualified Recycling Program
SaaS	Software As A Service
USACE	U.S. Army Corps of Engineers

requirements in a broad sense or specific to each transaction.

This pilot/demonstration project intends to realize the highest price possible for recyclables commodities by exposing it to the widest possible market of potential vendors and is intended to inform and guide the process of identifying any specific requirements, reports, APIs (application programming interface) or improvements that may be required for future use of the platform.

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(continued from previous page)


justification. Projects must account for the purchase and installation of an approved meter if a meter is not present at the building or will not be installed by the central Meter Data Monitoring System program soon after construction is completed. The U.S. Army Corps of Engineers Engineering and Support Center, Huntsville (HNC) validates all candidate ECIP projects for technical and economic feasibility. Completed ECIP projects must report energy savings or energy produced in the Army Energy and Water Reporting System (AEWRS).

Beginning in FY14, funding for ECIP

projects is allocated on a competitive basis. In the first quarter of each fiscal year, the services submit candidate projects to OSD for funding in the following fiscal year. The submittals include a completed narrative submission template that addresses the selection criteria: financial, energy savings, goals, energy security, synergistic effect, partnership, test bed application/innovative technology, and service priority. OSD selects those projects that best meet these criteria, commensurate with achieving an overall OSD savings-to-investment ratio (SIR) of 2.0. Funding is proportioned into four categories: energy conservation (60 percent), renewable energy (25 percent), water conservation (5 percent), and energy security (10 percent).

Some feedback from the FY14 OSD competition included weak narratives, particularly those for energy security projects, mis-categorization of projects (energy security projects that should have been renewable energy projects), and too many energy security projects that brought down the overall OSD program SIR.

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63D RSC Lessons Learned in Energy Efficiency

by Colonel Stewart R. Fearon

In an effort to improve energy efficiency and reduce greenhouse gas emissions the 63D Regional Support Command (RSC) used the Bryan US Army Reserve Center, home of the 420th Engineer Command, as a test bed for a Geothermal Heat Pump, solar water heating and a Photovoltaic (PV) Solar Array. The goal was to implement Executive Order 13423 to reduce energy intensity by 3 percent annually and implements renewable energy generation projects on Army Reserve property.

The Geothermal Heat Pump was the first of its kind installed in a 63D RSC Army Reserve Center. Basically eighty three (83) 300-foot deep wells were drilled to feed 37 heat pumps. This completely replaced the chiller unit.

In Bryan Texas comparatively little energy is expended on heating the building so cooling is the primary driver for the Heating Ventilation Air Conditioning (HVAC) system. Compared to a typical chiller unit the initial cost and annual maintenance of the Geothermal Heat Pump are more expensive but over a 25 year life cycle cost the energy savings make the Geothermal system less expensive while complying with EO 13423. Geothermal heating and cooling is a mature technology and has been used for decades. The components are not high tech and do not require extensive maintenance. The expected life span of the Geothermal Heat Pump is 30 years with periodic maintenance of the pumps, heating and cooling coils.

The Bryan U.S. Army Reserve Center

Acronyms and Abbreviations

ARIMD	Army Reserve Installation Management Directorate
BTU	Bryan Texas Utilities
EO	Executive Order
HVAC	Heating Ventilation Air Conditioning
PV	Photovoltaic
RSC	Regional Support Command

project is using of solar water heaters for hot water in the latrines and kitchen. Small pumps continuously circulate the hot water from the collector to storage tanks and control the circulation depending on the weather. Water Furnace has an excellent diagram showing how the process works at <http://www.waterfurnace.com/how-it-works.aspx>

The Photovoltaic (PV) Solar Array at Bryan covers 14,220 square feet and is made up of 682 (77"x30") solar panels for an initial cost of \$1.48 million. Each panel is capable of generating 280 watt and has a maximum power of 190.9 Kilowatts but the inverters can only capture 175 Kilowatts. Part of the negotiation between the U.S. Army Corps of Engineers and Bryan Texas Utilities (BTU) resulted in 50 percent of the Renewable Energy Credits going to BTU.

One of the lessons learned is that each utility manages the renewable energy added to their grid differently. Bryan Texas Utilities does not simply give the 63rd RSC credit for the energy it produces and deduct it from the bill (net metering). Instead the 63rd RSC is required to sell the solar power to Bryan Texas Utilities at the current Grid Pricing schedule; which fluctuates and is tied to the seasonal demands for the region. Then the 63rd RSC has to purchase the power back from the power company at the normal (higher) rate. The 63rd RSC in conjunction with the Army Reserve Installation Management Directorate (ARIMD) is looking at strategies to eliminate the requirement to sell the solar power to BTU. One idea is adding on site energy storage for the power generated by the PV Array. This would allow the 63D RSC to use 100 percent of the energy generated instead of selling it to BTU and purchasing it back at a higher rate.

The 63rd RSC in conjunction with the Army Reserve Installation Management Directorate (ARIMD) is looking at



The Bryan U.S. Army Reserve Center solar array

strategies to eliminate requirement to sell the solar power to Bryan Texas Utilities. One idea is adding on site energy storage for the power generated by the PV Array. This would allow the 63D RSC to use 100 percent of the energy generated instead of selling it to Bryan Texas Utilities and then purchasing it back at a higher rate.

If the actual energy credits from the first six months are mirrored by the next six months the PV Array will pay for itself in 143 years. However, in the 63rd RSC energy strategy, solar power reduces our reliance on petroleum based energy and reduces the 63rd RSC overall energy consumption. The 63D Regional Support Command (RSC) is leading the way in implementing Executive Order 13423. By reducing energy consumption through the use of geothermal and solar water heaters while generating energy from renewable sources the 63D RSC is positioning itself to meet the 3 percent annually energy reduction goal while creating renewable energy generation projects for the Army Reserve.

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Federal Agencies Embracing New Contracting Methods to Help Reduce Energy Costs, Improve Facilities and Meet Sustainability Goals

by Darcy L. Immerman, Michael Norton and Randy Peacock

When President Obama announced Executive Order 13514 in October 2009, the directive was clear. How federal agencies and the armed services were going to answer it, however, would need to be decided. The EO builds on and expands energy reduction and environmental requirements of EO 13423 by making reductions of greenhouse gas emissions a priority and by requiring agencies to develop sustainability plans focused on cost-effective projects. It also expands the Energy Independence and Security Act of 2007 which requires comprehensive energy and water audits in 25 percent of covered facilities and a 30 percent reduction in energy use by 2030. The U.S. government occupies nearly 500,000 buildings, operates more than 600,000 vehicles, employs more than 1.8 million civilians, and purchases more than \$500 billion per year in goods and services. The potential for energy reduction and cost savings is significant.

Amid this environment of shrinking capital appropriations budgets, agencies are embracing alternative financing and delivery methods to save energy and water and reduce waste. In addition to substantial energy savings, many of these contracting mechanisms will reduce the cost of maintenance and equipment upgrades.

Power Purchase Agreement a long-term contract to buy power from an energy provider that uses its own source of funds to build an energy facility on government land and owns, maintains and operates the facility for an extended term up to 30 years.

Enhanced Use Lease is a method for funding construction or renovations on military sites.

Utility Energy Service Contracts offer federal agencies an effective means to implement energy efficiency, renewable energy and water efficiency projects.

Energy Saving Performance Contracts (ESPC) leverage private funds to

implement energy and water efficiency and renewable energy as well as waste reduction projects.

The EPSC method sounds simple but these projects are quite complex. The most successful projects are a partnership between base personnel, the ESCO and the contracting agency.

The U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville oversees the team that manages and supports the USACE ESPC Multiple Award Task Order Contract. Huntsville Center can use this ESPC MATOC to support all DOD and has awarded about two thirds of the Army's ESPCs.

Huntsville Center offered the U.S. Navy's Space and Warfare Systems Center, Pacific in San Diego an opportunity through an ESPC to replace older systems and meet energy savings requirements over a 19-year term. SSCPAC has 225 buildings totaling more than 3 million square feet. AECOM was awarded a \$12 million ESPC that is expected to result in an energy cost avoidance of \$23 million during the term of the contract. Work includes lighting upgrades; water conservation measures; chilled water air conditioning upgrades; a heating and hot water retrofit; upgraded air handlers; rooftop photovoltaic systems; and electronic control systems.

Based on the success of the first phase of the project, AECOM was awarded second and third task orders for another \$22 million in energy improvements that include central cooling plant upgrades; data center cooling and controls improvement to optimize temperature distribution; and additional lighting and domestic water energy saving measures.

The SSCPAC improvements validate the advantages of bundling energy conservation and facility improvement measures. Bundling shorter payback items like lighting and controls leverage implementation of longer payback projects

Acronyms and Abbreviations	
DoD	Department of Defense
EO	Executive Order
ESCO	Energy Services Company
ESPC	Energy Saving Performance Contract
MATOC	Multiple Award Task Order Contract
SSCPAC	U.S. Navy's Space and Warfare Systems Center, Pacific
USACE	U.S. Army Corps of Engineers

like building automation controls, building envelope improvements and infrastructure upgrades

In December 2011, President Barack Obama launched an initiative to contract for an additional \$2 billion in ESPC by the end of 2013. The memorandum encourages agencies to enter into installation-wide and portfolio-wide performance contracts. It also recommends they undertake comprehensive projects that include short- and long-term energy conservation measures to maximize efficiency and return on investment to the American taxpayer.

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Army Central Meter Program and Meter Data Management System Make Progress on Installations, at Facilities

by James Campbell

The U.S. Army Corps of Engineers Army Central Meter Program and Meter Data Management System are helping energy managers keep tabs on resources and reduce waste at Army installations. AMP's mission to meter Army installation facility energy use and incorporate into energy monitoring systems as well as integration to the enterprise-wide single Meter Data Management System is well under way.

With more than 6,300 meters installed worldwide across 70 Army installations and 50 states, AMP and MDMS are working hand in hand to get meters reporting to the 74 MDMS gateways scheduled for deployment through September 2014. "Currently seven sites, 634 meters, have been connected to MDMS with another 600 planned to come online within the next few months," said Alicia Allen, program manager for AMP. "Of those, 53 are Phase I electric meters reporting automatically to MDMS from AMP installed accredited metering information systems."

Phase I consists of metering buildings that meet the criteria of at least 29,000 square feet in size, \$35,000 per year in electrical energy consumption, or reimbursable tenant facilities. The meters are a part of an installation metering system which consists of the building meters and associated equipment and the building points of connection that convert the meter data to a format that can be read by the metering servers, followed by the installation of the metering servers and the connection of everything through the installation's network infrastructure. By the end of Phase I, 6,160 buildings will have electric metering systems installed by AMP Huntsville Center and more than 7,643 electric meters will be measuring electrical energy, Allen said.

The Meter Program end state of meters reporting to MDMS gives the Army an

enterprise energy information system for effective, accurate, and compliant collection and reporting at the installation, regional and headquarters levels for timely energy management and analysis of energy data.

The MDMS gateways being shipped to Army installations this year are essentially a bridge between the installation's energy data reporting system and the top level enterprise-wide system the Army envisions, said John Trudell III, MDMS program manager at the Huntsville Center.

MDMS collects meter data about the consumption and production of electricity, gas, steam and water and allows that data to be analyzed and viewed, giving experts an opportunity to spot savings and fix problems much faster, Trudell said. "This system gives the energy manager a comprehensive display of their energy footprint using a web portal."

The MDMS gateways, once installed, transmit the raw meter data to a system that runs sophisticated analytics. The software allows for the energy manager to compile and view easy-to-understand graphs and charts. The systems are secure, accredited for enterprise networks and designed to enable a centralized reporting system, something the Army has wanted for quite a while and "they can use it to develop savings and energy plans, conduct rate reviews, validate savings, prepare reports and compile accurate billing for tenants," Trudell said.

Along with helping installation energy managers develop plans to save energy, a problem, such as a leaking water valve or electrical equipment that's not performing optimally, can be identified quickly. When unexpected spikes occur, the data can often provide an explanation or help the installation find and fix a problem with their systems. Trudell said the system has already helped customers track down the source of power outages at two facilities and identified the cause of a spike in water

Acronyms and Abbreviations	
AMP	Army Meter Program
MDMS	Meter Data Management System

use at another.

"MDMS will provide the integrated view," said Paul Robinson, chief of the Center's Energy Division. "This system is capable of bringing multiple Army enterprise systems together, providing a holistic view of energy data in a way that will empower energy and facility managers across our installations."

Next for AMP is the implementation of Phase II: metering other utilities; metering buildings for electrical usage at a lower criteria level; connecting more meters to MDMS as network infrastructure is added at the Installations and connecting legacy metering systems to MDMS.

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On behalf of the Army Energy Initiative Task Force (EITF) Communication Director, Ms. Joyce VanSlyke, is the link to the organization's inaugural newsletter aimed at informing and engaging industry and installations on large-scale renewable energy projects and current hot topics.

http://www.armyeitf.com/downloads/July%202013_EITF%20Newsletter.pdf



Commercial Utilities Program Update

by Ernesto Ortiz

The Commercial Utilities Program is designed to be an integral and essential element of the Army. The program identifies ways to reduce utility services by intervening in rate case increases, performing site visits, conducting installation utility rate surveys and performing utility contract management oversight.

The CUP is the center of expertise for utility rate intervention support, installation utility rate reviews, tenant reimbursement oversight and the conversion of tariff-based utility rate arrangements to special utility contracts.

Installation Management Command, in coordination with the Corps of Engineers, has used the CUP to maximize energy cost savings since early 2004. The CUP's major benefits to the Army are the substantial energy costs avoidance, attained through minimizing cost increases, — and energy cost savings, achieved through utility costs reduction.

CUP identified opportunities well over the investment made in fiscal year 2012. In fiscal 2013, CUP initiated 8 survey studies with an attempt to mitigate rate increases and identify cost reduction opportunities for Army Garrisons to take advantage. Eight Army Garrisons targeted for the utility survey study include:

Fort Benning, Georgia is currently under the most favorable energy rates. However, a vigilant awareness for opportunities for lower rates will position Ft. Benning in a better standing should this year's rate intervention not be in the Garrisons favor. Fort Benning's utilities sales officer should ensure capital improvement costs are recovered from non-federal entities in accordance with Department of Army Chief of Engineers, Interim Guidance on the Calculation of Rates for the Sale of Utilities Services and Utilities Contracts Invoicing/Billing, dtd 1 Nov 12. Given the significant military presence in Georgia,

Fort Benning should intervene in all GPC rate filings before the Georgia Public Service Commission. Intervention, whether active or passive, keeps information flowing to military decision makers. In Georgia intervention should focus on keeping benefits obtained in the past.

Fort Gordon, Georgia should consider installing meters to all of its resident reimbursable tenants. Old meters should be replaced and others recalibrated. Fort Gordon's electric privatization contractor may serve as a means to fix the meter problems. Late electric payments is a common issue. Coordination with your Garrison Commander should resolve this problem.

Fort Stewart and Hunter Air Field, Georgia should ensure reimbursable utilities are charged in accordance with Department of Army Chief of Engineers, Interim Guidance on the Calculation of Rates for the Sale of Utilities Services and Utilities Contracts Invoicing/Billing, dtd 1 Nov 12. Management of reimbursable billing is an arduous task. Fort Stewart should consider use of the privatized contractor to fulfill this task.

Fort Campbell, Kentucky should investigate the savings potential the Tennessee Valley Authority (TVA) alternate rate offers (a savings of approximately 1.5%) over the designed rate currently in use. Due to lack of formal regulation on TVA, Fort Campbell should build a report with TVA and become more active in customer meetings to be able to impact future rate increases and rate designs. Ongoing optimization study should reveal more detailed information on strategies and cost opportunities Fort Campbell should take advantage and participate.

Fort Belvoir, Virginia, with opportunity to reduce demand related costs by using time-of-day energy rates utilizing on peak-times and saving 1.5% below the existing

Acronyms and Abbreviations	
CUP	Commercial Utilities Program
FY	fiscal year
IMCOM	Installation Management Command

rate. With retail choice as an option in the Dominion service territory, Fort Belvoir has started a market analysis and is attempting to combine its load with other military installation to make its combined portfolio more appealing to the potential suppliers of electric power.

Redstone Arsenal, Alabama accounts for 40% power purchased from the Tennessee Valley Authority. Having the National Aeronautics and Space Administration (NASA) as the largest consumer on site, Redstone should encourage power reduction incentives to mitigate high energy costs during peak times. Additionally, Redstone Arsenal 5% growth year-on-year in KWh purchased should be relooked to ensure capturing more accurately the cost of O&M for non-government organizations. Recommend investigating what advantages are offered in the use of generator power for peak shaving opportunities. Due to lack of formal regulation on TVA, Fort

Campbell should build a report with TVA and become more active in customer meetings to be able to impact future rate increases and rate designs. Ongoing optimization study should reveal more detailed information on strategies and cost opportunities Redstone Arsenal should take advantage and participate.

This FY13, The Entergy Louisiana "ELL" and Georgia Power Company "GPC" filed their cases to their local Public Service Commissions. ELL in Louisiana affecting Fort Polk and GPC in Georgia affecting Fort Benning, Fort Stewart, Fort Gordon and Hunter Army Air Field. Both rate interventions are ongoing and the Commissions will not reach a decision until final results from



Solid Waste and Recycling Reporting

by Jim Gill

We are swiftly coming down to the FY 2103 end-of-yr data call for solid waste reporting via the Solid Waste Annual Reporting Web (SWARWeb) data repository. As the Solid Waste Program Manager at HQ, I want to take a moment to emphasize the importance of accurate and timely reporting of waste and recycling data. Pardon the pun, but as with any computing repository, garbage in = garbage out and the affects can be multifaceted and/or far reaching.

The installation's data is a valuable source for consideration when HQ develops Program Objective Memorandum (POM) budgets for near and long term requirements. It will be of particular importance in the coming Fiscal Year as budgets are being cut across the board and what does get funded will be closely scrutinized in terms of need and financial viability.

In addition to overall funding concerns, attention needs to be paid to the operational cost areas. One such area that is commonly overlooked is the Average Disposal Facility Fee (ADFF) costs that are used in calculating program costs and is a powerful tool that helps both installations and HQ solid waste managers determine

the feasibility of their solid waste programs and how they relate to recycling efforts.

Moreover, accurate data can be related to Best Practices that individual installations are applying so that they can be disseminated throughout the Army in general. This best practice information is used to determine how best to meet statutes regarding waste disposal reduction as well as overall solid waste and construction & demolition diversion goals set by the executive office and Army senior leadership. It will also insure that a realistic path forward can be executed.

As a look into the future, note that within the next year, work will start on the transformation from the legacy SWARWeb system to a new Headquarters Army Environmental System (HQAES) that is currently scheduled to be rolled out at the end of calendar year 2014. I will be working on several projects to "cleanse" that database and search for skeletons in the closet within the SWARWeb code itself. My goal is to clean up the code before launching a new software package so that errors and/or omissions are not carried over into it where they will be much harder to handle. At the same time, DOD is working on a revised Integrated Solid Waste Management instructions and the

Acronyms and Abbreviations	
OACSIM	Office of the Assistant Chief of Staff for Installation Management
ADFF	Average Disposal Facility Fee
FY	Fiscal Year
HQ	Headquarters
HQAES	Headquarters Army Environmental System
POM	Program Objective Memorandum
SWARWeb	Solid Waste Annual Reporting Web

SWARWeb code will need to be adjusted to address those instructions.

On a final note, the current tasker for FY 2013 has emphasized the importance of monthly reporting so that corrections to reporting processes can be made throughout the year rather than waiting until the end. I cannot stress enough the importance of religiously entering data on that monthly basis, particularly as we head in the next FY with funding cuts and new software coming on line over the horizon.

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(continued from previous page)

the witness ceremony are completed. The Commissions have not broadcasted its decision dates at this time.

Previous garrison studies have identified billing errors, late fees, rate increases and incorrect rate classes among other utility discrepancies. CUP has found discrepancies and inequalities at garrisons lacking utility expertise and the personnel. It is a tool that can increase the garrison's ability to identify, negotiate and change providers to reduce its energy consumption cost.

Garrisons that have used CUP report that they like its results. Because of its positive outcomes, CUP is being improved, including increased staff training and Army Regulatory Law Office coordination, and the programming of \$550,000 to increase the number of CUP sites to 10 in FY 2013.

Headquarters IMCOM is prioritizing targeted garrisons to maximize their energy cost savings opportunities.

The Army's ability to execute projects quickly is hampered by lack of funds. This situation, together with the ongoing

instability of commodity prices, creates a challenge that is difficult to overcome and makes it hard to take advantage of savings opportunities. As a result, implementation of energy savings and cost avoidance opportunities identified through CUP require timely response to capture those savings.

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Army Family Housing and Solar-Ice-Storage

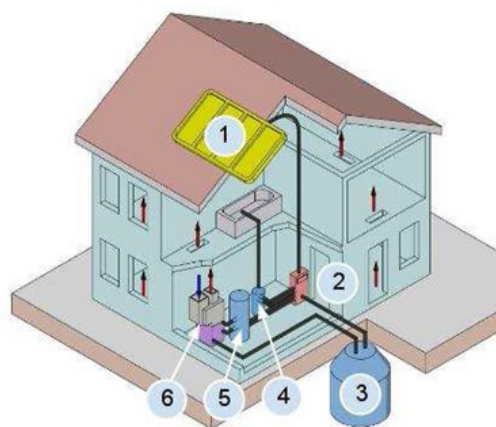
by Robert Arlt and Jonathan W. Winkler

Solar-Ice-Storage is a new technology included in the next Army Family Housing (AFH) construction project in Europe. These 3 and 4 bedroom Junior Non-Commissioned Officers (JNCO) homes will be built at Rose Barracks in Vilseck, Germany, will be ready in 2015, and will meet Army and DOD service standards. The Solar-Ice Storage system generates heat from the air, the earth and the sun by using electrical energy.

They will look like normal homes on the outside, however, Solar-Ice-Storage technology included in the homes will far exceed the baseline standards from ICEE 2009, making these home far more energy efficient and cost effective to heat. The project will also comply with German energy performance mandates. This ensures that the primary energy usage of the building does not exceed the stringent levels in the German Energy Performance Standard and that a minimum of 15 percent of the heating energy for the homes is generated from renewable resources. Each home will be equipped with advanced utility meters to collect detailed energy consumption data for all utilities and energy used by the homes.

The ice storage system is based on a 12 m³ underground concrete tank with 2 built-in heat exchangers (one connected to the heat pump, one connected to solar air absorbers at the roof). It is filled with regular tap water and buried in the garden. The solar air absorbers on the roof collect heat from the ambient air and solar radiation. This energy will be stored in the tank or transferred directly to the heat pump. The ice storage absorbs additional heat from the surrounding earth. Hereby the heat pump has two sources – the ice storage tank and the solar air absorbers at

- 6 Key Components:**
1. Solar collector: Provides Solar / Air energy.
 2. Control unit: Solar Ice Manager unit.
 3. Ice Storage: Stores the Sun/Air/Earth energy in water or Ice.
 4. Hot water storage: Provides hot water throughout the year.
 5. Heating buffer.
 6. Heat Pump: Heats your house with free, clean and renewable energy.



6 key components of Solar-Ice-Storage System

the roof.

Solar-Ice-Storage Heat Pumps have many similarities to a traditional geothermal heat pump system. One main advantage of the solar-ice-storage system is that it does not require drilling holes into the earth or the extensive digging necessary to install large-area geothermal collectors. In these typical systems, the thermal heat source/supply is the earth itself into which pipes are placed to transfer the heat to and from the heat pumps. Typical geothermal systems require special permits due to the risks of impacting groundwater should piping leak. With Ice-storage, official permits are not necessary because the large storage tank contains all required heat transfer piping. The pipes are not exposed to movements in the earth or corrosion, and even if a pipe leaked, there would be no impact to the groundwater.

One point needs to be added here. The system is not heating with ice, but ice results from the transfer of heat from the storage tank to the home. During the thermodynamic heat transfer process, the heat pump removes energy from the underground tank to the buildings. In turn ice will develop in the storage tank and this is how the system is designed to work. The transition from liquid water to a solid releases as much energy as is stored during the reverse process of melting. For an ice storage tank of 12 cubic meters, this

is equivalent to the energy of 32 gallons of heating fuel. Even after the tank contents have been frozen, enough heat is still provided from the solar air absorbers and the earth to allow the heat pump to reliably and economically heat the building. Free energy from the sun and the outside air is then channeled back into the tank to thaw it again.

This system works most effectively and efficiently with a floor heating system, a ventilation system with a heat recovery and an insulated air-tight building envelope, including perimeter insulation installed along the edge of the floor slab. Each home unit will be equipped with M-Bus utility meters allowing for networking and remote readings that will be automatically stored in a central database that will be used to monitor the energy performance of these homes.

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Acronyms and Abbreviations	
AFH	Army Family Housing
DOD	Department of Defense
ICEE	International Conference on Electrical Engineering
JNCO	Junior Non-Commissioned Officers



Net Zero Water Installations Subject of Regional Assessments

by Elisabeth Jenicek

A series of recent studies sponsored by the Office of the Assistant Secretary of the Army for Installations, Energy, and Environment identified threats to long-term water sustainability at Army installations. The assessments evaluated total water supply and demand in regions where installations are located. These analyses—completed on a watershed level—include estimates of both installation and regional water demand as compared to total regional supply.

Studies were completed for four Net Zero Water installations, bringing to a total of 19 installations where assessments were completed. While each installation is unique in water regime and stressors, several common issues emerge that are steering Army policy and informing investments in water topics research and support for installations.

The U.S. Army Engineer Research and Development Center completed regional water sustainability assessments for Aberdeen Proving Ground, Maryland; Camp Rilea, Oregon; Fort Buchanan, Puerto Rico; and Tobyhanna Army Depot, Pennsylvania. Each analysis included several alternate future scenarios. These scenarios define changes that might take place on the installation and within the region over a 30-year time frame with the potential of affecting the regional water cycle. Water supply and demand were projected for each scenario, both for the installation and the region.

The factors that affect water supply and demand tend to be regional in nature. For example, geographic and geologic

conditions, weather and climate, population growth, sustainability of ground or surface water sources, and water-intensive industries are unique to each study region. These studies, however, revealed some common themes among the range of study installations. Recurring water issues include:

- Metering of individual building water use: This is a continuing challenge, both from a technology and a cost perspective. Installed meters require connection to a centralized monitoring system as well as a program of inspection and calibration to ensure accuracy. Metering reimbursable customers is the responsibility of the Directorate of Public Works so water bills are often estimates based on rules of thumb.
- Privatization: Privatized activities on Army installations give rise to several water conundrums. It is difficult to accurately bill reimbursable customers (such as morale, welfare and recreation) without metering individual buildings or use. It is also challenging to ensure that all facilities on post comply with water-efficient technologies and practices when long-term contracts span several generations of Army water policy.
- Irrigation and unaccounted for water: It is often difficult to identify exactly where water is being used that is not returned to the wastewater stream. Ideally this water is returned to the water cycle through irrigation; however, it is possible that water leaks and other losses account for a significant proportion.
- State Code: The ability to implement some water efficiency measures varies from state to state depending on code, both plumbing and health. A case in point is in the use of gray water to meet some water needs. Up to one-quarter of building water needs, and significant irrigation loads, can be met



A Tobyhanna Army Depot employee uses leak detection technology as part of a regional water assessment. U.S. Army photo

by other than potable water. This is encouraged by policy such as Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance.

- Regional Planning: Addressing most water issues requires a regional approach. Management of this shared resource cannot be effectively carried out in isolation. Installations must work cooperatively with federal, state, and local agencies.

Threats to installation water sustainability are numerous and their effects are accelerating both in severity and geographic extent. Understanding the issues that influence water supply and demand is the first step in planning for continued access to adequate sources. Ongoing water studies include examinations of water marketing and water rights to help ensure adequate resource supplies to support installations.

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Acronyms and Abbreviations	
CFS	cubic feet per second
DPW	Directorate of Public Works
ERDC	Engineer Research and Development Center
MWR	Morale, Welfare and Recreation
NZW	Net Zero Water
OSAS (IE&E)	Office of the Assistant Secretary of the Army for Installations, Energy, and Environment



Taking Ownership in Recycling to Reach Net Zero Waste 2020

by Christine Luciano

Every day tons of trash ends up at Fort Hood, Texas, landfill. You'll find plastic bags, cardboard, metal cans and a lot of other items that could have been recycled. With more than 1,800 blue recycle containers throughout the installation, it is too easy to find one for your recyclable goods.

"In the short two years since Fort Hood has been a pilot fort net zero waste 2020, the installation has made tremendous progress by cutting the amount of trash going into the landfill by about 20 percent," said Brian Dosa, director of Public Works. "Fort Hood leaders, commanders, recycling coordinators and the community are working together to see what is doable, learn new ways to reduce, repurpose and recycle products and pass on lessons learned to the rest of the Army."

Net zero waste 2020 challenges Soldiers, Civilians and their Families to rethink their lifestyles, make changes to their daily routines, and take advantage of the services available.

Fort Hood's environmental programs and services have led to a reduction in the amount of garbage headed to the landfill. This year's diversion goal is 50 percent. "We discovered that 48 percent of what goes into the landfill are items that we can recycle. Units need to take ownership of not only their recycling containers but trash containers," said Jennifer Rawlings, net zero waste project officer.

Recycling coordinator, Sgt. Jason Cray from 3rd Brigade Combat Team, 1st Cavalry Division emphasized that leaders have to reach out to Soldiers to have a bigger impact on the installation's efforts towards net zero waste. "We need first line leaders to do walk-thrus on recycle and trash containers; leaders should provide rewards to the best Soldiers in their unit and develop an incentive program that is fun, easy and creates competition," Cray said. "This will help get individuals responsible for their actions and be

proactive themselves."

The 41st Fires Brigade's leadership emphasizes that awareness, education and training and enforcement of standards are key elements for Soldier accountability and ownership of environmental stewardship. "If we are going to meet the net zero waste goal, it starts with changing the culture. In order to foster this change, there needs to be command emphasis," said Maj. Charles Kean, executive officer, 41st Fires Brigade. "If commanders are talking about net zero waste 2020 at the brigade, battalion and company level, it translates into the Soldiers' actions. Once Soldiers develop the ownership, then they come up with innovative solutions and help become better stewards."

Texas National Guard's 36th Infantry Division has also been reducing their carbon footprint while training at Fort Hood. CW2 Jennifer Phinney, brigade food service advisor, took ownership of the brigade's recycle program and leads by example to encourage other Soldiers to recycle. Phinney's food service team provides meals for about 500 Soldiers. The packaging for the food products generates thousands of pounds of cardboard, tin cans and plastic that can be recycled. When the brigade first arrived for training, the recycle plan was non-existent. Phinney worked with her team to set up a trash and recycle detail. The result was a significant decrease of 16,000 pounds to 3,000 pounds going into the landfill.

Ownership of net zero waste and recycling is widespread in military, civilian and contractor activities. Army spouses and Families are also helping to spread the message. Carol Parker, an Army spouse and Fort Hood Family housing community mayor, encourages her residents to lead by example and promote recycling. Parker's community was one of two Family housing communities that conducted a recycle pilot for single stream last year. The pilot was successful and recycling efforts doubled. As a result, additional recycle containers



Texas National Guard's 36th Infantry Division Soldiers unload cardboard at the Fort Hood recycle center.

were purchased and distributed to all 6,430 homes in Family housing. Parker and other residents no longer have to separate plastic bottles and glass containers from old newspapers and soda cans on recycling day. Instead all recyclables are in one 96-gallon recycle container.

"As a Family we are trying to encourage residents to go green because Fort Hood has made it easy for Families to recycle," said Parker. Soldiers and civilians like Kean, Phinney and Parker are leading the way in an installation wide effort to recycle, repurpose and waste less and support net zero waste.

To reach net zero, everyone has a role to play.

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Christine Luciano is the environmental outreach coordinator, DPW, Fort Hood. 🌱



Bulletin Describes High-Carbon Content Wastes to Improve Military Site Rehabilitation

by Dick L. Gebhart

The U.S. Army Corps of Engineers has issued a new Public Works Technical Bulletin that provides information about the types, management, and use of high-carbon materials for amending soils and improving vegetative growth on Army lands that require rehabilitation and revegetation to reduce erosion, improve wildlife habitat, and sustain training realism. PWTB 200-1-122, "Use of High Carbon Waste Material for Soil Restoration," is posted on the internet at http://www.wbdg.org/ccb/ARMYCOE/PWTB/pwtb_200_1_122.pdf

The U.S. Army manages over 12 million acres of land for military training, and these lands routinely require rehabilitation and maintenance to support training activities, control water and air pollution, protect biological diversity, and sustain ecosystem services. Often plant populations are greatly reduced or altered due to any number of land uses including military training activities, agricultural outleasing programs that may include timber harvesting and crop production, and construction or site maintenance operations. Soil structure is often changed as vegetation is removed, topsoil erodes, and soil horizons are mixed and compacted. Because of limited funds for land management in recent years, land managers need low energy, cost-effective technologies to that can be applied to damaged sites to improve rehabilitation success through improved revegetation practices using native plant species.

Perennial warm season grasses are well adapted to harsh environmental conditions, including low nitrogen availability, which gives them a competitive advantage in poor soils. These grasses are advantageous to vegetative reclamation projects because they develop extensive root systems that



Revegetation success two years after use of high-carbon waste materials as soil amendments. Photo by Ryan Busby, ERDC-CERL

penetrate deep into soils, providing a very effective safeguard against erosion. Even though these species are well suited to reclamation plantings, establishment in nitrogen-rich soils may be impeded by weedy species that easily out-compete them and cause stand failure. The use of high-carbon waste materials as soil amendments, however, can limit nitrogen availability to weedy species and provide a competitive advantage to native vegetation, thereby improving revegetation success. Sources of high-carbon wastes include, for example, shredded paper, paper mill waste, wood chips, composted/uncomposted organic materials, and yard wastes.

In addition to land rehabilitation and revegetation benefits associated with the use of high-carbon content waste materials, diversion of significant amounts of materials away from landfills for potential recycling and reuse are also possible. The Department of Defense ("Strategic Sustainability Performance

Plan," dated July 11, 2011, established a goal that 50 percent of non-hazardous solid waste be diverted from the waste stream by 2015 and thereafter through 2020. In 2008, the U.S. Army spent an estimated \$68 million to dispose of various forms of waste at landfills and by incineration. Because of potential cost savings, efforts are being made to identify and increase the use of alternative disposal methods that have a payback. This PWTB can assist in achieving these goals by identifying materials that can potentially be diverted away from the waste stream towards beneficial reuse in land rehabilitation efforts.

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Acronyms and Abbreviations	
PWTB	Public Works Technical Bulletin



Neitzel Retires After 40-Plus Years at Fort McCoy

by Rob Schuette

Fort McCoy's director of the Directorate of Public Works has retired after a career at the installation that spanned 41.5 years. Few people working at the installation have the in-depth perspective of their organization than Darrell Neitzel.

Neitzel started his career at the entry level at then-Camp McCoy Dec. 27, 1971, as an electrical engineer intern for DPW. Neitzel has served in a number of positions in DPW, including chief of the Utilities Division, and chief of the Engineering Plans and Services Division before becoming the director of Support Services in 1994.

"I have more perspective of how DPW

worked and the installation operated because of my background and mentoring," Neitzel said. "My education started when I was hired by Art Jahnke (chief of the Utilities Division)." Jahnke taught him many practical and technical engineering skills, Neitzel said. Another important figure in the DPW, Harold Needham, the DPW deputy director, also was instrumental in his development because he insisted Neitzel attend many schools and training to further his education, especially in the management field.

Neitzel said one of the biggest accomplishments/satisfactions for him came in 1982 with the development of a comprehensive Master Plan and Land Use Plan which helped Fort McCoy to become a Total Force Training Center. Neitzel's most-memorable events included the installation's mobilization missions, the A-76 (Commercial Activities) study decision to have many of the DPW and DOL functions performed by contractors, and the Cuban refugee mission — an intense mission that spanned several months in 1980.

Even though Neitzel said it took him several years to realize the importance, the renaming of Camp McCoy to Fort McCoy in 1974 was a significant event. "The old-timers here at that time were very excited because it changed Fort McCoy's stature in the eyes of the Department of the Army and Department of Defense," Neitzel said. "It also marked the beginning of the large expansion of training after that."

Before 1974, the units that came to train at the installation were here for summer training. After the installation attained fort status, the focus was more on units in the area training at the installation, another sign the installation was becoming a Total Force Training Center, he said.

McCoy's off-post missions have evolved over the years, he said. The installation acquired a few off-post missions in the



Darrell Neitzel

mid-1970s. The Base Realignment and Closure actions from the mid-1990s also added to Fort McCoy's mission, as the installation picked up the remaining Fort Sheridan, Ill., Devens, Mass., etc., support missions after those installations closed. McCoy also served as a parent organization to Fort Hunter Liggett and Parks Reserve Forces Training Area in California. Overall, the DPW's off-post missions lasted about 30 years, from about the mid-1970s to the first decade of the 2000s, he said.

As his service wrapped up, Neitzel said the installation is in good hands and has a bright future.

"My hope is a number of the young people hired at Fort McCoy over the past few years continue on with the strong tradition of caring for the Soldiers and continue to use our Strategic Business Plan to guide them into the future," Neitzel said. "I've greatly enjoyed my work here."

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Rob Schuette is the assistant editor of *The Real McCoy*, Fort McCoy's installation newspaper, Fort McCoy Public Affairs Office.

Acronyms and Abbreviations	
DOL	Directorate of Logistics
DPW	Directorate of Public Works
Ill.	Illinois
IMCOM	Installation Management Command
Mass.	Massachusetts

From the editor

Fort McCoy leadership was notified through Installation Management Command channels July 2 that Neitzel had been selected as the recipient of the 2012 William C. Gribble, Jr., DPW Executive of the Year Award. This award recognizes managerial excellence at the highest levels of Installation DPW management. The IMCOM DPW Annual Awards Program recognizes the superior performance and outstanding contributions of Army Public Works employees and organizations. Seven individual and two organization awards are presented.

*Kathy Gerrity-Milibrum
Managing Editor*



The USACE Hydroelectric Design Center

by John Etzel

With the increasing attention being placed by the Army and Federal Agencies on meeting renewable energy mandates it is important to know about the many resources available across the Army to support meeting these requirements. One important resource in the hydropower technology area is the U.S. Army Corps of Engineers Hydroelectric Design Center (HDC).

Established in 1948 to support new hydroelectric development on the Columbia River, the Hydroelectric Design Center is the Corps of Engineers' National Center for Expertise in hydroelectric and large pumping plant engineering services. Conventional hydropower provides 6% of the nation's electricity needs; of that 6 percent the Corps of Engineers owns and operates facilities that produce 22.9 percent of the nation's hydropower. There are 75 major hydropower plants located throughout the Corps of Engineers' national footprint; from Florida to

Washington and South Dakota, among other locations with 376 total generating units. These Corps generating units have a generating capacity of 21,060 Megawatts, or enough to power 15 million average U.S. homes. The employees at HDC play a critical role in supporting the planning, engineering, construction and operation of these facilities.

The Hydroelectric Design Center is headquartered in Portland, Oregon with a forward office located in Mobile, Alabama. There is a staff of approximately 120 employees who are technical experts in electrical, mechanical, computer, civil and structural engineering as well as economists. This staff of technical experts is available to provide planning, engineering, construction and operation support to customers as needed on a reimbursable basis. The team at HDC is continuously working with industry to maintain technical relevance and has recently developed and presented a webinar that highlights the emerging micro-hydro technology.



400 MW capacity Dworshak Dam, located in Idaho.

Whether one is maintaining an existing hydropower facility or considering the installation of a new micro or small-scale hydropower technology, the technical staff at HDC is available to provide consultation and support.

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Acronyms and Abbreviations

HDC	Hydroelectric Design Center
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Going Green: Ancient Technology Helps Corps Build Green at Presidio

by Carlos J. Lazo

The Egyptians did it. So did the Romans. Now, at the Presidio of Monterey in California, the U.S.



A 35,000-gallon tank is put into place next to a new general instruction building under construction at the Presidio of Monterey, Calif., March 25, 2013. (U.S. Army Photo by Jack Davies/Released)

Army Corps of Engineers Sacramento District is using the same ancient practice to meet modern-day, green-building requirements. The district is harvesting rain water and storing it in large, underground cisterns for future use at a new school building under construction at the installation.


"Monterey has forever been in a drought situation and water is a premium down there," said Alan Morita, with the Sacramento District's design branch. "In using rain water – water that would have been going down the hill...and flushed out to the ocean – we've actually cultivated that water and used it for functional purposes."

The new general instruction building, designed to achieve Leadership in Energy

Acronyms and Abbreviations

GIB11	General instruction building Fiscal Year 2011
GIB09	General instruction building Fiscal Year 2009
LEED	Leadership in Energy and Environmental Design

and Environmental Design certification, is for use by the Defense Language Institute, the primary center for foreign language instruction by the Department of Defense. The project, named GIB11, is the final of three general instruction buildings the Sacramento District has built for the installation.

Three cisterns will be used for the project: two 20,000-gallon tanks 



Fort Sill Seeks to Treat, Reuse Water

by Marie Berbera

The state of Oklahoma is in extreme drought conditions. Fort Sill leaders are aware of the situation and are working toward using available water more efficiently by recycling it. “If the lakes go dry around here we can’t buy more water. So, unless you have a way of filling up that lake, which rainfall is the only way, once we’re out of water -- we’re out of water,” said Chris Brown, Directorate of Public Works energy manager.

Brown is working with American Water Enterprises (AWE) to use effluent, or discharge from the sewer plant, treat it and reuse it to water the grass and keep buildings climate controlled. AWE contracts with Fort Sill to manage its water treatment and sewer systems. “The big picture is you’ve got Lake Lawtonka that’s where our drinking water comes from. So, we pull the water out of Lawtonka, and it’s fed through a series of pipes to Fort Sill. Fort Sill uses it, sends it down the sewer to the treatment plant, we treat it and then discharge it into the creek. We want to take a portion of that discharge that would go to the creek and reuse it on post,” said Brown.

AWE owns the first treated effluent permit issued in Oklahoma. As part of a pilot project, the effluent is currently used two different ways to heat and cool Building 5900 on the training side of post. Once that water passes through, it’s poured into Cache Creek.

There are two different ways DPW uses water to control building temperatures. One is through a cooling tower. The tower works similarly to how an air conditioner uses coils and a fan. The fan draws in heated air from the room and that air flows over a chilled coil. The fan then blows the cooler air back into the room. In the cooling tower, it simply replaces air with water. A pipeline goes from the building to the tower. The tower sends the water to a chiller to cool it off and sends it back to the building.

The other system DPW puts in place is a geothermal system or heat pumps. It consists of vertical wells underground, and the earth heats and cools the water. Brown said while this system works, he wants to change it to fit this new efficient pipeline system which will take up less land and have less of impact on the area. He said it will run like any other water main, but will use effluent instead of extra water.


“In a nutshell that one project over there we’re getting an energy savings and a

water savings out of it on water that we’ve already bought and used once,” said Brown. Currently, the Basic Combat Training starships alone use 7 million gallons of potable water a year to control the heat and air. Once the new system is in place, that water will be saved by using treated effluent instead.

“We have another project which hasn’t started construction yet, but we have the funds for it. It’s in design now to continue that same pipeline going from Building 5900, taking it across the highway to the Polo Field and then up to the cemetery. We’re going to use that water to irrigate those areas-just to water the grass. We use regular water to do that right now,” said Brown.

He said even in drought conditions that irrigation system won’t draw down the lake or use extra water. “If we can use the same water two or three times with the drought going on; to me it’s just the right thing to do.”

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Marie Berbera is a writer/editor for the Fort Sill Cannoneer which is part of Fort Sill’s Public Affairs Office. 

Acronyms and Abbreviations

AWE	American Water Enterprises
DPW	Directorate of Public Works

(continued from previous page)

and one 35,000-gallon tank. The dual 20,000-gallon tanks will collect rain water from the parking lots surrounding the building to supply an irrigation system. The 35,000-gallon tank will collect water from the building’s roof to supply its plumbing system. “We’re getting our water from the roofs,” said Morita, “and, on demand, we are using that to flush the toilets – it’s a non-drinking source of water.”


The bulk of non-potable water will be used for flushing, and the rain water

system will help meet 80 to 85 percent of that demand, according to Morita. The cisterns were placed at the site in April 2013 and are expected to be fully operational by the time construction of GIB11 is complete in late 2014. The cisterns will also be able to support the neighboring GIB09 building, a similar project completed by the district in 2012. “GIB09, already completed, requires now only the hookup of the tank, which is already on site,” said Morita.

Achieving LEED certification for both buildings required a high level of collaboration between the Sacramento

District interdisciplinary team that designed them, according to Morita. “All disciplines have to work together to achieve LEED certification,” said Morita. “We all had a part in achieving the recognition of LEED-Silver for GIB09. And we all, as a team, are working to achieve the LEED-Silver for GIB11.”

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Carlos J. Lazo is a public affairs specialist with the U.S. Army Corps of Engineers at the Sacramento District. 



HQ IMCOM Energy Awareness and Conservation Assessments

by Ralph Totorica

Each year, the Headquarters, Installation Management Command (IMCOM), centrally funds energy awareness and conservation assessments at IMCOM installations. The assessments help IMCOM garrisons identify no-cost and low-cost energy savings opportunities and provide energy conservation awareness training for the garrison leadership and community. The intent is to capture quick wins through energy savings opportunities that the garrison can execute immediately with little to no investment costs.

The assessment is a valuable tool available to garrisons to evaluate their current energy consumption patterns and increase energy awareness throughout the installation community. In addition, the

assessments assist garrisons with meeting the requirement to perform energy audits on 25 percent of covered facilities each year. HQ IMCOM conducts 18-24 assessments per year, with a goal to get each garrison on a four-year rotating cycle.

The assessment consists of a one-week site visit by a representative from IMCOM and an energy consultant under contract for technical support. The week starts with introductory meetings with the Garrison Commander and DPW. Following discussion with the installation energy manager to discuss objectives and expectations, the contractor reviews utility cost and consumption data and identifies buildings to be surveyed in coordination with the energy manager. The contractor then conducts four days of building surveys, including a night assessment, looking for energy saving opportunities with a focus on low-cost measures and O&M improvements that can be easily implemented with in-house resources.

Following the building surveys, the contractor prepares site-specific presentations with details of the surveys and presents observations at training sessions for building energy monitors, commanders and staff, and DPW personnel. A good turnout from the installation community at the presentations is key to success of the effort.

In addition to identifying specific energy conservation measures, the assessment also offers a great opportunity for the energy manager to increase energy awareness through their Public Affairs Office. The energy awareness and conservation assessment concludes with an out-brief to the Garrison Commander and Directors.


The assessments are conducted at no cost to the installation; however the host installation must provide support to escort the contractor and provide access to facilities to be surveyed. To obtain additional information or to request an energy awareness and conservation assessment for your installation, contact the



A typical energy conservation measure using skylights to provide adequate lighting during daytime

author at the POC information below.

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Ralph Totorica is a general engineer in the Energy and Utilities Branch with the Public Works Division at Headquarters, IMCOM. 

Acronyms and Abbreviations

IMCOM	Installation Management Command
HQ	Headquarters

Top 5 Easy to Correct Energy Hogs

1. Validate building daily and weekend occupancy schedules, plus holidays and check the night setback heating and cooling temperature setpoints.
2. Verify heating and chilled water resets are being used to avoid over-cooling or heating.
3. Ensure kitchen exhaust hoods are shut down when not in use.
4. Place equipment controls in Automatic – if they don't work in Auto, get them repaired. This avoids VFD motor controllers running full speed, air handler fans on all night, etc.
5. Eliminate daytime exterior lighting; repair photo-sensors, place entry lights on motion/photo sensors, replace HPS lamps with CFLs.

Top 5 Things Occupants Can Do to Help Energy Conservation

1. Place thermostats at proper temperature settings.
2. Program thermostats for daily and weekend occupancy schedules, including night setback temperatures.
3. Turn off office lights, shut down computer and peripherals, turn off other personal items such as fans, chargers, radio, coffee pots, adapters, etc. Better yet – put them on a power strip and just turn off one switch when leaving.
4. Turn in service order for entry doors that don't fully close or windows and doors that have gaps due to missing weather-stripping.
5. Remove unauthorized items, including; space heaters, window air conditioners, personal refrigerators, and computer UPS.



Interagency Group Promotes Synergy for Advanced Power Research

by Tarek Abdallah and Allen Hefner, Jr.

Federal agencies seeking to comply with the nation's many energy mandates rely in part on advanced power research that addresses energy storage, power distribution and control, energy conversion and renewables. A volunteer group committed to identifying unnecessary duplication of efforts and decreased efficiency within federal energy research programs is the Interagency Advanced Power Group. The IAPG, which will celebrate its 65th year of existence in November 2013, is a jointly sponsored organization with participation from the U.S. Army, Navy and Air Force, the National Aeronautics and Space Administration, Department of Energy, and National Institute of Standards and Technology. The IAPG provides a forum for interchange among government professionals in advanced power research.

The group emphasizes collaboration, coordination and innovation through open communication among federal agencies. As a solely volunteer-driven organization, IAPG's success is driven by members' interest in furthering power research and ensuring synergy among various agency programs and interests. These power experts are dedicated to fostering innovation and research through collaboration to meet future challenges. Current membership has identified the following focus areas of focus as part of a recent strategic planning process:

- Identifying emerging growth areas
- Addressing opportunities and gap areas for further efforts
- Limiting redundancy and duplication of research among agencies

IAPG membership consists of the steering group and multiple working groups. The steering group serves as the leadership body of the IAPG, helping develop the strategic plan and annual focus areas. A small group represented by representatives from each member agency, the steering group helps guide the overall direction of the group and addresses

large-scale concerns such as research focus areas, resources and funding, and long-term planning. IAPG steering group chair Edward Shaffer has seen the organization's impact grow over the past few years with a continuing focus on federal funding.

"The importance of a collaborative organization like the IAPG is critical in these economic times of limited resources and fiscal responsibility," Shaffer said. "The communication between multiple agencies and their research efforts provides an avenue to ensure efficiencies and limit duplications."

The primary avenue for information exchange exists within the working groups. Current working groups include chemical, electrical systems, mechanical and renewable energy conversion. These working groups identify primary focus areas and meet on a regular basis to synchronize research efforts. The working groups may add sub-groups (panels) as new technologies emerge. IAPG members are welcome to participate in as many working groups as their agencies find beneficial. Allen Hefner, NIST, serves as the electrical

Acronyms and Abbreviations	
GAO	Government Accountability Office
IAPG	the Interagency Advanced Power Group
Ill.	Illinois

systems working group chair, said he has seen the benefits of collaboration within the IAPG, noting that "The IAPG's work in coordinating development of technology and standards for energy conversion and power distribution are truly beneficial to the energy and economic needs of our nation."

A recent IAPG success story was detailed in a Government Accountability Office report. The GAO audited six federal agencies for potential inefficiencies and funding allocation specific to energy storage research. The large number of energy storage characteristics and uses makes it difficult to evaluate investment. IAPG technical and program personnel worked with the GAO team to convey their knowledge of energy storage investments, which allowed the GAO team to make informed decisions and assess agency duplications.

IAPG ORGANIZATION CHART



Working groups within the IAPG are dynamic, adding new sub-groups as needed to address emerging technologies.



Managing Temporary Water Withdrawal Agreements

by Eileen Williamson

The Missouri River reservoir and its system of reservoirs are operated with a goal of achieving the maximum multi-purpose benefits for eight competing congressionally authorized purposes under the Flood Control Act of 1944. Those purposes are: flood control, water supply, irrigation, navigation, hydropower, recreation, fish and wildlife and water quality control. Because water supply is one of the eight authorized purposes, it is equally weighed among the other seven purposes when making and implementing operational decisions.

According to project manager Tiffany Vanosdall, applications for entering into agreements for temporary water withdrawal are processed in alignment with the Corps' obligations under the 1944 Flood Control Act. How the Corps operates the integrated dam and reservoir projects of the Missouri River as a system is guided by laws and historical data presented in the operational objectives of the Missouri River Master Manual.

During periods of flooding and drought, support to some of the authorized purposes is altered. For example, spring pulse releases for fish and wildlife didn't take place in 2010 and 2011 because the reservoirs were evacuating water from the flood control pool. Operations were also altered from

2005 to 2007 and other times because the reservoirs were operated under drought conservation measures.

"The Missouri River Master Manual provides guidelines for operations during situations like flood and drought. These conditions were considered in the Final Garrison Surplus Water Report, which determined that the authorized purposes would not be significantly affected by the water withdrawal amount proposed," said Vanosdall. The Final Garrison Surplus Water Report anticipates that the maximum anticipated 10-year demand for municipal and industrial water out of Lake Sakakawea is 100,000 acre-feet per year (combination of existing water users plus new water users). Many of the new water requests have come from the oil and gas industry.

To put the amount of water into perspective, approximately 875,000 acre-feet of water evaporates from Lake Sakakawea alone every year, more than eight times the maximum anticipated demand for municipal and industrial water supply under the agreements for temporary withdrawal of water. To date, the Corps has only approved one temporary water withdrawal agreement in the amount of 4,950 acre-feet. Ten other withdrawal applications are currently being processed.



Garrison Dam temporary storage

The Garrison Report used an 80-year period of record, which included the dustbowl period of the 1930s and 1940s to determine the amount of water that could be made available on a temporary basis (a period of up to five years) for withdrawing water from Lake Sakakawea. A five-year extension could be granted, if needed.

Annual usage reporting by each applicant who withdraws water from Lake Sakakawea is currently required to help ensure water users do not exceed their water agreement or water right. The Corps also monitors average annual system runoff inflows into the Missouri River system to ensure inflows do not fall below the drought period experienced during the dust bowl. "Monitoring users' usage as well as average inflows puts us on alert to identify a trigger to determine whether we need to review agreements or cease processing applications to prevent adverse impacts to the congressionally authorized purposes," said Vanosdall.


For 2013, system storage in the Missouri River mainstream reservoir system remained below normal at the start of June despite above normal precipitation in the upper basin. Drought conditions vary across the basin. "The Missouri River has experienced these types of ebbs and flows for decades and analyses

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The IAPG is always looking for new members interested in participating on one or more working groups. Membership is open to all employees of the member agencies, including installation Directorate of Public Works energy coordinators. On occasion, participation opportunities also arise for individuals within the power research field that work in industry or academia. Becoming a member is a simple process: interested persons can complete an application online at the IAPG website,

<https://iapginfo.org>.

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Alternative Financing and the President's Performance Contracting Challenge


by Randy Smidt

Alternative Financing through performance contracts such as Energy Savings Performance Contracts (ESPC) and Utility Energy Services Contracts (UESC) provide the Army an alternative means of financing and implementing energy and water projects when appropriated funds are limited or not available. Energy Service Companies (ESCOs) and Utilities may finance energy projects using private sector funding and are repaid from the value of the energy savings realized from their investment over the life of the contract term, up to 25 years for ESPCs and up to 10 years for UESCs. The ESCO may perform energy evaluations/audits, design energy projects, implement/construct energy projects, and provide operations and maintenance on the installed equipment. Since ESPCs are performance contracts, savings guarantees are validated annually through measurement and verification (M&V). Payments made to the ESCOs are based on these performance guarantees and are withheld or decremented if savings guarantees are not met. Because many

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of drought periods were conducted and considered before the release and approval of the Final Garrison Report by the Assistant Secretary of the Army," said Vanosdall. "Municipal and industrial water supply users have been withdrawing water from these reservoirs since the system was put into place. The primary difference between now and then is the need to enter into water withdrawal agreement."

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state utility commissions do not allow utilities to offer guarantees, UESC utilize performance assurances such as periodic inspections and commissioning of installed equipment to ensure proper operation.

A Presidential Memorandum (Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings) dated December 2, 2011 announced the President's Performance Contracting Challenge (PPCC), a commitment that the Federal government would enter into a minimum of \$2 Billion in performance-based energy efficiency contracts by December 31, 2013. The Army's share of that Federal goal was set at \$384 million of new third party investment. This initiative, along with budget pressures on appropriated funds for projects and an increasing awareness of ESPC and UESC have almost doubled the Army's execution rate for these types of contracts. As of August 13, 2013, Army ESPCs in addition to Utility Contracts under this initiative totaled \$252 million of the \$691 million awarded by the entire Federal Government. With approximately three months left in the execution period the Army still has \$132 million of investment to get awarded to meet its goal. It is imperative that projects stay on track since even one or two projects slipping off their timelines will cause the Army to miss the goal.


The Army will not sacrifice quality for speed, however. Identifying any issues to the project facilitator as early as possible and resolving them in a timely manner will help projects continue through approval to award. Be aware of project status and milestones so that requests for input are answered and proposals do not sit waiting for review and approval. Because of the nature of this initiative, the Army must report implementation status up through the Office of the Secretary of Defense to the White House Council on Environmental Quality on a monthly basis.

Acronyms and Abbreviations

ESCOs	Energy Service Companies
ESPC	Energy Savings Performance Contracts
M&V	Measurement and Verification
PPCC	President's Performance Contracting Challenge
UESC	Utility Energy Services Contracts

Historically, the Army has been the most aggressive user of ESPCs and UESCs with the largest program in the Federal Government. Since 1992, over \$1.7 Billion of third party investment has been awarded for Army ESPC and UESC projects. With proposals from Congress and industry for a follow-on goal of \$1 Billion of third party investment in Energy and water projects (translated to \$150 million to \$200 million per year for the Army), the program could grow by over fifty percent in the next five years. With budget pressure and lower amounts of appropriated funds available for projects, alternative financing is already being looked upon to do more. Projects can include (this list is not all inclusive): Boiler improvements, chiller improvements, utility monitoring and controls systems, heating ventilation and air conditioning improvements, energy-efficient lighting improvements and controls, building envelope modifications, steam and water distribution systems, electric motors and drives, distributed generation, renewable energy systems, energy/utility distribution systems, water and sewer conservation measures, electric peak shaving or load shifting measures, retro-commissioning, and process or manufacturing improvements.

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Energy Project at West Point Includes Awareness Campaign

by Robert Mackey

Energy managers at the U.S. Military Academy at West Point are building energy conservation awareness through a new program included as part of a larger Energy Savings Performance Contracting project.

The \$26.6 million energy ESPC project, awarded by the U.S. Army Engineering and Support Center, Huntsville, includes six building improvements: lighting upgrades, a new energy management control system, mechanical upgrades, kitchen hood improvements, steam system repairs and upgrades, and a photovoltaic system that will showcase renewable energy. The total project investment will be paid from guaranteed savings over an 18-year contract term.

ESPCs can be a means to increasing the size and scope of energy efficiency, water conservation and renewable projects when combined with capital improvement monies or planned Sustainment, Restoration and Modernization funds. Additionally, ESPC projects provide a performance guarantee, which brings additional value to any SRM project while accelerating movement toward sustainability goals and mandates.

Yet another benefit to incorporating an



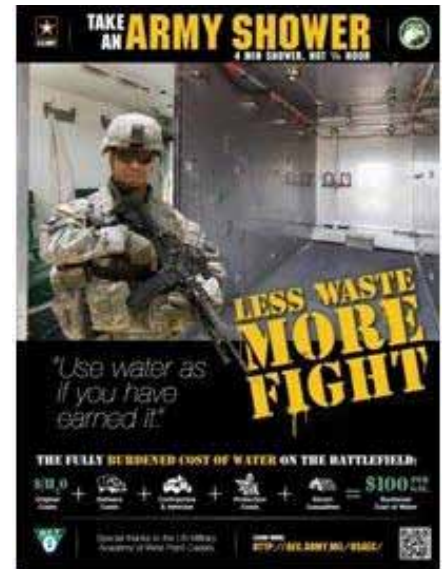
Cadet holding theme card

ESPC program into SRM-funded work is the “people-side” of performance contracting. Leveraging the building retrofits to engage building occupants can create a substantial Energy Conservation Measure - the people - creating additional energy savings over and above traditional ECMs. As an Army Net-Zero energy pilot garrison, a unique people-based ECM is being tested at the U.S. Army Garrison West Point, N.Y. “We recognize that West Point is training the leaders of tomorrow, and they can instill this pattern of behavior throughout the Army,” said Will Irby, the Huntsville Center ESPC Program Manager.

West Point officials agreed to include a people-based energy conservation measure – known as Energy Conservation Through Behavior Change® -- that was included as a pilot and part of the larger project. No savings are being claimed through this pilot, but the impact to West Point is significant, instilling energy conservation in the next generation of leaders. Cadet energy environmental officers partnered with the U.S. Army Environmental Command to develop the “Less Waste More Fight” slogan to envelope all energy and environmental efforts at West Point.

Together with Col. Russell Lachance and Lt. Col. Mark Smith, West Point, and Robert Kirgan, PhD, AEC, the team created and provided materials to reinforce this message as a “pilot within a pilot.”

The cadets proposed a custom pack of playing cards as a vehicle for communicating four main themes about which they were focusing their efforts; energy, waste, water and benefits. They generated many taglines including “Kill the light to win the fights” and “Conserve Water, Sustain Life” to be printed on the individual cards. They also wanted the cards to be used for more than the usual games, so a large puzzle was included in the background to add another dimension of utility to the cards. Information was also included highlighting the efforts and



mission of the AEC.

The team also created large-scale posters to be hung in the halls of West Point. Several of the ideas behind the posters were suggestions of cadets, either an energy environmental officer or a cadet participating in a marketing class. Much emphasis was placed on the connection between realities at home and on the battlefield and the motivations behind cadet actions.

From this, “The fully burdened cost of water on the battlefield” was developed. Not only does the Army pay the financial costs of purchasing the water used on the battlefield, but the delivery costs, contractors and vehicles for transportation, protection costs, and escort casualties all increase the cost of water. This deeper message was placed on the water poster and a similar message was featured on the energy poster as “The fully burdened cost of fuel on the battlefield.” This additional focus elevates the importance of

Acronyms and Abbreviations	
AEC	Army Environmental Command
ESPC	Energy Savings Performance Contracting
N.Y.	New York
SRM	Sustainment, Restoration and Modernization



Army MATOC - First Awards Under \$7 Billion Renewable Energy Contract

by Debra Valine

The U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, working with the Army Energy Initiatives Task Force (EITF), today awarded the first of its kind Indefinite Delivery Indefinite Quantity (IDIQ) Multiple Award Task Order Contracts (MATOC) for the first technology under this contract to support renewable energy on Defense Department installations.

The first MATOC award announcement for geothermal was made in May 2013. Announcement of awards for the remaining technologies, solar, wind and biomass, are anticipated for staggered release through the end of calendar year 2013. The total amount for all awards under the Renewable and Alternative Energy Power Production for DoD Installations MATOC will not exceed \$7 billion. The MATOC will be used to procure reliable, locally generated, renewable and alternative energy through power purchase agreements (PPA). The \$7 billion capacity would be expended for PPAs to procure energy over a period of 30 years or less from renewable energy plants that are designed, financed, constructed, operated and maintained by contractors using private sector financing.

Five companies awarded contracts for use in competing and awarding PPA task orders using geothermal technology. The contracts provide a three-year base with

seven one-year options, for a total ordering period of 10 years. Having these contracts in place will expedite the acquisition process for future projects.

Huntsville Center, working on behalf of USACE with the Army's EITF, issued the Request for Proposal for the \$7 billion Renewable and Alternative Energy Power Production for DoD Installations MATOC on Aug. 7, 2012. These contracts will place the Army one step closer to meeting the Congressionally mandated energy goal of 25 percent production and consumption of energy from renewable sources by 2025 and improving installation energy security and sustainability while remaining cost conscious.

"In our current fiscal environment, attracting third-party money to build renewable energy production facilities that will allow military installations to purchase energy at a pre-determined rate without building, owning and maintaining the facility is the right thing to do," said Col. Robert Ruch, Huntsville Center commander. "Increasing energy security is a top priority for DoD and Army leadership, and this effort will lead to enhanced energy security and sustainability for our installations."

In April 2012, the White House announced the Defense Department was making one of the largest commitments

Acronyms and Abbreviations	
DoD	Department of Defense
EITF	Army Energy Initiatives Task Force
IDIQ	Indefinite Delivery Indefinite Quantity
MATOC	Multiple Award Task Order Contracts
PPA	Power Purchase Agreements
USACE	U.S. Army Corps of Engineers

to clean energy in history, by setting a goal to deploy 3 gigawatts of renewable energy – including solar, wind, biomass or geothermal – on Army, Navy and Air Force installations by 2025. That is enough energy to power 750,000 homes. The Army's goal is 1 gigawatt of that total. These goals support the broader DoD goal to enhance installation energy security and reduce installation energy costs.

By awarding these contracts, the Army will increase its agility by streamlining acquisition processes to develop large-scale renewable energy projects that use private sector financing. This approach will help speed overall project development timelines to ensure the best value to the Army and private sector.

Mr. John Lushetsky, the EITF's executive director, spoke about the role of the EITF in helping the Army meet its renewable energy goals. "To reach the Army's goal of deploying 1 gigawatt of renewable energy by 2025 will require a different way of doing business with the private sector. The issuance of the MATOC is a clear milestone for us, and the significant interest we've seen from industry indicates that we are on the right path. The EITF has worked closely with the Huntsville Center to make the MATOC a streamlined and agile tool for the government to procure power from large scale renewable energy projects."

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conservation and environmental responsibility.

Supplemental pieces included a brochure that educates readers about the impacts of their personal actions at home and on the battlefield with regard to energy usage. A light switch cover reminding users to turn off the lights when leaving a room has also been developed.

With all of these efforts focusing on

personal responsibility for energy use and the environment while exposing the consequences of misuse, West Point is making great strides toward the Net Zero goal.

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Army Awards Second Technology Under \$7 Billion Renewable Energy MATOC

by Debra Valine

The U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville, working with the Army Energy Initiatives Task Force, awarded Multiple Award Task Order Contracts Aug. 27 to a group of 22 solar technology contractors.

Solar is the second of four technologies being awarded under a \$7 billion Renewable and Alternative Energy Power Production MATOC for DoD Installations. The first technology, geothermal, was awarded in May 2013. The remaining technologies – wind and biomass – will be awarded on a staggered schedule by the end of the calendar year.

The contractors qualified through this process will be eligible to compete for future projects within their approved technology area for any renewable energy

task order issued under the MATOC by the Army or Department of Defense. The MATOC leverages the DoD authority to contract up to 30 years under Title 10 USC 2922a.

“The MATOC represents a major step forward in the procurement of renewable energy for the Army and the other Services that will significantly reduce timelines by streamlining acquisition processes. Utilizing the MATOC in this way will assist the EITF in meeting the Army’s goal for one gigawatt renewable energy by 2025 as well as additional Congressional mandates,” said John Lushetsky, EITF’s executive director.

This MATOC will be used to procure reliable, locally generated, renewable and alternative energy for DoD installations through power purchase agreements. The \$7 billion capacity will be expended for

Acronyms and Abbreviations	
DoD	Department of Defense
EITF	Energy Initiatives Task Force
MATOC	Multiple Award Task Order Contract
PPA	Power Purchase Agreements
USACE	U.S. Army Corps of Engineers

PPAs to procure energy during a period of up to 30 years from renewable energy generation systems that are designed, financed, constructed, operated and maintained by contractors using private sector financing.

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Building a Sustainable Future

by Amanda Price

Fort Stewart/Hunter Army Airfield (FS/HAAF) maintains the balance between the military mission and the environment by working to ensure that sustainability principles are integrated into daily operations and emphasized at all levels. Through its ISO 14001 conformant Environmental/Sustainability Management System (E/SMS), FS/HAAF has coordinated the development and implementation of processes that seamlessly integrate into the Installation’s Strategic Plan. Aligned with the Lines of Effort of the Installation Management Command’s Campaign Plan, major objectives of the E/SMS are sustaining the mission, as well as natural and fiscal resources. The E/SMS stresses pollution prevention, natural resource conservation, compliance with all Federal, state, and local laws and regulations, and continuous improvement in environmental stewardship.

The Installation’s E/SMS is a strategy for change that has succeeded in designing, developing and implementing sustainability goals through a cross-functional team that works closely with Command to ensure environmental quality and sustainability are integrated into the Installation’s strategic planning process. The sustainability team is broken into four Process Actions Teams which target processes/activities that may have problematic environmental conditions, elevate issues needing a higher level of attention, and help disseminate sustainability requirements across the Installation. These are feed into Strategic Planning Quality Management Boards (QMBs) which focus on requirements directly linked to improving the Installation’s ability to support mission readiness while sustaining its resources.

For example, the objective of FS/HAAF’s Energy and Water Efficiency and Security QMB is to create an energy

Acronyms and Abbreviations	
ACUB	Army Compatible Use Buffer
E/SMS	Environmental/Sustainability Management System
FS/HAAF	Fort Stewart and Hunter Army Airfield
ISO	International Organization for Standardization
QMB	quality management board

and water efficient Installation by holding users accountable, modernizing facilities, installing new technologies, and leveraging partnerships that provide an increased level of energy and water security. In support of this objective, FS/HAAF is minimizing and controlling irrigation times, replacing equipment with newer high efficiency models/technologies, and developing/using alternate water sources. FS/HAAF is also using biomass as an energy source. Recovering and chipping woody debris from timber harvests provides fuel for the energy plant’s wood-fired boiler. Since ➤



Net Zero Waste - Sorting It Out

by D. Ben Chandler, Jr.

The Army's Net Zero Waste (NZW) policy challenges installations to eliminate their landfill waste. An installation's waste stream is a remnant of its processes and procedures, as well as its efficiencies and opportunities for improvement. To effectively reduce waste, an understanding of the activities that produce it are necessary. Installation activities, such as fleet management, training, facility maintenance, mess halls and office operations, produce a wide variety of wastes and by-products, including brake fluids, grease, spent ammunition, latex paint, concertina wire, organic waste, paper and toner cartridges. Systematically documenting the composition, quantity, and disposal methods of these items provides a snapshot of current system conditions, which can pinpoint opportunities for improved performance in the future.

A waste sort involves the physical collection, sorting, and weighing of a

sample from an installation's waste stream. Common waste sort objectives include:

- Determine the composition and quantities of waste being generated
- Measure effectiveness of existing waste management systems
- Identify opportunities for improving systems and strategies
- Collect baseline data for measuring the effectiveness of future waste minimization strategies

A waste sort is the first step towards managing the diverse waste streams generated at an installation. The three-step process provided below has been used at locations throughout CONUS to characterize non-hazardous DoD waste streams and serves as a helpful guide for those seeking to understand their waste streams and actions needed to achieve the Army's NZW Initiative.

Pre-Waste Sort Actions: Usually 1-2

Acronyms and Abbreviations	
CONUS	Continental United States
DOD	Department of Defense
HASP	Health and Safety Plan
MTCO2E	Metric Tons of Carbon Dioxide Equivalent
NZW	Net Zero Waste
RS&H	Reynolds, Smith and Hills, Inc.

weeks before a waste sort, the team begins contacting the facility officer to discuss temporary requirements (work area, waste collection procedures, etc.) needed to conduct the waste sort. Waste sort safety considerations are addressed in a Health and Safety Plan (HASP), which is prepared specifically for the waste sort location. Equipment needed includes industrial strength clear plastic bags, scales, tarps, paperwork – forms, duct tape, batteries, shovels, brooms, towels, and a camera. Personal protective equipment, such as safety glasses, gloves, coveralls, and dust masks, are also required. ➤

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2011, approximately 24,410 tons of this renewable fuel source have been used, contributing to a 27 percent reduction in FS/HAAF's energy intensity since 2003.

Similarly, the Installation Readiness QMB effects good stewardship of resources to provide FS/HAAF with the infrastructure and support services needed to remain highly effective. Specific objectives include solid waste reduction, and partnering with local communities to reduce impacts on regional landfills by recycling. With command emphasis placed on Solid Waste Management through incorporation of the E/SMS, goals were initiated resulting in an extremely successful Installation Qualified Recycling Program recycling approximately 9,000 tons per year. The self-sustaining operation generates revenue to offset program management costs, but also extends the life of the

on-post landfill by diverting recyclable materials. FS/HAAF has increased diversion from 20 percent in FY07 to 45 percent in FY12, and received its ninth consecutive Keep America Beautiful Certification.

A focus on protection of natural resources, threatened and endangered species management actions are also monitored. Of the many achievements resulting from these actions, the most notable (arguably) was the Installation's red-cockaded woodpecker population reaching recovery status in 2012. This triumph can also be attributed to the Installation's land conservation efforts through the Army Compatible Use Buffer (ACUB) program. ACUB encourages continued management and compatible use of lands neighboring the Installation boundary and is an invaluable tool in sustaining FS/HAAF's training lands. Since 2002, FS/HAAF's ACUB program has permanently protected 28,000 acres.

FS/HAAF recognizes the importance of educating and involving Soldiers, Families, Civilians, and local communities in its quest for sustainability and utilizes conferences, social media, newspapers, professional journals, events, tours, and other outlets to ensure its sustainability message reaches far beyond the Installation's boundaries. Augmenting the QMB process, the Installation's National Environmental Policy Act review process identifies and addresses concerns for all projects proposed on the Installation and ensures that sustainability is fully integrated in every aspect of the Installation's decision making process.

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Focusing on Reducing Energy Consumption and Cost During Fiscal Uncertainty

by Frederick Nassar

Energy is an essential resource for the Army to perform its mission. It is often a resource that is taken for granted. Whether it is turning on the coffee pot in the morning or switching on a piece of equipment necessary to perform our job, we expect sufficient, uninterrupted energy to power the equipment and technology we use every day. As part of the military's industrial base, the Red River Army Depot's (RRAD) maintenance and remanufacturing mission utilizes processes that are by nature energy intensive. Each unit of energy consumed has an associated cost that affects our bottom line. In 2011, the Army accounted for approximately 36 percent of DoD's facility energy consumption (according to the Department of Defense Annual Energy Management Report, Fiscal Year 2011, <http://www.acq.osd.mil/ie/energy/library/FY.2011.AEMR.PDF>) translating into

nearly 1.5 billion dollars in cost. While the access to relatively cheap and abundant energy has given RRAD a competitive edge over the years, energy experts expect energy cost will continue to increase. The

2007) require agencies to reduce energy intensity by three percent per year through 2015 for a total reduction of 30 percent from the baseline year of 2003. In order to comply with EISA 2007 and to reduce overall energy cost, RRAD has or is in the process of implementing over 18 million dollars in energy conservation measures (ECMs) through an Energy Savings Performance Contract (ESPC).

Project	Area Affected	Annual Savings
Energy Management Control System	701,633 sq. ft.	\$63,527
HVAC System Upgrades	851,353 sq. ft.	\$94,888
Lighting Upgrades	511,463 sq. ft.	\$44,373
Steam Distribution Repairs/Upgrades	295 steam traps	\$136,460
Compressed Air Optimization	Depot Wide	\$129,251
Boiler Plant Optimization	Boiler Plant	\$577,157
Biomass Boiler (25,000 lbs/hr)	Boiler Plant	\$544,205

The ESPC is a vehicle which allows an organization to leverage third party financing to fund and implement cost effective ECMs. The savings realized by the ECMs are used to repay the loan and result in a cost neutral solution for the organization. A summary of the projects that have been completed or are ongoing under the ESPC are:

As the projects come on line it is projected that RRAD will meet the EISA 2007 targets. More importantly annual energy savings will exceed 1 million dollars per year. Additionally, over 100 advanced "smart" electrical meters have been installed throughout RRAD and will be connected to the energy management control system implemented under the ESPC. This will allow real time

energy and its associated cost that we may have taken for granted now must be looked at more closely in light of shrinking budgets.

Energy conservation and efficiency policies and laws have been in place for several years. Notably, the Energy Independence and Security Act (EISA

Acronyms and Abbreviations	
DOD	Department of Defense
EISA	Energy Independence and Security Act
ECM	Energy Conservation Measure
ESPC	Energy Savings Performance Contract
RRAD	Red River Army Depot

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Waste Sort: Once at the facility, the team checks-in and briefs the facility officer on the day's activities. After the briefing, the team reviews the HASP and then begins to setup the work area. Paying special attention to local barriers, the team establishes staging areas and the weigh station as close to the waste container(s) as possible. The team begins by removing waste from the container, sorting material into pre-established categories (i.e. recyclables, compostables, etc.) and weighing each waste category. Photography is essential to vividly communicate waste sort results. Once the collection containers are empty and all material has been

weighed and categorized, the team returns the sorted material into the designated disposal container (i.e. dumpsters, rolloffs, compactors, etc.) and returns the work area to a clean condition. Depending on the size of the facility and work area conditions, waste sorts take from four to six hours to complete.

Data Analysis and Reporting: Once the data is synthesized and analyzed the report is prepared with photographs to document results. Photographs are essential to motivating personnel to reduce the volume of waste they are generating. The initial sections of the report document the methodology and limitations, such as a dumpster being emptied the day before the sort. The mid-section of the report details

the waste types sorted and their weights. The final portion of the report discusses the effectiveness of current waste management practices and recommends improvements on the basis of the NZW Hierarchy.

The waste sort is integral to developing an effective Roadmap to NZW. Over the last six years, these proven techniques helped one of our DoD clients average more than \$5 million in net revenue through improved waste management.

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Thoughts on Decision Analysis from a Sustainability Perspective: A Focus on Processing Organic Material

by S. Lynn Odom

When one hears that an analysis is needed to support a decision, it has become common habit to immediately consider preparing either a Cost-Benefit Analysis (CBA) or Life Cycle Cost Analysis (LCCA). How the scope of that analysis is defined is crucial to understanding the tangible and intangible, apparent and hidden, short- and long-range cost so the decisions made based on this evaluation leads to the ability to truly partake in the parallel and complementary benefits of the decision. When due diligence is forfeited because of lack of time to devote to appropriate analysis, hidden cost manifest themselves later in the life cycle of the project or initiative as high-priority “hot” issues that pilfer financial and manpower resources from the most diligently scrutinized and well-intended budgets.

It is understood that the intended result of any decision is not to burden the organization with inadvertent consequences simply because decisions are made while juggling numerous requirements with limited information and resources. The overarching desire is to have all IMCOM Installations remain a valued asset to the Department of Defense (DoD) and the Army into the future. Completing a ‘value-add’ analysis prior to briefing a decision maker demonstrates the briefers thorough knowledge of his/her

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electrical monitoring as well as provide trending analysis capability so that high energy usage can be targeted for further energy conservation and efficiency measures. Eventually, this real time data will have visibility at the Department of Army level through its enterprise data management system. This effort will directly support the Army’s overall strategy for reducing energy usage.

While these ECMs will reduce RRAD’s energy footprint, a stewardship



S. Lynn Odom, Ph.D.

request and is essential when the decision authority is making financial commitments in a time of limited dollars to spend or people to perform tasks.

Now to extrapolate this concept onto an area of focus ... when facing a decision on the most appropriate area in which to direct or redirect mission critical resources in order to meet, say, a federal requirement to divert non-hazardous solid waste by 50 percent,¹ it is conceivable that a very simple data analysis would provide quantified objective evidence identifying the large source generators on an IMCOM installation. This opens a door to developing the partnerships needed to work towards the collective Army waste diversion goal. Then through waste categorization, the types and quantities of non-hazardous solid waste can

culture must be cultivated to sustain and improve on conservation measures. Focusing now on energy conservation will not only help RRAD to survive during these times of fiscal uncertainty, but ultimately to thrive as RRAD becomes more competitive through energy conservation and efficiency measures.

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Excerpt from Executive Order 13514: “Federal agencies shall ... eliminate waste ...

(e) promote pollution prevention and eliminate waste by:

(i) minimizing the generation of waste and pollutants through source reduction;

(ii) diverting at least 50 percent of non-hazardous solid waste, excluding construction and demolition debris, by the end of fiscal year 2015;

(iii) diverting at least 50 percent of construction and demolition materials and debris by the end of fiscal year 2015;

(iv) reducing printing paper use and acquiring uncoated printing and writing paper containing at least 30 percent postconsumer fiber;

(v) reducing and minimizing the quantity of toxic and hazardous chemicals and materials acquired, used, or disposed of;

(vi) increasing diversion of compostable and organic material from the waste stream;

(vii) implementing integrated pest management and other appropriate landscape management practices;

(viii) increasing agency use of acceptable alternative chemicals and processes in keeping with the agency’s procurement policies;

(ix) decreasing agency use of chemicals where such decrease will assist the agency in achieving greenhouse gas emission reduction targets under section 2(a) and (b) of this order; and

(x) reporting in accordance with the requirements of sections 301 through 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. 11001 et seq.); ...”



be identified. For some tenants on an Installation the largest portion of their non-hazardous solid waste is categorized as organic material, so much so – that in some cases it makes upwards of 40-45 percent of the overall Installation’s non-hazardous solid waste stream. Having this quantified data, makes the decision to direct resources to improving capabilities to process organic waste materials an easy one – “Yes” – and it makes intuitive sense to tackle the reduction of your largest sources, first. “But” to what project or initiative are the financial and manpower resources directed? ... Composting? Which type of composting? Aerated windrow? In-vessel? ... Digesters? Dehydrators? ... Where? Large scale centrally located-centrally managed? Small scale at the source of generation? Thus an evaluation of ‘several key criteria’ is needed to assist in making a somewhat blurred interpretation more clear by determining the most appropriate method of processing organic material at IMCOM Installations knowing ‘one size does not fit all.’

To come full circle the analysis encompassing these ‘several key criteria’ that would be used to evaluate the most appropriate and advantageous way to process ‘no longer useful’ organic material should be detailed enough yet broad enough such that the analysis itself can be transferred to other focus areas.

So, what is meant by analysis from a sustainability perspective? BLUF: A sustainability analysis is providing the decision maker with a simple mosaic of (mission critical resource) considerations to reveal a clearer depiction of the life-cycle costs and benefits rather than the currently accepted minimalist interpretation of what

is for the most part a stand-alone capital cost – along with some form of estimated O&M cost, and possibly, expected energy cost calculated to provide present value. A sustainability analysis could entail a phased approach, in which decisions are built upon one another from broad to more narrow depending on level of application. Regardless of application level, the approach and decision criteria included cross-link the principles of sustainability (Mission Excellence, Community Collaboration, Environmental Stewardship, and Economic Benefit) with IMCOM mission critical resources (Human Capital, Infrastructure Assets (a.k.a. Man-Made or Built Capital), Natural Capital, Information/Information Technology, Financial Capital, and Energy).

Now back to looking at alternatives for organic material processing that aligns our efforts and on the ground conditions in the direction of meeting overall legal requirements, i.e. 50 percent diversion by 2015. One set (or level) of decision criteria would look at whether the ‘solution’ would be better located in a central location or at the source of generation. Once that decision is made, another more detailed set of decision criteria would look at specific alternatives.

Some of the decision criteria associated with Human Capital could include

1. the potential to partner within our community, both inside and outside the fence-line [Community Collaboration];
2. the ability to draw on institutional knowledge and technical expertise through effective team work; or
3. quantity and quality of personnel needed by the alternative being considered.

Mission Excellence considerations could include land requirements, such that future testing-training capabilities would be negatively impacted [Natural Capital]; or the ability to offer training for Soldiers

The USACE Public Sustainability page contains links and other items of interest about “Going Green”


<http://www.usace.army.mil/Missions/Sustainability.aspx>

such that this knowledge, methodology or technology can be transferred to field operations [Human Capital]. Financial Capital resources can be enhanced if the alternative being considered offers an opportunity to turn what was once considered a ‘waste’ into a value-added product – a bag of mulch or ‘garden tea’ that can be sold for revenue or used on the installation such that a requirement to purchase that resource is reduced.

A sustainability analysis would, as stated earlier, provide information beyond the commonly accepted capital cost, present valued life-cycle O&M and energy costs. Ultimately, the decision maker is provided a more revealing analysis portraying the current and future aspects and impacts associated with the decisions being made and the ability to meet more than one requirement with the direction² being analyzed.

As the Optometrist says when examining your eyes, “clearer or more blurred ... clearer or more blurred.”

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¹ See an excerpt from Executive Order 13514 referenced in the text box.

² A sustainability analysis is intended to also highlight the capability to meet multiple legal requirement, e.g. when focusing on diverting organic material from the waste stream (i.e., (e)(vi) from the Executive Order 13514 excerpt), opens the ability to also divert 50% of non-hazardous waste stream (e)(ii), and implementing appropriate landscape management practices (e)(vii).

Acronyms and Abbreviations	
BLUF	Bottom Line Up-Front
CBA	Cost-Benefit Analysis
LCCA	Life Cycle Cost Analysis
IMCOM	Installation Management Command
HQ	Headquarters



Net Zero Planner Informs ERDC Laboratory Energy Strategy

by Benjamin Barnes, Matthew Swanson and Michael Case

The Engineer Research and Development Center is supporting Army installations as they seek to reach net zero energy requirements. At the same time, ERDC's laboratories are also working toward reducing energy consumption. To test new energy planning software jointly developed by the Construction Engineering Research Laboratory and Information Technology Laboratory, ERDC launched a study of ITL's facilities. ITL, located in Vicksburg, Miss., is ERDC's largest energy consumer.

Energy Planning Tool

Installation-scale energy planning is a difficult, highly coupled problem; incremental projects that are individually optimal are not necessarily part of the most strategic master plan. It requires simultaneous analysis of hourly heating, cooling, and electric loads, a firm grasp of the possible utility rate structures, and robust cost and performance models of existing and potential energy conversion and energy storage equipment. To meet these challenges, CERL and ITL developed the "Net Zero Planner" software, which suggests energy solutions at the installation scale that comply with legislative or mission requirements. The tool automatically examines non-intuitive solutions while providing faster turn-around than manual, expert analysis.

Using "Net Zero Planner" at ITL

ITL consumes roughly 40,500 megawatt-hours per year, about half of the consumption at ERDC's Vicksburg campus. ITL's site includes 70,000 square

feet of office space, the 10,000 sf Joint Computing Facility, and the 10,000 sf High-Performance Computing Center. The HPC, with its high supercomputing and associated cooling loads, consumes half of the electricity at ITL. These loads are likely to grow quickly as processor density increases. As such, the planning scenario assumed 10 times the current HPC computing load and a corresponding increase in cooling, pump, and blower requirements. With the almost entirely fixed, 24/7 load, the daily load profile was initially thought of as flat..

Since energy security is a dominant planning goal, and since uninterruptable information technology loads are increasing, more on-site generation could offset the cost of additional backup diesel generators, but the heating load alone is too small to justify cogeneration. The cooling and electric loads are well matched, however, prompting investigation of cogeneration with recovered heat driving absorption chillers. Net Zero Planner was used to examine this issue while incorporating all of the characteristics and constraints discussed.

The optimization algorithm examined combinations of many options for natural gas reciprocating and turbine engines, chilled water storage, and absorption and electric chillers. It determined that any possible cogeneration scheme was not life-cycle cost optimal. The best solution made use of high first cost, high-efficiency, electric mag-lev chillers, an outcome that validated recent decisions at ITL. Surprisingly, given the mostly flat cooling demand profile, the optimum also included a small amount of chilled water storage. On closer inspection it was clear that, given the daily variation in load for the office portion of the cooling, a small amount of storage could defer the purchase of an additional chiller. Since the load profile was formerly thought of as "flat," this result would not have been considered in a purely manual analysis.



This aerial shot of ITL at Vicksburg, Miss., shows some of the massive chiller equipment required to cool the supercomputers inside the facility. Photo courtesy of ERDC

To validate the Phase I optimization results, ERDC performed manual analysis for several combinations of absorption chillers and on-site natural gas generators, as well as for the grid-powered, highly efficient electric chillers. This analysis arrived at an energy solution similar to that of the Net Zero Planner, but with a slightly higher cost due to its failure to examine every possible combination.

Phase II dug deeper into the chilled water storage issue. This study used isolated HPC loads and changed the rate structure from the blended rate that ITL is billed to the marginal rate plus demand charge that ERDC pays, allowing for even more chilled water storage opportunities. Despite the fact that ITL's load profile is very nearly flat, it shares a substation with the rest of the campus and a large portion of its electric load can be inexpensively "stored" as chilled water; that is, it has a major opportunity to offset the peak loads from the rest of ERDC's facilities by delaying chiller operation. When Net Zero Planner was run with the more sophisticated utility structure, it recommended chilled water storage twice as large as in Phase I.

Another interesting outcome of Phase II was a result of the new redundancy ➤

Acronyms and Abbreviations	
CERL	Construction Engineering Research Laboratory
ERDC	Engineer Research and Development Center
HPC	High Performance Computing Center
Ill.	Illinois
ITL	Information Technology Lab
JCF	Joint Computing Facility
sf	square feet



Bulletin Describes Automated Radio Telemetry Systems for Tracking, Monitoring Animal Populations

by David Delaney

The Corps of Engineers has issued a new Public Works Technical Bulletin that offers guidance on the use of automated radio telemetry systems for monitoring animal populations. PWTB 200-1-129, "Demonstration and Guidance of Automated Radio Telemetry Systems for Monitoring Animal Populations," is available on the internet at http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215

Department of Defense natural resource managers need defensible data to understand how various animal populations use military lands to address the question of potential military effects (e.g., training maneuvers and noise), while also maintaining the military's ability to train to standard. Conventional field techniques for monitoring animal movement patterns and behavior, such as hand-tracking of radio-tagged animals and direct observation, can be labor-intensive, typically provide only infrequent sampling regimes, are prohibitively expensive, or provide limited data.

The U.S. Army Engineer Research and Development Center's Construction Engineering Research Laboratory investigated automated radio telemetry

systems as an alternative to traditional monitoring methods. Radio telemetry is a powerful tool that has been used for more than 50 years to track animal populations. This technology has provided invaluable life-history data for numerous animal species across many disciplines within the field of wildlife ecology. Automated radio telemetry systems were developed soon after wildlife animal tagging began but have not been fully implemented until recently because of limitations of cost, availability of hardware, and computational power.

It is important that new technology and techniques be developed and tested to monitor animal populations through improvements in data acquisition capability and cost effectiveness. Automated telemetry systems are effective at tracking and monitoring animal populations and can be an important research tool to investigate the activity and movement patterns of multiple animals quickly over large areas of land. A number of research institutions are using this technology and have integrated these systems into their sensor networks.

The PWTB includes appendices that provide background information on various types of radio telemetry systems and their components; describes a demonstration project and the types of systems used along



Transmitters are attached to desert tortoises (male in burrow, female just outside burrow) at Fort Irwin, Calif. The position of the transmitter varies based on size and/or gender of the animal. Photo by Andrew Walde

with results and conclusions; discusses pros and cons of using conventional and automated tracking systems; and offers lessons learned and recommendations for using automated systems under varying circumstances.

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Acronyms and Abbreviations

PWTB	Public Works Technical Bulletin
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constraint enforced; due to HPC's reliability requirements, the optimization was constrained to specify solutions with chilled water capacity 25% in excess of the peak. Without tedious, manual analysis of specific combinations, the algorithm was able to determine that maintaining, but not regularly dispatching, three of the existing air-cooled chillers and decommissioning the remaining one, rather than over-sizing new chillers, provided this redundant

capacity at the lowest life-cycle cost.

Both phases validated ITL's current plan to switch to highly efficient chillers, and manual analysis using well established techniques verified optimization outputs. In addition, the unique capabilities of the optimization revealed that the true life-cycle cost optimum includes some unexpected increases in chilled water storage.

Net Zero Planner 1.0 was released in September of 2013. It has been demonstrated at Fort Leonard-Wood,

West Point Military Academy, and Portsmouth Naval Shipyard, Waterways Experiment station, and Fort Hunter Liggett. For more information, please contact Michael Case, 217-373-7259, Michael.P.Case@usace.army.mil.

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Benjamin Barnes and Matthew Swanson are research mechanical engineers and Michael Case is program manager for installations, all at ERDC-CERL in Champaign, Ill.



Novel Invention Harvests Energy from Mild Breezes

by Carl Feickert and Charles Marsh

The Engineer Research and Development Center invented a field-portable system that can potentially supply power to forward operating bases by capturing the energy in low-speed winds. Called the “Flutter Mallard,” the technology is under development at ERDC’s Construction Engineering Research Laboratory.

Reliable, sustainable and net zero energy use is a top priority for both the Army’s installations and FOBs. The Flutter Mallard approach is to harvest the low energy portion of the wind that is otherwise too weak to be usable for conventional wind turbines of the type used worldwide. Typically these wind turbines are large, tall structures found in large groupings (“wind farms”) capable of generating many kilowatts of “green power.” However, they will not operate efficiently (or not at all) if the wind is too weak, typically for speeds less than about 4 meters per second. Further, they are not feasible structures for FOBs because they present a large, vulnerable target and would pose a severe logistic burden for deployment.

CERL’s researchers found inspiration for the Flutter Mallard from an unusual source. They observed that common venetian blinds, fluttering in the gentle breeze of an open window, could become a prime mover for low wind speed energy capture. Based on this concept, they replaced the rigid blind with an articulated flexible membrane capable of deforming and storing elastic energy in real time. They then affixed to the membrane a pick-up coil and magnet that can convert the vibrating membrane energy into an electrical current. This electrical energy requires power conditioning to compensate for the variability in wind speed, and presented a significant challenge.

The team’s solution was to capture the fluctuating electrical energy along with that from similar generating strips and perform rectification, so that the resulting direct current power can then be stored in a super-capacitor. The super capacitor represents a new class of electrical energy storage devices that can store very high energy densities. The CERL team developed one such device as an outgrowth of their research, which resulted in a patent application.

To determine the quality and availability of low-speed wind resources, the research team continuously measured the near-ground wind velocity at the CERL campus in Champaign, Ill. around the clock (24/7) from late February to mid-July 2012. During this time they amassed more than 400 million data points of wind velocity and confirmed that during evening hours, 70 percent of the average wind speed available was less than or equal to 3 meters per second, with only 46.4 percent available during daylight hours. These results suggest that, for climates similar to those in Illinois, any means of capturing the 70 percent nighttime availability could greatly help supplement a FOB’s low-energy requirements.

To get some measure of the energy available using the prototype Flutter Mallard, CERL compared the active wind capture area (about 0.65 square meters) required of a typical small wind turbine to that of the combined equivalent areas of several Flutter Mallards operating at low wind velocities (less than or equal to about 3 meters per second). The Flutter Mallard generated about 3 watts of power versus the



Cadet Daniel Brownfield works on a prototype Flutter Mallard in an experimental “B-Hut” setting at the ERDC Forward Operating Base Laboratory in Champaign, Ill. Photo by Scott Lux

equivalent of nearly zero watts for an under powered turbine at these low wind speeds. As the research continues to progress, the team’s vision is to replace the vibrating membranes with a highly elastic membrane made out of flexible photovoltaic solar cells. Doing so will capture and store additional available solar energy during the day, which will complement the harvested wind energy. This research effort is part of an ongoing ERDC Center Directed Research project.

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Carl Feickert is a research physicist and Charles Marsh is a senior research materials engineer. Both work at ERDC-CERL, where Marsh leads the Flutter Mallard project. He also serves as an adjunct professor at the University of Illinois at Urbana-Champaign.

Acronyms and Abbreviations

CERL	Construction Engineering Research Laboratory
ERDC	Engineer Research and Development Center
FOB	Forward operating base

Public Works Digest 2014 Theme and Deadline Schedule		
Issue	Theme	Deadline
Jan-Feb-Mar	Master Planning, Housing and Barracks	12-Dec
Apr-May-Jun	Environment and Sustainability	7-Mar
Jul-Aug-Sep	Operations, Maintenance and Engineering	6-Jun
Oct-Nov-Dec	Energy, Water and Waste	30-Aug

Please note – due dates are subject to change. Should a change occur, notification will be posted on the web and sent via email. Thank you so much. editor.pwdigest@usace.army.mil



Utility Rate Intervention can Save Army Installations Money

by Debra Valine

Wouldn't it be great if there was someone you could call if the utility company was trying to raise the cost for energy? If you're an Army garrison, there is.

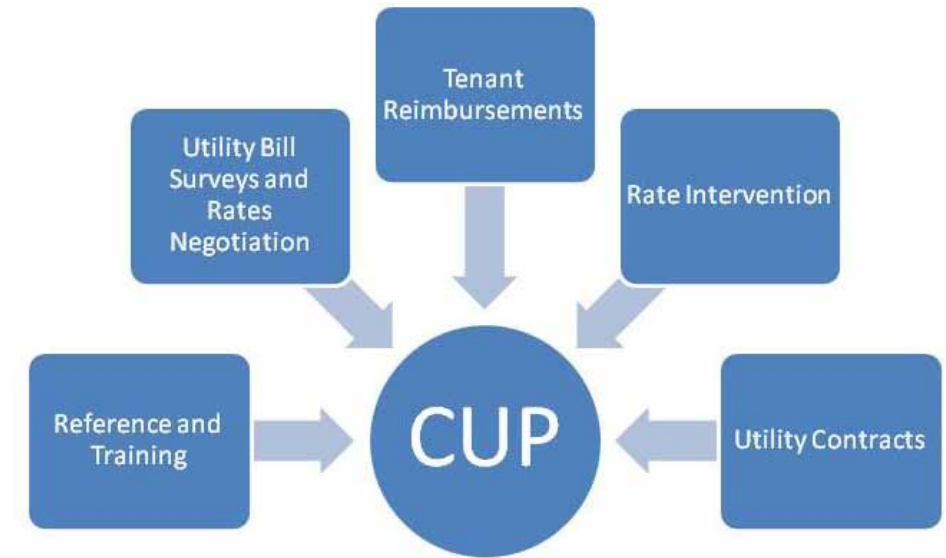
The U.S. Army Engineering and Support Center, Huntsville's Commercial Utilities Program (CUP) is staffed with two public utility specialists who can provide a utility rate intervention and help negotiate a lower utility cost for you. "In 2012, the Army paid approximately \$1.3 billion for utilities consumed at garrisons and other land-holding facilities, Army wide," said Bernard Givan, the Assistant Deputy Army Power Procurement Officer. "The Commercial Utilities Program could save the Army millions per year."

CUP can assist and ensure installations are paying the best utility rates and review utility bills to ensure that utility companies are charging properly, installations are being reimbursed by tenant organizations, taking advantage demand side management options, maximizing peak reductions, etc.

CUP provides the following services and benefits to installations:

1. Utility Rate Intervention – CUP provides technical support to U.S. Army Legal Services and manages utility consultants that provide expert witness testimony before utility regulatory bodies in opposition to rate increase petitions filed by regulated utility companies. CUP can negotiate with unregulated utilities for the best rates available to the installation. The benefits are significant cost avoidance and savings that can be as great as \$7 - \$8 million annually Army wide.

2. Installation Utility Management Evaluations – CUP assists and trains



installation personnel to review utility billings to ensure billings are accurate, use the appropriate rate, exclude taxes for which the Army is exempt and includes any credits, e.g., for power outages. CUP also assists and trains installation personnel to calculate fair and equitable rates for utility consumption by reimbursable tenants. These benefits include tangible savings, cost avoidance and increased funding from non-Army tenants.

3. Utility Rate Surveys – CUP verifies that an installation is receiving benefit of the lowest rate offered by a utility company and if not, recommends steps to be taken to obtain the lowest rate offered; identify other potential utility cost savings associated with improved peak demand reduction and load management, e.g., upgrading substations to accept higher voltage service offered for a lower utility rate, etc. Utility rate surveys contribute significantly to the success of rate intervention and installation utility management evaluations and potential benefits are identified.

4. Negotiate Special Rate Contracts – The Installation Management Reform

Task Force recently recommended that the Army convert its utility contracts that are now tariff based (existing rate schedule) to special rate contracts. CUP can negotiate a special rate design with the utility company whereby if the installation aggressively manages its energy demand to reduce the utility's cost of supplying energy then in return can receive the special rate from the utility.

The Chief of Engineers is the Department of the Army's power procurement officer and is responsible for administration of the purchase and sale of utility services and for policies, engineering, rates and legal sufficiency in connection with all utility services and contracts in which the Army has a monetary interest.

Unlike other initiatives, CUP doesn't reduce energy usage, but reduces the overall cost for energy. CUP and the Army Regulatory Law Office have helped the Army achieve cost avoidance in excess of \$5 million per year since FY09.

FY12 examples of successful interventions include Fort Riley, Kan. and Fort Leavenworth, Kan. where the utility requested a \$650,000 increase in annual ➤

Acronyms and Abbreviations	
CUP	Commercial Utilities Program
FY	Fiscal Year
Kan.	Kansas
Ky.	Kentucky
U.S.	United States



UMCS, Metering Programs Help Military, Federal Agencies Control Utility Use

by Debra Valine

As government agencies are striving to reduce energy costs and consumption and increase use of renewable energy, many turn to the U.S. Army Engineering and Support Center, Huntsville.

Huntsville Center, on behalf of the U.S. Army Corps of Engineers, manages programs that implement energy improvements and make living and working conditions better for Soldiers, civilians and families on military installations and other federal agencies.

One way to reduce energy costs and consumption is to identify energy conservation measures such as upgrades to utility monitoring and control systems. Another way is to be more aware of how much energy an agency is using by installing utility meters.

Huntsville Center's provides Department of Defense and other federal agencies a consistent approach to designing, procuring and installing complex monitoring and control systems. The Army Central Metering Program is installing meters that will measure energy consumption and ultimately be connected through the Meter Data Management System for centralized monitoring.

As of July 2013, the UMCS program was tracking 338 projects with an estimated \$709 million value. Metering

had 93 projects valued at \$175 million.

"We do not sell our program based on energy savings," said Gina Elliott, UMCS Project Management Branch chief.

"However, now that the focus in the past 5-7 years has shifted to increasing utility costs, people are running toward UMCS. A typical UMCS project on a typical military base could save you 17-20 percent. It is quite a bit of savings."

A UMCS focuses on the control of the utilities' mechanical equipment and to reduce energy usage in the smartest and most efficient way for the government. These control systems often apply to utility equipment such as boilers; chillers; heating, ventilation and air conditioning systems; supervisory control and data acquisition; lighting; and alternative energy sources.

"People may think we just change out light bulbs or mechanical equipment, and although we are doing that, the bigger part is utility control," Elliott said. "The local energy managers use their UMCS system to apply control sequences that will reduce energy use. UMCS also assists the facility manager with the ability to monitor and control equipment functions, use and efficiency. The brain of the UMCS system resides in a front-end server; this is where the data is captured and manipulated. Sophisticated software allows this data to be easily viewed on a monitor or operator

Acronyms and Abbreviations

UMCS-MCX	Utility Monitoring and Control System Mandatory Center of Expertise
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workstation. From here the energy or facility manager can make decisions and control the equipment as needed."

Installed utility meters can help control energy consumption by identifying how much electricity and other utilities are being used by location.

"We are installing electric meters on Army installations, and expect to be finished by the end of fiscal year 13," said Alicia Allen, Metering program manager. "Once the electric meters are installed, we will start installing meters to measure water, gas and steam as well. At the conclusion of the program, more than 20,000 meters for various utilities will have been installed on key Army facilities."

UMCS and Metering are two programs managed by the Huntsville Center that help military organizations and other federal agencies monitor and control energy use. Other programs help reduce energy or install renewable energy. Huntsville Center energy programs also remove facilities that are no longer needed and are consuming energy, renovate facilities using state-of-the-art energy improvement methods, and show installation energy managers ways to manage energy resources more effectively.

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Debra Valine is the chief of Public Affairs for the U.S. Army Engineering and Support Center, Huntsville.

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revenue. The final decision/settlement was \$150,000 which provided an annual cost avoidance of \$500,000. Also in FY12, the electric utility servicing Fort Knox, Ky. and Blue Grass Army Depot, Ky. requested an increase of \$810,000 per year. The final settlement was \$540,000 resulting in an annual cost avoidance of \$270,000.

"CUP is a proven dollar saver, which is very important in these times of

sequestration," Givan said. "The annual savings far exceed the cost for running the program. An estimated annual cost of \$2 million to proactively run the program has projected savings of between \$12 and \$24 million per year."

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Debra Valine is the chief of Public Affairs at the U.S. Army Engineering and Support Center in Huntsville, Alabama.



Mobile Application Tracks Water Equipment

by Laura E. Curvey

A newly developed mobile “app” can speed installation water audits, provide accurate data, and lower the cost of tracking equipment. The Mobile Information Collection Application: Water Equipment Tracking -- MICA:WET -- tool is an Android based app that provides a means of tracking water equipment and conservation projects at the building level across an installation.

Water resources are being stressed from a variety of factors, including increased demand and drought, and climate change may further disrupt current and future water availability. Executive Orders 13342 and 13514 require federal agencies to establish baselines for potable water consumption using fiscal year 2007 and reduce potable water intensity per square foot by 2% annually through 2020. The challenge for most installation operators has been to disaggregate the data from the installation-level meter to determine where water demand can be reduced.

In addition to the EO requirements, Section 432 of the Energy Independence and Security Act of 2007 requires federal agencies to also track and evaluate energy and water use on “covered facilities.” These facilities include any building, installation, structure or other property over 50,000 square feet owned or operated by the federal government. The EO states that energy managers “shall complete, for every calendar year, a comprehensive energy and water evaluation for approximately 25 percent of the covered facilities...in a manner that ensures the installation is evaluated every four years.” This mandate



MICA:WET users can expedite field audits using a mobile tablet. Photo by Sarah Nemeth, ERDC

requires energy managers to establish a regular audit program to track the data and plan energy and water savings projects based on an evaluation of the finding.

For an installation, the field work and data tracking have the potential to be overwhelming. However, in recent years mobile computer technology has improved and application-based audits are becoming possible. The light, adaptable platforms provide potential for a variety of uses throughout the military. The benefits from using apps on tablets are speed and elimination of transfer errors. For example, energy audit applications being tested by the National Renewable Energy Laboratory show that time spent collecting data in the field with mobile tablets speeds audits and can reduce overall cost of Level III auditing by 75%. This result shows that it is possible to do Level III audits cheaper than the cost for current Level I and II audits.

WET was created through the collaboration of two Engineer Research and Development Center laboratories, the Construction Engineering Research

Laboratory and the Information Technology Laboratory. ITL’s existing MICA framework was used to create WET, known together as MICA:WET. This tool can be used to capture water equipment information throughout an installation while also identifying potential equipment options useful in facility planning.

MICA:WET allows auditors to quantitatively measure flow rates and photographically inventory water equipment throughout an installation. The collected data is then wirelessly transmitted to a central server located at ITL in Vicksburg, Miss. Downloadable databases are available to users to help estimate yearly or daily water demand at the building level. Algorithms are currently being created to the calculations automatically. The will be based on estimated daily occupancy, time of use throughout the day, and demographics.

MICA:WET is compatible to two established management and optimization programs: BUILDER and the Net Zero Installation(NZI) Tool, both of which were developed at CERL. After the data

Acronyms and Abbreviations

CERL	Construction Engineering Research Laboratory
EO	Executive Order
ITL	Information Technology Lab
MICA:WET	The Mobile Information Collection Application: Water Equipment Tracking
Miss.	Mississippi
NZI	Net Zero Installation
WET	Water Equipment Tracking



Teachers Attend STEM Training in Champaign

by Dana Finney

ERDRC-CERL hosted two STEM teacher workshops during Aug. 7-9 for area secondary school mathematics and science educators. According to John Mudrick, who coordinates outreach efforts for the Champaign site, 18 teachers attended with 11 enrolled in the Math for Robot 1 module and seven taking the Forensic and Discovery module. The training workshops prepare teachers to incorporate the modules into their classroom curricula during the school year.

The National Center for the Advancement of STEM Education provided instructors for the workshops with help from CERL researchers Sanat Bhole (robotics) and Dr. Kensey Amaya and Dr. Rebekah Wilson (forensics). The Math for Robot 1 module required teachers to assemble a Lego robot and program it to complete a point-to-point course. To achieve success, they had to measure parameters such as wheel diameter, course length, and gear size. They then competed with the other teacher teams to determine



CERL's Dr. Rebekah Wilson (left) works with area science teacher Tricia Hozie to compare a bite mark on an apple with teeth diagrams during a STEM teachers' workshop in Champaign during August. Photo by Dana Finney

Acronyms and Abbreviations	
CERL	Construction Engineering Research Laboratory
EDRC-CERL	Engineering Research Department Center
Ill.	Illinois
STEM	Science, Technology, Engineering and Mathematics

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collected by MICA:WET is uploaded to the ITL servers, registered users of the NZI tool can download and use their data to plan efficiency and conservation measures. The algorithms are currently being tested. Currently MICA:WET is able to create databases to be immediately available for download from the NZI tool. Additional work on calculations, once complete, will be able to estimate building-level water use which can then be rolled up into an overall water use

which robot came closest to reaching the endpoint.

In the Forensics and Discovery workshop, attendees analyzed a crime scene that involved two victims, an apple, a car, and a swimming pool. Chris Kerns, a teacher from Heritage Junior High School at Homer, Ill., said, "We're analyzing the blood spatter pattern on the pavement along with skid marks. The first victim was killed by a hit-and-run driver, while the second victim was actually the driver who

profile from an installation-level meter. Both the databases and calculations will be available through the NZI tool. When the algorithms are refined, the MICA:WET tool will be useful in determining tenant use until meters and/or sub-meters are installed.

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Laura Curvey is a community planner at ERDC's Construction Engineering Research Laboratory in Champaign, Ill. 

somehow ended up drowned in a nearby swimming pool."

The apple found at the crime scene had a bite mark from whoever had been eating it at the time of the accident. "By measuring the impression and comparing it to standard teeth diagrams, we're trying to determine if it had been left by the accident victim or the perpetrator," said Tricia Hozie, who teaches at Holy Trinity Catholic Junior High School in Bloomington, Ill.

The module had six stations where teachers analyzed information to provide clues that would ultimately allow them to develop a likely scenario that could be communicated to the media. They presented their findings at the end of the workshop.

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Transforming the Civilian Workforce

by CP-18 Proponency Office

Sequestration. Continuing Resolution. Budget Cuts. Furloughs. These words so often bring negative impressions to the forefront and tend to make us lose site of one very important fact. Our Civilians are critical to the success of our missions and we must not stop training and developing our workforce despite all the challenges we face. One of the key platforms to addressing our way ahead is through Civilian Workforce Transformation (CWT).

The CWT effort was established by the Assistant Secretary of the Army for Manpower and Reserve Affairs - ASA (M&RA). CWT's primary goal is to produce a more "flexible and adaptable" Civilian cohort to better support Army goals and missions today and in the future.

The program's overall intent is to deliver "the right Army Civilian, to the right place, at the right time." CWT is seen as fulfilling our "Social Contract" with our Civilian cohort by addressing the following:

- **Hiring:** Develop an Army strategy to execute targeted recruiting and talent acquisition while meeting the Office of Personnel Management hiring standard of 80 days or less.
 - **Management:** Empower the individual career program manager by funding career support personnel requirements and successfully map 100% of the Civilian cohort to one of 31 Career Programs. Develop and publish Career Maps to include the alignment of Functional Competencies.
 - **Training:** Identify Leader Development Competencies from GS-13 thru SES. Reorganize existing leader development programs to address priority competencies. Pilot Army Career Tracker-Civilian and bring to IOC by Sep 2012.
 - **Sustainment:** Address an Enterprise-based Requirements process that aligns People and Resources.
- The CWT 2012 Report Cites: What is Civilian Workforce Transformation's Pay-

Off?

- **For Civilians** - A defined "roadmap" for success with the appropriate training and development opportunities to facilitate the achievement of career goals within the Army.
- **For Commanders** - The right workforce with the right training and development for the current and future mission needs.
- **For the Army** - A predictable and rational method to articulate requirements and make decisions about resourcing in a fluid environment.
- **For the Nation** - The investment in human capital required to effectively manage the institutional Army now and in the future.

CWT consists of six lines of effort:

- **Line of Effort 1:** Integrate requirements determination, allocation and resourcing processes that identify the civilian workforce capabilities. The intended outcome is to



Vicki Brown, chief of Civilian Training and Leader Development, Army G3/5/7, answers a question about Army civilian training during a speaker roundtable Aug. 7, 2012, at the annual Civilian Training and Leader Development Symposium. Also on the panel were David Rude, chief of Leader and Professional Development at DOD; Anthony Stamilio, deputy assistant secretary of the Army for Manpower and Reserve Affairs; and Gwendolyn DeFilippi, director of the Army Civilian Senior Leader Management Office. (U.S. Army photo by Julia Bobick)



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achieve a flexible and responsive civilian requirements determination process that results in a right-sized, resourced, and aligned civilian workforce to support the Army's strategic priorities.

- Line of Effort 2: Improve civilian workforce lifecycle strategy, planning and operations to enhance mission effectiveness. The intended outcome is to improve strategy, planning, and operations for the development of the civilian workforce to enhance mission effectiveness.
- Line of Effort 3: Establish an integrated management system to support decision making on human capital and allow both leaders and employees to perform their roles more efficiently. The intended outcome is to develop management processes that are integrated and systematic to deliver results that are responsive to Army's changing missions.
- Line of Effort 4: Develop Army Civilian Leader requirements and align civilian leader education, training and experience programs with these requirements and secure resources needed to fund these programs. The intended outcome is deliberate, focused development of Army civilian leaders.
- Line of Effort 5: Execute activities to reform the Civilian hiring process making it quicker, more efficient, and more effective to access a more adaptable, flexible and capable workforce.
- Line of Effort 6: Examine in a holistic manner the role of the Army's civilian workforce in the Army and adapt policy, regulations and doctrine, as appropriate, to account for and promote the roles(s) of the Army Civilian Corps.

So what does that mean for the Careerist and Career Program Offices?

- Expanded alignment to Career Programs: 100% alignment for all Careerists to one of the 31 existing or new Career Programs (CPs) to include Wage

Schedule, Non-Appropriated Funded individuals and Foreign Nationals.

- New self development tools such as Army Career Tracker (ACT) now available for all careerists. www.actnow.army.mil
 - o The Army Career Tracker is an Army leadership development web-based tool developed by U.S. Army Training and Doctrine Command's Institute for Noncommissioned Officer Professional Development.
 - o The ACT provides Army personnel -enlisted, officer and civilian cohorts - a system to manage their professional development and to monitor progress toward training, education, and career goals. The ACT interfaces with more than a dozen source systems in providing data such as assignment history, training history, education history, and certifications.
 - o ACT integrates training, education, and experiential learning into one personalized and easy to use interface, presents users with an intelligent search capability for multiple Army education and training resources, provides users with a more efficient and effective way to monitor their career development and allows Leaders/Supervisors and Mentors the ability to track and advise users with a personalized approach to leadership development.
- Senior Enterprise Talent Management (SETM) is designed to afford selected GS-14 and GS-15, or equivalent Army Senior Civilians, an exception professional development, senior-level educational or experiential learning opportunity.
- Civilian Education System (CES) leadership training for careerists at all levels in their professional development based on current grade level.
- CWT created a centrally-funded school account in which GS-14 and GS-15 Army Civilians are assigned while

Acronyms and Abbreviations	
ACT	Army Career Tracker
ASA (M&RA)	Assistant Secretary of the Army for Manpower and Reserve Affairs
CPs	Career Programs
CP-18	Career Program 18, Engineers and Scientists – Resources and Construction
CSLDO	Civilian Senior Leader Development Office
CSLMO	Civilian Senior Leader Management Office
CWT	Civilian Workforce Transformation
SETM	Senior Enterprise Talent Management

attending Senior Service College in a PCS status.

- A restructured Civilian Senior Leader Development Office (CSLDO)/Civilian Senior Leader Management Office (CSLMO) into one office responsible for the management of professional development of Senior Executives and GS-15s.
- Established a succession planning process for Senior Executive Service.

In this time of fiscal uncertainty Army values our Civilian workforce and will continue to move forward with transformation efforts to ensure that we are developing flexible, adaptable and diverse Careerists to meet the future needs of the Army.

More information on Army Civilian Training and Leader Development: <http://www.civiliantraining.army.mil/Pages/Homepage.aspx>

More information on CWT is available at <http://www.asamra.army.mil/cwt/>

More information on Army Career Tracker at: <http://www.actnow.army.mil>

More information on Senior Enterprise Talent Management: <https://www.csldo.army.mil/SETM/SETMIndex.aspx>

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