INSTALLATION MANAGEMENT
ENERGY PORTFOLIO

2010 - 2017

15 SEPTEMBER 2010

Annual Secretary of the Army Energy & Water Management Award Winners

Honoring Leaders, Champions, Innovators and Pioneers on Army Installations for 32 Years

2009

2010

2008

DEPARTMENT OF THE ARMY

SUBJECT: Installation Management Energy Portfolio - Army Energy Vision 2017

The Installation Management Energy Portfolio is a companion to the Army Energy Security Implementation Strategy (AESIS) and represents the vision of the entire Installation Management Community to achieve the objectives set for us by the Secretary of the Army to improve our Energy Security posture.

The Portfolio is an overview of the Army energy "toolbox" capabilities we will use to eliminate unnecessary consumption, increase efficiency, and expand use of renewable sources. These actions are essential if we are to break our dangerous dependence on foreign fossil fuel, address the deteriorating environment from greenhouse gas emissions, and posture our installations to sustain operations in spite of natural disasters or other grid interruptions. All commands are moving our energy program forward with innovative planning and effective application of resources by making energy a consideration in all of our actions. Within the Installation Management Command (IMCOM), for example, a new Installation Management Campaign Plan is being implemented with a specific Line of Effort focused on Energy. In addition, IMCOM has issued an Energy Operations Order (OPORD) that puts in motion a broad range of actions to move us forward using the capabilities in this Portfolio.

The Portfolio also highlights many projects recently completed or currently underway using both conventional and renewable energy sources to help meet our commitment to make the Army a leader in Energy solutions and achieve operational security through greater efficiency in our facilities and utility systems. It serves as a guide to help us answer three very important questions when assessing the progress of the energy program at each of our installations: 1) Are we doing the right things? 2) Are we doing things right? and 3) What are we missing?

This document is intended to be shared with Commanders at all levels; Defense Department and other government executives; our sister Services; our enterprise partners; federal, state and local agencies; contractors; and energy providers who work with us to deliver the programs and innovative solutions for the future Army by utilizing all the tools, technologies, and authorities available to us.

ARMY STRONG!

Rick Lynch
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ARMY ENERGY VISION 2017

This Portfolio embraces the Army Energy Security Vision 2017 that empowers installations to seek effective and innovative solutions to ensure mission success while enhancing the quality of life for our Soldiers, Civilians and their Families. These solutions require **Leadership** that changes Army culture, an **Enterprise-wide Partnership** that leverages investment opportunities, and **Ownership** and accountability for our energy decisions that will serve as a model for the nation. The Army is moving toward this Energy Vision by providing guidance, prioritizing actions, identifying resource opportunities, and executing exemplary energy efficiency, water efficiency, and renewable energy projects.

Energy Security Vision:

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

Energy Security means the Army must provide reliable, affordable, stable energy supplies to provide safe, environmentally compliant and cost-effective energy services to Soldiers, Families and Civilians on installations worldwide. The disruption of critical power and fuel supplies could compromise the Army's ability to accomplish its missions. Such a risk exposes an Army's vulnerability that must be addressed by a more secure energy posture and future outlook.

ENERGY SECURITY

- ✓ ***SURETY*** Preventing loss of access to power and fuel sources
- ✓ ***SURVIVABILITY*** Ensuring resilience in energy systems
- ✓ ***SUPPLY*** Accessing alternative and renewable energy sources available on installations
- ✓ ***SUFFICIENCY*** Providing adequate power for critical missions
- ✓ ***SUSTAINABILITY*** Promoting support for the Army's mission, its community, and the environment

Installations will first work to reduce consumption through reduction of our facility inventory that puts an unceasing demand on our limited resources. By reducing the volume of our facilities to the minimum essential to execute our mission we can then take aggressive steps to increase the efficiency of the remaining inventory. Finally, with our efficiency at its best, we can satisfy the remaining demand with expanded use of renewable sources in order to reduce as much as possible our dependency on the grid and foreign fuel sources. To meet these challenges, we will continue to execute programs that recognize energy as a strategic resource. We have both the opportunity and obligation to address installation energy. Enhancing energy security is a basic responsibility of every Army Soldier and Civilian. Success lies in individual and organizational accountability for improved performance through implementation of solutions to meet today's energy security challenges. Changing our behavior is central to success.

Are we doing the right things*?*
This first fundamental question has everything to do with being a leader of strong Character. Organizations and well-intentioned individuals throughout the Army are attempting to meet energy efficiency and renewable energy mandates of executive orders, public law and Secretary of the Army's intent. However, we must also focus on the Army's unique energy security requirements. Are we implementing the right energy security actions and are we getting the appropriate value out of our installation Energy Programs? Over the years, the Army has invested a significant amount of money in energy programs. Due to current energy legislation, the energy conservation requirements for the Army have increased. We must get out in front of the energy security requirements process and focus on energy projects that provide the most value and return on investment for the Army.

Are we doing things right?
We must have an integrated approach that addresses energy efficiency while placing greater emphasis reducing our facility inventory and expanding renewable energy sources to improve our security posture. Are we developing an integrated holistic approach as we move toward improving our energy posture? We must make use of all available resources within the Army and capitalize on third-party funding opportunities when proven to be cost-effective to the Army. To be doing things right, we must look beyond the first dollar cost of items and keep the emphasis maximizing lifecycle benefits. We must not burden future Soldiers with higher Operations and Maintenance budgets and needlessly costly utility bills.

What are we missing?
Periodically, we should take a step back and think about what else we should be doing that is not being done already to improve our energy security posture. Installations must identify viable energy projects, new approaches, and innovative funding solutions to maximize benefits to the Army.

Effective and responsible leaders at all levels must ask these three questions so that we can better focus our resources and reinforce the things that are being done well. With increased decision making opportunities at all levels, you can make a difference. Let's all take responsibility for improving our installation energy security plans and the Installation Management Community.

Contents

ARMY ENERGY GUIDANCE

Secretary of the Army issued the *Army Energy Security Implementation Strategy (AESIS)* on January 13, 2009. The AESIS addresses the Army's energy security challenges through newly established central leadership and five integrated goal-driven energy activities. The five goals are:

(1) Reduced energy consumption
(2) Increased energy efficiency across platforms and facilities
(3) Increased use of renewable/alternative energy
(4) Assured access to sufficient energy supply
(5) Reduced adverse impacts on the environment.

Energy Security Mission

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

These goals implicitly incorporate the fundamental principle that the improvements achieved shall enhance our operational capability to ensure the ability of the Army to carry out its primary missions.

Energy Efficiency and Security Line of Effort (LOE) #6:

KEYS TO SUCCESS

1. Reduce energy and water consumption
2. Increase energy and water efficiency and modernized infrastructure
3. Improve development of renewable and alternative energy, and access to energy and water supplies
4. Improve development of renewable and alternative energy for vehicle fleet mobility fuel
5. Reduce carbon "bootprint" on the environment

Our Installation Management Command (IMCOM) has developed an *Installation Management Campaign Plan (IMCP)* which establishes an integrated plan for six essential Lines of Effort to execute key Family, facility, and mission initiatives to include addressing the overall Army Energy Security Strategy. All Commands and Components should consider establishing a similar plan. 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 sustainable and resilient infrastructure and mission assurance. This Energy Efficiency Line of Effort sets five Keys to Success to focus efforts and measure progress towards meeting our Energy Vision in the future.

MOVING TO ENERGY SECURITY

The Army is taking advantage of new technologies to move toward a more secure and reliable energy security future. We will pursue **Renewable Energy** including solar, wind, biomass, landfill gas, geothermal, municipal solid waste and hydroelectric generation capacity.

We are implementing the **Army Metering Implementation Plan** approved to install advanced utility meters on new and existing buildings in the Army, Army Reserve and Army National Guard. When the metering is complete, approximately 6,700 Army, Army Reserve and Army National Guard facilities at over 480 sites worldwide will have the capability to track and trend consumption, make better decisions on energy and water use, and provide a baseline for developing new energy projects.

Nearly half of our energy initiatives can be resourced by leveraging **"3rd Party Financing"** – taking maximum advantage of alternative contracting mechanisms that do not require Army up-front expenditures. Using these programs we can engage energy experts to provide new technologies, energy security, efficient solutions, sustained support, and measurable results without burdening installations with large initial costs.

We will utilize **Sustainment, Restoration, and Modernization (SRM)** funded repair and modernization projects to incorporate the full range of technologies and include building features such as energy management control systems, motion sensors, Light Emitting Diodes (LEDs), and other lighting improvements. Enhanced building envelope and upgraded Heating, Ventilation, and Air Conditioning (HVAC) will also be included.

We will incorporate the most efficient and cost-effective energy technologies in new **Military Construction** projects. New holistic designs will consider all aspects of energy and sustainable design features and will meet statutory expectations, but more importantly, these projects will save energy, leverage renewable sources, and reduce the Army's long-term operating costs.

The Army is investing in **Smart Grid** technology to improve our energy posture. The smart grid is, in essence, an "energy internet," providing Army installations with real-time knowledge and decision-making tools that will empower them to save energy, resources, and the environment. The smart grid is not a product, but rather a collection of hardware and software that works together to help the Army make smarter energy conservation decisions.

Complementing our energy efforts are the Army's initiatives in **water use efficiency** for both water consumption and storm water management. We are expanding our programs to implement reduced water use for irrigation, improved cycles in cooling towers, low flow faucets and other fixtures, and application of low intensity development principles consistent with statute and industry standards per American Society of Heating, Air Conditioning, and Refrigeration Engineers (ASHRAE Standard 189.1).

ENERGY RESOURCE OPPORTUNITIES

The Army is committed to reducing energy consumption, improving efficiency, and expanding renewable energy capability to improve our operational capability and the quality of life of our Soldiers and Families. Developing new partnerships and expanding existing partnerships with private industry will provide the Army with the energy expertise and resources to ensure more efficient use of energy and create a robust renewable energy program at Army facilities. The Army resource opportunities include:

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP): The Energy Conservation Investment Program is a subset of the Military Construction (MILCON) funded program to improve energy efficiency of DOD facilities. ECIP focuses on energy and water savings, renewable energy projects, and converting systems to cleaner energy sources. DOD manages the program and allocates funding to the Army based largely on energy usage and project execution success. Our ECIP program is expanding and provides an increasing source of funds to build new energy capacity.

ACTION: Two-thirds of the annual ECIP funding will be dedicated to renewable energy projects.

IMPROVING ENERGY EFFICIENCY OF MILITARY CONSTRUCTION AND SUSTAINMENT, RESTORATION AND MODERNIZATION FUNDED PROJECTS: All new and renovated facilities will incorporate required enhanced energy and sustainable features to maximize their energy performance. Major renovations include projects that exceed 25% of the building's plant replacement value. Such features may include alterations of the building envelope, advanced technology, lighting, plumbing, and electrical systems, and improved heating/air conditioning systems. Planning for energy efficiency begins at project formulation and design. New buildings, structures, and major renovations will be planned, programmed, budgeted, designed, and built to conform to the five guiding principles in the Federal Leadership in High Performance and Sustainable Buildings.

ACTION: New and renovated buildings will incorporate all required energy features.

UTILITY ENERGY SERVICE CONTRACTs (UESCs): Utility Energy Service Contracts (UESCs) offer the Army an effective means to implement energy efficiency, renewable energy, and water efficiency projects. In a UESC, a utility company arranges financing to cover the capital costs of the energy project, which are repaid by the installation over the contract term from energy savings generated by the energy efficiency measures.

ACTION: All Army installations will use UESCs when this contract vehicle is available from servicing utility.

ENERGY SAVINGS PERFORMANCE CONTRACT (ESPC): An Energy Savings Performance Contract (ESPC) is a partnership between the Army and an Energy Service Company (ESCO). In consultation with the installation, the ESCO designs and executes projects that meet the Army's needs by improving energy efficiency of existing facilities and implement new renewable energy capability where economics permit. The ESCO arranges the financing for the project and guarantees that the improvements will generate sufficient energy cost savings to pay for the project over the term of the contract. After the contract ends, all additional cost savings accrue to the Army. ESPCs allow installations to accomplish energy savings projects without up-front capital costs.

ACTION: The Army will award $130 million annually for new ESPCs for renewable generation and energy efficiency.

POWER PURCHASE AGREEMENTS (PPAs): Power purchase agreements (PPAs) allow the Army to finance on-site renewable energy projects without up-front capital costs. With a PPA, a developer installs a renewable energy system on Army property under an agreement that the Army will purchase the power generated by the system. The Army pays for the system through these power payments over the life of the contract. The developer owns, operates, and maintains the system for the life of the contract.

ACTION: Installations will explore the use of PPAs for the development of renewable power generation.

UTILITY RENEWABLE ELECTRICITY SERVICE CONTRACT (URESC): Utility Renewable Electricity Service Contract (URESC) is a distinct type of power purchase agreement with the local utility company to allow the Army to develop a renewable energy project. URESC will allow the Army to finance on-site renewable energy projects with no up-front capital costs. In this Department of Energy pilot program, the utility company owns, operates and maintains a renewable energy project located at an Army installation and sells the electricity to the Army.

ACTION: Installations will explore the use of URESCs for the development of renewable power generation when available and proven to be economical.

ENHANCED USE LEASING (EUL): The Enhanced Use Leasing (EUL) process allows military installations to out-lease land to a private or public entity for the development of renewable power or other energy projects. Installations can out-lease land, enter into long-term or short-term leases, provide greater flexibility for facility reuse, and receive fair market rental, (either in cash or in-kind), as consideration for the leased property. In exchange, the developer can provide power generation facilities, manage distribution systems, and deliver critical energy needs without significant upfront installation investment.

ACTION: Installations are encouraged to use EUL for the development of renewable power generation.

UTILITY MODERNIZATION PROGRAM: Utility Modernization upgrades of existing Army-owned utility systems to implement new or higher standards, to accommodate new functions, to increase efficiencies of components or the overall system and to replace components that are at or beyond their service life. The Army's Utilities Modernization Program improves non-privatized utility systems with primary focus on central energy plants, thermal distribution systems and water distribution systems. This program assists the Army in making appropriate decisions required to sustain or improve the condition of utility systems to support readiness. The Army is utilizing a five-year program to identify, prioritize, and fund energy and utility projects using funds for Operations and Maintenance.

ACTION: Installations will develop and prioritize utility system projects for modernization.

ENERGY ENGINEERING AND ANALYSIS PROGRAM (EEAP): The EEAP conducts energy surveys and assists the Garrison in developing a Capital Investment Strategy (CIS) to achieve its energy reduction goals. Energy savings projects are identified to include recommended funding sources and a roadmap for implementation. The CIS is then incorporated into the installation master plan.

ACTION: Installations will coordinate with HQ IMCOM to schedule your EEAP survey.

RESOURCE EFFICIENCY MANAGER PROGRAM (REM): The REM program places energy expert consultants at Army Garrisons to assist the installation in meeting their energy goals by finding, developing and implementing energy conservation measures and renewable energy opportunities. Currently, REMs have identified energy savings opportunities as much as 10 times their annual salary cost. If the REMs do not produce a positive return on investment, the contract is not renewed.

ACTION: Installations will consider using this resource to improve your Energy Program.

Installation Technology Transition Program: The Installation Technology Transition Program (ITTP) is an Operation and Maintenance (O&M) funded program to test promising emerging technology within the installation environment. Since 2008, the program has conducted several projects related to energy and sustainability, such as improved cement additives to widen the construction window in cold climates, a deployable renewable energy system, and a corrosion resistant re-cycled plastic bridge for training lands.

ACTION: Installations serve as test beds for new and emerging technologies

ENERGY PROGRAMS FOR SUCCESS

METERING PROGRAM: The Army Metering Program executes the provision of the Energy Policy Act of 2005 (EPACT 2005). Our program requires installation to install advanced electric meters where cost-effective by 2012; and to install gas, water, and steam meters by 2016. Meters will be connected to the Army Meter Data Management System and the procedures established to use the data to track and trend energy use, enabling identification and improvement of energy efficiency. This program will enable installations to review energy consumption trends and identify energy reduction opportunities. Under the Residential Community Initiative (RCI) Program, a metering policy is set which establishes an energy usage baseline for each occupant and currently shows that 80 percent of occupants are receiving rebates because the energy usage is less than the baseline. If the usage is over the baseline, the occupant is sent a utility bill for payment.

ACTION: Installations will install advanced meters on all appropriate buildings. Meters will be connected to a Meter Data Management System to facilitate management decision and real-time energy management actions.

ENERGY MANAGER: To implement the Army Installation Energy Program, it is essential that each installation have a full-time energy manager to lead its efforts in energy awareness, efficiency, and project development. Energy Managers develop the energy awareness program for their installation -- to educate Soldiers, Families, and Civilians -- on the importance of energy conservation. They implement the energy policies established by the Army and develop long-range plans for implementing energy projects. They spearhead an aggressive program to reduce energy consumption and costs. In addition, they are responsible for compiling, maintaining, and submitting all energy reports in the Army Energy and Water Reporting System (AEWRS) which is used to monitor performance at each installation. Their expertise is critical in proposing energy features in all facility designs, construction, and renovation activities.

ACTION: Each Army installation will designate an Energy Manager on site.

ARMY SUSTAINABLE DESIGN AND DEVELOPMENT (SDD) PROGRAM: Army policy adopts the US Green Building Council's Leadership in Energy and Environmental Design (LEED) performance rating of SILVER (or higher) as the Army standard. Starting with the 2008 MILCON Program, all new construction and major renovation projects will be evaluated using the Green Building Certification Institute (GBCI) criteria and must achieve the LEED SILVER rating or higher. In

ACTION: Installations will incorporate sustainable design principles into the siting of new facilities, project design, and execution of new construction and renovation projects to achieve the LEED SILVER rating.

order to achieve LEED SILVER rating, a project must meet the criteria for the following six areas: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, and Innovation in Design. All Army Family Housing new construction residential housing starting with FY2013 military construction program will be certified at the LEED SILVER level or higher for Homes by the GBCI, and Energy Star Qualified New Homes. All major renovations will also achieve the LEED-New Construction/Major Renovations SILVER level or higher.

UTILITY INCENTIVES: Most states have Utility Incentive Programs that help Army installations offset energy costs while promoting energy efficiency and renewable energy technologies. Programs allow the reduction of installation utility bills through innovative agreements involving power generation, energy efficient distribution, and aggressive conservation measures. Installations must take advantage of the types of programs.

ACTION: Installations must work with the local utility company in taking advantage of Utility Incentive Programs.

AWARDS: The Secretary of the Army Energy and Water Management Awards Program recognize installations and individuals who make significant achievements in energy conservation and water management. AR 420-1, Army Facilities Management, Chap 22, Army Energy Program describe the process to recognize individuals, small groups and installations from the Army, Army Reserve, and Army National Guard. The White House Council of Environmental Quality GreenGov Presidential Awards is another opportunity to recognize our employees for their support, leadership, and efforts in promoting and improving energy and water management. GreenGov Presidential Awards were initiated to encourage the Federal Government to lead by example in promoting a clean energy economy that will increase our Nation's prosperity, promote energy security, protect the interests of taxpayers, and safeguard the health of our environment.

ACTION: Installations will identify and nominate employees, teams, and installations deserving of recognition under the Secretary of the Army Energy and Water Management Awards Program, the White House Council of Environmental Quality GreenGov Presidential Awards and the Federal Energy and Water Management Awards Program sponsored by Department of Energy.

SAVINGS AND SALES ACCOUNTS: Under the direction of the Resource Directorate in ACSIM, the Army will assist installations to establish energy savings and energy sales accounts to track, measure, and validate savings from the result of installation energy initiatives. Utilization of the accounts allows installations to retain a portion of the realized energy savings from the energy initiative measures to re-invest in additional energy conservation measures.

ACTION: In coordination with Department of the Army, Installations will establish accounts and procedures for utilization of energy savings and sales accounts.

ARMY UTILITY PRIVATIZATION (UP) PROGRAM: Utilities Privatization (UP) is a method for improving utility systems and services by allowing Army installations the option to leverage private capital to make project investments needed for energy efficient, secure, reliable, and sustainable utility systems. The private company finance to own, operate, maintain, and improve efficiencies of Army utility systems. Army installations have been unable to upgrade and maintain reliable utility systems fully due to inadequate funding and competing installation management priorities. The objective of UP is to better meet mission needs, protect life, health, safety, and the environment by bringing utilities up to industry standards and sustaining operations at that level. The Army has aggressively pursued UP whenever cost-effective, as the preferred investment strategy to repair and upgrade deficient utility systems. UP evaluations find the most cost-effective way to bring a utility up to industry standards and be able to operate at that level.

ACTION: Consistent with the Army Installation Management Campaign Plan, installations will leverage UP to improve energy efficiency, infrastructure, and technology.

IMPROVING GRID SECURITY: In concert with the Department of Energy, Federal Energy Regulatory Commission, Homeland Security, and the Department of Defense, the Army will work to improve security of the commercial grid and on-post distribution systems supporting critical installations. Actions must prevent interruption of service or destruction of equipment from accidental or intentional cyber interdiction that results in inappropriate closing of switches or alteration of phasing that causes equipment failure. The security of the grid is dependent on its vulnerable cyber network for management and control. This infrastructure must be improved to preclude interruptions from cyber, Electro-Magnetic Pulse (EMP), or other actions resulting from manmade or natural disasters.

ACTION: Installations shall review, assess, and update critical infrastructure energy requirements against vulnerability.

WATER PROGRAM: Executive Order 13514 dated 5 October 2009 requires installations to reduce water consumption intensity by 2 percent annually through fiscal year 2020 or 26 percent by the end of fiscal year 2020 using 2007 water data as the base year. The Army has implemented Federal Water Efficiency Best Management Practices to reduce water use through life-cycle cost-effective water efficiency improvements. ASHRAE 189.1 prescribes technical performance standards for development of water measures for inside buildings and outdoor use.

ACTION: Each Installation will develop and implement their water management plan. This plan will provide clear information about how a facility uses its water, specific conservation measures that must be taken, and management practices from the time it is piped onto the facility through its ultimate disposal.

ARMY NONTACTICAL VEHICLE (NTV) FLEET PROGRAM: The Army's goal is to reduce NTV petroleum consumption 2 percent annually through fiscal year 2030, as mandated by Executive Order 13514 - Federal Leadership in Environmental, Energy, and Economic Performance. Fiscal Year 2012-2016 target is 4.4 million gallon equivalent gasoline reduction (MGEG). By right-sizing the NTV fleet and replacing fossil fuel vehicles with hybrid and alternative fuel vehicles (AFVs), the Army can exceed the petroleum reduction goal in fiscal year 2016 with an estimated 9 MGEG reduction. The Army currently has 2,713 hybrid electric vehicles (2,671 gasoline and 42 diesel). The plan is to add 200 hybrid vehicles annually, through normal vehicle rotation. Plug-in hybrid electric vehicle (PHEV) is similar to a hybrid electric vehicle, but has a larger battery that is charged both by the vehicle's gasoline engine and from plugging into a standard 110 volt electrical outlet for a few hours each day. This type of vehicle is not yet widely manufactured or available, but is an option when they become economically feasible. The Army currently has 27,251 E-85 vehicles in the fleet. The Army fleet also includes 325 Compressed Natural Gas (CNG) and 53 Liquid Propane Gas (LPG) powered vehicles. These vehicles are primarily medium duty trucks. Low Speed Electric Vehicles (LSEVs) have been part of the NTV fleet for over 10 years. When replacing a fossil fuel vehicle, an LSEV has the most impact on petroleum consumption reduction. Electric Vehicle (EV) technology is rapidly advancing with many manufacturers entering the market; but, manufacturers are not yet releasing EV cost figures. The Army has plans to conduct a feasibility study to lease 10 electric buses for three years with charging stations capable of multiple charge settings (110, 220 and 440 volts). These charging stations will account for electrical use and with solar, thermal or wind generation can supplement the electrical grid. The intent is to include EVs in the Army NTV fleet as technologically and economically feasible to meet mission requirements.

Each Installation shall acquire Hybrid Electric, Plug-in hybrid electric vehicles (PHEVs), and Electric Vehicles (EVs) when affordable and available. Low Speed Electric Vehicles LSEVs will be used where effective to meet mission requirements.

PROJECTS

Installations are pursuing many cost-effective energy projects in a strategic manner towards achieving our energy security goals. The energy projects highlighted use appropriated funding sources such as the Energy Conservation Investment Program (ECIP), Operations and Maintenance Army (OMA), and Military Construction (MILCON) Program, and third-party financing opportunities such as Utility Energy Service Contracts (UESC), Energy Savings Performance Contracts (ESPC), Power Purchase Agreement, and Enhanced Use Lease.

For additional information on how these projects could be replicated at your installation, submit your request through the Policy/Program Issues Form on the Army Energy Program web site at: http://army-energy.hqda.pentagon.mil/contact/form.asp

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SOLAR ARRAYS ON STRUCTURES

Sea Girt, NJ, Photovoltaic Solar Electric Power System: The Army National Guard Training Center in Sea Girt, New Jersey, constructed a photovoltaic solar electric power system that represents ongoing efforts to optimize efficiency, conserve natural resources and reduce dependency on foreign energy sources. This parking canopy system utilizes 1,064 solar modules covering more than 20,000 square feet. The 230 kW of power generating capacity will allow the installation to completely pay for the system in less than 10 years. This system will reduce carbon dioxide emissions by more than seven million pounds over the next 30 years. A website that monitors the production of electricity in real time at the Army National Guard Training Center in Sea Girt, New Jersey can be accessed at http://www.sunviewer.net/portals/SeaGirt/

Fort Bliss 21.6kV Solar Array Carport: This solar energy project supplies electricity to an administration building which allows Fort Bliss to remove this building partially off-the-grid. The solar array also serves as cover for a vehicle parking area. The solar array provides excess power back to the grid on the

weekends. This project includes a metered system that measures production of electricity from the solar array. This project was funded using OMA.

Nevada Army National Guard Renewable Energy Super Solar Phase I:

The Nevada Army National Guard through a power purchase agreement is constructing solar shade structure arrays at Carson City and Las Vegas Nevada. The project is at 98 percent completion and the commissioning process at the Las Vegas Readiness Center is underway. Carson City solar shade structure arrays will produce 1.25MW of electricity and Las Vegas will produce 1.8MW of electricity.

Fort Dix	NJ	Photovoltaic Roof System
Fort Bragg	NC	Renewable Energy and GSHP
Kelley Barracks	Germany	Install Solar Panels On Roof
Fort Dix	NJ	PV Solar Power System
Lawrenceville RC	NJ	PV Solar Power System
Germersheim Army Depot	Germany	Solar Panels On The Roof of Bldgs
Presidio of Monterey	CA	Solar Power Generation POM
Fort Irwin	CA	Cantonment Area Solar Street Lights
Fort Irwin	CA	Install Solar Street Lights
Fort Polk	LA	Install Solar Lights
Aberdeen Proving Ground	MD	Solar Re-Roofing Building 525
Schofield Barracks	HI	Install Photovoltaic System
Schofield Barracks	HI	Install Photovoltaic System
Aliamanu Military Reservation	HI	Install Photovoltaic System
Aliamanu Military Reservation	HI	Install Photovoltaic System
Schofield Barracks	HI	Install Photovoltaic System
Wheeler Army Airfield	HI	Install Photovoltaic System
Fort Benning	GA	Solar Photovoltaic System

SOLAR ARRAYS GROUND MOUNTED

Fort Carson Solar Power Array: Fort Carson constructed a solar array on 12 acres of a closed landfill and is currently the Army's largest solar power site. The two-megawatt, ground-mounted photovoltaic array will generate 3,200 megawatt-hours of power annually. The power supply produces enough power for 540 Fort Carson homes per year. Seven agencies worked together to create a mutually beneficial arrangement. Under its power marketing authority, Western Area Power Administration (WAPA) wrote two contracts to allow Fort Carson to buy power from the array as supplemental energy for a low fixed cost for 20 years. This project reduces Fort Carson's reliance on fossil fuels and helps to build a sustainable energy future.

Bethany Beach	DE	Solar Photovoltaic System
Presidio of Monterey	CA	Photovoltaic Solar System
Vicenza	Italy	Photovoltaic Installation
Fort Huachuca	AZ	Photovoltaics
Sea Girt	NJ	Electric Power Photovoltaic System
Grafenwoehr	Germany	Install Photovoltaic System
Camp Vilseck	Germany	Install Photovoltaic System
Pohakuloa Training Area	HI	Install Photovoltaic System
Pohakuloa Training Area	HI	Building 238 Photovoltaic System
Pohakuloa Training Area	HI	Building 390 Photovoltaic System
Fort Bliss	TX	Solar Power to Bldgs & Ranges

VEGETATIVE ROOF

Tobyhanna Army Depot, PA, Vegetative Roof Project: The vegetative roof reduces energy consumption costs by 25 percent, according to data collected by the installation's environmental management division. The depot installed plant modules atop one wing of its headquarters building in 2006. The entire roof was covered by late 2008. The roofing

modules contain plants that are able to thrive in Pennsylvania's northeastern climate. The roof improves energy efficiency, reduces storm water runoff and protects storm water quality. It adds a layer of insulation during the heating and cooling seasons, and becomes more efficient as the plants grow. This shielding also extends the roof life by stopping ultraviolet rays from breaking down the adhesive at the seams, which are the roof's weakest points.

CENTRAL UTILITY PLANT

Fort Detrick, MD, Central Utility Plant: Fort Detrick constructed a central utility plant (CUP) using a EUL agreement. A contractor was selected to develop, finance, design/build, and operate a secure reliable utility plant. The contractor is leasing the project land from Fort Detrick, owns the CUP, and sells the CUP produced energy to the Army through a separate energy services contract. The CUP provides an efficient, cost-effective, reliable, and secure critical utility. The chiller plant was designed to meet Leadership for Energy and Environmental Design (LEED) efficiency criteria. This plant delivers highly reliable steam, chilled water, and high quality stand-by emergency power to the National Interagency Bio-defense Campus.

Fort Greely	AK	Install Leak Detectors
Aberdeen Proving Ground	MD	Replace The Hot Water Heating Pipes
Hohenfels Training Area	Germany	Repair District Heating Lines
Hohenfels Training Area	Germany	Replace Centralized Heating Plant
Daumerie Caserne	Belgium	Replace The Central Heating Plant
Panzer Kaserne	Germany	Replace Boiler Control System
Panzer Kaserne	Germany	Repair Panzer Heating Plant
Panzer Kaserne	Germany	Replace Heat Distribution Lines South
Panzer Kaserne	Germany	Replace Heat Distribution Lines North
Camp Zama	Japan	Replace Steam Lines Bldg 238
Camp Zama	Japan	Replace Steam Lines Bldg 719
Camp Zama	Japan	Replace Steam Lines Bldgs 278/425
Camp Zama	Japan	Replace Steam Lines Bldg 332
Camp Zama	Japan	Replace Steam Lines (455 to 742)
Camp Zama	Japan	Replace Steam Lines (455 to 551)
Aberdeen Proving Ground	MD	Replace Steam Lines
Fort Campbell	KY	Boiler Plant Improvements
Panzer Kaserne	Germany	Convert Steam Hot Water
Germersheim Army Depot	Germany	Replace Boiler Of Heating System

Aberdeen Proving Ground	MD	Repair Boiler No. 3
Camp Zama	Japan	Replace A/C & Heating Units
Camp Ederle	Italy	Connect Ederle Inn to Steam System
Fort Hood	TX	Repair Central Energy Plant Equip.
West Point	NY	Central Power Plant Equip. Upgrade
Aberdeen Proving Ground	MD	Repair Boiler/Condensate Bldg 4312
Fort Bragg	NC	Central Plant Modification
Aberdeen Proving Grounds	MD	Steam Sys Adv Controls/ Distribution
Aberdeen Proving Grounds	MD	Lighting, Occupancy Sensors
Rock Island Arsenal	IL	Boiler Two Stoker Grate Replacement
Aberdeen Proving Grounds	MD	Boiler Plant mods, EMCS, HVAC
Adelphi Labs	MD	Facility Energy Improvements
Aberdeen Proving Grounds	MD	Building Envelope/Chillers/Controls
Rock Island Arsenal	IL	Replace VFD for Fans 2&3, Bldg. 227
Rock Island Arsenal	IL	Replace Ash Control Panel
Aberdeen Proving Ground	MD	Repair Steam System, Main Front
Camp Zama	Japan	Insulation For Heating/Cooling Sys
Aberdeen Proving Ground	MD	Repair Chiller
Rock Island Arsenal	IL	Repair Filters, Bldg 227
West Point	NY	Central Power Plant Repair Boiler #2
Rock Island Arsenal	IL	Boiler Tube Inspections, Bldg 227
West Point	NY	Relocate Chiller & Cooling Tower
Fort Wainwright	AK	Insulate Steam and Condensate Lines
Redstone Arsenal	AL	Replace Condensate Piping
Redstone Arsenal	AL	Replace Steam & Condensate Lines
Pine Bluff Arsenal	AR	Steam Line Replacement Phase I
Fort Huachuca	AZ	Replace South Plant Chiller
Fort Irwin	CA	Repair Chilled/Hot Loop Feed System
Fort Gillem	GA	Replace #2 Boiler
Rock Island Arsenal	IL	Repair Branch Circuit Wiring
Rock Island Arsenal	IL	Repair Expansion Joints, Bldg 227
Rock Island Arsenal	IL	Repair Hot Lime Softener Process
Rock Island Arsenal	IL	Repair Feedwater Heaters Bldg 227
Rock Island Arsenal	IL	Repair Heating Plant Make Up Air
Aberdeen Proving Ground	MD	Replace Underground Heat Lines
Aberdeen Proving Ground	MD	Replace 3 Boilers in E1574
Aberdeen Proving Ground	MD	Replace 3 Boilers, Bldg 525
Aberdeen Proving Ground	MD	Boiler Replacement, Bldg 4219
Aberdeen Proving Ground	MD	Replace 2 Steam Boilers Bldg 1064
Aberdeen Proving Ground	MD	Repair Boiler, 4119
Aberdeen Proving Ground	MD	Repair Boiler, E5774
Aberdeen Proving Ground	MD	Repair Boiler, 2377
Adelphi Laboratory Center	MD	Replace Chiller #3 (Central Plant)

Adelphi Laboratory Center	MD	Replace Cooling Towers #1, #2 & #3
Fort Leonard Wood	MO	Replace High Temp Boiler #1
Fort Leonard Wood	MO	Replace High Temp Boiler #2
West Point	NY	Repair Steam Lines, Vaults,Tunnels
Fort Jackson	SC	Replace Heating Water Distribution
Fort Eustis	VA	Repair Steam Distribution Bldg 801
Fort Eustis	VA	Restore Steam Distribution System
Fort Story	VA	Repair Central Heat/Cool Plant
Fort Lewis	WA	Replace Stack On Boiler Plant
Fort Lewis	WA	Install 3 Stack Economizers #I
Fort Lewis	WA	Install Stack Economizers #2
Fort Huachuca	AZ	Replace Boiler with Wood Chip Boiler
Fort Carson	CO	Replacement Of Boiler #1-Phase 3
Fort Stewart	GA	Repair Chilled Water Distribution Sys
Schofield Barracks	HI	Central Plant Tube Repair& Maint.
Aberdeen Proving Ground	MD	Replace Exterior Steam Lines
Aberdeen Proving Ground	MD	Correct Steam Issues
Detroit Arsenal	MI	Replace Condensate Pump Motors
Fort Bragg	NC	Replace Failed and Failing Chillers
Fort Bragg	NC	Replace Failing CW/HW Distribution
Fort Bragg	NC	Repair/Replace Failing Central Plant
Fort Bragg	NC	Repair & Replace Failed Equipment,
Fort Bragg	NC	Repair/Replace Central Plant Equip.
Hawthorne Army Depot	NV	Modernize Steam & Condensate Line
Fort Sill	OK	Central Plant Mechanical Equipment
Fort Sill	OK	Central Plant Mechanical Equipment
Fort Sill	OK	Central Heat/Cool Dist. Sys.
Fort Jackson	SC	Central Energy Plant Distribution
Fort Sam Houston	TX	Repair Heat Distribution Lines
Fort Lewis	WA	Repair Heat Distribution Piping#1
Fort Lewis	WA	Repair Heat Distribution Piping#2
Fort Lewis	WA	Replace Stack On Boiler Plant 3292
Fort Lewis	WA	Replace Stack On Boiler Plant 9580

HEAT VENTILATION AIR CONDITIONING (HVAC)

Walter Reed AMC	DC	Boiler replacement, High-efficiency A/C Units,
Fort Sam Houston	TX	Repair Water Tower 1565
Ansbach	Germany	Install Radiant Heating in 7 Hangers
Fort Benning	GA	Heating Plant Decentralization
Wiesbaden	Germany	Radiant Heating System
Fort Eustis	VA	Heating Plant Decentralization

Fort Eustis	VA	Infrared Heat, Misc Projects
Kaiserslautern	Germany	Radiant Heating & Weatherizing
Walter Reed AMC	DC	Chiller Replacement, Controls & Plant Upgrade
Camp Carroll	Korea	Upgrade Laundry Process Steam Boiler
Anniston AD	AL	Upgrade Steam Distribution System
Tomkins Barracks	Germany	Replace Main Heating Pumps and Control Panel
Fort Lee	VA	Infrared Heating, 6200 Block
Aberdeen PG	MD	Natural Gas Conversion, Boiler, Conversion,
Aberdeen Proving Ground	MD	Repair HVAC and Electric, E4900
Aberdeen Proving Ground	MD	Repair HVAC, 309
Fort Bragg	NC	Chilled Water Storage System
Sagami General Depot	Japan	Replace HVAC System (MWR Sagami Lounge)
Fort Bragg	NC	Recover Turbine Exhaust Heat
Fort Polk	LA	Boiler replacements, HVAC Controls
West Point	NY	Variable Air Volume Control, Electric Chiller,)
Tobyhanna AD	PA	Decentralization of Heating Plant
USAG Hawaii	HI	HVAC and Solar Hot Water Heaters
Fort Campbell	KY	Solar HVAC Upgrades, Efficient Boilers
Fort Knox	KY	HVAC Improvement
Husterhoeh Kaserne	Germany	Replace Failed Boilers
Picatinny Arsenal	NJ	HVAC Improvement (7 Buildings)
Aberdeen PG	MD	HVAC Renovation and Conversion
Fort Leonard Wood	MO	AC & Water (AFH)
Aberdeen Proving Ground	MD	Repair Chiller, E4229
Aberdeen Proving Ground	MD	Repair Chiller, E4222
Fort Bragg	NC	Heating System Improvements
Walter Reed AMC	DC	AFIP- Chilled Water Line, Lighting, Misc
Fort Campbell	KY	Decentralization of Boiler Plant
Fort Carson	CO	Chiller Replacements, Cooling Towers,
Fort Knox	KY	HVAC 12 Bldgs 2300 Block
Fort McPherson	GA	Chiller and HVAC Upgrades
Fort McPherson	GA	Infrared Heating, Lighting, Controls
Fort McPherson	GA	Natural Gas Boilers, Chillers and Control system,
USAG - Alaska	AK	Decentralization of Central Plant
Redstone Arsenal	AL	Chiller Improvements, Building Automation
Fort Gordon	GA	Convert 88 Bldg to Variable Speed Pumps
SERMC Hospitals (Ft Benning, Ft Gordon, Ft Jackson, Ft Rucker & Ft Stewart)	AL GA SC	Chiller Improvements Building Automation Systems/EMCS Heating, Ventilating & Air Conditioning Lighting Improvements Building Envelope Modifications Chilled/Hot/Steam Piping & Dist. in 6 medical facilities
Fort Carson	CO	Replace Boilers/Furnaces
Fort Bragg	NC	Electrical Load Management, HVAC

Sagami General Depot	Japan	Replace A/C System
Fort Gordon	GA	Moran Hall Chilled Water/Condensate Pipe
Picatinny Arsenal	NJ	HVAC improvements for 13 buildings
Camp Ederle	Italy	Install Radiant Heating B-207
West Point	NY	Variable Air Volume Conversion, Chiller Plant
Camp Ederle	Italy	Repair By Replacement Chiller B-345
Trippler AMC	HI	AHU Upgrades, Pump Control,
Camp Ederle	Italy	Repair By Replacing Chillers Bldg 302
West Point	NY	Boiler Replacements & Gas line
Livorno	Italy	Replace Heating System with Radiant Heat
Redstone Arsenal	AL	Steam Plant Decentralization
Corpus Christi AD	TX	Steam Decentralization
Fort Belvoir	VA	Decentralize Steam System
Fort Benning	GA	Replace HVAC System - Bldg 17
Fort Belvoir	VA	Boiler
West Point	NY	Gas Regulators @ Bldg 604
Fort Bragg	NC	Repair/Replace Failing Steam Heating System,
Fort Drum	NY	Building Automation Systems/EMCS, HVAC
Katterbach Kaserne	Germany	Install Hangar Radiant Heat
Picatinny Arsenal	NJ	Decentralized heating systems
Fort Greely	AK	Install Heat Recovery System (HRV)
Fort Greely	AK	Install A Heat Recovery Ventilation System
Fort Irwin	CA	Boiler Improvements; Chiller Improvements;
Picatinny Arsenal	NJ	HVAC
Conn Barracks	Germany	Replace Heating System with Radiant Heat
West Point	NY	Gas Regulators @ Laundry Boiler Plant
Vicenza	Italy	Boiler Plant modifications
Fort Monroe	VA	Replace Air Handler AC Unit
Aberdeen Proving Ground	MD	Repair Boiler, E3832
Myer/Henderson Hall	VA	Replace steam system
Fort Benning	GA	Replace Air Conditioning
West Point	NY	Replace Failing HVAC System
Fort Greely	AK	Install Air Conditioner
Fort Gillem	GA	Replace Roof Top Chiller
Fort McPherson	GA	Replace Angle Gear Drives For Condenser Fans
West Point	NY	Install Gas Bypass On 2 Chillers
West Point	NY	Repair Absorber #3
Fort Greely	AK	Install Head Bolt Heater Plugs
West Point	NY	B603 West Point Club - Replace Absorber
Fort Greely	AK	Install Heat Recovery Ventilation System
Fort Drum	NY	Repair HVAC System, P-10050
Fort Rucker	AL	Repair Boiler - B4605
Fort Huachuca	AZ	Replace Evaporative Cooling w/AC

Fort Huachuca	AZ	Replace Evap Cooling w/A/C, Bldg 70525
Fort Huachuca	AZ	Replace Evap Cooling w/A/C, Bldg 50010
Fort Huachuca	AZ	Replace Evap Cooling Bldgs 55332/55338
Fort Benning	GA	Replace Cooling Tower Building 398.
Rock Island Arsenal	IL	Repair Three Water Chillers, Building 350
Rock Island Arsenal	IL	Repair Heating Plant Cooling Water System
Aberdeen Proving Ground	MD	Repair Boiler, 3062
Aberdeen Proving Ground	MD	Replace The Hot Water Boiler in 740c
Aberdeen Proving Ground	MD	Repair Boiler, 2312
Aberdeen Proving Ground	MD	Repair Boiler, 394
Aberdeen Proving Ground	MD	Repair Boiler in Facility 300
Adelphi Laboratory Center	MD	Repair Cooling Towers #4, #6 & #7 Building 106
Fort Jackson	SC	Replace HVAC at Building 4600
Fort Jackson	SC	Renovate HVAC in Building 5975
Fort Jackson	SC	Replace Chiller in B2100
Fort Jackson	SC	Replace Chiller in Building 12650
Fort Hood	TX	Replace Outdated Chillers and Boilers
Fort Belvoir	VA	Decentralize Heating Plant, Building 808
Fort Belvoir	VA	Decentralize Heating Plant, 12th Street
Fort Belvoir	VA	Replace HVAC System, Building 201
Fort Eustis	VA	HVAC System Repairs Building 814
Fort Eustis	VA	HVAC System Repairs Building 804
Fort Eustis	VA	HVAC System Repairs Building 810
Fort Eustis	VA	HVAC System Repairs Building 815
Fort Eustis	VA	Chemical Clean Boilers, Buildings 587 & 2701
Fort Wainwright	AK	Bldg 1555, HVAC Repair & Upgrade
Fort Wainwright	AK	Bldg 3401, HVAC Repair &
Fort Wainwright	AK	Building 3490: Replace Ventilation System
Fort Rucker	AL	HVAC Conversion - Training Barracks
Fort Rucker	AL	Install Air Conditioning to Communication Rooms
Fort Huachuca	AZ	Repair Boiler and Insulate Admin Building 41420
Fort Huachuca	AZ	Improve Chilled Water Distribution Loop
Fort McNair	VA	Decentralize Steam Plant McNair Bldg 34
Fort Benning	GA	Decentralize Boiler Plant, Bldg 397
Wheeler Army Airfield	HI	Replace Building 105 HVAC System
Wheeler Army Airfield	HI	Building 1006 - Misc HVAC and Lighting Repair
Aberdeen Proving Ground	MD	Repair/Replace Defective Fan Coil Units
Aberdeen Proving Ground	MD	Repairs to HVAC in Bldg 394
Aberdeen Proving Ground	MD	Replace Air Conditioning Units, E2188
Aberdeen Proving Ground	MD	Repair HVAC in Bldg 331
Aberdeen Proving Ground	MD	Repair A/C and Heat Units, Bldgs E4586/88
Aberdeen Proving Ground	MD	Repair Boiler, Maintenance Bldg E1464
Detroit Arsenal	MI	Replace HVAC System in B212

Fort Bragg	NC	Replace Chiller, Bldg 4-1431
Fort Drum	NY	Replace Furnaces in 72 Buildings
Fort Hamilton	NY	Convert Oil-Fired Boilers to Gas
Carlisle Barracks	PA	Replace The HVAC Air Handlers @ B-122
Fort Bliss	TX	Replace Old HVAC/Solar Day Lighting
Fort Bliss AAA Ranges	TX	Replace Inadequate AC System
Fort Bliss	TX	Replace Deteriorated AC System
Fort Eustis	VA	HVAC System Repairs
Fort Myer	VA	Replace Air Handling Unit (AHU) and Controls
Fort Myer	VA	Repair & Modify Boiler Control Panel
Detroit Arsenal	MI	Repair Cooling Tower

COMMISSIONING

Fort Drum	NY	Retro-commissioning for 17 buildings
Camp Red Cloud	Korea	Conduct Energy Audit
Fort Bragg	NC	Retro-Commission Separates in A Area
Fort Jackson	SC	Repair Findings Identified By Commissioning at Various Buildings
Fort Lewis	WA	Re-commission Facilities
Fort Bragg	NC	Perform Retro Commissioning HVAC System,
Carlisle Barracks	PA	Re-Commission Building 950

HYDROPOWER

McAlester AAP	OK	Purchased Hydropower
Rock Island Arsenal	IL	3 MW hydropower
Rock Island Arsenal	IL	Dredge Moline Pool
Rock Island Arsenal	IL	Repair Windows in Old Section, Bldg 160
Fort Richardson	AK	Hydroelectric Power Generator
Rock Island Arsenal	IL	Repair Masonry, Old Section, Building 160
Rock Island Arsenal	IL	Repair Masonry, New Section, Building 160

BIOGENIC RENEWABLE METHANE GAS

Fort Knox, KY, Methane Gas Project: Fort Knox partnered with a rural electric cooperative using a Utility Energy Service Contract (UESC) at a cost avoidance of $5 million to harvest biogenic renewable methane gas from Devonian-Shale. This project decreases consumption of natural gas from the interstate grid, increases Fort Knox's energy security posture. There is a 14 percent cost savings over commercial gas. The project is estimated to save 20 to 30 % per year over the 25 year plus life of the project.

Fort Knox	KY	Purchased KWH from local landfill gas
Fort Huachuca	AZ	Repair Wastewtr Treat Plant/Prevent Gas Escape

ULTRA LOW ENERGY HOUSING

Installation Management Command-Europe Region (IMCOM-Europe) *Passivhaus:* In partnership with the Nürnberg *bauamt* (or state construction office), the Army set a new benchmark for Family Housing projects. The project constructed one street of a new Army family housing neighborhood to be certified to the ultra-low energy standard known in Germany as *Passivhaus* standards. These standards are much more rigorous than those in the United States. *Passivhaus* standards use one-fourth of the energy demanded by typical facilities constructed in Germany. They are called Passiv (or passive, in English) because the interior climate is intended to be maintained without active heating and cooling systems and therefore, the house heats and cools itself. IMCOM-Europe has constructed 22 Passivhaus townhouses out of 106 total townhouses built in 2010 in the Urlas Housing Area of U.S. Army Garrison Ansbach. This project is funded by Military Construction (Army Family Housing).

Energy Projects Through Army Privatization Program: The Army has funded extensive energy project initiatives accomplished through its various privatization programs. The Army Residential Communities Initiative (RCI) is dedicated to building quality residential communities for Soldiers and their families. Through RCI, Fort Belvoir Neighborhood Center received the first Leadership in Energy & Environment Design (LEED) PLATINUM rating in the Department of Defense. Fort Hood has constructed energy efficient homes that meet the LEED SILVER rating. Hawaii has LEED SILVER homes with extensive solar water heating and photovoltaic projects. The Army Utilities Privatization (UP) Program has invested hundreds of millions to modernize and upgrade deteriorating and deficient utility systems. In addition to routinely installing new infrastructure to reduce losses and improve efficiency and sustainability, UP Providers have also worked with installations to fund specific energy-saving projects. Recent UP energy initiatives in Alaska, for example, include a wind turbine to help meet remote electrical requirements, landfill gas

energy recovery, and backpressure turbine energy recovery at the central heat and power plant.

Ultra Low Energy Community Systems: Two Contracts were awarded February 2010, totaling $2.9 million using American Recovery and Reinvestment Act funding to develop energy models providing an optimal selection of cost effective, low energy technologies for a specific site with its unique weather, building/energy systems, energy costs, and occupancy demands. The focus will be on technologies and practices to achieve 60% - 80% more energy efficient buildings than required by the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2004. The approach will maximize the use of renewable energy technologies and optimize life-cycle cost. Concepts will be validated at Fort Irwin, CA and Fort Carson, CO.

Presidio of Monterey	CA	Energy Efficient Insulation
Fort Polk	LA	Insulation, Energy improvements
Fort Greely	AK	Replace Roof On Bldg 612 w/R-Value 60
Fort Greely	AK	Bldg 663 Energy Efficient Windows
Fort Greely	AK	Replace Roof On Bldg 609 with R-60 Roof
Fort Greely	AK	R-60 Value Roof Building 650
Fort Greely	AK	Repair Alaska Brand Windows
Fort Bliss	TX	Repair and Insulate
Camp Zama	Japan	Replace Roof (UPH)
Rock Island Arsenal	IL	Repair Roof, Bldg 299
Fort Greely	AK	Install EIFS Siding On Bldg 609
Fort Greely	AK	Energy Efficient Windows Bldg 609
Fort Greely	AK	Energy Efficient Windows Building 661
Fort Greely	AK	Install Insulation Finish System Bldg 661
Fort Greely	AK	Install Insulation Finish System Bldg 655
Fort Wainwright	AK	Improve Building Envelope Building 3015
Fort Wainwright	AK	Improve Building Envelope Building 3030
Fort Wainwright	AK	Repair Center Built-Up Roof Building
Fort Wainwright	AK	Repair West Built-Up Roof- Building
Fort Wainwright	AK	Repair East Irma Roof Building 3030
Fort Wainwright	AK	Repair West Irma Roof Building 3030
Yuma Proving Ground	AZ	Replace Exterior Door Weather Stripping
Fort Greely	AK	Replace Windows in Bldg 702
Fort Greely	AK	Install Insulation Finishing System Bldg 663
Fort Wainwright	AK	Replace Roof Building 2019
Schofield Barracks	HI	Improve Building Envelope Motor Pool
Fort Bliss	TX	Repair Windows and Insulation

WIND SYSTEMS

Tooele Army Depot, UT, Wind Turbine: Tooele Army Depot celebrated the construction of the first wind turbine at an Active Army installation in July 2010. The project was approved and funded through the Army Energy Conservation Investment Program (ECIP) in 2007. The project will result in energy savings of 14.5 Billion British Thermal Units (BBTUs). The 262-foot-tall wind turbine will generate 1.5 megawatts of electricity which translates to approximately $206,625 in savings per year. The turbine was completed a year ahead of schedule. This wind turbine requires wind speeds of at least 12 mph to generate electricity and the average wind speed at the depot's wind-turbine site is 14 mph.

Arizona Army Nat. Guard	AZ	Camp Navajo Wind Turbine
Arizona Army Nat. Guard	AZ	PPMR ECObuilduing Wind Turbines
Sea Girt	NJ	Install 1.5 MW Wind Turbine
Fort Huachuca	AZ	10KW Wind Turbine
Fort Irwin	CA	Install small 8 KW Wind Turbine
Fort Knox	KY	Wind turbine installed 1.8KW
Fort Huachuca	AZ	850 kW Wind Turbine
Minnesota Army Nat. Guard	MN	XCEL Wind Rosemount
Minnesota Army Nat. Guard	MN	AHATS XCEL Wind Turbine
Minnesota Army Nat. Guard	MN	Wind Energy Purchase
Minnesota Army Nat. Guard	MN	Renewable Energy Camp Ripley
Fort Wainwright	AK	Install Wind Turbine at Black Rapids
Kahuku Training Area	HI	Wind/Solar Power Generation System

MICROGRIDS

Fort Sill, OK, Microgrid Field Scale Demonstration Project: Contract was awarded July 2010 in the amount of $2.5 million using American Recovery and Reinvestment Act funding for the development of hardware, software, and controls to perform field scale renewable focused, “intelligent” micro-grid implementation for a set of buildings on the installation. It will provide secure and high reliability energy and environmental performance in an islanded mode. This project will validate the system’s ability to network renewable and advanced distributed generation sources, quantify carbon footprint reduction, serve critical mission power requirements in a sustainable,

reliable, and secure manner, increase energy security, and enable integration of existing and future renewable energy sources.

Fort Hunter Liggett	CA	1 MW Solar Micro Grid
Aberdeen PG	MD	Distributed Generation
Schofield Barracks	HI	Micro-cogeneration
Fort Greely	AK	Install Back Up Power/All POL Facilities
Fort Bragg	NC	82nd Cogeneration project
Fort Bragg	NC	Cogeneration Project (Chiller) MOD
Vincenza	Italy	1.5 megawatt cogeneration project.
Fort Benning	GA	Repair & Upgrade Peak Shaving Plant
Fort Knox	KY	Replace Diesel Generator w/Natural Gas
Fort Knox	KY	Install Connections/West Point Wellfield
Fort Knox	KY	Install Automatic Switchgear On Generators
Detroit Arsenal	MI	Install Fuel Cell Generator

SOLAR WALLS AND SOLAR THERMAL

Tooele Army Depot Solar Walls:

Toole Army Depot awarded a contract in fiscal year 2009 to install solar walls on 14 buildings using Energy Conservation Investment Program funding in the amount of $800,000. Solar wall air heating systems are perforated metal sheets that heat up when exposed to sunlight (passive solar heating). A thermostat within the solar walls is connected to a fan that is programmed to come on at 65 degrees, draw air through the perforations in the metal, and send the heated air into the buildings. Tooele's expected annual energy savings is approximately $100,000 per year.

Fort Drum, NY, Installs Solar Walls And Energy Improvements: This ECIP project renovates five 1960's vintage maintenance shops to utilize renewable energy and improve energy efficiency. Prior to this project, four of the five buildings were under- insulated with inadequate heating systems using fuel oil and propane. The facilities had obsolete T-12 fluorescent lighting or incandescent lighting and the buildings are used year round. This project installed solar wall preheat panels to provide solar heated ventilation air, insulating walls, roofs and new windows, natural gas

fired heating, Direct Digital Heat Ventilation Air Conditioning Controls, new T-8 and T-5 high bay lighting. The construction cost was $1.6 million and the annual energy savings are expected to be 7,192 Million British Thermal Units (MBTU) and a payback of 5.8 years.

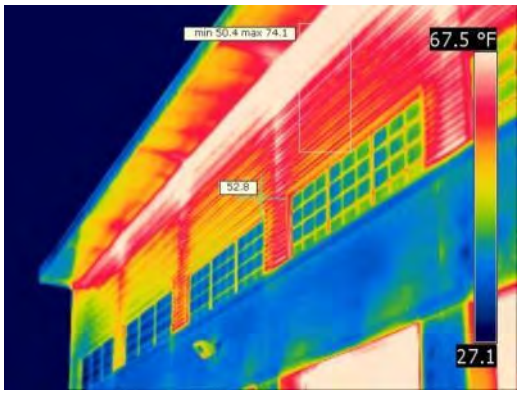
Fort Bragg	NC	Solar Walls, & Solar Daylighting
Fort Knox	KY	Solar Walls & Day Lighting
Arizona Army Nat. Guard	AZ	Solar Absorption Chiller - PPMR ECObuilding
Arizona Army Nat. Guard	AZ	AZARNG HQ Solar Water Potable Water
Army Research Lab Adelphi	MD	Install Thermal Roof Tile Heating System
Fort Drum	NY	Solar walls & rehab shops
Colorado Army Nat. Guard	CO	Transpired Solar Collector
Pohakuloa Training	HI	Solar Hot Water & Daylighting
Fort Buchanan	PR	Solar Water Heaters & HVAC Replacement
Adelphi Lab	MD	Install solar thermal roof tile heating system
Aberdeen PG	MD	Install Solar Tubes and Controls
Fort Buchanan	PR	Solar Water Heaters
Schofield Bks	HI	Solar Water Heaters & Lighting Retrofit
Benelux	Belgium	Install solar water heating
Fort Knox	KY	Geothermal Domestic Hot Water & Exit Lighting
Fort Carson	CO	Transpired Solar Collector, Bldg 803
Fort Carson	CO	Transpired Solar Walls, Bldg 963
Fort Carson	CO	Solar Hot Water for Indoor Pool
Fort Drum	NY	Solar Walls
Fort Drum	NY	Solar Walls & Rehab Shops
Fort Drum	NY	Solar Walls & Energy Improvements
Fort Drum	NY	Install Solar Walls, Energy Improvements
Fort Huachuca	AZ	Solar Walls
Fort Sill	OK	Solar Water Pre-heater
Fort Huachuca	AZ	Solar Attic
Fort Huachuca	AZ	Barnes Fieldhouse, Pool Water Heater
Tooele AD	UT	Solar Walls on 14 Buildings
Fort Sill	OK	Solar Pool Water Heater
Hawaii Army Nat. Guard	HI	RTSM 103rd Troop Command Solar Heater
Fort Wainwright	AK	Install Solar Wall at FWA
USAG Benelux	BE	Solar Water Heating
USAG Hawaii	HI	Solar water heating
Fort Drum	NY	Upgrade Solar Wall Damper & Controls
Fort Shafter	HI	Replace Water Heaters with Solar Heaters
Wheeler Army Airfield	HI	Repair Solar Hot Water Systems

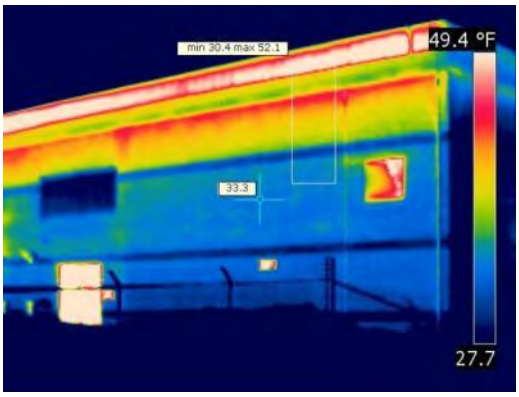
LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

Fort Carson, CO., LEED Success Story: 4th Infantry Division of the United States Army returned home from Iraq to a new Headquarters Command and Control Facility (C2F). This state of the art facility was designed to become a powerful sustainable platform for success. It is designed to reduce Volatile Organic Compounds (VOC) emissions and utilize recycled materials without compromising the aesthetic image necessary for a headquarters facility. The C2F achieved LEED SILVER Certification and a significant energy usage reduction compared to the building's baseline performance rating, as well as a 53 percent reduction in water use. With all its innovations, this Military Construction funded C2F project was completed at 7 percent below budget. The Fort Carson C2F is proof that facilities can be delivered "better, cheaper, faster, and greener" while still maintaining the highest standards of aesthetics, function and sustainability.

THERMOGRAPHY

Thermography: Thermography is a "heat diagram" or a visible picture using infrared wavelengths. The human eye cannot see infrared light; however, an infrared camera can detect radiation of heat from the surface of an object; translate the information into temperatures, and then display the temperatures as colors on a video screen that the human eye can see. This tool gives valuable information about the





source of heat loss, which can be used to diagnose problems and determine how to conserve energy. The U.S. Army Reserves has already implemented this technology in the energy efficiency evaluation of their key projects. Infrared Thermography is an excellent tool for achieving quality assurance in mechanical systems, electrical systems,

roofing systems and building envelopes. Starting fiscal year 2011, the SDD Validation Committee will also include Infrared Thermography as part of the SDD validation to check mechanical systems, electrical systems, roofing systems and building envelopes as quality assurance measures.

WATER CONSERVATION PROGRAM

Low Impact Development at Fort Belvoir, VA: Rain-water "harvesting" captures rainfall runoff from roofs that would normally escape to storm sewers or overland flow that can be used to extend an installation's water supply. The new community hospital at Ft Belvoir will collect and store up to 140,000 gallons of rainwater for reuse. Roofs over each outpatient clinic will collect rainwater into cisterns which will be used to irrigate areas of the courtyards and landscaping around the hospital.

Fort Stewart, GA, Golf Course Water Retention Pond: In June/July 2010, Fort Stewart began saving approximately 863 thousand gallons of drinking water per day when it converted its golf course irrigation and Central Energy Plant chillers to reuse water. This partnership with the City of Hinesville, GA., was a win-win for all providing the city with a reuse customer and assisting the Army to achieve energy and water conservation objectives of the Executive Order 13514 and Georgia's Water Stewardship Act of 2010.

Fort Rucker	AL	Water Conservation Project
Fort Benning	GA	Rain Water Harvesting

GROUND SOURCE HEAT PUMPS

Fort Bragg	NC	Ground Source Heap Pump Well Field
Fort Riley	KS	Ground Source Heat Pumps
Fort Knox	KY	Barracks Geothermal Phase 4
Fort AP Hill,	VA	Ground Source Heat Pumps
Fort Campbell	KY	Barracks 7112 Ground Source Heat Pump

Fort Sill	OK	Geothermal heating & cooling
Iowa AAP	IA	Ground Source Heap Pump & PV
Fort Knox	KY	Barracks Ground Source Heat Pumps,
Fort Gordon	GA	Ground Source Heat Pumps
Fort Knox	KY	Barracks Ground Source Heat Pumps,
Hawthorne AD	NV	Geothermal Test Wells, Ph 2
MOT Sunny Point	NC	Ground Coupled Heat Pumps
Fort Sill	OK	Geothermal Heat Pumps for Buildings
Fort Gordon	GA	Geothermal Heat Pumps 13 Bldgs
McAlester AAP	OK	Geothermal Heat Pump/Hot Water System
Fort Knox	KY	Barracks GSHP Phase 4
Fort Knox	KY	Geothermal Domestic Hot Water
Fort Knox	KY	Barracks GSHP Phase 5
Fort Knox	KY	Barracks GSHP Phase 6
Fort Sam Houston	TX	Geothermal Heat Pumps, Lighting, HVAC
Fort Knox	KY	Geothermal Heat Pumps, Lighting Retrofits
MOT Sunny Point	NC	Ground Source Heat Pumps
Aberdeen Proving Grounds	MD	Ground Source Heat Pumps
Rock Island Arsenal	IL	Geothermal Heat Pumps
Carlisle Barracks	PA	Geothermal Heat Pumps, Direct Digital
Aberdeen Proving Grounds	MD	Geothermal Heat Pumps, 634 AFH units
Fort Hamilton	NY	Geothermal, Hydroelectric Upgrades
Yongsan	Korea	GHP Systems, Bldg Automation Systems
Fort Hamilton	NY	Feasibility Study For Energy
Fort Leonard Wood	MO	Replace Obstruction Lighting/Beacon
Fort Knox	KY	HVAC w/Renewable Geothermal 1
Fort Knox	KY	HVAC w/Renewable Geothermal 2
Fort Knox	KY	HVAC w/Renewable Geothermal 3
Fort Knox	KY	HVAC w/Renewable Geothermal 4
Fort Bragg	NC	Install Ground Source Heat Pump
Fort Hamilton	NY	Replace HVAC w/Geothermal Energy
Fort Hamilton	NY	Construct Geo-Thermal Plant
Fort Benning	GA	Ground Source Heat Pump

ENERGY MANAGEMENT CONTROL SYSTEMS/METERS/ UTILITY MANAGEMENT AND CONTROL SYSTEMS/SENSORS

Utility Monitoring and Control System (UMCS): Fort Bragg will potentially save 12 million dollars through the use of UMCS. Once UMCS is installed and programs are in place to properly monitor and react to energy conservation opportunities the system will yield a 15-20% savings of energy while maintaining the same operational requirements. As a result of increasing populations and ever rising energy costs, a plan was developed three years ago to implement a central utility processing center for building and facility controls pertaining to any part of the air-conditioning and heating systems of occupied buildings. This UMCS have the primary function to be an advanced warning system in the event of equipment malfunction or failure and the second benefit is that it can be designed to reduce energy consumption and increase operational efficiency at Fort Bragg. The state-of-the-art equipment performs by integrating environmental control, energy management, maintenance management, lighting control and overall facility monitoring in all types and sizes of buildings. The UMCS also integrates equipment and systems from more than 100 manufactures, allowing the government to protect investments in systems and products already installed. The system creates a synergy between the buildings on the installation and a central management system. Through customized reports, Fort Bragg Energy Manger will be able to accurately measure energy savings, monitor electrical power utilization, and manage peak electrical demand. Additionally, the system will help managers establishing energy consumption accountability, motivate conservation behavior among facility occupants and identify where energy saving facility improvements are economically justified. Fort Bragg has awarded 16 projects representing 269 buildings and 8.3 million square feet. 64 buildings totaling 1.7 million square feet are funded and soon will be awarded. Fort Bragg metering project will include over 400 additional buildings integrated into the UMCS and will give access to over 750 buildings from the UMCS.

Fort Bragg	NC	UMCS System
Fort Riley	KS	Install EMCS System
Fort Bragg	NC	Simmons Army Airfield: ECSM 1
Fort Benning	GA	UMCS
Fort Gordon	GA	Utility meters
Fort Bragg	NC	JSOC Facilities: ECSM 1
Fort Lewis	WA	Vending Misers and Lighting

Yuma Proving Ground	AZ	Install motion sensors in 200 buildings
Fort Bragg	NC	Lighting, Heat, Controls
Fort Bragg	NC	EMCS
Camp Carroll	Korea	Install Watt Hour Meters
White Sands Missile	NM	Install Direct Digital Controls
Fort Irwin	CA	Controls & Water
Fort Hood	TX	Install 8,000 Motion Sensors
Ledward Barracks	Germany	Replace UMCS Cabinets
Fort Lee	VA	EMCS Upgrade, Ph 2
Fort Buchanan	PR	Project Wireless Digital HVAC Controls
Fort Campbell	KY	Ground Source Heat Pumps
Germersheim Army	Germany	Repl/Upgrade Controls For Light./Heat
Fort Stewart	GA	UMCS in 30 Buildings ECIP
Fort Leavenworth	KS	EMCS Consolidation to BACNET
Anniston AD	AL	EMCS
Camp Zama	Japan	Install Inverter Controllers
Fort Campbell	KY	EMCS/electrical system improvements
Camp Zama	Japan	Install Automatic Control System
Hohenfels Training Area	Germany	Replace UEMCS Main Central Station
Fort Greely	AK	Repl Light Switches w/Motion Sensors
Fort Rucker	AL	Energy Monitoring Control System
Wiesbaden	GE	UEMCS and lighting
Giebelstadt	GE	UEMCS
Picatinny Arsenal	NJ	UEMCS
Fort Knox	KY	Meters
Landstuhl	GE	UEMCS
Fort Lewis	WA	EMCS, Controls, Heating System Imp.
Fort Hood	TX	UMCS, Vending Machine Controls
Fort Stewart	GA	Water/Sewer Sys, Bldg Auto Sys/EMCS
West Point	NY	Upgrade Electronic Controls
Fort Hood	TX	Phase II - Build Auto Sys/EMCS;
Fort Jackson	SC	Building Automation Systems/EMCS
Fort Huachuca	AZ	EMCS, Lighting, Water
Detroit Arsenal	MI	Install Motion Sensors
Fort Dix	NJ	EMCS, Lighting, HVAC, PV, Water
Fort Bliss	TX	EMCS, Renewable, Lighting
Fort Bragg	NC	ECIP Utility Monitoring Control System
Camp Humphreys	Korea	Replace Exterior Lighting Control
West Point	NY	Replace Jace Control Interface W/B849
West Point	NY	Connect Existing EMCS System to B604
Fort Leavenworth	KS	Install Gas Meters
Fort Richardson	AK	Install Lighting Controls Building 800

Fort Huachuca	AZ	Install Water Meters
Fort Huachuca	AZ	Calibrate Production Well Meters
Yuma Proving Ground	AZ	Retro Light Switches w/Occup. Sensors
Detroit Arsenal	MI	Upgrade EMS
Fort Drum	NY	Small Building Control Sys
Fort Drum	NY	Replace Failing Telemetry System
Carlisle Barracks	PA	Repairs and Metering
Fort Jackson	SC	Place EMCS Controls On LAN
Fort Richardson	AK	Install Heat Controls Bldg 7
Fort Richardson	AK	Install Heat Controls/Sidewalk System
Fort Richardson	AK	Install Heat Ctrls/Sidewalk Bldg 690
Fort Richardson	AK	Install Lighting Controls Bldg 806
Fort Richardson	AK	Install Lighting Controls Bldg 804
Fort Richardson	AK	Install Lighting Controls Bldg 802
Fort Richardson	AK	Install Lighting Controls Bldg 600
Fort Richardson	AK	Install Lighting Controls Bldg 800
Fort Rucker	AL	Convert Electrical and Gas Meters
Fort Rucker	AL	Replace Digital Controls - B9214
Redstone Arsenal	AL	Replace Potable Water Meters
Fort Huachuca	AZ	Repair Basewide EMCS
Fort Riley	KS	Bldg 8370 Install DDC Controls
Fort Riley	KS	Bldg 8330 Install DDC Controls
Fort Riley	KS	Motorpool Upgrade install Digital Controls
Fort Riley	KS	Rebuild Gas Metering Station
Fort Bragg	NC	Repair Failing Chiller/Boiler Controls
Fort Bragg	NC	Repair Chiller/Boiler Controls
Fort Bragg	NC	Install Occupancy Sensors
Fort Hamilton	NY	Replace Water Meters Post-Wide
Fort Sill	OK	Replace EMCS
Fort Bliss	TX	Occupancy Sensors/Timers
Fort Sam Houston	TX	Replace HVAC Controls
Fort Sam Houston	TX	Connect Bldg 2225/(UMCS)
Detroit Arsenal	MI	Install Energy Saving Motion Sensors

SOLAR DAYLIGHTING/LIGHTING

Fort Bliss	TX	Solar Daylighting
Aberdeen Proving Ground	MD	Install Solar Tubes & Controls
Arizona Army Nat. Guard	AZ	Solar Daylighting at PPMR
Fort Bliss	TX	Solar Daylighting
USAG – Hawaii	HI	Daylighting

Fort Bliss	TX	Solar Daylighting
Fort Carson	CO	Solar Tubes
Fort Huachuca	AZ	Daylighting
Fort Huachuca	AZ	Lighting, Daylighting

NETZERO BUILDING

Fort Irwin, CA, NetZero Energy Building: Fort Irwin constructed a 6,250 NetZero energy building. This 6,250 square foot NetZero prefabricated ammunition storage facility requires no electricity from the commercial electric grid because it produces enough electricity to power all of its electrical needs. The roof-mounted solar panels supplies 2.3KW of power. Exterior lighting uses high efficiency lights coupled

with a light sensitive photocell which turns the exterior lighting on only when it is dark outside. The battery bank is charged by the PV panels for power storage when the sun isn't shining. Skylights, incorporated into the roof of the building, provide most of the lighting needed throughout the day so electrical lighting is only needed in the evenings. Interior lighting uses high efficiency light bulbs and timers which turn off lights after normal duty hours. The total electrical building costs for the NetZero facility were $62,000. The facility not only saved Fort Irwin $12,000 in construction costs, it saves more than $1,000 annually in electricity.

OTHER INITIATIVES

Aberdeen Proving Ground (APG), MD, is developing a Waste-to-Energy plant that will burn municipal solid waste (MSW) from the installation and surrounding communities and provide steam and electricity to the Edgewood cantonment of APG. The proposal is to develop the plant

through the Energy Savings Performance Contract (ESPC) authority with an expected third party investment of around $400 million to be paid back through savings achieved through lowered steam and electricity rates (as compared to the commercial market). The new plant will be sited on leased Army property adjacent to the existing waste-to-energy scheduled to reach the end of its useful life in January of 2016. The new plant will be larger, sized to meet additional BRAC related energy requirements as well as increased waste disposal requirements.

Fort Detrick	MD	Incinerator Heat Recovery

Energy Security Audit & Islanding Methodology: Six contracts were awarded February April 2010, totaling $ 6.8 million using American Recovery and Reinvestment Act funding to develop energy security self audit methodologies and analysis tools for Army installations and validate at 16 force projection installations. The project will identify actionable projects for each installation to improve energy security and develop methodologies for islanding critical missions of Army installations from the commercial electric utility grid and validate the methods. Goals are to improve coordination between installation anti terrorism/force protection and energy offices, and provide consistent methodologies and metrics for improving installation energy security.

Ft. Wainwright, Alaska, Cold Weather Admixture for Concrete: Under the Installation Technology Transition Program (ITTP), a construction technique for mixing and placing concrete at below freezing temperatures was demonstrated. This Cold-Weather Admixture System (CWAS) produces a savings of 31percent in cost and lengthens the construction season in cold climates. The many advantages include reduction in time, energy, and cost with no loss of strength. This system eliminated the need to preheat the ground or build enclosures and pipe in heat for periods of days or weeks.

Fort Bragg / Camp Mackall, NC, Recycled-Plastic Vehicular Bridge: Two recycled-plastic timber bridges were built at Camp Mackall in 2009 replacing deteriorated chemically-treated wood timber bridges. The old bridges had a load capacity of 6 tons or less. The plastic timber replacement bridges were designed to carry the load of a 71 ton M-1 tank. The recycled-plastic timbers used in these bridges are

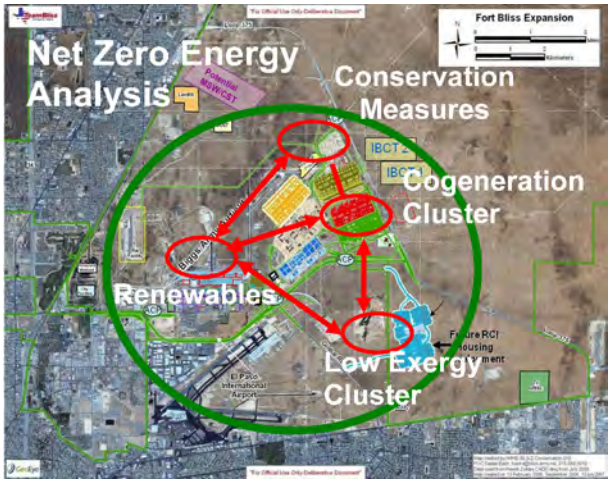
inherently resistant to rot, insects and moisture without the need of added chemical treatments. Not only are these plastic timber bridges cost competitive on a first-cost basis but, with their low/no-maintenance needs over their projected 50-year plus life, they are clear winners on a lifecycle basis. These durable, sustainable, environmentally-friendly and cost effective materials and innovative designed structures could be used to replace the hundreds of wood timber bridges used on Army installations world-wide. A third recycled-plastic timber bridge is currently under construction at Camp Mackall.

Ft. Greeley and Ft. Wainwright, Alaska, Use of Outside Firing Ranges Extended: This ITTP program has provided soldiers the capability to continue marksmanship training with small arms at firing ranges to maintain readiness even in severely cold temperatures at Forts Greely and Wainwright. Enclosed hydronic-heated air curtains protect the soldiers from inclement weather and severe cold temperatures. Troops began using the new facility at Fort Wainwright in October 2009. By mid-winter it was being used extensively. Currently data is being collected to ensure air quality is maintained during intensive training in severely cold weather.

Ft. Richardson, AK, Energy Production from Straight Vegetable Oil: Under the ITTP, a low maintenance used vegetable oil (UVO) filtration and oil burning system is being demonstrated at Ft. Richardson, AK. The UVO produced from the dining facilities will be reconditioned through suitable vegetable oil pumping and filtration technology to make the cooking oil useable. The oil will then be used by a hot water heater capable of burning the used fryer oil to pre-heat the domestic hot water needs of the primary dining facility. The hot water heater and the filtration equipment is being installed in BLDG 655 (Gold Rush Inn dining hall) since the facility is open year round and it is not dependent on staying open when military personnel are deployed. The 125 gallons of oil produced per month in this facility will be used for preheating. The water heater will be installed upstream from the steam/water heat exchanger and thus will be used for preheating the incoming

domestic water which will result in a reduction in natural gas consumption by the existing steam boiler. The system is designed large enough to allow other sites oil to be added to it later.

Net Zero Energy Analysis: This applied research program was initiated in FY2010. The intent is to provide installation planners a capability for integrated energy analysis and optimization, and adaptation to energy requirements as installation missions change over time. It will develop a computational framework for non-linear network simulation to predict performance and optimize integration of installation energy systems including hydraulic heating and cooling, natural gas and liquid fuels, and electric power. The goal is to support installations in meeting net-zero energy requirements by 2030.



Advanced Energy Design Guides for Army Buildings: This project is investigating building features, construction methods and materials to optimize the selected standard designs with regard to energy reduction and sustainability; at a minimum ensure that the selected standard designs meet all applicable energy reduction and sustainable design policy (e.g. LEED SILVER, EPACT 2005, EISA 2007, EO13423 and, EO13514).

Previous work developed and delivered energy performance benchmarks to meet the intent of the 2005 Energy Policy Act. The 2007 Energy Independence Security Act (EISA) reductions in fossil fuel requires 65-80% more energy efficient facilities. To meet these more stringent goals, the Army is collaborating with DOE labs and ASHRAE to develop designs for 5 building types: Battalion / Brigade Headquarters, Unaccompanied Enlisted Personnel Housing (UEPH), Tactical Equipment Maintenance Facility (TEMF), Enlisted Personnel Dining Facility (EPDF), and Company Operations Facility (COF). The extra costs to achieve the goals, beyond the previous standard construction costs, will also be calculated, e.g. 10-20 percent over the programmed amount (PA).

Utilities Privatization (UP) Program: Of the 355 Army utility systems in the United States, 304 have been evaluated for UP (85%) resulting in 146 utility systems being privatized . UP evaluations find the most cost-effective way to bring a utility up to industry standards and operate at that level. Contracts awarded since FY99, valued at about $6.7 billion, have yielded a net present value cost avoidance of $1.7 billion.

146 Privatized Systems:

Aberdeen PG - G, W, WW
Aberdeen (Edgewood) - G
Adelphi Lab - G
A.P. Hill - E, W, WW
Belvoir - E, G, W, WW
Benning - E, G, W, WW
Bliss - E, G, W, WW
Blue Grass AD - G
Bragg - E, W, WW
Campbell - G, W, WW
Detrick - G
Detroit Arsenal - G
Devens - E, G, W, WW
Dix - E, G
Eustis - E, G, W, WW
Gordon - E, G, W, WW
Greely - E, W, WW, P
Hamilton - E, G, W, WW
Hawaii - E, W
Hood – W, WW
Huachuca – E
Hunter AAF - E
Irwin - E, W, WW
Jackson - W, WW
Knox - E, WW
Leavenworth - E, W, WW
Lee - E, W, WW
Leonard Wood - E, G
Letterkenny AD - W, WW
Lewis - G
Hood – W, WW
Huachuca – E
Hunter AAF - E
Irwin - E, W, WW
Jackson - W, WW
Knox - E, WW
Leavenworth - E, W, WW
Lee - E, W, WW
Leonard Wood - E, G
Letterkenny AD - W, WW
Lewis - G
Meade - E, G, W, WW
McCoy - E, G
McNair - E, G
Monmouth - G
Monroe - E, W, WW
Myer - E, G
Natick Lab - E, G
Oahu/ Schofield Brks – WW
Ord Com - E, G, W, WW
Parks RFTA - E, G, W, WW
Picatinny Arsenal - E, G
Pickett - E, W
Polk – W, WW
Pres Monterey - E, G, W, WW
Red River AD - E, W, WW
Redstone Arsenal – WW
Richardson - E, G, W, WW, P
Rucker - E, G, W, WW
Sam Houston - E, G
Sill - G, W, WW
Stewart - E
Story - E, G, W, WW
Sierra AD - E, G
Stewart Sub-Post - G
Sunny Point MOT - E
Tooele AD - G
Vancouver Brks - G
Wainwright - E, W, WW, P
Walter Reed AMC - G
Yakima Trng Ctr – G

E = Electricity
G = Natural Gas
W = Water
WW = Waste Water

Fort Irwin, CA, Lighting Controls: Lighting typically accounts for nearly 40% of electricity use in Army facilities. Fort Irwin recently installed digital lighting control system called Ecosystem in seven buildings. This system includes addressable, dimmable ballasts which allow us to trim the high-end lighting output from 100% down to 80% and even lower in some parts of the building depending on the needs of the

building occupants. Fort Irwin installed sensors which work with the digital ballasts in the room lighting. These sensors reduce the intensity of lighting levels as sunlight penetrates the interior of the building. Also installed were occupancy sensors in every room that either turn lights completely off or dim lights when the spaces become unoccupied. Depending on how much daylight is received and how much activity is going on within the building during any particular week, the installation is saving 30 to 50 percent on lighting costs.

Fort Irwin, CA, COB KING Multiple Technology Structure: The goal was to construct a 52-foot diameter dome to be used as a TOC in a remote location on Fort Irwin. Due to the isolated setting and distance to the nearest power connection, it was cost-prohibitive to build a structure that would require connection to the power grid. A net-zero solution was required and built. The utilities to support the dome are: Geo-Thermal for heating and cooling, solar arrays that track the sun and generate electrical power and wind turbines to charge the batteries. The project was completed two-years ago and is saving the installation approximately $300 per month on saved utility expenses.

Fort Irwin, CA, Foam Sprayed Tents and Structures: Located in the RUBA section of the cantonment at Fort Irwin, California are sprayed insulated structures. The installation, with a goal to increase the quality of life for rotational units during their stay at Fort Irwin, while conserving energy, used foam spray on the exterior of the structures. Original tin shade areas were connected and enclosed, then sprayed with foam on the outside. In addition to the shade areas, tents were also sprayed with foam. Using foam insulation on the outside of the structures leads to at least a 20% reduction in utility

costs. Given the desert environment, this was a great way to save money while providing an improvement in the soldiers' quality of life.

Fort Bragg, NC, Thermal Energy Storage: With peak energy demand at 130 MW and a real time pricing rider in the rate structure from the power generation company, Fort Bragg has a vested interest in shifting electrical load to an off peak time.

Thermal energy storage is a viable solution for the rapidly increasing capacity needs and high density population found on the installation. Thermal energy storage can typically refer to a number of technologies. Fort Bragg has chosen to utilize a simple chilled water system which provides lower cost, longer life, and less maintenance. This partial storage system minimizes capital investment. At night, the chillers produce a surplus of cold water which is stored and during the day they meet the normal demand and augment production by circulating water through the tank to extract additional cooling capacity. This kind of system usually runs in cold water mode for 16 to 18 hours a day, and circulating mode for 4-6 hours a day. Capital expenditures are significant; but, additional capacity and off peak operation is enough to justify the system. The 2.2 million gallon tank will store cold water to provide the additional cooling capacity to a central energy plant.

For additional information on how these projects could be replicated at your installation, submit your request through the Policy/Program Issues Form on the Army Energy Program web site at: http://army-energy.hqda.pentagon.mil/contact/form.asp

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WAY AHEAD

The Army must execute a comprehensive and enterprise approach in order to meet our energy efficiency, water conservation, and energy security goals. To achieve these goals installations will:

- Develop a Comprehensive Energy and Water Master Plan to achieve the *Army Energy Security Implementation Strategy*, *Installation Management Campaign Plan*, and installation-level energy security goals.

- Develop energy and water management accountability in key positions throughout the chain of command.

- Establish full-time energy manager positions to lead their energy programs.

- Use innovative and creative leadership to leverage the full range of available funding programs and third party financing to:

  - ✓ Implement cost-effective renewable energy solutions to provide reliable and stable energy supplies to Army installations.

  - ✓ Achieve higher energy efficiency by incorporating enhanced energy and sustainable features in building renovations and new construction.

- Ensure that all new Power Generation projects are assessed by the ASA (I&E) in accordance with policy and Governance Board procedures to ensure that Army investments of land and resources are consistent with Army energy security goals and priorities

For more information or to submit comments visit:

http://army-energy.hqda.pentagon.mil/contact/form.asp

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