

# Public Works DIGEST

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**Energy, Water  
and Waste**

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*One of three 275-kilowatt wind turbines is installed at Fort Buchanan, Puerto Rico. The U.S. Army Engineering and Support Center, Huntsville, Alabama, awarded the \$34 million task order. (Courtesy photo)*



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Management Command  
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## Army readiness needs access to energy, water, land

by Lt. Gen. Gwen Bingham

**T**he Army's No. 1 priority is readiness. Access to energy, water and land enables sustained readiness. As the Assistant Chief of Staff for Installation Management, I lead a team focused on assuring access to these vital resources.

New weapons systems and emerging missions, such as home-station mission command and cyber operations, increase demand for energy, water, and land. Lack of access to these resources delays training, disrupts operations and weakens strategic effects. To meet increased demand, the Army must efficiently use its existing resources, build redundancies, and diversify supplies.

The Army's plan to meet this increased demand is described in our *Energy Security and Sustainability Strategy*. This strategy ensures we will sustain access to needed resources by making informed decisions, optimizing use, assuring access, building resiliency and driving innovation.

My office fully supports the strategy by resourcing utility modernization, energy efficiency, water conservation, and renewable energy projects. In addition to these efforts, the newly published Facility Investment Guidance for Program Objective Memorandum 19-23 now allows Land Holding Commands to submit energy and water security projects that address vulnerabilities.

Installation energy managers continue to help the Army reallocate energy savings to meet other needs. Fort Hood, Texas, reduced its energy intensity 2.5 percent in fiscal year 2015 by implementing conservation measures. Fort Irwin, California reduced its energy consumption 59 percent in 22 buildings by employing innovative energy storage technology.

Installations partner with industry through Energy Savings Performance Contracts and Utility Energy Services Contracting to build redundancy, reduce consumption and improve operations. These types of contracts allow private companies and services to fund initial



*Lt. Gen. Gwen Bingham addresses the office of the Assistant Chief of Staff for Installation Management staff members during a July 7 town hall in the Pentagon. Bingham assumed the role of Assistant Chief of Staff for Installation Management on June 30. (Photo by Spc. Tammy Nooner)*

capital investments using repayments from utility savings. Energy Savings Performance Contract programs have 613 task orders at 95 installations, representing \$2.45 billion in private sector investments since the mid-1990s. This initiative provides the Army flexibility in using scarce resources for critical requirements.


We cannot diversify alone; we need the support of other federal agencies, state and local government, and industry partners. Partnerships are critical in today's fiscally constrained environment with shifting requirements and emerging missions. Sharing resources benefits the Army, host communities, state and federal agencies, and industry by developing infrastructure and renewable energy resources. The Army is collaborating with the Hawaiian Electric Company on the development of a 50-megawatt multi-fuel/biofuel generation plant at Schofield Barracks, Hawaii. The project will enhance the resiliency of the Oahu electrical grid, and provide Schofield Barracks, Field Station Kunia and Wheeler Army Air Field with secure and renewable energy generation during emergencies.

On Aug. 11, the Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack and I proudly presented the Secretary of the Army's Energy and Water Management

Awards to the most innovative teams leading the way in resource conservation, redundancy, and diversification. We recognized 13 individuals, small groups and installations from the Army, Army Reserve and Army National Guard for their achievements in energy efficiency, energy management and water conservation. More work must be done if we are to counter the growing demand for energy, water and land in the next 30 years. We must preserve future choices through superior knowledge, technologies and execution.

Team ACSIM is excited to support the Army's *Energy Security and Sustainability Strategy*. We know the quality of the Army's Installation Management Community, and that collectively, we will find new ways to use energy, water, and land resources effectively, build redundancies, and diversify supplies. Together, we will contribute to improving Army readiness.

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# USACE puts focus on supporting installation energy, sustainability goals

by Lt. Gen. Todd T. Semonite

As the 54th Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers, I am proud to lead 90,000 engineer Soldiers within the active-duty Army, Reserve and National Guard, and 32,000 Civilians who are science, engineering and technology professionals within the Corps of Engineers.

We are energized by the great strides we are making to ensure energy security, conserve water, and reduce waste, because our progress promotes readiness, the Army's No. 1 priority.

I have challenged every professional serving within the Army Corps of Engineers to leverage his or her expertise to do three things: Strengthen the Foundation, Deliver the Program, and Achieve Our Vision so together we provide engineering services that strengthen our nation's security, energize the economy, and reduce risks associated with disasters more efficiently and effectively than ever before.

Within our 2017-2020 Campaign Plan you see objectives and goals related to installation resiliency, energy, cybersecurity, and achieving energy security and sustainability goals. We are relentless in pursuing these objectives because we get it, we understand how crucial it is to support Army installations, contingency bases, and energy and environmental programs to enable Army Operations and care for warfighters and their families.

A little more than two years ago, as the Army Corps of Engineers Deputy Commanding General, one of my jobs was co-chair of our Strategic Sustainability Council, which oversees our sustainability program. When asked to talk about the future of sustainability, I discussed how it was necessary for our agency, as well as the Department of Army as a whole, to move past implementing the "easy to do" programs and initiatives. In other words, we had already picked the low-hanging fruit. I said it was time to purchase the ladder and take the next steps up.

Today, we have not only purchased



Commanding General of the U.S. Army Corps of Engineers Lt. Gen. Todd T. Semonite (left) tours the new state-of-art Irwin Army Community Hospital at Fort Riley, Kansas, with Col. Michael D. Brennan, commander of the U.S. Army Health Facility Planning Agency and G-9 Facilities, Headquarters, U.S. Army Medical Command. The hospital was completed by the U.S. Army Corps of Engineers Kansas City District. (U.S. Army Photo)

the ladder, but we've gone up two steep steps to find the new domain of low-hanging fruit. One example is alternative financing tools, such as Energy Savings Performance Contracts and Utility Energy Services Contracts, which help us reach the higher-hanging fruit. Through these contracts we achieve savings and efficiencies much more quickly than we ever would with appropriated funds. In fact, in fiscal years 2015 and 2016, the Corps of Engineers supported the Army with capital investments of \$209 million in Energy Savings Performance Contracts and \$72.9 million in Utility Energy Service Contracts.

We are continuing to climb the ladder, moving toward the next level of return on investment and eyeing long-term solutions. We can't let people talk us out of making those investments or taking those next steps to address the hard-to-do changes we must make. We need to keep setting the example of what right looks like. For example, we are an active partner in supporting the Army's energy initiatives as well as its Net Zero program. Since coming on board in May, I have seen our agency professionals participate in three groundbreaking ceremonies for renewable energy projects, projects that bring the Army closer to

achieving Net Zero.

That is just one way we support the Army Energy Program. We also provide design, construction, real estate and contracting, as well as research and development services. We are advancing the technology and applying science and engineering to real-world situations to build resiliency on Army installations and in our Civil Works and Overseas Contingency Operations. Resilience includes plans for the recovery and continued functioning of infrastructure even if some elements of the infrastructure do not survive.

We also serve as the Army's metering program manager; have published a Deep Energy Retrofit guide for existing buildings (retrofit is underway at Fort Campbell, Kentucky); and we are developing a process to evaluate energy disruptions and overcome vulnerabilities.

Just last month, two of our projects received presidential GreenGov Awards bringing great credit not only to the Corps of Engineers, but to our installation partners as well. Our Army Engineer Research and Development Center Construction Engineering Research Laboratory and

(See Goals, page 5)



# Partnerships vital to Fort Carson's Net Zero successes

by Hal Alguire

In April 2011, Fort Carson, Colorado, self-nominated to become one of two Army posts designated to reach triple Net Zero energy, water and waste by 2020. This means the installation is working to “zero out” its energy and water use and waste generation through renewable energy, water efficiency projects and increasing recycling, among other strategies.

As the installation took up the Net Zero challenge, leadership quickly learned that strategic partnerships with government and nongovernment agencies would be key to success.

One of the early benefits of designation as a Net Zero site was the assistance from the Assistant Secretary of the Army for Installations, Energy and Environment Office in securing support to complete a Net Zero Environmental Assessment. The Army Environmental Command assisted in preparing the Net Zero Environmental Assessment in 2012 to help pave the way for Fort Carson to pursue various strategies to incorporate renewables by providing the necessary approval framework. The assessment identified more than a dozen potential sites for renewable energy, some of which, including a consolidated photovoltaic site located near Butts Army Airfield, are already in use.

At the same time the assessment was being completed, the National Renewable



*SolarCity finished installing 3 megawatts of solar systems this summer on the roofs of privatized family housing units at Fort Carson, Colorado. The solar energy from family housing units is providing 128 percent of the family housing residents' electricity. (Photo courtesy of SolarCity)*

Energy Labs in nearby Golden, Colorado, was leveraging its considerable expertise to conduct a Net Zero Energy, Water and Waste Assessment to determine what was feasible in terms of energy, water, and waste projects for the Mountain Post.

Ultimately, that analysis showed that Fort Carson has ample renewable energy resources available to almost completely eliminate nonrenewable energy use. Although Net Zero energy looks promising from a technical perspective, the post currently pays relatively low utility electricity and natural gas rates. This helped lay

a framework for the energy and water initiatives Fort Carson wanted to pursue.

Fort Carson also enlisted the support of the U.S. Army Corps of Engineers Pacific Northwest National Labs to conduct a water balance study and provide recommendations on how to achieve Net Zero water in a semi-arid region where water is at a premium. As a result of that analysis, Fort Carson began conducting water fixture retrofits in many facilities as well as pursuing a significant expansion of the reclaimed water system.

*(See Successes, page 7)*

*(Goals, continued from page 4)*


Fort Worth District received the Green Innovation Award for integrating the Net-Zero Planner and the Comprehensive Asset Master Planning Solution Dashboard tools. The newly integrated planning technology tool, which was demonstrated at Fort Hood, Texas, and Joint Base Pearl Harbor-Hickam, Hawaii, allows installation personnel to more quickly, effectively, and routinely evaluate ways to cut energy consumption and costs as part of their daily workflow.

Our Omaha District with its Fort Carson, Colorado, partner received the Building the Future Award for the 13th Combat Aviation Brigade's Aviation Support Battalion Hangar, the Army's first Leadership in Energy and Environmental Design Platinum hangar, producing less waste, generating less pollution, using less water and putting more energy back into the grid.

I am passionate about these initiatives. Through steadfast collaboration with our diverse stakeholders and reliable, consistent

funding, we can achieve energy security, water conservation, and waste reduction goals that will support global Army operations and improve the natural environment and quality of life for Soldiers and their Families.

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Lt. Gen. Todd T. Semonite is the 54th Chief of Engineers and Commanding General of the U.S. Army Corps of Engineers. Walters is the managing editor of the Public Works Digest. 



# USACE taps industry expertise to help bring Net Zero energy to Fort Carson

by John M. Offen

Near the turn of the last decade, Fort Carson, Colorado, was selected to be the home of the Army's newest Combat Aviation Brigade while nearly simultaneously being designated to become a triple Net Zero energy, water and waste installation by 2020. To meet the energy goals, the U.S. Army Corps of Engineers Omaha District used best value, performance-based design-build contracts to select the best proposals from industry for a large portion of the \$250-million Fiscal Year 2012 Combat Aviation Brigade Military Construction program. This acquisition strategy resulted in award-winning buildings and infrastructure that meet and exceed the Army's Net Zero ready objective for Fort Carson.

The Fort Carson Directorate of Public Works has a robust energy program committed to reduce the post's energy footprint and expand the use of renewable energy sources. Supporting the installation's efforts, the Corps of Engineers has completed more than 80 U.S. Green Building Council Leadership in Energy and Environmental Design-certified buildings on Fort Carson since 2008. Included in this list is the Army's first LEED Gold-certified building, three buildings that are LEED Platinum certified and many others that are LEED Gold certified.

Even more impressive is the energy performance of these buildings. Buildings built since 2008 on Fort Carson have consistently been modeled to reduce energy by more than 30 percent than an American Society of Heating, Refrigerating and Air-Conditioning Engineers-90.1 baseline building. Many of these buildings have pushed 40 percent, and a few even a 50



*This construction photo shows the simplicity of the transpired solar walls for the 13th Combat Aviation Brigade Aviation Support Battalion Hangar at Fort Carson, Colorado. The system blends into the façade without being an eyesore. (U.S. Army photo)*

percent reduction. These reductions have been achieved with high performance building envelopes, high efficient equipment and fixtures such as ground source heat pumps and LED lamps and advanced heating, ventilation and air conditioning and lighting controls. Many of the energy saving features were made possible through the use of "bid savings" that the Army Corps of Engineers realized between 2008 and 2012.

Energy reductions were made even more impressive when onsite renewables were included. Many of the contracts awarded to design and construct the buildings included onsite renewable energy systems. Photovoltaic, air side energy recovery systems and solar thermal domestic water heating and transpired solar collectors have pushed the net energy reductions to more than 50 percent, with some pushing 70 and even 80 percent.

Fort Carson's selection to host the Army's new Combat Aviation Brigade

meant that the Corps of Engineers would be building many more facilities on the post. The approximately \$750-million eight-year Military Construction program would nearly completely rebuild Butts Airfield located at the southern edge of the installation. The program included several new helicopter hangars, headquarters buildings, barracks, a new control tower, company operation facilities, motor pools, a flight simulator, a new fire station and all new infrastructure - more than 1 million square feet of additional environmentally controlled and occupied space. Without built-in energy reduction and onsite renewables, adding the brigade's facilities would make Fort Carson's ambitious Net Zero objective even more difficult.

The Corps of Engineers quickly recognized that it needed to award contracts that required the contractors to provide the best energy performance possible. The construction began with a bang in Fiscal Year 12 - the new air traffic control tower, the barracks, the brigade headquarters and the Aviation Support Battalion Hangar. To get the best energy use value for the facilities, the Corps of Engineers used the best value source selection and put energy reduction and onsite energy renewable high on the list of selection criteria.

*(See Industry Expertise, page 8)*

Building	Design / Build Firm	Energy Reduction	%Onsite Renewables	NET
Control tower	Hensel Phelps /Jacobs*	50%	6%	44%
Barracks	Mortenson / HDR**	41 %	25 %	34 %
Hangar	Hensel Phelps /Jacobs*	51 %	49 %	Zero !

\* Hensel Phelps Construction Company and Jacobs Engineering Group  
 \*\* Mortenson Construction Company and HDR Architecture, Inc.



*(Successes, continued from page 5)*

We also engaged the U.S. Army Engineering and Support Center, Huntsville, Alabama, to secure an Energy Savings Performance Contract, a critical tool to leverage private capital in moving toward Net Zero. Our Energy Savings Performance Contract projects have yielded significant results to installation energy and water savings. Projects completed during the last five years include: interior lighting upgrades, exterior lighting retrofits, heating, ventilation and air conditioning control improvements, more efficient motors and liquid pool covers. On the water side, work was focused on replacing more than 3,800 toilets, 6,600 aerators, 3,700 showerheads and nearly 400 urinals, saving an estimated 74 million gallons of water annually.

Another key partnership was with the Army Corps of Engineers Omaha, Nebraska, District on the expansion of the reclaimed water irrigation system. The district's experts helped complete a reclaimed water system expansion analysis. With funds secured from the Energy Conservation Investment Program in fiscal year 2014, as well as additional expansion under the Energy Savings Performance Contract, the reclaimed water system has been significantly increased in size from its original design for the post golf course. The desired end-state of the post's reclaimed water system expansion efforts is to use 100 percent, roughly 200 million gallons, of Fort Carson's treated waste water for irrigation of priority turf areas, such as sports fields and parks, during watering season. It is estimated that the installation will save close to \$1 million of its annual irrigation costs by using reclaimed water instead of drinking water.

As an installation, Fort Carson has set itself apart by having more sustainable, U.S. Green Building Council Leadership in Energy and Environmental Design-certified facilities than any other community of its size. More than 82 buildings meet the certification. This achievement would

not have been possible without the support of the Army Corps of Engineers, which demonstrated its commitment to sustainable, energy and water-efficient building projects by requiring a minimum of Silver Leadership in Energy and Environmental Design certification on new construction beginning in fiscal year 2008. These facilities have been key components ensuring the installation's energy and water intensity measures continue to decline. In addition, the tool has been instrumental in securing renewable building features such as photovoltaics, solar hot water heating and ground source heat pump systems.

Our local utility provider, Colorado Springs Utilities, has worked side-by-side with the installation from the outset of our sustainability journey. The utility has supported wind purchases and worked with the installation on a power purchase agreement site - the installation's first solar array, which brought 2 megawatts of renewable energy to post in early 2008. Approximately 14 percent of Fort Carson's electrical energy comes from renewable sources (8 percent from on-site photovoltaics and 6 percent from a wind power purchase). Several solar hot water systems, facility ground source heat pump systems and transpired solar walls contribute toward renewable heating goals that were facilitated with the utility company's support. They are currently proposing a hydropower project that would provide additional sustainable energy.

After a couple years of coordinating with Fort Carson and Department of the Army Headquarters staff, Balfour Beatty Communities LLC, the installation's privatized housing company, was able to pursue 3 megawatts of solar systems installed on the roofs of family housing units. SolarCity finished installing the solar systems this summer and is selling the energy to Balfour. This solar energy is providing 18 percent of the family housing residents' electricity.

Colorado Springs Utilities' incentives

helped make the project economical for the housing company. As part of this project, SolarCity is providing Fort Carson with Renewable Energy Credits we count toward our renewable energy goals.

Fort Carson ensured our waste and refuse contract reflected installation Net Zero waste goals. Through the full support of the contractor, more than 53 percent of waste on Fort Carson is being recycled or reused. More recently, the installation has focused on improving diversion rates through single stream recycling efforts primarily concentrated in motorpools and Soldier barracks.

Our Recycle Program staff works with multiple local Front Range companies to divert waste streams such as wood, electronics, cardboard, brass and plastics. Recently, the installation conducted a joint inspection with one firm where a truck full of recyclables collected on post was dumped and separated by hand to assess how well the installation community was recycling. We looked for opportunities to increase our diversion rates and maximize profits for both Fort Carson and private industry.

Fort Carson leadership knew from the outset that achieving Net Zero energy, water and waste by 2020 was an ambitious end state. What the installation Directorate of Public Works staff has learned through this process is that partnerships broaden opportunities. The installation's fence line is not a barrier to collaboration. Teams working together toward a common goal, like Net Zero, can produce great results.

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Colorado, Directorate of Public Works.*



## Army recognizes installation energy, water management innovation

by Stephen Oertwig

**P**ROVIDENCE, Rhode Island - Enhancing Army readiness through energy and water resources stewardship earned 35 individuals and organizations Secretary of the Army awards at an Aug. 11 ceremony here.

Katherine Hammack, assistant secretary of the Army for Installations, Energy and Environment, and Lt. Gen. Gwen Bingham, Army assistant chief of staff for Installation Management, presented the 2016 Secretary of the Army Energy and Water Management Awards at the Army Energy Manager Training Workshop.

The awards recognized achievements during fiscal 2015 in energy and water conservation and management that support Army readiness. Selected were achievements from across the total Army that advance the Army's energy and water program strategic goals, improve energy security and promote sustainability on Army installations.

Nominations represented individuals, small groups, installations, and exceptional performance. Categories included energy efficiency and energy management; energy program effectiveness; water conservation; renewables and alternatives; and innovative and new technology.

Individual winners were:

- Mark Fincher, Fort Benning, Georgia



*Mélanie Chaballe, energy manager, checks the solar panel inverters on Chièvres Air Base, Belgium. U.S. Army Garrison Benelux, Belgium, won the Secretary of the Army Energy and Water Management Awards small group category in renewables and alternatives for its Energy Conservation Investment Program 451-kilowatt solar panel array. (Photo by Donovan Abrassart)*

- innovative and new technology
  - Madison Thomas, Mississippi Army National Guard - energy program effectiveness
- Small group winners were:
- U.S. Army Garrison Benelux, Belgium - renewables and alternatives
  - Fort Meade, Maryland - innovative and new technology
  - 63rd Regional Support Command

- and the Directorate of Public Works staff - energy efficiency and energy management
- Army Research Development and Engineering Command, Aberdeen Proving Ground, Maryland - energy efficiency and energy management
- Fort Hood, Texas - energy efficiency and energy management

(See Innovation, page 9)

(Industry Expertise, continued from page 6)

Best value source selection, more specifically, “Best Value, Trade Off” source selection, allows the Corps of Engineers’ contracting officer to make awards based more on a commitment to performance than cost by the contractor, in this case, energy performance. The firms that designed and constructed the barracks, the control tower and the hangar were selected and awarded with energy as the most important criteria. Energy was valued more important than price, building function and aesthetics. The energy results of each of these design-build contracts

speak for themselves.

The Net Zero commitment of the Hensel Phelps/Jacobs team on the hangar was accomplished by using energy efficient features previously applied on design-build projects with the addition of transpired solar collectors to preheat the fresh air supply to the building and a photovoltaic field. The photovoltaic field produces more than 2-million kilowatts/year of energy - enough energy to power nearly 200 homes for a year.

The reduced energy footprint of the buildings in combination with the onsite renewable energy sources are significant

contributors to Fort Carson Net Zero by 2020 goal. This success was made possible with the emphasis the Corps of Engineers and the Army placed on energy use, and letting private industry do what it does best when challenged: Provide competitive, innovative solutions and provide great value to the taxpayer, the Army and its Soldiers and their families.

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Offen is U.S. Army Corps of Engineers Omaha District resident engineer at the U.S. Air Force Academy Resident Office, Colorado.





# Army recognizes 63rd Regional Support Command with energy award

by Jonelle Kimbrough

The U.S. Army Reserve's 63rd Regional Support Command received the Secretary of the Army Energy and Water Management Award for Energy Efficiency and Energy Management, Small Group.

The award celebrated a variety of innovative sustainability initiatives that saved energy, water and fiscal resources throughout the 63rd Regional Support Command, which includes the states of Arizona, Arkansas, California, Nevada, New Mexico, Oklahoma and Texas. In fiscal year 2015, conservation efforts saved 31.3 million British Thermal Units of energy, and they reduced water consumption by 38 percent when compared to fiscal year 2014. As a result, the command saved \$583,503.

To decrease energy use, the command leveraged meters, renewable technologies and energy efficiency improvements. The Army Meter Data Management System monitored energy use at 74 facilities across the region. Solar arrays at March Armed Forces Reserve Center in California and Barnes Hall Army Reserve Center in Arizona produced 293,000 kilowatt hours of power in fiscal year 2015, and an award-winning lighting project in parking areas

at Camp Pike, Arkansas, reduced energy consumption by 85 percent at that site.

The 63rd implemented various water conservation efforts as well. Improvements to plumbing increased water efficiency at multiple facilities, and drought tolerant, native plant landscapes – known as xeriscapes – reduced the need for irrigation at multiple Army Reserve sites in southern California.

Furthermore, the command's Energy Team continued to educate its communities about conservation and its commitment to sustainability.

The Secretary of the Army Energy and Water Management Awards were presented at an Aug. 11 ceremony at the annual Energy Exchange in Providence, Rhode Island. Col. Stewart Fearon, the 63rd Regional Support Center's Director of Public Works, attended the event with Deputy Director of Public Works Keith Puschinsky, Operations Division Chief Mark Cutler, Energy Managers Rickey Johns, Hays Kinslow and Gerry McClelland, and Resource Efficiency Managers Brad Brown and Varun Sood.

"The Army is setting the standard for resource conservation – not only in the



*Katherine Hammack, assistant secretary of the Army for Installations, Energy and Environment, presents Col. Stewart Fearon, director of Public Works at the U.S. Army Reserve 63rd Regional Support Command, with the Secretary of the Army Energy and Water Management Award for Energy Efficiency and Energy Manager, Small Group on Aug. 11. (Photo by Theresa Shoemaker, Pacific Northwest National Laboratory)*

Department of Defense but in the Federal government," said Katherine Hammack, assistant secretary of the Army for Installations, Energy and the Environment.

Lt. Gen. Gwen Bingham, Army assistant chief of staff for Installation Management,

(See Energy Award, page 10)

(Innovation, continued from page 8)

- Fort Rucker, Alabama - energy efficiency and energy management Installation winners were:
  - Fort Irwin, California - innovative and new technology
  - Virginia Army National Guard - renewables and alternatives
- Exceptional performance winners were:
- Fort Hood - water conservation
  - Rock Island Arsenal-Joint Manufacturing and Technology Center, Illinois - energy program effectiveness
  - Presidio of Monterey, California

- energy program effectiveness

The Army Energy Manager Training Workshop featured energy managers sharing best practices for achieving success in meeting Army Energy Security and Sustainability Strategy goals. The Army seeks to reduce facility energy and water consumption and increase the capacity of renewable energy produced on its installations to improve mission readiness. Army and Department of Defense leaders also advised installations and commands on emerging policies with programs such as energy security and cyber security.

The Department of Defense partnered with the Department of Energy's Federal Energy Management Program to organize

the annual "Energy Exchange" in Providence. The Energy Exchange is a forum for industry and the federal government to exchange knowledge of building operations, energy management, and sustainability in the federal sector. Experts from various technical disciplines shared cost-effective, actionable solutions to help federal agencies meet and track energy-related requirements and goals.

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# Fort Hood projects win 2 Army energy, water awards

by Christine Luciano

**F**ort Hood, Texas, has long been a champion of environmental stewardship, focusing on supporting mission readiness while balancing environmental requirements. Leading the way in sustainability for other Army installations to follow, Fort Hood stood out at the 2016 Secretary of the Army Energy and Water Management Awards ceremony, winning two awards for Energy Efficiency and Energy Management for a Small Group and Exceptional Performance for Water Conservation.

“The Great Place is great because of the people who work in the Directorate of Public Works, the Garrison, and Fort Hood,” said Brian Dosa, Fort Hood director of Public Works. “We have made tremendous progress in creating a culture that is committed to conservation in the areas of energy, water, and waste. From engineers who design our buildings, to Soldiers and civilians who use them, it takes everyone working together to achieve the kind of results we have seen.”

The Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack, who was assisted by Lt. Gen. Gwen Bingham, assistant chief of staff for Installation Management, recognized installations, small groups and

individuals from the Army, Army Reserve, and Army National Guard for their achievements in energy efficiency, energy management and water conservation during an Aug. 11 ceremony at the Army’s Energy Manger Training Workshop in Providence, Rhode Island.

“We have a rich opportunity to make a positive difference each and every single day,” Bingham said. “It’s an opportunity to experience some great lessons learned, some great best practices, and being able to go back and share those ideas.”

“It is great to be recognized for our achievements because they are a reflection on what we are doing to make Fort Hood viable now and in the future,” Dosa said. “Living in Texas, where water is a precious commodity now, and even more in the future, it is important for Fort Hood to be a good neighbor and do all we can to conserve our water resources. And conserving electricity saves the Army money that can be used for training and other priorities.”

The team’s energy and water initiatives will provide a Fort Hood lifetime savings of more than \$8.9 million.

Helping to promote water and energy conservation and environmental awareness, Fort Hood’s active outreach and training



*Fort Hood’s first Net Zero Energy facility is offsetting power needs with energy efficient technologies and a solar photovoltaic roof system, providing 91 percent of its electricity from renewable energy. (U.S. Army photo)*

efforts include sustainability workshops, media campaigns, regional partnerships, and the active role of military and civilian leaders to explore opportunities for best practices and technologies.

“We are a team of teams,” Bingham said. “There is no way we can what we do inside our gates, without the full support and partnership of all of our leaders and industry partners.”

Fort Hood’s partnership with American Water represents the “team of teams” concept - working together to promote sustainability, while reducing costs and increasing conservation efforts. The

*(See Fort Hood, page 11)*

*(Energy Award, continued from page 9)*

also addressed the attendants and encouraged them to further their efforts. “What do you do when you achieve one goal?” she asked. “You set a new one.”

Johns said the command’s accomplishments are truly the results of a dedicated team, and command support has driven the success. “We’ve all heard that ‘it takes a village to raise a child,’” he said. “It takes a command to build a viable energy program. At the 63rd RSC, we have a command that supports our energy

program.” He pointed to the strong presence of leadership at the ceremony as evidence of that support.


Johns and Kinslow also praised the Army Reserve Installation Management Directorate (ARIMD) for its steadfast encouragement of their program and its assistance with the award nomination. “With the help of the ARIMD Energy Team, the hard work of the 63rd RSC Energy Team and the great support of the 63rd RSC’s public works staff was recognized today,” Kinslow said.

“I feel extremely fortunate to be a part of

this team,” Johns added. “I look forward to many more years with all of the Army Reserve family.”

To learn more about the 63rd Regional Support Command’s sustainability efforts, visit [usar.army.mil/Commands/Support/63rd-RSC/](http://usar.army.mil/Commands/Support/63rd-RSC/) or [usarsustainability.com](http://usarsustainability.com).

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# Energy savings expected from Fort Rucker heat recovery projects

by Trevor Marshall

Located in southeast Alabama, Fort Rucker has long been the Army's Center of Excellence for helicopter training. Some of its 600 buildings hark back to World War II, and, despite energy upgrades throughout the years, many remain well short of current standards for energy efficiency.

"Some of these buildings are pretty old," said Resource Efficiency Manager Tony King, "but it's a group of 1960-70s-era buildings that represent a real challenge to us."

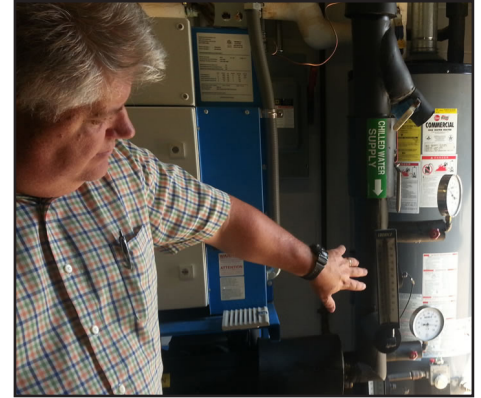
Fort Rucker has taken a major step toward meeting that challenge through a combination of energy savings projects that earned the installation a 2016 Secretary of the Army Energy Award for energy savings.

Installing heat recovery chillers at 11 installation buildings form the major component of a larger energy efficiency effort that included lighting conversions from incandescent to LED lamps, the conversion from fuel oil to natural gas

at the adjacent Hanchey Army Airfield, a 51-kilowatt solar array that now sells electricity to utility provider Alabama Power, retro-commissioning of buildings for greater energy efficiency and extensive controls upgrades.

Validation for the projects was supported by meter data, which showed how systems that capture heat generated at the core of a building and reuse it elsewhere in the same building could save the installation in annual heating and cooling costs. The heat recovery chillers will save the Army tens of thousands of dollars per year in natural gas and electricity savings, King said.

King realized that most of Fort Rucker's larger buildings have a need for simultaneous heating and cooling, a situation compounded by American Society of Heating, Refrigerating and Air-Conditioning Engineers standards that require the maintenance of a minimum relative humidity for human comfort. In typical fashion, larger Fort Rucker buildings



Tony King, resource efficiency manager at Fort Rucker, Alabama, discusses the heat recovery chillers the installation recently installed that earned the installation a 2016 Secretary of the Army Energy Award for Energy Savings. (U.S. Army photo)

such as office buildings, barracks and recreation centers use chillers for cooling and boilers for heating. However, during winter months some of those buildings required simultaneous heating and cooling.

(See Fort Rucker, page 13)

(Fort Hood, continued from page 10)

installation's water supply distribution system is owned and operated by American Water and consists of approximately 270 miles of looped distribution mains and 80 miles of service laterals.

"American Water is happy to support Fort Hood and their water conservation efforts," said A.J. Olson, Fort Hood utility manager for American Water. "We take pride in being the trusted steward of our most precious resource – water."

The installation is saving more than 317 million gallons and \$300,000 annually with best management practices like auto flushers with chlorine analyzers, water line looping, Supervisory Control And Data Acquisition System, automated flow control valves, alternative water supply at the golf course, and elevated storage tank mixing. These efforts have helped to

maintain water quality, while significantly reducing potable water consumption.

Fort Hood is also offsetting its power needs with the installation's first Net Zero Energy facility - a concept to produce as much energy as it uses during the course of a year. Featuring LED lights with occupancy sensors, energy efficient attic and wall insulation, and a solar photovoltaic roof system, the facility provided 91 percent of the electricity required from solar power.

The installation's energy initiatives also include a LED street light project, weekday and weekend setback, and dynamic scheduling, which helped the garrison become only one of the few Army installations to achieve the 10-year energy goal mandated by Executive Order 13423: Strengthening Federal Environmental, Energy, and Transportation Management.

"Developing and implementing innovative approaches and advancements in energy efficient technologies is a priority at

Fort Hood," said Bobby Lynn, Fort Hood chief of the Energy Management Branch.

Lynn emphasized that it takes everyone working together to be a part of the solution and reduce energy use on the installation.

"This exceptional accomplishment is a result of all within the Fort Hood community who have provided their unwavering support of the Army's energy program," Lynn said. "I feel more confident than ever that Fort Hood will successfully meet the challenge of the newest Executive Order to reduce our energy footprint even more by the year 2025."

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# Corps of Engineers teams garner GreenGov awards again

by Candy Walters

**T**wo U.S. Army Corps of Engineers joint teams recently received 2016 GreenGov Presidential Awards for their contributions in making the federal government more sustainable.

The White House Council on Environmental Quality presented 12 GreenGov awards during a Sept. 7 ceremony at the Eisenhower Executive Office Building to federal agency teams and individuals who fulfill President Obama's mandate to "lead by example" in implementing Executive Order 13693: Planning for Federal Sustainability in the Next Decade.

The two 2016 awards, Green Innovation and Building the Future, marked the fifth and sixth GreenGov awards Army Corps of Engineers teams and individuals have received in the past four years.

"It was an honor to participate in this important event to recognize the outstanding efforts of DOD personnel that both preserve environmental resources for future generations, and ensure that DOD has the land, water and airspace need to sustain military resources," said Maureen Sullivan, deputy assistant secretary of Defense for environment, safety and



*Receiving the Building the Future GreenGov Award on Sept. 7 were employees from the U.S. Army Corps of Engineers Omaha District and the Directorate of Public Works at Fort Carson, Colorado, along with senior leadership from the Department of Defense, Army and U.S. Army Corps of Engineers. The award was presented for the work done at the 13th Combat Aviation Brigade Aviation Support Battalion Hangar, Fort Carson, Colorado, the first LEED Platinum and Net Zero hangar in the Army. (Photo by Lt. Col. Patrick Dagan)*

occupational health.

"I am proud of this year's winners – they represent excellence and a tremendous dedication to the Nation and its resources."

For Assistant Secretary of the Army (Civil Works) Jo-Ellen Darcy, the ceremony marked the fourth year she has joined Corps of Engineers winners on the GreenGov Awards stage. "This is a chance to show the innovative work that the Corps of Engineers

does on the ground and delivers every day," she said.

"We have exceeded our Energy Savings Performance Contract goals (executing \$15.9 million, \$3.4 million more than the goal of \$12.6 million), and our districts continue to look for more innovative opportunities," Darcy added.

The Green Innovation Award was presented to a joint Corps of Engineers team from Fort Worth District, the U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory and Headquarters Corps of Engineers. The team combined the Net Zero Planner and Comprehensive Asset Master Planning Solution (CAMPS) Dashboard tools into a Combined Tool that has revolutionized the way planners and installation managers look at sustainability planning by allowing them to identify sustainability and energy implications and automates identification of energy efficiency measures. The final result of using the tool is the generation of a targeted list of energy projects that meet an installation's energy goals, leading to reducing costs and time for energy planning. The team successfully



*Receiving the Green Innovation GreenGov Award on Sept. 7 were employees from the U.S. Army Corps of Engineers Fort Worth District, U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory and Headquarters Corps of Engineers along with senior leadership from the Department of Defense, Army and U.S. Army Corps of Engineers. The award was presented for the work the joint team did in combining two tools, the Net Zero Planner and the Comprehensive Asset Master Planning Solution Dashboard, into one tool that identifies sustainability and energy implications in military installation planning, and automates identification of energy efficiency measures. (Photo by Lt. Col. Patrick Dagan)*

(See GreenGov Awards, page 13)



*(GreenGov Awards, continued from page 12)*

demonstrated the Combined Tool at Fort Hood, Texas, and Joint Base Pearl Harbor-Hickam's Ford Island, Hawaii, under a Department of Defense grant.

Receiving the award were Rumanda Young and Susan Wolters of Fort Worth District, Michael Case and Richard Liesen of the Construction Engineering Research Laboratory, and Jerry Zekert of Headquarters.

The Building the Future Award went to a team from Omaha District and Fort Carson, Colorado, for the 13th Combat Aviation Brigade Aviation Support Battalion Hangar at Fort Carson, which earned the Army's first Net Zero, Leadership in Energy and Environmental Design Platinum certification for a hangar, producing less waste, generating less pollution, using less

water, and putting energy back into the grid.

Fort Carson has a legacy of more than 56 LEED certified projects, including more than 82 certified building, half of them at the LEED Gold level, and including the hangar, three at the Platinum level.


Receiving the award were James Harding, Vince Turner, John Offen and Robert Collupy of Omaha District and Hal Alguire of Fort Carson.

In introducing the Building the Future Award, Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack noted that the team working on the hangar not only achieved reduced the environmental footprint, used renewable energy, enhanced energy security, achieved Net Zero and LEED Platinum, but "came in under budget. It was a win-win for all," she said.

"I'm always impressed with what the Army Corps of Engineers does when it comes to finding innovative and better ways of doing this," she said.

Maj. Gen. Mark Yenter, Corps of Engineers deputy commanding general for military and international operations, said he was impressed with the level of tenacity both teams displayed, having to overcome obstacles on many levels, including policy, technology, and financial limitations among others. "I'm absolutely impressed that they were able to stay on task," he said. "It's phenomenal. I'm proud to be an engineer."

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*(Fort Rucker, continued from page 11)*

Although the exterior of the building would lose heat on a chilly day through walls, windows and doors, thus requiring supplemental heat, the building's core would actually gain heat from internal loads caused by people, computers and office equipment. This heat would normally be vented into the outside air and wasted.

This prompted the engineers to consider how often energy is used to heat one part of a building while simultaneously cooling another part of that same building. "We have situations where the boiler is running when there is other heat being rejected from the building. We're generating a heat source and at the same time rejecting other heat to the atmosphere. We wanted find a way to capture that waste heat, introduce it into the hot water side and offset at least some of the energy used by a boiler. We have done that through heat recovery," King said.

He explained that dehumidification

required to bring relative humidity levels down to human comfort levels often cannot be achieved through simple space cooling. In those cases the chiller continues to run while humid air runs across the coil after the desired set point has been achieved. To avoid indoor air temperature from falling below that point, a hot coil is used to reheat the air so as not to drop the space temperature any further. This hot coil modulates on and off to keep the humidification process going without sub-cooling the space.

A review of meter data helped verify that these were solid candidates for installation of heat recovery chillers. "We first identified buildings that we thought might be good candidates based on their size, configuration and usage. We then mined meter data to either support or refute that the building was a candidate and to establish a baseline," King said.


King showed how the heat recovery chiller makes use of relatively small differences in chilled water to save money on heated water. "The Department of Energy says 50 percent of wasted energy in

buildings is waste heat, so why should we continue to throw out heat that could be reused elsewhere?"

He pointed out that any large building with major hot water requirements would be an ideal candidate for heat recovery. "One ideal situation would be a large dining hall or cafeteria with a kitchen that uses a lot of hot water," he said. Large office buildings having both boilers and chillers would also qualify, especially if located in hot, humid areas. Maxwell Air Force Base in nearby Montgomery, Alabama, is installing heat recovery chillers, and King expects the practice will be replicated at other Department of Defense installations.

"Heat recovery is the untapped resource for energy efficiency," King said. "It can work anywhere you have a simultaneous need for heating and cooling."

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# Let there be light: Army Reserve honored for energy efficiency projects

by Jonelle Kimbrough

The U.S. Army Reserve's 9th Mission Support Command and 99th Regional Support Command have garnered accolades with Department of Energy 2016 Interior Lighting Campaign awards.

Launched in May 2015 at the DOE Better Buildings Summit, the Interior Lighting Campaign is a recognition and guidance program to help facility owners and managers identify and implement savings opportunities from high efficiency interior lighting solutions. Currently, the Army Reserve, through its 9th Mission Support Command and 63rd, 81st, 88th and 99th Regional Support Commands, is among 49 participants in the program.

This year, 13 agencies were recognized for outstanding performances in applying lighting systems. For their energy conservation and efficiency initiatives, both the 9th Mission Support Command and 99th Regional Support Command received awards for Exemplary Federal Government Sector Sites.

## The project saved 184,000 kilowatt hours for a total energy reduction of 51 percent.

The 9th Mission Support Command's award was for a lighting replacement project at the Army Reserve Center in Guam. The reserve center replaced two-lamp (56 watt) and four-lamp (124 watt) fluorescent lights with 36 watt light emitting diodes (LEDs), reducing energy use by 62 percent and resulting in an estimated annual energy savings of 125,000 kilowatt hours, enough to power 11 average homes in the United States.

As part of its Energy Savings Performance Contract, the 99th Regional Support Command replaced three-lamp (86 watt) and four-lamp (108 watt) fluorescent lights with 46 watt and 61 watt LEDs at Technical Sergeant Vernon McGarity Army Reserve Center in Coraopolis, Pennsylvania.

"While many sites in the 99th's area of



*The U.S. Army Reserve 9th Mission Support Command and 99th Regional Support Command replaced fluorescent lights with energy efficient light emitting diodes, or LEDs, to increase resource conservation at Army Reserve Centers in Hawaii and Pennsylvania. (Courtesy photo)*

responsibility received LED upgrades under the ESPC, the McGarity ARC was one of the largest sites to receive an upgrade and thus was a good candidate to nominate for the award," said Justin Drigon, energy management coordinator for the 99th

"Sometimes, you do not see the benefit or the result of all your efforts with all the time and effort that goes into these projects. The award is confirmation that the team here is making a noticeable difference in the 9th MSC's overall energy strategy plan."

Drigon agreed. "The award means a lot for the team here," he said. "It is great to see that hard work and attention to detail pay off. [The award is] also something that the units at the McGarity ARC can take pride in as well. It is their facility, and I'm sure it is a great point of pride to know that it has been recognized.

"I think the award will go a long way in helping the 99th RSC community, the Army Reserve community and even the active Army component understand the strides the Army Reserve is making in energy conservation," he said.

For details about the Interior Lighting Campaign, visit [interiorlightingcampaign.org](http://interiorlightingcampaign.org). For more information about the Army Reserve and its sustainability programs, visit [usar.army.mil](http://usar.army.mil) or [usarsustainability.com](http://usarsustainability.com).

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Regional Support Center. The project saved 184,000 kilowatt hours for a total energy reduction of 51 percent. The efforts of all of the Interior Lighting Campaign's participants, which include Target, The Cleveland Clinic and T-Mobile, have saved 130 million kilowatt hours and an impressive \$13.5 million in the program's first year, and the Army Reserve is proud to contribute.

"[The project] has reduced our energy consumption and ecological footprint as a whole," said Christina Vicari, 9th Mission Support Command energy coordinator for the 9th MSC, adding that receiving the award is gratifying and that it demonstrates "our efforts are making enough of an impact to be worthy of mention.

"The accumulation of these efforts starts to take effect eventually," she said.



## Revisiting low cost/no cost energy savings a worthwhile project

by Matthew Talaber and Jonah Havranek

After pursuing numerous costly energy projects, the West Point Directorate of Public Works team saw cause to revisit the low cost/no cost energy savings project arena. Funding challenges, improvements in technology, and community awareness all warranted taking this second look, and the effort has revealed new possibilities that have reenergized and refocused the New York installation team.

The concept governing low cost/ no cost energy savings projects is perhaps not as straightforward as it sounds. It's not that these projects can be done for free, though many are relatively inexpensive. Rather, the real profit of these types of projects is in their speedy return on investment. For instance, making several improvements to a building's envelope (installing weather stripping, enhancing insulation, and repairing windows) can be achieved cheaply and quickly while instantly providing energy savings. Occasionally, these savings entirely offset the costs of the upgrades within a short period of time.

The strategy is fairly simple: systematically evaluate existing structures and infrastructure, amass simple, readily achievable objectives for each, and resist the appeal of more conspicuous possibilities. Let's examine each of these elements more closely.

First, develop criteria to apply when evaluating buildings, infrastructure, and other needs. A small warehouse with no permanent occupants may rank low, whereas a large building with inadequate insulation that houses a hundred employees has ample potential. Here at West Point, the priority of buildings and infrastructure was determined through historical data and a commitment to our master plan. Years of completing energy projects and studies provided a wealth of data, which was complemented by in-house knowledge.

Next, identify all low cost/ no cost improvements for each building or structure. Being diligent in this step is extremely valuable – make sure to capture every

opportunity and potential. Do all the doors feature weather stripping? Are your pipes properly insulated? Additionally, the West Point team carefully coordinated all energy-saving opportunities with the master plan to ensure complementary effort without duplication of effort.

Finally, though the temptation may be great, avoid grander projects at this stage. Large photovoltaic arrays are terrific, but they are costly to install and may feature an extended payback on investment. Shelf opportunities like this for now (but don't scrap them entirely).

Thus, your low cost/ no cost energy saving program is established, even though there will surely be some details to iron out. Here are a couple examples from West Point's efforts:

Gillis Field House is the home a track, weight room, team rooms, and locker rooms. – Houses track, weight room, team rooms, and locker room.

Proposal:

- Add air locks at entrance doors
- Repair exit doors and add weather stripping
- Repair skylights
- Repair/replace windows
- Add lighting controls
- Add roof insulation
- Add steam pipe insulation
- Energy awareness training
- Leave rooftop photovoltaic array, geothermal, new heating, ventilation, and air conditioning replacement for future building recapitalization or energy savings performance contract

The helicopter hangar houses West Point's two helicopters and support staff. – Houses West Point's two helicopters and support staff.

Proposal:

- Repair solar hot water system
- Replace antiquated furnace
- Add roof insulation
- Repair hangar doors
- Leave rooftop photovoltaic array,




Installing energy efficient LEDs (light-emitting diode), like these at Tate Rink at West Point, represent an excellent low-cost energy project. (Photo by Jonah Havranek)

geothermal, new heating, ventilation, and air conditioning replacement for future building recapitalization or energy savings performance contract

This second example is also illustrative of the advantages of flexibility. The scope of work was developed such that it can be compartmentalized based on funding availability, making it “command friendly” and allowing for efficient leadership prioritization of work. Work execution can take many forms, including in-house, job order contract, multiple award task order contract, and others. Moreover, the customer is involved in the scope process. Their voice is valuable in ensuring building activities link appropriately to improvements.

The West Point Directorate of Public Works energy team is considering a vast array of energy projects, but we also want to periodically revisit the basics, especially as mission, funding, building conditions, and uses change in order to pursue the energy improvements that are most affordable and executable.

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# Huntsville Center helps Army surpass \$1 billion energy milestone

by Debra Valine

When the Army Materiel Command's Anniston Army Depot in Alabama signed a \$20 million Utility Energy Services Contract with Alabama Power Aug. 11, the Army surpassed a presidential challenge to award \$1 billion in alternative financing energy contracts by the end of 2016.

This contract will enhance the Army's readiness efforts by allowing Anniston to run more effective and efficient daily operations.

The President's Performance Contracting Challenge set the goal of \$4 billion in Energy Savings Performance Contracts and Utility Energy Services Contracts across the federal government. The Army's share of that goal was \$1 billion.

In response to the contracting challenge, the Army has contracted for 127 individual projects, or task orders, totaling \$1.015 billion. This represents 33 percent of the federal government's total performance and 68 percent of the Department of Defense's total efforts.

While the Anniston Army Depot contract was not awarded by the U.S. Army Corps of Engineers, Engineering and Support Center, Huntsville's Energy Division was instrumental in helping the Army reach the contracting challenge milestone. Huntsville Center's Energy Savings Performance Contracts and Utility Energy Services Contracts cumulative capital investment represents 78 percent of the Army total.

The Huntsville Center is considered the Corps of Engineers Technical Center of Expertise for Energy Savings Performance Contracts. Much of Huntsville Center's success can be attributed to having all members of the project delivery team co-located and its streamlined acquisition processes.

"In order to help the Army achieve the \$1B milestone not one person could do it alone," said Jason Bray, Huntsville Center's ESPC program manager. "That



*A bird's eye view shows the 42-acre solar array located at White Sands Missile Range, New Mexico, that is helping to save more than \$2 million dollars in energy costs. It provides more than 4 megawatts of electricity to the installation. (Courtesy photo)*

is why at the Huntsville Center Corps of Engineers, we have program and project managers working with project delivery teams centrally located to strategically plan and execute Energy Savings Performance Contracts and Utility Energy Service Contracts.

"Having all members of the PDT (project delivery teams) close together assists with keeping the process efficient and effective," Bray said. "Customers come to Huntsville Center because they know that they will be provided with a team effort, and the partnership between the agency, the customer, and the energy service company or energy utility provider brings a holistic approach that both helps meet Army energy initiatives as well as a better quality of life for personnel manning the installations."

Projects such as White Sands Missile Range in New Mexico, Fort Buchanan in Puerto Rico, and Rock Island Arsenal, Illinois, awarded by Huntsville Center, illustrate the value of using third-party financing to achieve energy goals.

At White Sands Missile Range, more than \$2 million in energy costs have already been saved through a 42-acre solar-array project that came online in December 2012, according to Randall Smidt, an engineer working for the Office of the Assistant Chief of Staff for Installation Management. The 4.465 megawatt solar photovoltaic system guarantees energy savings of 35,358 million British thermal units per year and

reduces the range's energy consumption by 10 percent.

Two wind turbines at Fort Buchanan are estimated to produce more than 5 percent of the installation's power while 21,824 solar photovoltaic panels there will produce about 5.5 megawatts of power, which is at least 60 percent of the post's current power demand at peak periods, Smidt said.

Not all the contracts involve renewable-energy projects, though, Smidt said. Rock Island Arsenal has a \$39-million infrastructure-modernization project at its Joint Manufacturing and Technology Center. Honeywell is installing high-efficiency heating, ventilation and air conditioning systems and natural-gas heating that will allow the tech center to disconnect from the garrison's coal-fired steam plant. New plating and paint systems at the tech center also are part of the upgrade.

The Army has a long history of using performance contracting that predates the President's challenge. Since 1992, the Army has been aggressively pursuing energy savings and currently has the largest energy savings performance contracting program in federal government. The Army's 624 individual projects, or task orders, represent private investment of more than \$2.5 billion.

These contracts are important to the Army, said Katherine Hammack, assistant

*(See Huntsville Center, page 17)*





# Army, HECO break ground for new biodiesel power plant

by Christine Cabalo

**S**CHOFIELD BARRACKS, Hawaii — With many hands digging in to make it a reality, senior Army leaders, government officials and Hawaiian Electric Company executives broke ground on the Schofield Generating Station project, Aug. 22.

The generating station is a biofuel-capable power plant that will be run and owned by Hawaiian Electric Co. The Army leased 8.13 acres of land to build the plant. The groundbreaking and blessing ceremony highlighted the partnership of Hawaiian Electric Co., U.S. Army Garrison-Hawaii, the U.S. Army Office of Energy Initiatives and several others to develop renewable clean energy.

“Energy is not the core competence of the Army; theirs is the fight to defend the U.S. Constitution,” said Katherine Hammack, assistant secretary of the Army for Installations, Energy and Environment and one of several event speakers. “But the mission of the Army without assured access to energy makes them stand silent, and their mission fails.”

*(Huntsville Center, continued from page 16)*

secretary of the Army for Installations, Energy and Environment. Federal agencies like the Army can leverage their utility budgets and take the steps essential to enhancing resiliency, achieving cost savings, and improving operations and maintenance, with no up-front costs to the government.

Private investors use their own funds to modernize, upgrade, or implement energy and water efficiency, as well as renewable energy systems on Army installations. In return, the Army pays back the investment with some of the utility cost savings achieved from these improvements. The investors guarantee a minimum savings that meets or exceeds the required payments. At the end of the contract, the Army owns all of the

Schofield Barracks and its adjacent installations will be one of several areas the plant will service during an emergency power failure on Oahu. The 50-megawatt power plant will connect to the main power grid with an electrical power transmission line to Hawaii Electric Co.’s Wahiawa substation.

The future plant serves a strategic location for both the Army and civilian sector.

“When built, this plant is significant because it will be the first on Oahu built at high level,” said Alan Oshima, president and CEO of Hawaiian Electric Co. “In the past, we’ve relied on ocean cooling, but with the danger of tsunamis and flooding, we need to rethink for our future. This plant will provide power to the residents of Oahu, connecting to the grid and to the military. But in times of emergency, it can provide the Army and Wahiawa General Hospital with the ability to cope during power failure far better than we can in the present.”

The plant also will be able to restart other stations in an emergency, possibly

improvements and benefits from the continuing savings, which it can use to meet other readiness requirements.

The costs of the projects are paid back over time as the Army realizes savings from the improvements.

Utility Energy Service Contract projects do not require savings Measurement and Verification, though that can be obtained. They also do not provide guaranteed savings for the customer. The utility service contracts require annual equipment performance verification. The energy performance contract task orders require annual savings measurement and verification, as well as a minimum guaranteed savings amount.

Funding for these projects must be paid back to the energy service company within 25 years, along with interest. The cost



*Kahu Kordell Kekoa leads a traditional Hawaiian blessing of the area where the new Schofield Generating Station project will be built at Schofield Barracks, Hawaii. (Photo by Christine Cabalo)*


*(See Break Ground, page 18)*

avoidance in energy savings is used to pay the company, and the government gets to keep the rest of the energy savings.

The maximum contract term for both types of projects is 25 years. The Army will continue to work hand-in-hand with industry partners to develop cutting-edge methods to reduce energy consumption, enhance energy efficiency, improve readiness, and help the Army continue to be a good steward of taxpayer dollars.

*(Editor’s note: This article incorporates information originally released by the Army News Service.)*

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# Bringing a 20th century barracks into the 21st century

by Paul L. McCarty

In late 2014, the Fort Hunter Liggett Department of Public Works, working together with the U.S. Army Engineering and Support Center, Huntsville, Alabama, developed a vision for upgrades to four existing 300-person Transient Training Enlisted Barracks (constructed in the mid-1970s) to create Net Zero Energy Buildings.

Fort Hunter Liggett, located in the remote area of Jolon, California, is used as one of the primary Army Reserve Training locations. The unique characteristics of the Jolon climate with consistent daily temperature swings of up to 50 degrees lend themselves to energy recovery opportunities and great potential for energy savings.

In December 2014, while reviewing design drawings/models for a new Operational Readiness Training Complex, Greg Vallery of the installation's Directorate of Public Works realized that a paradigm shift was required in the approach to

constructing and retrofitting energy efficient barracks buildings. This shift involved looking at the buildings from a holistic view point, considering energy recovery opportunities in all areas, such as using removed heat while cooling a building to heat domestic hot water, leveraging the dry climate to take advantage of evaporative cooling and heat pump technology, LED interior lighting, and installing vent-less heat pump dryers in lieu of standard vented dryers, which exhaust a large amount of conditioned air to the outside.

These ideas went beyond the normal design approaches, which met energy savings goals through such things as scheduling, higher set-points, and low-flow water fixtures. Although these also are sound energy savings approaches, Vallery saw the potential for innovative approaches without sacrificing the comfort of the building's occupants.

The first step was to solve the problem of

how to economically get off fossil fuels and create an energy efficient all electric barracks that would fit into the Net-Zero Energy installation goal. The existing barracks is a major consumer of fuel oil for both comfort heating and domestic hot water (as there is no natural gas service to Fort Hunter Liggett). After working with Huntsville Center engineer Paul McCarty, the team determined the best energy efficient approach to solve both the comfort heating and domestic hot water heating production without fossil fuels was to use heat pump technology.

New all electric barracks buildings recently designed for the installation would typically require almost as much as two-thirds of the electrical service capacity of the entire building just to heat domestic hot water. This was due to the large instantaneous shower load required for 300 Soldiers showering at relatively the same

(See Barracks, page 19)

*(Break Ground, continued from page 17)*

preventing wider scale power loss Oahu residents may have experienced in the past.

Col. Stephen Dawson, commander, U.S. Army Garrison-Hawaii and a trained electrical engineer, encouraged attendees to think about how to expand operations and be even more sustainable. He asked the audience to think big.

"We're breaking ground on parcel of land that has a history of agriculture with resources that could power a biodiesel plant," Dawson said.

After senior government leaders spoke, Kahu Kordell Kekoa led a traditional Hawaiian blessing of the area. Kekoa explained the significance of the different elements in the blessing. He used salt from a salt pond on Kauai to purify the ground, purified rainwater and three ti leaves fresh from the land at the nearby

community center run by Island Palm Communities.

Col. Steve Peck, command chaplain for 25th Infantry Division and U.S. Army Garrison-Hawaii, also offered his blessings earlier and helped Kekoa in carrying his materials for the traditional Hawaiian blessing.

Kekoa asked the audience to reflect about their children, grandchildren and the generation of children to come as part of the blessing of the site.

"Think for them – what the next levels and next stages will be," he said. "In Hawaii, we're big dreamers, and this power plant will be history for them. What will be next? We want the best for them."

After the Hawaiian blessing, each senior official took one of 12 golden shovels and ceremonially turned over the first few mounds of dirt.

Several government leaders were among

those shoveling, including Gov. David Ige, who addressed the crowd about his enthusiasm for the project as the governor and an electrical engineer.

"I look forward to continued partnership for this project, and truly believe for 100 percent renewable energy use for Hawaii. It's a lot closer than you might think," the governor said. "Especially with imagined projects like this, it's making that dream a reality."

Sen. Brian Schatz, Sen. Mazie Hirono, Rep. Tulsi Gabbard and Christine Harada, Federal Chief Sustainability Officer, White House Council on Environmental Quality, also provided remarks.

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*(Barracks, continued from page 18)*

time of day. The new 300-person barracks were designed with a 450-kilowatt electric resistance water heater to meet the large instantaneous shower load.

Since the existing Transient Training Enlisted Barracks already had a large mechanical basement, Huntsville Center engineers used that space to install equipment that meets the large instantaneous shower load through a combination of domestic hot water storage and highly efficient heat pump technology. The system uses four 1,000 gallon domestic hot water storage tanks and three 12 ton air-to-water heat pumps. This approach provides the instantaneous shower load for the 300-person barracks with approximately one-tenth the electrical capacity (41 kilowatt input load) and one-fourth the energy consumption.



Additionally, to leverage energy recovery opportunities, the source air for the air-to-water domestic water heat pumps is pulled from the return air in the nine open sleeping areas during the hottest time of day (from noon to 5 p.m.). At this time of day the new rooftop heating, ventilation and air conditioning heat pump unit would generally be in the cooling mode and the removed heat would benefit the heating, ventilation and air conditioning unit energy consumption while heating domestic hot water at the same time.

Other energy initiatives included in the first recently renovated Transient Training Enlisted Barracks are LED lighting, evaporative cooling for both outside air and the condenser fan, a high efficiency heat-pump rooftop unit with variable speed compressors, and vent-less heat pump dryers. Detailed models of these energy initiatives show a reduction of annual energy

consumption in the building from 95,600 British Thermal Units per square foot to 24,400 British Thermal Units per square foot for an estimated 75 percent savings.

Fort Hunter Liggett Resource Efficiency Manager Glenn Woodson said he expects that actual metered data will show an annual energy usage of less than 25,000 British Thermal Units per square foot, which will allow the future installation of solar photovoltaic panels on the barrack's roof to create a truly Net-Zero Energy building.

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*New heat pumps and storage tanks, replacing fuel oil boilers and outside equipment, are located within the newly renovated barracks at Fort Hunter Liggett, California. The Transient Training Enlisted Barracks were upgraded to create net Zero Energy Buildings. (U.S. Army photos)*



# Army seeks to triple its Combined Heat and Power capacity

by Randy Smidt and Rick Ballard

Change is coming to the world of Energy Security. At the Energy Exchange 2016 training conference in August, Secretary of the Army Eric Fanning announced an initiative to triple the Army's Combined Heat and Power capacity during the next four years..

Combined Heat and Power, also referred to as cogeneration, is a win-win suite of technologies that enhances both energy efficiency and energy security on Army installations, by capturing heat that would normally be lost in the power generation process and converting it into energy for heating, cooling, and/or industrial use. Using waste heat from the generation of electricity to provide capacity for a thermal load is up to 90 percent efficient compared to 30-80 percent efficiency more typical of providing electric generation and heating individually.

Currently, the Army has installed approximately 100 megawatts of Combined Heat and Power. This new initiative will double that to 200 megawatts in two years and triple the capacity to 300 megawatts in four years, effectively identifying and awarding 50 megawatts of new capacity annually for the next four years. Combined Heat and Power is considered an alternative energy source under Executive Order 13693.

These systems provide continuous benefits to Army installations. They operate on a daily basis and are more reliable than backup generators that may not always perform during emergencies. Other benefits include reduced energy costs and air pollution emissions, improved energy security, diversity in energy supply, opportunities for private investment and the utilization of state/utility incentives, and the support of Army and Federal energy policies.

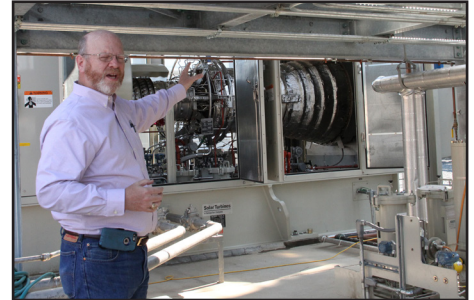
To incorporate it across the Army as standard practice where economically and technically feasible, execution will be performed through existing programs such as Energy Savings Performance Contracts, Utility Energy Services Contracts, Power

Purchase Agreements, Utilities Privatization, Office of Energy Initiatives, and the Energy Conservation Investment Program.

The Office of the Assistant Chief of Staff for Installation Management will establish and lead an Integrated Project Team under the charter of the Senior Energy and Sustainability Council to coordinate efforts on Combined Heat and Power deployment. The team will include members from Headquarters Department of Army, Landholding Command Headquarters, Headquarters U.S. Army Corps of Engineers, and Medical Command.

Headquarters Department of Army will coordinate technical resources from Department of Energy for assessments of potential and will provide support to Landholding Commands in coordinating opportunities to leverage the existing energy service programs for CHP deployment. Landholding Commands will have the lead role for implementation at installations within their portfolio. The team's first task is drafting guidance by the end of this calendar year as well as to establish reporting requirements to enable tracking of progress toward the goal. The overarching Combined Heat and Power Deployment Strategy will include a process for prioritizing sites for deployment that factors in energy security considerations and other mission critical characteristics.

In 2013, the Army began partnering with the Department of Energy Combined Heat and Power Technical Assistance Partnership program to determine what Army facilities have the highest technical and economic potential for Combined Heat and Power. Through the initial pilot effort, the Department of Energy team conducted qualification screenings at 50 Army hospitals and National Guard facilities. The Army energy managers and Department of Energy experts shared data to conduct spark spread analyses using average electric demand, average thermal demand, and average utility rates for each location to estimate the size of a Combined



*Jim Wyant from Compass Commissioning explains how the new Combined Heat and Power project at Aberdeen Proving Ground, Maryland, will operate. The electricity and steam from this project is expected to produce \$4 million in annual savings for the installation.*

*(Photo by Molly Blossie, Aberdeen Proving Ground)*

Heat and Power system, net cost savings and payback at each site. If the screening results are favorable, usually with a less than 10 year payback period, then a more detailed Feasibility Analysis is recommended. Army has worked with the Department of Energy team on a handful of feasibility analyses, which takes a deeper dive into the numbers, so facilities can narrow in on the optimal Combined Heat and Power size and technology for their location.

The potential for Combined Heat and Power at each installation will be different. Some will have large central utility plants that might be converted, while others may have smaller generators whose waste heat could provide domestic hot water. Other facilities like hospitals that have mission critical electricity requirements and a large heat load could be a good fit for smaller, more distributed systems like fuel cells. Technical assistance from the Department of Energy and others will help determine potential, feasibility, and a good fit for execution.

The Army currently has about 100 megawatts of Combined Heat and Power projects online. The most recent is a natural gas-fueled plant at Aberdeen Proving Ground, Maryland. This 7.9 megawatt facility was executed through an

*(See Capacity, page 21)*



# Energy conservation investment projects pay dividends at Presidio

by Jay Tulley

**T**wo Energy Conservation Investment Program projects at the Presidio of Monterey have been completed and are proving outstanding energy and water savings.

A 1-megawatt photovoltaic solar array, completed in August, has begun providing power. The system, which combines panels on carport canopies and ground-mounts, will produce approximately 1,600 megawatts annually, and will export electricity during summer weekends and holidays. The design allows the compound to run in an “islanding” mode during a power outage. The array can run in parallel with the building’s generators to extend their run-time during an extended outage.

The Energy Conservation Investment Program funded the \$5 million project, which was developed by the Presidio of Monterey’s Directorate of Public Works energy program to assist the installation in moving toward its “net zero” goal of producing energy equal to the installation’s energy usage by the year 2020. The project was managed by the U.S. Army Corps of Engineers and awarded as a design-build project to Tri-Technic Inc.

The second Energy Conservation Investment Program project completed in 2016 is providing major water savings in two ways: Xeriscaping and Passive Irrigation. This project replaced more



The completed 1-megawatt solar system at the Presidio of Monterey, California, combines ground and canopy mounted panels. (Photo by Jay Tulley)


than 4 acres of turf with drought resistant landscaping using California native plants. It also included the installation of a passive irrigation system beneath the compounds athletic field. The EPIC© (Environmentally Passive Integrated Chamber) system irrigates the field’s landscaping from below ground which prevents the evaporation and run-off associated with conventional, above-ground irrigation. The system also allows for irrigation using grey-water since there is no spray.

During the past eight months, we have seen a 48 percent reduction in water usage per square foot compared to a conventionally irrigated field using above ground sprinklers. Based on the success of this system, Presidio is investigating the

installation of the system at the other soccer and baseball fields on post.

Combined with other water-saving measures and more efficient building processes, water use at the two facilities where the landscaping was done has been reduced by 64 percent, more than 4.3 million gallons annually. The Xeriscaping and Passive Irrigation project also was managed by the Army Corps of Engineers and built by Jacob Construction.

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(Capacity continued from page 20)

Energy Savings Performance Contract, in partnership with the U.S. Army Engineering and Support Center, Huntsville; Johnson Controls; and a \$680,000 Baltimore, Gas and Electric grant. The facility also received a \$2.5 million Department of Energy grant. The plant’s electricity and steam will provide state-of-the-art laboratories with specific temperature and humidity controls for Aberdeen’s critical Army research and development activities and can be

quantified by some \$4 million in annual cost savings for the 25-year project life. With this project the environment wins, the taxpayer wins, and the installation’s resiliency is dramatically enhanced.

Achieving the Army’s aggressive Combined Heat and Power goal will be a significant challenge but one that can be met through diligence, teamwork, and continued collaboration with partners, such as the Department of Energy, our energy service contractors, and others in the public and private sector.

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# Ensuring energy resiliency to achieve mission assurance

by Daniel Shepard

There was a common theme at the 2016 U.S. Department of Energy, Energy Exchange and the Department of the Army Energy Manager Training Workshop Aug. 9 to 12 at the Rhode Island Convention Center, Providence, Rhode Island. That theme was Ensuring Energy Resiliency to Achieve Mission Assurance. It's an idea that spans all areas of the federal government and especially focused on how the Department of Defense is now elevating the importance of energy resilience due to the department's key requirements of projecting force and ensuring base level operations go uninterrupted.

Cybersecurity is one key critical aspect to ensure mission assurance of these new emerging technologies. These technologies include micro grids, combined heat and power, fuel cells, battery storage, and centralized utility monitoring control systems, which are now becoming prevalent within our facilities and on our installations. Cybersecurity is quickly becoming the critical link to ensure the Defense Department and the Army are mission ready. Installation Commanders and the staff within the Directorates of Public Works now must ensure that the new technologies they are deploying are secure and protected against cyberwarfare tactics and vulnerabilities along with ensuring a functional and efficient delivery of energy related services.

Ensuring the integration of cybersecurity standards into the development, procurement, and sustainment of related control systems supporting these emerging technologies is not a one-man effort. Effective cybersecurity strategy involves many considerations and many different critical role players, including but not limited to System Owner, Authorization Official, Hosting Provider, Network Service Provider, Vendor Integrator, and Acquisition Team. All of these players are critical in defining and executing an effective and successful cybersecurity strategy.

This overall concept of cybersecurity in relation to Army Energy Managers was discussed in depth during the Aug. 12 Army Energy Manager Training Workshop. Team members from the Office of the Assistant Chief of Staff for Installation Management

(Denise Faldowski and Laura Vaglia) and the U.S. Army Corps of Engineers (Daniel Shepard) discussed the vast array of cybersecurity considerations, events, current and future policies/guidance, regulations driving cybersecurity change, and strategies to assist organizations to develop a "Cybersecurity Roadmap".

A special emphasis was placed on the policies and regulations enforcing cybersecurity compliance for control systems. The most recent memorandum released by the Office of the Assistant Secretary of Defense for Energy, Installations, and Environment titled "Managing Cyber Risks to Facility-Related Control Systems," dated March 2016, requires the Army and other respective service branches to develop plans, goals, milestones and the resources needed to identify, register and implement cybersecurity controls on all facility-related control systems under their purview. The ultimate goal is to have all Defense Critical Assets and Tier 1 Task Critical Assets, as well as control systems connected to the DOD Information Network, receive authorizations to operate by the end of fiscal year 2019.

The Army, being led by the Office of the Assistant Chief of Staff for Installation Management and its partnership with Pacific Northwest National Laboratory, has established a functional working group comprised of control systems stakeholders across the Army footprint. This functional working group chartered to develop the roadmap to ensure the Army will meet the goal established by the Office of the Assistant Secretary of Defense (Energy, Installations and Environment).

Currently, there is a multitude of ongoing efforts related to control system cybersecurity across the Army. The Army Installation Management Command has established joint working group to address its command-related control systems cybersecurity compliance at its respective garrisons. U.S. Army Chief Information Officer/G-6 (CIO/G-6) is currently developing policy and guidance regarding Risk Management Framework Assessment and Authorization processes. The U.S. Army Corps of Engineers is primarily

engaged with developing Unified Facility Criteria 4-010-06, "Cybersecurity of Facility-Related Control Systems" and developing a standard methodology for inventorying control systems.

Cybersecurity is an ever-evolving technical discipline requiring many stakeholders to be involved during all phases of the control system's lifecycle to ensure success execution. It is imperative that Installation Energy Managers be aware of the interdependence of technology enhancements capabilities and cybersecurity requirements going hand in hand by incorporating the cybersecurity requirements in, vice bolting them on as an afterthought. Always remember sound requirements exponentially enhance the potential delivery of sound solutions ensuring mission assurance.

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# Demand Response helps lower electric consumption, utility costs

by Cecile Holloway

**D**emand Response has been around the energy arena since the 1990's, known as Demand Side Management. But now, it has been brought to the forefront by the following actions:

- Executive Order 13693 as one of the energy conservation measures to reduce energy consumption and cost;
- Results of a Government Accountability Office study on electricity markets (GAO-14-594) that have highlighted that the General Services Administration and the Department of Defense are participating in demand response activities, although the Defense Department does not have current policies or guidance encouraging installations' to participate in demand response; and,
- The court ruling on Federal Energy Regulatory Commission Order 745 that the commission overstepped its jurisdiction to compensate energy users at the full market price (Locational Marginal Price) in the wholesale market.

The Army encourages installations to participate in Demand Response program with their local utility provider, Curtailment Service Provider or Demand Response Aggregator since demand response is becoming an important resource for electric capacity market.

Demand Response programs support controlling utility peak load by enticing customers to reduce or shift load to non-peak hours through incentives. Participation with Curtailment Service Providers and Demand Response Aggregator can be facilitated through Defense Logistics Agency Energy.

At the Aug. 11-12 Army Energy Managers Training Workshop in Providence, Rhode Island, the Energy and Utility Branch of the office of the Army Chief of Staff for Installation Management presented Demand Response as a way of managing utility cost and reducing electric consumption. The session did not discuss these three actions, instead the discussions were focused on how to leverage demand response, increase participation when

Installation	Provider	Utility	FY15 Benefits, \$K	KW Pledged
Picatinny Arsenal	NUEnergen	JCPL	\$ 213	1,000
Aberdeen Proving Ground	Direct Energy (Formerly HESS)	BGE	\$ 51	12,500
USAG Hawaii	Hawaiian Elec (HECO)	HECO	\$ 287	18,280
Total			\$ 551	31,780

economically feasible, and lessons learned from Army installations currently participating in Demand Response.

The speaker from Defense Logistics Agency-Energy discussed "How to participate in Demand Response"; followed by U.S. Army Engineering and Support Center, Huntsville, together with EXETER representing the ongoing assessment at selected Army installations; and highlighted by the participation of three Installation Management Command energy managers regarding their "Lessons Learned" from U.S. Army Garrison Hawaii, Aberdeen Proving Ground, Maryland, and Picatinny Arsenal, New Jersey.

The Office of the Assistant Chief of Staff for Installation Management Facilities & Energy Policy Division will develop guidance and a handbook to remove impediments for successfully implementing Demand Response management. These impediments include technological barriers in time of use meter for participating in Demand Response programs; lack of awareness to understand electric rate structures and financial and common benefits of participation; and uncertainty or risk about how Demand Response will affect their operations since our tendency is to prefer stable rather than fluctuating prices. Long-term benefits provide reduction in required peaking generation capacity, reduction in required transmission and distribution capacity, and reduction in electrical costs.

Potential opportunities in energy systems that can be curtailed during demand response participation include:

- 1) Lighting - Reducing lighting levels in hallways, offices, warehouses, and open offices. Able to reduce a facility's maximum electrical demand by

approximately 2 percent.

- 2) Heating, Ventilation and Air Conditioning - Great potential for Demand Response opportunities with heating, ventilation and air conditioning systems since they consume consumed on average 27 percent of a facility's electrical energy. The recommendation for these systems is to decrease the setpoint temperature prior to a Demand Response event and increase the cooling setpoint for the duration of the event.
- 3) Process Equipment - Accounts for approximately 47 percent of the plant's electrical energy consumption. Prime candidates for Demand Response are parallel processes that do not run at full capacity.
- 4) Refrigeration - Applicable to cold storage facilities, which accounts for approximately 37 percent of a facility's electrical energy consumption.

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# Demand Response participation pays off at Picatinny Arsenal

by Helene Ferm

**P**icatinny Arsenal, New Jersey, has been participating in regional Demand Response programs since fiscal year 2009, with a successful record of revenue generation from demand response with minimal impact on employee comfort and productivity.

The Picatinny Energy Team was first motivated to participate in Demand Response to better understand the installation's electrical load profile while receiving a financial benefit for assisting with the stability of the regional electrical grid. Picatinny reduces heating, ventilation and air conditioning and lighting loads during a call for Demand Response; the installation's diesel backup generators are not permitted for use in load reduction operations.

The Picatinny electrical service is in the region of the PJM Interconnection LLC grid, a regional transmission organization that coordinates the movement of wholesale electricity in the central eastern states. Picatinny is currently enrolled in the PJM Emergency Capacity Market Demand Response program, where PJM uses the program to stabilize the electric power grid and avoid blackouts and brownouts during system-wide high peak loads generally occurring in the cooling season. Historically, the call for that type of event has been about once per year or less. Enrollment in the

program is through a third-party company called a Curtailment Service Provider. The Defense Logistics Agency Energy Group assisted with a competitive process to select a multi-year contract with a Curtailment Service Provider.

This load reduction program provides environmental benefits by supporting PJM's emergency load response. Typically, on high demand days, many of the inefficient and more polluting generation assets are pressed into service. By participating in the PJM emergency Demand Response program, Picatinny helps reduce the number of hours these inefficient generators operate. This provides an overall benefit to the atmosphere by reducing air emissions from the inefficient generating plants.

Picatinny started small with a 1 megawatt participation in fiscal year 2009. The program has grown as the installation saw what capabilities it had for load reduction. Along the way Picatinny learned how different loads are contributing to the installation's load profile. . Picatinny is currently enrolled for a 4 megawatt curtailment. Revenue from participation in fiscal year 2015 was more than \$160,000.

During a Demand Response event, most load reductions are from heating, ventilation and air conditioning operations through the

central building automation system. For loads not on the central system, heating, ventilation and air conditioning technicians are dispatched to manually turn off or adjust equipment to reduce loads.

Throughout the years, there have been a number of lessons learned:

- Work with Defense Logistics Agency Energy and learn what programs are available in your region.
- Start with an initial modest participation level and learn what is possible at your installation.
- Partner with your heating, ventilation and air conditioning department to reduce those loads during a demand response event and automate the response if possible.
- Most calls for load reduction occur in the later part of the work day and heating, ventilation and air conditioning load reductions for a short time do not have a large impact on employee comfort and productivity.

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# Aberdeen Proving Ground provides Demand Response lessons learned

by Devon Rock

In 2003, Aberdeen Proving Ground, Maryland, contracted with Baltimore Gas & Electric to construct a 15-megawatt peak shaving plant to take advantage of the utility company capacity payments. On behalf of Baltimore Gas & Electric, Constellation Energy constructed and installed six diesel-powered Peak Load Shaving Generators in 2004, each rated at 2.5 megawatts to provide 15 megawatt Distributed Generation and permitted them as Non-Emergency Use.

If possible, make a visit to your Regional Transmission Organization and see the operations. Even if you don't end up participating in a Demand Response program, it will be a great learning experience and an eyeopener about managing your utilities.

The Capacity Program in which Aberdeen Proving Ground participated has provided financial payments when the units were being used as a peak load reductions with Constellation Energy. However, the arrangement ended after it was determined that the installation could not accept financial payments in the form of a check from Constellation. Instead, Constellation created an escrow account and deposited payments until 2009. After legal and financial reviews, it was determined that the money could not be accepted by the garrison as under 10 U.S.C. §2919, Department of Defense services are required to establish an account to capture the financial benefits of participating in load reduction or funds will go to the US Treasury.

Aberdeen Proving Ground has participated in the PJM Emergency Demand Response Program through Hess Energy (now Direct Energy Business), our commodity provider. PJM Interconnection LLC is a Regional Transmission Organization that operates an electric transmission system serving all or part of 14 states, including Maryland. PJM provides monetary incentives to Aberdeen Proving Ground if the 15-megawatt capacity of these generators is made available to PJM for emergency purposes. Financial benefits of the program fluctuate depending on the

energy usage. The installation received financial benefits of \$928,000 for one summer season (June 1 – Sept. 30). The following year, the benefit was approximately \$450,000. PJM payment are seen as credits on the Hess commodity invoices in order to comply with 10 U.S.C. §2919. The installation participates in Demand Response instead of the capacity load shaving events from Constellation.

Here are the lessons learned that we would like to share with other Army installations considering Demand Response participation:

- Know your Operations/Maintenance staff. Demand Response requires responsiveness. If your installation cannot perform to the seven minute, half-hour, or two-hour response time of a program, then don't enroll. Financial penalties for non-performance can be stipulated in the contract. A good Contracting Officer can help you avoid them.
- Work with your utility or Privatization Contractor immediately if you are using generation potential. Every installation will be different in terms of safety procedures, regulations, relay protection thresholds, design standards, etc.
- Be familiar with operation and maintenance of your system. Aberdeen Proving Ground entered a Full Service Contract Program with Constellation Energy for a 10-year service agreement in 2006 since no government employees have experience operating or maintaining the generators. In January 2015, the installation paid Constellation \$406,000 for the final calendar year of the contract.
- Know environmental compliance since the recent National Emission Standards for Hazardous Air Pollutants regulations mandated carbon monoxide emissions reductions and the installation of monitoring equipment. Compliance with the regulations requires the installation to install an oxidation catalyst at a cost of approximately \$70,000 per engine, at total cost of approximately \$500,000. This requirement would not apply if the permit-to-construct status for these units was changed from "Non-Emergency Use" to "Emergency Use."
- Define the benefit prior to enrolling in the program. Every installation will need to consult with its Resource Management and Contracting team prior to entering into a Demand Response Agreement. Read the Financial Regulations (FMR Chapter 12) that clearly defines a payment, a rebate, a credit, and an incentive. Terminology matters. Make sure that funds are set up so the Garrison can retain them. For Aberdeen Proving Ground, the easiest way was to get an electricity credit through the commodity provider.
- Get educated on Demand Response Programs by contacting Defense Logistics Agency-Energy. Speak with a knowledgeable Contracting Officer and get his or her guidance. The Contracting Officer may help solicit the idea to your legal counsel or budget officer.
- If possible, make a visit to your Regional Transmission Organization and see the operations. Even if you don't end up participating in a Demand Response program, it will be a great learning experience and an eyeopener about managing your utilities.

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# Tool supports planning for rehabbing aging water systems

by Elisabeth Jenicek and Bryan Parker

Deteriorating infrastructure is receiving a great deal of interest across the United States. Limited rehabilitation of aging water pipe systems has resulted in many water main pipes reaching their useful service life thereby creating a high risk of pipe failure. The U.S. Army Engineer Research and Development Center's Construction Engineering Research Laboratory's Net Zero water team prioritized rehabilitation of water main pipe areas at Fort Leonard Wood, Missouri, based upon their remaining service life. The team produced a future pipe replacement expenditure plan, based on industry models that can be used as an example for other installations to follow.

In general, the condition of water distribution systems on Army installations is similar to that of the United States at large, where a 15 percent leakage rate is the target. Not only are leaks the source of significant water loss, but leaking water also embodies lost energy. Energy inputs occur at water supply and conveyance, water treatment, water distribution, end use, and waste water treatment. There has been no comprehensive analysis of

water infrastructure on installations as they typically address such needs independently. While public and privately operated utilities seek to finance upgrades through rate hikes and new revenue sources, investments in major repairs to Army water systems must be planned in advance so funds can be requested through available programs since not all costs can be recouped through increases in reimbursable customer rates.

The field of asset management has emerged since the turn of the 21st century with the realization that aging infrastructure is a concern for most United States utilities. The questions that need to be answered to establish an asset management program are:

- How long will potable water pipelines last?
- Which pipes should be renewed?
- What are the best ways to renew pipes?
- How much money is needed?

The "Buried No Longer" pipe replacement modeling tool was developed by the American Water Works Association using the data collected and methods used for the National Mains Replacement

Model, using the Nessie Model approach. This model allows the user to generate utility-scale estimates of possible water main replacement needs based on the national study. The national study derived 12 sub-models based on geographic region and system size, which include: Northeast Large, Northeast Medium and Small, Northeast Very Small, Midwest Large, Midwest Medium and Small, Midwest Very Small, South Large, South Medium and Small, South Very Small, West Large, West Medium and Small, West Very Small.

The model also generates a view of how a cap on replacement expenditures in the short term may affect future replacement requirements. The model requires a variety of installation-specific data, including distribution system age, population served, expected growth rate, pipe costs, and pipe materials and sizes. Without such data the model can be run using assumptions derived from survey data for similar sized systems in the same geographic region. Thus, it is possible to compare the results of analysis using sub-model defaults with analysis using installation-specific data where available.

Ideally, a pipe should be replaced before it reaches the end of service life when replacement or rehabilitation is less expensive than the costs of numerous unscheduled breaks and associated emergency repairs. Therefore, it is important to understand the typical useful service life by pipe materials and prioritize pipe condition of networks within the study region for future investment.

The average estimated service life for each pipe material was projected based on findings from the association's survey and is shown in Table 1.

The base case shows the predicted levels of expenditure required to meet pipe replacement requirements if adequate spending is enough to finish within 40 years. The results of the estimated replacement expenditures by both the pipe material and

(See Planning, page 27)

Derived Current Service Lives (Years)	CI	DI (LSL)	DI (SSL)	AC (LSL)	AC (SSL)	PVC
Northeast Large	130	110	50	80	80	100
Midwest Large	125	110	50	100	85	55
South Large	110	105	55	100	80	55
West Large	115	110	60	105	75	70
Northeast Medium & Small	115	110	55	100	85	100
Midwest Medium & Small	125	110	50	70	70	55
South Medium & Small	105	105	55	100	80	55
West Medium & Small	105	110	60	105	75	70
Northeast Very Small	115	120	60	100	85	100
Midwest Very Small	135	110	60	80	75	55
South Very Small	130	105	55	100	80	55
West Very Small	130	110	60	105	65	70

Source: Adapted from American Water Works Association 2012

CI: Cast Iron

DI: Ductile Iron

AC: Asbestos Cement

PVC: Polyvinyl Chloride

LSL indicates a relatively long service life for the material resulting from some combination of benign ground conditions and evolved laying practices etc.

SSL indicates a relatively short service life for the material resulting from some combination of harsh ground conditions and early laying practices, etc.



# Fort Detrick water treatment plant brings a unique first

by Clem Gaines

**D**rinking water for the members of the Fort Detrick, Maryland, community is now cleaner than ever, thanks to ultraviolet light.

In April, the U.S. Army Corps of Engineers, Baltimore District, finished extensive renovations to the Fort Detrick water treatment plant, which included installing a stand-alone ultraviolet system for disinfection. The upgraded system also represents the first-ever stand-alone ultraviolet system in state of Maryland.

“This \$16.1 million renovation and upgrade took the plant from a fully manual operation, with technicians turning valves and adding chemicals and taking samples for quality analysis, to a computer-networked controlled system to deliver volume based on usage and demand,” said Project Manager Will Hettchen.

The project included updated sludge handling and chemical treatment processes, a water quality testing laboratory, administrative spaces, sludge dewatering equipment and a new chemical storage building. It also repaired and replaced tanks, basins, pumping systems, and piping to improve efficiency and reliability.

Originally built in the 1940s, Baltimore District engineers estimate that this project is the 10th upgrade to the facility that takes



*Massive pumps send finished water to the Fort Detrick, Maryland, garrison. The volume of water can be adjusted in minutes to meet increased demand. (Photo by Clem Gaines)*

raw water from the Monocacy River to support Fort Detrick.

From the river to the installation's tap, water is captured and flows through screens at the water intake area to filter out the larger debris items. Moving along the system via new pumps and pipes, the raw water goes through a point where carbon dioxide is added to adjust the water so the chemicals work properly together.

“This is the first of several points in the process where computers monitor the

water chemistry and quality, and make adjustments,” said Mark Lewis, Fort Detrick water quality program manager. “Water is sampled throughout the plant by automatic equipment and by trained technicians using lab equipment, and by independent test labs.”

Water flows through a pre-sedimentation basin to settle out large/heavier material. Coagulant chemicals are then added to the water and slowly churned by paddles

*(See Water Treatment, page 28)*

*(Planning, continued from page 26)*

pipe size categories show that annual replacement expenditures will increase over time and expenditures will peak at a level of \$850,000 in 2038. Major expenditures during the investment years are incurred by pipes with diameters between 6 and 10 inches, initially asbestos cement and later cast iron pipes. Thus, early investment will reduce overall replacement costs.

The base case results also illustrate that the per capita replacement cost is projected to double over the analysis period with an expected annual inflation


rate of 2.1 percent compared to the projection using a fiscal year 2010 linear foot cost for water mains of \$149. The results tend to grow throughout the years and eventually, the required replacement (each year by 2050) will be approximately one mile of pipe per year.

Based on the results of estimated remaining service lives for the water mains on post, some of the water main pipes have reached their useful service conditions and need to be invested immediately before unexpected water main failure occurs.

Understanding the true cost of water is a motivator for becoming as water efficient as possible to minimize losses that can

be controlled. The realization that all non-government tenant utilities are subsidized to some extent provides strong justification for engaging tenants in an active conservation program.

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# Repurposing ground water system pays dividends at Lewis-McChord

by Erin Luther-Sheakley

**R**epurposing an active ground water remediation solution to support clean water requirements for heating and cooling systems is one of the many innovations of the Installation Restoration Program on Joint Base Lewis-McChord, Washington.

The Installation Restoration Program, which won the 2015 Secretary of the Army's Award for Environmental Restoration, Installation, investigates and cleans up sites on the installation and at Yakima Training Center where hazardous substances were released. Active since the early 1980's, the program has investigated more than 120 sites, with only 17 remaining sites that require continued remediation and monitoring. Sites include former landfills, former small arms ranges, leaking underground storage tanks, disposal pits, industrial yards, and historical petroleum or hazardous waste spill sites.

Two of three sites managed for ground water remediation use three groundwater

pump and treat systems to mitigate the trichloroethylene plume in two aquifers originating from a closed landfill. The systems are operating in the Logistics Center include: Sea Level Aquifer Pump and Treat, Interstate 5 barrier, and the closed landfill. The original cleanup operation for the systems was to pump and treat groundwater, and infiltrate the water back into the upper aquifer.

In a joint effort between restoration program staff and the Army Medical Command, the sea-level aquifer treatment system was repurposed to serve two critical needs: treat groundwater containing trichloroethylene for the Logistics Center; and meet the water supply needs of the Madigan Army Medical Center heating, ventilation and air conditioning system.

- A recent hospital expansion required additional water was needed to meet the medical center's increased cooling load. Approximately 1,800 gallons per minute of clean water from the

sea-level aquifer system provides 90 percent of the medical center's cooling requirements.

- Eliminating the need for a separate water supply system for cooling by using discharge from the trichloroethylene treatment saved approximately \$1 million.
- Water discharged from the medical center's cooling system goes into decorative ponds, which flow to groundwater infiltration galleries. Groundwater discharge supports the water flow of nearby Murray Creek, providing habitat for various species.
- Madigan Army Medical Center received Practice Green-health's "Partners for Change" with distinction award for, among other things, using the sea-level aquifer treatment system as the primary source of water for the heating and cooling system.

In a similar manner, the Interstate-5

*(See Lewis-McChord, page 29)*

*(Water Treatment, continued from page 27)*

in tanks to bind debris into larger particles in a treatment process called flocculation. The water then flows through sedimentation basins and the particles settle out prior to final filtration. Now called settled (but still raw) water, it is monitored and sent into piping for ultraviolet disinfection to kill any remaining microbes. Chlorine then is added to ensure residual disinfection for delivery to the customer. Water also is treated with fluoride for dental care and zinc orthophosphate for corrosion control.

To get to the tap, the water is sent by huge pumps into the garrison water supply system. Hettchen noted that the plant output can be increased from minimal to maximum in minutes versus hours and still maintain water quality. The plant is rated at 2.6 million gallons per day.

"One of the big improvements is in sludge handling," Hettchen said. "Sludge is the sediment that is removed from the water during treatment. The old plant produced 'soupy' sludge that needed to be mixed with dry material before it could be disposed in the landfill. The new plant produces very dry sludge, which means less trips to haul and less effort to dispose - and less cost."

As with every Baltimore District project, this upgrade was a team project including Area Engineer Brad Funt, Resident Engineer Pat Welker, and Project Engineer Bill Conroy.

"The new plant operations can account for any river water condition and apply the necessary chemicals to efficiently treat raw (river) water so that it meets and/or exceeds Maryland Department of the Environment and Environmental Protection Agency-mandated levels for clarity, taste, and potability," said Paul Loeber, who served as the day-to-day construction representative

overseeing the work. "The plant is designed to treat raw water with the correct chemicals based on season, water temperature, and climatic conditions."

Not only was the plant outdated, it needed to support a growing garrison community. In 2017, the U.S. Army Medical Research Institute for Infectious Diseases will be completed and become part of a huge complex known as the National Interagency Biodefense Campus. Several thousand workers will be consolidated from multiple locations into the Institute and other facilities. The Fort Detrick garrison and interagency planners worked for years to fund and build the campus. Modern and effective water supply is a key component.

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*(Lewis-McChord, continued from page 28)*

barrier system was reconfigured to provide water for ground source heat pumps for two recently constructed buildings. Approximately 800 gallons per minute is diverted from the system discharge pipe and used as a geothermal source for heating the buildings. The water provides 5.6 million British thermal units per hour of heat during the winter for two tactical equipment maintenance facilities. Each building is approximately 60,000 square feet and the system uses an estimated 62 percent less energy annually compared to conventional heating and cooling systems, for an estimated annual energy cost savings of about \$50,000. Additionally, this effort made construction of separate groundwater supply wells and a water delivery system for the new facilities unnecessary.

To deliver a reliable source of water to the maintenance facilities, worn out and inefficient flow control valves on the Interstate-5 barrier discharge pumps were

replaced with variable frequency drives, which match the entire system discharge rate to the sum of the individual extraction well discharge rates and allow the system to run more consistently and efficiently. Electricity savings averaged \$8,000 per year, and the variable frequency drives enable the system to be a more reliable source of groundwater for the maintenance facilities' heating systems.

Finally, the closed landfill site was reconfigured in 2014 to provide water for ground source heat pumps for an Army Reserve Center constructed nearby the same year. Approximately 400 gallons of treated groundwater per minute are pumped from the closed landfill system and used as a geothermal heat source for the building. The system became fully operational at the end of last year, with energy and cost savings similar to the other two systems expected.

The Installation Restoration Program's repurposing of all three systems to provide clean water sources supporting

facility heating and cooling systems made them models of water conservation and contributors to the installation's net-zero goals of its sustainability program. Additionally, the program helped facilitate construction of a credit union and pizza parlor on former brownfield site, while protecting occupants from vapor intrusion; used innovative passive diffusion bags in its groundwater monitoring to reduce costs; and, completed landfill cleanup with \$1 million in cost savings by using cleanfill from other local sites.

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*The Sea Level Aquifer Pump and Treat system at Joint Base Lewis-McChord, Washington, was repurposed to serve two critical needs on the installation, treating groundwater at the Logistic Center and meeting the water supply needs of the Madigan Army Medical Center's heating, ventilation and air conditioning system. (Photo by Tom Lynott)*



# You can't manage what you don't measure—flow recorder water data

by Elisabeth Jenicek and Jeannie Elseman

One challenge to an effective water management program is the lack of detailed end use data to evaluate water use intensity. There are few building-scale water meters installed in Army facilities. Existing meters — frequently in place for reimbursable customers only — are often aged, non-operable, and/or not integrated with building automation systems.

A recent U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory effort capitalized on water meters in buildings at Fort Leonard Wood, Missouri. When coupled with portable flow recorders containing data logging capability, these meters provided flow data at a scale that allowed detailed analysis.

The use of Meter Master 100EL Flow Recorders at the post was initiated in June 2013 as part of the ongoing Installation Strategic Sustainability Plan program. Since that time, flow recorders have been rotated between 12 different buildings ranging from barracks and battalion headquarters to clinics and dining facilities. This effort gave a better understanding of where significant water consumption occurs on the base in a real time setting. Flow recorder analysis can also help to pinpoint potential leaks, losses and other sources of unaccounted for consumption. The metrics developed during this effort can be used by the fort as a reference for sustainability planning and evaluation. Further, the data accrued is a useful resource for other installations and for the Army at large in evaluating water end use at similar facilities.

The flow recorders capture absolute amounts of water flow through the service pipe in real time. The recording interval ranges from 10 seconds to a minute, with operation from 30 to 90 days, respectively. This effort employed a one-minute interval. Data were subsequently downloaded at three-month intervals using Master-Meter Model 100 Software on a laptop computer. The units were relocated to new

buildings after a year's worth of meter data was collected in order to capture seasonal variability of water demand.

The flow recorder sensor, which is connected to the device with a cable, is affixed to the side of the meter body using a Velcro strap. The Meter Master software must be used to configure the recorder for the specific meter model and pipe diameter and for the desired recording interval.

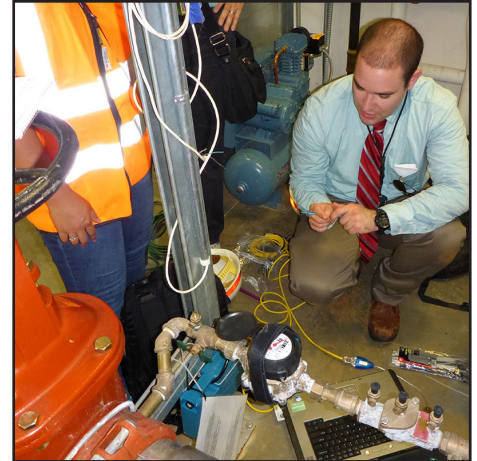
End use factors were employed as a means of understanding the significance of raw water demand data and vary depending on the type of facility. For example, dining facility end use is counted in meals served while barracks end use is counted in occupancy. For barracks it was important to note occupancy throughout the month, as using monthly occupancy averages could skew water use intensity values.

Following collection of both flow recorder and end use factor data, the two data sets were combined to produce a longitudinal record of water use intensity for each building. For the purposes of this data analysis, water use intensity units were defined for each facility type, rather than adopting the gallons per square foot water use intensity metric established by Executive Order 13693: *Planning for Federal Sustainability in the Next Decade*.

Data limitations required making some assumptions during the analyses. Since the barracks occupancy data is recorded on a consistent day of each week, it was assumed that the daily occupancy throughout the week remained constant.

Box plots statistically account for every flow event during the recording period by the day-of-week. These plots graphically display the median flow rate, upper and lower quartiles, maximum and minimum, and outlying flow rates. Charts depicting the average daily flow and average water use intensity also were created.

The data for Building 6102, Advanced Individual Training barracks, is an example of water use that tracks occupancy as



Noah Garfinkle, a research civil engineer with the U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory, attaches a flow recorder to a meter, which is then programmed to help evaluate effective water management. (Photo by Elisabeth Jenicek)

expected. The box and whisker plot reveal very nearly steady daily water demand from 0 to just above 2 gallons per minute, and a median around 0.5 gallons per minute, with higher consumption on Sunday due to clothes laundering. The high outlying data points are due to surges in water use when many soldiers are showering at once. The surge use intensity for this building averaged around 10-15 gallons/Soldier/day, however spikes occurred up to 30 gallons/Soldier/day. Gaps in data reflect times where the building was empty.

In contrast, the data for Building 4109, Pershing Community Center, shows lower water use on Sunday when facility usage drops. The box plot shows an average flow rate typically no higher than 5 gallons per minute though anomalies have occurred in the hundreds of gallons per minute for some events. The water use intensity peaks at mid-week when the families of graduates frequent the club. The overall water use intensity is fairly high which can be expected for a building that functions as a dining facility.

The use of flow recorders to evaluate

(See *Water Data*, page 31)



## Waste diversion offers path toward achieving Net Zero

by Giselle Rodriguez and Michael Andres

**T**here is value and potential in materials being landfilled.

Each military installation is unique. Factors like mission, tenants, culture and behavior affect waste generation trends; consequently, waste diversion opportunities will vary from site to site. However, there are still some common trends to be found and lessons learned to be shared.

Army Regulation 420-1, Army Facilities Management, calls for implementing integrated solid waste management, developing an Integrated Solid Waste Management Plan, source reduction to reduce the waste stream, and implementation of a Qualified Recycling Program. Also Army Directive 2014-2 mandates all installations to strive toward Net Zero whenever fiscally prudent.

However, first an installation must know what types of waste it generates, in what quantities and at which location. This is the role of a waste characterization study.

Waste characterizations assist installations in finding waste diversion opportunities. By better understanding the kind of materials being thrown away and where, the diversion potential can be maximized by focusing recycling program resources.

But what does it mean to find the diversion potential and how does it help an installation? Finding the diversion potential assists installations in prioritizing diversion strategies and placing the focus on the materials that offer the most opportunities

for diversion, either because their markets are more accessible or because the materials are generated in the highest quantities.

Whether these diversion strategies include reduction by better purchasing or recycling and composting, often identifying and quantifying these materials is the difference between meeting and exceeding a diversion goal.

For the past several years a U.S. Army Corps of Engineers Engineer Research and Development Center Construction Engineering Research Laboratory team has dedicated countless hours to studying waste generation and diversion potential at Army installations. In an effort funded by Installation Management Command, the team provides installations with quantitative data related to waste types generated, and waste generation and distribution trends based on building usage.

This process is unique because it develops waste “intensity” factors for each building type and waste type, such as #1 plastic at offices or cardboard at dining facilities. These factors are generated after doing intensive sorting at representative buildings of each type, and extrapolating across the installation based on the real property inventory. The waste is sorted by hand into at 19 categories, including plastics, food, and different types of paper. Categories might be added depending on the installation’s need.

Through this effort, the team has completed waste characterization studies at Fort Huachuca, Arizona, Presidio



of Monterey, California, Fort Benning, Georgia, and U.S. Army Garrison Japan. The team plans to continue its work at additional installations through this fiscal year.

These waste characterizations have revealed a common trend - food waste is the largest single component of the overall waste stream. At some installations, food waste represents up to more than 50 percent of the waste generation, and by weight, some installations are generating more tons of food waste a year than paper and plastic combined.

To address this issue, the team has evaluated multiple technologies for diverting food waste from landfills to include composting, anaerobic digestion to generate energy from biogas and food waste dehydration. In addition, Installation Management Command has fielded several dehydration systems in a pilot program that intends to reduce food waste generated at dining facilities by at least 70 percent. However, solving this problem will require non-material solutions such as adjusting the food procurement process and food donations.

Despite the challenges, understanding waste is the first step to reducing waste generation and increasing waste diversion.



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(Water Data, continued from page 30)

building-scale water use can identify demand patterns that point to the need for further investigation. Comparing water flow with end use factors can establish WUI values that are normal and those that fall outside of the expected ranges. This technology is readily available and can be adopted by any installation to improve water management programs.

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# Fort Benning waste-to-energy machine reveals power of trash

by Danielle Davis

**F**ORT BENNING, Georgia - Fort Benning is helping the Army test a new product that could one day change not only how forward operating bases get rid of their waste, but also how they make use of it.

The Battalion-scale Waste to Energy Conversion Green Energy Machine came to Fort Benning as the result of a partnership with Infoscitex and MSW Power.

“We’ve got a good working relationship with them. They call us about a lot of projects. This one is unique because it’s a closed loop system. It runs off the product that you put into it,” said Peter Lukken, the garrison’s sustainability manager.

“Something like this has never been done before, at least, not on this scale. And not one that produces this little pollution to the environment.”

Mark Fincher, Directorate of Public Works Business Operations Division energy manager, explained that all the trash being used to test the green energy machine comes from Fort Benning.

By using it, Fort Benning is not only reducing the amount of waste it sends to the landfill but its carbon footprint, he said.

Mark Young, vice president and director of Engineering at MSW Power, has been

‘This is a much more environmentally friendly way to get rid of the waste while making a good use of it.’

- Mark Young

working on the green energy machine project for 10 years.

He explained that the machine is a waste to energy system that has three major units: a preprocess that converts the trash into a pellet, then a thermal process to break down the solid fuel pellet into a flammable gas, then that gas can be used in an engine as fuel to produce electricity. This thermal treatment system is called gasification.



*The battalion-scale Waste to Energy Conversion Green Energy Machine converts 3 tons of trash into 100 gross kilowatts of energy at Fort Benning, Georgia. (Photo by Danielle Davis)*

According to Young, the green energy machine was designed to process three tons of trash daily. Once processed, that trash becomes 100 gross kilowatts. Out of those 100 gross kilowatts, the machine needs 26 to operate, leaving 74 net kilowatts for Fort Benning to use.

ash that is essentially harmless and can be put into the ground. This is a much more environmentally friendly way to get rid of the waste while making a good use of it, he added.

George Steuber, deputy garrison commander, explained that having a system that can take all these different types of waste and produce energy out of them would be beneficial to the U.S. forward operating bases. Those working on forward operating bases could also do away with a lot of obstacles that come along with off-site disposal of waste with this system, he said.

When the U.S. goes places, it tries not to pollute. Having a system like this makes it a cleaner operation for everyone involved while helping preserve the environment in other countries, Steuber added.

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# CERL team helps Fort Leonard Wood meet Net Zero goals

by Dominique Gilbert

**D**uring the past four years, the U.S. Army Corps of Engineers, Construction Engineering Research Laboratory has partnered with Fort Leonard Wood, Missouri, to provide ongoing support as the installation strives to achieve its Installation Strategic Sustainability Plan goals.

The team is composed of lab researchers, the installation's Directorate of Public Works, the Plans, Analysis and Integration Office, the Director, Family and Morale, Welfare and Recreation, the Directorate of Plans, Training, Mobilization and Security, the Directorate of Human Resources; and the Directorate of Evaluation and Standardization. Beginning in 2013, the team has focused on providing waste diversion alternatives and developing new tools to help installation management make decisions that align with government regulations, Army mandates and Net Zero Waste goals.

The team has evaluated the installation's population to determine waste generation rates by the different groups making up the post's overall daily population - on post residents, non-residents and transient civilians. The research revealed that each group generates waste at different rates. This information helped the installation integrate population-targeted schemes into waste management plans facilitating efforts to decrease waste.

A comparative analysis was performed to determine whether single stream waste or source separated waste agendas will more efficiently and cost effectively help the installation meet its net zero waste diversion goals. The study explored the pros and cons of the two waste collection methods using as source-information the most current literature in the field and numerous personal interviews with waste management personnel across the United States managing both types of waste facilities. This analysis was supported with a waste characterization study, which assessed the installation's waste stream to identify



*The U.S. Army Engineer Research and Development Center Construction Engineering Research Laboratory waste team sort Fort Leonard Wood, Missouri, municipal solid waste for recyclable items in St. Roberts Missouri as part of its evaluation of waste at the installation. (Photo by Giselle Rodriguez)*

recyclables having potential for diversion that are currently being disposed as waste. The study provided the foundation for Fort Leonard Wood to determine courses of action to increase its recycling rates and meet its goals for higher diversion rates.

The team selected 10 different buildings, representing the different building types common on the installation and in the Army. They included office buildings, community gathering type buildings and classroom buildings, which was important as the study's goals were to determine the waste generation rate for each building type. The team then established, by waste category, a daily rate for each building, extrapolating it to create installation wide estimated annual production rates.

The characterization study found the top three materials with potential for greater diversion by weight were food, paper products, and cardboard.

Currently the team is exploring the behavior side of waste generation. Based on the waste characterization study, the team switched gears to examine the effects different types of bin placement, waste and recycling signage can have on waste generation rates. To leverage previous data, the same 10 buildings were examined, however to increase the list of building types, seven small barracks were included.

The methodological approach taken on the representative buildings is to first examine waste generation under the status quo signage and bin placement and then mid experiment with alternate signage and bin placement. At the barracks to which recycling is being introduced, there is one set-up, and signage is the only focus.

These studies are important because they reveal critical information for the post to better meet its Net Zero Waste goals. The waste research targets the main drivers of waste generation, population, method of waste collection, building types and social behavior for a more holistic understanding of waste generation at Fort Leonard Wood. With this approach different waste practices can be simultaneously targeted for an overall increase in waste diversion rates and decrease in waste generation.

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# Taking out the trash: Improved reporting increases waste diversion

by Jonelle Kimbrough

Recycling is considered one of the easiest ways to integrate sustainability into daily operations. The U.S. Army Reserve has been successful in implementing recycling programs at its installations, Mission Support Command and Regional Support Commands.

But, due to their geographical dispersion and unique needs, Regional Support Commands face a challenge: to capture the recycling efforts that happen at their sites every day, across the country. The Army Reserve Solid Waste Program is meeting those challenges to ensure that the Army Reserve will reach federally mandated solid waste diversion goals.

Currently, the municipal solid waste diversion rate for the Army Reserve is 37 percent, which is 5 percent greater than the municipal solid waste diversion rate for fiscal year 2014. So even though there is still work to be done to reach the federal goal of 50 percent diversion from landfills, the Army Reserve is charting progress that can be attributed to improvements in reporting.

Many Army Reserve sites have established successful recycling programs, but according to Solid Waste Program coordinator Tyrone Cook, “the challenge has always been in capturing the diversion at the MSC and RSC level due to their unique organizational structures.”

“Overall installations, the MSC and RSCs are prepared to increase their diversion reporting simply by capturing what is taking place within their fence lines and out in the field. We may find that we have already reached or exceeded the federally mandated goals.”

‘We may find that we have already reached or exceeded the federally mandated goals.’

- Tyrone Cook

So Cook and the Solid Waste Team sought solutions. They developed a Solid Waste Management and Recycling Profile Survey, which is being used to improve solid waste best management practices, identify areas within established programs that need improvement and identify additional diversion opportunities.

In addition, the team added a solid waste management assessment to existing Comprehensive Energy and Water Evaluations to further identify diversion opportunities and program improvement areas, and created a Solid Waste and Recycling Weight Estimation Tool and accompanying guidance to help sites more accurately report their diversion.

As a result, sites have markedly improved their diversion reporting in Solid Waste Annual Reporting on the Web, an online system for tracking, analyzing and reporting information on the generation, recycling and disposal of non-hazardous solid waste at Department of Defense installations. Army Reserve installations, the Mission Support Command and Regional Support Commands are capturing a more complete set of data for the diversion that is taking place throughout the enterprise.

“We have improved processes that are helping to identify and include data that have been overlooked in the past,” Cook said.

As they ride the momentum of a notable increase in solid waste diversion, Cook and the Solid Waste Team realize that they cannot simply rest on that achievement. While they focus on capturing diversion at Army Reserve Centers, they also seek ways to decrease or divert food waste from waste streams. They are also bolstering recycling education and awareness efforts.

For instance, a paper reduction awareness campaign began in April with goals of meeting federal and Department of Defense paper reduction mandates, conserving resources, lowering operating costs, reducing waste and improving business efficiency for the Army Reserve. The recycling programs in the field are forging ahead, too, and continuing to support diversion efforts.

Whether it is reporting more of its diversion or recycling more of its waste, the Army Reserve is taking out the trash today so we have a more sustainable mission for the future.

Visit [www.usarsustainability.com](http://www.usarsustainability.com) or [www.usar.army.mil](http://www.usar.army.mil) for more information on Army Reserve sustainability.

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Kimbrough is the Army Reserve Sustainability Programs Communications coordinator, and Cook

**Army Reserve Recycles**

Recycle Right! Recycle More!

**Net Zero Goal:**  
Zero solid waste disposal in landfills

**Reduction**  
Re-Purpose  
Recycling & Composting  
Energy Recovery

**Waste Reduction**  
• Improved operational practices  
• e.g. Buy less, buy smarter  
• Reuse, repair and recycle  
• Solid waste reporting  
• Reduce emissions

**Solid Waste Goals**  
• 50% diversion by 2015  
• High C&D rates by FY2015

**Waste Minimization**  
• After meeting essential needs  
• Only where economically feasible

**Be a Recycle Champion!**

<http://www.usar.army.mil/resources/ForSoldiers/Pages/Army-Reserve-Recycles>



## Compatible Use Buffers serve as partnerships for protection

by Jennifer Morris

The noise, smoke and dust from military training can be an issue for communities bordering Army installations, while lights, lack of green space, restrictions on air corridors and radio frequency sharing can interrupt military training.

Local communities, along with conservation groups, state and county governments, and other federal agencies, partner with the Army to create buffers that enable training and protect habitats. The Army Compatible Use Buffer Program, or ACUB, allows the Department of Defense to form agreements with non-federal governments or private organizations to limit encroachments and other constraints on military training, testing, and operations by protecting land established as buffers around installations.

“ACUB benefits the Army and its partners and neighbors,” said Col. Robert C. Wittig, former commander of the U.S. Army Environmental Command. “In many cases it also creates a safe environment for native flora and fauna, which sometimes includes endangered species.”

The U.S. Army Environmental Command provides operational oversight of the program and helps installations



*The Red-Cockaded Woodpecker is a federally listed non-migratory bird native to the longleaf pine forests of the southeastern U.S. Fort Bragg contains 81,200 acres of longleaf pines, one of the largest remaining blocks of this forest type in North Carolina. Prescribed fire and other habitat enhancement techniques are used to maintain and restore habitat for the installation's robust woodpecker population. (Photo by Endangered Species Branch, Fort Bragg)*

develop strategies and identify partnership opportunities. The ACUB program is managed by the Office of the Assistant Chief of Staff for Installation Management, and executed by the Installation Management Command for active duty installations, and the National Guard for its installations.

A prime example of how the program supports the Army's triple bottom line of mission, environment, and community can be found at Fort Bragg, the installation that played a pivotal role in the program's formation.

Fort Bragg, located in the Sandhills region of North Carolina, is home to the Army's airborne and special operations forces, and also contains portions of the longleaf pine forest, a habitat for the endangered Red-Cockaded Woodpecker.

In 1992, the U.S. Fish and Wildlife Service imposed significant training restrictions on Fort Bragg to protect the woodpecker, which hindered training by restricting access to huge tracts of land. Fort Bragg, working through the Private Lands Initiative, supported recovery of the endangered bird's population, protecting not just the bird but also military readiness and the longleaf pine and wiregrass ecosystem. The Army joined with other organizations to form a regional partnership, resulting in more than 10,000 acres of longleaf pine habitat being preserved for the woodpecker population.

These efforts not only protected and began an effective recovery of the species, but also allowed the training restrictions to be lifted. Approximately 3,000 acres of Fort Bragg training land became unrestricted in 2009, and in 2013, training restrictions and protective signage were removed from an additional 4,000 acres.

The easements set aside for bird habitat surrounding the installation also kept infrastructure away, creating a buffer zone between the community and the installation.



*Using funds from the Army Compatible Use Buffer program, the Army was able to free up training land restrictions and still protect the Golden Cheeked Warbler by partnering with the City of San Antonio, Texas Parks and Wildlife Department and the Nature Conservancy to manage land with suitable habitat for the endangered bird off Camp Bullis, Texas. (U.S. Army Photo)*

“Through ACUB program initiatives, Fort Bragg has not only met our RCW (Red-Cockaded Woodpecker) recovery goals, but we have re-established a Long Leaf Pine ecosystem that is good for our endangered species and preferred by our Soldiers to train on,” said Jon Chase, Fort Bragg's ACUB coordinator. “Our ACUB working groups also created more community green space and recreational areas.”

Carver Creek State Park, adjacent to Fort Bragg, protects the installation boundary from incompatible growth pressures, Chase explained, while giving the community the first state park in Cumberland County. “It's clearly a win-win-win,” he said.

Fort Bragg is not the only successful installation in the ACUB program as more than 20 installations are working with local and Federal partners to protect the Army's ability to conduct military training and protect installation natural and cultural resources.

Camp Bullis, just outside the city limits of San Antonio, Texas, also has met the Army's triple bottom line.

Fort Sam Houston is located with the city

*(See Compatible Use Buffers, page 36)*



# Creative strategies for managing cultural resources pay dividends

by Anne Koster

**P**ublic Works Technical Bulletin 200-1-148, *Creative Strategies and Opportunities for Managing Cultural Resources on Army Training Lands*, serves as guidance for Installation cultural resource managers, trainers, and related planning areas on Army installations.

The bulletin identifies creative and innovative technologies and best management practices for cultural resources and site management on Army training lands. It provides background on cultural resource management and stewardship within the Army on installations within the United States.

Initial discussion includes proactive strategies for maintaining a sustainable cultural resource management program while retaining and achieving the Army's training mission.

Analysis of successful cultural resource management strategies or mitigation efforts is provided, with three examples:

- Site hardening at Fort Drum, New York, which has allowed land previously withdrawn from training access to be put back into available land for active Army training;
- Public education used as mitigation for archaeological site disturbance at Fort Leonard Wood, Missouri, allowing access to historical records and knowledge while documenting the site prior to adverse effects from installation activities; and,
- Alternative site mitigation done via Army Compatible Use Buffer land exchanges at Fort A.P. Hill, Virginia, where some cultural resources are permitted to be destroyed as long as

specific criteria are met for protecting other, more important sites.

A summarization of lessons learned for cultural resource management and mitigation on Army installations is provided within the bulletin, as well as opportunities for added value that may come from using some of the identified strategies.

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*(Compatible Use Buffers, continued from page 35)*

limits of San Antonio and is the home of all Department of Defense medic training, as well as training for some officer medical specialties. Camp Bullis is the only field training installation for the 38,000 military personnel at Fort Sam Houston.

It is also home for the Golden Cheeked Warbler.

There are 28,000 acres on Camp Bullis, with approximately one-fourth of the land not suitable for most field training. With the addition of 12,000 personnel due to the Base Realignment and Closure Act of 2005, training in the already limited space was a challenge.

Through the ACUB program, the Army partnered with the local government and nature conservation organizations to obtain mitigation credits that allowed the clearing of cedar on about 2,600 acres, resulting in a 25 percent increase in unrestricted field training areas on post. This partnership also allowed for 6,000 acres off-post to be

placed under permanent management as a nesting site for the warblers.

“The ACUB program allowed us to protect similar quality habitat off-installation in perpetuity,” said Camp Bullis Natural Resources manager Rustin Tabor. “It provided greater opportunity and flexibility to work with more partners at the federal, state and local levels to achieve mutual goals.”

Moving the warbler habitat off the installation was made possible through the conservation and protection of the Bracken Bat Cave. As the largest bat cave and bat nursery in North America, it supports approximately 20 million adult bats, who give birth and care for their young in the cave. Approximately 40 million bats migrate from this cave to Mexico for the winter.

The conservation and protection of the Bracken Bat Cave is eligible to be a part of the ACUB program as it is considered “ecologically relevant” since the land surrounding the cave is also habitat for the warbler. This allowed the Army to clear cedar from training grounds when the birds were away during the winter. Keeping the

habitat surrounding the Bracken Bat Cave allows them to set up their nests there, instead of on the installation, thus minimizing the impact on training.

ACUB partnerships contribute to the overall well-being of the Army, the local community and the environment. The overall goal is the same- land use management and preservation of natural resources- whether it is to support the training mission, keep neighboring communities safe, or preserve threatened and endangered species.

For more information about the Army Compatible Use Buffer program or other conservation efforts of the U.S. Army, visit <http://aec.army.mil/>.

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# Reflective transformation imaging enhances petroglyph management

by Torie Robinson

**S**CHOFIELD BARRACKS, Hawai'i – The U.S. Army Garrison, Hawai'i Cultural Resources Program is supporting the U.S. Army's management of at least 30 petroglyph sites on Oahu.

Archaeologists encounter many challenges when documenting petroglyphs, especially in Oahu's varied environments. The weather conditions, time of day, lighting and extent of deterioration can all prevent archaeologists from successfully documenting the true characteristics of a petroglyph.

Petroglyphs are nonrenewable resources that cannot be recreated if damaged or destroyed. Natural forces like wind and rain cause rock surfaces to erode over time. While some petroglyphs have survived for several hundred years or more, they are very slowly weathering and deteriorating. Accurate documentation is essential for their preservation, including documenting changes in the condition of the rock and its images.

The garrison's Cultural Resources Program began using Reflectance Transformation Imaging to record petroglyphs in a more thorough and comprehensive manner than

before. This imaging is a multi-image combination technique that interactively displays objects under varying lighting conditions to reveal surface phenomena.

Reflectance Transformation Imaging shows minute details on rock surfaces that are invisible to the naked eye and often impossible to record with conventional photography. The imaging's strength is its ability to highlight the subtle changes in height and depth on a subject's surface, allowing the viewer to better distinguish any human modifications present. The technique has already helped the garrison's archaeologists discover additional features on previously recorded petroglyphs that were not visible without using the imaging technique.

The images created also can help determine the particular production technique the artist used: pecked, bruised or abraded. Archaeologists also can use the imaging program to identify any anthropogenic or environmental damages to petroglyph boulders and then work to prevent further damage.



*Archaeologists Anthony Casciano and Torie Robinson perform a Reflective Transformation Imaging photoshoot in the field at Fort Shafter, Hawaii. Tent and tarps are set up for a photo shoot of the petroglyphs. (U.S. Army Photo)*

before. In fact, the technology was initially invented for use in a laboratory setting, where sun, wind, terrain and vegetation are not factors.

Implementing the imaging technology was very much a trial and error process.

## Implementing the imaging technology was very much a trial and error process.

The technology is accessible and easy to use. The software can be downloaded for free from Cultural Heritage Imaging and the technique doesn't require a special camera.

Garrison archaeologists first applied Reflectance Transformation Imaging at Fort Shafter Military Reservation. A basalt rock outcrop overlooking Kahauiki Stream contains multiple petroglyphs initially recorded in 2000.

The site was selected partly because the majority of the petroglyphs are difficult to see with the naked eye due to natural deterioration of the rock faces and poor lighting. Numerous petroglyphs throughout the site were difficult to identify and were never fully recorded.

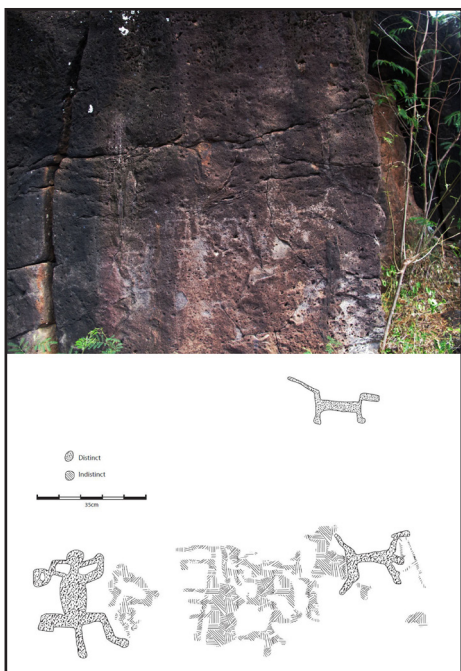
Reflectance Transformation Imaging was a relatively new technology to Hawai'i and using the technique in the uncontrolled, outdoor environs had never been done

The field crew experimented with several different methods aimed at limiting the effects of ambient light created by the sun: from tents and tarps to photo shoots in the dark of night. As the methods were perfected, results improved.

The U.S. Army Garrison-Hawai'i Cultural Resources Program is using Reflectance Transformation Imaging at all petroglyph sites on Army-managed land as a standard documentation practice, and plans to use it periodically to monitor petroglyph weathering and other impacts.

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*These petroglyphs had not been detected before the use of Reflective Transformation Imaging at Fort Shafter, Hawaii. (U.S. Army Photo)*



## PWTB looks at urban range design sustainable technologies

by Anne Koster

**P**ublic Works Technical Bulletin 200-1-141, *Sustainable Technologies Implementation in Urban Range Design*, serves as guidance for engineering support and range designers, as well as installation management for urban training range areas on Army installations. The bulletin provides a real-life analysis of sustainable field Best Management Practices and Low Impact Development design technology elements implementation, engineered to satisfy military training requirements as well as environmental compliance drivers. A primary focus is on stormwater management with solutions and guidance for erosion protection, as well as after-damage corrections.

The bulletin evaluates two types of urban training areas (permanent and temporary), relative to training infrastructure requirements and sustainability. The bulletin identifies and proposes design solutions for common erosion problems found on permanent and temporary

urban ranges. It uses two example urban military training ranges to walk through the design process for preventing and correcting erosion problems. Low cost and effective long-term solutions appropriate for in-field installation are emphasized, while compatibility to training requirements is a key consideration.


The bulletin also outlines the methods utilized in the study for engaging ArcGIS technologies and web based databases to effectively identify areas susceptible to erosion. A discussion is provided to describe how ArcGIS can be used to bring geological information together to create hydrologic maps that aid in the identification of potential erosion problems.

For both the permanent and temporary urban training area range example, erosion problems are identified, and the design process is described for each example in a problem-solution format. A problem section details the soil mechanics and other factors leading to and driving erosion at the site.

Photographs taken at the site are shown, each paired with an altered version with colored highlights overlays to illustrate the conditions at the site. A solution section explains installation procedures and benefits of using low impact development or best management practices to prevent erosion. Technical drawings are included for each example that show how each prescribed solution is implemented.

With this publication on in-field urban training area-appropriate design solutions guidance and technology transfer, the Army gains more potential in ensuring proactive, efficient, and sustainable designs that will save money in both long-term design-life and maintenance.

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## New guidelines for electronic security systems published

by Kaitlyn Davis

**T**he U.S. Army Engineering and Support Center, Huntsville worked with the Naval Facilities Engineering Command to publish two new Unified Facilities Guide Specifications in May.

These guide specifications pertain to Electronic Security Systems and Electronic Security System Acceptance Testing. The guidance includes the requirements security systems must meet and procedures on testing the systems once those requirements are met.

“Electronic security systems are a key element of physical security at DOD installations, enhancing the protection of facilities, equipment and people against a range of criminal and terrorist threats,”

said ESS Mandatory Center of Expertise Technical Deputy Charles Malone.

The ESS guide specifications encompass software, installation and a broad range of security equipment including cameras, sensors and card reader systems.

Within a period of three years, the two construction agents for the Department of Defense updated and merged their ESS guide specifications to create one unified tool for all the services to use.

“The purpose of the guide (specifications) is really to support military construction,” Malone said.

Their collaboration includes up-to-date technology for the ESS guide specifications and examples of testing procedures

for the ESS Acceptance Testing guide specifications, he said.

“The unification and a refresh on technology and standards — those are really what we’re most proud of about the documents,” Malone said.

Users of this new guidance have the opportunity to improve it by submitting their suggestions through a Criteria Change Request, he added.

For complete guidance, go to [wbdg.org](http://wbdg.org).

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Kaitlyn Davis is a Public Affairs summer hire at the U.S. Army Engineering and Support Center, Huntsville, Alabama. 



# Enterprise-wide cost estimating solution on the horizon for IMCOM

by Douglas Enfield

Garrison directorates of public works will soon see the first enterprise-wide result of a major shift in technology management for installations.

An enterprise cost-estimation solution due early this fiscal year will highlight the effectiveness of the U.S. Army Installation Management Command Information Technology Governance Board.

The business of public works is similar at every Installation Management Command installation. These similarities often far outweigh the differences. Finding redundant processes at multiple locations opens the door to investment in our command by providing an enterprise solution.

Up to now, each installation across the command that uses cost estimating software has purchased the licenses and support individually.

Every public works director has a primary mission tied to the construction and restoration of facilities and infrastructure. Staff provides scope and management to construction projects on their installations. In the process, the garrison's engineers, estimators, procurement techs, and resource managers employ an array of tools. One of these tools commonly used is cost estimating software.

At the start of a construction project, engineers gather the necessary requirements including, but not limited to, design, site preparation, environmental compliance, labor and materials. There are also regional factors to consider including local wages, material availability, remoteness of the project site, and historical building classification.

To combine the many factors to create a construction project estimate, a director of public works will often use a commercial off-the-shelf software product. Up to now, each installation across the command that

uses cost estimating software has purchased the licenses and support individually. Each also created unique business processes around those software packages.

In 2015, Installation Management Command established the Information Technology Governance Board to standardize and monitor information technology procurement and compliance. This board reviews command-owned software to ensure financial and cyber security compliance processes are followed. Costs are monitored in the Army Portfolio Management Solution that tracks all information technology assets owned by the Army. Cyber security is monitored through compliance with the department of defense's risk management framework.

At the board's third meeting, an installation presented its cost estimating software for approval. This was the second time in only three meetings that this type of software was presented to the board. After a few questions about the use and purpose of the software, the request was approved, with a follow-on task: Since this software type is primarily utilized by public works, the Installation Management Command Headquarters G4 Directorate was tasked to create an enterprise solution – a single cost-estimating software solution for the entire command.

The reasoning behind the enterprise approach is obvious. Paying for the solution at each installation meant procurement and compliance had been happening redundantly. Cost estimation processes are unique to each installation, and estimates are formatted and handled differently depending on the Directorate of Public Works and the software used. This approach squanders the opportunity to leverage the

command's size economies of scale.


The shift to an enterprise approach led G4 to gather the necessary requirements for such a software tool and to pursue a single license agreement for all users in the command.

Installation public works directors using different software products were surveyed to determine the products and features they needed to create estimates. The G4 headquarters staff engineers were then consulted on the necessary and unnecessary features of a software package. After that, the enterprise cost estimating solution was entered as a candidate record in the Army Portfolio Management System. The governance board approved that candidate.

All salient requirements were sent to the local contracting command to create an acquisition strategy. This solution should be available early this fiscal year.

At the end of the process, it will be one of the first enterprise solutions born from the governance process. More than that, Installation Management Command will have a road map as it pursues enterprise solutions for software, hardware, services, and all other information technology assets. The pursuit of information technology compliance is leading Installation Management Command to be both secure and efficient.

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## Hawaii NCOA Academy leads energy conservation charge

by Santiago J. Hernandez

The 25th Infantry Division's Noncommissioned Officer Academy, the premier junior enlisted academy for the Pacific, is leading the charge and energizing the green movement within U.S. Army Hawaii.

On its own initiative, the NCO Academy has raised the bar on teaching, coaching, counseling and evaluating junior NCOs on energy conservation. The U.S. Army Garrison-Hawaii community should expect this initiative and the academy's collective efforts are going to favor the Army and, more importantly, the environment.

The academy is designed to train current and future NCOs from the Army and allied pan-Pacific countries. Last fall, the academy began evaluating students in leadership positions on their abilities to monitor energy consumption and comply with new energy conservation standards.

"Energy conservation is a leadership responsibility," said Staff Sgt. Kareem Franklin, small group leader, 2nd Platoon. "As NCOs, we enforce standards, not just talk about them. We have to learn to do more with less."

The academy trains approximately 133 Soldiers per cycle (22 academic days) and roughly conducts nine cycles per year. Additionally, since September, the academy has trained soldiers from Singapore and Indonesia.

All students, regardless of origin, are evaluated on 31 daily duties and characteristics that include attributes, core competencies, principles of leadership, tactical standards and technique practices.

Energy conservation was recently added as a leadership-evaluated responsibility.

"It was 1st Sgt. Charles Danner II, the NCOA deputy commandant, who forwarded us the first monthly USAG-HI energy mock bill and expressed his concerns regarding energy costs at the academy. At first, it was definitely an eye opener," said Staff Sgt. David Hart, small group leader, 4th Platoon. "I noticed the NCOA is in a

unique position to train and evaluate our Soldiers on conservation practices, which in turn can help all of USARHAW (U.S. Army Hawaii) reduce its energy use. The bill was not perfect, but it gave us an idea of expenditures, broken down by building and the total amount paid by garrison."

The total September bill for the four buildings of the NCO Academy was \$16,218.84. Two months later, the November bill was \$15,670.71. The NCO Academy had reduced its energy usage by \$548.13. Though this may not seem like a large amount, over a year, the savings could amount to \$6,500, and \$13,000 over two years.

However, the biggest payoff is not so much in the monetary savings, but in the leadership investment the academy is making in junior leaders throughout 25th Infantry Division and U.S. Army.

"At first, the figures looked too excessive," said Staff Sgt. Terry Lawrence, 1st Platoon small group leader. "However, we realized that our air condition window units contributed immensely to the energy bill. We have built energy conservation into the student conduct book, and we discuss energy costs during their initial briefing."

The academy covers shutting off the lights when not in use, limiting the use of air conditioners by keeping the setting at 74 degrees, and shutting doors and windows to help keep room temperatures cooler, Lawrence explained.

"Bottom line, we teach them to be better stewards of energy and energy conservation," he said. "I respect 1st Sgt. Danner and appreciate how he made us part of the solution and not part of the problem. I will take his approach with me, regardless of where I go in the Army. No doubt about it, we all have to do our part to help the environment and reduce our energy bill."

"We designed, printed and passed out posters, which I believe, helps remind students to conserve energy," Hart added. "However, I have noticed that it is hard to



Staff Sgt. Luis I. Montijo teaches members of the 4th Platoon Small Group Leader, 25th Infantry Division's Noncommissioned Officer Academy, about energy conservation at Schofield Barracks, Hawaii. (Photo by Staff Sgt. David B. Hart)

change their mindset, and I can relate."

Hart described how he and his battle buddies never used to question energy use because they didn't pay the bill, and that changing a mindset isn't easy.

"Nevertheless, because of our collective efforts, our energy consumption at the academy is dropping," he said.

"I believe we should all embrace change. We all have to do it, and we should do it together, especially if we want to see savings throughout the entire Army," Franklin said. "We owe it to our present and future generations of Soldiers and family members."

Energy conservation is an easy, if inconvenient, idea to agree to and practice. The garrison community should all make the effort to conserve energy, even at the personal cost of convenience.

If you need to use energy, use it responsibly. If you don't, turn it off. Pass it on!

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# Just how important is succession planning for your career?

by Christine Gettys Hull

It is a scene you know all too well – you are enjoying a slice of cake at the retirement ceremony for the coworker who has been in that job since you were in grade school. That employee knows every nook and cranny of the job. Then it hits you – who could possibly fill those shoes?

If the first time you ask yourself this question is at the farewell reception, your organization is vulnerable. Investing time and energy into succession planning is becoming increasingly critical, especially for organizations like Directorates of Public Works. The Fort Bragg, North Carolina, Directorate of Public Works is experiencing a deluge of retirements like most federal agencies. Each retirement represents the loss of institutional knowledge, history, experience and expertise.

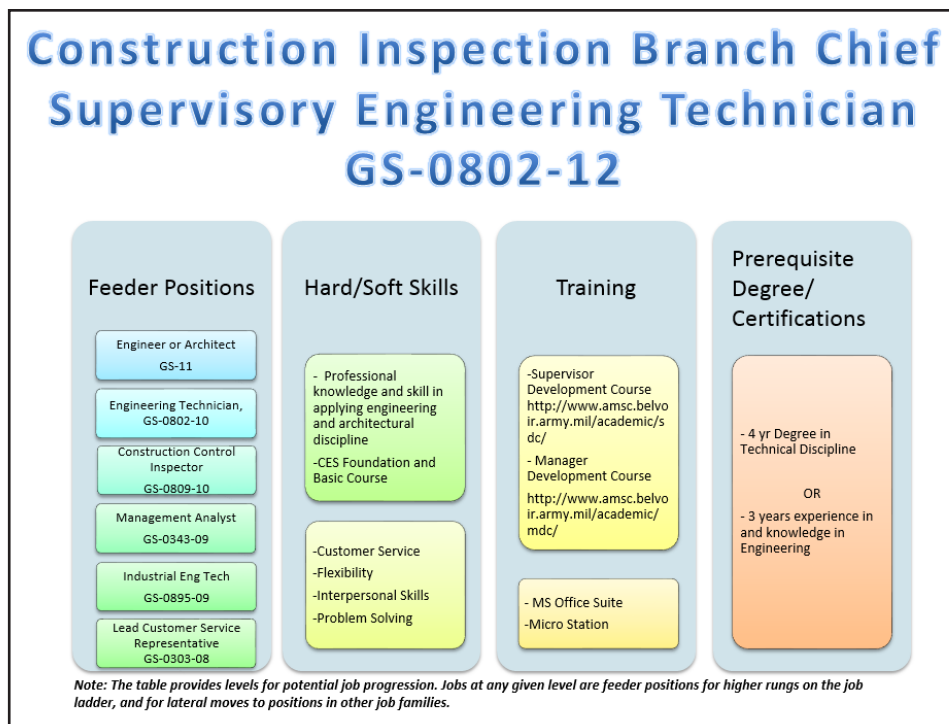
By embracing succession planning during the past seven years, the directorate has optimized staffing and ensured flexibility as the organization weathered constrained fiscal realities. At Fort Bragg, succession planning has been the responsibility of the directorate's leadership with the goal of providing information to the workforce on various paths for upward mobility.

## Succession planning steps

Step 1. *Identify critical positions within the organization.* These included supervisor positions as well as positions with specific degree or certification requirements. Specialty positions with only one current employee became critical positions as well. The list evolved during the process and is subdivided four ways – supervisors, non-supervisors, degreed and non-degreed.

Step 2. *Interview the employees filling the critical positions.* Questions included retirement planning timeline, required hard and soft skills, which feeder positions the employee had held, how that experience impacted skills and what degrees or training are recommended for the next employee filling that position.

Step 3. *Develop succession plans for each of*



the critical positions. These are very simple charts available to the DPW workforce. There are four sections for each position: potential feeder positions, soft and hard skills essential for success, formal training requirements and degree requirement (if applicable) or years of experience desired.

Step 4. *Disseminate information and ensure access for all employees.* This session was offered to all employees and information was presented for degreed and non-degreed positions, supervisory and non-supervisory. Briefers specifically outlined the types of training available to Army Civilians. While the Army provides some training, in many cases outside degrees or experience may be required and responsibility to identify (and sometimes fund) these lies on the employee.

Step 5. *Ensure critical positions are filled.* During the seven-year process, the directorate encountered chances to backfill critical positions. Vacancies presented opportunities for the work force and leadership to implement the succession plan. Competitive Detail-to-Unclassified Duties and Competitive Management

Directed Reassignments are two tools available that benefit both employees and the organization.

For Competitive Detail-to-Unclassified Duties, all employees receive an announcement to apply for 120-day details. The detail may be to cover duties that had been done by a vacated position or for a specific project. The opportunity is generally open to employees within two pay grades (above or below) of the vacant position. In many cases, the directorate was able to identify two or three successful candidates who were offered the opportunity to work 120 days each sequentially. This allows a buffer when hiring approvals are slow. Details present employees opportunities to obtain or improve skills and receive feedback on their resume and interview skills. For the organization, critical duties are covered and the supervisor has an employee motivated to learn something new. Care was taken to not assign duties above the detailee's pay grade.

Competitive Management Directed Reassignments are offered to employees

(See Succession Planning, page 43)



# Army Acquisition Workforce prepares to add many CP-18 careerists

by Dane Patterson

Supervisors in the U.S. Army Corps of Engineers are being required to review certain civilian employees' position descriptions to determine whether the position descriptions should be additionally coded into the Department of Defense Acquisition Workforce. This effort will eventually affect other Army commands with Career Program-18 civilians such as the Installation Management Command.

Once the positions are identified, employees encumbering these positions must begin pursuing requirements for acquisition certification at the level required for the position. The education, training and experience certification standards for these positions are determined by the Secretary of Defense, pursuant to the Defense Acquisition Workforce Improvement Act, and are based on the positions' required level of complexity.

While requiring supervisors to determine if a position description should be coded as acquisition workforce is not a new Army initiative, there are still many Army civilians, especially Career Program-18 careerists, who should be coded into the Acquisition Workforce Facilities Engineering Acquisition Career Field. The Army Corps of Engineers is one of Army's largest acquisition organizations, and is the defense department's largest construction acquisition organization. It also has the Army's largest population of Career Program-18 civilians, many of whom are in positions that could be coded in the Facilities Engineering Acquisition Career Field.

While many of these employees already meet facilities engineering criteria in performing their current duties, their position descriptions have not been updated with the appropriate Acquisition Workforce code of FE. This is the supervisors' responsibility.

Supervisors should follow the process outline in chapter 5 of the Acquisition Technology and Logistics Workforce Desk Guide, which provides comprehensive guidance regarding acquisition workforce career management as well as step-by-step instructions for reviewing and subsequently coding a position in the applicable acquisition career field. Prior to implementing changes to an employee's position description, supervisors must coordinate with local bargaining units to ensure all collective bargaining obligations are met for employees covered under collective bargaining agreements. The guide is available at [http://asc.army.mil/docs/dawia/ATL\\_Workforce\\_Desk\\_Guide.pdf](http://asc.army.mil/docs/dawia/ATL_Workforce_Desk_Guide.pdf).

Once the position descriptions have been appropriated coded, employee individual records must be updated in the Defense Civilian Personnel Data System to reflect the new code. This is the individual's responsibility. Also, the new Career Program-18 Facilities Engineering Acquisition Workforce coded careerists have 24 months to complete their appropriate grade level acquisition workforce requirements, available in the desk guide.

Every Army Civilian has access to

Army Civilian Training, Education and Development System funded career development opportunities within his or her respective career programs. Acquisition Workforce members have access to beneficial training, education and professional development specifically developed for acquisition workforce personnel.

These opportunities are specifically designed for acquisition workforce personnel and include human capital initiatives that can be funded by Section 852 of the 2008 National Defense Authorization Act Public Law No. 110-181, that directed the establishment of the Defense Acquisition Workforce Development Fund. This fund enables the defense department to recruit and hire; develop and train; and recognize and retain its acquisition workforce.

Employees filling officially designated Acquisition Workforce position have priority over non-Acquisition Workforce applicants for all no-tuition and/or no-travel cost Defense Acquisition University courses. There also are numerous online Continuous Learning Modules available.

Acquisition Workforce employees in the grades of GS-12 through GS-15 and broadband equivalents are required to be evaluated using the Senior Rater Potential Evaluation, a talent management tool used to evaluate the potential of civilian employees to serve in competitive career-enhancing acquisition positions

(See CP-18 careerists, page 43)

Public Works Digest		
2017 Theme and Deadline Schedule		
Issue	Theme	Deadline
Jan-Feb-Mar	Master Planning, Housing and Barracks	2-Dec-16
Apr-May-Jun	Environment and Sustainability	3-Mar-17
Jul-Aug-Sep	Operations, Maintenance and Engineering	2-June-17
Oct-Nov-Dec	Energy, Water and Waste	1-Sept-17



(CP-18 careerists, continued from page 42)

and compete for senior level acquisition developmental opportunities.

The U.S. Army Acquisition Support Center in conjunction with Headquarters Department of the Army Assistant G1 for Civilian Personnel is developing guidance to standardize implementation to the

Department of Defense Expedited Hiring Authority policy. This policy is intended to reduce the time to it takes to fill vacancies in Acquisition Workforce coded positions. More information on the expedited hiring authority is available at [http://www.hci.mil/policy/12\\_18\\_2015\\_DoD\\_Acq\\_Workforce\\_Expedited\\_Hiring\\_Authority\\_Memo\\_Signed.pdf](http://www.hci.mil/policy/12_18_2015_DoD_Acq_Workforce_Expedited_Hiring_Authority_Memo_Signed.pdf).

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where critical positions or tasks are impacted by vacancies. The same announcement and selection processes are used, however, these reassignments are limited to lateral assignments (e.g. grade GS10 to GS10). Unlike details, the Management Directed Reassignment is a permanent move by the employee.

Step 6. *Update Individual Development Plans.* Following workforce briefings, supervisors sat down for one-on-one discussions with employees to update their plans and ensure employees understood the components of the succession plan.


In summary, Succession Planning is not just possible – it is necessary. The end products include an engaged and informed workforce, the ability to quickly shift resources to cover vacant positions or tasks, cross training, communication improvement, and a shared understanding of critical positions and tasks.


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# October is Energy Action Month




1. 


Turn off task lighting when not in use or when natural light is available.

2. 


Shut off your computer's monitor before you leave the office.

3. 

Set Thermostat for 78 degrees in the summer and 68 degrees in the winter

4. 

Unplug items when you are not using them.



## Take These Four Actions Today to Reduce Your Energy Use

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