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The solar panels at Sandhills Utility Services, one of several renewable energy initiatives at Fort Bragg, N.C., provide 6,500 kilowatt hours to the installation per year. Photo by Paul Hora. Page 23.



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IMCOM moving forward with energy efficiency, security plans

by Joe Capps

Reliable access to affordable, stable energy supplies is a significant challenge for the Army and the nation. The Army relies on energy, and disruption of critical power and fuel supplies would harm the Army's ability to accomplish its missions. The scarcity of low-cost energy poses a risk and exposes a vulnerability that must be addressed by a more secure energy position and outlook.

The Army's assumptions concerning future plans for power and fuel at home, overseas and on the battlefield must account for such challenges. To address these energy security challenges, the secretary of the Army issued the *Army Energy Security Implementation Strategy* with five strategic energy goals:

- reduced energy consumption,
- increased energy efficiency across platforms and facilities,
- increased use of renewable and alternative energy,
- assured access to sufficient energy supplies, and
- reduced adverse impacts on the environment.

These goals incorporate the fundamental principle that the improvements achieved will not lead to reductions in operational capability or the ability to carry out primary missions.

Installation Management Campaign Plan

The Installation Management Command is moving its energy program forward with implementation of the *Installation Management Campaign Plan*, which includes a specific Line of Effort focused on energy to address the overall Army energy security strategy. The intent of the campaign plan's energy Line of Effort is to maintain energy- and water-efficient installations by holding users accountable, modernizing facilities, installing new technologies and leveraging partnerships that will provide an increased level of energy security leading to



Joe Capps
U.S. Army photo

sustainable and resilient infrastructure and mission assurance.

Garrison energy and water management programs

In addition, IMCOM issued an energy Operations Order, 10-257, that puts in play a broad range of actions to move us toward achieving the objectives set for us by the secretary of the Army to improve our energy security posture. All IMCOM garrisons are implementing garrison Energy and Water Management programs, which include the following actions:

- Appoint in writing full-time garrison energy managers and input contact information in the Army Energy and Water Reporting System. Garrison commanders will ensure their energy managers are knowledgeable and trained.
- Include energy and water conservation responsibilities in position descriptions of commanders, directors and other key positions that impact energy management to ensure compliance with federal legislation, executive orders, the implementation strategy and the campaign plan.
- Establish a garrison energy steering committee composed of energy managers and garrison organizations or units to meet quarterly, review energy and water consumption activities, evaluate goals and objectives, and develop improvement strategies.
- Implement Building Energy Monitor

Acronyms and Abbreviations

IMCOM	Installation Management Command
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and Unit Energy Conservation Officer programs. Examples are at <https://www.us.army.mil/suite/doc/32993110>.

- Provide at least quarterly energy training and awareness for installation and community personnel. Take advantage of opportunities to promote energy conservation awareness through command channels and community activities during annual Energy Awareness Month and Earth Week.
- Develop an energy security plan and update plans annually based on a review with local utility suppliers. A sample template is at <https://www.us.army.mil/suite/doc/32993146>.
- Enter accurate energy data monthly and water data quarterly into the Army Energy and Water Reporting System and conduct monthly quality-control checks. Provide a quarterly certification of data completeness to region energy manager.
- Submit a complete annual energy report each year in October.
- Nominate worthy projects, individuals and teams for *Secretary of the Army Energy and Water Management Awards* and *Federal Energy and Water Management awards*. ➤

Army Energy Security Vision

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

Army Energy Security Mission

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



(continued from previous page)

- Review all new construction and repair project plans and specifications for compliance with appropriate energy policies. Projects must include life-cycle cost-effective energy- and water-conservation measures.
- Ensure new construction and major repair and renovation projects greater than \$7.5 million incorporate sustainable design principles to achieve a minimum of the Silver level of Leadership in Energy and Environmental Design certification.
- Ensure all designs reduce energy consumption by 30 percent below the levels established by American Society of Heating, Refrigeration and Air-Conditioning Engineers' Standard 90.1.
- Perform annual energy audits of at least 25 percent of the garrison facilities' total square footage to evaluate energy usage and determine the best locations to incorporate energy savings measures. Energy audit guidance can be found in the *Department of Defense Energy Manager's Handbook* at http://www.acq.osd.mil/ie/energy/mgr_support.shtml.
- Implement all no-cost and low-cost measures as detailed in <https://www.us.army.mil/suite/doc/32993193>.

- Implement energy and water saving projects that have a simple payback of 10 years or fewer.
- Use alternate funding sources such as Energy Savings Performance Contracts, Utility Energy Services Contracts and the Energy Conservation Investment Program to help fund at least one project that cannot be self-funded annually.
- Reduce vehicle fleet petroleum use 30 percent by 2020 using 2005 as the base year as required by Executive Order 13514, *Federal Leadership in Environmental, Energy and Economic Performance*. Garrisons should develop a petroleum fuel reduction strategy that includes replacing fossil fuel vehicles with alternative fuel vehicles and electric vehicles, maximizing use of mass transit and shuttle buses, and installing alternative or renewable refueling infrastructure to encourage alternative and electric vehicle use.

Army net-zero strategy

Another component of the Army's energy security strategy is to appropriately manage our natural resources with a net-zero strategy. A net-zero strategy addresses energy, water and waste at Army installations and comprises five interrelated steps:

- **Reduction** includes maximizing energy efficiency in existing facilities, implementing water conservation practices and eliminating generation of unnecessary waste.
- **Repurposing** involves diverting energy, water or waste to a secondary purpose with limited processes.
- **Recycling or composting** involves management of the solid waste stream, development of closed loop systems to reclaim water or cogeneration with which two forms of energy — heat and electricity — are created from one source.
- **Recovery** occurs from converting unusable waste to energy, from renew-

able energy or from geothermal water sources.

- **Disposal** is the final step and last resort after the last drop of water, the last bit of thermal energy and all other waste mitigation strategies have been fully exercised.

Net-zero pilot installations

The Army approach is to identify and work with six installations to achieve net-zero energy, six installations to achieve net-zero waste, six installations to achieve net-zero water and two installations to achieve all three by 2020. The Army goal is to have 25 net-zero installations by 2030.

The net-zero pilot installations are:

Net-zero energy: Fort Bliss, Texas; Fort Carson, Colo.; Fort Detrick, Md.; Fort Hunter Liggett, Calif.; Kwajalein Atoll, Republic of the Marshall Islands; Parks Reserve Forces Training Area, Calif.; Sierra Army Depot, Calif.; U.S. Military Academy, West Point, N.Y.; Oregon Army National Guard.

Net-zero water: Fort Bliss; Fort Carson; Aberdeen Proving Ground, Md.; Camp Rilea, Ore.; Fort Buchanan, Puerto Rico; Fort Riley, Kan.; Joint Base Lewis-McChord, Wash.; Tobyhanna Army Depot, Pa.

Net-zero waste: Fort Bliss; Fort Carson; Fort Detrick; Fort Hunter Liggett; Joint Base Lewis-McChord; Fort Hood, Texas; Fort Polk, La.; U.S. Army Garrison Grafenwoehr, Germany.

IMCOM Headquarters, regions and garrisons are working together to develop garrison action plans, staff energy teams, implement energy conservation projects and monitor project progress to achieve the energy goals and objectives set for us by the secretary of the Army to improve our energy security posture.

Joe Capps is the executive director, IMCOM. 





Corps offers expertise, solutions to support Army's Energy Program

by Stacey K. Hirata

As the Army works to strengthen its commitment to energy and water conservation, efficiency and security, as well as meet the numerous energy and sustainability legislative mandates, executive orders and policies, it looks to the U.S. Army Corps of Engineers for technical expertise and solutions. Whether to deal with legislative requirements or Army policies, the Corps continues to step up to the challenge.

Enterprise approach

The requirement to conserve energy intertwines with today's challenge to build sustainable installations. Energy and sustainability programs, like other broad efforts, require a comprehensive approach. The Corps' holistic method supports the Army's needs by first taking an enterprise approach to master planning. From initial planning and visioning efforts, the garrison commander and installation stakeholders forge a broad vision and set planning principles that guide installation planning, including energy planning.

USACE and the Installation Management Command make energy conservation a major consideration in installation master planning by emphasizing energy-efficient building design and installation development. We have established integrated planning and development practices for consistent, energy-efficient, sustainable development.

As the Department of Defense, the Army and the other services are embracing sustainable energy-efficient planning practices, USACE is assisting installations transition to more compact development using area development plans and more regulated land use. Area development plans focus on designated districts on installations, define the built-out development plans for the districts and identify the specific planning pattern to achieve energy efficiency and sustainability while meeting both existing and unforeseen missions in an organized method. Focusing on compact, regulated districts



Stacey K. Hirata
Photo by F.T. Eyre

allows planners to provide direction on repurposing existing facilities, reducing energy distribution losses and minimizing the use of vehicles.

The planning effort is the first step in a comprehensive approach to meeting the Army's goal — energy independence. Developing and incorporating renewable energy sources into the Army's energy plan will play a significant role in whether we can realistically reduce our dependence on fossil fuel and foreign oil.

Since the beginning of fiscal 2011, the Army has worked to develop renewable energy projects where appropriate on its installations. As the Army strengthens its renewable energy portfolio, the Corps continues to play a significant role in the work.

Energy Initiatives Office

On Aug. 10, Secretary of the Army John McHugh announced that the Army is standing up an Energy Initiatives Office Task Force, which will be responsible for identifying industrial-scale renewable energy projects that will produce in excess of 200 megawatts of energy. USACE will be instrumental in this effort by providing technical, contractual and program management support.

The Corps assisted with the development of the Energy Initiatives Office concept and is currently drafting an acquisition strategy. Through Federal Business Opportunities, we developed

Acronyms and Abbreviations

USACE	U.S. Army Corps of Engineers
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and posted a \$5 billion sources-sought solicitation to ascertain the level of private sector interest. At the solicitation's close, USACE had heard from more than 150 firms.

Net-zero and other initiatives

Although most of the legislative requirements have been incorporated in USACE projects, the Corps continues to work with the Office of the Assistant Secretary of the Army for Installations, Energy and Environment, the Installation Management Command and the Office of the Assistant Chief of Staff for Installation Management to enhance the Army's energy posture.

Representatives from the Corps' Headquarters, the Engineering and Support Center Huntsville and the Construction Engineering Research Laboratory worked with the Office of the Deputy Assistant Secretary of the Army for Energy and Sustainability to develop criteria for identifying the Army's net-zero energy, water and waste installations. USACE representatives also helped provide training to installation energy managers from the net-zero installations.

USACE is instrumental in implementing many other energy initiatives. For example, Huntsville Center is installing smart meters and working with the Network Command to ensure the connectivity and net worthiness of the meters to the central data system. Headquarters USACE is actively working to establish regional energy centers of expertise to ensure technical and programmatic expertise exist in every region. We issued an Engineering Construction Bulletin directing districts to incorporate identified energy enhancement features into their projects if project schedules and life-cycle costs analyses indicate them to be an effective means for reducing energy consumption.



Army presents energy, water management awards

by David Purcell

The 33rd annual *Secretary of the Army Energy and Water Management Awards* were given out Aug. 11 at the Army Energy Manager Training Workshop in Cincinnati. Katherine Hammack, assistant secretary of the Army for installations, energy and environment, and Maj. Gen. Al Aycock, director of operations, Office of the Assistant Chief of Staff for Installation Management, presented the awards.

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

Small group awards

Energy Efficiency/Energy Management – **Jeffery Presgraves** and **Keith Pomraning**, Aberdeen Proving Ground, Md.

Innovative/New Technology – **Pat Walsh, Pat Appelman, Warren Clifford, R.J. Dyrdek** and **Steven Fries**, Fort Knox, Ky.

Energy Efficiency/Energy Management – **Willimore Mack** and **Paul Lindemer**, U.S. Army Garrison Kaiserslautern, Germany

Renewable/Alternatives – **John Hastings** and **Thomas Comyack**, National Guard Training Center, Sea Girt, N.J.

Energy Efficiency/Energy Management – **Bobby Lynn, Richard Strohl, Donald Clary, Huey Keaton** and **Cody Tippit**, Fort Hood, Texas

Installation award

Water Conservation – **Fort Stewart, Ga.**, Denise Kelley, Randy Parks, Stanley Thomas, Tressa Rutland and Matthew Bolen

Individual award

Innovative/New Technology – **Regina Kranz**, U.S. Army Garrison Ansbach, Germany

Exceptional performance award

Energy Efficiency/Energy Management – **Picatinny Arsenal, N.J.**, Lt. Col. Charles Koehler, John Costea, Richard Havrisko, Michael Maier and Thomas Struble

POC is David Purcell, 571-256-9761, david.purcell@us.army.mil

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



The Secretary of the Army Energy and Water Management Award awardees pose after the Aug. 11 ceremony with Katherine Hammack, assistant secretary of the Army for installations, energy and environment, and Maj. Gen. Al Aycock, director of operations, Office of the Assistant Chief of Staff for Installation Management. Photo by Terry Shoemaker, Pacific Northwest National Laboratory

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Energy-water nexus

Mechanical devices that employ water have been used to produce energy since ancient times, and that energy-water nexus continues today. Roughly 8 percent of fresh water withdrawals globally are used for energy, according to 2008 data from the World Economic Forum. Energy can account for 60 to 80 percent of water transportation and treatment costs and 14 percent of total water utility costs.

Energy and water production are clearly interconnected, but water's effect on energy and energy's effect on water, historically, have been ignored. That view is rapidly changing.

Our country developed most of its infrastructure, including its water and energy resources, during the 20th century, when the costs of water and energy remained low. Water use for agricultural

soared with the coming of subsidies and the spread of irrigation to previously unfarmed areas. Economic development led to more construction and more demand for energy and water resources.

Today, water is involved in energy production for thermoelectric cooling, hydropower, mineral extraction and mining, and fossil and nonfossil fuel and biofuel production and emission controls. Energy is used in potable water systems to pump, transport, treat and desalinate. About 40 percent of water use in the United States goes for energy production, the No. 2 use behind agriculture, according to a 2005 U.S. Geological Survey report.

Water and energy demands continue to increase, but water supplies are limited and will be affected by degradation and climate change over time. If we remain on our current path, we will reach a point

at which our finite water supplies cannot meet our water demands. Addressing this water-energy nexus — in the very near future — is critical to that future.

The Construction Engineering Research Lab developed a tool kit, found at <http://www.water-management-toolbox.com/>, to help understand this issue. It provides laws, regulations, policies and federal guidelines on water management. Also, Huntsville Center, as a part of its energy program, supports installations with developing integrated energy and water management plans.

When it comes to energy and water issues, USACE continues to be a source of both technical and programmatic expertise that provides solutions for our Army.

Building Strong!

Stacey K. Hirata is the chief, Installation Support, Headquarters USACE. 



Net-zero pilot installations meet

by Doug Waters

The Army's 17 net-zero pilot installations participated in a training event at Fort Detrick, Md., June 14-16. This workshop provided a venue for the pilot installations to share ideas and resources.

On April 19, at the Association of the U.S. Army's Installations Symposium in San Antonio, Assistant Secretary of the Army for Installations, Energy and Environment Katherine Hammack identified the pilot installations that will strive to achieve net-zero energy, water, waste or all three by 2020.

The Net Zero Program's goal is to ensure that the Army of tomorrow has access to the fuel, water and land that it needs to execute its mission at a price it can afford. This effort will improve the energy security and sustainability of Army installations and ensure the continuation of vital military missions in the event of energy or water utility grid disruptions. The net-zero approach unifies all Army actions to achieve multiple goals related to energy, waste, water and environmental protection.

A net-zero energy installation will produce as much energy on site as it uses over the course of a year. A net-zero water installation limits fresh water consumption while returning the water to its source so as to not deplete the quantity or quality of regional ground and surface water systems. A net-zero waste installation reduces, reuses and recovers solid waste, removing the need for landfill.

During the plenary session at Fort Detrick, attendees saw presentations from Army staff, other federal agencies and industry counterparts. Field trips were conducted at locations on Fort Detrick to highlight examples of sustainable practices in energy, water and waste.

On the second day, breakout sessions

Acronyms and Abbreviations	
NEPA	National Environmental Policy Act
OACSIM	Office of the Assistant Chief of Staff for Installation Management

were held separately for the energy, water and waste installations. Each installation made a short presentation describing its net-zero strategy and what assistance would be needed. Representatives from Department of Energy's Pacific Northwest National Laboratory and National Renewable Energy Laboratory, and the U.S. Army Corps of Engineers' Engineering and Support Center, Huntsville, and Construction Engineering Research Laboratory presented ideas and information on sustainable best practices and net-zero tools and approaches.

As part of the effort, the Office of the Assistant Secretary of the Army for Installations, Energy and Environment established a collaboration website to allow pilot installations access to technical resources, request assistance and share successes. In addition, monthly coordination calls will be held with the net-zero pilot installations to provide information on specific topics, training and approaches, and to share ideas.

Each installation is unique. No one-size-fits-all net-zero solutions exist. Installations will use a variety of net-zero strategies and will not be forced into a specific method. Instead, the pilot installations will be encouraged to present at conferences and symposia about their journey to achieve net zero, sharing their strategies, successes, challenges and lessons learned for use by other Army installations.

A programmatic National Environmental Policy Act Environmental Assessment is underway. The assessment will evaluate the various behaviors, processes and technologies that can be used to achieve net zero and their associated environmental impacts and mitigation. This effort will provide scoping and development of environmental



A map displays the Army net-zero pilot installations. Graphic by Pacific Northwest National Laboratory

considerations and will assist in developing information to support a site-specific NEPA analysis.

Net-zero energy installations are: Fort Detrick; Fort Hunter-Liggett, Calif.; U.S. Army Kwajalein Atoll; Parks Reserve Forces Training Area, Calif.; Sierra Army Depot, Calif.; and the U.S. Military Academy, West Point, N.Y. Although not an installation per se, the Oregon National Guard is also a net-zero energy participant for its statewide facilities.

Net-zero water installations are: Aberdeen Proving Ground, Md.; Camp Rilea, Ore.; Fort Buchanan, Puerto Rico; Fort Riley, Kan.; Joint Base Lewis-McChord, Wash.; and Tobyhanna Army Depot, Pa.

Net-zero waste installations are: Fort Detrick; Fort Hood, Texas; Fort Hunter-Liggett; Fort Polk, La.; Joint Base Lewis-McChord; and U.S. Army Garrison Grafenwoehr, Germany.

Net-zero energy, water and waste installations are: Fort Bliss, Texas; and Fort Carson, Colo.

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Doug Waters is the renewable energy and net-zero portfolio manager, Army Energy and Utility team, Facilities Policy Division, OACSIM.



Energy awareness and conservation assessments identify quick fixes

by Ralph Totorica

Each year, Headquarters Installation Management Command centrally funds about 12 energy awareness and conservation assessments at IMCOM installations. The assessments help IMCOM garrisons identify no-cost and low-cost energy-savings opportunities and provide energy conservation awareness training for the garrison leadership and community.

The intent is to capture quick wins through energy-saving efforts that the garrison can execute immediately with little to no investment costs.

The assessments furnish garrisons with a valuable tool to evaluate their current energy consumption patterns and increase energy awareness throughout the installation community. In addition, the assessments assist garrisons with meeting the requirement to perform energy audits on 25 percent of building inventory each year. Headquarters IMCOM's goal is to get each garrison on a four-year rotating cycle.

The assessment consists of a one-week site visit by a representative from Headquarters IMCOM and an energy consultant under contract for technical support. Representatives from IMCOM regions are also encouraged to attend and participate in the assessments.

Typically, the week starts with introductory meetings with the garrison

commander and director of Public Works. Following discussion with the installation energy manager about objectives and expectations, the contractor reviews utility cost and consumption data, and identifies buildings to be surveyed with the energy manager. The contractor then conducts four days of building surveys, including a night assessment, looking for energy-saving opportunities with a focus on low-cost measures and operations and maintenance improvements that can be easily implemented with in-house resources.

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

In addition to identifying specific energy conservation measures, the assessment also offers a great opportunity for the energy manager to increase energy awareness through the garrison's Public Affairs Office. The energy awareness and conservation assessment concludes with an out-brief to the garrison commander and directors.

The assessments are conducted at no cost to the installation; however the host installation must provide support to escort the contractor and provide access to facilities to be surveyed.

To request an energy awareness and conservation assessment, contact the author

Acronyms and Abbreviations

DPW	Directorate of Public Works
IMCOM	Installation Management Command

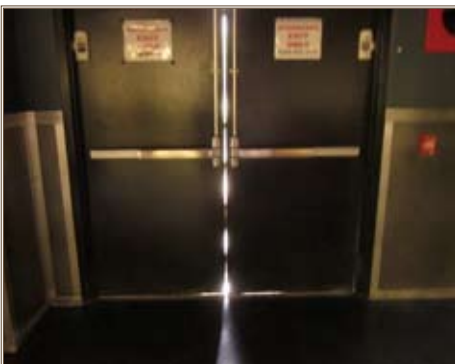
at the POC information below.

POC is Ralph Totorica, 210-466-0598, rtotorica@us.army.mil.

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

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., CFLs for incandescent.
7. Install lighting controls, motion sensors, light switches; and simply turn off lights at night.
8. Clean dirt and debris from or replace air filters, exhaust fan grilles and air intake louvers.
9. Replace weather-stripping, repair door closers or close windows at night to reduce heat losses and infiltration
10. Install low-flow faucets and showerheads to reduce hot water use, e.g., WaterSense fixtures and Energy Star-rated appliances and equipment.



Energy awareness and conservation assessments identify quick fixes to be made like the lack of weather stripping edge seals and bottom sweeps on entry doors. Photos by Lyman Parkhurst, Sain Engineering Associates



Unnecessary lighting such as this exterior lights on during daytime hours can be corrected for little of no cost.



Who wants free money?

by Clive Rountree

The Energy Savings Performance Contract program is a source of money to accomplish energy projects at the garrison. The program, authorized by the Energy Policy Act of 1992, allows Army agencies to use financing provided by energy services companies. Additional legislation extended and enhanced the ESPC program to offer numerous benefits to the Army.

Federal mandates require Army garrisons to reduce energy intensity by 3 percent per year from 2006, using 2003 as a baseline. They also require a 2 percent reduction per year in water intensity beginning in 2008, using 2007 as a baseline.

Intensity is defined as consumption per area. In the case of energy, the intensity is measured in million British thermal units used for every 1,000 square feet, or as commonly seen, MBtu/ksf. Water is measured in gallons per square foot, or gal/sf.

With ESPCs, as in real life, there isn't any such thing as a free lunch. The process can be daunting. There are numerous steps to take and hoops to jump through, but the end result is a significant energy project developed, financed, designed, constructed and maintained by an ESCO.

The garrison has some financial burden. It is responsible for hiring the project facilitator and engaging the contracting vehicle. This cost can be as much as \$75,000, which is a very small percentage of the total potential project.

The garrison also has other responsibilities. Operational Order 11-313 requires garrisons with ESPC projects to have an ESPC program manager, assigned in writing, to serve as the point of contact between the garrison and the ESCO. The garrison needs to provide utility data, escort services, points of contact in the Directorate of Public Works and shops, drawings and other survey data the ESCO may request.

The ESPC process is fairly straight



Clive Rountree
Courtesy photo

forward. After the garrison has decided to do an ESPC project, it hires a project facilitator, a third party who acts as a champion for the project and a central point of contact for all concerned. The garrison hires its facilitator from a list of approved individuals maintained by the Office of the Assistant Chief of Staff for Installation Management. Then, the ESCO selection process is started.

The potential ESCOs that respond to the advertised project do a walk-through with garrison personnel. Each develops a brief proposal of about 20 pages. From these proposals, one ESCO will be chosen.

The selection committee comprises individuals from the contract agency and the garrison, the project facilitator and others who may be involved. The proposals are reviewed and rated by individual members. Then the committee discusses the points, good and bad, of each proposal, and a selection is made by unanimous consent.

The selected ESCO returns to the installation and does a more in-depth survey. The ESCO representatives ask a lot of questions of their escorts and make suggestions. After the visit, the ESCO develops its site survey report. The SSR is a broad look at potential energy conservation measures and buildings, and includes rough savings and cost estimates, and early measurement and verification and operations and maintenance plans.

Acronyms and Abbreviations	
ECM	energy conservation measure
ESCO	energy services company
ESPC	Energy Savings Performance Contract
IMCOM	Installation Management Command
M&V	measurement and verification
O&M	operations and maintenance
OACSIM	Office of the Assistant Chief of Staff for Installation Management
SSR	site survey report
UESC	Utility Energy Savings Contract



After the SSR has been reviewed and the garrison has selected the ECMs and buildings to be included, the ESCO proceeds with an investment-grade audit. This audit results in a proposal with very exact ECM descriptions, cost, savings, M&V plan and O&M plan.

This proposal is reviewed by the garrison, region, contracting agency, project facilitator and Headquarters, Installation Management Command. Each reviewer develops questions and comments that are forwarded to the ESCO for resolution.

The ESCO incorporates the comments and questions in a final proposal. This final proposal is reviewed by same team that did the initial review to ensure all questions and comments have been incorporated or answered.

Now, the project is ready for higher headquarters approval and the contract to be issued to the ESCO. Headquarters IMCOM puts together a project summary and supporting documents, and forwards it up the chain of command through the OACSIM for final approval by the deputy assistant secretary of the Army for energy and sustainability. When final approval is obtained, the contracting agency issues the contract. ➤



Strategy for funding energy and utility projects

by Qaiser Toor

The *Installation Management Campaign Plan* includes a specific line of effort focused on energy and water efficiency and security. By achieving energy conservation, efficiency and security goals, IMCOM will better position the Army to accomplish its missions in a more cost-efficient manner regardless of the energy challenges in the future.

To expand on the line of effort, IMCOM issued Operations Order 10-257, which requires a broad range of actions, including,

- establishment of a garrison comprehensive energy and water conservation program,
- accomplishment of campaign plan goals, and
- enhancement of an energy posture across IMCOM.

IMCOM's strategy

The Energy OPORD directed specific actions and energy conservation measures to help achieve mandated energy goals with an emphasis on low-cost and no-cost ECMs, and identification and development of all cost-effective energy- and water-efficiency projects with a payback of less than 10 years. IMCOM's strategy is to focus on return on investment and to initially target low-cost and no-cost projects for funding to "buy out" these projects at all garrisons and then to focus on projects with less than a 10-year payback.

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In a short time, the garrison has new, energy-efficient equipment, reducing its consumption and putting it on the road to meeting its mandated goals, all paid for with other people's money and paid back from guaranteed savings.

Utility Energy Savings Contracts are another source of funding. The UESC is a direct partnership between the garrison and its utility provider. Like the ESPC, the utility acting as an ESCO will develop,

finance and construct the project and will receive payment from the savings realized by the garrison. Unlike the ESPC, the UESC does not require competitive bidding. The approval process for a UESC is similar to the ESPC process.

Remember, the ESPC and UESC programs are for energy savings. It takes planning and looking forward at the garrison equipment to put together a good project. They are not well suited for broken equipment replacement or massive



Qaiser Toor
Photo by Mary Beth Thompson

Specific low-cost and no-cost ECMs targeted for funding in fiscal 2011 included:

- replacing incandescent bulbs with CFLs or LED lamps;
- replacing exit lights with LED lighting fixtures;
- installing programmable thermostats;
- replacing T12 fluorescent lamps that have standard ballasts with T8 or T5 lamps that have electronic ballasts, and installing occupancy sensors;
- installing or replacing weather stripping on entry ways where gaps are visible and caulking joints, window frames, door jambs and wall penetrations;
- rewiring indoor lighting, except LED exit fixtures, that are wired on 24/7 to be turned on either by switches or motion sensors;

Acronyms and Abbreviations	
E&U	energy and utility
ECM	energy conservation measure
FSM	Facilities Sustainment Model
FY	fiscal year
IMCOM	Installation Management Command
ISR	Installation Status Report
NIST	National Institute of Standards and Technology
OPORD	operations order
PPS	Project Prioritization System
R&M	Restoration and Modernization
SRM	Sustainment, Restoration and Modernization

- replacing motors and pumps with high-efficiency Energy Star equipment when replacements are required instead of rewiring inefficient motors;
- installing timing controls for pump motors during high-use or high-demand times, allowing them to be off during low-use times; and
- recommissioning buildings.

In FY 2011, IMCOM funded \$112.3 million in garrison energy and utility infrastructure projects. This funding included \$16 million for low-cost and no-cost energy projects, \$41.4 million for Installation Status Report red- or black-condition utilities projects and \$54.9 million for energy and water efficiency projects with less than a 10-year payback.

Garrisons' role

Garrisons need to take advantage of this Headquarters IMCOM Restoration ➤

O&M savings and should not be used for those purposes.

For further information on the program, refer to the Army Energy Program Policies and Regulations, and ESPC Guidance at <http://army-energy.hqda.pentagon.mil/policies/guidance.asp>.

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and Modernization Program funding to augment their local Sustainment, Restoration and Modernization and Military Construction funds for energy and utilities projects. The first step for energy managers should be to work with their Master Planning, Engineering and Business Operations divisions to identify and plan for requirements using the garrison master plan to develop their annual work plans.

Garrisons should fund the resulting projects using sustainment funds from their local SRM budgets to the maximum extent possible. In concert with local SRM funds, the execution strategy can also include use of centralized Restoration and Modernization Program funds.

To take advantage of the R&M Program, it helps to have an understanding of how it is funded. Sustainment funds for IMCOM garrisons are derived from the Office of the Secretary of Defense's Facility Sustainment Model, which is built from the real property inventory at each garrison. In recent budgeting cycles, the Army funded sustainment at 90 percent of the FSM model, and IMCOM, in turn, funded its garrisons at 75 percent of the FSM model, while withholding the difference for use in key aspects of the R&M Program, to implement the Army's Facility Investment Strategy and to fund E&U projects.

Regions and garrisons will be asked for submissions of R&M projects by way of a Headquarters IMCOM operations order in early FY 2012. These funds become available for distribution to IMCOM garrisons at various times throughout the fiscal year.

Headquarters IMCOM awards R&M funds earmarked for E&U projects on a competitive basis. Projects are ranked according to savings-to-investment ratio, payback and energy saved as well as garrison and region priorities. Projects

dedicated to repair and modernization of utilities infrastructure are also included and prioritized according to ISR ratings Q3 and Q4 and solid project justification.

Achieving success

Taking certain steps will set your garrison up for success with the R&M Program.

First, ensure that all E&U projects are documented on a DA Form 4283, *Facilities Engineering Work Request*, and entered into the Project Prioritization System available at <http://pps.hqda.pentagon.mil>. Currently, PPS does not have the capability to capture savings-to-investment ratio or payback, so a companion Excel spreadsheet template is being used to solicit this critical data and enable prioritization and consolidation into a Headquarters IMCOM master project list. It is important to ensure that the project numbers and the project titles in PPS exactly match their counterparts on the Excel template. The PPS fix is in the works and should be completed prior to the next data call.

Second, follow the PPS Energy and Utilities Business Rules, available on the help tab, and include a properly completed life-cycle cost analysis worksheet. To aid in preparing the worksheet, the National Institute of Standards and Technology developed Handbook 135, available at http://www.nist.gov/customcf/get_pdf.cfm?pub_id=907459. NIST annually updates the energy price indices and discount factors for economic analysis in an interagency report, NISTIR 85-3273-21, found at <http://www1.eere.energy.gov/femp/pdfs/asbb10.pdf>. The report provides discount factors for life-cycle analysis.

Third, be aware of restrictions on funding arising from work classifications regulations. For maintenance and repair projects of more than \$750,000, a repair-to-replacement cost analysis determines who has the authority to approve the project.

For projects that have a ratio of more

than 50 percent, this authority rests with the deputy assistant secretary of the Army for installations and housing. These projects require that a DD Form 1391, *Military Construction Project Data*, also be submitted through Headquarters IMCOM for approval. The procedures for submission of the SRM DD1391 are available on Army Knowledge Online at <https://www.us.army.mil/suite/doc/30120912>.

Garrison commanders have the authority for repair projects up to \$5 million if the repair-to-replacement ratio is less than 50 percent. All SRM projects greater than \$5 million require submission through Headquarters IMCOM for deputy assistant secretary of the Army approval.

Projects over \$7.5 million require congressional notification. These projects must be submitted to Headquarters IMCOM no later than the first week of August to obtain congressional approval before the end of that fiscal year. Submit only projects that will be ready for execution by the end of the fiscal year.


Project execution

When a project is centrally funded, it must be executed and data updated in PPS. Any changes or substitutions need to be approved by Headquarters IMCOM.

Projects can be executed a number of different ways – by using the local contracting office, through your local Corps of Engineer district or through an Engineering and Support Center, Huntsville indefinite delivery-indefinite quantity contract.

In the future, IMCOM will also look to tracking and verifying energy and cost savings of projects.

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Achieving energy effectiveness, net zero – It takes a master plan

by Jerry Zekert

Installations are faced with huge challenges to meet federal goals for energy efficiency and achieve the net-zero vision. The Army assessed its physical plant and identified many projects that range from enhancing the ability to measure consumption, increasing heating and air conditioning systems' efficiency and improving buildings' insulation to leveraging the best technologies for renewable energy. However, the Army still has a ways to go to achieve its goals. At the same time, it is seeing on the horizon real world budget constraints, as well as no let-up on rapid changes in mission requirements.

All these issues can be constraints on capabilities for success. The importance of energy efficiency and attaining net zero for installations and the nation is obvious. How to accomplish it all is less evident.

Achieving success requires stepping back and taking a broad enterprise approach, using the installation master planning process to create a synchronized development plan that enables installations to meet current and projected mission requirements while achieving goals for energy and leveraging constrained funding streams.

Installations around the world are seizing this opportunity to synchronize their master plans with achieving their energy efficiency goals while meeting mission needs now and tomorrow. Here's how they are doing it.

Visioning is their key rubric. If your installation is relooking its master plan, consider using the visioning phase to integrate energy and net-zero goals into the installation's planning principles.

This integration is so important. These principles guide all installation development; therefore, if your vision

and goals and objectives state requirements for achieving net-zero, every proposal must follow suit.

Area development planning is where their planning becomes reality. During these efforts, installations focus on distinct areas and forge a comprehensive development plan for each. The ADP cites requirements, how they will be designed and, within the district, how the physical plant is going to provide energy and water and handle waste.

The ADP integrates the holistic energy supporting requirements into the master plan, including leveraging renewable sources for energy, aligning the ADP areas appropriately to most effectively use solar energy, considering more narrow configurations and proposing district energy plants. Further, the ADP develops an investment strategy for inserting these technologies into Sustainment, Restoration and Modernization; Military Construction; nonappropriated funds or other funding opportunities. This strategy leverages existing revenue streams to ensure energy considerations are embedded into investment actions.

Installation design guides enforce their planning standards. The IDGs document planning standards for activities that are providing construction, modernization or repair and replacement services on the installation.

The new IDG structure is much less prescriptive and reflects only the planning standards required to comply with the master plan. Since the IDG is part of the master plan, and all projects must be sited according to the master plan, the IDG can provide the associated energy planning standards needed to meet the goals of an energy-effective installation master plan.

Capital investment strategy synchronizes their installation development activities to



Jerry Zekert (right), the author, and Cindi Skinner, master planner at Fort Hunter Liggett, Calif., discuss energy-efficient solutions during an ADP work effort. Photo courtesy of Jerry Zekert

ensure all investments meet the goals of the ADPs, the IDG and, ultimately, the installation vision. The CIS ensures that all Military Construction and Sustainment, Restoration and Modernization initiatives, including infrastructure and energy requirements, are incorporated as well. Through the CIS, all projects are synchronized and vetted based on the installation's planning principles.

Using an enterprisewide approach to installation master planning can ensure energy considerations are prime principles in the installation's development of goals and objectives. These steps provide the means for any installation to achieve these goals.

The goals for energy efficiency are very high, and without a broad enterprise approach, they cannot be achieved. Using the principles of master planning, installations can ensure energy considerations are included.

As Benjamin Franklin stated, "If you fail to plan, you are planning to fail."

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Acronyms and Abbreviations	
ADP	area development plan
CIS	capital investment strategy
IDG	installation design guide



Moving toward net zero: Role of master planning

by Mark L. Gillem

At the August GovEnergy conference in Cincinnati, exhibitors and presenters focused on building energy reduction to achieve energy mandates. Innovative mechanical systems, building energy recover techniques and facility-based energy production tools were featured strategies. While these and many other solutions are essential in the drive to reduce Department of Defense energy use, another strategy that must be included in the conversation is the way we plan our installations.

When we place a few energy-efficient buildings within a landscape of sprawl that requires automobile trips and adds pavement, the benefits at the building level are undone by the energy used in transportation to get to and from those buildings.

To address the role of planning, U.S. Army Corps of Engineers planners are working to integrate energy, water and waste reduction at the installation scale within the context of the Army's Net-Zero Initiative. While the Army has selected several installations to be prototypes for achieving net-zero use in water, waste and energy, all installations should be working toward that goal.

The Natick Soldier Systems Center near Boston is one location where planners are addressing the issue at the installation and building scales. Achieving net zero requires a holistic approach to addressing Natick's energy, water and waste.

Planning can play a significant role in achieving these goals, but for the installation to attain a net-zero status, sustainable strategies must be incorporated into existing and new buildings, and reduction and conservation must be implemented at the individual user level as well. This holistic approach allows the Army to be stewards of the environment, reduce resource use and provide a sustainable future for Soldiers, Civilians and Families.

Natick's master plan emerged out of

a collaborative process that engaged hundreds of stakeholders on and off the installation to create a plan that could accommodate short- and long-term growth. Natick's planning vision is, "To be a sustainable research and development community that fosters mission excellence through state-of-the-art buildings organized into a walkable campus."

As part of the process, the team incorporated many strategies at the planning scale to move toward net zero. The team developed metrics to track compliance and focus efforts on the most beneficial strategies.

Water – Natick's projected water requirement is 26 million gallons annually. Using rainwater catchment and storage systems, the installation can capture up to 14 million gallons, or roughly 53 percent of its requirement. Net-zero water use can be achieved in part by adding aquifer recharge through on-site stormwater mitigation. By reducing impervious surfaces through a variety of master planning strategies, the installation would be able to mitigate the remaining 12 million gallons.

Energy – The projected annual energy requirement using standard planning methods is 22 million kilowatt hours. With appropriate master planning, up to a 40 percent reduction can be achieved using narrow wings, cool roofs and other strategies. Another 36 percent can be supplied by photovoltaic panels if used. These changes could result in a net energy reduction of 76 percent or almost



A rendering demonstrates the Natick Soldier System Center's vision of becoming a walkable campus that integrates strategies for water, energy and waste reduction. Graphic by The Urban Collaborative LLC

17 million kWh per year. In addition, a trigeneration district energy solution is planned. When coupled with user reduction, which is not factored in at the planning level, Natick could get to net-zero energy use.

Waste – When current recycling programs are applied to the master plan build-out, the waste stream can be reduced by 60 percent. Another 12 percent can be achieved by using compost and diversion techniques resulting in a total reduction of 72 percent. When coupled with user reduction, which is also not factored in at the planning level, Natick may be able to get to net-zero waste, too.

Master planning plays a key role in the Army's movement toward achieving net-zero energy, waste and water. Master planning strategies should be incorporated at the earliest stages and used to guide future development.

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Not white, not black, but gray – water, that is

by Richard Scholze

Contingency bases categorize water as “white,” “black” and “gray,” with variations on the gray. Respectively, those terms mean “potable,” “sanitary wastewater” and “all other.” In the continental United States, however, gray water has a more focused definition: the effluent from laundry and bathing or shower use in residential or similar facilities. Gray water has a variety of chemical, microbiological and physical contaminants that require care in its use, but it is a resource that can augment the water supply of water-short areas when used for a purpose requiring a lower quality.

Water resources are receiving increased attention throughout the nation and the Army. Executive orders, legislation and initiatives demand increased efficiency in water use and consumption, including EO 13514, the Energy Independence and Security Act and, most recently, the Army’s Net-Zero Water Initiative.

Augmentation of existing water supplies by up to 40 gallons per day per person has been estimated for gray water, which can be reused for fixture flushing or irrigation with minimal treatment. Gray water is not the same as reclaimed water, the highly treated product from very complex wastewater treatment facilities found primarily in purple pipe systems in Florida, California, Georgia, Arizona and Texas. Reclaimed water is used for a variety of purposes, primarily irrigation.

The advantages of using gray water are several:

- Less potable water is consumed.
- Less discharge occurs, reducing wastewater, which usually costs more to treat than potable water.
- Less energy and fewer chemicals are used by the water provider.
- Less hydraulic load to existing sewer

systems effectively increases the capacity of the wastewater system and treatment plant.

Potential disadvantages exist:

- Gray-water use may be more costly, an issue in areas where price is more important than water quantity.
- Gray-water use may decrease flow to the sewage plant, a concern in areas that are required to deliver a certain amount of return flow to existing streams.
- Gray-water use has a small potential for disease transmission if proper handling and treatment procedures are not followed.

Some states do not actively promote or ban gray-water use, and other states and communities have differing requirements. Consultation with local authorities is essential prior to initiating a program. Proponents nationwide are actively working to enact supportive ordinances, develop appropriate building codes, address user issues and develop a standardized testing protocol for manufactured units.

For military applications, the best time to use and design for gray-water use is during new construction. After estimating potential production, a decision can be reached whether to incorporate. Buildings such as a barracks would be the most logical choice. Life-cycle cost-effectiveness should be addressed along with local water restrictions.

Determining the end use will impact system design. Fixture flushing requires a higher level of treatment than subsurface irrigation, for example. Systems designed for larger buildings are available commercially and include more complex treatment processes. They may also be capable of handling other sources of nonpotable water such as rainwater, air handling unit condensate and even black water (sewage). Treatment is then through a membrane bioreactor or similarly sophisticated system rather than simple filtration and disinfection.



A CERL research assistant sets up an experimental gray-water treatment system, one of several ongoing studies seeking ways to make more use of gray water. Photo courtesy of CERL

Gray water has been receiving increased interest as a supplemental water resource, and research and development programs and a number of demonstrations are under way with government or academic oversight. For example, the Construction Engineering Research Laboratory is conducting a demonstration project that will collect gray water, harvested rainwater and air handling unit condensate and, following appropriate treatment, use it for fixture flushing, cooling towers, irrigation or aquifer recharge.

CERL, under Headquarters, U.S. Army Corps of Engineers’ sponsorship, prepared a Public Works Technical Bulletin available at http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215. The bulletin describes the pros and cons of gray-water use, a brief review of legal and health considerations, lessons learned from gray-water applications in other arenas and appropriate Army scenarios for toilet flushing, landscape irrigation or other acceptable uses. This bulletin will enable installations to determine the potential for gray-water recycling or application at their facilities as part of a sustainable water program, as a supplemental water supply source or to meet net-zero water requirements.

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Acronyms and Abbreviations	
CERL	Construction Engineering Research Laboratory
EO	Executive Order



Spend it like it's yours

by Deborah Lamb-Boatwright

All too often, installation and facility managers are not prudent with the government's money. In these days of both personal and business financial hardships, just paying the bills is not an option. In fact, one way to help reduce the federal debt is to carefully scrutinize all invoices and challenge questionable charges.

Utility services are one of the few examples of the noncontractual agreements by which the Army is bound. Installations have little or no control over rates, but they can significantly reduce or eliminate excessive charges by taking these steps:

- **Understand the invoice.** Learning how the utility companies calculate your charges can prove invaluable.
- **Investigate atypical charges.** Incorrect invoices can be caused by meter reading or operation problems, miscalculations and incorrect rates.

Equipment problems can also cause atypical charges, so checking pipes and systems for problems is important. However, this article focuses on looking for billing errors.

Meter reading

Meter reading problems can happen in several ways. The results can even be in the installation's favor, but unless the reduced cost or consumption data is due to a correction, inform the utility company.

Sometimes the meter reader can't get to the meter, so the utility company estimates the readings. This practice is ok for electricity meters. If usage was overestimated the previous month, the next reading will correct the problem, because it is a cumulative number.

Utility saving basics

- Use highly efficient systems.
- Operate them efficiently and from a sustainable perspective.
- Pay fair and reasonable prices.

Estimating is not ok for demand meters. There is no way to know what the reading actually should have been other than to compare the number to bills for the previous month or the same month from the previous year. Significant changes should be investigated.

Contact the utility company if it uses estimated readings for more than two months. Also, make sure the meters are accessible.

Meter operation

Like any mechanical device, meters can malfunction, possibly due to a manufacturer's defect. Meters are replaced all the time for this reason and others. If a utility company finds a bad meter, it may have to estimate the readings for that month.

Under the Army's metering implementation plan, the Army is moving toward the use of smart meters. Sometimes, mistakes are made even when new ones are installed. The new meter may have a different constant than the old meter, and the utility company may have forgotten to update the utility metering software.

Calculations

When a utility company changes to a new system of calculating bills, sometimes the company improperly places billable items in the wrong sequence causing a miscalculation of the amount owed.

Another area to check carefully is taxes and fees, which usually apply to certain items and not to others. Check that taxes or special fees are not misapplied. In addition, some taxes do not apply to the federal government.

Rates

Utility companies can change the rates to give you the best rate for your situation. However, they can't look at every bill each month to see if that is occurring.

For electricity, most installations' main meters have a "general service demand"




A gas meter behind a locked fence is inaccessible to a meter reader. Photo by Deborah Lamb-Boatwright

rate. The installation is charged a rate for total consumption of kilowatt hours and a separate rate for "demand," which is the peak power for that month. The second most common is the "general service rate," which is simply a charge on the total consumption of kilowatt hours. In some cases a "time of use" rate may be applied.

These rates should be checked periodically to make sure your installation is being charged the one most economically beneficial. (Editor's note: See the article on page 8 of the September/October 2010 Public Works Digest.)

Carefully checking utility invoices can reduce costs by ensuring the installation is being accurately charged for usage. It is a practice well worth the effort.

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Army designs to sustainable standards for medical facilities

by Richard D. Grulich

Military medical facilities designed and built today are incorporating sustainable design practices that will help conserve energy, enhance indoor air quality, increase infection control and improve the way the facility looks, making the health-care experience better for Soldiers, their Family members and other beneficiaries.

Hospital, clinic and laboratory facilities are being designed to meet a requirement to have all fiscal 2013 and beyond buildings certified at a minimum rating

of Silver under the Leadership in Energy and Environmental Design 2009 for New Construction or LEED for Healthcare. In addition, LEED for Commercial Interiors is being evaluated for projects that involve mostly building interiors.

Buildings must achieve 50 to 59 points to be certified LEED 2009 for New Construction Silver. A more ambitious but obtainable Gold rating requires 60 to 79 points.

Requirements

A new chapter in the Unified Facilities Code 4-510-01, *Design of Medical Military Facilities*, provides sustainable design criteria for permanent military health-care facilities. According to the new chapter, sustainable design requirements must be based on the U.S. Green Building Council's LEED rating system, and two of the LEED rating systems must be compared and applied to all military health-care facilities.

LEED for Healthcare and LEED 2009 for New Construction, will be applied where appropriate for all stand-alone and major renovations of Department of Defense medical facilities, the chapter states. Buildings and individual credits can be used as applicable for new construction and renovation. When a project does not include

Acronyms and Abbreviations	
LEED	Leadership in Energy and Environmental Design
MX	Medical Facilities Mandatory Center of Expertise and Standardization

an addition, renovation of the building envelope or replacement of the mechanical systems, LEED for Commercial Interiors must be considered.

Army expertise

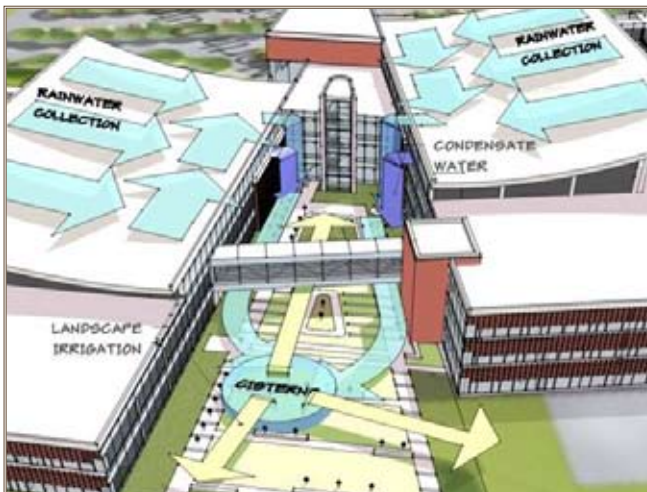
The U.S. Army Engineering and Support Center, Huntsville, Ala., through its Medical Facilities Mandatory Center of Expertise and Standardization, located in Alexandria, Va., plays a big part in designing state-of-the-art medical facilities. The MX's professional staff provides design review and medically unique guidance for architectural, life-safety, mechanical, electrical, commissioning and communications systems.

The MX partners with the U.S. Army Health Affairs Office, the U.S. Army Health Facility Planning Agency and the Air Force Surgeon General's Health Facilities Division to ensure sustainable design practices are included in plans for new medical facilities.

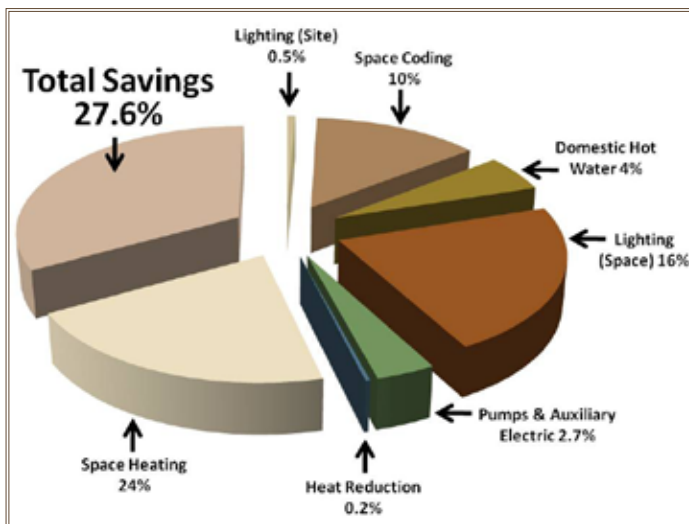
The MX also coordinates with the Navy's Medical Facilities Design Office to write and revise medical facility criteria. The MX consults on Navy projects built by the Corps of Engineers.

The Corps' geographic districts, acting as the construction agent, coordinate with the MX to incorporate design standards necessary to build a complete and usable facility certified by The Joint Commission, a health care accrediting organization. The MX authors and enforces design standards and guidance for facilities that support the commission's purpose to provide safe and effective health care of the highest quality and value.

Soon to be completed world class facilities like the Fort Belvoir, Va., Hospital pioneered sustainable features such as alternative energy, bike racks, ➤



The roof rainwater collection method used at Fort Belvoir demonstrates sustainable design. Graphics courtesy of Lidia Berger, HDR Architects



This pie chart illustrates innovative sustainable design measures used for Fort Belvoir Hospital.



Army holds energy manager training in Cincinnati

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. 11-12 in Cincinnati at the conclusion of the GovEnergy 2011 Conference and Trade Show. Almost 200 Army and other federal agency staff members participated in the workshop, including Army energy managers and resource efficiency managers from 37 IMCOM garrisons, eight Army Materiel Command installations and seven National Guard Bureau sites.

Katherine Hammack, assistant secretary of the Army for installations, energy and environment, was the keynote speaker. Hammack discussed how the Net Zero Program will provide the means to exceed the federal mandates for energy and water performance, as well as provide enhanced

energy security.

The net-zero hierarchy starts with reduction through conservation and waste elimination, proceeds with repurposing, which diverts energy, water or waste to a secondary purpose, and continues with recycling and composting, energy recovery and disposal. Seventeen Army installations and one statewide National Guard initiative have been selected as pilots for net-zero energy, water and/or waste. (Editor's note: See article on page 7.)

The assistant secretary also presented this year's *Secretary of the Army Energy and Water Management Awards*. (Editor's note: See article on page 6.)

Richard Kidd, deputy assistant secretary of the Army for energy and sustainability, spoke about Army energy policies under review and the fiscal 2013 budget line that covers the Army Energy Program and the Army Energy Initiatives Office task force. That number will almost triple to \$343 million and will include increased funding for utilities modernization, energy and water conservation and efficiency, renewable energy projects, ➤



Assistant Secretary Katherine Hammack speaks at the Army Energy Manager Training Workshop. Photos by Terry Shoemaker, Pacific Northwest National Laboratory



Robert Sperberg, chief, Facilities Policy Division, OACSIM, gives a presentation at the workshop in Cincinnati.

Acronyms and Abbreviations

EIO	Energy Initiatives Office
IMCOM	Installation Management Command
OACSIM	Office of the Assistant Chief of Staff for Installation Management

(continued from previous page)

construction waste management, an energy management plan, a LEED Silver rating, low-emitting materials, occupant lighting control, occupant thermal control, storm-water management and sustainable return on investment. Fort Belvoir used a comprehensive evaluation system, Sustainable Return on Investment, to reduce energy and focus on a sustainable patient environment.

Some of the major projects under development include the *Honor Award Concept Design* winning Ambulatory Care Center at Lackland Air Force Base, Texas; the Fort Knox, Ky., replacement hospital and a replacement public health command laboratory at Fort Detrick, Md. Future projects include a medical center at Fort Hood, Texas, and facilities at Fort Bliss,

Texas, and in Germany.

Exterior elements

The development of medical facility sustainable design begins with the building envelope — elevations, entrances, openings and roofs. The building envelope materials should be selected for high performance and reliability, with an emphasis on a hierarchy in form, detail and color. The use of regional and recycled materials gains LEED credits.

Another way to earn LEED credit is to enhance the patient care environment by using glass. Windows provide patients and staff with views of landscaped areas, which are said to promote healing. For example, during the Fort Hood design process, solar shading studies and energy modeling aided the decisions made about building orientation, sunscreen use and the

proportions of the windows.

At selected areas, vegetated roofs can be designed that help reduce patient and staff stress and enhance views for patients, visitors and staff while improving the sustainable aspects of the roof surface, canopies and coverings.

Through these design efforts, the Huntsville Center is helping to develop world class military medical facilities while improving energy efficiency. The MX is assisting with the creation of sustainable facilities that will serve Soldiers, their Families and others for years to come.

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Fort Benning tests small wind turbines to boost renewable energy

by Vince Little

Fort Benning, Ga., is making a pitch toward renewable energy use with two small wind turbines installed in July outside a Warrior Transition Battalion barracks.

The wind turbines are designed to capture updraft off the barracks' air-conditioning unit's four condenser fans and convert it into reusable energy, according to Fort Benning energy manager Vernon Duck. The twin generators, developed by Michigan-based WindTronics, sit atop manifolds on the building's air-cooled chiller. If proven successful, WindTronics' Blade Tip Power System could be expanded across the installation.

"This is innovative. It's really a slick new technology," Duck said. "We're going to look into these turbines and see what we



This wind turbine is designed to capture updraft from air-conditioning units and convert it into reusable energy. Photo by Vince Little

get out of them. We're aggressively seeking any alternatives that are economically viable to help us meet our renewable energy goals."

The Energy Policy Act of 2005 requires all government installations to purchase and consume at least 3 percent of their electrical consumption from renewable resources. The standard rose to 5 percent last year and will reach 7.5 percent in 2013.

Fort Benning isn't meeting the mandate now but could get to 2 percent with various projects under way, including the wind turbines and a waste methane gas effort at a landfill, Duck said.

Green energy comes with a high price tag, he said. For instance, a package offered by Georgia Power would cost the installation about \$800,000 a year. The Army believes it can spend less by generating renewable alternatives from within, but Fort Benning has limited amounts of wind and sun.

On average, Fort Benning receives just 4.9 solar hours a day. The Southeast also falls in Wind Class Area I, meaning there's normally less than 5 meters a second at 30 feet.

Friction and resistance, however, are low on the WindTronics

6-foot-diameter turbines, according to the company. The wheels begin spinning with 2 mph winds.

"We call it exhaust recovery application," said Sarah Jenan, the company's vice president of technical commercialization. "It can offset utility consumption. You're trying to recover some of the energy that's being wasted through the airstream. It channels that air up through the turbine and generates energy from that."

This project marks the company's first venture with a military installation, Jenan said.

Any energy savings from the project will be confined to the Warrior Transition Battalion barracks, where officials hope to slow down the building's watt meter, Duck said. The spinning turbine will create vertical airflow and pull measuring 25-30 mph and reduce the condenser fan workload on the chiller.

"This air would normally be exhausted out into the atmosphere," he said.

Each wind turbine costs about \$6,500 plus engineering and installation costs. The Directorate of Public Works will conduct a life-cycle cost analysis in the next year to determine whether the plan proceeds.

"You have to take some risk when you're trying a new technology out," Duck said. "We're willing to spend the money to ▶

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comprehensive energy and water evaluations, advanced utility metering and the EIO task force, Kidd said. The task force started work Sept. 15. It will identify, prioritize and support the development and implementation of large-scale, renewable and alternative energy projects, focusing on attracting private investments and delivering the best value to the Army enterprise.

Other presenters came from OACSIM; the U.S. Army Corps of Engineers' Headquarters, Construction Engineering

Research Laboratory and Engineering and Support Center Huntsville, Ala.; and the Naval Facility Engineering Service Center, Port Hueneme, Calif. Topics included updates on the Army energy budget for fiscal years 2013-2017, the IMCOM Headquarters' energy program and enterprise strategy, utilities privatization, Army and Navy technology evaluation programs, major renovation energy-efficient design standards for Military Construction, the Army metering program and Energy Conservation Investment Program changes.

In addition, four award winners

presented their success stories: U.S. Army Garrison Kaiserslautern, Germany; National Guard Training Center, Sea Girt, N.J.; Fort Hood, Texas; and Fort Stewart, Ga.

The agenda, copies of the presentations and photos are available at <http://army-energy.hqda.pentagon.mil/training/training2011.asp>.

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Fort Sam Houston steps up to energy conservation

by Jerry McCall

What does energy conservation mean to you? Does it mean turning off lights and monitors when not in use, combining errand trips, setting your thermostat a degree or two higher during hot weather or driving a more fuel-efficient vehicle?

To Fort Sam Houston, Texas, it means a chance to save some big bucks. The June utility bills for the post ran close to \$2.5 million for gas and electricity combined.

So, what is Fort Sam Houston doing to conserve? A recent audit, conducted by Sain Engineering Associates Inc., identified energy inefficiencies and wastes in 20 representative buildings on post and proposed projects to meet mandatory requirements.

Yes, it's true: conservation is mandatory, as in "not an option." Executive Orders 13423 and 13514, the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007 all mandated energy saving. The results of the Sain study at Fort Sam Houston will be used to develop projects to help meet those requirements.

Fort Sam Houston is now a part of Joint Base San Antonio, along with Lackland and Randolph Air Force Bases. The Air Force is the operations and maintenance administrator for the combined bases, and it is up to it to tackle the energy mandates there.

The 502nd Air Base Wing issued an energy policy letter last April with a list of 18 energy-saving initiatives. Included were:

- create a culture of conservation,
- plan to upgrade or demolish energy wasters,
- identify and correct after-hours energy consumption,
- set up strict thermostat settings of 68 F to 72 F for heating seasons and 76 F to 78 F for cooling seasons with a 10-hour comfort-time window,
- consolidate appliances to central break rooms, and
- establish Energy Star compliance for new equipment.

Fort Sam Houston is working toward meeting these goals and, hopefully, nobody has noticed. The best conservation efforts are those that save energy without causing discomfort or inconvenience.

One of the most successful projects involves load curtailment at a large, high-energy-use building. The chilled water temperature is allowed to creep higher by shutting down one of the chillers during high electrical demand periods of the day. This practice cuts down the use of expensive electricity and allows chillers to resume operation later in the day. In turn, the utility provider, City Public Service Energy, pays for the curtailed demand. The cooling water temperature is never allowed to get high enough that the quarters become uncomfortable. Added benefits of this procedure are that it does not cost anything and it helps reduce the chance of rolling brownouts.

A project now in the trial stage will



A worker installs an LED fixture in antique lamp post at Fort Sam Houston. Photo courtesy of Frank Thomas

replace incandescent lights and CFLs with LEDs. LED bulbs produce as much high-quality light as incandescent bulbs while consuming a fraction of the electricity, even less than CFLs, and they do not contain mercury with its potential disposal hazard. Unfortunately, LEDs are still quite expensive, but prices are expected to go down, which will make the project even more viable with a shorter payback period.

These projects and others will help Fort Sam Houston reduce its energy usage, lowering that huge utility bill while maintaining a comfortable environment for those who live and work on the installation.

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test and evaluate it. We think we'll get enough savings from it to pay for itself."

Based on testing, the wind turbines could reclaim up to 15 percent of the power consumed by the chiller, which adds up over time, Jenan said.

The Directorate of Public Works estimates the wind turbines will yield 3 kilowatts an hour of renewable energy.

More than 18,300 kilowatts could be gained, if the air conditioner is used for 70 percent of the year, he explained.

For Benning holds roughly 1,700 buildings. If the technology were to be applied to 1,000 structures, it could hypothetically generate up to 3 megawatts an hour in renewable energy.

"Last year, we spent \$36 million on gas and electricity," Duck said. "With all the

new facilities we have, that'll probably go to \$40 million this year. We consume a lot on this installation. Any energy we can produce here ourselves is very beneficial."

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Fort Carson builds toward energy, water, waste goals

by Andrea Sutherland

Fort Carson, Colo., is constructing a brigade and battalion headquarters building for the 4th Brigade Combat Team, 4th Infantry Division, to meet Leadership in Energy and Environmental Design Platinum standards, a feat that only 5 percent of U.S. LEED-certified buildings have achieved.

“It’s not about getting the points, although that’s how you get LEED Silver, Gold and Platinum,” said Hal Alguire, director of Public Works, Fort Carson. “It drives us toward a number of sustainable design improvements, like putting features within a facility that make it more energy efficient, that reduce the water consumption in a building, that improve the air quality ... It allows us to provide more daylighting into a facility to reduce the amount of lighting that’s needed, so we reduce our energy bills.”

Reducing costs is crucial, Alguire said.

“At the end of the day, it’s about saving resources, saving money on the operations of that building, but also providing an environment that improves quality of life and training,” he said. “So, if we can do that through this scoring system, then we’re excited about that.”

In the past 18 months, construction crews completed 14 buildings for the 4th Infantry Division. The buildings, all of which are eligible for LEED Gold, feature tight envelope construction; solar water-heating systems; low-flow fixtures; heating, ventilation and air conditioning controls;

and lighting controls.

In addition to the Gold-level features, the 140,000-square foot brigade and battalion headquarters building has advanced lighting controls, a 500,000-watt photovoltaic array system and LED exterior lighting. If it meets requirements, it will become one of the Army’s first LEED Platinum buildings.

As Fort Carson continues construction of the 4th Infantry Division buildings and prepares for the new combat aviation brigade, it remains dedicated to meeting LEED and net-zero goals. Fort Carson was designated as one of two Army installations to pursue net-zero energy, water and waste by 2020.

“The net-zero designation gives us a great opportunity as we build out the CAB site,” said Alguire. A control tower, aircraft hangar, barracks and operational facilities are planned. “We can actually look to getting those facilities closer to net zero — energy, water, waste — as we build at the airfield.”

To meet net-zero goals, the plan is to build central energy plants using solar, wind, geothermal and biomass technologies that would reduce the amount of energy purchased from outside utility companies. The challenge for the DPW and the Army Corps of Engineers is funding these energy plants.

“It’s still cheaper to use fossil fuels,” Alguire said. Until the costs of alternative energies come down or the cost of fossil fuels rise, Fort Carson will continue to reduce its energy consumption through equipment upgrades and a changes in culture that encourage people to decrease energy use.

Over the past decade, Fort Carson has made strides in conserving water, according to Alguire. The post reduced water consumption by more

Acronyms and Abbreviations	
CAB	combat aviation brigade
DPW	Directorate of Public Works
LEED	Leadership in Energy and Environmental Design

than 45 percent since 2002 through landscaping and turf management changes, using low-flow fixtures in new facilities, irrigating the golf course with treated wastewater and requiring military units to use the Central Vehicle Wash Facility.

Fort Carson also increased on-post recycling to decrease the amount of waste heading to landfills.

“We’ve upped the number of recycle containers within all facilities,” Alguire said. “That’s the key. We’ll all recycle if it’s easy.”

But, he said, unless Fort Carson invests in a waste-to-energy operation, meeting net-zero waste goals may prove elusive.

“In order to get to the goal — nothing to the landfill — we can recycle, we can look at the procurement stream and buy less packaging and stuff that we’re just going to have to throw away,” he said. “But, at the end of the day, we’re still going to be left with something that would have to go to the landfill. So if we had some kind of waste-to-energy operation ... then that would get us to 100 percent.”

Although Fort Carson has made progress toward its sustainability and net-zero goals, the post has a long way to go, Alguire said.

“We are not going to get to our goals on Fort Carson without strong support from everyone,” he said. The Defense Commissary Agency, the Army and Air Force Exchange Service, Balfour Beatty Communities, military units and all others who own or operate facilities on Fort Carson must all be part of the solution.

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A 500,000-watt photovoltaic array system that will help bring Fort Carson nearer to its net-zero goals is under construction outside the 4th Brigade Combat Team, 4th Infantry Division’s new brigade and battalion headquarters building. Photo by Andrea Sutherland



Fort Hood wins energy and water management award

by Christine Luciano

The Fort Hood, Texas, Directorate of Public Works, Energy Management Branch, was named a 2011 *Secretary of the Army Energy and Water Management Award* winner for *Energy Efficiency and Energy Management*. On Aug. 11, at the GovEnergy conference in Cincinnati, Fort Hood's Bobby Lynn, Richard Strohl, Donald Clary, Huey Keaton and Cody Tipitt were presented the award.

"I'm thrilled that the Army has recognized Fort Hood's commitment to energy conservation," said Brian Dosa, director of Public Works. "Although not selected as a net-zero energy installation, our post is committed to sustainable design and development, and greater energy efficiency ... we are fortunate to have such a talented and dedicated staff."

The branch used an Energy Savings Performance Contract to initiate various energy conservation measures. The ESPC established an efficient and effective energy program that eliminated proprietary control systems, added energy-efficient lighting upgrades and educated Soldiers and the community through training and outreach.

"Developing and implementing innovative approaches and advancements in energy-efficient technologies is a priority at Fort Hood," said Lynn, who is the chief of the Energy Management Branch. "Fort Hood's utility management and control system is an innovative system that promotes conservation, lowers energy costs and protects the environment."

The UMCS manages the utilities of numerous facilities, enabling the transition of several networked and stand-alone control systems to a consolidated system and open communication protocol.

"The implementation of an open

system revolutionized the way energy management systems are procured, operated and maintained," Lynn said. "The open system eliminates the need for proprietary systems while providing open competition for manufacturers, reducing the final cost to the government."

The UMCS not only reduces energy waste and saves dollars, it also provides a standard platform, which helps reduce the Army's dependence on proprietary control systems that cost the Army millions. Eliminating these proprietary devices allows Fort Hood to have flat peer-to-peer architecture with an interoperable and open system.

The system's features let authorized users schedule the run-time of heating, ventilation and air-conditioning equipment based on facility operating hours. Users can change operating temperatures, turn equipment on and off, do diagnostics and identify systems that are not operating properly. They also receive notification of any issues upon sign-in and then can navigate through the web-based system to investigate and make corrections.

Operating time directly affects equipment efficiency and life, said Strohl, the UMCS manager. When equipment is operating, the UMCS captures run time and evaluates it for energy consumption, operational cost and the environmental impact of that consumption.

As part of the ESPC, an energy survey initially identified 57 facilities with HVAC equipment that was operating continuously, regardless of occupancy, and operating at less than optimal efficiency. These facilities were integrated into the UMCS under the first two delivery orders, resulting in more than 90 facilities with a combined floor area of more than 2.6 million square feet monitored and controlled from a central location. A third delivery order increased those numbers to more than 140 facilities with a combined floor area of more than 4.3 million square feet.



(Left to right) Bobby Lynn, Donald Clary, Cody Tipitt, Dick Strohl and Huey Keaton, Energy Management Branch, use Fort Hood's UMCS to manage a facility's HVAC. Photo by Christine Luciano


The UMCS and the use of the ESPC to generate ECMs resulted in \$1,912,833 in annual energy cost savings, Lynn said. These initiatives are helping Fort Hood reduce energy intensity by 3 percent annually to meet the goal of 30 percent reduction by 2015.

To address user behavior, the Energy Management Branch established mock billing for Fort Hood units. Mock billing helps create a culture of energy awareness, modify behavior and promote competition among units.

Each month, commanders receive mock bills from the garrison commander. Each unit's mock bill reflects facilities that have been metered within the unit's footprint. The mock billing program now affects 114 buildings. Fort Hood adds buildings to the program as new meters are brought online.

"The branch is dedicated to sustainability and environmental stewardship through energy efficiency and conservation," Lynn said. "But it takes everyone's involvement in the Fort Hood community to make smart energy choices to achieve environmental success."

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Christine Luciano is the environmental outreach coordinator, Directorate of Public Works, Fort Hood, Texas. 

Acronyms and Abbreviations	
ECM	energy conservation measure
ESPC	Energy Savings Performance Contract
HVAC	heating, ventilation and air conditioning
UMCS	utility management and control system



Fort Buchanan's islandwide approach for sustainability

by Anibal Negron

The Fort Buchanan, Puerto Rico, Directorate of Public Works' Environmental Division and the U.S. Army Corp of Engineers' Jacksonville District are completing various Energy Conservation Investment Program projects, including installations of solar water heaters, a photovoltaic street lighting system, advanced energy management control systems and power inverter air conditioning split units. In addition, an Energy Saving Performance Contract scheduled for the first quarter of fiscal 2012 will initiate 13 energy conservation measures for Fort Buchanan and Army Reserve centers on the island. The ESPC project will install wind turbines; photovoltaic arrays; solar water heaters; water conservation fixtures; lighting systems; high-efficiency heating, ventilation and air-conditioning systems; and building envelope improvements.

The Fort Buchanan garrison's islandwide support mission includes real property management and base operations support for 12 Army Reserve centers, which host the 1st Mission Support Command and some 81st Regional Support Command components located throughout Puerto Rico. For this mission, Jacksonville District also started the design of 143 photovoltaic street lighting systems for the Army Reserve centers on Puerto Rico.

On a reimbursable basis, Fort Buchanan's Environmental Division provides support to the Puerto Rico National Guard and other Reserve components. This unique condition defines Fort Buchanan's sustainability framework.

All of those projects contribute to meeting Fort Buchanan's sustainability goals. To achieve the goals, the Environmental Division established the Sustainability and Environmental



Anibal Negron
Photos by Luis Delgadillo

Management System in 2008 and 10 specific Environmental Management Action Plans in 2009.

The EMAPs designate responsibility for achieving the objectives to relevant functions and organizations. They also provide the means and timeframe for achieving the goals. For the 10 EMAPs, the Environmental Division established five working groups comprising representatives with technical expertise or functions related to the SEMS' significant aspects.

SEMS is a well-defined management structure designed to deal with the impact on the environment of the organization's activities, products and services. It incorporates environmental considerations into daily operations throughout the organization. It is also designed to promote continual improvement, i.e., plan, do, check, act.

After SEMS was established, the Environmental Division initiated an aggressive community outreach and annual awareness program both on post and across the island. Since then, the Environmental Division has conducted the Army Earth Day Expo annually at the installation's community club. About 37 sponsors participate, representing a wide variety of community sectors including private, education, federal and state government, universities, tenants and students.

Other initiatives include monthly environmental articles in the garrison's newspaper, flyers, posters, awareness training sessions, energy conservation information, reforestation events with community members from the Department of Defense schools and Boy Scouts, recycling, updates posted on the Environmental Intranet Portal and energy conservation initiatives.

These efforts ensure that Fort Buchanan and the Reserve centers conform to the *Installation Management Community Campaign Plan* and state, federal and DoD environmental requirements, and that they advance the continuous improvement requirements of the SEMS standards

As one measure of Fort Buchanan's sustainability success, an external audit found the post in conformance with International Organization for Standardization standards in 2008, and the post declared the same Feb. 9, 2009, far ahead of the Army's deadline of Dec. 31, 2009. As a result of the 2010 external audit, Fort Buchanan will reiterate EMS conformance by first quarter of fiscal 2012. Furthermore, according to the last Environmental Performance Assessment System audit inspection, improvement has been truly evident. The post went from 53 Class I findings in the previous audit inspection in 2007 to 21 on the 2010 audit.

Facing a new fiscal reality, Fort Buchanan's Environmental Division continues to mold the future of Army



Students from Fort Buchanan's Antilles Middle School display their recycling projects during Fort Buchanan's Earth Day 2011 celebration.

Acronyms and Abbreviations	
DoD	Department of Defense
EMAP	Environmental Management Action Plan
SEMS	Sustainability & Environmental Management System



Fort Bragg draws on solar technologies for net-zero initiative

by Jonelle Thompson

To face the continuing challenges of energy security and sustainability, Fort Bragg, N.C., is moving forward on the Army's established goal of net-zero energy consumption by 2030. The Fort Bragg Energy Program is developing and implementing methods to produce as much energy as Fort Bragg consumes.

"Operational energy is a critical focus to the whole Department of Defense," said Katherine Hammack, assistant secretary of the Army for installations, energy and the environment. "Everything that we can do to reduce that logistical field is important to the Soldiers and the cost of the battles we are fighting. Striving for net zero is operationally necessary, financially prudent and critical to our mission."

To fulfill this objective, the Fort Bragg Energy Program created multiple approaches to renewable energy. Holistic designs for construction and for maintenance and renovation of existing facilities on post employ technologies such as solar panels, transpired solar collectors, solar hot water systems and passive solar methods.

Fort Bragg has been identified as a viable candidate for solar energy production, according to Paul Hora, Energy Awareness Program coordinator. On average, North Carolina experiences 250 days of sun annually.

"In our region of North Carolina, solar radiation for energy or thermal production is more than adequate for justifying projects with a financial payback in their

useful lifespan," Hora said.

Solar panels — also known as photovoltaic or PV panels — are consistently appearing on Fort Bragg. For example, the PV panel at Sandhills Utility Services is 4.4 kilowatts and produces 6,500 kilowatt hours every year. At the Alternative Fueling Station, solar technology is used to power the perimeter lights. A 167-kW direct current array is in the installation phase at the Warriors in Transition project. The array will reduce electrical consumption by about 219,000 kWh each year and produce a savings of \$19,000 annually. This project will also accrue 518 renewable energy credits valued at \$79,000 every year. In addition, PV technologies are employed on training ranges to charge the batteries that power electronic targets.

Transpired solar collectors are being installed on Fort Bragg. These technologies can reduce the heating and cooling load for facilities. In the winter, outdoor air that is heated by the sun as it passes through the solar collector is released into the facility through the ventilation system. In the summer, transpired solar collectors prevent solar radiation from reaching the structure. Warm air between the collector paneling and the building rises and escapes through holes at the top of the exterior cladding, reducing the cooling load in the facility. Bypass dampers draw fresh ventilation air into the building.

Similarly, solar hot water systems gather energy from the sun to heat water for use in laundries, showers and kitchens. Conventional water heaters are used in conjunction with solar heated water to meet the demands of the facility. The Linden Oaks Community Emergency Services Station is one of the structures on Fort Bragg with solar domestic hot water features.

Passive solar design strategies such as daylighting maximize energy efficiency. For instance, the Linden Oaks emergency services facility is sited to benefit from



The PV panels on a Fort Bragg dining facility feed a solar domestic hot water system. Photo by Jonelle Thompson


natural lighting. Most of the windows face north and south rather than east and west. Consequently, the building can capture more sun without glare and heat gain. Daylight reaches more than 90 percent of all regularly occupied spaces in this structure.

Since solar power has the potential to reduce emissions and dependence on foreign petroleum, these methods of renewable energy support federal environmental mandates, garrison goals and Fort Bragg energy security objectives.

"Solar technology is deployable," Hora explained. "It is accessible, and it can provide long term solutions to current energy needs. As the price of conventional energy rises, economies of scale will ensure that the cost of solar energy will come down. Thermal technology is something we can implement now with minimal adjustments to the system. Both photovoltaic and thermal technology will be a large portion of our net-zero initiative."

Ultimately, solar technologies can be an integral means to sustain the natural and fiscal resources at Fort Bragg — the right way, the green way, all the way.

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sustainability in the Caribbean by renewing its place as the Sentinel of the Caribbean.

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Corps builds sustainable distribution center for DLA in Europe

by Jennifer H. Aldridge

The Defense Logistics Agency's 250,000-square-foot Logistics Distribution Center Europe in Germersheim, Germany, is nearing completion. The \$25 million construction project, managed by the U.S. Army Corps of Engineers' Europe District, will enable DLA Distribution to more effectively support warfighters throughout Europe, the Middle East and Africa. When completed in 2012, all DLA Distribution Europe offices and supply chain operations will be consolidated under one roof.

Efficient

The facility will enable DLA Distribution to combine operations such as receiving, storing, issuing, cross-docking and transportation from several outlying warehouses into on facility, explained Lt. Col. Andre J. Baldanza, DLA Distribution Europe commander.

"We will be able to receive, store and transport all of the items that go through DLA Europe more efficiently," said Baldanza.

Not only will the new facility be a one-stop shop for daily operations, it will also increase the capacity of the distribution center.

"Right now, we have nine bays, and [in the new facility] we will have 26," Baldanza said. "Storage will be right there where the docks are. We will pick, pack and ship right from our consolidated facility. Everything will be closer."

Providing items like repair parts, barrier and construction materials, and clothing and textiles to the warfighter in a timely manner is a key part of DLA's mission.

"We will be able to get items to the warfighter faster," said Baldanza. "We worked with engineers and architects to design the building to meet our mission."

Acronyms and Abbreviations

DLA	Defense Logistics Agency
LDCE	Logistics Distribution Center Europe
USACE	U.S. Army Corps of Engineers

We are building to industry standard as opposed to trying to fit our mission into an existing structure."

Sustainable

USACE and DLA worked together to incorporate a variety of energy-efficient features into the facility. According to Baldanza, the distribution center will be almost entirely self-sustainable.

One of the environmentally friendly solutions that USACE designed into the LDCE is a biomass heating system, which was selected over more traditional boilers. The two biomass-fed boilers will allow the distribution center to generate nearly 100 percent of its heating on site.

This innovative green technology is relatively new to USACE, and the LDCE has one of the Army's first biomass heating systems in Europe, according to David Scott, USACE project engineer.

Biomass heating is only one of the features helping to make the new DLA distribution center sustainable.

Solar panels will line the LDCE's roof to capture sunlight and generate electricity. Eventually, DLA would like to add enough photovoltaic panels to satisfy all of the electrical needs of the building.

The solar panels will provide up to 330,000 kilowatts of electricity annually, according to Daniela Heath, DLA Distribution Europe facility manager.

The radiant heat flooring involves a grid of piping placed under the concrete floor. Hot water will be pumped through the pipes and heat the facility, keeping workers more comfortable during chilly winter months. The radiant heating will also save on energy expenditure and costs.

Enormous skylights will provide the LDCE with copious amounts of natural light that will allow the facility to consume less electricity as compared to the current facilities, which have no natural light and use fluorescent fixtures.



A biomass heating system is among the energy-efficient features in the new Logistics Distribution Center in Germersheim, Germany. Photo by Jennifer H. Aldridge

Well planned

The sustainable environmental solutions incorporated into this building have been carefully planned by DLA Distribution and USACE.

"We feel very blessed, because we were able to build to our specifications," Baldanza said. "The Corps played a definite role in enabling us to do that. They took every suggestion we had and incorporated it into the design. From my experience I don't think that happens often [with other construction agents]."

DLA employees who will work in the completed facility provided input and suggestions to USACE during the design phase.

"This building, when opened, will have a lot of ideas from folks who are actually working the floors of our warehouses," said Baldanza.

DLA Distribution Europe is very pleased with the construction's progress and the team effort that is making the LDCE a reality, Heath said.

"So far there are no delays, and we are on track," she said.

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Iowa Army Ammunition Plant welcomes steam plant upgrades

by Alessandra E. Brown

Steam plant modernization projects at the Iowa Army Ammunition Plant are improving its pollution control equipment and technology. These projects support an effort to comply with the Environmental Protection Agency's maximum achievable control technology standards for industrial boilers, which include control of emissions of hazardous particulate matter.

Project leaders also see MACT compliance as an opportunity to reduce operating costs.

"There is compliance, but you can always run cleaner than the standards," said Art Shattuck, project manager for Science Applications International Corporation, the steam plant modernization contractor. "There is no requirement that says you have to comply with the exact numerical standards. It's a combination of burning cleaner and also burning more efficiently. That means you're burning less coal, and that means you're also reducing your operating costs in addition to complying with the standards."

A team of schematic and building engineers, design experts, process management monitors and environmental specialists began preliminary work in 2006, but planning for the upgrades started more than 10 years ago, according to Leon Baxter, chief, Installation Stewardship Division.

IAAAP started working with the Office of the Project Director for Joint Services and the Program Executive Office for Ammunition inputting project documentation to address the new air standards.

"This heating plant is our primary source of providing comfort and process heat for the facility, so it was important that we plan carefully so we would be able to continue operating," Baxter said.

One of the initial upgrades was the installation of baghouse filtration technology to replace the outdated emissions-collecting equipment. The MACT required a reduction in emissions in the form of opacity, sulfur and nitrogen oxides, according to Loren Nihart, utilities manager for American Ordinance and project manager for the steam plant upgrades.

"Back then, our emission controls included an electrostatic precipitator, which was a 1970s version, and it was about worn out," Nihart said. "The decision was made to go with the baghouse technology, because it could be supplemented with reagent systems, which will be going in upstream from the bags and use calcium hydroxide or bromated powdered activated carbon to remove additional contaminants such as mercury."

Additional modernizations for the baghouse filtration technology included a new ash retrieval system, new exhausters, improved ash unloading, new coal feeders and an economizer for the boiler system and heat exchangers, both of which will allow better temperature control. The most recent project, scheduled for completion this fall, is the installation of a new systems-monitoring control panel that includes electrical upgrades and combustion controls.

"Everything will be recorded," Nihart said. "We can go back and see cause and effect, if somebody sped something up and what that did. With the new controls, there will be better automation and, hopefully, everyone can operate the boilers the same. It should help on efficiency."

Unofficial engineering and compliance tests revealed that the steam plant is very close to meeting boiler MACT standards for emissions limits, and, with the modernization projects, the steam plant should be prepared to meet future regulations.

A data comparison on the particulate matter currently being released from



A crane removes the electrostatic precipitator from the main heating plant at IAAAP. Photo by Arthur Shattuck

the boiler and the amount of emissions released prior to the modernization projects is not confirmed, but Nihart believes there are improvements as a result of the steam plant modernization. The biggest benefit is that opacity, the measure of particulate matter emitted from the stack, is 3 percent or less; when the electrostatic precipitator was in use, opacity was at about 8 percent, he said.

The IAAAP steam plant modernization may be a model for improvement projects at other Joint Munitions Command installations.

"You're meeting the MACT, you're making the boilers run more efficiently, but you're also making the boilers more reliable," Shattuck said. "That's the first priority. Get the boilers so that they're reliable, so that they don't go down, so that there isn't a lack of steam to the process areas. And that is the primary goal of everybody around here — to make sure that the steam needs of the production areas are met so that the production quotas and yields are met."

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When this article was written, Alessandra E. Brown was a Minority College Relations Program student, Public Affairs Office, IAAP.

Acronyms and Abbreviations

IAAAP	Iowa Army Ammunition Plant
MACT	maximum achievable control technology



Tool supports master planning for net-zero installations

by Dana Finney

The first tool of an integrated virtual model to help installations meet the Army's ambitious net-zero goals debuted at the GovEnergy conference during August in Cincinnati. This module, part of the Net Zero Installations Planning Tool, provides engineering analysis for planners seeking to achieve net-zero energy at the facility level, which will feed a system-level analysis model coming in January.

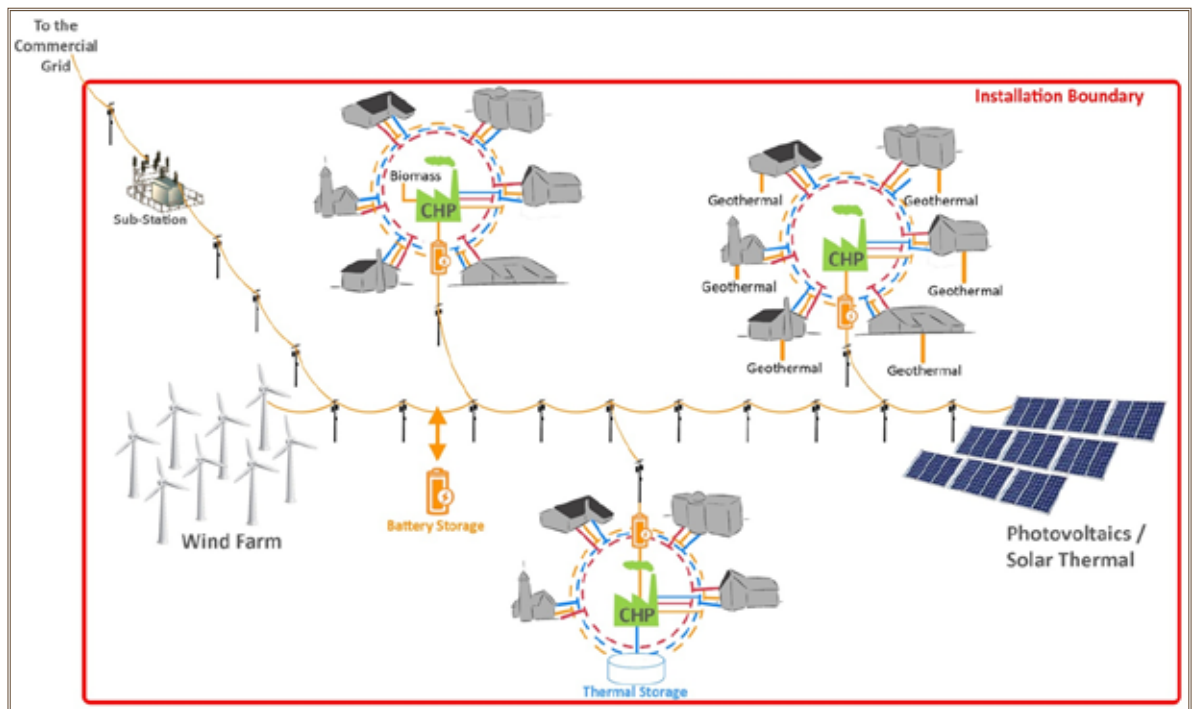
"Before you can optimize systems across the installation, you have to know what the loads are for individual buildings and then determine what energy efficiency measures can get the loads as low as possible," said Michael Case, program manager at the Engineer Research and Development Center's Construction Engineering Research Laboratory. These measures include tried-and-true approaches

such as added insulation; daylighting; modifications to heating, ventilation and air-conditioning equipment; better windows; and lighting controls.

The Net Zero Energy Tool, the first module within the program, allows master planners and energy managers to select clusters of buildings by simply dragging a cursor around those they wish to study. It then retrieves required information

Acronyms and Abbreviations	
BAA	Broad Area Announcement
CERL	Construction Engineering Research Laboratory
ERDC	Engineer Research and Development Center

for each building type within the cluster. Next, users can run energy simulations to select the best energy-efficiency measure packages along with costs and savings-to-investment ratios. The tool will use the ➤



When feasible, co-generation with biomass can help building clusters achieve net-zero fossil fuel and export green energy to existing building stock. Graphic courtesy of ERDC-CERL

Attention innovators: Solicitation invites your ideas

ERDC recently added a topic area to its Broad Agency Announcement as an expedient mechanism to support the Army's net-zero goals. Topic N, *Integrating Installation Energy, Water, and Waste Modeling (CERL-35)*, calls for interested parties to bring their good ideas to ERDC for net-zero studies and technology demonstrations.

Innovators can submit preproposals through the BAA to ERDC for review. While there is no funding set aside for the topics in this BAA, the lab can seek funding from agencies that might be interested in sponsoring the ideas submitted and favorably evaluated.

Through the BAA review process, ERDC subject matter experts will provide technical direction in shaping proposals to obtain the best value for installations. It is expected that agencies would fund ERDC to manage contract execution in partnership with the

installation and sponsor. The BAA has flexibility to award standard contracts, cooperative agreements or grants, as appropriate.

The entire ERDC BAA is available at: https://acquisition.army.mil/asfi/solicitation_view.cfm?psolicitationnbr=W912HZ11BAA02. The BAA includes instructions for preparing and submitting pre-proposals.

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Fort Bragg: Ozone levels pose no threat to prescribed burn program

by Dana Finney

Because ecosystems are dynamic, the environmental laws governing them often intersect. At Fort Bragg, N.C., prescribed burning helps maintain the longleaf pine-grassland ecosystem, which is habitat for the endangered red-cockaded woodpecker. At the same time, the post must comply with Clean Air Act mandates that include limits on ozone precursors released into the atmosphere.

A study led by the U.S. Army Engineer Research and Development Center modeled ozone precursor production using hypothetical 50-, 250- and 1,250-acre burns near the center of the post using the Fire Emissions Production Simulator. Results are reported in a new Corps of Engineers Public Works Technical Bulletin, PWTB 200-1-82, *Modeling the Effects of Prescribed Burning on Ozone Precursors at Fort Bragg, N.C.*, available at http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215.

The Clean Air Act authorizes the U.S. Environmental Protection Agency to establish emission standards for ozone

precursors, delineate ozone nonattainment zones and limit certain activities within those zones. Environmental personnel at Fort Bragg were concerned that emissions of ozone precursors during prescribed burns would affect regional air quality and threaten their maintenance program.

The red-cockaded woodpecker prefers open, frequently burned, mature and over-mature longleaf pine stands having sparse mid-story layers. These forests provide food sources plus the roosting and nesting habitat necessary to sustain the species. Maintaining these conditions requires controlled, low-intensity fires at one- to five-year intervals to prevent encroachment from scrub oaks and other pine that would disrupt the longleaf pine-wiregrass ecosystem to the red-cockaded woodpecker's detriment.

The software chosen for the modeling study, FEPS, is a user-friendly program designed to predict emissions and heat release characteristics from prescribed burns or wildfires. It is available from ▶

Acronyms and Abbreviations	
AQMS	Air Quality Monitoring System
ERDC	Engineer Research and Development Center
FEPS	Fire Emissions Production Simulator
PWTB	Public Works Technical Bulletin



Fort Bragg and other southeastern U.S. installations use prescribed burning to mimic the natural fire regimes needed to maintain the health of longleaf pine forests, which are habitat for the endangered red-cockaded woodpecker. Photo by K. Bischof, North Carolina Division of Parks and Recreation

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selected options to optimize facility-level solutions and provide documentation and justifications for preparing DD Form 1391s or to prepare bundles of projects designed to be attractive to private financing.

“We’ll never get to net-zero energy on a building-by-building basis,” Case said. “But by making each building as efficient as practical and affordable, we can then evaluate district-level strategies such as biogas-fired cogeneration solutions that efficiently generate electricity while using normally wasted energy to heat and cool nearby facilities. We also need to consider centralized versus distributed renewable solutions, such as wind, solar and other new or emerging technologies.

“Basically, the tool helps weigh the tradeoffs among alternatives and costs, energy saved, fossil fuel eliminated and

green house gases reduced,” he said.

Development of the net-zero tool is funded by the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology. During fiscal year 2012, CERL will begin work on modules for net-zero water and waste to be integrated with the tool. The research team includes subject matter experts from the Department of Energy, academia and industry. Web demonstrations of the net-zero tool are available by contacting the POC below.

“Energy, water, solid waste and greenhouse gas are complex, coupled systems,” said team member Hany Zaghoul. “For example, strategies to achieve net-zero energy can increase water usage, while processes such as desalination use large amounts of energy.”

To ensure the integrated tool will reflect the most innovative, cutting-edge

ideas from academia and the private sector, CERL issued a Broad Agency Announcement solicitation in July. (Editor’s note: See sidebar on page 26.) The goal is to gather a critical mass of expertise to augment the research team and complete the tool at an accelerated pace.

Meanwhile, numerous ongoing studies and demonstrations focus on energy, water and waste technology and greenhouse gases. These studies will help lay the groundwork for the future modules. For example, regional water studies and conservation strategies will help in building the water model, and a pilot-scale demonstration of a solid-waste gasification plant started this year.

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Net zero offers chance for updated water model to show value added

by Paul Landgraff

The Army's Net-Zero initiative provides an opportunity to prove the worth of a user-friendly, computer-based model created by the U.S. Army Corps of Engineers two decades ago. The Installation Water Resources Analysis and Planning System is a model that, using a new spreadsheet format, can accurately identify installations' water needs, a key requirement for implementing the water portion of net-zero and other conservation initiatives.

Water is a strategic resource, essential to military operations, installation support and industrial processes. The resource's availability is increasingly threatened by pollution, overuse and conflicting demands. This situation has been particularly true in the Western United States and is the driving issue behind the Army's net-zero water initiative.

A sound net-zero strategy makes investments designed to reduce energy and water consumption and waste generation; increase the supplies of renewable and alternative energy sources; and provide efficient handling of sewage, stormwater and solid waste.

Water consumption and energy usage are related. As water demands increase, a greater quantity must be produced, treated, stored and distributed to users resulting in a greater volume of wastewater to be collected, pumped, treated and disposed.

All of these processes require energy. Thus, a net-zero water installation can help



Paul Landgraff
Photo by Mary Beth Thompson

the Department of Defense achieve the federally mandated energy sustainability goals.

A net-zero installation would "repurpose" its water, ultimately returning used water back to the watershed so as not to increase existing draws from regional resources. This approach emphasizes what an installation needs as opposed to what it may be using.

Repurposing could, for instance, begin with improvements to the installation's distribution systems. Gray water, wastewater and brackish water can be repurposed. Gray water — generated from sources such as showers, sinks and laundries — can be combined with precipitation runoff and used for irrigation. Wastewater can be treated and reused like gray water or returned to its source. Desalination can convert brackish water to fresh water suitable for human consumption.

IWRAPS addresses the issue of need,

of prescribed burns during ozone (nonattainment) episodes. The results also showed that the effect of prescribed burning on regional eight-hour average ozone levels is probably trivial — fewer than 3 parts per billion by volume over background.

This outcome means the benefits attained by prescribed burns for restoration or maintenance of the longleaf pine-grassland ecosystem at Fort Bragg far

Acronyms and Abbreviations

IWRAPS	Installation Water Resources Analysis and Planning System
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as opposed to usage. The model was developed from 1987 to 1991 and tested during the early 1990s at installations in Western states during water rights litigation. The model proved effective at forecasting installation water needs up to 100 years into the future with about a 95 percent confidence level under normal, conservation and mobilization scenarios. The courts upheld these forecasts.

Unfortunately for Army users, IWRAPS fell victim to the "peace dividend" in the later 1990s, and funding evaporated. Legal issues with the software that ensued have been resolved, and IWRAPS, once accessible only in DOS, is now available in Windows, ready for use in today's environment.

While its overall approach remains technically sound, installation usage data and the real property database need updating. IWRAPS is still considered by many to be the best water-needs forecasting algorithm in the industry, but that distinction needs to be proven.

The Corps would like to work with the Office of the Assistant Chief of Staff for Installation Management and Installation Management Command to test IWRAPS at the six installations designated as net-zero water installations. The goal is to prove IWRAPS' worth. This proof-of-principle involves applying the lessons

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the U.S. Forest Service at <https://www.fs.fed.us/pnw/fera/feps>. Output from FEPS was sent to the Environmental Policy Modeling Group at the University of North Carolina, Chapel Hill, for incorporation into the state-approved Air Quality Modeling System.

While the results were specific to the particular inputs into FEPS and AQMS, they supported the current prohibition

outweigh the impact of ozone production arising from these activities. It was concluded that there was no ozone-related basis for modifying the existing prescribed burning program at Fort Bragg.

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Bulletin provides help for managing winter annual grasses

by Ryan Busby

Land managers at military installations face challenges in discriminating between winter annual grasses as invasive species and those that are not detrimental to the ecosystem. Now, comprehensive guidance is available from the Corps of Engineers as a Public Works Technical Bulletin. PWTB 200-88-1, Guidelines for Management of Winter Annual Grasses, is available at http://www.wbdg.org/cb/ARMYCOE/PWTB/pwtb_200_1_88.pdf.

While winter annual grasses occur in all 50 states, they create the most problems in the arid and semi-arid western United States where they are adapted to take advantage of seasonal precipitation that occurs in fall, winter and spring. In these environments, winter annuals use a major portion of soil moisture before native perennials and other desirable plant species are active. Once the moisture runs out, winter annuals flower, set seed and mature to create a readily combustible fuel source throughout the hot, dry months of the

growing season.

Fires associated with winter annual grass invasion have dramatically decreased the fire return interval from decades to every few years in many locations. Many native plant species are not adapted to cope with recurring fires and are replaced by winter annuals.

Not all winter annual grasses behave in this way and do not need to be controlled. Separating native from introduced species is important so that control efforts are focused on the nonnative problem species and not erroneously conducted on native species only perceived to be a problem.

The PWTB:

- includes a comprehensive list of winter annual grass species occurring in the United States, both native and introduced;
- provides distribution and occurrence information for these species;
- describes management practices to control winter annual grasses in general; and
- includes an identification key for the grass genera having widespread native



Cheatgrass, *Bromus tectorum*, is the most widespread and aggressive invasive winter annual grass in the United States. Photo by Ryan Busby

and introduced species to aid in separating those species from one another.

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Acronyms and Abbreviations	
PWTB	Public Works Technical Bulletin

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learned from working with the original model and would include updating the installation's usage data, updating the real property database and, finally, recalibrating the model. The needs prediction would come in the form of the updated spreadsheet platform.

IWRAPS forecasts do not rely on per-capita usage, which account for only 50 percent of observed variance. The forecasts do not rely on gallons of water consumed per square foot, a method that accounts for only 85 percent of the observed variance. IWRAPS forecasts relate usage directly to building types and sizes as surrogate variables for mission and population. This approach accounts for the dynamics of use intensity for various facilities types over time.

To determine the actual water need, IWRAPS considers these usage dynamics together with percentages that factor the installation's improvement with man-made facilities, construction and demolition plans, and seasonality, climate and weather variables.

Payoffs associated with an accurate water-needs forecast are:

- fewer dollars allocated to paying water and sewage bills;
- fewer dollars allocated to paying the legal cost of defending water rights;
- improvements to Soldiers' quality of life;
- reductions in the installation's draw of resources from the surrounding community;
- enhanced support for the economic base of the surrounding community;

- enhanced ability to support the operational mission while addressing the triple bottom line of financial, social and ecological interests; and
- ability to take advantage of a 2005 Energy Policy Act provision that allows unspent appropriations for water conservation, assuming at least some conservation actions are implemented, to be retained for future investment in other energy-savings projects.

This last item would make it easier for installations to meet all their net-zero goals.

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White paper explores challenges in achieving net-zero water

by Elisabeth Jenicek

The Center for Advancement of Sustainability Innovations published a technical note that examines issues related to ensuring long-term availability of water resources for military installations. Part of the CASI “White Paper” series, *Net Zero Water for Army Installations* is available at http://www.cecer.army.mil/techreports/erdc-cerl_tn-11-2/erdc-cerl_tn-11-2.pdf. This article summarizes information contained in the white paper.

The U.S. Army is vulnerable to the same issues of water supply and demand that jeopardize global water security. Providing the required amount of clean, fresh water where it is needed is increasingly difficult.

The conditions that threaten water availability are the aging state of water infrastructure; generalized population growth, especially in regions containing key Army installations; increased water demands for energy; and the uncertain but generally agreed upon regional effects of global climate change. The complexity of water compacts, treaties and agreements is another challenge for installations. In the coming years, the effects of water scarcity will be more severe in certain locations and this will be reflected in increasing costs.

To help ensure sustainable water supplies for installations, the Army launched the Net-Zero Water initiative. Installations maintain a high degree of control over city-like campuses. This positions them to be involved in acquisition, treatment, distribution and use — and potentially reuse — in a holistic fashion, an opportunity that few other organizations are afforded.

Given this significant opportunity, partnering will be the key. Some water management functions are already privatized. Every activity that uses water affects others in the watershed as do

regulators. The Army needs to have end users fully engaged in whatever solutions it selects and implements. Partnering should also include state and regional players, code groups, national industry associations and other federal entities.

Few truly new technologies are available for water efficiency and conservation programs. However, there is a lack of information for many technologies on effectiveness, return on investment, maintenance and other life-cycle implications. It is imperative that the Army document its own technology demonstrations and also collect the lessons learned from others to assist installations in planning and investment toward attainment of net-zero water.

Large reductions in water use will require a holistic approach that includes policy, technology, education, partnering with others and strong command emphasis. Some initiatives will apply Armywide, while others will be site-specific.

Consideration should be given for the varying circumstances that may affect water supply and demand. Installations are located in regions that encompass a broad spectrum of conditions affecting water security, cost and applicability of water-efficient technologies.

Hydrologic conditions vary across the United States and include differences in surface and groundwater availability, and vulnerability to drought and other climate extremes. Climate conditions will affect the potential applicability of some net-zero water technologies, e.g., collection of rainwater and condensate. Local laws and codes will also affect technology infusion e.g., the legality of collecting rainwater and the codes regulating gray-water reuse.

Finally, installations vary in the maturity of their water conservation programs, some having already achieved substantial savings and perhaps not easily able to further reduce consumption. An installation’s net-zero water program should be unique and tailored to these characteristics.



A Vicenza, Italy, barracks bathroom has dual-flush toilets, a “low-hanging fruit” water-conservation measure that many installations have already added. Photo courtesy CERL

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Web tool supports net-zero water efforts

A web portal launched earlier this year, the Water Management Toolbox, has been enhanced to specifically address achieving net-zero water. (See related article in *Public Works Digest* July/August 2011, page 36.)

Topics include:

- 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
- News

The toolbox is publicly accessible at <http://water-management-toolbox.com/>.

Acronyms and Abbreviations

CASI	Center for the Application of Sustainable Innovations
CERL	Construction Engineering Research Laboratory



Treating landfill leachate with microbial mats: Not recommended

by Gary Gerdes

The Corps of Engineers published a new Public Works Technical Bulletin describing results of a pilot test at Fort Hood, Texas, to evaluate a microbial mat system for treating landfill leachate. PWTB 200-1-80, *Microbial Mat Landfill Leachate Treatment System*, is posted on the Whole Building Design Guide website at http://www.wbdg.org/ccb/ARMYCOE/PWTB/pwtb_200_1_80.pdf.

While the Army has few active landfills such as the one at Fort Hood, numerous closed landfills on military installations may, at some time, require the collection and treatment of leachate. Thus, it is valuable for Directorate of Public Works personnel to be knowledgeable about alternatives to treat landfill leachate discharges. These discharges may be transported off site for treatment, treated on site for discharge to the environment or pretreated and discharged to a wastewater treatment system.

Leachate typically contains high concentrations of metals that exceed treatment and pretreatment discharge limits set forth by local or state regulatory agencies. Discharging untreated leachate could cause the facility to be noncompliant with its National Pollution Discharge Elimination System permit and also could lead to a notice of violation being issued to the wastewater treatment works that serves the installation. If the contaminated wastewater is discharged to a publicly owned treatment works, it could result in financial claims against the Army.

A study was conducted at Fort Hood under the Waste Minimization and Pollution Prevention program managed by the Engineer Research and Development Center's Construction Engineering Research Laboratory to evaluate whether a pilot-scale microbial mat leachate

treatment system could effectively reduce metal concentrations to within test goals based on regulatory requirements. The study was conducted in 2006, with CERL choosing to evaluate the system because it had potential for reducing metal concentrations. However, it was determined through the evaluation process that the microbial mat system needed the addition of a polishing system.

The study team then conducted a pilot-scale demonstration of the microbial mat system with constructed wetland polishing. The combined system removed some metals — iron and manganese — but failed to reduce concentrations of all metals below the field test goals.

In particular, the system was not able to withstand wide fluctuations in metals concentrations. Boron could not be removed in the polishing system, although it had been removed successfully in bench-scale tests.

Other problems occurred during the field test.

- Higher-than-expected iron concentration caused saturation in the biomats.
- The design flow rate appeared to overwhelm the system.
- Hot midsummer days may have impaired the acclimation of the wetland plants in



A pilot scale study at Fort Hood revealed that high levels of iron in the leachate saturated the biomats. Photos courtesy of ERDC



The microbial mat system components are set up at Fort Hood.

the polishing system.

Use of the microbial mat leachate treatment system cannot be recommended without a redesign based on actual influent characteristics and subsequent retesting. Due to the problems outlined above, proposed use of this system would require significant design adjustments to enhance system performance.

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Gary Gerdes retired from ERDC-CERL, as a senior project manager. 

Acronyms and Abbreviations

CERL	Construction Engineering Research Laboratory
ERDC	Engineer Research and Development Center
PWTB	Public Works Technical Bulletin



Improving power supply in southern Afghanistan: A project view

by Joan F. Kibler

Residents in Afghanistan’s Helmand and Kandahar provinces will get improvement in the amount of electricity they receive, thanks to an interim measure designed to reduce the number of daily circuit interruptions at the Kajaki Dam power house on the Helmand River. While residents will see the results of a primary switch center installation, Da Afghanistan Breshna Sherkat, the Afghan utility power company, will benefit from fewer shutdowns that cause wear and tear on the turbines generating this power.

The net result is twofold: more electricity for citizens and a prolonged lifespan for the two turbines.

Kajaki Dam has long been recognized as the source for sustainable and renewable power for Helmand and Kandahar provinces. Afghanistan and U.S. agencies are partnering to increase its power generation and distribution over the next three years. Part of the solution lies in installing a third turbine at the Kajaki power house and making other electrical repairs.

Recognizing the need to make immediate fixes until the longer term projects are complete, International Security Assistance Force Regional Command Southwest asked DABS what could be done quickly to provide the most benefit, according to Jim Murray, project manager for power, Afghanistan Engineer District-South. The answer was feeder circuit protection for the turbines.

Switch center faults

On July 11, technicians from DABS and the South District finished a nine-day project that will reduce the number of faults — electrical overloads and shorts — causing the turbines to shut down.

Acronyms and Abbreviations

DABS	Da Afghanistan Breshna Sherkat (Afghan utility power company)
kV	kilovolt
SEPS	Southern Electrical Power System
USAID	U.S. Agency for International Development

“The new primary switch center will absorb many of the faults, so they won’t make their way to the turbines and shut them down,” Murray said. “When the switch center trips, the DABS operator resets the switch, which takes about 15 minutes, but the turbines remain operating. Previously, when the turbines shut down because of faults, the operators had to synchronize both of them to bring them back on line; this process generally took about an hour each time.

“Resetting the switch center is similar to resetting a circuit breaker in your home electrical panel when the circuit breaker has tripped, though on a much larger scale,” Murray said.

Chief Warrant Officer 5 Thomas Black and his team of power specialists — Staff Sgt. Alex Brown, Sgt. Terry Dietrick and Sgt. Joshua Strausbaugh — worked with DABS to install the switch center. Black is deputy commander of Task Force Breshna Barq, a unit within the South District charged with providing engineering and construction services to support projects for the Southern Electrical Power System, which serves the Kandahar, Helmand and Uruzgan provinces. The power specialists are from the 249th Engineer Battalion (Prime Power).

“The switch center has measures that will protect the turbines,” Dietrick said. “It’s costly to repair or replace them, so the longer you can extend their life, the better.”

Transmission line faults

The Kajaki power house distributes electricity through two lines: a 13.8-kilovolt line that transmits to Tangi and Kajaki villages and a 110-kV line that transmits to Lashkar Gah and Kandahar



Kajaki Dam power house, built by the United States in the 1970s, provides power to residents of Helmand and Kandahar provinces. Photo by Chief Warrant Officer 5 Thomas B. Black

City. Most of the faults occur in the 13.8-kV line because of two failing circuit breakers that could not protect the turbines from faults. The new switch center replaced these circuit breakers.

The new switch center will not stop the faults completely, according to Black, but it will isolate many of them from getting to the turbines and thus taking down the entire grid. In addition, the switch center will lessen the impact of any faults that do make it to the turbines.

DABS power house operators told Black that circuit interruptions on the 13.8-kV line occurred as many as 10 times a day before the switch center was installed, shutting down the turbines for extended periods. Consequently, no power was distributed over either line until the turbines were powered up again.

“Residents served by the Kajaki power house will now have more electricity because the turbines will be down less,” Murray said. “For people on the 13.8-kV line, this doesn’t mean they won’t have outages. When outages are stopped at the switch center, they only last a short period.”

Collaboration among many

This project was a shared effort, representative of all the work being done by the Afghan and U.S. partners to improve SEPS, according to Black. ➤



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“DABS engineers did the majority of the work to construct the air switch assembly, which we call the rack,” Black said. “They removed the inoperable switches, helped to install the switch center and made the connections on the 13.8-kV line.”

The II Marine Expeditionary Force transported the team, airlifted the equipment and provided security, Black said. Black and Veatch, the company working for the U.S. Agency for International Development on the power projects, provided lift assets and basic life support needs.

“Without their assistance lifting the rack into place, our work would have been much more labor intensive and taken much longer,” Black said.

The joint team spent the first few days inventorying equipment and materials, testing cables and fabricating the frame. When it was time to begin the installation, DABS disconnected the 13.8-kV line from the grid.

“The line was out of service for just over three days, with no power provided to Kajaki and Tangi villages, since there was no safe way to create a bypass transmission line,” Black said. “DABS met with the elders in advance to explain why it was necessary to disconnect the power line. We wanted the citizens to fully understand

that their power would be disrupted while we worked on improving the amount of power they receive.”

Technician’s partner

Dietrick, the project manager for the switch installation, said that while the project was about helping to bolster the infrastructure, it was also about building capacity with the DABS technicians.

“The work came easy to them because of their practical experience,” Dietrick said. “We showed them how to operate the switches correctly and the industry standards for safely handling cable. They did the work on their own fairly quickly.”

The joint team worked from sunup to sundown every day.

“The DABS technicians were with us every step of this project,” Strausbaugh said. “They stayed with us until the mission was done. They have a good work ethic. It was a great experience for them and us. Because of this project, they will have more reliable power, and that’s important for winning the hearts and minds of the people.”



(Left to right) Sgt. Joshua Strausbaugh, Staff Sgt. Alex Brown, Sgt. Terry Dietrick and Chief Warrant Officer 5 Thomas Black, power specialists from the Afghanistan Engineer District–South, pose at the Kajaki Dam power house where they improved power supply to the Helmand and Kandahar provinces. U.S. Army Corps of Engineers photo

upgrades begin.”

When installed, the third turbine at Kajaki Dam will increase generation capacity from the current 32 megawatts to about 52 megawatts. The United States built the Kajaki Dam power house in the 1970s, but it has deteriorated due to decades of conflict. In the last few years, USAID rehabilitated the two existing generators to restore power production to its current level.

In addition to installing the third turbine, the Afghan and U.S. governments are planning projects to provide sustainable and affordable power throughout southern Afghanistan to foster economic growth and improve the lives of citizens.

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At the time this article was written, Joan F. Kibler was the public affairs officer, Afghanistan Engineer District-South, U.S. Army Corps of Engineers. She is now with Middle East District.



Sgt. Terry Dietrick (right) looks on as DABS engineers work to construct the switch center that will reduce the number of daily circuit interruptions at the Kajaki Dam. Photo by Chief Warrant Officer 5 Thomas B. Black



Managing construction in Afghanistan: A project manager's experience

by Jenn Domashevich

He went from managing environmental cleanup projects at formerly used defense sites in Ohio to managing roughly \$309 million worth of construction projects in Afghanistan. During his six-month deployment at Kandahar Airfield, Lynn Jarrett, a U.S. Army Corps of Engineers' employee, managed construction projects for the Afghan National Police, a section within the Afghan National Security Force.

"I managed projects, both pre-award and post-award, that built district headquarters for police and border patrol facilities," said Jarrett. "We were building these facilities to house anywhere from 60 to 500 personnel in the ANP program."

The projects were done in two phases. The first, the pre-award phase, involved getting contracts awarded. After contracts were awarded and contractors had been hired, the second phase, the post-award, would begin.

"What I found the most interesting was putting together all of the pieces that were necessary to get these facilities both contracted and then constructed afterwards," said Jarrett. "I had to work with Real Estate, Office of Counsel, Contracting, Engineering, Construction and the contractors. I also addressed the needs of the stakeholders, who, in this case were the Afghan National Police and their mentors."

Jarrett worked on about 25 pre-award



Old border patrol facilities in Afghanistan like this one are being replaced with facilities that will house from 60 to 500 Afghan National Police personnel. Photo by Lynn Jarrett

projects and 20 post-award projects, all of which were in different stages of completion. The projects ranged from \$5 million to \$20 million and had to be completed at an accelerated rate.

"We worked 128 hours a pay period, 64 hours a week, and a lot of times even more than that in order to get things done," said Jarrett. "It was a very expedited process."

Jarrett managed projects in Kandahar, Uruzgan, Daykundi and Zabul provinces. Many areas where projects were being built were extremely remote and required materials to be transported down dirt roads. All of the roads that Jarrett traveled had to be cleared of improvised explosive devices by a route clearance team.

"We went out a few times with the route clearance team," said Jarrett. "We had to push up some dirt roads to access the facilities with MRAPs [Mine Resistant Ambush Protected vehicles]. It was a long and bumpy ride."

The properties where facilities were being constructed also had to be cleared of explosive devices.

"There always had to be mine clearance as a component of each of these contracts," said Jarrett. "We had a mine clearance project manager and people who oversaw mine clearances to make sure it was done correctly and met USACE criteria."

Prior to his deployment, Jarrett worked as a project manager in the Louisville District's Environmental Branch, managing all formerly used defense site projects in Ohio. During his deployment he was promoted, and he returned to the district as the program manager for the district's Defense Logistics Agency Strategic Materials

Acronyms and Abbreviations	
ANP	Afghan National Police
FUDS	Formerly Used Defense Site
USACE	U.S. Army Corps of Engineers



Lynn Jarrett is transported aboard a helicopter to a remote Afghan construction site. Photo by Lt. Col. John Carpenter, U.S. Army

Program and project manager for the Inventory Project Reports for the FUDS program.

"My experience in Afghanistan was both interesting and challenging," said Jarrett. "The construction we did is benefiting the Afghanistan National Security Forces and the Afghan people and will for the foreseeable future. It was a privilege to contribute to the rebuilding and fortification of this war-ravaged country. In addition, I personally acquired new skills and knowledge from the deployment that I can use in my current position."

"It is gratifying what a dedicated group of competent people can do in a short time when they stay focused."

POC is Jenn Domashevich, jennifer.s.domashevich@usace.army.mil.

When this article was written, Jenn Domashevich was a public affairs specialist, Louisville District, USACE. She is now with Jacksonville District.





Developing Afghan facility engineering: A leadership perspective

by Lt. Col. Ted Bernhard

Unreliable city power grids, inoperable wastewater treatment plants and depleting deep-water wells ... Afghanistan has been in a continuous state of war for more than 30 years, so, naturally, its infrastructure is in a severe state of disrepair. U.S. forces have been operating in this environment for almost 10 years under Operation Enduring Freedom. One of the current strategic objectives for the U.S.-led coalition is to field Afghan National Security Forces consisting of more than 350,000 army troops and policemen. This objective includes building the ANSF's mission and support facilities. After completion, the maintenance and repair of those facilities will be a daunting task as the coalition transitions responsibility for facility sustainment to the Afghans.

It is with that backdrop that I share some of our experiences with regard to the state of Afghan public works and offer some lessons learned that can be applied in other future contingency environments or perhaps our own U.S. facilities.

NATO Training Mission-Afghanistan/ Combined Security Transition Command-Afghanistan is focused on ANSF professionalization and developing its capacity for all primary and enabling functions. Within that command structure, the Combined Joint Engineer Directorate has an Infrastructure Training Advisory Group Branch dedicated to developing facility engineering. ITAG's mission is to provide training, mentorship and synchronization of operations and maintenance efforts at ANSF sites to ensure ANSF-led facility sustainment.

The scope of NTM-A's build and

maintenance effort is massive. The current and planned nationwide build effort covers six regions and more than 800 Afghan National Army and Police sites, and is valued at more than \$11 billion. Two of the command's primary concerns are to protect the investment in these facilities and help promote Afghan stewardship to ensure long-term sustainment.

Operating in an underdeveloped, dangerous environment has certainly provided challenges to our ITAG teams. ANSF facility processes and systems at the garrison, engineer department and ministerial levels are in their infancy. There is a critical need to build facility engineer staff capacity at all levels and address systemic problems centered on manning, training and equipping the Afghans. Having a realistic and usable budget at the garrison level is essential. ITAG teams have been a catalyst for positive change and are able to solve some of these issues in part, but more interaction on facilities issues between the coalition and ministries is needed.

Providing on-the-job training for Afghan facility personnel has been and continues to be a big need. The trades required at each garrison are fairly standard; they include: masonry; carpentry; electrical; plumbing; heating, ventilation and air conditioning; metal working; painting; and generator maintenance.

ITAG has been able to oversee some of this vocational training conducted by our national O&M contractor at a centralized location in Kabul and at selected garrisons. Hands-on training seems to be the best approach, and on-site practical application has yielded the best results. For example, one ITAG team led an OJT project to build a 2,200-square-foot multi-purpose facility from start to finish. With ITAG supervision, an inexperienced Afghan crew prepped the site, placed the concrete, framed the walls and completed finish



Staff Sgt. Joe Campos (right) instructs Afghans participating in OJT about power tools. Photo by Cpt. Jose Rocha

work for the entire structure.

For these ANSF tradesmen, the experience was invaluable. They used power tools for the first time and increased their building skills on a real project outside the classroom.

ITAG continues to work through training and other challenges, such as a workforce with 10-20 percent literacy, as it helps establish public works organizations throughout Afghanistan. Operational budgets; reliable logistics and supply chain systems; and the ability to recruit, train and assign facilities personnel are all critical to success.

To illustrate, we can examine the recruiting need. ITAG has focused on several manning initiatives. One attractive option is to have the ministries work with local vocational trade schools to set up a tailored program that would train Afghans if they sign up to work at ANSF locations for a five-year commitment. Another option is to recruit Afghan tradesmen who are working on existing U.S. contracts. Once the current nationwide infrastructure development slows down, they could migrate to ANSF positions.

Pay parity is an issue, because government positions can't match the current market's pay. However, the dynamics of this solution may well work out as the economy adjusts after most major builds are completed.

In the spirit of continuous improvement and the crucial need to

Acronyms and Abbreviations	
ANSF	Afghan National Security Forces
CSTC-A	Combined Security Transition Command-Afghanistan
ITAG	Infrastructure Training Advisory Group
NTM-A	NATO Training Mission-Afghanistan
O&M	operations and maintenance
OJT	on-the-job training



Career development: Breaking your own glass ceiling, part 3

by Jim Hearn

As I expanded our career development discussion in the July/August issue, you were asked to conduct a personal SWOT (strengths, weaknesses, opportunities, threats) analysis to identify areas to emphasize, areas to improve, areas to pursue and areas to avoid in your career plans. This SWOT analysis on top of the personality trait analysis discussed in the May/June issue provides you with a detailed picture of your readiness to develop a plan to achieve your career potential.

As the Cheshire Cat challenged Alice in "Alice in Wonderland," "If you don't know where you are going, then any road will take you there." If your career plan is just, "any road" then you have no real idea where it will take you. Many dead ends, long deviations or rocky potholed routes can detour or hinder your progress towards your desired career goal.

The first task in mapping a career path is "visioning" your ultimate goal. If you are like me, you have to visualize a problem



Jim Hearn
Photo by Harry Weddington,
Omaha District

before you can develop a solution. Having a vision of your ultimate career goal allows you to charter a course to reach it.

Your ultimate career goal may change over time as you reach intermediate objectives faster or other priorities slow your progress. Picturing where you will be — position, location — in five, 10, 15, 20 years will give you intermediate objectives to keep you on your selected career path.

Many of you belong to a designated

Acronyms and Abbreviations

CP-18	Career Program 18, Engineers and Scientists – Resources and Construction
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career program, such as CP-18 for engineers and scientists. The Department of the Army intends to eventually have every individual covered by a career program. These career programs provide broad guidelines on technical skills and relative positions that careerists should have as they move along their career paths. Adding graduate education programs, Army sponsored Civilian Education System courses, developmental assignments and career-broadening opportunities fills critical gaps along your career path. The resultant plan ensures a broad development, strategic perspective and appropriate preparation for senior level responsibility.

Those who do not yet have a prescribed career path should talk to their supervisor or mentor to determine a logical and realistic path toward their career goals. Mentors can be a great resource, since they are not normally in your direct

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learn from the past, I've put together some lessons learned that are of interest in this theater and may be considered in stateside operations:

- Build infrastructure that is sustainable; this is particularly important for the Afghans as they have limited budgets, immature supply chain systems and an austere environment.
- Focus on developing systems and processes that are "right for Afghanistan," not a pure Western approach that will not reach a critical mass as we reduce our assistance levels.
- Build in-house or organic capacity first for routine maintenance but develop a robust contracting capacity for more technical O&M infrastructure such as power plants (most ANSF structures are not on a city grid), wastewater treatment plants and deep wells.

- Leverage the existing trained workforce to hire tradesmen migrating from the private sector to save on training costs and time, as the current build demand won't continue.
- Continue building Afghan literacy but focus training effort on practical, hands-on methods to maximize training effect with the objective to be able to conduct O&M at each site.
- Improve networks and initiate process improvements so the ANSF can grow from a paper work order and log system to a more automated system that can track budget and parts.
- Implement quality control systems for work validation and increased contractor oversight.

Afghans are on the right path to building their capacity to sustain ANSF facilities. They are moving from an ad-hoc to a more defined process by further

developing their budget, logistics and training processes. Stateside garrisons may consider some of the fundamental issues the Afghans are facing, especially as they attempt to manage and optimize their own operations with limited resources.

The ANSF is taking those first incremental steps toward managing a facility maintenance task that is massive in scope. Given their dynamic and challenging environment, the Afghans really are making visible progress, and momentum is going in the right direction for the transition of infrastructure responsibility and future Afghan-led sustainment.

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Lt. Col. Alan T. Bernhard is the officer in charge, ITAG Branch, Combined Joint Engineering Directorate, NTM-A/CSTC-A.



Directorate of Public Works training curriculum at a glance

by Gustavo (Gus) E. De Jesus

The establishment of a Directorate of Public Works curriculum has moved forward under the auspices of the Installation Management Command Academy. The IMCOM Academy was established to bring all IMCOM institutional training under a single enterprise solution. A facility was constructed in Fort Sam Houston, Texas, and its eight classrooms with a capacity of 216 students are in operation. The DPW Academy is a subset of this effort that supports engineers, scientists, housing personnel and public works professionals.

Most people assume that facilities management is primarily professional engineers at work, but facility management encompasses multiple disciplines that ensure functionality of the built environment by integration of personnel, place, process and technology. To be proficient in this profession, individuals require a broad range of knowledge and skills, including engineering, asset management, planning and plant operations, to name a few.



Gustavo E. De Jesus
Photo by Michael Andres

DPW Academy classes are open to staff members of DPWs, Army Reserve installations, facility management, contracting and the Corps of Engineers. There is no tuition. The class location had not been determined as of publication time but will include San Antonio hotels and the IMCOM Academy at Fort Sam Houston.

Enroll in DPW Academy classes on Army Knowledge Online at <https://www.us.army.mil/suite/page/649494>. Complete the application and forward it to Sally Zapata at celia.zapataruiz@us.army.mil. IMCOM is working to move registration to the Army Training Requirements and Resources System to facilitate administration and to automatically update students' personnel records when courses

are completed.

Fiscal 2012 DPW Academy curriculum

IMPW-01

DPW Business Operations and Integration

Jan. 31-Feb. 9 and June 5-14

This course provides students the skills, knowledge and abilities for the Business Operations and Integration Division in a standard garrison DPW. Through lectures, discussions, group exercises and an integrated planning practical exercise, students develop an annual work plan and strategies for managing a DPW. Students plan, execute and provide process improvement solutions for DPW business and operational functions and are introduced to the Army management structure.

Topics include: work management; annual work plans; resource management plans; business plans; work classification and project approvals; work reception; preventive maintenance; municipal services; Sustainment, Restoration and Modernization and Military Construction project management; the Project Prioritization System; financial management; program management; process improvement; personnel

Acronyms and Abbreviations

DPW	Directorate of Public Works
FY	fiscal year
IMCOM	Installation Management Command
USACE	U.S. Army Corps of Engineers

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supervisory chain but understand your profession and can provide a neutral assessment of your aspirations.

Identifying and soliciting a mentor can be a daunting challenge. I never had a mentor and hence made many poor choices along my career path. Because of my past mistakes, I willingly accept mentorship requests to help career pilgrims on their journey. Most senior leaders are honored to be considered for a mentorship relationship.

Many Army major subordinate commands have formal and informal

mentorship programs. Look into your organization's program if you feel nervous about personally approaching a perspective mentor. Even the Senior Executive Service has a mentorship program available to its newly inducted members.

Once you have envisioned and developed a career plan to guide your decisions and plan for seminal activities, sharing your career plan with family is important, because your plan will affect your whole family. Some activities will require a longer time commitment, such as getting a master's degree. Some may require family separation, such as senior service college attendance, developmental

assignments or overseas deployments. Involving the family early and often is important to having and keeping their support when the career path gets tough and disappointment lurks around every corner.

In the future, I will discuss the tools that you need, such as resumes or interviewing skills, to achieve the intermediate objectives along this journey to your career goals.

Jim Hearn, Ph.D., is the director, Regional Business, Northwestern Division, U.S. Army Corps of Engineers, and a CP-18 Career Program Planning Board member.



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management; information management; standard garrison missions and functions; and acquisition.

IMPW-02

DPW Engineering

Dec. 5-9 and March 26-30

This course provides students with the skills, knowledge and abilities for the standard garrison DPW Engineering Division. Through lectures, discussions, group exercises and an integrated planning practical exercise, students develop strategies to provide engineering design, project delivery services and contract management for a DPW.

Students learn to plan and execute process improvement solutions for garrison DPW engineering functions and are introduced to the Army management structure. Topics include: project acquisition strategies, contracts types, design management, information technology, energy conservation programs, the *Army Energy Security Implementation Strategy* and supporting plans, architectural-engineering contracting and negotiations, construction management, Building Information Modeling, quality and safety management, environmental awareness, USACE installation support, technical management and value engineering.

IMPW-03

DPW Operations and Maintenance

Oct. 31-Nov. 4 and Aug. 20-24

This course provides students the skills, knowledge and abilities for the DPW Operations and Maintenance Division. Through lectures, discussions, group exercises and an integrated practical exercise, students develop strategies to provide municipal services, operate utility plans, sustain critical infrastructure, provide facilities life-cycle management, meet energy and solid waste recycling goals, increase the expected life of installed equipment and building components, and

sustain project delivery services. Students are introduced to the Army management structure and learn to plan and execute process improvement solutions for DPW operations and maintenance functions.

Topics include: preventive maintenance management, component life-cycle management, environmental awareness and operational requirements, energy conservation programs, the *Army Energy Security Implementation Strategy* and supporting plans, privatization contract management, critical infrastructure, performance-based service acquisition, process improvement, sustainment management systems, master planning, plant operations, municipal services and pest management. The course challenges students to apply sound engineering and technical management skills to provide quality, cost-effective operations and sustainment of garrison facilities.

IMPW-04

DPW Basic Orientation Course

Jan. 23-27 and July 30-Aug. 3

This course provides students with an overview of Army installation management concepts, organization and missions, and of DPW operations. Classroom instruction includes lectures and practical exercises.

The course covers: real property requirements planning; acquisition planning; financial and work management systems; DPW evaluation procedures, organization, function and mission; and integration of real property maintenance activities.

IMPW-05

PW Leadership "CAPSTONE"

Feb. 28-March 1

This course provides DPW managers with an integrated, holistic approach to



*DPW Academy participants listen as a class student poses a question.
Photo by Mindy Rosito*

facility life-cycle management. Classroom instruction includes limited lectures in a seminar-workshop environment.

This course covers business engineering in terms of installation readiness, the Army's investment strategy, garrison and senior commanders' intent, and sustainability concepts. The planning and programming required to make these concepts a reality is presented in the context of real property inventory management, facilities sustainment, and the planning and programming, budget and execution cycles. Work documentation, resourcing, the acquisition cycle and the efficient use of program and project priorities are also covered.

The course puts business engineering principles to work on the development of a cost-effective and executable plant maintenance annual work plan. This exercise covers the development of a facilities maintenance expenditure structure and the databases that support preventive, on-demand and cyclic maintenance to sustain facilities and critical infrastructure.

IMPW-06

Army Safety Inspection of In-Service Bridges

Dates to be determined

This course is required to meet Public Law 95-599 requirements and to provide a safe environment for Soldiers and Civilians on Army installations. The course is designed for engineers, technicians and ➤



Federal planning organization to convene regional workshop

by Mark L. Gillem

The Federal Planning Division of the American Planning Association announced its first regional workshop to be held at the Sheraton hotel in downtown Denver Nov. 9-10. The workshop's objective is to provide a venue for federal planners to share their planning successes and concerns with colleagues from other federal agencies under the theme "Interagency Collaboration for Sustainable Landscapes."

When considering energy and water resource management, federal agencies need to move beyond just thinking at the building scale and consider broader methods. Specific tracks will deal with



A workshop provides a venue for discussion among professional colleagues. Photo by Jill Schreyfer, Urban Collective

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structural inspectors involved in inspecting bridges or responsible for administering contracts for bridge inspection.

Upon completion of the course, participants will be able to evaluate a variety of bridges and determine the critical areas for inspection, including fatigue-prone details, common points of deterioration and distress, and effective safety inspection for common bridge types and culverts.

They will be able to: provide documentation of defects in various materials and of bridge configurations, recognize the need to inspect the underwater portions of bridge structures, describe the types of deficiencies to look for, determine when an inspection is necessary, identify the procedures and types of equipment available and the advantages and limitations of each, evaluate the severity of material deterioration and member distress and assign ratings according to Federal Highway Administration guidance, determine when to recommend bridge closure, determine the equipment requirements for a complete inspection, recognize when further inspection is required beyond the usual visual and hand tool inspection, and decide what type should be conducted.

The course provides participants with certification as bridge safety inspectors.

IMPW-07 Dam Safety Inspection

Dates to be determined

The course provides participants with the skill set to conduct dam inspections per Army Regulation 420-1 and to meet Public Laws 92-367 and 104-303 requirements.

The course offers participants the information needed to: describe the different types and the principal features of an embankment dam; describe the functions of each feature; describe the procedures for inspecting the upstream slope, downstream slope, crest, abutments, downstream toe and seepage collection drains; identify and explain the characteristics and potential consequences of seepage, cracking, instability, sinkholes, depressions and inadequate maintenance; and explain actions to be taken to protect the dam embankment.

Participants are able to: determine the hazard classifications, inspection frequency, remedial measures for common problems and dam maintenance; develop and update emergency action plans; and conduct hands-on field inspection trips.

IMPW-08 Basic Railroad Track Standards and Maintenance

Dates to be determined

This course provides students with the skills to inspect Army railroad tracks. It is required to meet the national railroad

track safety standards and to provide a safe environment for Soldiers and Civilians on Army installations. Every garrison with active railroad tracks is required to have a certified railroad track inspector, and successful completion of this course provides participants with that certification.

The participants learn to recognize track defects and to apply Unified Facilities Code 4-860-03, *Railroad Track Maintenance and Safety Standards*. They develop an understanding of basic track maintenance, safety and standards. They also develop the ability to detect deviations from the standards, recommend appropriate remedial action, apply required restrictions and take action to correct track defects. The course includes hands-on field inspection.

More to come

Other courses planned for FY 2012 will support a variety of facility management functions and skills sets, such as DPW Job Order Contracting management, resource management planning, master planning, environmental basics, applied preventive maintenance, financial management, contract management and performance-based service acquisition.

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Gustavo E. De Jesus is the chief, Facilities Management Branch, Headquarters, IMCOM





Master Planning Institute announces 2012 course schedule

by Andrea Wohlfeld Kuhn

Proponent Sponsored Engineer Corps Training master planning classes have been expanded to focus on energy and sustainability. In keeping with the intent of this suite of classes, these course offerings are referred to as “The Master Planning Institute.”

Classes are open to all interested parties, including contractors; private citizens; and federal, state, city and county employees. These accredited classes provide American Institute of Certified Planners’ certification maintenance units, American Institute of Architects’ learning units, National Society of Professional Engineers’ professional development hours and continuing education units. The instructors employ a variety of dynamic media that includes lectures, hands-on training, small group exercises, field trips and other learning opportunities.

The fiscal 2012 Master Planning Institute class schedule follows:



Andrea Wohlfeld Kuhn
Photo by Mary Beth Thompson

Course 75 Master Planning Principles

Nov. 14-18, New Orleans

This course offers an introduction to master planning concepts and principles. It provides an overview of the planning process with an emphasis on general planning principles that are applicable to all organizations and government levels. The original Course 75 has been expanded

into two separate courses. This course is an introduction, and Course 241, Master Planning Practices, is the companion class.

Course 241 Master Planning Practices

Dec. 5-9, San Antonio

This new course is the follow-on to Master Planning Principles. It expands on the basic planning concepts and relates them to Army-specific examples and issues. Both courses offer a combination of lectures, small group exercises and site-specific learning opportunities.

Course 948 Master Planning Visualization Techniques

Jan. 30-Feb. 2, Huntsville, Ala

This course provides a fundamental overview of planning visualization tools such as Google SketchUp, Google Earth and Photoshop. Students receive hands-on instruction and will produce illustrations and basic area development plans using these techniques.

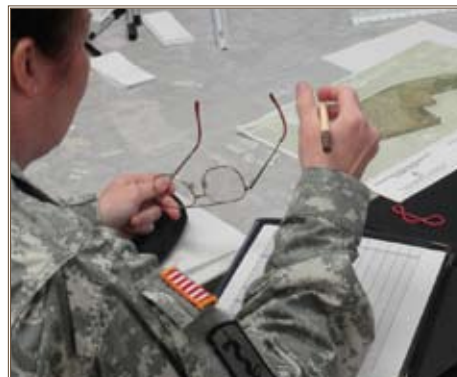
Course 392 Historic Structures I

March 12-16, Seattle

This course provides an awareness of the unique characteristics, legal requirements, procedures, technical knowledge and skills necessary to administer, maintain and repair federal historic properties. Sustainable and energy-efficient solutions for historic preservation are key components. Pertinent laws, regulations and guidance are covered. ➤



The installation's master plan is the hands-on focus during master planning classes. Photos by Jill Schreiber, Urban Collective



A student concentrates on possible solutions to a master planning class exercise.

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issues of energy and water management on federal lands. Sponsors include the Federal Planning Division, the National Park Service and the U.S. Forest Service.

Federal planners regularly deal with issues of sustainability, and they frequently collaborate across agency boundaries. During this regional workshop, planners from all federal agencies will have

opportunities to share their stories and learn from their colleagues. The workshop will attract an interdisciplinary and interagency group of federal planners and consultants from across the nation. They will have the opportunity to receive professional continuing education credits for their participation.

Federal planners interested in participating or submitting a presentation

proposal should contact the workshop chair at the e-mail address in the POC information below.

POC is Mark L. Gillem, 510-551-8065, mark@urbancollaborative.com.

Mark L. Gillem, Ph.D., AIA, AICP, a principal with The Urban Collaborative, is a consultant, Master Planning Team, U.S. Army Corps of Engineers.





Training essential for energy and water efficiency planning

by Mark L. Gillem

While considering energy- and water-efficiency measures at the building level is essential, Army engineers, architects, landscape architects and planners need to also consider how broader planning issues can impact energy and water use. To help in this effort, the U.S. Army Corps of Engineers is introducing *Master Planning Energy and Sustainability Factors*, Proponent Sponsored Engineer Corps Training 258, which will focus on planning strategies for energy and water efficiency.

Recent executive orders on energy efficiency and sustainability, the Army commitment to American Society of Heating, Refrigerating and Air Conditioning Engineers 189-2 compliance, the new Department of Defense Master

Planning Unified Facilities Code and updated master planning policies require that energy efficiency and sustainability be integrated into all planning and development of Department of Defense properties. This course provides planners an understanding of the principles of sustainability and energy efficiency, provides instruction on how to apply those principles in the planning and development of installations, and provides instruction on how to create a suite of metrics to assure principle compliance.

The course provides a unique learning environment involving lecture, studio-based applied instruction and design, and field trips to visit examples of energy- and water-efficient planning. These events enable students to understand and identify



Master planning students discuss a class project. Photo by Jill Schreiber, Urban Collective

the various sustainability and energy-efficiency planning practices to meet recent executive order requirements.

Students will gain knowledge of how to implement the master planning processes and identify metrics to

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Course 258

Master Planning Energy and Sustainability Factors

March 19-23, Denver

This new course covers energy and sustainability on a broader level, rather than an individual building level. Discussion and demonstration of energy-related planning practices and initiatives demonstrate effective energy strategies. Classroom learning is enhanced by field trips and demonstrations of energy-saving methodology from a planning and design perspective. (Editor's note: See related article above.)

Course 319

Master Planning Coding Practices

April 23-27, Chicago

This new course provides students with an understanding of form-based coding and its use in the planning and development of installations. Students will learn how to develop a code and planning standards and how to create a regulatory plan for code enforcement.

Course 952

Master Planning Advanced Techniques

Aug. 13-17, Portland, Ore.

Through an intensive, hands-on workshop, students use a planning charrette technique to develop an area development plan for a real world installation planning problem. Advanced concepts and cutting-edge practices are featured. Participants are required to have a fundamental knowledge of master planning or real property management.

Course 163

Historic Structures II

May 21-25, Port Townsend, Wash.

This course increases awareness and sensitivity to maintenance, repair and energy-saving measures in historic structures and enhances preservation craft skills. Through lectures and field exercises, the course covers the secretary of the interior's standards, levels of treatment and repair versus replacement. A two-day field exercise, working with and taught by experienced craftspeople, provides hands-on experience.

Course 326

Master Planning Applied Skills

July 25-29, Baltimore

This class provides an overview and techniques to develop real property requirements and allowances, and assess stationing actions. Students will learn how to use Army planning tools to conduct planning studies and requirements analyses, and to determine the impact to the installation's real property master plan.

In addition to these classes, on-site workshops or practicums can be scheduled at installations or regional locations. Contact the POCs below for information or to schedule a class specifically tailored to your needs.

To register or view course descriptions, go to <http://ulc.usace.army.mil>, or contact Janine Wright at 256-895-7431 or Janine.p.wright@usace.army.mil.

POCs are Jerry Zekert, Master Planning team lead, Headquarters, U.S. Army Corps of Engineers, 202-761-7525, jerry.c.zekert@usace.army.mil; and Andrea Wohlfeld Kuhn, 202-761-1859, andrea.w.kuhn@usace.army.mil.

Andrea Wohlfeld Kuhn, AICP, LEED Green Associate, is a senior planner, Headquarters, U.S. Army Corps of Engineers.



Toor is chief of Energy and Utilities

by Mary Beth Thompson

At home and at work, Qaiser Toor advocates taking simple actions that reduce energy and water use. Toor, the chief of the Energy and Utilities Branch in the Public Works Division at Installation Management Command Headquarters, lives by what he preaches.

"My kids and family can attest to that," he said.

In Toor's home, CFLs have replaced incandescent bulbs for the past 15 years. He and his family have taught themselves to turn off lights and electronic equipment when they are done with them. He also uses programmable thermostats to turn up the settings when no one is home and at night. For his Texas garden, Toor employs a micro drip system that uses very little water.

These efforts are examples of changes that affect energy and water consumption in the home. They also exemplify no-cost or low-cost efforts that can reduce usage on installations.

The big projects are important, Toor said, but the low-cost and no-cost changes with a one- to three-year payback — CFLs, sensors that automatically turn off lights and community education — are easy to do and are key to making inroads on an installation's utility bills.

"I like to spend the Army's money as if I'm spending my own money," he said. "That really brings your focus on what you should be doing."

As engineers make purchases, even for their own homes, they do quick life-cycle



Qaiser Toor
Photo by Mary Beth Thompson

cost analyses in their minds, Toor said. Does the product meet the need? Are the extra features worth the extra money? Will it be easy and economical to operate and maintain? Will it last?

"That's how I look at it when I'm spending the Army's money," he said.

As IMCOM's Energy and Utilities chief, Toor oversees energy and water programs and actions for IMCOM garrisons, ensuring they comply with federal laws, executive orders, and Department of Defense and Army requirements. His branch handles the IMCOM energy program and the utilities privatization and modernization program from A to Z. Toor's team gets involved in a myriad of issues that arise daily. It also manages certain centrally funded programs: the Certified Energy Managers Training, Energy Awareness and Conservation Assessments, Energy Engineering Analysis Program, Electric Tariff Rate Analysis, Metering and Boiler Inspections to

development and observe the practices in action through field trip activities.

The first course offering will be March 19-23 in Denver. Participants will be able to receive professional continuing education credits through the American Institute of Certified Planners and the American Institute of Architects. If you are interested in taking the course, contact Janine Wright of the USACE Learning

Acronyms and Abbreviations	
IMCOM	Installation Management Command
OPORD	operation order

name a few.

After he took the position in August 2010, Toor developed an Energy Operations Order. OPOD 10-257 describes how an installation's energy program should look and lists 25 actions garrisons must take.

Some garrisons have great programs in place, some take a casual approach, and others do nothing, Toor explained. The OPOD establishes a standard and a base level at which energy programs should function at garrisons. His goal is to get all installations to that one standard.

To help garrisons reach their energy goals, Toor and his team are writing an energy manager's handbook and planning energy manager courses. They are also developing an enterprisewide energy strategy to determine how to apply available funds to reach the near-term goal of a 30 percent reduction by 2015 compared to the 2003 baseline.

"We've done a lot of studies in the past, and what I want to do is look at all those studies that we've done and apply them across the map to see how we can achieve the 30 percent reduction goals by 2015," Toor said.

Toor earned a bachelor's degree in mechanical engineering from the University of Florida. He is a graduate of the Army Management Staff College's

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ensure the principles are followed through programming, design and construction of projects at all scales. Through an intensive, hands-on workshop, students will use design studio techniques to apply these practices to a real-world planning problem at an installation. Students will learn how to define a series of codes and metrics for sustainable, energy-efficient installation

Center at Janine.P.Wright@usace.army.mil. (Editor's note: See article on page 40 for more on Master Planning Institute courses.)

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Mark L. Gillem, Ph.D., AIA, AICP, a principal with The Urban Collaborative, is a consultant, Master Planning Team, U.S. Army Corps of Engineers.





Army energy managers earn national certification

by Ralph Totorica

Forty Army energy managers took their official training in Huntsville, Ala., June 20-24. Course attendees came from the six Installation Management Command regions that existed at the time, Headquarters IMCOM and the U.S. Army Corp of Engineers.

Legislation calls for federal agencies to provide training for facility energy managers. The *Installation Management Campaign Plan* requires full-time, trained energy managers to lead the energy program on each installation. Headquarters IMCOM sponsors annual training to address these requirements.

The Association of Energy Engineers conducted the June training, which culminated in a four-hour certification examination. After successful completion of the training, examination and credentials review, 23 of the 40 students received the nationally recognized designation “certified energy manager,” or CEM.

As nationally recognized experts, the new CEMs are valuable resources for the development and implementation of their installations’ energy and water management and conservation programs as the Army strives to meet the challenge of compliance with energy goals mandated by legislation

and executive order.

The newly certified energy managers are:

Christopher Brown, Fort Sill, Okla.

Edward Chacho, Fort Wainwright, Alaska

Lothar Gerhardt, U.S. Army Garrison Wiesbaden, Germany

Nicholas Gorsky, U.S. Military Academy, West Point, N.Y.

Russ Hayes, Fort Bragg, N.C.

Mohammed Ikram, Detroit Arsenal, Mich.

Will Irby, U.S. Army Engineering and Support Center, Huntsville

Dennis Lacy, U.S. Army Engineering and Support Center, Huntsville

Robert Lopez, Fort Bliss, Texas

Nils Maier, USAG Grafenwoehr, Germany

Trevor Marshall, Fort Greely, Alaska

Charles Mock, Torii Station, Okinawa

John Mores, IMCOM, Korea Region

Simon Muench, IMCOM, West Region

Fred Rashnavadi, USAG Ansbach, Germany

Acronyms and Abbreviations

CEM	certified energy manager
IMCOM	Installation Management Command
USAG	U.S. Army Garrison

Eulalio Rodriguez, Fort Bliss

Devon Rust, Aberdeen Proving Ground, Md.

Kristen Thomas, IMCOM Southeast Region

Jay Tulley, Presidio of Monterey, Calif.


Candice Vaughn, Fort Rucker, Ala.

Eric Waehling, Joint Base Lewis-McChord, Wash.

Brian Wieseler, Fort Jackson, S.C.

Paul Wirt, IMCOM Southeast Region

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Sustaining Base Leadership course, and he was part of the 1999 Army energy team that received Vice President Gore’s Hammer Award.

Toor’s more than 26-year career with the Army includes experiences ranging from the garrison level through headquarters. He served as chief of the Operations and Maintenance Branches at IMCOM Europe and IMCOM Southwest regions. He also held general and mechanical engineering positions with U.S. Army Europe; the Office of the Deputy Chief of Staff for Engineering in Heidelberg, Germany; the Office of the


Assistant Chief of Staff for Installation Management in Washington, D.C.; the U.S. Army Engineering and Housing Support Center at Fort Belvoir, Va.; and the Directorate of Public Works at Fort Stewart and Hunter Army Airfield, Ga.

“I really enjoy working energy,” he said. “I’ve been doing that for the Army for 24 years now. This [job] is like the culmination of all the work I’ve done, being in a place where I can influence energy and the people who work it.

“The Energy Program is not new,” Toor said. “It’s been around since the late ’70s. It goes in cycles, and right now, the cycle is way up, with strong leadership support by Lt. Gen. [Rick] Lynch, commanding

general of IMCOM, and Ms. [Katherine] Hammack, [assistant secretary of the Army for installations, energy and environment].

“People who work this program need to realize it’s the time to take advantage of it. Get your energy managers, get your program, and get it kick started. How you change the culture of people who live and work on our garrisons — that’s a big challenge and an opportunity. We need to work that piece, because that’s where we’ll really make a difference for us and the next generation.”

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

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