Public Works DIGEST

Volume XXII, No.5
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This Issue:
Energy and Water

Lyman Parkhurst (left), Sain Engineering Associates inspector, and Marco Orsolini, a Directorate of Public Works air conditioning and refrigeration technician, inspect cooling systems during an Energy Awareness and Conservation Assessment at Camp Darby, Italy. Photo by Joyce Costello, U.S. Army Garrison Livorno, Italy. Page 23

IMCOM
U.S. ARMY INSTALLATION MANAGEMENT COMMAND

Public Works DIGEST

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U.S. Army Installation
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From the editor

In the July/August issue, a commentary mentioned disposal of trash bags in burn pits at forward operating bases before septic tank installation. To clarify, this practice was observed on a small platoon level in an early construction phase prior to septic tank installation, where environmental damage, if any, would be minimal. However, disposal of trash bags in open-air burn pits is not a common practice and is in violation of current policy, Directive Type Memorandum 09-032, *Use of Open-air Burn Pits in Contingency Operations*. Thanks go to John Horstmann, environmental program manager, U.S. Army Central Command, for the information.

Mary Beth Thompson
Managing editor

Putting energy front and center

by Lt. Gen. Rick Lynch

In the past, energy has been a side conversation for the Army. It tended to be an area of concern for some experts and specialists, but for a lot of us, whether Soldiers and civilians in the workplace or family members in the community, we did not give it much thought. Maybe we paid attention to the public service announcements reminding us to turn off lights, but that was about it.

However, with changing security concerns and increased demands on finite financial and natural resources, energy has become an issue we all have to pay attention to. We have to pay attention to energy now, for the sake of ourselves, the nation and future generations. So I intend to keep the issue front and center. I intend to keep the dialogue focused on what we in the Installation Management community must do, can do and are doing to increase the Army's energy efficiency and security.

The Army depends on a reliable, safe, cost-effective supply of energy to accomplish its mission, as well as provide a good quality of life for Soldiers, civilians and families on installations worldwide. To the extent that the supply and distribution of energy lay outside the Army's control, the ability to accomplish our mission is open to risk.

In January 2009, the Army issued guidance for increasing energy security, the *Army Energy Security Implementation Strategy*. The *Installation Management Campaign Plan*, the strategic document directing our actions, includes a section focused on energy efficiency and security; this section, Line of Effort 6, was developed in support of the Army energy guidance. The keys to success for LOE 6 focus on reducing energy and water consumption, increasing energy and water efficiency, modernizing infrastructure, and developing renewable and alternative energy supplies.

Since version 1 of the campaign plan was released in March, we have continued to work on LOE 6, in particular refining the keys to success and developing meaningful metrics to measure our progress. Version 2 of the campaign plan will be released in October, which is national Energy Awareness Month. I did not plan for the two events to coincide, but it is fitting. The revised LOE 6 will show us the way ahead for achieving the energy security and efficiency that is a critical part of achieving and maintaining installation readiness.

Lt. Gen. Rick Lynch
U.S. Army photo

While the campaign plan is the driving force in changing how we do business, the *Installation Management Energy Portfolio* is our toolbox. This document, which is also being revised for release in October, describes Army programs and initiatives that help installations realize their energy goals.

One example is metering. Residential Communities Initiative housing on 45 Army installations are metered to measure whether the occupants of each unit are using above or below the energy usage baseline every month. Provided with the meter data, occupants have steadily reduced their energy consumption so that 80 percent now receive money back for using less than the baseline each month.

Other programs and initiatives include efforts to improve the Army's energy grid security and management, to track and offset utility costs, and to require that new military construction and renovation meet rigorous energy efficiency standards.

Acronyms and Abbreviations	
LOE	Line of Effort

I have always said that vision without resources is hallucination, so the Energy Portfolio also lists a number of resource opportunities. These include Army and private programs, contracts and other vehicles through which installations can partner with private industry to gain expertise and resources to create innovative energy programs.

Finally, the Energy Portfolio highlights several projects in which installations are making creative use of all these resources to save and produce energy. These projects include a 12-acre solar power array at Fort Carson, Colo., a vegetative roof project at Tobyhanna Army Depot, Pa., a methane gas project at Fort Knox, Ky., the first wind turbine on an active Army installation at Tooele Army Depot, Utah, and solar walls at Fort Drum, N.Y. The revised Energy Portfolio will expand on this last section in particular, to provide ideas and inspiration to other members of the Installation Management community.

In addition to version 2 of the campaign plan and the revised Energy Portfolio, in October, I will also publish an energy operations order to direct specific actions that raise the overall level of effort within the Installation Management community.

When we look at the energy projects around our installations, we can see the Installation Management community has made a solid start in addressing energy issues. However, when we consider those issues, we can also see how far we still have to go. Last year, we spent $1.3 billion for the installation utility bill, which includes electricity, steam, water and natural gas. The Army spent $4 billion for fuel and utilities. That is a large price tag for resources we do not control and that will run out eventually. ➤

Army presents energy, water management awards

by David Purcell

The winners of the 32nd annual *Secretary of the Army Energy and Water Management Awards* received their achievement awards Aug. 19 at the Army Energy Manager Training Workshop 2010 in Dallas.

Lt. Gen. Rick Lynch, assistant chief of staff for Installation Management and commanding general, Installation Management Command, presented the awards, and I assisted him with the ceremony.

Each winner received an engraved plaque, a certificate and a monetary award. The categories and award winners are:

Installation Energy Efficiency/Energy Management

U.S. Army Garrison Wiesbaden, Germany – Sergio Verde and Ernst Kusiak

First Row (left to right): ***Col. Rick Schwartz****,* ***Pat Walsh****, and* ***Gary Meredith*** *of Fort Knox;* ***Col. Francis Burns*** *and* ***Ricky Jones*** *of Fort Polk;* ***Lt. Gen. Rick Lynch****;* ***David Holt*** *of USAG Wiesbaden;* ***Lt. Col Herb Koehler*** *and* ***Nick Stecky*** *of Picatinny Arsenal; and* ***Matthew Bowman*** *of Fort Knox. Second Row (left to right):* ***R.J. Dyrdek*** *and* ***Pat Appelman*** *of Fort Knox;* ***Michael Maier*** *of Picatinny Arsenal;* ***Jay Weyland*** *and* ***Chris Tillman*** *of Tooele Army Depot;* ***Ernst Kusiak*** *of USAG Wiesbaden;* ***Jacob Lantz*** *of Fort Polk; and* ***Steve Fries*** *of Fort Knox. Photo by Terry Shoemaker, Pacific Northwest National Laboratory*

Small Group Innovation/New Technology

Fort Knox, Ky. – Pat Appleman, Steve Fries, Matt Bowman, R.J. Dyrdek and Patrick Walsh

Small Group Renewable/Alternatives

Fort Polk, La. – Ricky Jones and Jacob Lantz

Small Group Energy Efficiency/Energy Management

Picatinny Arsenal, N.J. – Thomas Struble, Edward Brice, Richard Wood and Michael Maier

Individual Award Energy Efficiency/ Energy Management

Jay Weyland – Tooele Army Depot, Utah

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David Purcell is the branch chief, Army Energy and Utility Team, Facilities Policy Division, OACSIM.

Acronyms and Abbreviations	
OACSIM	Office of the Assistant Chief of Staff for Installation Management
USAG	U.S. Army Garrison

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I am looking for people who are passionate about energy issues and committed to finding innovative ways to solve the challenges. One key person is the garrison energy manager. Every garrison needs a full-time energy manager, or more than one, depending on the size of the installation, who can help leadership build a robust energy program. And every garrison needs leadership to back a robust energy plan. Leadership has to communicate that every Soldier, civilian employee and family member on the installation is responsible for doing his or her part.

Occasionally, someone who is less-than-committed to energy efficiency says to me, in effect, "Hey, quit going on about turning off the lights." Here is an idea: turn off the lights, and I will quit talking about it. When we have achieved the energy efficiencies that are possible — when we have found ways to avoid energy costs and reduced unavoidable costs and limited our use of nonrenewable resources — then we can talk about other issues, such as which Soldier and family programs to apply the savings to.

Focusing on our energy programs is truly nonnegotiable. We have to look to our programs to generate savings that will help with the Army's part of the $23 billion in efficiencies that the secretary of Defense is requiring from all the services. We have to look to them to more securely position us to accomplish our missions, to provide an even better quality of life for Soldiers and families, and to help address some critical environmental issues, so that we do not pass them on to our children and their children. For all of these reasons, it is the right thing to do to get our energy programs right.

Lt. Gen. Rick Lynch is the commander, Installation Management Command.

Energy Governance Council oversees USACE energy activities

by James C. Dalton

In support of the Army Senior Energy Council and the *Army Energy Security Implementation Strategy*, the Headquarters, U.S. Army Corps of Engineers, created the Energy Governance Council to oversee and coordinate all energy activities throughout USACE and the Office of the Chief of Engineers. The EGC provides an executive-level forum for Headquarters, USACE, to identify and discuss the full range of USACE energy capabilities, synchronize USACE activities, maintain a common operating picture of energy-related activities and identify, champion and exploit initiatives in support of the Army.

The EGC consists of a Governance Board, an Advisory Board and project delivery teams that work in concert to identify solutions to energy related issues and problems. Key to the EGC is its mission to bring an energy enterprise management perspective to USACE energy operations. The EGC endeavors to provide a holistic approach to meeting the significant challenge of providing safe, reliable, affordable and constant energy to Army installations.

Among the USACE support that the EGC oversees through its project delivery teams are:

- Military Construction business process, formerly known as MILCON Transformation, including sustainable design and development, and the Energy Conservation Investment Program;
- Energy Savings Performance Contracts and Utility Energy Savings Contracts;
- Energy Engineering Analysis Program;
- Army Metering Implementation Program;
- resource efficiency manager contracts;
- Army Commercial Utilities Program;
- research and development; and
- related real estate and environmental.

Currently, USACE is involved in the development of validation performance models, construction documentation

James C. Dalton
Photo by F.T. Eyre

and the auditing of energy conservation technologies in MILCON projects to achieve the goals imposed by the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007.

All new military construction and major renovation projects must meet the requirements of EPAct 05. These requirements include accelerated provision of electrical metering, use of Energy Star or Federal Energy Management Program products, use of premium efficiency motors and consumption of 40 percent less energy than a similar project built to the American Society of Heating, Refrigerating and Air Conditioning Engineers Standard 90.1-2007, if life-cycle cost effective. Note that Engineering and Construction Bulletin 2010-14, recently released, increased this requirement from 30 percent energy savings.

The Army is currently developing energy models for five standard tier 1 facility designs — barracks, headquarters brigade buildings, tactical equipment maintenance facilities, company operations facilities and dining facilities — to provide an alternative DD Form 1391 programming document that allows the Army to build more energy-efficient systems and sustainable structures into its facilities.

USACE is actively working with the Engineer Research and Development Center's Construction Engineering Research Laboratory, USACE Centers of Standardization and the Department of Energy National Renewable Energy Laboratory to evaluate life-cycle cost effective technologies on the market today for each facility type in each climatic region. The team will investigate building features, construction methods and materials to optimize the selected standard designs for fiscal year 2013 and beyond for MILCON projects with regard to energy reduction and sustainability and, as a minimum, ensure that the selected standard designs meet all applicable energy reduction and sustainable design policy, e.g., Leadership in Energy and Environmental Design Silver, EPAct 05, EISA 07, and Executive Orders 13423 and 13514. ERDC-CERL is collaborating with the EGC in promoting research and development technology transfer into MILCON.

In the current environment of limited appropriated and Sustainment, Restoration and Modernization funding available to implement projects to meet the EISA 07 energy reduction goals, the ESPC program is one of the best tools to implement energy conservation measures. ESPCs allow garrisons to implement energy savings projects without upfront capital costs, and the guaranteed savings generated are used to pay for the project over the contract term.

Our Huntsville Engineering and Support Center has issued ESPC projects that have a capital investment of $397 million with energy savings of about $801 million. These projects provide a wide ➤

Acronyms and Abbreviations	
CERL	Construction Engineering Research Laboratory
CUP	Commercial Utilities Program
EGC	Energy Governance Council
EISA 07	Energy Independence and Security Act of 2007
EPAct 05	Energy Policy Act of 2005
ERDC	Engineer Research and Development Center
ESPC	Energy Savings Performance Contract
MILCON	Military Construction
USACE	U.S. Army Corps of Engineers

Army holds energy manager training in Dallas

by David Purcell

The Office of Assistant Chief of Staff for Installation Management, in coordination with Headquarters, Installation Management Command, held its annual Army Energy Manager Training Workshop Aug. 19-20 in Dallas at the conclusion of the GovEnergy 2010 Conference and Trade Show.

More than 225 Army and other federal agency staff members participated in this year's workshop, including Army energy managers and resource efficiency managers from 58 IMCOM garrisons, eight Army Material Command installations and 16 National Guard Bureau sites.

Lt. Gen. Rick Lynch, ACSIM and commanding general of IMCOM, was the keynote speaker at the workshop. Lynch recognized the great work and initiative displayed by energy managers across the Army.

He said he wanted to ensure their efforts are not random and that they support the Army's strategic direction.

The commanding general also presented this year's *Secretary of the Army Energy and Water Management Awards*. (Editor's note: See article on page 4.)

Qaiser Toor, chief of the Energy and Utilities Branch, Headquarters, IMCOM, discussed the *Installation Management Campaign Plan*'s Line of Effort 6, Energy Efficiency and Security.

Toor emphasized the four keys to success:

Robert Sperberg, chief, Facilities Policy Division, OACSIM, speaks at the workshop in Dallas. Photo by Terry Shoemaker, Pacific Northwest National Laboratory

- Reduce energy and water consumption.
- Increase energy and water efficiency, and modernize infrastructure.
- Improve the development of renewable and alternative energy, and ensure access to energy supplies.
- Improve the development of renewable and alternative energy for vehicle fleet mobility fuel.

Toor also discussed the Headquarters, IMCOM, programs that support the achievement of these objectives.

Other workshop topics included updates on policies and requirements for the *Army Energy Security Implementation Strategy*, greenhouse gas reporting, the Energy Conservation Investment Program, the Army Energy and Water Reporting System, energy security planning and power purchase agreements.

Acronyms and Abbreviations	
IMCOM	Installation Management Command
OACSIM	Office of the Assistant Chief of Staff for Installation Management

In addition, four installation success stories were presented by the energy managers from Redstone Arsenal, Ala., and Forts Bragg, N.C., Knox, Ky., and Bliss, Texas.

This year's workshop included other presenters from OACSIM, the Office of the Assistant Secretary of the Army for Installations and Environment, the U.S. Army Audit Agency, Defense Logistics Agency, Pacific Northwest National Laboratory and the National Renewable Energy Laboratory.

Jerry Schubel from the Aquarium of the Pacific, Long Beach, Calif., presented the energy initiatives that have allowed the aquarium to reduce grid-supplied electricity over the last eight years while increasing attendance by more than 30 percent.

The agenda, copies of the presentations and photos are available at *http://army-energy.hqda.pentagon.mil/training/training2010.asp*.

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variety of infrastructure improvements including more efficient hot water or steam distribution systems; chillers; boilers; heating, ventilation and air conditioning systems; building envelopes; lighting; energy management controls; renewables such as photovoltaic and wind; and like equipment to reduce the energy demand on the garrisons.

Another USACE program that benefits the Army is the CUP. The CUP ensures that the Army purchases reliable utility services at fair and reasonable rates and utilities services are equitably resold to its tenants. Over the past three years this program has yielded about $54 million in cost avoidance to the Army — $34 million in utility rate interventions, $8.9 million in utility rate studies and $11 million in utility billing audits.

Undoubtedly, the EGC will ensure that USACE involvement is orchestrated to efficiently support the Army Energy Program and produce benefits to the Army. We are making a mark in the history of this nation and its efforts to eliminate or diminish our dependency on foreign oil and fossil fuels.

Building Strong!

James C. Dalton is the chief, Engineering and Construction Community of Practice, Headquarters, USACE.

Army mapping the way to energy, water sustainability

by Trace Taylor

The extreme heat wave experienced by many over the summer adds to the challenge Army installations face as they work to meet mandated energy and water reduction goals. Not only has the consumption of these commodities gone up, so has the price tag. The requirement to meet goals, however, has not changed.

Army planners developed a roadmap that will help meet or exceed reduction goals outlined in the Energy Policy Act of 2005, the Energy Independence Security Act of 2007 and Executive Order 13514 of Oct. 5, 2009. These mandates address energy and water conservation currently and into the future with the intent that the United States would move toward greater energy independence and security.

The roadmap, called the *Comprehensive Energy and Water Management Plan*, outlines a long-range and visionary strategy. In 2008, the U.S. Army Engineering and Support Center, Huntsville, worked with Don LaRoque and Paul Volkman — both of Headquarters, Installation Management Command, at the time — to develop the strategy each installation will follow to develop its personalized CEWMP.

Key stakeholders participate in a visioning workshop at Fort Irwin, Calif. Photo courtesy of AECOM Technology Corp.

The IMCOM-directed CEWMP, under the leadership of Qaiser Toor, Headquarters, IMCOM, is managed by Huntsville Center's Planning and Programming Branch. So far, eight installations have completed their CEWMPs, 23 are in progress, and 14 installations are scheduled for the future. The 45 continental U.S. installations are on track to be finished by September 2011.

Huntsville Center manages the contracts and process to develop the CEWMPs.

A CEWMP:

- assesses existing energy and water infrastructure;
- focuses on building systems and infrastructure to address and improve sustainable goals;
- fosters the ultimate goals of an enduring Army that is enabled by secure and sustainable operations, systems and communities; and
- conveys a sustainability strategy for achieving compliance with the mandated energy and water reduction goals, and promotes energy security through implementation.

A standardized framework is used to help installations assess, measure, define and implement current and future energy and water strategies.

The process starts when an installation's subject matter experts, key leaders and decision-makers attend an energy and water visioning workshop to consider the vision, goals and objectives for optimizing and sustaining energy and water systems. At the workshop, attendees assess existing data to provide a baseline of energy and water consumption. Using the baseline, they establish the reduction goals specified in the national mandates.

An analysis provides the overall "health" of each system, identifies opportunities and constraints associated with meeting energy and water security goals, and serves as the basis and justification for programming actions. The group then develops plan directives at the strategic level that include recommendations for additional studies, programs, best management practices and energy conservation measures.

Acronyms and Abbreviations	
CEWMP	Comprehensive Energy and Water Management Plan
IMCOM	Installation Management Command

Each project is kicked off by introducing the program and collecting data during a one-day previsioning visit. The team returns to the installation for a week-long visioning workshop and site survey. During this week, a strengths, weaknesses, opportunities and threats analysis is performed, and energy and water profiles are formulated.

Results from the strengths, weaknesses, opportunities and threats analysis and the profiles are used to develop the action plans and the future focus areas. The week-long charrette is attended by key installation stakeholders, and an energy and water sustainability vision statement is completed.

Once the plan is complete and the project action plans are developed and prioritized, the document will become a useful tool that will go hand-in-hand with the installation's real property master plan. The CEWMP also is intended to work closely with other studies such as the Energy Engineering Analysis Program, also managed by Huntsville Center, that ultimately forms the basis of DD 1391 development.

POC is Trace Taylor, 256-201-2232, sttaylor@hntb.com.

Trace Taylor, LEED AP, is a project manager, Engineering and Support Center, Huntsville, Ala.

Understanding electric bill valuable when looking to cut costs

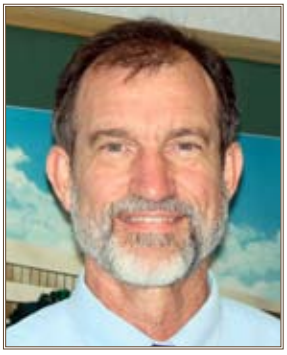
by Bob Hennessee

Understanding utility rates can save your installation money. It should be the first step toward creating a successful energy conservation program. Once you understand your garrison's operations and how it is billed, you can determine which energy savings measures are best and tailor a strategy to fit your situation.

Electric rates vary a lot by garrison. Electricity is where most utility money goes. Natural gas, water and sewer rate structures also vary.

A typical garrison's electric rate components are:

- monthly fee, which is constant every month regardless of consumption;
- energy cost, measured in kilowatt-hours;
- demand, which is how much electricity is required for peak 15- or 30-minute use, measured in kilowatts; and
- others, such as power factor, time of day and power quality.



Bob Hennessee
Photo by Becky Proaps

The biggest items are energy and demand costs. Energy costs are based on how many kwh are consumed. Demand costs are usually based on the highest 30 minutes of kw consumption, but some electric companies base it on the highest 15 minutes of consumption. Both energy and demand are variable, so attacking them will reduce your bill. Your electric company's rate structure will determine which of these costs are highest.

Demand cost – Demand rates usually range from zero to $25 per kw. In areas where there is no strain on the supply or delivery system, this cost is cheap or nonexistent. The best strategy for such areas is to reduce kwh consumption. If however, you are in an area where the grid is strained, demand may be your biggest rate component. Focus on demand reduction in that situation.

Ratchet charges –Many electric companies have a "ratchet charge." They bill you a demand charge each month based on the highest kw of the past 11 months.

For example, Cameron Station, Va., averaged a $100,000 per month electric bill. After the installation was closed, electricity was used only for a guard shack and exterior lighting. However, the bills dropped merely 30 percent over the next 11 months. Electric demand was the biggest rate component. A single 30-minute demand peak in July became a stranded cost for the next 11 months.

Time-of-use and time-of-day rates – More utilities now offer these rates. Garrisons with industrial processes often benefit from time-of-use rates if they can shift their production to times when electricity is cheap.

Invalid rate components – Often, no-cost opportunities to save money on electricity and other services arise. Some invalid and questionable charges that often appear on electricity invoices include:

- taxes,
- late fees,
- prior balances that were actually paid, and
- math errors.

Most of the people who approve utility invoices have short suspenses to submit them. The advice to them should be to focus on late charges and prior balances, and approve invoices in one day to avoid late payment fees. They should note on the invoice if a past payment hasn't ➤

Acronyms and Abbreviations	
kw	kilowatts
kwh	killowatt hours

CURRENT CHARGES

Electric Charges

RATE PLAN
024 - Large General Svc Tou

METER READING
Electric Meter read on 06/29/09 at 12:00 am
(Next scheduled read date 7/31/09)

METER NUMBER
001049125

BILLING PERIOD 5/28/09 - 6/29/09 DAYS 32

TIME OF USE PERIOD	KWH	KW DEMAND	KVA DEMAND
On-peak - Summer	4,461,528	28,752	31,459
Off-peak	13,301,664	30,288	33,078

On-peak Bill Demand of 28752 kW is maximum measured peak.
Off-peak Bill Demand of 1536 kW is Off-Peak Bill Demand less On-Peak Demand.
Power factor is 91.00%.

Basic Facilities Charge (USER FEE)	1,400.00
On-Peak - Summer - 4461528 kWh X $ 0.07260 (ENERGY COSTS)	323,906.93
Off-Peak - 13301664 kWh X $ 0.04192	557,605.75
On-Peak - Summer - 28752 kW X $ 14.97000 (Demand Costs)	430,417.44
Off-Peak - 1536 kW X $ 4.49000	6,896.64
Meterlink Charge (USER FEE)	50.00
Total Electric Charges	**$1,320,276.76**

Other Charges & Credits

Late Payment Charge (Invalid Charge (Waived))	~~-12,989.20~~
Total Other Charges & Credits	**~~$12,989.20~~**

Payment experience reported to credit agencies. SCE&G reports payment experience of our commercial customers to Dun & Bradstreet and other similar agencies.

Energy = 67% of cost
Demand = 3% of cost
User Fee = 0.1% of cost

Notations on an electric bill indicate a substantial late fee was waived. Image courtesy of Bob Hennessee

Low impact development for restores natural hydrology

by Bill E. Sproul

Low impact development is a site planning and design approach that maintains or restores natural storm-water and water-balance functions on a site by using green technologies distributed throughout the site and its infrastructure. The Army has been leading the way in the integration of LID and sustainable design and construction for more than 10 years.

A LID plan uses permeable surfaces that allow water to filter through them. Graphic by Neil Weinstein, Low Impact Development Center, Greenbelt, Md.

The Energy Independence Security Act of 2007 requires all federal facility construction to meet predevelopment hydrology, or natural water balance, conditions for new construction. The Army is going to accomplish this requirement through a new policy that will require integration of LID into the master planning and site planning processes, and into project renovation. Installations and activities will be required to report on their progress each year.

A comprehensive approach for LID integration into planning, funding, construction and maintenance is currently under way. The Office of Assistant Chief of Staff for Installation Management is funding more than $3.5 million of construction for the demonstration and validation of LID. The goal is to allow the Army to understand and develop strategies and design guidance on the use of LID planning, maintenance and construction techniques. OACSIM is also funding development of LID training and a technical user guide on how to best use LID to meet regulatory requirements and stewardship goals.

Acronyms and Abbreviations	
LID	low impact development
OACSIM	Office of the Assistant Chief of Staff for Installation Management

In 2010, OACSIM sponsored pilot projects at Fort George G. Meade and Aberdeen Proving Ground in Maryland, and at Fort A.P. Hill, Va. These projects are in the Chesapeake Bay region and are being managed by the Baltimore District of the Corps of Engineers.

The projects include the use of rain gardens and bioswales, soil amendments, permeable pavements, tree box filters, reforestation and stream restoration.

Rain gardens and bioswales are landscaped areas designed to filter pollutants from nonpoint urban sources, such as parking areas and roads, and then recharge the groundwater. Soil amendments are mixes of compost and other recyclable materials that are worked into the soil to restore the infiltration capacity and help promote healthy vegetation without the use of fertilizers.

Permeable pavements include concrete and concrete block systems that allow for infiltration of water through spaces between the blocks or the pores in the concrete. Tree box filters are small scale precast planters that capture and filter runoff from streets and parking areas. Reforestation and stream daylighting help reduce the volume of runoff from parking areas, restore stream habitats and reduce urban heat island effects.

An important part of these projects is the partnering with and leveraging of other federal and nonprofit resources in the Chesapeake Bay region. These resources participate in the design and planning process, promotion and outreach for the ➤

(continued from previous page)

been credited and subtract that from the invoice, call the utility to ensure they received the payment, and, if there's a late fee, ask the utility to waive it. Often, they will.

Any tax should be questioned. The Army is usually tax-exempt, but cash-strapped states and municipalities are frequently trying to slip in new taxes to raise funds. The recommendation is to pay the tax, then ask your legal resources if it is valid. You may also contact the author at the POC information below. If you determine that it's invalid, request a refund and tell the utility to stop charging you for it.

For math errors, when you have a short window to pay the bill on time, pay it. Later, contact the utility to correct its mistake.

Most energy managers and directors of Public Works understand electricity billing, but many other people — post commanders, resource managers and other stakeholders — don't. You may need to educate them on the subject, or they won't fund the most effective energy savings measures.

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Bob Hennessee, CEM, is a public utilities specialist, Engineering and Support Center, Huntsville.

Quick checks for too much outside air help energy efficiency

by Will White

In this day of federal mandates for increased efficiencies and limited funding, facility engineers are looking for ways to save a buck and still maintain comfortable working conditions.

The 1970s oil embargo also created a push for conservation. The government issued temperature setpoint guidelines designed to reduce energy use. Spaces were heated to 68 degrees and cooled to 78 degrees. Where enforced, these setpoints created such unhappy occupants that work force productivity fell. Buildings that heated and cooled unevenly provided stories of people wearing gloves at their desks while trying to type and folks covertly placing space heaters at their feet. Thankfully, those days are over.

Now, the focus is on maintaining reasonable temperatures and adequate fresh air for the health of the buildings and the tenants. New federal standards dictate equipment efficiencies, improved building automation systems with direct digital controls, higher insulation values, low-flow water appliances and increased investments in renewable energy sources.

Even with all the standards in place, installations still need to look at each facility for energy conservation opportunities. Two areas cause perennial problems.

Occurrences like this in which a broom is used to physically override the control system can cause significant energy loss. Photo by Carl Lundstrom, EMC Engineers Inc.

Excess outside air flow into environmentally controlled spaces – Site investigations reveal that this issue results in substantial and costly waste of heating and cooling. The rule of thumb formula for heat transfer in air is:

Q = cubic feet per minute x 1.19 x delta T

In this formula, Q is British thermal units per hour, and the semi-constant of 1.19, as it depends on temperature, is derived from the heat capacity of air, the mass of a pound of air, the number of Btu in a pound of air and a conversion of minutes to hours.

For example, let's use a 20-degree day with your dampers set either to bring in an excess 600 cfm or they're leaking 600 CFM. This is not uncommon. Design engineers often err on the side of excess outside air to prevent the dreaded sick building syndrome, and old dampers' seals are notoriously big leakers. Your air handler is delivering 70-degree air to the space so the delta T is 50. Plug that data into the formula:

600 cfm x 1.19 x 50 = 35,700 Btu per hour

Over the course of 24 hours, that's 856,800 Btu. If you are heating with natural gas containing 1,030 Btu per cubic foot at about $10 per 1,000 cubic feet, you are spending for the excess outside air conditioned to space temperature each day for each air handler:

856,800 Btu x 1 Mcf of natural gas/1,030,000 Btu x $10/Mcf = $8.32

In many systems, although the outside air setpoint is 10 percent, recommissioning teams have found that the system is actually delivering outside air closer to 20 percent or higher. It is very difficult to calibrate dampers.

Acronyms and Abbreviations	
Btu	British thermal unit
cfm	cubic feet per minute
Mcf	1,000 cubic feet
Q	Heat in Btu per hour
T	Temperature

This $8.32 a day may not sound like much until you consider the vast number of systems an installation has and that many are pulling in much more than 600 cfm of excess outside air. Notwithstanding the American Society of Heating, Refrigerating and Air-conditioning Engineers' requirements for minimum outside air, you can keep your building healthy and reduce excess outside air by using carbon dioxide sensors integrated into your building automation system. Some have alarm limits that, when triggered, open the outside air dampers to 100 percent. Perhaps a less severe response would be to incrementally open the outside air dampers with respect to a rise in the parts per million reading on the sensor as it approaches some adjustable value.

A quick check to see if your dampers are misbehaving is to look at the temperature readings of return air, mixed air and outside air, assuming that you have instrumentation and controls on the air hander and the readings are reliable. If the mixed air temperature reading is halfway between the outside air and return air readings, you can deduce that you have about 50 percent outside air mixing with the return. This is bad news if your setpoint is 10 percent. You can extrapolate other ratios from this approach.

Ask your utility monitoring and control system or energy monitoring and control system manager, operator or controls engineer to check or validate the sequence of operation in the programming ➤

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project, and use of the outcomes for other research efforts that will help protect and restore the bay.

The results of these projects and other LID efforts being conducted across the country will be used to help develop the LID technical user guide and training for release in 2011.

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Where's the water? – the future dilemma installations face

by Kristine Kingery

The Army relies on its installations to meet its mission of providing the forces and capabilities to execute the national security, defense and military strategies. At many installations, the availability of fresh water is diminishing, while consumption requirements are increasing in response to construction of facilities and infrastructure to support Army growth and Base Realignment and Closure requirements.

Globally, water use has tripled in the past 50 years; yet fresh water availability remains relatively constant. Managing water resources is complicated by climate, geography and geology. To meet the challenges of the 21st century, Army installations must be sustainable. Water cost, quality and availability are key elements, and several laws, executive orders and Army policy require the Army to meet water conservation goals and improve installation sustainability.

Acronyms and Abbreviations	
EO	executive order
FY	fiscal year

Kristine Kingery
Photo by Lt. Col. William R. Martin, U.S. Army Legal Services Agency

Water use

Installation consumption dominates Army water use. Water availability plays a pivotal role in whether an installation can expand and also whether the installation can continue to support assigned or additional missions while maintaining quality of life. Fort Huachuca, Ariz., Fort Carson, Colo., and Picatinny Arsenal, N.J., provide examples of how to address water conservation issues.

The San Pedro River, an environmentally sensitive resource, is connected hydrologically to the groundwater beneath Fort Huachuca. Over the years, Fort Huachuca's and the surrounding community's growing groundwater usage have lowered the river's water level, aggravating the river's ecosystem, which is home to several threatened and endangered species. As a result, Fort Huachuca, per agreement with the U.S. Fish and Wildlife Service, must offset its water withdrawals to conserve river flows in the San Pedro ecosystem.

To accomplish that agreement, Fort Huachuca reuses the installation's treated wastewater and purchases conservation easements to prevent development and limit water use that would encroach on the installation. Fort Huachuca is able to count the easements as credits towards ➤

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for the suspect air handler. Again, recommissioning teams are finding that the proper sequence of operation for the equipment either was never loaded and activated or subsequently changed. This situation can affect the economizer cycle for free cooling as well as the correct setpoint for the dampers. In certain ambient conditions and when correctly engineered and programmed, the dampers alone, through the blending of the return and outside air streams, can provide supply air at the desired temperature without additional heating or cooling.

Exhaust fans in kitchens and dining facilities that run amuck – Where the building automation system does not include either a monitoring or control device on large exhaust fans, the fans can be a problem. Frequently, the kitchen workers turn on these fans manually when cooking activities begin, and the fans stay on all day and maybe all night, too.

Usually the makeup air required for the exhaust is provided from a companion system, and the two are interlocked. If there is no makeup air system for these fans and the air is drawn from the space, there is a great loss of conditioned air. When the kitchen is closed, ensure all the fans are off.

Most new grill and stove hood exhaust systems have an integral makeup air channel. When balanced and properly commissioned, this state of affairs is fine. If the exhaust fan draws more air than the makeup channel can provide, the balance is captured from the space and spit out in the world.

As compared with the rest of the inventory, dining facilities are already at the high end of energy use intensity. This conditioned air loss can exacerbate the already high energy use condition.

If you can, compare the energy use as measured or metered of your dining facility with another of similar size and use patterns. Both may be hogs or great models of efficiency, and you'll learn little, but if one stands out as noticeably different, you can investigate why.

These are only two of many areas that need attention in the search for energy efficiency. Excess outside air leaking in, either through the dampers or sneaking in through the building envelope, account for a major portion of loss. A properly balanced, calibrated and instrumented air handler system will go a long ways toward helping you meet your energy goals.

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groundwater pumping reduction.

Fort Carson reduced the use of potable water that it purchased from a local municipal treatment plant. Monetary savings were not the only driver prompting Fort Carson's action. The installation and surrounding community faced water restrictions resulting from population growth, dry climate and periodic droughts.

For more than 30 years, Fort Carson has been making improvements to its wastewater treatment plant. The post uses the treated effluent to irrigate turf. The installation also modified its large vehicle wash facility to use a closed-loop system that recycles water. The installation reuses about 303 million gallons of water annually, saving about $682,000 per year.

Picatinny Arsenal had a potable water treatment plant that was approaching its maximum production capacity in fiscal year 2008. Rather than expand the plant or construct a new one, the arsenal implemented an aggressive leak detection and repair program. The effort resulted in a 14 percent reduction in water consumption even as the installation's operational activities increased 30 percent.

Water sustainability

Since water availability does not obey installation, city or state boundaries, the Army Environmental Policy Institute sponsored an installation water assessment. The report, *Army Installations Water Sustainability Assessment: An Evaluation of Vulnerability to Water Supply,* employed a regional approach to look at installation water requirements today and to project water availability 30 years into the future.

The report divided the country into regions vulnerable to issues of water supply and used the Sustainable Installation Regional Resource Assessment database to identify watersheds with potential problems. Using the model results, the report identified available water resources baselines for Fort Bragg, N.C., and Fort Bliss, Texas, and determined future water resources for several potential scenarios.

The assessment, located at *http://www.aepi.army.mil/docs/whatsnew/ERDC-CERL_TR-09-38.pdf*, provides an excellent review of federal, Department of Defense and Army water policy. It also summarizes available water efficiency planning methods and tools that provide installations with a consolidated reference for water conservation efforts to comply with Energy Independence and Security Act and EOs.

The assessment also makes six common sense water resources management recommendations:

1) Emphasize water manager staffing and centralize data collection.
2) Include water efficiency measures in all projects.
3) Adopt a program of total water management.
4) Continue to emphasize metering and infrastructure upgrades.
5) Conduct a comprehensive review of installation water rates and contracts.
6) Engage the local community in planning for sustainable water.

Next steps

The Army is testing the methods developed in the pilot to better understand regional water issues at 10 continental U.S. and three overseas installations. Results will be available this fall and will be used to develop recommendations for a global water strategy. In the interim, installations should continue to analyze installation water usage and continue to take steps to recycle and reduce water consumption.

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Major Federal Actions	Water-Related Requirements
1992 Energy Policy Act	Establishes water efficiency standards.
2005 Energy Policy Act	Codifies Energy Star Program.
2007 Energy Independence and Security Act	Requires agencies to identify all "covered facilities" that account for 75 percent of facility energy and water use.
Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management,* 2007	Requires a 2 percent annual reduction in water consumption from fiscal years 2008 through 2015 or a 16 percent reduction by FY 2015.
EO 13514, *Federal Leadership in Environment, Energy, and Economic Performance*, 2009	Extends the annual 2 percent reduction required in EO 13423 to FY 2020 for a total 26 percent reduction of potable water. Adds the requirement to reduce nonpotable industrial, landscaping and agriculture water consumption by 2 percent annually or 20 percent by FY 2020.
Army Energy and Water Campaign Plan for Installations, 2007	Provides the Army's strategy to meet energy and water conservation requirements and goals to guide installations in conserving water resources.
Army Sustainability Campaign Plan, 2010	Instills sustainability principles throughout the Army. A tenet of the plan is to provide services and operate facilities in a manner that promotes the reduction of energy, water and other resources.

Major federal actions and their resulting water-related requirements are listed in this chart. Graphic by Kristine Kingery

Great planning means considering energy, infrastructure factors

by Jerry Zekert

Energy planning is more than just the newest technology or the coolest new solar farm. Rather, it considers the foundation of how installations are planned and developed.

Installation master planning is a comprehensive process that creates the overarching plan for post development. It is a holistic, collaborative process that ensures meeting today's missions while preserving installation military capabilities for the future and ensuring that installations protect the environment, become sustainable, preserve natural and cultural resources, and provide great communities for Soldiers, their families and civilians.

Energy conservation is a major consideration for Army installation master planning. From the initial planning and visioning efforts, the garrison commander and installation stakeholders forge a comprehensive vision and set planning principles that guide installation planning. These principles guide how each area development plan is formulated.

Each development plan contains the Military Construction requirements and other opportunities that must be achieved to complete the plan. The Military Construction identified must be consistent with the master plan, not only for siting but also for compliance to the planning principles. Embedding energy conservation and other sustainability aspects in the planning principles ensures these tenets endure through the entire planning horizon.

The Army embraces several planning practices that promote effective energy conservation. Two examples are compact neighborhood area development planning and the "narrow wings" concept for building footprints.

Compact neighborhood area development planning – Compact neighborhood development gives the ability to leverage energy efficiency by grouping buildings into one place rather than sprawled across large spaces. This practice gives installations more flexibility to explore holistic energy saving solutions at the neighborhood level. This approach also allows installations to preserve limited land and facilities for future military needs while meeting current mission requirements.

This Ellsworth Air Force Base office building is designed with narrow wings that lower energy use by reducing air conditioning, relying on cross ventilation and providing more natural light. Photo by Mark Gillem, Urban Collaborative

Research has found denser development uses less energy and emits fewer greenhouse gases by a factor of 2.0 to 2.5 than less dense neighborhoods. By promoting multi-story in-fill solutions and more mixed-use development, installations can be more energy efficient. Compact development drastically reduces reliance on automobile travel, too, and there are also savings from effective landscaping and siting efficiencies.

Narrow-wings building footprints – Designing buildings with narrow wings is a very cost effective method of saving energy without expensive technology solutions. In administrative buildings, which make up a sizable percentage of facilities on military installations, energy consumption for artificial lighting accounts for nearly half of all energy use. In addition, more air conditioning capacity is needed to remove the heat generated by artificial lighting.

The best way to reduce demand for artificial lighting is to create narrow wings that allow natural light into the buildings. The concept of narrow wings in a modern Department of Defense building was first implemented at Rushmore Center, Ellsworth Air Force Base, S.D. This 112,000- square-foot office building was designed with 50-foot wide wings to capture as much light as possible within the building.

These planning practices have been embraced at Army installations, including Fort Lewis, Wash., Fort Hunter Liggett, Calif., Natick Laboratory, Mass., Fort Polk, La., Fort Sill, Okla., and Fort Hood, Texas.

The Army's installation planning approaches follow the best sustainable planning practices used in the cities and towns of America, such as Portland, Ore., Norfolk, Va., Atlanta, Denver, Chicago, Montgomery, Ala., and Tulsa, Okla.

These practices will be incorporated in the updated Army master planning regulation, which should be published by January.

How do you use these practices in planning? They are being taught at Army Master Planning Professional Training and Development classes and workshops and are being presented to incoming garrison commanders during Garrison Pre-Command Courses. For information, contact the author at the POC information below.

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How flow monitoring contributes to a wastewater study

by Paula Robertson

To analyze existing infrastructure and its capacity to support the expansion required by Base Realignment and Closure 2005, the Fort Sam Houston, Texas, Directorate of Public Works contracted the U.S. Army Corps of Engineers, Fort Worth District, to provide comprehensive infrastructure studies of its water utilities. Included in the studies was an evaluation of the wastewater collection system.

For the wastewater study, Fort Worth District engineers conducted a sanitary sewer evaluation survey, which typically includes the following:

- assessment of the lift stations, which pump wastewater uphill to the collection system of pipes, or mainlines;
- manhole inventory and assessment;
- wastewater flow monitoring;
- mainline inventory and assessment;
- GPS surveying, to update or create an accurate geographic information system map of the collection system components; and
- development and analysis of a hydraulic model based on the data collected.

Monitoring wastewater flow in the system mainlines is one of the early activities of the survey, typically done while collecting the manhole inventory data. The Fort Sam Houston wastewater collection system consists of roughly 232,000 linear feet of gravity sewer mainline and 1,060 manholes. Much of the system, built in the 1930s, has far exceeded its 50-year design life.

Outside water that infiltrates a wastewater system reduces the system's capacity and could result in backups or overflows. For example, groundwater can enter through broken or cracked pipes, and rainwater can get into the system when covers or seals are missing or damaged. To quantify and determine where groundwater and rain could enter the system, the study team installed flow monitoring equipment in 18 manholes at key locations representative of the system hydraulics. Flow monitoring measures the hydraulic variation of sanitary sewer flows for extended periods under dry- and wet-weather conditions.

Acronyms and Abbreviations	
BRAC	Base Realignment and Closure
DPW	Directorate of Public Works

To measure the actual flow, technicians installed a submerged flowmeter inside each of the 18 manholes. Six continuously recording rainfall gauges obtained rainfall intensity and duration for the same monitoring period.

The flowmeter, which is a small probe, was mounted to a steel band installed inside the outgoing pipe at the manhole base. The probe used sonar to detect fluid velocity. A pressure sensor determined the depth of fluid in the mainline. The probe connected to a data recorder, which captured and stored the flowmeter readings.

The meters measured and recorded flow data at 15-minute intervals. Over a 24-hour period, each recorder accumulated 96 data sets, which included velocity in cubic feet per second and fluid depth in inches. For this study, the 18 flow monitors were active for 39 days. About once a week, a technician pulled the cover of each meter manhole and connected the recorder to a laptop to upload the data.

Using the velocity, fluid depth and pipe diameter data for each monitored mainline, additional flow data was derived, including minimum and maximum flow, average daily flow, peak flow, ratio of fluid depth to pipe diameter and percent full. The wastewater flow monitoring provided adequate hydraulics data to determine key information for the system area represented by each meter manhole:

A flowmeter and data recorder installed in a manhole record wastewater study data. Photos courtesy of Pipeline Analysis LLC

A technician descends into a manhole for the manhole and mainline assessments

Dry-weather average daily flow – The flow data for a typical week not impacted by rainfall provided an average flow rate per day.

Dry-weather peak flow – Peak flows recorded during dry weather were compared to the full pipe capacity to determine the total system capacity ➤

Metering policy and guidance

by Ismael Melendez

Managing energy at the building level has historically been a challenge for the federal government. Over time, energy costs and use have risen, and priorities have been placed on energy awareness and reduction.

Until recently, the overwhelming majority of Army buildings did not have utility meters for electricity, natural gas, potable water and other utilities. The Energy Policy Act of 2005 requires installation of meters and advanced electric meters on all federal buildings by 2012, where practicable, according to guidelines set forth by the Department of Energy.

The overarching concept is that managers cannot control what is not measured or metered. The expectation is that the Army Metering Program will provide the tools and information to instill effective energy conservation accountability and behavior among building occupants and, in turn, provide an effective means to reduce energy usage to conservation glide path targets.

Meters to measure utilities are available with a great variety of capabilities, methods of operation and communication options. Current federal policy and DoE guidance provide a bare minimum of specificity

Ismael Melendez
Photo courtesy of Headquarters, IMCOM

on what is considered a valid advanced meter. To make clear what is needed for advanced meter installation and meter data management projects, the Office of the Assistance Secretary of the Army, in coordination with the Engineering and Support Center, Huntsville, developed and published the *Army Metering Implementation Plan* based on the DoE guidance.

An advanced meter has the capability to measure and record interval data and communicate the data to a remote location in a format that can be easily integrated into an advanced metering system. An advanced metering system collects time-differentiated energy usage data from advanced meters via a network system on an on-request or defined-schedule basis. The system is capable of providing usage information on at least a daily basis and can support desired features and functionality related to energy use management, procurement and operations.

Acronyms and Abbreviations	
DoE	Department of Energy
IMCOM	Installation Management Command

General electrical meters specifications are:

- *quantities measured* – average power demand in kilowatts over 15 minutes intervals and energy demand in kilowatt-hours;
- *measurement configuration* – for single-phase application, 120-240 volt; for three-phase application, 120-600 volt, 3-wire delta or 4-wire wye;
- *operation temperatures* – from minus 20 C to 60 C; for exterior mounting, consider the local ambient temperature extremes and moisture proof enclosures;
- *humidity operation range* – 5 percent to 90 percent relative humidity, noncondensing;
- *accuracy* – revenue grade of plus or ➤

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being used during dry weather.

Wet-weather average daily flow – Wet-weather flows for each recorded rainfall event were analyzed to determine the percentage of rain that entered the collection system. Comparing the rainfall event flows with the dry-weather flows established the rainfall derived infiltration/inflow.

Wet-weather peak flow – Peak flow rates during wet weather are critical to the analysis of the total system capacity. Peaking ratios were compared for dry and wet weather.

Flow monitoring also provided important information about flow patterns, which the study team used to develop a hydraulic model of the wastewater collection system. The model uses the baseline flow patterns to assess carrying capacity and to predict the system's performance under a variety of simulated operational conditions.

The wastewater system analysis and the hydraulic model give the Fort Sam Houston DPW reliable data as well as access to the measurements and assumptions that the study team used to construct the hydraulic model.

"Planners, utility design engineers and maintenance personnel will be able to use modeling results to clearly identify problems and create proper system designs for future development at Fort Sam Houston," Dave Bowersock, Fort Worth District senior engineer, said.

Further, the flow data was used to quantify the inflow and infiltration, assess its impact and prioritize areas for rehabilitation to meet the BRAC requirements, with the resulting recommendation of a $2.7 million investment in the wastewater collection system.

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Retrofitting saves energy: Corps team finds opportunities

by Maj. Gen. Merdith W.B. Temple, Franklin H. Holcomb and Tammie L. Learned

Installations must comply with a growing number of national and Defense directives to reduce dependence on fossil fuels. Legislation, including the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007, calls for a minimum energy reduction of 3 percent per year since 2003, with the ultimate goal being a 30 percent reduction by 2015.

All new military construction after 2008 will achieve a Platinum rating under the Leadership in Energy and Environmental Design in which designers seek to include maximum energy-saving opportunities. However, installation Directorates of Public Works manage thousands of buildings — many built in the days of lower-cost energy — that could be targeted for retrofits or other measures to reduce energy consumption.

Acronyms and Abbreviations	
Btu	British Thermal Unit
CERL	Construction Engineering Research Laboratory
ECM	energy conservation measures
EEAP	Energy Engineering Analysis Program
EPAP	Energy and Process Assessment Protocol
ERDC	Engineer Research and Development Center
FY	fiscal year
USACE	U.S. Army Corps of Engineers

To help identify energy-saving opportunities, the U.S. Army Corps of Engineers established a team to assess buildings and identify potential savings through new technologies or process changes. The team comprises the USACE Engineer Research and Development Center; the Engineering and Support Center, Huntsville; and the Department of Energy's Pacific Northwest National Laboratories.

ERDC's Construction Engineering Research Laboratory developed the comprehensive Energy and Process Assessment Protocol in coordination with an international standards group and other participants. The protocol describes how to find and assess energy inefficiencies in existing facilities using three levels of audit.

Huntsville Center uses the guidance, along with information from the Federal Energy Management Program, to manage the Energy Engineering and Analysis Program, funded by the Installation Management Command. This program is used to conduct energy surveys and to provide the rationale for future investments to be included in the installation master plan.

Levels of audit

The protocol addresses both technical and nontechnical organizational capabilities required for successful assessment geared toward identifying ➤

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minus 0.2 percent at unity power factor, plus or minus 0.5 percent at 0.5 power factor;

- *frequency* – 50 or 60 hertz plus or minus 5 percent, 60 hertz for continental U.S. application.
- *for non-LonWorks meter application* – digital output only, Modbus RTU/RS485; and
- *for LonWorks meter application* – digital output only, ANSI/CEA-709. Lb protocol (LonTalk) output for communications using Standard Network Variable Types for measured values.

Department of Defense guidance mandates electrical meters for:

- facilities equal to or greater than 29,000 square feet;
- facilities with an estimated electric utility cost of $35,000 or more per year; and
- all significant reimbursable tenant facilities.

Using these requirements, Headquarters, Installation Management Command, with Huntsville Center developed the Army Metering Program. IMCOM has installed around 7,000 electric and gas advanced meters at 37 installations as of August.

Realizing, that the Army Metering Implementation Plan provides metering for only a small percentage of total Army real property, Headquarters, IMCOM, developed mandatory criteria that require the installation of advance utility meters on all new Military Construction projects and for building renovation or energy conservation projects with a programmed cost of $200,000 or more that include electrical, natural gas, water or steam components.

However, installing an advanced meter on a building is only one of the required steps to achieve program success. Multiple processes and systems must be in place.

Data collection – The meter must be read so that the installation has a record of energy usage during a specified period of time.

Feedback – The recorded usage must be presented to the installation tenants.

Required action – The tenants must be required to act upon the provided feedback.

Enforcement – An approved, clear guidance procedure must be implemented if the required actions are not performed within the defined period of time.

Without each of these four elements, an energy culture change is unlikely to occur. The combination provides energy use accountability and incentive for action. Furthermore, energy use patterns may be quickly and inexpensively altered by adjusting the feedback and enforcement components.

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energy and other operating cost reduction measures without adversely impacting facility quality, safety, occupant morale or the environment. It uses a pre-assessment phase, **Level 0**, to select targets for energy assessments and required composition of the team, and three tiers of energy audits with different levels of effort. Each of these three levels can be implemented in different ways — a simplified or a more detailed assessment, depending on energy usage and other available data.

During the selection phase, Level 0, auditors can choose from the installation building and system list those having the most promising energy-saving potential. In addition, they can select from a specific building the systems to be audited or, within a system, the components to be considered for more detailed analysis.

A **Level I** audit is a preliminary energy and process optimization opportunity analysis consisting primarily of a walk-through review and consultation of existing documents and consumption figures. A Level I audit would normally be followed by a **Level II** audit to verify the Level I assumptions, and to more fully develop the ideas from the Level I screening analysis.

The Level II effort includes an in-depth analysis in which all assumptions are verified. The end product is a group of "appropriation grade" process improvement projects for funding and implementation.

Finally, the **Level III** audit is a detailed engineering analysis with construction or installation as appropriate, performance measurement and verification, and fully instrumented diagnostic measurements.

Under the EEAP, the EPAP tool is used to identify appropriate fixes, estimate ballpark costs and potential energy savings, and produce project documentation needed for funding and implementation. Due to the limited effort and funds allocated to a Level I assessment, the EEAP survey also recommends for further analysis many other potentially significant measures.

Lights are replaced with energy-efficient lighting, an example of a possible EEAP recommendation that can be phased in over five years and tied into the installation's energy reduction goals. Photo courtesy of ERDC-CERL

Successes to date

Since fiscal year 2006, EEAP has completed 32 surveys, and the program has grown from two surveys per year in FY 2006 to eight in FY 2010, with an anticipated nine surveys to be completed in FY 2011. EEAP studies identify energy inefficiencies and wastes, and also propose energy-related projects with recommended funding or methods of execution that could help the installation meet nationally mandated energy reduction requirements.

In the first 24 surveys, during FYs 2006 to 2008, 2,369 energy conservation measures were identified. If implemented, annual energy savings would be more than 6.2 trillion British thermal units and generate an estimated annual savings to the Army of $124.4 million. The capital investment of $438.8 million would see an average simple payback of 3.5 years.

In FY 2009, EEAP identified 300 energy conservation measures at eight installations. If all the ECMs are implemented, the annual energy savings is 2.1 trillion Btu, which equates to $19.8 million in annual savings. The average simple payback would be four years with an initial capital investment of less than $80 million.

EEAP succeeds where previous programs have not because identifying sources of energy waste and potential ECMs is only the beginning — not the end product. The EEAP end product is an energy capital investment strategy that sets the schedule for implementing projects to achieve the installation's overall mandated energy reduction goals. The minimum is 3 percent per year since 2003, with the ultimate goal being a 30 percent reduction by 2015.

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What it will take to reach renewable energy and energy security goals

by Doug Waters

The Army was mandated to meet energy security and renewable energy goals by the Energy Policy Act of 2005, followed by Executive Orders 13423 and 13514, and the Energy Independence and Security Act of 2007. In response, the Army established the *Army Energy Strategy for Installations* in 2005, the *Army Energy and Water Campaign Plan for Installations* in 2007 and the *Army Energy Security Implementation Strategy* in 2009.

The aims of these mandates and Army guidance are high and will require a concerted effort to achieve.

The goals

The Army was to substitute renewable energy for 3 percent of its total electrical energy consumption by 2009, 5 percent by 2010 and 7.5 percent in 2013 and beyond. EO 13423 required that no more than 50 percent of that renewable energy be from sources installed prior to 1999.

EISA requires that, by 2025, the Army acquire 25 percent of its domestic total energy consumed from renewable energy sources and that new buildings reduce their fossil fuel use by 55 percent by 2010 and 100 percent by 2030 relative to 2003 levels.

The Senior Energy Council, created in 2008, established an implementation plan and objectives to achieve the mandates and guide the Army to energy security. The council also decided to identify five net-zero installations by 2012 and a total of 25 net-zero installations by 2014, with the first five becoming net-zero installations by 2020 and the remaining 20 by 2030.

A wind turbines project at Camp Williams, Utah, will help the Army achieve renewable energy goals.

Doug Waters
Photos courtesy of OACSIM

A net-zero installation produces as much energy as it consumes annually from renewable or alternative means or cogeneration.

Another objective is to produce 1,500 megawatts of renewable energy by the end of 2017 through power purchase agreements, enhanced use leases or other public-private partnerships.

To achieve net-zero, the 25 installations will need to reduce their energy consumption and develop the maximum renewable energy capability. Each installation also must improve its energy distribution system, develop micro-grids and smart grids to control the energy produced, make excess energy available to the larger grid and secure its grid.

The net-zero installations have not been established; however, some installations have already developed plans to become net-zero or near net–zero, and others have assessments under way to determine their plans to become net-zero.

Legislation is being considered that would codify the EOs and give the Department of Defense and the Army additional requirements — implementation plans at each installation, energy managers for every federal building, implementation plan reports and follow-up reporting on accomplishments.

Acronyms and Abbreviations	
EISA	Energy Independence and Security Act
EO	executive order
mw	megawatt
OACSIM	Office of the Assistant Chief of Staff for Installation Management

Even though Army commands and installations, including the National Guard and Army Reserve, are attempting to achieve these objectives as cost effectively as possible, and some installations have actually exceeded targets, the Army has not met its goals to date. This situation demands that the Army develop an enterprise approach to achieve its goals.

What will it take?

In 2009, the Army had a total estimated peak demand of 2,360 mw of electricity. If the Army reduces its consumption, or at least its demand, by 30 percent and its energy intensity by 30 percent by 2015, then peak demand should be about 1,650 mw. This status would require that renewable energy capacity in 2025 be 25 percent, or about 410 mw.

This goal can be met if some of the large-scale renewable energy projects being planned are achieved by 2025, just 15 years from now. However, the cost will be significant. The cost of one mw of solar power averages $4 million, and one mw of wind power averages $2.5 million. Some projects, depending on the size, location and type of renewable technology, have cost double that.

These costs mean that to achieve the renewable energy goal, the Army must secure financing of $2-5 billion over the next 15 years. The 1,500 mw objective will require roughly $8-18 billion. These amounts are clearly beyond appropriated funding capability. The Army must rely on private investment and private-public partnerships to achieve these goals.

The Army is working with the ➤

Commercial Utilities Program 101

by Rafael Zayas

During World War II, the president directed all executive agencies of the government that were directly or indirectly responsible for power procurement to designate a power procurement officer to handle contracts and arrangements for electric power. The present system of power procurement, known as the Army Commercial Utilities Program, traces its history to that directive.

Evolution

For many years, the Army had been processing power procurement matters through a Utilities Contract Board under the Construction Division of the Quartermaster General. When construction was transferred to the U.S. Army Corps of Engineers, the Utilities Contracts Board functions and personnel were also transferred. As a result of the president's directive, the Utilities Contracts Board chairman was appointed the Army power procurement officer.

In 1950, in accordance with a presidential order dated July 1, 1949, the administrator of the General Services Administration and the secretary of Defense signed a Statement of Areas of Understanding in which GSA delegated the authority to procure electricity, natural and manufactured gas distributed by pipes, steams, sewerage and water services to the Department of Defense. The statement also granted limited rights to the Army's Judge Advocate General to represent DoD and other federal executive agencies in proceedings involving public utilities before municipal, state and federal regulatory bodies.

Rafael Zayas
Photo by Mary Beth Thompson

When DoD delegated the utilities acquisition authority to the services, the assistant secretary of the Army for research, development and acquisition — today the assistant secretary of the Army for acquisition, logistics and technology — delegated the authority to the chief of Engineers, as the APPO, to enter into contracts for the acquisition of public utility services for periods not exceeding 10 years.

The chief of Engineers appointed the chief of the Utilities Contracts Office as the deputy APPO with the responsibility of administering the acquisition and sales of utilities services Armywide. Later, the functions and personnel of the Utilities Contracts Office were transferred to the U.S. Army Facilities Engineering Support Agency, a field operating activity of USACE, which still later became the U.S. Army Engineering and Housing Support Center.

In 1993, the Engineering and Housing Support Center was split into two organizations: the Office of the Assistant Chief of Staff for Installation Management and the Army Center for Public Works. During this reorganization, the majority of the chief of Engineers' policy and regulation development responsibilities was transferred to OACSIM. Utilities contracting was one of the very few policy and regulation responsibilities retained by the chief of Engineers.

During 1998-99, the Center for Public Works was disestablished. Headquarters, USACE, retained the chief of Engineers' Army staff policy and guidance development responsibilities. The utility services contracts approval, utilities services contracting assistance, and rate litigation and intervention functions were transferred to the U.S. Army Engineering and Support Center, Huntsville.

USACE districts continued to be responsible for the negotiation and preparation of utility services contracts ➤

Acronyms and Abbreviations	
APPO	Army power procurement officer
CUP	Commercial Utilities Program
DAPPO	deputy Army power procurement officer
DoD	Department of Defense
OACSIM	Office of the Assistant Chief of Staff for Installation Management
USACE	U.S. Army Corps of Engineers

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national laboratories, Defense Logistics Agency, the Navy and other external and internal agencies that have expertise in both renewable energy and private-public partnerships to aid installations in renewable energy development. These entities have some funding available for assessments, feasibility studies and prototype project development.

Subject matter expert support teams can and should be formed to aid installations with the business analysis and planning documents needed to develop and present projects to Army headquarters for approval. The Office of the Assistant Chief of Staff for Installation Management can facilitate the establishment of these teams.

Meeting the Army goals is doable but requires significant effort. All must work together as one team and help one another with lessons learned and expertise to accomplish the goals.

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Energy contracts help installations meet reduction goals

by Michael Norton

Garrison commanders and directors of Public Works are challenged with finding the means and resources to meet mandated 30 percent energy and 15 percent water reduction goals by 2015. Existing appropriated funding sources are often inadequate to accomplish the immense task of replacing existing infrastructure with more energy-efficient infrastructure, such as hot water or steam distribution systems; chillers; boilers; heating, ventilation and air conditioning systems and controls; building envelopes; lighting; and renewable energy production.

The Energy Conservation Investment Program and Military Construction are appropriated funding sources for energy infrastructure. ECIP normally funds energy projects in the range of $2 million to $5 million, and MILCON is best for projects of $10 million or more. However, the investment required to reduce energy consumption by 3 percent per year is usually too great for an installation to count on appropriated funding sources to satisfy this requirement.

Energy Savings Performance Contracts offer another solution. They are partnerships between the Army and an energy service company.

Michael Norton
Photo by James Campbell

In consultation with the garrison, the ESCO provides capital and expertise to make comprehensive infrastructure energy improvements or implements new renewable capability where economies permit to reduce Army energy consumption and costs, and maintains the projects in exchange for a portion of the generated savings.

Acronyms and Abbreviations	
ECIP	Energy Conservation Investment Program
ESCO	energy savings company
ESPC	Energy Savings Performance Contracts
IMCOM	Installation Management Command
M&V	measurement and verification
MILCON	Military Construction
O&M	operation and maintenance
UESC	Utility Energy Savings Contract

With an ESPC task order:

- energy savings guarantees are mandatory,
- savings must exceed ESPC payments each year,
- measurement and verification are mandatory, and
- contract term cannot exceed 25 years, i.e., the Army must pay off the capital investment, including operation and maintenance performed by the ESCO, within that time.

Garrisons use their O&M, Army, J Account to make the payments.

An alternative is a Utility Energy Savings Contract. These contracts also provide private sector financing ➤

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when involved or engaged in Military Construction, Army; minor construction; and maintenance and repair projects.

Revitalization

In 2004, Headquarters, USACE, renamed the program the Army Commercial Utilities Program and started its revitalization. Today, the DAPPO executes the chief of Engineers' CUP Army staff responsibilities from within Installation Support at Headquarters, USACE. Performance of these responsibilities depends entirely on availability of Headquarters, USACE, internal funds.

CUP projects in development are:

- an update of Army Regulation 420-41, *Acquisition and Sale of Utilities Services*, which is currently being coordinated Armywide;
- *Handbook for the Acquisition and Sale of Utilities Services*, which will supplement the updated regulation;
- the Army CUP Oversight/Management web application, which will assist Army garrisons, commands, direct reporting units and headquarters with their utilities contracting mission;
- an Army CUP website, which will provide the main means of disseminating utilities contracting information within the Army;
- the Army CUP Wiki-Encyclopedia, which will be the Army's repository for utilities contracting knowledge; and
- web-based utilities contracting training.

Huntsville Center performs the majority of the chief of Engineers' CUP technical support responsibilities to Army garrisons, commands and direct reporting units. Headquarters, Installation Management Command, funds Huntsville Center's CUP support mission.

Huntsville Center reviews and approves utility contracts above a certain dollar threshold, provides technical and legal assistance to garrisons and contracting officers in utility contract negotiations, performs technical and analytical review of utility tariffs, and manages, in conjunction with the Army Regulatory Law Office, the Utility Rate Intervention and Litigation Program.

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for energy conservation measures at Department of Defense garrisons. A utility company provides capital and expertise to make infrastructure energy improvements on government facilities to reduce Army energy use in exchange for a portion of the generated energy savings.

The primary difference between ESPC and UESC is that the former requires M&V of the actual energy savings and operations and maintenance, and the latter does not. The capital investment is amortized under UESC through the utility billings payable from the installation's J Account to the utility company.

Paying interest, currently 5 to 7 percent for an ESPC, is the downside of using private sector financing. These rates reflect the ESCO's assumed risk that the energy savings will meet or exceed the minimum guarantees to receive payment from the Army. Rates also reflect current market conditions for long-term commercial and industrial investments.

UESCs often have shorter payback periods because the ESCO does not provide O&M or M&V. The disadvantage is that the Army does not have the maintenance and M&V to ensure optimal equipment operation and to prevent overpayment based on actual yearly energy savings.

Installations don't see much, if any, reductions in their J account expenditures until after the ESPC or UESC project is paid off, because most, if not all, the energy savings achieved is paid toward amortizing the capital investment for the improvements. The latter is frequently perceived as a disadvantage. After all, what's the difference between paying 100 percent of the J account to the utility company versus 80 percent to the utility company and 20 percent to the ESCO or UESC for the facility improvements that produced energy savings? It still totals 100 percent — and that is the worst case.

The benefits of ESPC and UESC include:

- not paying upfront for capital improvements;
- obtaining needed infrastructure improvements when existing funding sources are not available in the required timeline;
- obtaining operation and maintenance of new, complex equipment when the Directorate of Public Works does not have an experienced workforce;
- leveraging of additional projects by using existing funding to shorten the term or generate more savings;
- avoiding the cost from the inevitable utility rate increases levied upon higher utility consumption if the ESPC or UESC were not implemented; and
- having all of the equipment installed under ESPC maintained by the contractor and replaced if it fails before the end of the contract, taking the pressure off the annual base operations and sustainment, restoration and modernization budgets.

The best uses for ESPCs or UESCs are those projects that typically comprise a combination of short- and long-term payback based on what the installation needs, what state-of-the-art technology can deliver and the financial market conditions at the time of contract negotiations.

According to recent Army Audit Agency draft findings, the Army needs to use the ESPC Program more. It noted that 64 percent of Installation Management Command installations are not meeting energy goals, whereas 99 percent of IMCOM and Army Materiel Command garrisons that have ongoing ESPC projects are meeting energy goals. Those same garrisons also are aggressively using other funding sources for energy-use reduction.

The U.S. Army Engineering and Support Center, Huntsville, has a nationwide ESPC indefinite–delivery, indefinite-quantity multiple award task order contract with 15 ESCOs and a capacity of $900 million. IMCOM garrisons obtain Huntsville Center services without cost because Headquarters, IMCOM, provides funding to Huntsville Center to administer this contract and provide program and project management. Huntsville also can award and administer UESC contracts for garrisons.

Huntsville Center has awarded ESPC projects that have a capital investment of $397 million with energy savings of about $801 million. These projects provide a wide variety of infrastructure improvements that include more efficient boilers, chillers, controls, lighting, air handlers and generators to reduce energy demand. The ESPC projects in the pipeline will have an initial investment of $180 million and an estimated savings of $324 million over about 20 years.

The Army is taking advantage of the private sector to provide capital and expertise just like it did to replace and maintain outdated family housing and utility systems.

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Army Metering Program: Closing the gap

by Lawson (Stan) Lee

The Army Metering Program is closing in on its primary objective: website access to near real-time meter data for thousands of Army facilities worldwide. More than 5,000 advanced electric meters and 600 advanced gas meters have been installed on existing Army facilities by the U.S. Army Engineering and Support Center, Huntsville.

The current plan is to double this amount by fiscal year 2012's end. However, installing an advanced meter on a building is only half the battle. The other half is achieving connectivity of the meters with the Meter Data Management System, the central Armywide system for meter data analysis and reporting.

Advanced meters electronically transmit data to a head-in server typically located within the server room of the Network Enterprise Center, formerly known as the Directorate of Information Management. The consolidated meter data is then transmitted from the head-in server to the MDMS via a secure Internet connection.

That is the plan but not the reality at many installations. The NEC is responsible for protecting the installation's network against cyber attacks. The cyber threat is real, and the implications are scary — the Army and society at large depend heavily on functioning and secure networks. It is understandable, given cyber security complexity, that many NECs will not allow facility applications such as utility monitoring and control systems and advanced metering to connect to the installation network without a Certificate of Networthiness.

At some installations, NECs require system accreditation under the Defense Information Assurance Certification and Accreditation Program, a much more stringent requirement. The concern is not with the MDMS, which has already received accreditation and a CON. The concern is over meters electronically reporting to a head-in server. Using the information highway metaphor, the expressway is approved for secure travel, but the feeder streets are not.

Acronyms and Abbreviations	
CON	Certificate of Networthiness
FY	fiscal year
MDMS	Meter Data Management System
NEC	Network Enterprise Center
UMCS	utility monitoring and control systems

Advanced meters tracks electricity usage at Redstone Arsenal, Ala. Photo by Patrick Holmes, Johnson Controls, Huntsville

Differences in the interpretation and application of Army network security requirements to metering and UMCS prompted the formation of a team to recommended policy clarifications, technical approaches and a more streamlined CON application process. The team comprises representatives from the Installation Management Command, the Engineering Research and Development Center and Huntsville Center. The team's recommendations will be presented to the chief information officer/G6 and the 7th Signal Command, the NEC's major command, for decision making.

The current situation does include some connectivity successes. Forts Carson, Colo., and Stewart, Ga., are now transmitting facility meter readings to the MDMS central server. The U.S. Military Academy, West Point, N.Y., is expected to come on line in early FY 2011.

A task order with the MDMS contractor, CALIBRE, to expand MDMS connectivity to 48 other installations was just awarded. Assuming the success of the initiative, 28 installations will be able to download their meter data analysis reports from a website accessible with an Army Knowledge Online password before the end of FY 2011, with others closely following

Roll-out of MDMS connectivity to other installations is expected to accelerate once the CON issues are resolved and CALIBRE works through all the varieties of head-in server software and meter data output configurations for MDMS compatibility.

While some temporary technical work-arounds will be necessary, the goal is a universal standard output protocol for transmission of meter data to the MDMS. The Army is actually helping to lead the industry in achieving this objective by being the first major buyer of an open protocol advanced metering system — one that can accommodate a variety of equipment from different manufacturers and multiple sources of compatible head-in server software. This approach will assure the Army has a system that will continue to be supported by industry and have competitive sources for expanding and modernizing the system in the future.

Installing meters complies with the letter of the Energy Policy Act of 2005 and the Energy Independence Security Act of 2007, but the MDMS is needed to comply with the congressional intent. The MDMS will access facility data from the real property inventory and local meteorological data sources so that facility meter readings can be analyzed and reported in the proper context.

Installation energy managers will have access to a menu of actionable reports. Examples include lists of buildings that consume the most energy per square foot for a particular facility type, that have the most variation in their hourly energy use and where the current energy use is significantly higher than its historical average for the same outdoor temperature range. ➤

Energy assessments help garrisons identify conservation opportunities

by Ralph Totorica

Continually rising energy costs and shrinking budgets are requiring Army garrisons to take a closer look at their energy consumption. One tool available to garrisons to evaluate their current energy consumption patterns is an Energy Awareness and Conservation Assessment.

Headquarters, Installation Management Command, centrally funds 10 to 12 EACAs per year to help garrisons identify no-cost and low-cost energy savings opportunities and provide energy conservation awareness training for the garrison leadership and community.

Situation

Although the total energy consumption for IMCOM garrisons was reduced by about 19 percent between fiscal years 2003 and 2009, the total cost for that energy increased 32 percent over this same period. This rising cost of energy coupled with shrinking forecasted budgets means that garrisons must redouble efforts to reduce energy consumption or risk having to cut back on providing valuable services. In addition, the Energy Independence and Security Act of 2007 mandated that federal facilities must perform energy audits on 25 percent of building inventory each year.

To assist garrisons with meeting these challenges, Headquarters, IMCOM, funds EACA visits. The goal is to get each garrison on a four- to five-year rotating cycle.

Lyman Parkhurst (left), Sain Engineering Associates inspector, and Marco Orsolini, DPW air conditioning and refrigeration technician, inspect cooling systems at Camp Darby, Italy, during an EACA. Photo by Joyce Costello, U.S. Army Garrison Livorno, Italy

Assessments

EACA visits focus on identifying no-cost and low-cost energy- and water-saving opportunities, promoting energy awareness and assisting garrisons to reduce their energy consumption and costs. The intent is to capture quick wins through energy savings opportunities that the garrison can execute immediately with little to no investment costs.

The EACA survey provides an outside pair of energy expert eyes to identify savings opportunities that may have been overlooked. The week-long visit includes an in-brief with the garrison commander, four days of facility walk-throughs including a night assessment, an out-brief with the commander and directors, and a training session for building coordinators and the Directorate of Public Works staff.

A major EACA goal is to raise the ➤

Acronyms and Abbreviations	
DPW	Directorate of Public Works
EACA	Energy Awareness and Conservation Assessments
FY	fiscal year
IMCOM	Network Enterprise Center

Top 10 no-cost or low-cost energy savings opportunities:

1. Validate building daily occupancy and weekend occupancy schedules, plus, where possible, program holiday, deployment and training schedules.
2. Adjust the occupied and unoccupied heating and cooling temperature set-points.
3. Reduce unnecessary exterior lighting, e.g., parking lot and entry lighting for unoccupied buildings.
4. Reduce unnecessary interior lighting in areas with sufficient daylighting, e.g., foyers and lobby lighting.
5. Delamp over-lit areas and rooms, e.g., four-lamp hallway fixtures.
6. Make simple lamp and ballast upgrades, e.g., compact fluorescent lamps for incandescent.
7. Install lighting controls, motion sensors, light switches; and simply turn off lights at night.
8. Clean dirt and debris or replace air filters, exhaust fan grilles and air intake louvers.
9. Replace weatherstripping, repairing door closers or close windows at night to reduce heat losses and infiltration.
10. Install low-flow faucet and showerheads to reduce hot water use, e.g., WaterSense fixtures and Energy Star-rated appliances and equipment.

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Other planned MDMS applications include automated reimbursable tenant utility billing, measurement and verification of Energy Savings Performance Contracts, and determining the actual energy savings payback of a completed project. The MDMS will also allow energy managers to perform their own analyses and download customized reports.

The only path forward for achieving this vision is solving the cyber security concerns, priority one for the Metering Program.

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Web-based Water Management Toolbox launched

by Elisabeth Jenicek

A new web portal centralizes information on installation water management issues. Both new staff and experienced water managers will find the latest data, technology and guidance at the Water Management Toolbox website, *http://water-management-toolbox.com/*.

Water issues are impacting Army installations and operations in many locations across the nation. Concerns including supply variability, increased cost of purchase or production, quality, habitat degradation and salinity issues have prompted a renewed focus on water resources at the installation, national and global levels.

Recent national policy that establishes water conservation targets includes Executive Order 13514, *Federal Leadership in Environmental, Energy and Economic Performance*, which requires installations to reduce water consumption by 2 percent per year from 2007 through 2020. The target applies to buildings, landscaping and industrial usage.

The U.S. Army Engineer Research and Development Center developed the Water Management Toolbox as a one-stop resource to help water managers achieve the new efficiency requirements.

Acronyms and Abbreviations	
ERDC	Engineer Research and Development Center

Elisabeth Jenicek
Photo by Sandra Bantz

The web portal was created with installation water managers in mind, but it is also a resource for designers and planners of new facilities, contract utility staff updating water systems and anyone else involved with water conservation.

The Water Management Toolbox provides comprehensive material in an easily accessed, central location. It is organized into 10 topic areas, each accessed through the menu on the left side of the main page.

Topics include:

- the Water Demand Projection Tool;
- laws, regulations and policies;
- best management practices and guidance;
- tools;
- data;
- focus areas;
- regional and state resources;
- international resources;
- other resources and links; and
- news.

The toolbox is an open website intended to aid users in becoming a community of informed water managers who can share experiences and help each other address challenges through online collaboration. It could be especially useful for persons transitioning into water manager positions without experience at an installation.

The website will evolve over time to contain the latest information and to address emerging Army water issues. User feedback will be used to guide updates. ERDC is seeking specific feedback from the portal's users.

Those interested in reviewing the site may contact the POC below for information about participating.

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energy awareness throughout the garrison. Frequently DPW staff members have good conservation ideas that may only need validation or command attention to implement. The awareness effort can help with that.

A post-assessment report is provided to the garrison about 90 days later. The report includes an Action Item Summary spreadsheet that is used by IMCOM to track the energy savings recommendations that fall outside no-cost and low-cost capability and require investment funding.

Benefits

The EACA visit provides valuable energy and cost savings recommendations and helps garrisons meet energy audit requirements. The recommendations typically involve changes to operations, maintenance, garrison policies and procedures, and behavioral changes brought about by increased energy awareness.

Reductions in energy consumption of 5 to 10 percent are often achievable by the application of simple no-cost or low-cost measures. In FY 2010, 10 EACA visits were completed at installations throughout the Europe Region. These visits averaged roughly $1 million in energy savings opportunities potential for each installation.

To request an EACA for your installation, contact the author at the POC information below.

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Water sustainability studies highlight need for conservation

by Elisabeth Jenicek

A series of studies sponsored by the Army Environmental Policy Institute provide the first comprehensive review of long-term water sustainability at installations. A national screening used existing validated datasets and geographic information system mapping to evaluate the health of regional watersheds. National datasets and maps were used to assess the vulnerability of Army installations to issues of water supply and demand.

The assessments evaluated total water supply and demand in regions where installations are located. These analyses, completed on a watershed level, include estimates of both installation and regional water demand. Studies were completed for 12 continental U.S. Army posts and three overseas installations. The results depict a range of installation water sustainability conditions that reflect the larger picture of water sustainability across the country.

The U.S. Army Engineer Research and Development Center completed methodologies and regional water sustainability assessments for Forts Bragg, N.C., and Bliss, Texas, in 2009. The findings are documented in a technical report available at: *http://www.aepi.army.mil/docs/whatsnew/ERDC-CERL_TR-09-38.pdf*.

Two additional studies are nearing completion, and results will be published by October. The *Water Sustainability Assessment for Ten Army Installations* includes Forts Benning, Ga., Campbell, Ky., Carson, Colo., Hood, Texas, Lewis, Wash., Irwin, Calif., and Riley, Kan., Camp Shelby, Miss., McAlester Army Ammunition Depot, Okla., and the U.S. Military Academy at West Point, N.Y. The *Army Overseas Water Sustainability Study* includes U.S. Army Garrisons Grafenwoehr, Germany; Vicenza, Italy; and Humphreys, Korea.

Acronyms and Abbreviations	
ERDC	Engineer Research and Development Center

Water issues tend to be regional in nature due to the factors that affect supply and demand of this finite resource. These studies, however, revealed some common themes.

- Technologies that save energy can also have a greater water footprint, so it is important to consider the connection between water and energy when planning installation infrastructure projects. Biofuel and renewable energy technologies should be selected with consideration for their impact on water demand.
- Water is priced not according to its value as a precious resource but to recover costs incurred to extract and pump. Army facilities within the United States enjoy relatively low water costs, but the cost of water is a lagging indicator and does not reflect the scarcity. Only when water becomes difficult to obtain will the limited supply be reflected in increased price. Higher costs can be expected when water must be transported long distances or obtained from nonpotable sources.
- Because, the historic water rights systems — Riparian Rights of Landowners and Prior Appropriation Doctrine — were developed during times of water abundance, current water allocation law is leaving insufficient supplies for users experiencing water scarcity due to drought, population growth or declining aquifers.

The region containing Fort Bliss, Texas, is mapped to show water supply and demand factors. Graphic courtesy of ERDC-CERL

- Metering of individual buildings on Army installations produces new information about and attitudes toward water consumption. One installation that installed water meters for reimbursable customers found that the actual consumption was double the amount of the previous estimated billing. Another installation conducted mock billing of housing residents and saw a five percent drop in consumption as a result of this simple awareness tool.
- The mandated water reduction targets — a decrease of 2 percent per year from 2008 through 2020 — apply to the entire installation, although overall water demand is impacted by both reimbursable utility customers and by system losses that could be the responsibility of utility contract operators.
- Global climate change is expected to affect water availability. Anticipated changes in the water cycle include differences in precipitation patterns and intensity, increased drought and flood ➤

Utility rate intervention: It helps to be proactive

by Karl Thompson

Utilities are big business. With the Army's utility bill expected to surpass $1.4 billion this fiscal year, it is crucial to look for ways to control costs when and where it makes sense.

Sharp increases in electrical and gas billings will likely continue. These increases are attributed to soaring fuel costs, increasing environmental and security costs and carbon taxes. However, as strange as it might seem, conservation is also driving up costs as utilities are revenue driven.

Deregulation of the retail electricity market in the 1990s is also a factor for the rate increases. These increases are caused primarily by the expiration of reduced rates and frozen rate caps that were implemented by respective state commissions to encourage competition. However, the level of competition that deregulation was expected to generate and the self-regulating effect that was anticipated would keep rates competitive did not occur.

Utilities have been constrained by these rate freezes and caps and have accumulated deferred maintenance and operational costs. These deferred costs coupled with loss of revenue are putting utilities in a state in which they can no longer absorb and accumulate the deferred costs. As a result, utility companies are seeking rate increases to not only recoup these deferred costs but to get reimbursed for other escalating operational and maintenance costs.

Karl Thompson
Photo by James Campbell

Over the last several years, the average rate case increase requested was 8.1 percent, and the average rate case approved was 5.6 percent. Based on the last six years' historical trend and volatility, the probability that prices will continue to rise is greater than 87 percent.

No one can accurately forecast when a utility will file a rate increase request, but Army installations can still be proactive. One action that has had significant repayment is the rate interventions taken by the Army when a utility has proposed a change in rates, terms or conditions of service. Federal Acquisition Regulation 41 and Army Regulation 420-41 provide procedures for working a rate increase.

In general, the Army undertakes intervention efforts when significant rate increases are proposed, where utility operating costs are declining or where the military installation is paying a disproportionate share of the utility's return on investment. Experience has proven that without intervention and representation, the federal government, with its perceived deep pockets, pays a disproportionate share of any increase that is negotiated or litigated, or is deprived of its fair share of rate reductions ordered by the regulatory commission.

Since 1999, the U.S. Army Engineering and Support Center, Huntsville, has intervened in 55 cases that produced in excess of $102 million in savings and cost avoidance.

Energy and utilities managers should review all notices received from their utility providers, particularly those that propose a change in rates, terms or rate structure. Most states require that consumers be notified in advance of any rate change. In addition, most Army utility contracts require that a notice of a proposed rate change be given to the affected Army installation, which is typically sent with the monthly utility invoice. Should you receive a notice of a proposed increase that will affect your billing, contact the Huntsville Center at the POC information below.

If intervention action is warranted, Huntsville Center will provide necessary counsel and expert witness support to protect the Army's consumer interest. Expert witness support and testimony is highly technical and can focus on topics ranging from traditional revenue requirements, rate design, industry restructuring, or return of investment and cost of service.

On average, a rate case will take about six to nine months for a final ➤

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cycles, widespread melting of ice and snow affecting surface water runoff and the requirement for greater amounts of water due to temperature rise.

The Army's greatest water challenge is that the supply and demand act across multiple scales. Watersheds and aquifers cross political boundaries and require federal, state and local agencies to work cooperatively in addressing water issues. Army installations represent just a fraction of regional water demand, yet the negative impacts of water scarcity and degradation will be borne equally by all users.

Nearly 100 of the 411 installations included in a national screening — 23 percent — lie within watersheds that are highly vulnerable to water crisis situations. The time to address this nonsubstitutable resource is now before the impacts accelerate.

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IMCOM program develops energy efficiency projects for garrisons

by Ralph Totorica

Army garrisons can obtain the assistance of a team of energy experts to identify and implement energy efficiency projects through the Installation Management Command Energy Engineering and Analysis Program.

Headquarters, IMCOM, initiated EEAP to assist garrisons in achieving energy reduction goals mandated in the Energy Policy Act of 2005 and Executive Order 13423. The goals require IMCOM to reduce energy consumption per square foot 30 percent by fiscal year 2015 compared to the FY 2003 baseline year.

IMCOM is currently not on the glide path to meet the 30 percent reduction goal. Part of IMCOM's strategy to get on track is to execute many of the energy efficiency projects identified by EEAP assessments.

When a garrison commits to using EEAP, an assessment team visits the installation. The EEAP team includes the U.S. Army Engineering and Support Center, Huntsville, the Construction Engineering Research Laboratory, the Department of Energy's Pacific Northwest National Laboratory, contractors and the garrison staff.

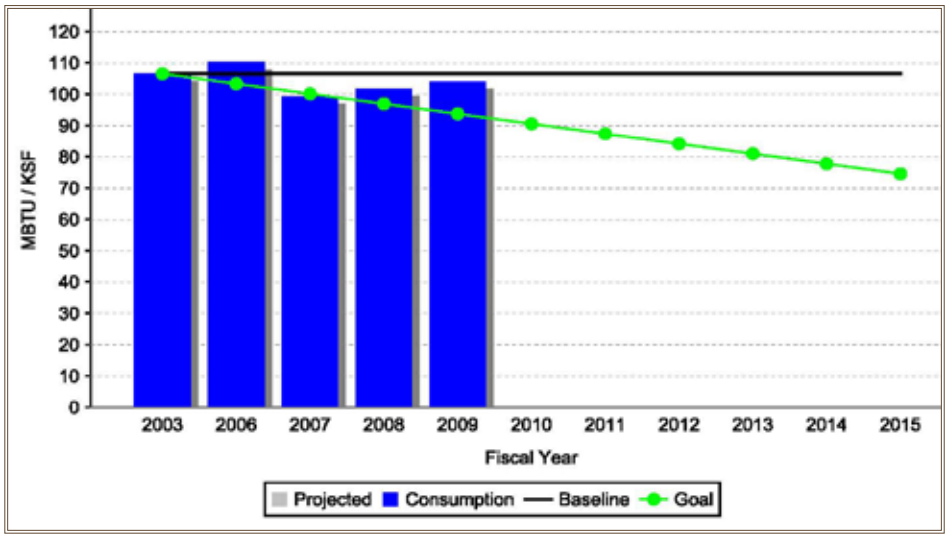
The team surveys buildings to observe operations and to identify energy savings opportunities. The assessment team identifies large, capital-intensive energy-savings projects and works with the garrison to build a capital investment strategy for developing and executing the projects.

The energy efficiency projects require capital investment, but the investment costs are normally recouped over a few years through reduced energy consumption and associated utility cost savings. There is a pay-back period associated with each project, typically fewer than 10 years. After that, the measures continue to produce savings through reduced energy and water costs.

There are various funding options available for executing energy efficiency projects. The first is for garrisons to fund the projects within their Sustainment, ➤

Acronyms and Abbreviations	
EEAP	Energy Engineering Analysis Program
FY	fiscal year
IMCOM	Installation Management Command
MBtu	million British thermal units
SRM	Sustainment, Restoration and Modernization

IMCOM Energy Reduction Performance



EEAP Surveys Completed	
Year	**Garrison**
FY 2006	Rock Island Arsenal, Ill. Fort Polk, La.
FY 2007	Fort Belvoir, Va. Aberdeen Proving Ground, Md. Fort Bliss, Texas Fort Drum, N.Y. Fort Rucker, Ala. Fort Lewis/McChord/Yakima, Wash. West Point Military Academy, N.Y.
FY 2008	Fort Bragg, N.C. Fort Carson, Colo. Fort Benning, Ga. Fort Sill, Okla. US Army Garrison Hawaii Fort Huachuca, Ariz. Fort Hood, Texas
FY 2009	Fort Hamilton, N.Y. Fort Campbell, Ky. Dugway Proving Ground, Utah Fort Riley, Kan. Natick Soldier Systems Center, Mass. Redstone Arsenal, Ala. Fort Leavenworth, Kan. White Sands Missile Range, N.M
FY 2010	Fort Greely, Alaska Fort Waignwright, Alaska Presidio of Monterey, Calif. Yuma Proving Ground, Ariz. Fort Leonard Wood, Mo. Fort Jackson, S.C. Fort Myer, Va./McNair, D.C. (planned) Fort Mead, Md. (planned)

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ruling. However, the time it takes hinges on the commission's prescribed procedural schedule, the complexity of the rate design factors and the cost of service allocations.

Take advantage of the expertise at Huntsville Center. Let us know when you receive a notice of a planned rate increase. You play a vital part in helping the Army control escalating utility costs and ensuring it continues to receive fair and reasonable utility rates.

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Karl Thompson is the assistant deputy Army power procurement officer, U.S. Army Corps of Engineers.

Contracts will offer fast, easy ways to improve energy efficiency

by Robert Mackey

Installation energy managers Armywide are looking for ways to improve energy efficiency as they strive to meet mandated energy goals. The U.S. Army Engineering and Support Center, Huntsville's Energy Conservation Investment Program is developing the tools and has the expertise to help U.S. Army Corps of Engineers districts and Department of Defense installations worldwide in this endeavor.

ECIP is a Military Construction-funded program designed to improve energy efficiency at DoD facilities while reducing utility energy- and nonenergy-related costs. The program is a key component of DoD's energy management strategy. ECIP projects focus on energy and water savings, implementing renewable energy and converting systems to cleaner energy sources.

The Huntsville Center supports local Corps districts, as well as the Installation Management Command and other DoD agencies to meet this mission. Because Huntsville Center is not restricted by geography, it can provide single-source convenience and rapid acquisition for both renewable- and nonrenewable-funded energy projects.

The Huntsville Center provides this

Robert Mackey
Photo by James Campbell

capability through a five-year, $250 million, design-build, multiple award task order contract. This capability is in the request-for-proposals stage and will come online in early 2011. These contracts are structured to provide ECIP contract acquisition and project management support DoD-wide. The main objective is to provide appropriate, turnkey solutions for clients who need them.

Another contracting tool that will support the more detailed designs required in complex energy savings projects is an energy architect and engineering MATOC that also will be online and available to assist clients in early 2011.

These design-build contracts will allow DoD clients the opportunity to meet Energy Policy Act of 2005; Executive Order 13423, *Strengthening Federal Environmental Energy and Transportation Management*; and the Energy Independence and Security act of 2007 mandates. These acts require a 3 percent federal energy reduction with a target of 30 percent reduction by 2015. ECIP projects along with other energy savings improvements assist clients with meeting these goals.

The contracts will allow Huntsville Center to assist customers with meeting their energy requirements by using industry leading contractors. It is anticipated that due to the overwhelming response in the initial survey of interest, the five-year capacity for both contracts will be depleted in fewer than five years.

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Acronyms and Abbreviations	
ECIP	Energy Conservation and Investment Program
DoD	Department of Defense
MATOC	multiple award task order contract

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Restoration and Modernization funding allocation. Projects with payback of fewer than 10 years should receive high priority for funding in the installation's SRM budget.

Other options include submitting projects to compete for Energy Conservation Investment Program funding or pursuing alternative financing mechanisms such as Energy Savings Performance Contracts and Utility Energy Services Contracts.

Finally, projects that cannot be funded through one of these mechanisms should be identified and entered into the Project Prioritization System for Headquarters, IMCOM, funding consideration.

The energy assessments could mean big savings in energy costs and consumption if the garrisons put the recommendations into place. The time and resources invested in these assessments by the eight garrisons that took advantage of the opportunity in FY 2009 were rewarded by the identification of projects with an aggregate annual energy savings potential of 2,100,338 million British thermal units and annual cost savings potential of $19.8 million.

Since FY 2006, 32 IMCOM garrisons have used EEAP to identify projects with an aggregate annual energy savings potential of 6,206,493 MBtu and annual cost savings potential of $124.4 million.

To have an EEAP assessment performed at your installation, contact the author at the POC information below.

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Energy and process assessment training on free CD

by Dahtzen Chu

Information that can help Directorates of Public Works perform energy and process assessments is available at no cost. The U.S. Army Engineer Research and Development Center's Construction Engineering Research Laboratory offers a CD with presentations from two workshops to augment a new international protocol for identifying energy waste in buildings.

The assessment identifies opportunities to reduce the energy input into the building, process or system without negatively affecting the output, or in the case of an occupied building, impairing human comfort, health, safety or productivity. Once energy conservation options are identified, they can be prioritized based on their projected return on investment.

CERL has been working with the International Energy Agency Energy Conservation in Buildings and Community Systems Programme's *Annex 46: Holistic Assessment Tool-kit on Energy Efficient Retrofit Measures for Government Buildings*. As part of this effort, international experts from government, educational institutions and the private sector developed an energy and process assessment protocol that provides guidance for energy assessments and audits. The protocol addresses both the technical and nontechnical organizational capabilities required for successful assessments.

The protocol is available for purchase from the American Society of Heating, Refrigerating and Air-conditioning Engineers. The free CD complements the protocol with real-world examples of energy assessment practices.

The CD contains 38 presentations given at a September 2007 workshop at the U.S. Military Academy, West Point, N.Y., and a September 2009 workshop at Fort Lee, Va. The sessions on energy assessment methodologies, indoor air quality, comfort and sustainability, energy systems and potential energy conservation measures were developed and presented by technology subject matter experts from the United States, Canada, Finland and Germany.

To receive a copy of the CD, contact Dahtzen Chu, 217-373-6784, dahtzen.chu@usace.army.mil.

Acronyms and Abbreviations	
CERL	Construction Engineering Research Laboratory
ERDC	Engineer Research and Development Center

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5 contracts awarded for services to medical facilities

The U.S. Army Engineering and Support Center, Huntsville, awarded five contracts with a $409 million shared programmatic capacity to five companies June 29. The contracts will provide initial outfitting and transition services for Army medical facilities worldwide.

The contracts were awarded to: Military Healthcare Outfitting and Transition, Los Angeles; Lockheed Martin Corporation, Gaithersburg, Md.; IAP Worldwide Services Inc., Cape Canaveral, Fla.; General Dynamics Information Technology, Fairfax, Va.; and BTF Solutions, Dallas. The performance period for these multiple-award task order, indefinite-delivery, indefinite-quantity service contracts is a base period of one year and three one-year option periods, for a total of four years.

These contracts provide the U.S. Army Medical Department with a pool of contractors that will provide total troop-ready project support for planning, outfitting and transitioning the staff and patients associated with the fiscal years 2010-15 healthcare construction projects. Services include:

- comprehensive project management for all contracted services;
- furniture, fixtures and equipment interior design;
- planning, specification, procurement, tracking, shipping, warehousing, installation, inspection and associated services of medical, research, nonmedical equipment and furnishings;
- design, specification, procurement, installation, inspection and associated services of any identified information management, physical security and specialty telecom equipment;
- transition and relocation planning and services;
- provision of temporary and long-term warehousing, including receiving, inventorying, storing and all associated transportation as necessary for existing and new furnishings;
- installation, assembly, technical inspection and training for equipment and systems; and
- final turnover and close-out services and post-occupancy evaluations for identified construction projects.

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From a Huntsville Center news release.

Picatinny Arsenal saves energy, water holistically

by Nick Stecky

By modifying an existing energy conservation contract, Picatinny Arsenal, N.J., gained additional energy and water improvements and savings. The results were exceptional and won the installation a *Secretary of Army Energy and Water Management Award* and a *Federal Energy Management Program Award* for 2010.

Picatinny established an Energy and Water Team consisting of operations and maintenance personnel; the resource energy manager; the Energy Savings Performance contractor, Chevron Energy Services; and the on-site, government-owned, contractor-operated potable water plant operator, Veolia Water. The team's mission was to develop a holistic, comprehensive plan to address energy, water, safety and environmental concerns.

The goals were to:

- optimize energy efficiency and reduce energy costs by eliminating wasted energy and installing more efficient equipment and heat recovery systems;
- reduce energy costs by replacing higher cost oil and propane use with lower cost natural gas;
- integrate fuel switching to save money, reduce the environmental risks and reporting requirements associated with oil storage tanks and reduce use of petroleum-based fuels;
- conserve and protect potable water by rebuilding the service water, a nonpotable water system, to improve its distribution and quality so that it would replace potable water use in industrial, nonpotable water applications
- improve energy performance, use heat recovery, reduce water consumption, replace potable water with service water, reduce water treatment chemical use and reduce sewage wastewater discharge flows at a 1,500-horsepower and a 500-horsepower boiler plant; and
- increase energy efficiency, occupant comfort and productivity by improving heating, ventilation and air conditioning with new equipment and additional building controls systems.

Picatinny Arsenal chose to modify an existing energy conservation project contract rather than create a new ESPC project. This approach saved two years in delivery time and achieved savings two years earlier. The modification increased the guaranteed savings by $1,020,000 per year and installed an additional $10,069,338 in energy-related capital improvements.

These projects were completed in fiscal years 2008 and 2009:

- converted two buildings from oil and propane to natural gas;
- installed new boilers in 1,400 enclosure and eliminate steam distribution lines, which eliminated about 5,000 feet of steam line with associated losses;
- rebuilt service water pump station, installing high-efficiency pump motors with variable speed drives and high-efficiency filtration for sediment control;
- expanded a postwide energy management system to include heating and air conditioning controls for 13 buildings;
- upgraded steam system by installing boiler stack economizers and boiler wastewater, called "blowdown," heat recovery units at the two boiler plants; and
- installed a filtration system and converted the two boiler plants from potable water use to service water.

Although the individual energy and water saving measures stand alone as good projects, it is the holistic integration of some measures that magnifies the effect. This is especially true of the steam plant upgrades.

These steam plants serve space-heating and process related loads. Space-heating demand is limited to the winter season, but the process loads are year around. This plant uses 100 percent makeup water as it has no condensate return due to process uses and long distances to the loads. Condensate returns were analyzed and found to be a poor payback.

Acronyms and Abbreviations	
ESPC	Energy Savings Performance Contract
gpd	gallons per day

Operational issues included very hard potable water, frequent backwashes of the boiler water softener system, the need for quenching boiler blowdown, scaling of sewage piping due to high water hardness and lack of adequate service water. In addition, the on-site potable water plant was operating near its maximum output of 1 million gallons per day, and a capital expansion was being considered. The boiler plant used an average of 200,000 gpd of potable water.

The Water and Energy Team developed a strategy to replace the hard potable water uses with much softer service water and an energy-savings plan using heat recovery techniques. When the service water plant was upgraded, soft service water ➤

The recovery devices, the cubic blue boxes on top of each boiler stack, preheat water before sending it into the boiler as feedwater. Photo by Nick Stecky

At Fort Polk: How to renovate 35-year-old barracks to meet energy requirements

by Gilbert J. Valla

In continuing support of the U.S Army at Fort Polk, La., the U.S. Army Corps of Engineers' Fort Worth District and Walton Industries are renovating 16 Voluntary Army-era barracks and four central energy plants. The VOLAR barracks were built about 35 years ago and were in great need of renovation to eliminate mold and mildew, improve energy efficiency to exceed Energy Policy Act of 2005 requirements and improve the quality of life for Soldiers.

To meet the 30 percent reduction in energy requirement, the buildings' exteriors are being renovated down to the concrete masonry unit blocks, and an external insulation finish wall system with drainage plane is being installed. The wall system includes a sheathing surface that has an air and vapor barrier, a rigid insulation system that includes the drainage membrane and a base coat with reinforced mesh and outside finish. This system improves the wall thermal insulation performance and provides a drainage plane to remove water and vapor that, with previous designs, might get trapped in the wall and cause mold and mildew.

The building will be slightly pressurized and nearly air tight to prevent humid air from entering the building and to reduce the energy costs to heat and cool. In this design, the air barrier envelops the entire building including the walls, ceiling and floors. The stairs and atrium areas are being enclosed, and the buildings are being tested to meet specific ASTM air leakage requirements.

The chilled water and heating water systems are of the highest efficiency and include variable frequency drives to vary the load demand.

The design was also required to improve the living environment and to maintain a comfortable temperature with very low humidity. This improvement is met by dedicated outside air units that precondition and temper the outside air before it enters the buildings. At no point will untreated humid air be allowed to enter the buildings.

This project is also required to meet Leadership in Energy and Environmental Design Silver certification.

The VOLAR barracks can be found at many installations throughout the country. Similar barracks and central energy plants are being renovated at Fort Hood, Texas.

By making the buildings airtight, controlling the condition of the air entering the buildings, improving the thermal insulation levels, improving the architecture and equipment, the barracks will exceed the 30 percent energy reduction requirements. The improvements will also create a more pleasant living environment for the Soldiers, which, beside energy reduction is the most important goal.

Engineers check the installation of the exterior insulation finish system. Photo by G. Valla

Acronyms and Abbreviations	
VOLAR	Voluntary Army (barracks)

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displaced the hard potable water. This change also reduced the work load on the water softening system, the backwashes and treatment chemicals use.

A boiler blowdown heat recovery system was installed to preheat the makeup water before sending the wastewater to the sewer. This process also reduces the blowdown's high temperature, which means it no longer needs the hard potable water, previously used as quench water, that fouled the sewer piping with scale. Quench water has just about been eliminated, and sewer piping scaling has been eliminated.

Only 60,000 gpd of service water are now needed as opposed to the previous requirement of 200,000 gpd of potable water. In addition, the boiler stack economizers that preheat the boiler makeup water save energy and reduce boiler exhaust stack temperatures.

This holistic approach reduces energy consumption green house gases, potable water use and chemical treatment use. It also saves money, avoids potable water plant expansion, preserves the long-term sustainability of the potable water well aquifer and reduces the sewage flow rate by 140,000 gpd.

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Nick Stecky is a resource efficiency manager, Picatinny Arsenal.

Fort Benning installs chemical-free cooling tower water treatment

by David L. Miller, Kirk Ticknor and John Wilson

The Directorate of Public Works at Fort Benning, Ga., installed a chemical-free water treatment device on the Sand Hill Post Exchange cooling tower that protects the tower and treats the water for reuse. Shaw Infrastructure, DuBois Chemical and Dolphin Water Care worked with the Fort Benning DPW to install the device, which became operational July 7, 2009.

The treatment device uses magnetic pulse technology to precipitate calcium carbonate from the water before it can form an insulating scale on the cooling tower and heat transfer surfaces. The precipitated calcium forms as a solid powder after the water is exposed to the treatment device. This powder is subsequently discharged in the blow-down water, filtered or settled out in the cooling tower basin.

An important additional benefit is that bacteria present in the cooling water are damaged by the electrical pulse and encapsulated in the calcium carbonate precipitate preventing the formation of microbial slime on the cooling tower surfaces. Because the water treatment is chemical free, the blow-down water can be reused for any purpose, making the entire process environmentally friendly.

Electrical field-influenced water treatment systems, such as magnetic pulse technology, had been previously tested by the U.S. Army Corps of Engineers, but the systems examined 10 years ago were examples of an emerging technology and were determined to be ineffective. The Dolphin magnetic pulse water treatment system has not been tested by the Army. The current installation at Fort Benning represents the latest generation of a now maturing technology.

The "pulsed power" cooling tower water treatment uses an induction coil to subject water flowing through a pipe inside the induction coil to alternating low (60 hertz) and high (10 to 100 kilohertz) magnetic fields. The magnetic fields modify the surface charge on naturally occurring particulate matter, permitting these particulates to serve as nucleation sites for dissolved calcium and carbonate ions. This initial formation of calcium carbonate on the original particle then favors the growth of calcium carbonate as a powder in the water proper, rather than calcium carbonate crystal growth as corrosive scale on equipment surfaces.

The process is conductivity controlled, where the conductivity set-point is slightly above scale saturation as determined by the Puckorius Scaling Index. Operating the system at higher conductivities, and hence higher cycles of concentration, causes the calcium carbonate powder to form where it can be removed by side stream filtration or allowed to settle out in low velocity areas to be physically removed periodically.

Because calcium carbonate is being precipitated, the cycles of concentration cannot be determined by calcium hardness, alkalinity or conductivity measurement but rather calculated using the chloride concentration in the process water divided by the chloride concentration in the feed water.

The control of bacterial growth in a pulsed power water treatment system is accomplished by two mechanisms — encapsulation and electroporation. Bacteria that attach to the calcium carbonate powder are entombed as the particle continues to grow around the original nucleation site. High strength electromagnetic fields are known to rupture cell membranes causing bacterial death. Low strength fields such as found in this system influence the charge on the bacterial cell wall, changing its permeability to small ions such as sodium and potassium. These permeation changes disrupt cellular respiration and reproduction leading to sublethal cell injury that ultimately limits the bacterial population.

Acronyms and Abbreviations	
DPW	Directorate of Public Works
PX	post exchange

Fort Benning is using a chemical-free water treatment device at the Sand Hill PX. Photo by David Jenkins

The system's efficacy is monitored by visual inspection, water tests and microbial plate count. Longer term studies have been well documented, and the Sand Hill PX system and another at the North Island Naval Air Station, San Diego, were not conceived to be extensive studies of this technology. There is a possible Dolphin installation at Scott Air Force Base, Ill., in the planning stages, envisioned as a long-term cooperative study involving DuBois Chemical, the Corps of Engineers and the University of Illinois, Champaign-Urbana.

To date, the Sand Hill PX cooling tower has shown no buildup of scale, no biofilm producing bacterial growth and low bacterial plate counts.

The discharge water from the system is used to irrigate new plantings near the PX. Previous plantings of holly became overgrown and were removed to ➤

Germersheim Army Depot's Energy Pass audits step up to sustainability

by Amanda R. Wilding

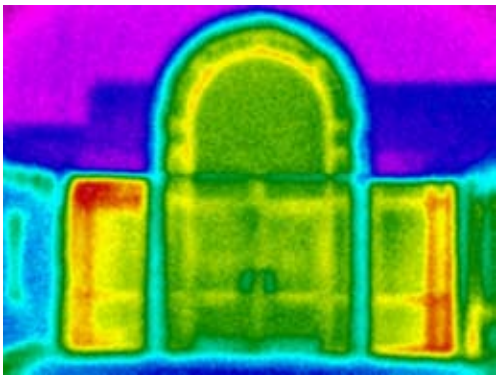
During the past months, the U.S. Army Garrison Baden-Württemberg, Germany, has conducted Energy Pass audits of several buildings on the Germersheim Army Depot. The Energy Pass, or *Energieausweis*, is an evaluation of the energy efficiency of new and existing buildings, which is a requirement of European Union and German laws. As a U.S. Army installation, Germersheim must also make continual improvement in environmental stewardship and sustainability as an integral part of the *Army Strategy for the Environment*.

By evaluating the energy intensity used by buildings, the USAG Baden-Württemberg Directorate of Public Works, Environmental Division, increases knowledge and awareness on how day-to-day building operations affect the environment. The Energy Pass audit begins with on-site evaluations of the existing structures and reviews of building plans.

The audits at Germersheim were completed on a representative basis. Typical examples of warehouses, administrative buildings and motor pools were selected and evaluated to characterize the structures on post.

During site visits, the buildings' structural components such as walls, roofs, windows and doors were evaluated. The type and thickness of a building's insulation is critical to the building's energy efficiency.

Acronyms and Abbreviations	
DPW	Directorate of Public Works
USAG	U.S. Army Garrison



Thermal imaging demonstrates heat loss from a Germersheim structure. Thermal image by Rafael Konarski and photo by Anja Emmenecker

A thermographic camera was used to look for areas of heat loss.

The primary energy demand was calculated using information gathered on the structure. After this analysis, an "energy label" of Red, Amber or Green was assigned to the building on a sliding scale.

The energy label serves as an illustration of the cradle-to-grave energy consumption of a structure. For example, a building with less insulation and older single-paned windows that uses fossil fuels like oil for heating would receive a lower or Red label. A well-insulated building that uses a renewable heating source, like a biomass plant that uses locally grown and harvested wood chips, would have a Green label.

By evaluating structural components, building material, types and sources of fuels and materials, the energy label estimates how much carbon dioxide and greenhouse gases are produced by a structure. In addition to providing information on a building's current energy efficiency, the Energy Pass provides recommendations to optimize buildings that have Amber and Red ratings. Understanding day-to-day operations of facilities increases awareness and provide a clearer vision for increasing sustainability.

Germersheim Army Depot is an enduring installation that is undergoing many changes. A new logistics center is being developed, and renewable heating sources have been incorporated into its design. In addition to sustainable heating sources, photovoltaic systems are being included during the planning phases of new facilities.

The Energy Pass audits completed at Germersheim provide a road map to how and where energy efficiencies and sustainability can be incorporated during renovation and new construction for a more sustainable future and increased mission readiness.

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prevent leaf litter from obstructing the building's make-up air fans. An irrigated planting area will permit the placement of small, compact plants that are more in keeping with the surrounding landscape and will not block air intakes.

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Kirk Ticknor, P.E., and John Wilson, P.E., are with DPW, Fort Benning; David L. Miller is with Shaw Environmental and Infrastructure.

Camp Zama uses innovation to halt water seepage at historic bunker

by Orange Marshall

A novel adaption of an existing technology — electro-osmotic pulse — will be used to stop groundwater from intruding into a bunker at Camp Zama, Japan, that was built to protect Emperor Hirohito during World War II. The U.S. Army Engineer Research and Development Center is installing EOP dewatering wells around the bunker as part of the Department of Defense Corrosion Prevention and Control Program.

During the war, Camp Zama was a Japanese army officer training base. When the war turned in favor of the Allied Forces and Japan came within range of its enemy's bombs, an air raid bunker was constructed at Camp Zama for Hirohito, his staff and family.

The bunker consists of three small rooms with a concrete passageway at each end for entry and exit. It is a concrete structure buried into a hillside with an overhead cover of soil.

Hirohito never used it, but the bunker remains today as a Japanese national monument and is open to visitors. However, before any guests can go inside, the Camp Zama Directorate of Public Works, which is responsible for its upkeep, has to pump out up to an inch of standing water.

The hydraulic gradient in the surrounding soil causes moisture to seep through the bunker's concrete walls, ceilings and floors resulting in constant standing water in the rooms. This water infiltration causes an unpleasant environment with foul odors, is corroding metal components and will eventually result in structural damage.

The DPW has long sought to stop water from intruding into the bunker, but because it is both a historic structure and a national monument, nothing can be done that permanently affects the appearance of the rooms or passageways. Standard dewatering wells were one possible remedy as they are effective in removing excess water from saturated soils. However, they are not effective at removing water from soil that doesn't reach saturation — the moisture held in the inter-granular region and pores in the soil.

Acronyms and Abbreviations	
CERL	Construction Engineering Research Laboratory
DPW	Directorate of Public Works
EOP	electro-osmotic pulse
ERDC	Engineer Research and Development Center

This entrance leads to a three-room bunker at Camp Zama constructed during World War II as a shelter for Emperor Hirohito in the event of a bombing attack. Photo courtesy of ERDC-CERL

ERDC's Construction Engineering Research Laboratory and Geotechnical and Structures Laboratory patented a design that incorporates EOP technology with dewatering wells to dry soils. This external retrofit holds promise as a solution to the moisture seepage in the Hirohito air raid shelter.

EOP is based on the principle of electro-osmosis — the movement of a liquid through a porous medium under the influence of an external electric field. CERL has optimized pulsed electro-osmosis technology for control of water intrusion within concrete and masonry structures and holds numerous patents related to the technology.

EOP uses two sets of electrodes. One set is embedded just below the surface of the concrete walls or floors; the other is placed either in the surrounding soil or, if the concrete wall is thick, deep within the wall. A pulsing direct current voltage applied between the electrodes produces an electric field in the concrete, which moves water from the dry side — the interior— toward the wet side — the exterior, preventing moisture from reaching the inner surfaces of the concrete. A typical EOP system uses about the same amount of electricity as a 40-watt light bulb.

By introducing EOP into dewatering wells, the soil can be quickly dried to levels well below the saturation and maintained at that drier level. The EOP electrodes draw the water into the well casing where it will be pumped out to a nearby storm drain. Between the EOP wells will be a monitoring well that will be used to check the ground water depth.

Temperature and humidity sensors will be placed inside the bunker to record interior moisture reduction. Time-of-wetness sensors will also be placed on the floor of the passageway just outside the entry room door to record moisture reduction. By installing the EOP wells outside the bunker, no alterations to the structure will be necessary, which preserves its historic value.

The EOP-dewatering well technology has many other applications, such as drying basements, tunnels and other underground structures to eliminate corrosion of equipment and reinforcing steel; stopping mold and mildew growth while improving air quality; and regulating soil moisture content around structures with expansive soils to stop concrete cracking or curling due to soil expansion and contraction.

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Wheeler Army Airfield debuts technology that gives electrical grid strength, brains, flexibility

by John Wray

In efforts to provide a clean source of green power and monitor and control nearly any source of electrical power or load within an existing electrical grid, the Directorate of Public Works, U.S. Army Garrison Hawaii, is demonstrating a new type of micro-grid at Wheeler Army Airfield, Hawaii, that will help make the installation energy independent.

Currently, all Department of Defense installations use a host grid with backup generators. A new smart-charging micro-grid will connect these generators and other diverse power sources to the grid with complete monitoring and control.

The SCMG can take in any source of power, including AC, DC, solar, wind, vehicles and backup generators. Employing smart software, it uses the most efficient, clean and effective sources to stabilize and maintain computer-grade power quality. Power from the SCMG can work together with an existing electrical grid or independently of a grid.

The DPW energy manager, Keith Yamanaka, developed the host site and is providing project construction coordination. The demo system was created by the U.S. Army Tank Automotive Research, Development and Engineering Center. Working with industry, TARDEC is currently installing this important demonstration project.

"For years, TARDEC has been advancing micro-grid power, and we saw an opportunity to make it mobile by using hybrid trucks that export power," said Paul Makar, project manager at TARDEC's National Automotive Center. This can benefit our Soldiers immediately.

"We also saw an opportunity to incorporate renewable energy sources, including wind and solar power into the package," Makar continued. "Micro-grids, used in this fashion will give us independence from the utility grid, avoid brown outs and reduce our need for coal and oil."

An electronic power control and conditioning module, potentially a vital part of a micro-grid, takes a variety of electrical inputs from sources as diverse as unsteady grids in foreign nations, generators and renewable energy resources, and combines this mix of spotty, inconsistent power sources into a single smooth flow of computer-grade electrical power." Photo courtesy of U.S. Army

Dependence on fossil fuels as an energy source compromises national and tactical energy security, Makar said. Hawaii's goals for energy independence make Wheeler Army Airfield a perfect demonstration site.

Sen. Daniel Inouye of Hawaii sponsored a Congressional Add Program, the Alternative Energy Resource, in fiscal year 2009, he explained. Shortly after, TARDEC began developing technology that would help Hawaii remove itself from the oil standard.

The TARDEC SCMG-distributed power management system comprises a 25-kilowatt solar power array, 200 kilowatt hours of battery storage and four plug-in electric vehicles with a charging station.

The project supports the tri-service Hawaii Advanced Vehicle Working Group and the U.S. Pacific Command's Energy Partnership and Strategy Council, which was organized to coordinate support to DoD and state of Hawaii energy initiatives.

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John Wray is a media relations manager, TARDEC, Warren, Mich.

Acronyms and Abbreviations	
DoD	Department of Defense
DPW	Directorate of Public Works
SCMG	smart-charging micro grid
TARDEC	U.S. Army Tank Automotive Research, Development and Engineering Center

Look us up on the WEB

http://www.imcom.army.mil/sites/pw/digest.asp

Fort Riley combines data sources into 1 common operating picture

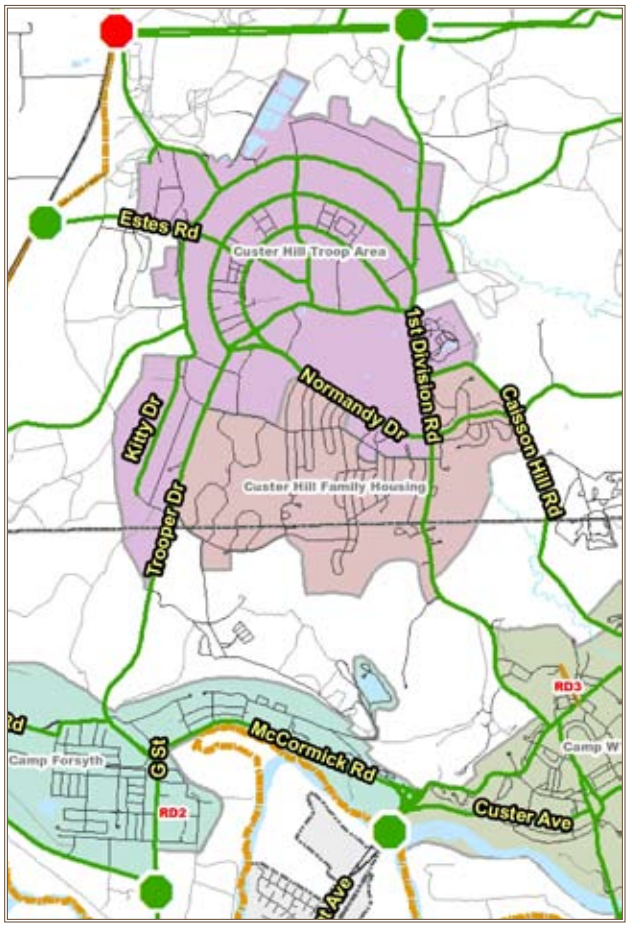
by Joe Gritton

The U.S. Army Garrison Fort Riley, Kan., lacked a method to track multiple data sources in a single system during crisis situations. Many excellent systems tracked very meaningful data, but these stand-alone systems made it difficult to combine data into a single view to aid in important decision making.

The Fort Riley Public Works Geographic Information Systems Office was tasked to develop a common operating picture that would integrate data from a variety of sources into a single view that could be used by the Crisis Management Team during natural disasters, terrorist attacks or other emergencies. The constraints were to use existing software and as much existing data and systems as possible to avoid additional data management tasks.

The GIS team created an intranet web-mapping application that pulls together many different installation datasets into a single viewer. The COP's basic architecture consists of a series of desktop applications that feed a single web-mapping application.

The desktop applications were developed in Microsoft Access and contain "front ends" where data is entered and then updated in "back-end" databases. These back-end databases feed data to the web application, where it is combined with data layers pulled from the installation's geodatabase.



The Fort Riley cantonment area COP, a portion of which is shown here, gives the Crisis Management Team current information during an emergency. Graphic courtesy of Joe Gritton

Use of the desktop applications is restricted to the particular organization that is responsible for managing the data. The web application is accessible from any common access card-enabled workstation on the installation through a web browser such as Internet Explorer.

The COP development started with an ArcGIS Server out-of-the-box web application that included basic GIS tools such as zoom-in, zoom-out, measure and pan. A standard table of contents allows for the display of individual data layers to be turned on and off as desired. Custom tools such as find, zoom-to-building and print were added. Finally, custom coding was added to provide the required web application functionality.

Phase I: Roads – The GIS Office is using a phased approach to develop Fort Riley's COP. Phase I was primarily focused on the Road Status Module, which provided a system for the Fort Riley Operations Center to manage and view road conditions on the installation. Major road features were broken down into segments as identified by the Operations Center.

Acronyms and Abbreviations	
COP	common operating picture
GIS	geographic information system

The front-end desktop application allows the center to change the conditions to Green, Amber, Red or Closed, and add comments for each road segment. These changes and comments are then reflected in the web-mapping application. This module provides the Operations Center with a tool to maintain an up-to-the-minute map displaying road limitations and closures due to weather, accidents or infrastructure failures.

Phase I also included a Gate Status Module, which displays the status of the installation's access control points. The status of each gate is automatically displayed based upon its preset hours of operation but can be overridden as needed by the Operations Center through a desktop application similar to the one used for road conditions.

Transaction logging tables created in this phase are populated with metadata about which features were updated, when they were updated and who updated them. Phase I was put into production Dec. 4, 2009.

Phase II: Airfield – Phase II brought the Airfield Status Module, which provided airfield personnel the ability to manage predefined airfield runway, ramp, apron and other segment conditions labeled as Green, Amber, Red or Closed. Comments can be added through a front end similar to the Road Status Module. Changes to airfield conditions and comments are reflected in the same web-mapping application as the roads and the gates. ➤

Pine Bluff Arsenal combines 2 projects for big energy savings

by Greg Yada

The U.S. Army Corps of Engineers, Little Rock District, is helping Arkansas' Pine Bluff Arsenal modernize its infrastructure. This modernization, funded through the American Reinvestment and Recovery Act, includes the demolition of an above-ground steam distribution system commissioned during World War II and is projected to produce millions in energy savings.

Three centralized boiler houses distribute steam to more than 70 buildings scattered throughout the arsenal providing comfort, humidity control and energy for ammunition-making processes. A contract was awarded in May to demolish the steam lines and upgrade and install infrastructure that will complement an existing Energy Savings Performance Contract. The new infrastructure is estimated to generate more than $3 million per year in energy savings.

The Pine Bluff Arsenal ESPC is the third largest of its kind in energy savings and capital improvement in the federal government. The ESPC is a Department of Energy-sponsored contracting vehicle that allows agencies to accomplish energy projects for their facilities without upfront capital costs and without congressional appropriations to pay for the improvements. The arsenal will make annual payments from the guaranteed energy savings from the newly installed infrastructure.

Acronyms and Abbreviations	
ARRA	American Recovery and Reinvestment Act
ESPC	Energy Savings Performance Contract
HVAC	Heating, Ventilation and Air Conditioning

Miles of above-ground steam line at Pine Bluff Arsenal will be removed through an ARRA-funded infrastructure upgrade project. Photo by Ray Fish, Pine Bluff Arsenal

This ESPC project was awarded by Pine Bluff Arsenal in December to install modern and energy-efficient systems, such as geothermal; cold-water; decentralized steam generation; heat pumps; heating, ventilating and air-conditioning; and lighting.

Although the ESPC and the ARRA projects are both in the first year of their two-year contracts, the success of the steam line project has not come easily. The project overcame challenges in programming complex scope, schedule and construction phasing requirements. These requirements also affect the ESPC, the more than 70 active production buildings, the end-users and their important military mission.

To meet the challenge of getting ARRA funds to work quickly, the Corps concurrently developed the project's scope and schedule, and prepared the steam line contract's acquisition phase. The acquisition phase was also accelerated to meet time constraints on ARRA spending. High accuracy standards manage the risk posed by the potential that contingency funds would not be available.

Jacobs Engineering, hired by the Corps for the contract acquisition phase, and Pine Bluff Arsenal teamed to make the construction contract award a success. ➤

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Phase II was put into production April 1.

Phase III in development – Phase III is being developed but already provides users with the ability to draw and edit features on the web viewer itself that are then displayed to all COP users. This capability proved to be invaluable during the recent Installation Force Protection Exercise.

Incidents such as collapsed buildings, the path of a tornado and areas without power were drawn in and attributed on the fly as points, lines and polygons and were displayed on the COP for viewing by the entire Crisis Management Team. This ability for anyone on the team to create, edit, attribute and display features on the COP may be the most powerful and useful tool to date.

Phase III also includes a Directorate of Family Morale Welfare and Recreation application that displays the status of its facilities such as gyms, child development centers and recreation facilities. Regional geographical data such as county boundaries, road networks and imagery are also being added.

Future phases – Potential items for future phases of the Fort Riley COP include linking to the Range Facility Maintenance Support System data and displaying range statuses; modules for utility data, master planning, environmental and housing; links to the Integrated Facilities System and the General Fund Enterprise Business System; and moving to a web-based, front-end application architecture for data manipulation.

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Joe Gritton is the GIS manager, Fort Riley.

Fort Bliss on the way to achieving renewable energy goals

by Virginia Reza

Strategic investment in renewable energy and conservation has proven to be profitable after only two years of implementation at Fort Bliss, Texas. Due to aggressive measures the post is taking, Fort Bliss is producing more than 1.3 percent of its renewable energy needs and conserving 10 percent of its electricity use.

The mandated goal is to produce 7.5 percent renewable energy by 2015, though Col. Joseph Simonelli, Fort Bliss garrison commander, is hoping for 10 percent by 2013.

Fort Bliss spends $19 million annually on energy bills, an amount expected to increase to $95 million by 2025 if no action is taken. The ultimate goal is to produce all energy consumed through renewable energy by 2025.

"This is the beginning of a big range of an aggressive energy plan, which will save Fort Bliss at least $5 [million] to $10 million in energy bills yearly in spite of the growth," said Toufic Alhaj, Business Operation Integration and Energy Division chief.

Alhaj, who came to Fort Bliss from Germany three years ago, said most homes there have roof solar panels despite only about 140 days of sun a year, and every major city in Europe has a solid-waste-to-energy power plant. Alhaj was shocked to see few taking advantage of free energy in a town where the sun shines 330 days a year.

"This place is a gold mine for solar energy power," said Alhaj. "We need to stop depending on fossil fuel. It's killing us financially."

The strategic energy plan is to provide renewable energy 24 hours a day with a wide array of inputs from the sun, the wind and the earth. Not only will the strategy conserve electricity, but it will save taxpayer money, too. In the near future, it may also help deployed Soldiers, as extended-range electrical military vehicles are under assessment.

"Renewable energy is becoming a weapon of war," said Alhaj.

The post is investing $15 million in buildings retrofits, including solar panels, and $10 million in energy conservation. Two wind test towers have been put in place, and a geothermal exploration project at McGregor Range, N.M., was scheduled to begin in September.

Completed energy projects include a solar-thermal system at Replica Aquatic Center, solar day-lighting at eight different facilities, solar photovoltaic panels in three locations, insulation to meet Leadership in Energy and Environmental Design standards in various buildings, a utility monitoring and control system, and advanced metering and electrical lighting and controls at numerous Fort Bliss facilities.

"As the military led in the civil rights movement, I think it's going to lead the revolution on renewable energy to make it acceptable to the rest of the country," said Jon Lear, the Ruby Mountain Inc. representative who is responsible for the geothermal project. "When the military shows that [renewable energy] makes sense, and they do it in an organized and systemic way, which is exactly what is happening at Fort Bliss, everyone will recognize it does work. The technologies will have been worked out by the military that was willing to take the first step."

Solar Energy Association members observe solar energy panels at East Fort Bliss June 26. Photo by Virginia Reza

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The two projects will update the arsenal with efficient electrical power and natural gas consumption and higher mission capacity. More communication band width for HVAC controls and energy monitoring will also mean improved communications for fire protection and security systems. In addition, miles of unsightly, damaged, asbestos-insulated steam lines will be remediated and removed from sight — a major improvement to the quality and safety of the arsenal.

When completed, these projects will enhance productivity and quality of life at the only installation with its capabilities in the United States, supporting the arsenal's mission to further the security of the nation and its allies.

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Fort Huachuca tests energy, water conservation for Armywide use

by Lee Roberts

In 1877, when Fort Huachuca, Ariz., perched on the edge of the American frontier, its cavalrymen protected settlers and travel routes in Southeast Arizona. Today, the post's missions have changed, but the fort still focuses on caring for people and protecting the environment. Its Directorate of Public Works, along with the U.S. Army Corps of Engineers' Los Angeles District, is on the frontier of testing renewable technologies for Armywide application.

One of the more important test projects involves the potential use of wind turbines on Army installations to harvest and reduce power consumption.

The Los Angeles District is constructing a $2.8 million, one-megawatt, 330-foot-tall wind turbine on post that will initially be used to test the potential side effects its electrical pulses could have on radar and air operations. Fifteen tons of rebar and 122 yards of concrete were placed for the foundation, and the ground rods and ring were installed. The housing, nacelle and blades are expected to be erected this fall with operations beginning in November.

Once constructed, Nordic, the wind turbine manufacturer, will install its instrumentation for the wind study, and the Electric Power Group will assess the effects of the turbine's load and transmission during a two-year study.

Testing renewable energy technology like wind and solar is an important step in reaching federal energy reduction mandates, Sam Montanez, an energy engineer at the post, said. The results of the wind turbine test have far-reaching effects on similar projects at the post and elsewhere.

"It's clean energy. It's a very abundant energy resource here because we have wind all the time," Montanez said. "We want to see the effects this tower will have on everybody around us."

Another test is being conducted by the Directorate of Public Works in conjunction with the U.S. Army Corps of Engineers Construction Engineering Research Laboratory. The test involves comparing less expensive solar panel technology with more expensive double-wall evacuated solar tube technology, which features an internal core that absorbs more heat with fewer radiated losses.

Craig Hansen, acting energy coordinator at Fort Huachuca, holds a double-wall evacuated solar tube that absorbs more heat with less radiated losses. Photo by Lee Roberts

The test involves 240 solar tubes and six flat solar panels installed on the test facility roof. A heat recovery electric generator originally designed for geothermal applications is being tested for its potential to use stored heat energy and produce electricity, too.

The test will help determine if it's advantageous to spend the extra dollars to get the greater output of electricity with newer technologies, Craig Hansen, the fort's acting energy coordinator, said.

"Our net output, once we have all the bugs worked out, should be between 35 and 40 kilowatts an hour," Hansen said. "If it works like we're thinking it will work, then it is fully adaptable to large scale installation. And it will be adaptable to other forts, and it will also counteract one of the major fallbacks or problem areas with renewable energy."

Solar energy provides power when the sun is abundant, but none when it is not, Hansen pointed out.

"This [new process] actually has storage, so we get the heat," he said. "We can delay the processing of it and get the electricity when we need the electricity," he said.

The Los Angeles District's Fort Huachuca Resident Office has also been incorporating energy and water conservation technologies in a number of other building projects on post.

A $2.9 million headquarters building nearing completion for the 309th Military Intelligence Battalion features geothermal technology to reduce the cost of heating and cooling the building. To heat and cool the headquarters, 32 shafts or wells were bored 310 feet deep underneath the outdoor running track and exercise field. Water is pumped through the shafts and enters the exchanger at about 65 F. The exchanger either increases or decreases the temperature to regulate the desired temperature of the building.

The Corps just broke ground on a company operations building and a tactical equipment facility supporting Fort Huachuca's unmanned aerial vehicle training mission that includes roof surface rainwater harvesting systems for toilet flushing and on-site irrigation. Solar panels for heating potable water are also being mounted on the roofs of both buildings.

The strides being made at Fort Huachuca are important to the post and will impact the future use of renewable energy across the Army.

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Lee Roberts, formerly of Los Angeles District, is a public affairs specialist, Nashville District, U.S. Army Corps of Engineers.

Chislett replaces LaRocque as Army's Public Works chief

by Mary Beth Thompson

Gregg Chislett took over as chief, Public Works Division, Headquarters, Installation Management Command Aug. 16. Don LaRocque, the former chief, retired in July after 35 years of federal service.

In his first few weeks, while still new to Headquarters, IMCOM, Chislett hit the ground running on energy and the *Installation Management Campaign Plan*.

"It's very hectic, because of the campaign plan and the focus on that as it relates to energy and the energy line of effort," Chislett said. "Leadership is very focused on reducing energy consumption and on energy security, and it is important to get our arms around this effort."

Chislett came to Headquarters, IMCOM, from the U.S. Army Medical Command. He had served there as the executive director of facilities since August 2007. He was responsible for the life-cycle management of the Army's medical facilities and installations, and was also the command's sustainability coordinator.

Chief of Public Works is not Chislett's first position with IMCOM. Starting in July 2003, he was part of the team that established the Installation Management Agency's Southwest Region. The Installation Management Agency later became IMCOM, and the Southwest Region was restructured into the West Region. While at the region, he served as the Environmental Branch chief and the Public Works Division chief.

Chislett graduated with a bachelor's degree in architecture from the University of Miami in 1982. He earned a master's in civil engineering from the Georgia Institute of Technology, and he also graduated from the U.S. Army Command and General Staff College.

Acronyms and Abbreviations	
DPW	Directorate of Public Works
IMCOM	Installation Management Command
USACE	U.S. Army Corps of Engineers

Gregg Chislett
Photo by Mary Beth Thompson

He retired from the Army as a lieutenant colonel in 2003. As a Soldier, Chislett served as an engineer officer in Europe and the United States at company, battalion and major command levels. While in uniform, he also had assignments with the U.S. Army Corps of Engineers in the Wilmington and Fort Worth districts and as a director of Public Works in Heidelberg, Germany.

Chislett is now responsible for ensuring Army facilities and infrastructure meet all mission support requirements.

"The ultimate responsibility I have is to provide the resources for garrisons and garrison DPWs to support Soldiers, their families and the mission of the garrisons," he said.

To fulfill his new responsibilities, he can draw on all his old experiences. As a Soldier, he used Army facilities and helped construct and renovate them. As a civilian, he managed them and made them more sustainable. His work with IMCOM and its predecessor at the regional level gave him more of those experiences along with institutional and organizational knowledge.

During his first weeks, he was learning about the interdependent roles of IMCOM, the Office of the Assistant Chief of Staff for Installation Management and USACE.

"The biggest challenge is understanding the roles and responsibilities," he said. "I think it's an evolving thing within IMCOM, ACSIM [Office of the Assistant Chief of Staff for Installation Management], and the regions, the Corps of Engineers — and then trying to shape that so it supports the garrisons and the Army."

IMCOM is going through considerable change, and, as Chislett pointed out, roles are evolving. At the same time, the amount of work being done on installations and the speed at which everything is happening is remarkable, he said.

"The changes at IMCOM provide a lot of opportunities for the Public Works community," Chislett said. "Public Works within IMCOM garrisons is a very significant part of the operation of IMCOM. Trying to manage those facilities, improve them and coordinate the construction of them while we're changing is pretty amazing. But with the change is opportunity to shape it — whether at garrison level, up to the region and at headquarters — to make it better.

He was also getting to know the great staff, he said. He likes doing Public Works problem solving and interacting with people.

How does he intend to interact with the Army Public Works community? Communication is the key, he said. The stronger the communication, the better off and more successful the community will be.

"I'm here to support them," Chislett said. "I see that as my job, a very important part of it. I need to let them know that I intend to communicate with them and, hopefully, they'll communicate with me.

"And they will; they just haven't found my phone number yet," he added with a smile.

He also plans to visit garrisons to see what's happening there, what's being accomplished and the challenges DPWs face.

"I think it's important to see, and I intend to try to see as much as I can to better help them, as much as I have ➤

Ray heads business operations for IMCOM Public Works

by Mary Beth Thompson

Miriam Ray learned her strong work ethic and her concern for others growing up as the daughter of Cuban immigrants in Miami. Ray observed her parents and developed their strong principles.

"Work hard and be kind [is my philosophy]," she said. "I tell that to my kids, and it's worked for me over the years. I work hard at what I do, and treating others with kindness and respect works better than anything else.

"I saw it in my parents," Ray continued. "I don't know if they ever said it to me, but my dad worked incredibly hard. He was an immigrant, so he came with nothing. My mom was always volunteering and doing stuff for other people. They made a great life for themselves and for our family."

Ray attended the U.S. Military Academy at West Point, N.Y., until an injury forced her to transfer during her third year. She finished her college education at the University of Miami, earning a bachelor's degree in industrial engineering.

She interned with the Army in Heidelberg, Germany, and later moved to Fort Knox, Ky., and Fort Rucker, Ala., working in Directorates of Public Works. She transferred to the Center for Public Works, a former U.S. Army Corps of Engineers agency. When she returned to Germany, she worked for the Installation Management Command, Europe Region. Back in the states, she became chief of the Engineering Branch, Public Works Division, Headquarters, IMCOM. In her last position, she served as the IMCOM liaison to the Training and Doctrine Command.

Miriam Ray
Photo by Mary Beth Thompson

"I am also an Army wife, and that has really helped me in my career, because I moved around a lot," Ray said. "So, I got to experience the Army at all different levels and managed to stick with Public Works through it all.

"Army installation support and facilities management — that's what I love," she said.

Ray came back to IMCOM Public Works in January as the chief of the Business Operations and Integration Division. She oversees a staff of nine and the funds for a $4 billion program. DPWs depend on her and her team for Facilities Operations Support and for Sustainment, Restoration and Modernization programs funding, and for systems support.

"I am responsible for ensuring that the Public Works resources are programmed and allocated to our garrisons based on requirements," Ray said. "I manage those resources ruthlessly."

There are always a lot more requirements than funds, so all needs cannot be taken care of, she said. Sometimes, the response Ray has to give to a garrison is not the response that is wanted, even though she knows the need is genuine. Tough decisions have to be made every day.

"Operating under constrained resources is always a challenge," Ray said.

On the other side of the coin, many good things do get accomplished.

"To me, Public Works is the most fascinating business at a garrison," she said. "As the chief of Business Operations, I love that I get to touch every piece, every function of the Public Works business. I have many opportunities to help garrisons and fix things for the Army. Every day is rewarding. You can actually see that you made a difference, that you made that happen, that you moved something around and helped a garrison get that project done in time."

Over the next couple years, Ray's team will help deploy the General Fund Enterprise Business System. GFEBS is critical to DPWs, Ray said. It affects every aspect of DPW business.

At the time of the interview, Ray was working on a force restructuring initiative that will align manpower across DPWs to meet current needs at each location.

"Some requirements have grown, and their manpower hasn't grown, and some other requirements have shrunk, and their manpower hasn't," she said. "So we're trying to rebalance the force again ➤

Acronyms and Abbreviations	
DPW	Directorate of Public Works
GFEBS	General Fund Enterprise Business System
IMCOM	Installation Management Command

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the power to do within the budget," he said.

Chislett looks forward to the challenges of his new job even though, he admitted, it appeared a little overwhelming at the start. However, a good attitude makes a big difference.

"I wake every day, and I think it's the best day of my life and look forward to today," he said. "Life's short, and you should take every opportunity to make every day a great day.

"I look forward to working with everyone in the community and improving the Army's facilities and having fun doing it," Chislett said. "Wouldn't be here if we weren't having fun."

Mary Beth Thompson is the managing editor of the Public Works Digest.

Career Program 18 – year in review

by Lt. Gen Robert L. Van Antwerp

I continue to be amazed by the GREATNESS that I see every day in the service provided to the nation and our armed forces by Army engineers and scientists. The challenges that we face in executing the broad spectrum of missions from the recapitalization of our continental U.S. installations to our expeditionary support carrying out overseas contingency operations around the world, requires a strong and vibrant career program.

It has never been more critical than it is now to focus our energy and passion to meet our career program mission to *recruit, develop and retain a relevant, ready, diverse and technically proficient workforce.*

The first step in implementing our mission goals is to actively recruit talent to accomplish our unprecedented workload and to ensure a strong future organization. This step is accomplished by marketing the Army as an employer of choice through a variety of activities such as advertising in targeted publications, attending career fairs and networking with professional organizations and associations. For this fiscal year, we have hired 195 new Army Civilian Education Training and Development System interns across the Army and more than 1,800 new engineers and scientists, half of which are in mission critical occupations.

Lt. Gen. Robert L. Van Antwerp
Photo by F.T. Eyre

Members of the CP-18 Proponency Team, combined with the dedicated activity career program managers who continue to volunteer their valuable time and energy, have taken the lead for Army career programs in identifying new opportunities for training, development and retention. By strategically aligning CP-18 ACTEDS competitive professional development funding to our competency management efforts and professional development maps, the team set new records for training and development.

During fiscal 2009, CP-18 used funds to provide training for 171 employees. In FY 2010, this number grew to 1,600 — more than nine times the previous year. Of these, almost 1,400 were employees who had never used career program funding before.

Our strategy included providing more outreach training to the field by bringing courses on site to districts and installations to reduce costs for travel and training. The recognized cost savings of avoiding 1,400 separate travel instances equates to about $2 million dollars that can be reinvested in additional career development and human capital initiatives. Most importantly, these courses targeted competency gap areas identified by the national technical competency assessment report and allowed us to train more careerists.

One of our more significant efforts is a year-long pilot that began in June. This web-based learning initiative allows licensed professionals, both military and civilian, to take continuing education courses required by their states to maintain their licenses at no cost to the individuals or their organizations. All of the courses offered through the pilot have already been approved by the licensing states.

The 350 participants represent grades and ranks ranging from GS-11 to Senior Executive Service and from lieutenant to colonel; specialty areas ranging from engineers to interior designers; and geographic areas encompassing hundreds of locations throughout the continental United States and overseas. If successful, this pilot will serve as a recruitment, development and retention tool for the Army to leverage.

Each and every day, the members of CP-18 answer the call to duty delivering superior performance, setting the standard for the profession and making positive impacts on our nation and other nations. The key role that the career program provides in getting us to GREAT is "building to last" a strong bench of educated, trained, competent, experienced and certified professionals. I am proud of all that we have done and continue to do.

Over the next year, I anticipate even greater accomplishments from our individuals, teams and the proponency ➤

Acronyms and Abbreviations	
ACTEDS	American Recovery and Reinvestment Act
CP-18	Career Program 18, Engineers and Scientists – Resources and Construction
FY	fiscal year

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and determine our authorizations based on true needs and requirements, not just because they were there. We're doing everything we can to get it right."

Another big project was preparations for fiscal 2011. Her team was capturing requirements and allocating resources so that garrisons will know early what their resources will be for the fiscal year.

"I am extremely honored and privileged to do my part in improving the facilities operations and infrastructure that support our Soldiers, family members and civilians," she said. "I love Soldiers. I'm an Army wife and an Army mom. I can't imagine any other career. I can't imagine doing anything else."

Mary Beth Thompson is the managing editor of the Public Works Digest.

USACE-IMCOM interdepartmental civilian development

by Dwayne Melton

The Installation Management Command and the U.S. Army Corps of Engineers work closely together but have differing roles, expertise and culture. The IMCOM Fellows program provides an opportunity to cross train with the two organizations.

The five year program develops individuals in two career paths through formal training and interdepartmental assignments. The result is a multifunctional cadre of individuals who more efficiently support service members through shared knowledge.

Fort Sam Houston, Texas, for example, is among the installations undergoing vast Base Realignment and Closure expansion efforts. These efforts will centralize various multi-service requirements and lower overall management costs.

To successfully achieve the BRAC initiative, military services and government organizations are working as one to supply Soldiers with safe, high quality housing, dining and medical facilities.

Providing service members adequate facilities through interdependent cooperation does not begin or end at construction completion. USACE develops, designs and constructs these facilities, and IMCOM assumes the daily operations and maintenance roles throughout the facilities' lifetimes.

Acronyms and Abbreviations	
BRAC	Base Realignment and Closure
IMCOM	Installation Management Command
USACE	U.S. Army Corps of Engineers

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staff. Together, fortified with a sound business process and disciplined approach, we will continue to implement our strategy of recruiting, developing and retaining our workforce and drive forward on our path to GREATNESS.

Lt. Gen. Robert L. Van Antwerp is chief of engineers, commanding general of the U.S. Army Corps of Engineers and the functional chief of CP-18.

Dwayne Melton, an IMCOM fellow, checks a construction site at Fort Sam Houston, Texas. Photo by Ed Martinez, USACE

Constant cooperation and an overall team atmosphere is required to ensure USACE delivers buildings that IMCOM can sustain to achieve the overarching objective of supporting service members. Successfully maintaining these facilities requires personnel who possess a knowledge-base of multiple functions including design, construction and sustainment processes.

Constructing a facility from concept is a challenge all in its own. Doing this while incorporating multi-decade sustainment needs requires vast knowledge from dedicated multi-discipline teams who understand that the buildings designed and constructed today will be used decades into the future.

This needed knowledge-base cannot be attained in a day, a week or even a month. Developing individuals who understand the complex processes involved takes years.

The IMCOM Fellows program delivers individuals who understand USACE's concept creation, development and construction methodologies along with IMCOM's sustainment, restoration and modernization management processes. The experience allows the fellow to learn both organizations, their interdependence and shared responsibilities.

During the one-year rotation with USACE, an IMCOM fellow is exposed to design development, project management, quality control and the various technical aspects of several engineering disciplines.

The cross training enforces both USACE's and IMCOM's understanding of the multiple disciplined expertise needed during the life cycle of Army facilities.

Programs such as the IMCOM Fellows help develop a multidepartmental workforce that can think and function as a single entity. The team approach advocates the interservice and interagency overarching goal of continuously supporting the warfighter.

Information about the IMCOM Fellows program is available at the Civilian Personnel Online website, *http://acpol.army.mil/employment/intern_overview.htm.*

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IMCOM

U.S. ARMY INSTALLATION MANAGEMENT COMMAND