

# Department of Defense

## Annual Energy Management Report



### Fiscal Year 2006

USD (AT&L)

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## EXECUTIVE SUMMARY

The Department of Defense (DoD) continues to make significant progress toward achieving the goals of the Energy Policy Act of 2005 (EPAct 2005) and Executive Order (EO) 13123 *Greening the Government Through Efficient Energy Management*. The DoD Energy Program initiatives include energy awareness efforts, energy manager training, audit programs, procurement of energy efficient products, and the use of sustainable design in new construction. Other contributing factors include integrated energy planning, enhanced use of renewable energy, and demonstration of innovative technologies, and the use of Energy Savings Performance Contracts (ESPC) and Utility Energy Service Contracts (UESC).

In August 2005, the President signed into law EPAct 2005, which established a new energy baseline (2003), increased the annual reduction requirement to 2 percent per year, increased the percentage of renewable energy required (7.5 percent by 2013), increased efficiency of new construction to 30 percent below the current standard, and required metering electricity consumption of all facilities. In September 2005, in response to sharply rising oil prices, President Bush issued a memorandum to all Federal agencies to minimize non-essential petroleum fuel consumption.

Through Fiscal Year (FY) 2006, the Department of Defense achieved a 5.5 percent decrease in goal facility energy consumption (as measured on a British Thermal Units (Btu) per gross square foot (GSF) basis [Btu/GSF]) as compared to the baseline. This was achieved despite increased troop mobilization and training, extensive efforts in fighting the Global War on Terrorism, and response to natural disasters.

At the end of FY 2006 the Department has approximately 1.96 billion square feet of facilities and spent approximately \$3.5 billion on facility energy. DoD spent \$16.5 billion on non-fleet vehicles and other equipment – such as auto gasoline, LPG-Propane, Aviation Gasoline, jet fuel and Navy-special fuel.

DoD achieved a significant reduction in water usage by implementing water management plans and conservation technologies. In FY 2006, DoD consumed 114.1 billion gallons of potable water. This represents a 29.6 percent decrease from baseline.

DoD continued to make progress in installing renewable energy technologies and purchasing electricity generated from renewable sources (solar, wind, geothermal, and biomass) when life cycle cost-effective. The total renewable energy usage amounted to 9.631 trillion Btu. This accounts for 9.5 percent of all electricity consumption in the DoD. Examples of projects completed this year are detailed in Section II.B.

Efforts are continuing to develop on-site validation of fuel cells, wave energy and Ocean Thermal Energy Conversion to provide additional clean, affordable, renewable energy resources.

## I. Management and Administration

Energy management at DoD installations is focused on improving efficiency, reducing demand, eliminating waste, and enhancing the quality of life while meeting mission requirements. Accomplishing these objectives reduces utility costs and achieves the energy program goals established in a DoD memorandum dated November 18, 2005.

The facilities energy program is decentralized, with Defense Component Headquarters (HQ) providing guidance and funding, and installations managing site-specific energy and water conservation programs. Energy project funding comes from a combination of government and alternative financing initiatives. Military installations are responsible for maintaining awareness, developing and implementing projects, and ensuring that new construction meets sustainable design criteria.

One of the most significant accomplishments in FY 2006 was the development of the Army's *Energy & Water Campaign Plan for Installations*. The *Campaign Plan* provides the specific actions, milestones and funding strategies and the desired end state to be achieved within each of the five initiatives of the Army's *Energy & Water Strategy for Installations*. The initiatives are: 1) eliminate energy waste in existing facilities, 2) increase energy efficiency in new construction, 3) reduce dependence on fossil fuels, 4) conserve water resources and 5) improve energy security. The *Strategy* also identifies the Metrics of Success and provides a year-by-year Investment Plan. It coordinates all Army energy/water users and policy components including security, privatization, procurement, technology, construction and environment into comprehensive and measurable objectives.

The Army Energy & Water Campaign Plan was finalized in December 2005 after an extensive, coordinated effort to combine state-of-the-art industry recommendations with the creative professional ideas of representatives of a broad cross-section of Department of the Army, other services, and other Federal organizations including:

- Industry
- Army Corps of Engineers / CERL
- Armed Forces Command
- Army Training and Doctrine Command
- Army Materiel Command
- Army Medical Command
- Federal Labs
- Private consultants

**Energy - Interim Policy Guidance.** In December 2006, Deputy Assistant Secretary of the Army (DASA) for Installations and Housing (I&H) signed the Energy Interim Policy Guidance. This policy incorporated requirements that will be included in Army Regulations and required implementation. The guidance incorporated provisions of EPA's 2005 Energy Star® rated equipment, mandated heating and cooling limits as well as turning off computers and related equipment when not in use.

**Also of significance is the component's involvement with Office of the Secretary of Defense (OSD) Energy Integrated Product Team (IPT) and Defense Science Board (DSB).** The major effort of the OSD Energy IPT was to address Department of Defense energy security and investment programs. The Defense Science Board was focused on the development of a new DoD energy strategy. The components provided members to both the OSD IPT Installations Panel and DSB Facility Panel. These advisors were actively involved in presentations and assisted in the development of concepts, programs, and projects that address the future needs of the Army and our national energy independence.

## **A. Energy Management Infrastructure**

### **1. Senior Agency Official**

The Principal Deputy Under Secretary of Defense (Acquisition, Technology and Logistics) is the DoD Senior Agency Official responsible for meeting the goals of EAct 2005 and EO 13123.

### **2. Agency Energy Team**

The DoD Installations Capabilities Council (ICC), chaired by the Deputy Under Secretary of Defense for Installations & Environment (I&E) and chartered to address a broad spectrum of installation issues, is designated as the DoD Agency Energy Team. The membership of the ICC contains the cross-section of DoD senior leadership necessary to make decisions needed to remove obstacles hindering compliance with EAct 2005 and EO 13123.

## **B. Management Tools**

### **1. Awards (Employee Incentive Programs)**

#### The Army

Energy conservation awards are awarded to individuals, organizations, and installations to recognize their energy/water-saving efforts. In addition to recognition, these awards provide motivation for continued energy-reduction achievements. The installations participated in two major energy awards programs--*the Secretary of the Army Energy and Water Management Awards and the Department of Energy Federal Energy and Water Management Awards*. Each program recognizes individuals and organizations for exceptional performance in implementing energy efficiency achievements set forth in EO 13123.

The Secretary of the Army Energy and Water Management Awards: On September 13, 2006 the Under Secretary of the Army presented the 28th Annual Secretary of the Army Energy and Water Management awards during the opening ceremonies of the World Energy Engineering Congress (WEEC) 2006 at the Washington, DC Convention Center. This year's Awards were for accomplishments in FY 2005. There were six winners in the Small Group Category and three winners in the Individual category. The awardees for Small Group accomplishments include:

- Fort Gordon, GA - Energy Efficiency/Energy Management for a cost avoidance of \$303,000 and reduction in consumption of 34,900 million Btu/year (MBtu/yr)
- Fort Knox, KY – Renewable Energy/Alternative Energy for a cost avoidance of \$807,000 and reduction in consumption of 102,000 MBtu/yr
- Fort Sam Houston, TX – Water Conservation for a cost avoidance of \$64,100 and reduction in consumption of 3,858,700 gallons/year
- New Jersey Army National Guard - Renewable Energy /Alternative Energy for a cost avoidance of \$69,000 and reduction in consumption of 390 MBtu/yr
- Picatinny Arsenal, NJ - Energy Efficiency/ Energy Management for a cost avoidance of \$210,500 and reduction in consumption of 30,200 MBtu/yr
- Washington Army National Guard – Energy Efficiency/Energy Management for a cost avoidance of \$107,100 and a reduction in consumption of 17,200 MBtu/yr.

This year's winners for Individual accomplishments in energy efficiency / energy management or water conservation /water management include:

- Mr. Morgan Benson - Dugway Proving Ground, UT for a cost avoidance of \$36,400 and a reduction in water consumption of 89,000,000 Gallons/year
- Mr. John D. Ghim - Yongsan Garrison, Korea Region Office for a cost avoidance of \$69,700 and an annual reduction in consumption of 83,000,000 Gallons/year
- Mr. Jeff Seaton - Arizona Army National Guard for a cost avoidance of \$133,200 and a reduction in consumption of 4,300 MBtu/yr.

#### ***The Federal Energy Management Program Energy (FEMP) Awards 2006:***

Fort Knox won the FEMP Renewable Energy (Small Group category) award for the project to install Ground Coupled Heat Pumps in the Fort Knox Disney Barracks Complex. The project saved over \$800,000 and 102,000 MBtu/yr of natural gas. The members of the group recognized included Mr. Gary Meredith, Mr. Frank Baker, Mr. Steve Fries, Mr. Vince Heuser and Mr. Patrick Walsh. FEMP Awards recognize federal agency teams, individuals and facilities that have excelled in the use of the energy efficiency and management tools specified in EO 13123 and EPAAct 2005.

#### **Department of Navy (DON)**

DON annually holds a Secretary of the Navy (SECNAV) energy awards ceremony to recognize outstanding achievement in the efficient use of energy. Five awards were provided to Navy and Marine Corps winners in the categories of facilities and industrial installations. In addition to the SECNAV awards, installations with an aggressive and successful program were recognized as achieving Platinum (highest) or Gold (second highest) level rankings for their energy programs.

DON received 3 of 5 Presidential Energy awards. Naval Base Coronado, California; Naval Undersea Warfare Center Division, Keyport Washington; and Marine Corps Air Station, Yuma, Arizona received Presidential Energy awards for their comprehensive programs that include energy project investment, reduced electrical loads and petroleum usage, and new technology implementation. These installations reduced energy intensity by 44.6 percent, 33 percent and 39.9 percent respectively, since 1985. DON installations and individuals received seven of 20 awards for Federal Energy and Water Management.

## **Air Force**

The Air Force participated in the 2006 Federal Energy and Water Management Awards program. The Air Force was awarded three winners out of 10 submissions. They are:

- Energy Efficiency/Energy Management, Small Group – The Energy Efficiency Group, 316<sup>th</sup> Civil Engineer Squadron, Andrews AFB, MD. Group members include Mr. George Lopez, Mr. Matt Capano, Mr. Andre Johnson, and MSgt David Minzie.
- Energy Efficiency/Energy Management, Small Group - The 28th Civil Engineering Energy Management Team at Ellsworth AFB, SD. Group members include Mr. Dennis Svalstad, Mr. Chris Tinsley, and Mr. Jon Rexroad from Ellsworth, along with Mr. Chuck Miller and Ms. Lisa Teeslink from WBI Holdings, Inc., Rapid City, SD.
- Renewable Energy, Small Group – The Renewable Energy Group, 75<sup>th</sup> Civil Engineer Squadron, Hill AFB, UT. Group members include 1LT Jonathan Corwin, 1LT Timothy Hinko, Mr. David Abbott, Mr. Leon Jones, and Mr. Kent Nomura.
- U.S. Air Force Spring 2006 “You Have the Power” Energy Champion. The Air Force selected Dean Nakasone of HQ Pacific Air Forces (PACAF), located at Hickam AFB, Hawaii, as their awardee/nominee. A poster of the USAF Energy Champion was published and distributed by FEMP to major commands and bases for April’s “Earth Day” and was posted on the FEMP web site.
- The Air Force Reduced Energy Appreciation Program (REAP). REAP rewards major installations for their ongoing efforts to reduce energy consumption. Purchased renewable energy is not counted as part of this program. The Continental U.S. (CONUS) bases selected this year are Andrews AFB (Air Mobility Command [AMC]) and Seymour Johnson AFB (Air Combat Command [ACC]). The overseas selection is the Ramstein AB. They reduced their energy consumption by 14.4 percent, 17.7 percent, and 4.2 percent, respectively, from the previous year.
- Hickam AFB HI won an Illuminating Engineering Society (IES) award for the Solar Bollard Lighting Project.
- Kunsan AB Korea participated in the FY 2006 Major General Clifton D. Wright Award competition that recognizes outstanding Civil Engineering Operations Flight performance. One of the many criteria of judgment is energy reduction/savings.
- Several commands have developed energy award programs that distribute funds to their base winners each year. They include:
  - PACAF has a \$225K annual award program recognizing long-term and short energy reduction projects at their installations.

- ACC has a base energy award program that awards up to a total of \$1.0 Million to ACC bases for exceeding the FY milestone goal and/or improved over last year's performance.
- ACC initiated a new energy funding program from Major Command (MAJCOM) funds. The ACC Energy Saving Solutions (ACCESS) fund provides \$2 Million for energy/utility savings projects with a Savings-to-Investment Ratio greater than one.

### **Defense Contract Management Agency (DCMA)**

DCMA will use the FEMP Annual Federal Energy and Water Management Awards Program to nominate individuals, facilities or teams that perform exceptional work in implementing EO 13123. A DCMA representative attended the Department of Energy (DOE) 2006 Federal Energy and Water Management Awards ceremony held at the National Press Club in Washington, D.C.

### **Defense Commissary Agency (DeCA)**

- DeCA currently uses its existing performance awards procedures and on-the-spot awards.
- DeCA normally participates in the Federal Energy and Water Management Awards program.
- The DeCA Energy Management Program Policy Directive incorporates provisions for incentive awards through the existing Improve Defense Commissary Agency's Efficiency and Service (IDEAS) suggestion program and on-the-spot awards.
- DeCA's East, West, and Europe regional offices established their own, separate energy awards program to encourage energy savings and innovation at store and employee level.

### **Washington Headquarters Service (WHS)**

The Heating & Refrigeration Plant (H&RP) has an Award Fee in their contract as a Most Efficient Organization (MEO) resulting from a previous A-76 Competition. The H&RP personnel must maintain performance requirements of the equipment through proper staffing, maintenance, repairs, etc. Each quarter the MEO may get up to \$25,000.00 in awards each quarter, a small portion of which is directly related to energy efficient operations. Through three quarters in FY 2006, they received 100 percent of the total available award with the 4<sup>th</sup> quarter award pending.

### **Defense Finance and Accounting Service (DFAS)**

DFAS has added appropriate statements to include successful implementation of conservation actions in the position descriptions and performance evaluations of members of the agency energy team.

**National Geospatial-Intelligence Agency (NGA)**

- NGA rewards its government Energy Team member's through performance awards.
- NGA incorporates energy conservation as part of the award fee for Base Operations Services Contracts (BOSC) at each of our sites.

**2. Performance Evaluations**

Energy and water management provisions are included in performance plans of the DoD Energy Chain of Command, including major command, base and site energy managers.

**The Army**

Army Regulation (AR) 11-27, Army Energy Program, requires inclusion of energy and water conservation responsibilities in the position descriptions of members of the Army's energy team, principal program managers, heads of field offices, facility managers, designers, energy managers and their supervisors. The goal is for Army Energy and Water Programs to be managed intensively to ensure efficient and effective use of energy. Installation Management Command's (IMCOM) regional offices conducted scheduled assistance visits to their respective installations and verified that installations are in compliance with the provisions of EO 13123, AR 11-27 and EPA Act 2005. These visits include verification of Energy Manager position descriptions and evaluations of personnel responsible for the energy program. The DoD Energy Manager's Handbook is distributed on the National Institute of Building Sciences Construction Criteria Base computer disk which is distributed to all Army installations.

**Department of Navy**

The Navy created an agency-wide standard description of the roles and responsibilities of its energy managers. This description defined all the elements of the energy management function at the installation level and the regional level. These roles and responsibilities are used in existing job series to set the performance expectations for energy managers. Due to constraints on in-house workforce, DON is increasingly contracting for Resource Efficiency Managers (REM) at its installations. REMs are expected to produce energy savings equal to twice their cost, providing at least a 2:1 return on investment.

**Air Force**

- All base and MAJCOM energy managers have performance statements that include ratings on implementing energy conservation measures to meet federal goals for their installations and commands.
- HQ PACAF is using the REM concept command wide. All major PACAF installations now have a REM assigned at those locations. PACAF REMs submit a monthly report of all tasks performed and a quarterly scorecard showing implementation of projects and achieved savings.

- HQ Air Education and Training Command (AETC) and HQ Air Force Materiel Command both have a REM program at HQ level and with several of their bases. HQ ACC has established a traveling REM program based at the headquarters and HQ Air Force Space Command (AFSPC) has a REM at one base.

### DeCA

- Energy management provisions are in the performance evaluations of the DeCA Director and Chief Executive Officer by virtue of his requirement to execute the Agency's Strategic Plan and Key Objectives for FY 2006-12. Key goals of this plan are: preserve and deliver a premier quality-of-life benefit for customers; be the employer of choice; and implement business process improvements to enhance corporate performance with business partners. DeCA's strategic plan includes goals for improving facility condition, which includes reducing facility and commissary energy use. This is directly related to reducing unit operating cost. DeCA has accomplished this by improving the infrastructure through reduction of maintenance backlog, executing new construction, modernization, maintenance and repair, and store equipment requirements that incorporate state-of-the art efficiencies.
- Energy management provisions are in performance evaluations of the Chief, Facilities Sustainment Division; Facilities Program Manager; Agency Energy and Environmental Manager (EEM); Energy and Environmental Engineer; region engineer and field engineers. Region directors have facility maintenance (including refrigeration/heating ventilating and air conditioning (HVAC) maintenance) responsibilities in their position descriptions. DeCA West field engineers have references within their respective position descriptions stating that they are to comply with EO 13123. The DeCA West CONUS Field Engineer and DeCA Europe Region Engineer are also identified as the Region Energy Conservation Officer for their region. Their responsibilities include review of regional office managed projects to ensure energy conservation and sustainable design practices are being implemented. Energy conservation design practices are also included as duties and responsibilities in the position description of DeCA region and field engineers. Other critical elements include review of energy use to ensure timely reporting. A critical element in their work performance includes HQ DeCA energy program policies and guidance implementation and reporting.
- Sustainable design practices are included as duties and responsibilities in the position description of the DeCA West Engineer. DeCA region chief of operations, zone managers, and store directors have a critical element in their performance plan for unit cost management and control. Store level utilities costs are a significant part of store level costs of operations. Utilities cost management, control, and awareness include quarterly reporting of energy use and costs from each store.
- A DeCA West Region Energy Task Force Team has been developed. This Task Force meets quarterly and is continuously looking at energy saving programs/projects in an effort to achieve both short and long-term energy efficiency.

- Performance plans of DeCA West chief of operations, zone managers, store directors, and consolidated distribution center (CDC) managers have a critical element for unit cost management and control. Utilities cost are a significant part of facility operational costs; therefore, proper reporting is essential. Utilities management, control and awareness include quarterly reporting of energy use and costs from each facility to the Region designated energy conservation representative, who reviews, consolidates and forwards to HQ DeCA.

### **DCMA**

Energy Management responsibilities and duties will be included as part of the individual's performance plan.

### **DFAS**

DFAS has added appropriate statements to include successful implementation of conservation actions in the position descriptions and performance evaluations of members of the agency energy team.

### **DLA**

DLA has an Energy Manager at each host facility with a reporting requirement for energy consumption and cost described as other duties as assigned within the position description.

### **NGA**

- NGA includes energy conservation as part of the government team members' performance appraisal process.
- BOSC team member's performance includes energy conservation as a consideration during contract evaluation for award fee.

### **NSA**

The management staff is committed to cost effective energy saving projects and programs designed to benefit NSA in numerous areas. Mr. Steve Lopez, the Deputy Associate Director of the Installations and Logistics organization, and Mr. Russ Bernt, the Installations and Logistics Technical Director, both have provisions included in their annual employee performance appraisal directed at the goals of EO 13123.

### **WHS**

Some job descriptions and critical elements include energy conservation principles for appropriate management and operations personnel and are updated on an annual basis. Pentagon Building Management Office (PBMO) will continue to perform job description updates for its management and operations personnel.

### 3. Training and Education

In FY 2006, DoD provided energy management training for 3200 of the 8871 appropriate personnel. The following summarizes provides specific examples of activities associated with DoD training and education programs.

#### The Army

The Army Energy Campaign Plan emphasizes certification of all of its energy managers at installations. The Army uses commercial energy management training resources such as the Association of Energy Engineers (AEE) to meet the requirements of EO 13123, EAct 2005 and the *Campaign Plan*. During the week of June 12-16, 2006, the Office of the Army Chief of Staff for Installation Management (ACSIM) sponsored Certified Energy Manager (CEM) training for Army Energy Managers, which was conducted by AEE and included four days of intense instruction culminating with a four hour examination. Of the 30 Army Energy Managers participating in the training, 17 passed the examination and are now nationally recognized professionals, who can be dedicated full-time to implement effective Army energy and water management and conservation programs. ACSIM sponsors and funds this CEM training every year. Other training events included:

- **OSD Developmental Assignment.** From May 30, 2006 to Jul 7, 2006, ACSIM provided a Senior Staff Energy Engineer Mr. David Williams, to serve as the Associate Director for Energy and Utilities Management in the office of Installations Requirements and Management (IRM) under DUSD (I&E). Mr. Williams worked on a number of key activities including DoD facility energy and utilities program and policy oversight, IRM turnover and staff transition assistance and continuity, and OSD Energy IPT participation.
- **World Energy Engineers Congress (WEEC) 2006.** Headquarters Army and OSD co-hosted the WEEC 2006 in conjunction with the Army Energy Forum. The Congress provided training workshops and up-to-date industry information to 68 Army energy professionals on challenges for the Army's energy program and compliance with EAct 2005. WEEC 2006 was sponsored by AEE.
- **2006 Army Energy Forum.** The Army 2006 Energy Forum was held at the Washington, DC Convention Center on 11-12 September in conjunction with the WEEC 2006. The two-day forum was attended by over 80 Energy Managers from installation through HQ level. They discussed a broad range of installation energy issues including topics such as EAct 2005; procurement of energy efficient products; metering; ESPC; renewable energy projects; and the Army Energy Strategy and Campaign Plan, which forms the foundation for the future direction and resource requirements for optimal energy and water management for the Army. The Strategy and Campaign Plan will ensure that the Army provides safe, secure, reliable, environmentally compliant, and cost-effective energy and water services to Soldiers, families, civilians, and contractors on Army installations. The Army's Installation Management Command (IMCOM) regions and the National Guard Bureau (NGB) reported

on energy conservation progress in their areas. The Director of the FEMP, DOE renewable energy labs, Defense agencies, and other Army offices participated as presenters.

- **Regional Training.** IMCOM Regions also provide training to their respective installations. For example, in Dec 2005, the Southeast Region Office (SERO) held an Energy Manager's Forum in Charleston, SC. SERO brought together installation staff, HQ Army staff, DOE Staff, and various other energy consultants and personnel to discuss strategies, programs, and procedures to improve energy operations and assist in meeting the goals of EAct 2005 and EO 13123. Other IMCOM regions participated in FEMP training via web cast and teleconferencing. The European Region conducts annual energy manager training in the context of host nation standards and is consistent with the efficiency requirements of EO 13123 and EAct 2005.
- **Army Energy Program Website.** The Army's Energy website, developed in conjunction with the Department of Energy Pacific Northwest Laboratories under contract to the Army, has been revised (accessible by going to <http://army-energy.hqda.pentagon.mil/>) and is providing current information and reference materials applicable to the energy program. The Army Energy Program web site was updated and provides a reliable, ready resource for the Army's Energy Managers. On March 16, 2006, security requirements caused the web site to migrate behind the Army firewall. From October 2005 until March 2006, the site received 9,111 discrete visits and over 172,000 hits. Four quarterly newsletters were generated to support all Army entities and private industry.
- **Energy Awareness Month.** In September 2006, the Secretary of the Army signed a memo identifying October as Energy Awareness Month with the theme, *Energy Independence Depends on US*. The memo was posted to ACSIM, IMCOM, and Army Energy Program, and Army Knowledge Online (AKO) web sites; Army News published an article including information on energy myths and a link to the memo. Also, the *Public Works Digest* included a copy of the memo in the September / October 2006 issue.

### **Department of Navy**

In FY 2006, 206 personnel received training in areas specified on EAct 2005. These personnel consist of: Energy Managers, Energy Conservation Officers, Maintenance Mechanics, Planners, Equipment Mechanics, Facilities Supervisors, Accountants, Admin. Officers, Project Managers, APWO's, Architects, Environmental Engineers, Electrical Engineers, Division Directors, Controls Mechanics, Civil Engineers, Budget Analysts, Boiler Plant Personnel, Resident Officers in Charge of Contracting, Zone Managers, and Utility Engineers. This brings total personnel receiving training to 2359 since the program began.

The training consisted of specific training opportunities under the specified areas of EAct 2005, namely: Operations and Maintenance (O&M), Controls, Design, Lighting, Electric Codes, Leadership in Energy and Environmental Design (LEED), Natural Gas Seminars, Water Resource Management, Steam Plant Improvement, Renewable Energy, Energy Accounting, ESPC, Measurement and Verification (M&V), training on equipment found in Federal facilities and CEM training. The Navy has seen 150 personnel registered as CEMs since the program inception. The sources of training include in house and commercially available sources such as:

North Carolina University, Dept. of Energy, Association of Energy Engineers, Johnson Controls, Redvector Online Courses, Utility Companies, Tempcon, Allen Bradley, Northwest Energy Efficiency Council, Sandia Nat'l Labs, IEEC, American Institute of Architecture, National Technology Transfer, Inc, Navy Civil Engineer Corps Officer School, American Solar Energy Society, University of Wisconsin, Federal Energy Management Program, The U.S. Green Building Council, American Water Works Assoc., Florida Solar Center, and GSA.

DON continued and expanded its energy awareness program to train all personnel to be aware of and influence energy consumption. The program includes compact disks that provide policy, publications and program execution tips for energy managers, as well as, materials targeted to educate and involve military family members. DON distributed a monthly newsletter titled *Energized*, and weekly flash emails to energy managers, regions and HQ quickly disseminates key information. Promotional materials are distributed to personnel to involve all in energy management practices without adversely impacting their productivity.

### **Air Force**

- The Air Force Civil Engineer Support Agency (AFCESA), web based ESPC training program provided training for 21 personnel (from engineering, contracting, legal and comptroller areas) from 6 locations.
- The Air National Guard (ANG) at base level promoted energy conservation awareness through the following methods: building manager training/meetings, semiannual state employee awareness training, drill weekend assemblies and base newspaper articles; 35 members were trained this year.
- ACC funded the costs for all their base energy managers (25) to attend the DOE Workshop, Energy 2006, held in Chicago, IL.

ACC provided Energy Management and Conservation Systems (EMCS)/Direct Digital Controls (DDC) training to approximately 15 base HVAC technicians to insure optimal use of energy conserving control strategies.

- Hickam AFB, CA Facility Managers Training held monthly, 246 Facility Managers per/year.
- Air Force Reserve Command bases reported training 242 building managers in FY 2006.
- HQ AFCESA held its annual command energy managers meeting in conjunction with WEEC 2006; 73 personnel attended
- HQ AFSPC held a Command wide Base Energy Manager's Workshop with support from HQ AFCESA.

## DeCA

The DeCA Center for Learning hosted five Quality Surveillance Representative (QSR) courses and nine Facility Energy Supervisor/QSR (FES) courses during FY 2006. The FES/QSR training course is a 2-day, commissary specific course for the commissary FES/QSR. The QSR course places emphasis on managing the refrigeration and HVAC maintenance contract to bring efficiencies to quality of maintenance and repair and equipment operation at the most energy efficient level possible. Our department operations courses address energy usage and conservation in the store director, meat management, produce management, grocery, and quality assurance courses. These courses are taught throughout DeCA's worldwide operations. Instruction includes formal classroom training for energy awareness and conservation practices, quality assurance, reporting, energy monitoring and the basic operation of refrigeration monitoring and control systems (RMCS). Also, a site visit to a nearby commissary facility is conducted to acquire "hands-on" experience and serve as a vehicle for student evaluation.

DeCA continues to pursue our continuing goal of two trained FESs per store. The target audience in FY 2006 was commissary store administrators. As second in command in the store supervisory chain, this position is the Quality Assurance Evaluator (QAE) for HVAC maintenance contracts. DeCA trained 228 commissary store personnel during our FY 2006 training cycle. This represents 152 percent (228/150) of the original FY 2006 training goal. Training and travel costs were \$335,583. Students represented facilities in Europe, Far East, and CONUS. The FES/QSR and QSR students are normally department managers, quality assurance, or store supply personnel. The Facility Energy Supervisor Executive Course (FESEC) students are normally store directors, store administrators, or facility managers.

All DeCA employees are required to view a 12-minute, commissary energy awareness video, "Put Yourself in the DeCA Energy Efficiency Picture," within 30 days of hire, which is also incorporated in the FES/QSR and executive courses. This commissary specific, energy awareness training video is provided to all DeCA commissaries, CDCs, and office facilities in a formal classroom format.

Each commissary, CDC, and office facility has an energy management supervisor whose title is "Facility Energy Supervisor" (FES) identified and assigned. Commissaries and CDCs have a requirement to maintain two FES/QSR trained personnel on staff at all times. This person attends formal training minimally every 2 to 3 years.

Training aids, including videos, are available at each store and office for initial and refresher energy awareness training.

Annual continuing education unit (CEU) requirements to maintain state licensing are met by reviewing articles in professional periodicals, which includes articles in various energy alternatives and conservation. Benefits are maintaining professional licensing and awareness of current and developing new technologies impacting energy conservation.

In FY 2006, Energy Star<sup>®</sup> products continued to receive utmost consideration when developing specifications and issuing acquisitions for energy using products.

Information technology hardware and computer and copying equipment are acquired under the Energy Star® program using GSA schedules and either government-wide or service contracts.

### **Other DoD Agencies**

- One member of the DFAS Energy Management Team attended Evolving Energy Markets Workshop, live web cast, July 2006. Pertinent energy information has been posted to the DFAS ePortal site for employee access.
- All Defense Logistics Agency (DLA) Energy Managers were advised to attend DOE and AEE formal, interactive computer and correspondence courses to stay abreast of all new technology in order to implement the provisions of EO 13123.
- NGA personnel attended WEEC 2006, (Energy Action Officer, 2 site supervisory personnel, 2 site operation and maintenance personnel); approximate cost \$16,000. The Energy Action Officer attended Construction Commissioning/LEED Certification training at the University of Wisconsin; approximate cost \$4,000. NGA will be using the formal commissioning process outlined in American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) National Institute of Building Sciences (NIBS) Guideline 0-2005 to ensure design and construction of the New Campus East, estimated completion September 2011, meets EAct 2005, EO 13123, and implementing DoD Instruction guidelines.
- WHS - During Earth week each year, booths are arranged in the Pentagon to educate observers about energy conservation, recycling and other environmental friendly activities. Pamphlets, cards, and other various reading materials are made available to provide information on practices and their benefits. Three Tenant Activities Group (TAG) training sessions were put together by the Pentagon Renovation Project to help educate tenants in the Pentagon about the need for creating a sustainable living environment in the building. Topics covered were 1) Indoor Air Quality, 2) Environmental Materials, and 3) Recycling. LEED workshop training was also provided during the year which provided information about the LEED rating system and how it is applied. In all, 33 of the appropriate personnel types were trained during FY 2006.
- The DCMA Energy Manager attended the Energy 2006 held in Chicago, IL. HQ DCMA Energy Management Administrator attended AEE's Course: Theory and Practice of Energy Efficiency & Green Buildings to stay abreast of all new technology in order to implement the provisions of EO 13123.

### **4. Showcase Facilities**

DoD continues to participate in DOE-designated Showcase Facilities to demonstrate new and innovative energy saving technologies. Facilities that are designated Showcase Facilities may incorporate energy and water saving designs, energy conservation improvements, and renewable energy use. Below are examples of Showcase-related activities in DoD.

## **Department of Navy**

DON established one new showcase in FY 2006. The showcase is a 309 kW roof top photovoltaic (PV) array on a museum at Ford Island, Pearl Harbor, Hawaii. The array produces 500 MWH annually; avoiding \$70K/yr in electricity costs, and is the largest single PV system in Hawaii.

Naval Base Ventura County, Port Hueneme, CA and the U.S Naval Academy, Annapolis, MD continue as on-going DON showcase installations due to the large numbers of Academy midshipmen, Civil Engineer Corps officers, and Navy facilities managers who receive operations and facilities training there. Other continuing showcase projects are: Naval Station Guantanamo Bay wind farm, Marine Corps Base Camp Pendleton, CA high efficiency and solar powered lighting systems, The Naval Base San Diego Admiral Prout Field House and Pool, the DDC system at NSWC Dahlgren, the 7MW cogeneration system at MCAGCC Twenty-Nine Palms, the 750 kW photovoltaic system at Naval Base Coronado, CA, the ground source heat pumps and EMCS at MCAS Beaufort, SC, the BOQ at NTC Great Lakes and various projects at Naval Medical Center San Diego, CA.

## **Air Force**

Edwards AFB, CA Consolidated Support Facility was a 2006 Federal Energy Saver Showcase Award winner.

## **DeCA**

Modifications to existing facilities. The designated “showcase facility” for the FY 2006 construction program is the Barksdale AFB, LA Commissary. Energy efficiency features include heat reclaimed from the refrigeration systems for space and water heating and refrigeration compressor systems comprised of several compressor sizes to ensure the most efficient combination of compressors is running at any one time to meet the load. The RMCS for control of the HVAC System ensures efficient equipment operation. DeCA maximized use of energy efficient glass door refrigerated display cases, installed automatic scheduling of the sales area and display case lighting, anti-sweat heater controls, temperature-terminated defrost, and energy efficient lighting systems. Additional energy efficiency features of this facility are occupancy sensors, automatic water control on restroom fixtures, dual path HVAC systems for the sales area, maximum use of wall and roof insulation, energy efficient doors and windows, and utility metering. This facility earned 31 LEED credits as evaluated by the design Architect-Engineer and could be submitted to the US Green Building Council (USGBC) for consideration as a “certified” facility under the LEED program.

New Showcase Facilities. The designated “showcase facility” for the FY 2007 construction program is the NAB Little Creek, VA Commissary. A lighting study is currently underway to identify new lighting equipment and strategies to reduce the energy consumption (watts per square foot) for commissary facilities to meet the requirements of the ASHRAE Standard 90.1, *Energy Standard for Buildings Except Low-Rise Residential Buildings*. Senior leadership will be able to evaluate how appropriate the design is from an operational standpoint as well as an

energy efficiency perspective before incorporating the features in all new designs. The proposed design is expected to reduce the life-cycle lighting costs by 12 to 30 percent.

### **Other DoD Agencies**

DLA has one showcase facility in the Military Construction (MILCON) program, construction of a new physical fitness center at Defense Supply Center Columbus (DSCC). This building will include U.S. Army Corps of Engineers (USACE) Sustainable Design and Development (SDD) Concepts.

WHS -- The Remote Delivery Facility (RDF) was recently LEED certified by the USGBC. This certification states that the RDF's construction achieved LEED benchmarks in sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. There are now three Pentagon LEED certified facilities: Metro Entrance Facility, Pentagon Athletic Center, and RDF.

Pentagon Wedge 2's construction completed in mid-September 2006 and the LEED certification application has been planned for submission. Only at the end of the LEED scorecard evaluation will the renovation's status be clear.

As a whole, the Pentagon building has previously been designated as the "Energy Showcase Building" for DoD. The goal of the Pentagon Renovation and Construction Program is to provide an exemplary sustainable DoD facility. Due to its efficient and commissioned design and construction, the facility should be a model for efficient and functional operations.

## II. Energy Efficiency Performance

### A. Energy Reduction Performance

#### 1. Goal Subject Buildings

Below is the matrix from the Scorecard (See IV C - Data Tables and Inventory)

	Base Year (2003)	Previous Year (2005)	Current Year (2006)	Percent Change (Current vs. Base)
Site Energy Efficiency Improvement Goals (EPACT)	113,509.6 Btu/GSF	103,371.7 Btu/GSF	107,212.7 Btu/GSF	-5.5

In FY 2006, DoD achieved a reduction in energy use of 5.5 percent (measured in Btu/GSF) compared to FY 2003. The primary energy conservation goal for Federal facilities for the period FY 2006-2015 is a 2 percent reduction per year using FY 2003 as the benchmark. However, DoD's consumption rate exceeded 2005. This increase was influenced by increased troop mobilization and training, activities supporting the Global War on Terrorism, and response to natural disasters. The increase is also attributable to the change in facility category accounting from 2005 to 2006.

#### 2. Excluded Facilities

##### Department of Navy

DON excludes mission critical, concentrated energy use transmitters, simulators, cold iron support to ships, and some private party facilities as authorized by the DOE criteria guidelines. A list of exempt facilities is provided in Section IV.

##### Air Force

The Air Force has identified several excluded facilities. Numerous Military Family Housing (MFH) facilities are being privatized with the utility systems belonging to the housing contractor and the contractor paying for the costs of the utilities therefore excluded from the energy goals. Several communication/test lab facilities are also being excluded due to energy intensive loads driven by mission and operational requirements and not influenced by conventional building energy conservation measures. A complete list of excluded facilities is included in Section IV.

#### 3. Non-Fleet Vehicle and Equipment Fuel Use

In FY 2006, DoD consumed approximately 4.60 billion gallons of mobility fuels – down from 5.17 billion gallons in FY 2005. Spending on mobility fuels increased 26.5 percent from \$7.95 billion in FY 2005 to \$10.06 billion in FY 2006. This increase in cost is attributed to the rise in fuel prices. For example, the price of jet fuel increased from \$1.70 per gallon in FY 2005 to \$2.34 per gallon in FY 2005.

## **B. Renewable Energy**

The total renewable energy usage in the DoD was 9.631 trillion Btu in FY 2006. This is 9.5 percent of all electricity consumed in the DoD. The sources include purchase of green power, geothermal energy, and biomass from municipal waste, wind energy, solar energy, ground source heat pumps and thermal energy from cogeneration systems developed after 1990.

### **1. Self-Generated Renewable Energy**

DoD has integrated PV power systems, solar water heating systems, and transpired solar collectors (solar walls) into its facilities. Active solar heating applications have included maintenance facility solar walls, swimming pool heating, and hot water heating. Below are illustrative examples of self-generated renewable energy projects:

#### **The Army**

As technologies have become more cost-effective, the Army has used self-generating technologies such as solar, wind, geothermal, and biomass, and continues to make significant progress in promoting the use of these and other renewable technologies at our installations. The Army has integrated PV power systems, solar water heating systems, and transpired solar collectors (solar walls) into facilities and generated an estimated 674 billion Btu (BBtu) of self-generated electrical power during FY 2006. This self-generated power is coupled with projects such as ground-source heat pumps, solar water heating systems and photovoltaic systems to generate electricity for isolated loads such as range targets, airfield landing strip lighting, and remote water pumping stations. Active solar heating applications have included maintenance facility solar walls, swimming pool heating, and hot water heating.

The Army was also successful in funding the following self-generating renewable energy projects implemented and operating on Army Installations:

- **Fort Stewart, GA** generated high-pressure steam using wood chips at the central energy plant. In FY 2006, Fort Stewart used about 167 BBtu (39,901 short tons) of wood chips to generate steam.
- **Fort Huachuca, AZ** generated 487 million Btu of energy from photovoltaic, solar and wind generation in FY 2006.
- **Rock Island Arsenal, IL** generated approximately 70.3 BBtu of electricity from its hydroelectric plant in FY 2006.

- **Red River Army Depot, TX** consumed 49.0 BBtu of renewable energy through burning wood scrap in FY 2006.
- **Fort Knox, KY, and Hawthorne Army Depot, CA,** provided renewable energy projects to generate renewable savings. The geothermal conversion of barracks at Fort Knox resulted in savings of 16,800 MBtu savings per year while the geothermal test wells at Hawthorne will facilitate development of future geothermal facility systems.

### **Department of Navy**

- DON is increasing generation of renewable energy, operating the largest wind/diesel hybrid plant in the world and the two largest Federal photovoltaic systems in the United States. DON is generating “free” thermal energy from the waste heat of five cogeneration systems, and contracted for a sixth plant in Yokosuka Japan, due on line in June 2008. DON generated 308,431 MWH of renewable electricity and 1.8 million Mbtu of renewable thermal energy in FY 2006.
- The Navy’s geothermal plant at NAWS China Lake, CA, on average, delivers 1.4 million MWH of electricity annually, to the state electric grid. Most of this resource was developed prior to 1990 and does not contribute to the Navy’s renewable goal. Per DOE guidelines, 296,608 MWH of ‘new’ (post 1990) renewable electricity produced at China Lake is credited toward the Navy’s renewable goal.
- A 30-year Public-Private venture contract for development of the geothermal resources at NAS Fallon was awarded in December 2005. The initial production target is 30 MW with a total allowable development capacity of 160 MW. First production must be on-line by 2013.
- Naval Air Facility El Centro installed a 30.3 kW PV system on two shade structures located south of the new barracks compound. The shade structures cover 80 parking spots for residents of the barracks. The electricity produced by this PV system, and the 20 kW thin film system installed 3 years ago, is fed directly into the buildings associated with the barracks compound, which includes 160 residential rooms and a Conference/Lounge building.
- Naval Base Point Loma, CA installed a 29.4 kW grid-tied roof mounted solar PV System at the Fleet Intelligence Training Center, Bldg. 564. It has been connected to the grid since September 2006.
- Naval Base Kitsap – Bangor installed a 5.7 kW SunWize Grid-Tied photovoltaic system on Building 1101.
- Naval Facilities Engineering Command Hawaii installed three solar water heating systems at the Fort Kamehameha wastewater treatment facility.
- Naval Station Pearl Harbor installed solar water heating systems on two carports.

- Projects made operational in FY 2006 include:

*Photovoltaics*

NAF El Centro, California  
Naval Base Point Loma, California  
Naval Base Kitsap, Washington

*Solar Thermal*

NAVFAC Hawaii  
Naval Station Pearl Harbor, Hawaii

**Air Force**

The amount of the renewable energy reported in Table 1.6 of the Energy Management Data Report is not applied to Standard Buildings for the renewable energy credit, but is applied in the Energy Scorecard reduction figures. Examples of self-generated energy projects include:

- Luke AFB, AZ installed a 375 kW PV system.
- Nellis AFB, NV awarded a contract on July 31, 2006 to build the world's largest PV array in the world. The array will be a minimum of 15 MW and provide approximately one third of the base's power needs.
- Dyess AFB, TX awarded an ESPC contract to construct a 5.5 MW waste-to-energy plant.
- Hill AFB, UT generated about 7,100 MWH of electricity from landfill gas.
- March AFB, CA is installing a 400 kW PV system.
- Hickam AFB, HI has installed PV at the Auto Hobby shop, billeting/commissary, Ft Kam area, and Onizuka area with an estimated 340 MBtus/yr.

**DeCA**

- Many commissary designs incorporate passive solar features, such as day lighting.
- Heat reclaim is always considered and normally used. Day lighting is also considered in design development.
- Geothermal heat pump systems are now analyzed when considering design alternatives since larger capacities have become available.
- DeCA initiated installation of a roof mounted, photovoltaic solar array capable of producing an estimated 152 kW at the Los Angeles AFB Commissary, CA. The project was funded

through Energy Conservation Investment Program (ECIP) funds provided to DeCA and the Air Force. Construction should be completed in FY 2007.

**WHS**

The Pentagon has three PV arrays with a combined capacity of 96 kW and smaller PV systems (solar lights) at 48 various locations bring the total Pentagon Reservation PV capacity to 110.4 kW. This energy source is not connected to the Pentagon grid; therefore it did not produce energy for the building’s use.

The solar thermal system at the H&RP guard booth consists of 400 GSF of tiles with a total capacity of 11.7 kW to provide lighting, heat and air conditioning for the H&RP guard booth. It is estimated that 51.2 MWH were produced by the solar thermal system in FY 2006.

**2. Purchase of Renewable Energy**

DoD continued to purchase energy from renewable sources. In FY 2006, DoD purchased 1,213,782 MWH and 1,601,786 MBtu. The following provides a brief summary of other DoD agency achievements in this area:

**The Army**

- During FY 2006, the Army purchased 1,228 BBtu of renewable thermal energy and purchased 130 MWH of electricity from renewable sources. In total, the Army purchased the equivalent of 197,850 MWH of renewable energy and all renewable energy credits were applied to Goal Subject Buildings.
- Redstone Arsenal purchases steam from the City of Huntsville that is produced from municipal solid waste. Fort Carson is purchasing electrical power generated from renewable sources from Colorado Springs Utility.
- The Presidio of Monterey, Fort Sill and McAlister Army Depot purchased solar energy in FY 2006. Fort Lewis purchased solar and wind energy and Aberdeen Proving Ground purchased thermal energy in FY 2006.

The Army has approximately 3,800 “solar roofs” in use at its installations and has requested assistance from the DOE’s Sandia National Laboratory to assist in the maintenance and repair of several PV systems. This partnership provides the Army with the technical expertise needed to bring failed/failing systems back to operational status. Active solar heating applications have been expanded to include maintenance facility solar walls, swimming pool heating, and hot water heating in Army family housing.

Photovoltaic Power System Projects:

<b><u>Installation</u></b>	<b><u>Application(s)</u></b>	<b><u>Size (kW)</u></b>
Fort Carson, CO	Water pumping, off-grid lighting, telecomm	30

Fort Huachuca, AZ	Grid-connected, off-grid lighting	55
Fort Dix, NJ	Grid-connected, off-grid lighting	70
Yuma Proving Ground, AZ	Grid-connected, off-grid lighting, remote off-grid facility	900
Yuma Proving Ground, AZ	Off-grid lighting, remote off-grid facility	225
Pohakuloa Training Area, HI	Range targets, control towers, airstrip lighting	50
Fort Irwin, CA	Remote off-grid facility, stand-alone lighting	20
Fort Polk, LA	Training range field instrumentation	10
White Sands Missile Range, NM	Grid-connected, weather data equip, telecomm	60
Fort Greely, AK	Training range field instrumentation	10
Fort Bragg, NC	Special ops. power supply (20-kW panels)	200
Yakima Firing Range, WA	Water pumping, off-grid lighting, telecomm	18
<b>Total</b>		<b>1648</b>

The Army has also implemented other advanced technology projects such as Storage Cooling Systems. Storage Cooling is a peak load shaving system in which off-peak cooling is stored and used during peak cooling times to reduce use of high-cost electricity.

<u>Installation</u>	<u>Storage Medium</u>	<u>Application(s)</u>
Fort Jackson, SC	Chilled Water	Central Energy Plant (CEP) #2
Fort Huachuca, AZ	Chilled Water	Barrack Complex
Fort Gordon, GA	Chilled Water	Office Buildings
Fort Jackson, SC	Chilled Water	Barrack Complex
Construction Engineering Research Lab, Champaign, IL	Ice	Laboratory Complex
Yuma Proving Ground, AZ	Ice	Single Barrack
Fort Bliss, TX	Ice	Dental Clinic
Fort Stewart, GA	Ice	PX Building
Fort Eustis, VA	Ice	Office Building
Fort Myer, VA	Ice	Commissary and Office Building

### Department of Navy

DON purchased 133,657 MWH of renewable electricity and 364,024 MBtu of renewable thermal energy at the Norfolk Naval Shipyard, Portsmouth, VA. The installation purchases electricity and steam from a privatized waste to energy plant.

### C. Petroleum

In 2006, DoD used 25,547 BBtu for facilities. This is 23.0 percent less than the 2003 base year and less than 2005, when 27,377 BBtu were used.

### D. Water Conservation

In 2006, water consumption in the DoD decreased 29.6 percent – from 162,096 Million Gallons (MGal) in 2003 to 114,116 MGal in 2006. Consumption also decreased from FY 2005, when it was 124,293 MGal.

In 2006, DoD had established Water Management Plans and implemented at least 4 Best Management Practices in 324 of the existing agency inventory of 769 facilities.

While there is no specific water reduction goal specified in EO 13123 or EPAct 2005, DoD remains committed to reducing over all consumption of natural resources by recording annual water consumption data from the Services.

DoD is striving to increase water conservation awareness and reduce water use—particularly where tight water supplies may potentially impact mission accomplishment and personnel morale. Water conservation measures not only reduce water use and cost, but also reduce energy consumption (for pumping) and sewage treatment costs. Additionally, water conservation helps to reduce the quantities of wastewater treatment chemicals (most notably chlorine) being released into the environment, and reduces the risk of drawing down aquifers or saltwater intrusion into aquifers. Thus, water conservation efforts, in addition to being environmentally responsible, can help installations stretch dwindling O&M dollars. For specifics, please see below:

#### Department of Navy

- Naval Facilities Engineering Command Southwest, CA found and repaired previously undetected water leaks at NAVBASE Coronado. Contracted for Navy Region Southwest irrigation manager to oversee operation of automated irrigation system at NAVBASE Coronado, help manage irrigation water use in San Diego area and help develop water conservation projects.
- Naval Base Coronado, CA purchased 300 1.75 Gallon per Minute (GPM) showerheads using energy award funds. In partnership with Combined Bachelor Housing (CBH), enlisted CBH personnel installed 100 showerheads at no cost in FY 2006; another 146 are slated for an early FY 2007 install. Each showerhead installed will save 0.75 GPM; 100 installed in FY 2006 will result in annual water / wastewater cost savings of \$85,800.
- Naval Air Facility El Centro, CA implemented xeriscaping for the exterior of several buildings throughout the installation. The large Olympic training pool was also repaired and resurfaced in FY 2006. This project is expected to save approximately \$27,000 annually.

- Naval Air Station Lemoore, CA funded a xeriscape project for 6 percent of applicable acreage. The project will be executed FY 2007.
- Naval Air Station Lemoore, CA and Naval Base Ventura County, CA awarded a contract for 502 waterless urinals in a joint UESC project in 2006 with installation to begin in FY 2007.
- Naval Air Weapons Station China Lake, CA continued to use their Supervisor Control and Data Acquisition (SCADA) system to monitor for noticeable abnormalities in water consumption.
- Naval Support Activity Mechanicsburg, PA installed additional waterless urinals and now has over 50 waterless urinals operating successfully.
- Naval Station Great Lakes, Chicago, IL installed waterless urinals in Building 179 (17 units).
- Naval Air Station, Patuxent River, MD installed waterless urinals in 4 buildings, which are saving 78,000 gallons of water annually.
- Naval Station Norfolk, VA awarded a contract to re-use treated wastewater as feedwater for the Naval Station steam plant. They also installed 113 water-efficient washing machines in bachelor housing and temporary lodging facilities.
- Naval Air Station Oceana, VA installed 94 Energy Star front-loading washing machines, which reduce water consumption by 33 percent and electric consumption by 22 percent.
- Naval Surface Warfare Center Dahlgren, VA awarded a contract to prepare a water conservation plan.
- Naval Air Facility Atsugi, Japan installed shower water conservation devices to every showerhead at two gyms. The attachment mixes air to the shower flow and saves 40 percent of heated water instantly.
- US Naval Base Guam provides potable water for both the Navy and the local community. The Naval Base has a water conservation instruction that describes what water conservation actions to take whenever the Navy Reservoir level reaches a set point based on a historic 10-yr average. The Naval Base had to implement water conservation measures this year during the dry seasons from January through June due to the low reservoir level. By utilizing media, the quality of life committee, Base Security, and Housing staff for enforcement, the Navy water treatment plant was able to maintain adequate water supplies throughout the dry season.

## **Air Force**

- The Air Force consumed 35,987.6 MGal of water in FY 2006 at a cost of \$88,107.8K. This is a reduction of 5.6 percent from last year's consumption.
- Hurlburt AFB, FL awarded a project to reuse the effluent from the wastewater treatment plant. This project was funded through a partnership with the City of Ft. Walton Beach and Hurlburt Field. The reuse line can provide up to 1 MGal per day of effluent water.
- Eielson AFB, AK received Productivity Investment Fund (PIF) funding (only second energy project to receive PIF funding in the AF) to replace 9 single-pass water-cooled A/Cs on base which will save 42 MGal/yr. The project is currently under construction to be completed winter of FY 2007.

## **DCMA**

- Water usage in FY 2006 was 3.3 MGal at a cost of \$10.1K. Compared to the previous year, which was 3.4 MGal at a cost of \$7.4K, this represents a 3 percent reduction in actual water utilization even though GSF increased from 80,000 sq ft to 151,000 sq ft.

## **DeCA**

- The DeCA design criterion requires low consumption toilets and urinals with electronic flush sensors for new and renovated commissaries. Electronic sensor control valves are specified on hand wash lavatories. At locations where host installations maintain "waterless" urinals, the projects may include the "waterless" urinals.
- DeCA construction projects implemented are required to include low-flow devices for flush valves and lavatory faucets. The use of electronic valves was included in projects to reduce water use. The DeCA East regional office is located in a GSA negotiated leased building. The regional office contracted for the space and requested that the building owner incorporate current commercial energy efficient design with set-back thermostats and state-of-the-art equipment efficiency ratings. The plumbing fixtures in the office are all of the low-flow type and meet commercial plumbing criteria. The energy and utility costs are included in the lease agreement so the rent includes these costs. This makes it beneficial for the owner to use the most energy efficient equipment to maximize their energy savings.
- DeCA West continues to upgrade restroom facilities by fitting them with low-flow type fixtures and where applicable, sensor-activated faucets and flush valves.
- More emphasis has been placed on the immediate necessity to repair leaky and/or faulty plumbing fixtures as they are identified. If the installation/base maintenance work force is not available to resolve the problem, outside (off-base) maintenance will be sought to acquire immediate correction of the problem.

- Closer monitoring and improved quality checking of commissary store quarterly water use and cost reports (DeCA Form 20-1) has been implemented. Store directors continue to stress the importance of conserving water in their daily operations.
- The DeCA East San Antonio office implemented local city water conservation rules for lawn watering schedules and has a booster pump in the lawn sprinkler supply line for optimum use of available water pressure.
- The DeCA East Utilities Task Force directed that all locations conduct a comparative reading of water meters each month to validate consumption as reported by host installation.
- Local city water conservation rules for lawn watering schedules were implemented at the DeCA East San Antonio office.
- Landscape irrigation, at times, has been substantially reduced at the DeCA Headquarters facility, Fort Lee, VA.
- DeCA Europe's Kaiserslautern CDC (Cold Storage) installed three water meters for all incoming service lines.
- Proposed landscaping for new facilities is closely reviewed during all phases of the design for low-maintenance and watering requirements.

### **DLA**

DLA is currently working on a Water Conservation Management Plan, which is expected to be completed in FY 2007.

### **NGA**

Meter replacements were completed at NGA's largest facilities in Bethesda and St Louis in FY 2005, allowing NGA to compile accurate consumption records for the first time since FY 2000.

- In FY 2006 NGA consumed 102.7 MGal of water at a cost of \$587,000. Compared to the revised baseline rate of 103.5 MGal, this represents a drop in consumption of just one tenth of one percent (0.1 percent). The steady consumption rate can be attributed to a combination of large personnel increases offset by facility improvements and implementation of Water Management Plans at NGA sites.
- NGA established a Water Management Program in FY 2003 which incorporated Water Management Plans for each of 6 major sites. For FY 2006, NGA exceeded the mandated goal of implementing Best Management Practice's (BMPs) at 30 percent of sites, as all 6 sites have implemented at least 4 BMPs and half of the sites have implemented 5 or more. NGA will continue to place emphasis on BMPs as an efficient and cost effective way to achieve water conservation.

### III. Implementation Strategies

DoD's philosophy is to give the Defense components the flexibility to manage their own energy programs to meet the goals of EPA Act 2005 and EO 13123. DoD's primary objectives in implementing strategies are to improve energy efficiency, eliminate energy waste, and reduce costs. To achieve these objectives, the Services use the following common strategies:

1. Invest in energy efficient technologies, such as high efficiency lighting and ballasts, energy efficient motors, and packaged heating and cooling equipment with energy efficiency ratios (EER) that meet or exceed Federal criteria for retrofitting existing buildings.
2. Utilize ESPC and UESC.
3. Investing in EMCS.
4. Re-energizing of Energy Awareness Campaigns
5. Providing training to energy coordinators at both the region and installation level.

#### A. Life Cycle Cost Analysis (LCCA)

The Department's Facilities and Energy managers utilize life-cycle cost analysis in making decisions about their investment in products, services, construction, and other projects to lower costs and to reduce energy and water consumption. DoD considers the life-cycle costs of combining projects and encourages bundling of energy efficiency projects with renewable energy projects, where appropriate. Projects are prioritized for capital funding and execution is based upon the greatest life-cycle savings to investment ratio. Sustainable development projects use life-cycle costing methodology and follow the Whole Building Design Guide. For examples, please see below:

#### The Army

Army installations utilize life-cycle cost analysis in making decisions about their investment in facilities maintenance and repairs and construction projects to reduce energy and water consumption. The Army is required to use building systems and/or equipment that meets or exceeds the energy performance standards set forth in 10 US Code of Federal Regulations 435, local building standards, etc, and that result in the lowest life-cycle cost. The Army considers the life cycle costs of combining projects, and encourages bundling of energy efficiency projects with renewable energy projects, where appropriate. Utilizing energy efficiency, water conservation, solar and other renewable energy technologies can minimize life-cycle cost. The use of passive solar design and active solar technologies are required, where cost effective over the life of a project.

#### Department of Navy

All DON energy projects (centrally funded and financed) are required to evaluate savings on a life cycle basis. Projects submitted utilize the National Institute of Standards and Technology publication handbook 135 and DOE energy discount factors as guidance. In FY 2003, DON energy projects team adopted use of DOE's Building Life Cycle Costing software as a standard

for determining project economics. Sustainable development projects use life cycle costing methodology and follow the whole building design guide. FEMP, EPA, Energy Star®, GSA, and DLA guidance on purchasing energy efficient products continues to be distributed in order to educate purchasers of the life cycle costing requirement and provide them assistance making purchasing decisions.

### **Air Force**

LCCA was used on all new construction projects and retrofit projects, including ESPC, UESC, and ECIP programs. Examples include:

- Barksdale AFB, LA MILCON \$15.6 Million dormitory construction.
- Eielson AFB, AK received FASCAP funding for the Hawg Pen and F-16 door installation projects that met a 2-year payback.
- Base-funded Hangar Door Weather Seal Replacement project met a 2-year payback.

### **DeCA**

DeCA Design Criteria Handbook (DeCAH) 20-1, emphasizes use of life-cycle cost requirements in the design of commissaries, was revised in FY 2006 and is available on line at <http://www.decafacilities.com/decadesign/>. The handbook emphasizes life-cycle cost evaluation of HVAC systems for alternate fuel sources and other energy reduction strategies including direct expansion and gas-fired systems. Designs include occupancy sensors, energy efficient lamps and ballasts, LED exit signs, high efficiency motors on air handling units and display cases, maximized use of glass door refrigerated cases instead of open cases, use of refrigeration monitoring and control systems for the most efficient operation of refrigeration systems and HVAC, automatic water controls for restroom fixtures for efficient use of water, use of dual path and desiccant air handling units for the most economical means of cooling and dehumidification, maximized use of wall and roof insulation, implementation of energy efficient doors and windows, and plastic curtains on refrigerated cooler doors. Plastic or metal swing air curtain doors are replacing the strip curtains on walk-in refrigeration equipment in the freezers, meat, dairy, and produce rooms in new and renovation projects. The boiler replacement project at Grafenwoehr Commissary, GE, used the life-cycle analysis method to determine the benefit for various system components. The use of life-cycle cost alternatives is a primary focus in the design determination required during major and sustainment project development. In FY 2006, an analysis was conducted relative to fax machine repairs at the Agency Headquarters. Machines with the lowest life cycle costs were selected for procurement. Submittals during the design phases, including life-cycle analysis, of all major construction projects are reviewed and comments are provided by the region as applicable for the specific location.

## B. Facility Energy Audits

DoD demonstrates the department's commitment to energy efficiency by conducting energy audits of facilities and installations. In FY 2006, DoD completed an audit of 248,448 thousand square feet (ksf) or 13.3 percent of total facility area.

### The Army

The Army has a growing number of methods with which it determines the quantity of energy consumed as well as the efficiency of individual installations and energy systems.

- **Army Energy & Water Reporting System (AWERS) Improvements.** In FY 2006, improvements were made to the capabilities of the AWERS. (1) the Energy Managers Database module was added; (2) reports were created to extract data from the Energy Manager's Database; (3) the energy glide path was converted to an FY 2003 baseline to conform to EPAct 2005; (4) Department of Defense Activity Account Codes (DODAAC) for reporting installations were replaced with Installation numbers to align AEWRS with other reporting systems (Installation Status Report, Integrated Facilities System, Real Property Plans, etc); (5) a New User Registration form was added on AEWRS home page allowing e-mail verification; (6) modifications made to quarterly water consumption and cost report. (7) Documentation and Users Manual was updated to reflect changes in AEWRS; (8) Security was enhanced by patches issued by Army Global Network Operations & Security Center in January, April, and July 2006.
- HQ IMCOM implemented the Natural Gas Risk Management Program to provide price stability to Garrisons protecting their budgets from price volatility in the natural gas market. 35 of 38 installations are eligible to lock in natural gas prices to achieve budget stabilization. Cost avoidance in FY 2006 was approximately \$ 5M.
- Electric Tariff Rate Surveys. There are 68 rate surveys planned for the FY 2006-2007 timeframe. Out of 42 completed surveys, cost avoidance and energy savings of \$ 12.7M have been identified.
- Boiler Safety Inspections. AR 420-49, Utilities Services, requires boiler inspections to determine safety status of boilers and to identify repairs to ensure safe operation. IMCOM performed a total of 969 inspections on 535 boilers at 51 sites in FY 2006.
- Water Needs Study at Presidio of Monterey. In accordance with FY 2006 Defense Appropriations Act, the Army initiated a water needs assessment for the Presidio of Monterey (POM) / Ord Military Community (OMC) to cover the next 50 years. The final report, submitted to Congress in Apr 06, concluded that the water needs at POM will exceed supplies in 2013 and at OMC in 2051. It also identifies numerous water-saving initiatives that are currently under investigation for possible implementation.

- In FY 2006, the Army conducted nine Energy Awareness and Conservation Assessment visits (EACA) at Army Installations. A total of 6.1 million square feet was audited resulting in an identified potential cost avoidance of \$7.1M through no-cost / low-cost savings opportunities. The EACAs included site visits, command / supervisory briefings, cost analyses and guidance to achieve energy savings averaging 10 percent of installation energy consumption. Installations included in FY 2006 EACA visits were Radford Army Ammunition Plant, VA; Fort Drum, NY; Fort Richardson, AK; Fort Benning, GA; Fort Stewart, GA; US Army Garrison Hawaii; Presidio of Monterey, CA; Fort Irwin, CA; and Army Research Lab - Adelphi, MD. Additionally, ESPC and UESC contractors provided additional energy audits as part of their preliminary project evaluations. The contractors conducted energy audits in 114.0 MSF of facilities in FY 2006. This represents 14.3 percent of the total square footage of Army facilities.

### **Department of Navy**

Energy audits were conducted on 12.2 percent of facility square footage. Since 1992, audits were completed on a total of 169 percent equivalent of DON facility square footage. Some audits were repeat audits, several years apart, to investigate additional conservation measures not cost effective previously, or to investigate measures that were not identified during the first audit. DON strives to fund audits on a reimbursable basis (funds provided by individual installations) or by adding the cost of audits into alternatively financed projects.

The Naval Facilities Engineering Command (NAVFAC) Utility and Energy Cost Savers Tiger Team conducted audits at 5 DON installations. A team of Navy energy experts from a variety of regional commands survey an installation and identify low-cost initiatives that can quickly reduce utility bills. The team typically finds \$0.5M in savings from a sample of 10-20 buildings.

### **Air Force**

- The Air Force has performed facility audits of 81,753ksf/614,573ksf or 13.3 percent of the total facility space for FY 2006.
- The Air Force has established metering milestones to install Automatic Meter Readers (AMR) to help collect facility data and provide our base leadership with accurate data to make informed energy decisions.
- Two Air Force installations, Hill AFB and Robins AFB, received DOE/FEMP energy audits this year.

### **DeCA**

DeCA audited 21.5 percent of its reporting facilities in FY 2006. DeCA partnered with the DOE for a retro-commissioning plan to audit commissaries with the objective of providing a baseline for a detailed retro-commissioning plan that will be applied to all commissaries system-wide. Energy audits are accomplished from the DeCA HQ level through the Agency EEM. DeCA East, West, and Europe have Utility Energy Task Forces (UTF) that investigate high energy

using facilities and make recommendations for remediation of the problems that are found. The UTFs required energy audits to be accomplished through the DeCA EEM or for existing audits to be revisited to better identify problems. DeCA plans formation of a UTF in January 2007. Additionally, 60 commissaries were audited electronically through analysis of refrigeration monitoring and control data. These audits will result in potential annual energy savings and maintenance improvements once recommended corrections are completed.

### **Other DoD Agencies**

WHS - The Pentagon has developed an ESPC partnership with Honeywell. Its initial efforts have gone towards analyzing the utility usage and costs for the Pentagon and other associated buildings. An estimated baseline has been calculated to identify usage before energy conservation measures (ECMs) are put in place. Honeywell has begun investigating ECMs that could be effectively implemented. Progress has been made to achieve the EO goals. In FY 2003, it was identified that 37.6 percent of the Pentagon had been audited. That number remains accurate through FY 2006.

DCMA - In FY 2006, DCMA completed a SAVEnergy Audit through the DOE for DCMA District West HQ, Carson, CA.

### **C. Financing Mechanisms**

UESC and ESPC are crucial tools for financing energy efficiency measures that allow installations to improve their infrastructure and pay for the energy efficiency measures through the savings generated by the project over time (10-25 years). ESPCs are partnerships with private sector companies, known as Energy Savings Companies (ESCOs). UESCs are similar to ESPCs, with the most notable difference being that the projects are financed and implemented through utility companies

In FY 2006, Defense Components awarded 17 UESC and 19 ESPC task orders/contracts at an award value of \$694 Million. It is projected that this will produce annual energy savings of 1,750 Trillion Btu and a total life-cycle savings of \$501 Million.

### **The Army**

Army installations access all of the financing mechanisms available to them, including ESPC, UESC, and various forms of appropriated funds. Some Army installations have used the Army's Utility Modernization Program as well as ESPC projects to accomplish energy projects.

In FY 2006, the Army awarded 2 ESPC contracts, one at Fort Stewart, GA and another at Fort Hood, TX, with first year investments totaling \$17.9 million and combined estimated annual savings of 110,554 MBtu. All of the anticipated savings will be paid to the ESCO for the improvements.

In FY 2006, the Army awarded nine UESCs, (seven at Fort Knox, one at Fort Campbell and one at Fort Rucker) with utility company investment of approximately \$29.6 million. Most of the

anticipated \$42.6 million in cost savings will be returned to the utility company to pay for improvement measures.

In FY 2006, the Army awarded five Utilities Privatization (UP) contracts at Army installations. The privatized systems are: Natick, MA (electric), Fort Gordon, GA (electric), Fort Myer, VA (electric), Fort McNair, VA (electric), Fort Belvoir, VA (electric). These UP contracts have a total value of \$593,412,203, with cost avoidance to the Army of \$75,590,448.

In FY 2006, the Army awarded a four year contract with Municipal Services Contract, with six one-year options (total 10 years) for Fort Gordon to the City of Augusta for water & waste water treatment services. The Fort Gordo contract has a total value of \$36,345,686, with cost avoidance to the Army of \$6,640,951. This was the first utilization of the special Municipal Services Contracting authority provided to the Army by Congress for FY 2006.

### **Department of Navy**

Based on past projects, DON estimates it needs to invest \$140-\$170M/yr in energy efficient equipment (financed + appropriated) in order to meet EPAct 2005 energy reduction goals. UESC and ESPC are invaluable financial mechanisms to fund energy efficiency measures. NAVFAC utilizing Utility, DOE, Department of Army, and Department of Navy contracts, executes both contract vehicles, and makes full use of appropriated project funds.

DON awarded \$148.6M (first cost) financed energy projects that will provide 771,682 Mbtu annual energy savings once constructed. Projects range from a \$500K HVAC upgrade to a \$105M cogeneration plant to meet Fleet shore power requirements. Once the contract payments are completed, these projects will produce \$28.8M life cycle savings to DON.

The following is a list of delivery orders awarded this fiscal year:

<b>Activity Name</b>	<b>Project Title</b>	<b>Program</b>
NSY Norfolk	Facility Energy Improvements	ESPC
NAVSTA Pearl Harbor	Facility Energy Improvements	ESPC
MCB Quantico	Facility Energy Improvements	ESPC
MCAS Miramar	Facility Energy Improvements	ESPC
NAVFAC Far East	Electrical Energy Systems	ESPC
NAVBASE San Diego	Electrical Energy Systems	UESC
NAVSTA Newport	Steam and Condensate Systems	UESC
NAS Whidbey Island	Steam and Condensate Systems	UESC
NUWC Keyport	HVAC	UESC
SPAWAR San Diego	Boiler Plant Modifications	UESC

### **Air Force**

The Air Force awarded 11 new ESPC and 3 new UESC task orders in FY 2006. These task orders include energy infrastructure upgrades and new equipment to help the installations reduce

energy and water consumption and produce renewable energy. Examples include new waste to steam generation, chillers, boilers, lights, motors, EMCS systems and water reducing devices.

**ESPC Table of Awarded Projects**

Base	Award Date	Awarded To Contractor	Contracting Agent
Keesler	Nov, 30 2005	\$13,214 K	DOE
Moody	Dec 1, 2005	\$5,652 K	AF
Wright Patterson	Dec 2, 2005	\$3,943 K	AF
Little Rock	Dec 30, 2005	\$4,148 K	DOE
Dyess	Jan 13, 2006	\$17,361 K	AF
Dyess	Jan 13, 2006	\$22,791 K	AF
Hill	Feb 16, 2006	\$3,241 K	DOE
Maxwell	Mar 15, 2006	\$3,757 K	AF
Hickam	Jul 21, 2006	\$3,666 K	AF
Whiteman	Jul 21, 2006	\$5,904 K	DOE
Tyndall	Sep 29, 2006	\$5,165 K	DOE
<b>Total</b>		<b>\$88,843 K</b>	

**UESC Table of Awarded Projects**

Base	Award Date	Awarded To Contractor	Contracting Agent
Shaw	Oct 31, 2005	\$2,738 K	AF
Offutt	Jun 28, 2006	\$892 K	AF
Eglin	Mar 2, 2006	\$6,504 K	AF
<b>Total</b>		<b>\$10,134 K</b>	

**Other DoD Agencies**

DeCA is considering giving USACE Huntsville District authority to make another attempt to pursue an ESPC and is also working with DOE Northeast Region for ESPC services pending completion of DOE partnering energy audits.

NGA’s St. Louis Site contracted for an ESPC in 1999 and continues to realize savings from this effort. The payback period ends in FY 2012.

WHS -- An ESPC partnership has been established with Honeywell to help meet the audit goals of EO 13123. The Pentagon will facilitate energy audits with its ESPC partner to identify energy saving strategies. Upon identifying and evaluating these strategies, the Pentagon will select the most practical strategies and authorize implementation.

**D. Energy-Star ® and Other Energy-Efficient Products**

When life cycle cost-effective, DoD organizations select Energy Star® and other energy-efficient products when acquiring energy-consuming products. Guidance generated by DOE, GSA, and DLA for energy-efficient products are incorporated into the sustainable design and development of new and renovated facilities. The components are procuring energy-consuming

products that are in the upper 25 percent of energy efficiency. Energy efficient technologies include high-efficiency lighting and ballasts, exit signs, energy efficient motors, low-voltage distribution transformers, and the use of packaged heating and cooling equipment with energy efficiency ratios that meet or exceed Federal criteria for retrofitting existing buildings. Information technology hardware, computers and copying equipment are acquired under the Energy Star® program using GSA Schedules and either Government-wide or Service contracts. For specifics of some of the actions taken by DoD components, please see below:

### **The Army**

When life cycle cost-effective, the Army requires Energy Star® and other energy-efficient products when acquiring energy-consuming products. These revisions enable installations to factor energy-effectiveness into the purchase cost of the item and to factor in both the purchase and operating costs of the item into the overall purchase price to determine "best value".

### **Department of Navy**

The DON eBusiness Office, Card Management Group, agreed to incorporate into the curriculum relevant information about federal buyers being directed to purchase products that are Energy Star® labeled or FEMP identified products. This training provided by the Naval Supply Corps School and developed through the Card Management Group. GSA is a regular instructor at the Navy in-house energy manager's course. The GSA has partnered with the DOE and the EPA to offer the federal community a broad range of energy efficient products. They have identified energy efficient products in catalogs and on the GSA Advantage, an online shopping and ordering system that provides access to thousands of contractors and millions of products and services.

A survey was conducted of energy efficient products policy and products use. Of 88 installations responding, the following table indicates strong use of available information and incorporation of energy efficient products.

<b>Energy Efficient Products Issue</b>	<b>Number of Installations Responding</b>
Recommendations Distributed and Use is Encouraged	70
Advertised During Awareness Activities	88
Instructions Address FEMP Recommendations	64
Designers and Equipment Specifiers use FEMP product recommendations	78
Procurement Officials use FEMP Recommendations	69
Nothing Formal is Being Done to Implement FEMP Recommendations	15

Energy Star® performance criteria are included in acquisition requirements for systems and appliances in privatized family housing units. Energy efficient operations are included in some BOSC.

The Navy/Marine Corps Intranet (NMCI) contractor operates desk top and servers for most DON employees around the world. The contractor previously required that all computers remain continuously on to enable remote operations and maintenance activities such as pushing software upgrades. DON changed the contract to allow employees to turn off computers and monitors after work hours, but the contractor required they be allowed to power up the computers in the middle of the night to push software upgrades. DON is working with the contractor to implement an auto-off procedure that will shut the computers off after the software upgrades have been accomplished. This initiative could save DON up to \$7M/yr.

### **Air Force**

- The Air Force continues to pursue a policy that all purchases of computers, printers and copiers will be specified as Energy Star® compliant as stated in the EPO Act 2005.
- Design specifications for new and retrofitted equipment are reviewed to ensure they are in the upper 25 percent or Energy Star® compliant as stated in UFC 03-400-01, Design: Energy Conservation.

### **DeCA**

DeCA's Contracting Directorate (AM) procures energy efficient products, such as paper grocery bags made up of a minimum of 5 percent pre-consumer or post-consumer recycled products. New or replacement balers are purchased for our commissaries in consideration of efficient disposal of cardboard products. In March 2006, the DeCA Government-wide Purchase Card (GPC) program began requiring all new GPC program participants to complete training on the Energy Star® program prior to being issued an account. Energy Star® training is part of the Mandatory Sources and Products Training Module, and is provided via Power Point slides posted in DeCA Public Folders. Training includes a description of the requirement, how DeCA must comply, and provides an introduction to tools to find Energy Star® compliant products. Energy Star® training is also provided in a classroom setting during a 3-day GPC hands-on training session. This training is provided approximately eight times per year. The level of training is for the purchase card holders and approving officials. In FY 2007, all current GPC participants will be required to complete the Energy Star® training, regardless of how long they have been a GPC participant. This training is also posted in DeCA's public folders for access and reference. In accordance with EO 13123, GPC holders are made aware of their responsibility to purchase energy efficient products. Benefits are: reduced energy costs as more energy efficient products are purchased, improved efficiency in purchasing Energy Star® products, and better understanding of Agency energy usage. Energy Star® products continued to receive utmost consideration when developing specifications and issuing acquisitions for energy using products. Information technology hardware and computer and copying equipment are acquired under the Energy Star® program using GSA schedules and either government-wide or service contracts. DeCA continues to review and pursue opportunities to utilize electronic communication and data transfer, which conserves the use of such things as paper, postage, and personal resources. Additionally, Energy Star® compliance is a requirement for vendors to participate. One-hundred percent of the Program Management Directorate (PM) acquisitions are energy efficient. DeCA PM published a hardware standards document to assure 100 percent energy efficient hardware

purchases. DeCA design criteria requires premium efficiency fan motors for HVAC systems, electronically commuted fan motors on the refrigeration display cases, and T- 8 fluorescent light fixtures with electronic ballasts in display cases and in new and renovated facilities.

### **WHS**

The Pentagon has developed a plug load management program to reduce electrical usage in its office spaces. The program functions with the use of energy saving power strips such as the Watt Stopper®. The strips use occupancy sensors to shed inserted plug loads. This function aims to reduce energy usage during unoccupied operations.

### **E. Energy Star ® Buildings**

Energy Star® Buildings is a program developed by the EPA to promote energy efficiency in buildings. Energy Star® Building criteria are based on a five-stage implementation strategy consisting of lighting upgrades, building tune-up, load reductions, fan system upgrades, and heating and cooling system upgrades. For specifics, please see below:

#### **Department of Navy**

The Naval Medical Center, San Diego, CA (2001) and the Naval Base Ventura County, Port Hueneme, CA, Welcome Center (2003) were awarded the EPA energy star label. The Energy Star® Label means the building is in the top 25 percent of the most energy efficient buildings of similar type in the nation. The Medical Center is also an energy showcase. The welcome center employs an efficient HVAC system and energy efficient lighting.

The EPA certification program was briefed at the energy projects team meeting and regional energy managers were encouraged to apply for EPA certification. Energy efficient O&M practices will be distributed to enable low cost, high payback energy savings.

#### **Other DoD Agencies**

- All new Air Force MFH units must be designed to meet the Energy Star® criteria.
- DeCA has no buildings designated as Energy Star® Buildings, but **expects** to self-certify up to 85 CONUS commissaries in FY 2007. This represents 32 percent (85/264) of commissary facilities.
- WHS -- The Energy Star® Target Finder has evaluated the Pentagon Library and Conference Center (PLC2) design as in the top 12 percentile in energy efficiency.

## **F. Sustainable Building Design**

Sustainability initiatives require an integrated design approach to the life cycle of buildings and infrastructure. The concepts of sustainable development as applied to DoD installations have been incorporated into the master planning process of each of the Services. Installations are encouraged to approach land use planning and urban design in a holistic manner and integrate it with energy planning. In FY 2006, DoD adopted and applied sustainable design principles in 599 new building projects. Of these, 247 projects can or will be certified under LEED. The following provides examples of Defense Component sustainable building design and construction efforts.

### **The Army**

SDD is the design, construction, operation and reuse/removal of the building in an environmentally and energy efficient manner. The building must meet the need of today's customer without compromising the ability of future generations to meet their needs. The Army has embraced this concept and has identified projects since FY 2002 and beyond as Army SDD showcase facilities. USACE is incorporating sustainability principles into its design and military construction transformation process.

Sustainability initiatives require an integrated design approach to effectively manage the life cycle of buildings and infrastructure. During FY 2001, the Department of the Army issued a policy requiring all projects to be scored using the Sustainable Project Rating Tool (SPiRiT) and required all project designs to achieve a minimum of the Bronze level. Starting in FY 2006, the Army required that all construction project designs achieve the SPiRiT Gold level. In 2006 the Army updated its installation sustainability strategy by beginning the transition from SPiRiT to the USGBC LEED Building Rating System. Effective with the FY 2008 military construction program, building projects will be scored and rated using LEED for New Construction (NC) and will achieve the SILVER level. The LEED rating systems for Housing (H), Existing Buildings (EB) and Neighborhood Development (ND) are also being evaluated for future Army adoption. The Army continues to engage the perspectives and expertise of its personnel throughout the plan, design, build and commissioning process and to establish sustainable goals. Consideration of sustainable building practices and technologies helps decide current and future resource priorities, materials used, mission needs and building performance; and ensuring contract documents are written to support sustainable design, construction and performance objectives. It also facilitates The Army's awareness of how facility systems and materials affect initial project and life-cycle costs, operations and maintenance practices, and ultimate facility performance over the facilities lifetime.

### **Department of Navy**

NAVFAC Instruction 9830.1, Sustainable Development Policy, June 9, 2003, implements sustainable development principles and strategies to reduce the total cost of ownership of facilities. The policy requires the use of the USGBC LEED Green Building Rating System and that all new construction projects meet the LEED Certified level unless conditions exist that limit

the pursuit and accomplishments of the LEED credits necessary for achieving the LEED Certified level. The Assistant Secretary of Navy (ASN) (Installations and Environment) Memorandum, August 4, 2006, directs Navy and Marine Corps Commanders to take steps to plan, program and budget to meet the requirements in the EPAAct 2005, the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding and at least LEED Silver level rating performance in new and replacement buildings. NAVFAC is developing interim guidance to implement the ASN memorandum. NAVFAC Instruction 9830.1 will be revised to incorporate the requirements of the ASN memorandum and other necessary sustainable program updates such as programming, metrics, data collection, installation planning and LEED certification.

18 of 36 FY 2006 MILCON building projects are being constructed to meet the LEED Certified level. Projects such as piers, runways, roadwork and entry gates are not included. A program metrics template has been developed to collect sustainable design data for NAVFAC projects and a method of data collection using the template is being assessed.

DON continues to provide sustainable development training for all business lines. In FY 2006, the Design Strategies for Low-Energy, Sustainable, Secure Buildings Workshop was provided in NAVFAC Pacific, Pearl Harbor, HI and NAVFAC Southwest, San Diego, CA. Workshops are planned for NAVFAC Southeast and NAVFAC Midwest in FY 2007. In addition to this classroom training, NAVFAC is completing development of online sustainable development training for all business lines to provide a sustainable primer and identify the changes in their processes to implement sustainable development in the acquisition process. This online training is scheduled for completion December 2006. This investment in training will lead us to be more efficient and effective in implementing sustainable principles and strategies to reduce the total ownership costs of our facilities.

To date, the results of the investment in sustainable development are being determined through design and manufacturer estimates and modeling. DON awarded a task order contract to determine which design options offer the greatest sustainable solution and the greatest return on investment (ROI), through measurement of the actual performance of buildings. The measurement of the design's effectiveness will also support the business case for further implementation of sustainable development across DON. The information on building performance will be used to: Adapt/Improve equipment to operate more efficiently and as designed; determine actual whole building return on investment for sustainable development; and develop design guidance on best sustainable design options.

In anticipation of programming impacts to the FY 2008 MILCON program, a contract was awarded to study three Norfolk, VA building types and identify the energy efficient measures (EEMs) and the costs necessary to comply with the "30 percent below" requirement of EPAAct 2005. The results follow.

- Administration Building - Additional cost = .63 percent of primary facility cost. Building is 32.6 percent below ASHRAE 90.1-2004. Annual energy savings = \$4,143
- BQ – Additional cost = 2.2 percent of primary facility cost. Building is 37.9 percent below ASHRAE 90.1-2004. Annual energy savings = \$27,791.

- Maintenance Facility – Additional cost = 2.6 percent of primary facility cost. Building is 31.1 percent below ASHRAE 90.1-2004. Annual energy savings = \$28,288.
- Estimated energy modeling is \$20,000 per project.

The Personnel Support Facility, NAB Little Creek, Norfolk, VA is a USGBC LEED Silver level building and was occupied in August 2004. It is a 37, 750 SF administrative building. Sustainable achievements include: 21 percent reduction energy use / 411,37/yr energy savings, 50 percent reduction water use / \$3,000/yr water savings, 75 percent Construction waste diverted from landfill. The additional construction cost to achieve LEED Silver was 2 percent. The ROI/simple payback on this investment is 10 percent/10 years. This building demonstrates that total ownership costs of facilities can be reduced through sustainable design while balancing mission, budget and client requirements.

Building 850, Naval Base Ventura County Public Works Department, Port Hueneme, CA is a USGBC LEED Gold level building and was the recipient of the 2006 White House Closing the Circle Award for Sustainable Design and Green Buildings in the Military. In addition to being a high performance, sustainable building, it is also an “Energy Showcase” facility demonstrating and testing new and emerging technologies to communicate with the facility design community the successes and failures for continual improvement.

Other DON sustainable program initiatives include: revising Unified Facilities Criteria (UFC) to incorporate the impacts of the EPAct 2005, continuing the EPAct 2005 study to include four additional climate zones, and developing UFC for Sustainable Installations and Sustainable Disaster Design (e.g. re-building after disasters).

### **Air Force**

The Air Force applies sustainable development concepts in the planning, design, construction and operation of facilities using the LEED certification as the sustainable metric. The goal is to have 60 percent of eligible FY 2006 projects as capable of achieving LEED certification (26 points) with a goal of achieving 100 percent LEED certifiable facilities by FY 2009. The Air Force sustainable target for FY 2006 was 60 percent. In FY 2006 the Air Force identified 56 out of 144 projects or 39 percent (MILCON and major renovation) that will apply the sustainable design principles. The following are project examples that used sustainable design concepts:

- Hanscom AFB, MA Base Civil Engineer Heavy Repair Facility, \$3.9Million
- Hill AFB, UT Aircraft Damage Repair Facility, \$4.5Million, and Software Support Facility, \$19.3Million.

## DeCA

Four new design and seven construction projects were initiated in FY 2006. They were evaluated in accordance with DeCA's new Sustainable Design Rating Guide, which is based on the LEED NC; LEED - NC for Retail, Pilot Version, March 2005. Design projects were initiated for Eglin AFB, FL; Chievres AB, Belgium; Saratoga Springs, NY; and Keesler AFB, MS. Construction projects were started at Fort McCoy, WI; Fort Detrick, MD; Dyess AFB, TX; Camp Zama, Japan; Barksdale AFB, LA; Peterson AFB, CO; and Harrison Village, IN. All DeCA projects incorporated sustainable development principles. Projects initiated in FY 2006 used sustainable development and design principles (or equivalent) as a standard for DeCA commissary construction. Standard design principles used are as follows:

- Storm Water Management
- During site selections, sensitivity to habitat of endangered species and wetlands, preference to urban areas with existing infrastructure
- Advocate alternative transportation by providing bicycle racks and size automobile parking to meet, but not exceed, what is needed
- Maximize water efficiency by using automatic water controls for restroom fixtures
- Implementation of a building commissioning plan
- Maximize use of energy saving techniques to include implementing heat reclaim from the refrigeration systems to provide space heating and water heating, using refrigeration compressor systems comprised of several compressor sizes to ensure that the most efficient combination of compressors are running at any one time to meet the load, implementing a RMCS for control of the HVAC system to ensure efficient operation, maximized use of more efficient glass door refrigerated display cases rather than open cases, maximized use of the most energy efficient lighting systems implementing the most advanced lighting equipment available, use of lighting occupancy sensors to ensure lighting is off when rooms are not in use, use of a dual path HVAC unit for the sales area which allows for a more efficient method of cooling, maximum use of wall and roof insulation, implementation of the most energy efficient doors and windows, and maximum use of utility metering.
- Chloro Fluoro Carbon (CFC) reduction in Heating, Ventilating, Air Conditioning and Refrigeration (HVAC&R) equipment
- Use of fire suppression systems that use no hydrochlorofluorocarbons (HCFCs) or halons
- Use of cardboard balers
- Maximum use of existing building structures, rather than replacing, through our major add/alt projects

- During building demolitions recyclable materials are saved
- Use of materials with recycled content; and
- Meet indoor air quality standards

Beginning with the FY 2005 major construction program, all project designs tracked metrics associated with the USACE SPiRiT or USGBC LEED programs. While DeCA does not strive to achieve certification levels as established by the sponsoring organizations, DeCA is committed to sustainable development and incorporating sustainable principles in all major design and construction projects.

The DeCA Design Criteria Handbook documents sustainable design requirements as stated above. The handbook emphasizes use of life-cycle costs, pollution prevention, other environmental and energy costs associated with the construction and life-cycle operation of the facility. Detailed requirements are incorporated for items such as energy efficient lighting, dual-path HVAC, premium efficiency fan motors, refrigeration monitoring and control systems, lighting controls, and roof membrane materials. DeCA design criteria are reviewed and updated annually.

### **WHS**

Pentagon Renovation (PENREN) incorporates sustainability requirements and goals in each of their design-build Requests for Proposal. The following projects are ongoing: 1) PLC2 was awarded in July 2004 (4th Qtr FY 2004). However, most of the design was accomplished in FY 2005. This design-build contract included a requirement that a “Certified” rating be earned under LEED-NC. The building is scheduled to apply for Gold Certification. 2) Wedge 3 started in FY 2005 and is following the LEED-EB rating system. Although this project is still in the early stages, it is on track to earn a “Certified” rating. 3) Wedge 4 design recently reached its 95 percent complete stage. Like PLC2, the building’s design has required LEED-NC certification. 4) The Pentagon Memorial started construction in late FY 2006. Because it is an outdoor facility, LEED certification is unattainable. However, there will be efforts to identify LEED certification points within the design.

### **G. Energy Efficiency in Lease Provisions**

DoD emphasizes energy and water conservation in leased facilities and each of the Services has issued guidance directing that all leased spaces comply with the energy and water efficiency requirements of the Energy Policy Act of 1992. It is DoD’s intent to continue to have the landlord make appropriate investments in energy efficiency, which can be amortized in the lease, provided the new total cost (energy costs plus lease cost) does not exceed total costs without improvements. These leases should amortize the investments over the economic life of the improvements. Build-to-lease solicitations for DoD facilities will contain criteria encouraging sustainable design and development, energy efficiency, and verification of building performance. DoD relies upon the GSA to ensure the above provisions are included in buildings that they lease for DoD. Below are some examples of actions taken by DoD components:

## **The Army**

The Army emphasizes that energy and water conservation be included in all facility leases and requires (in AR11-27) that these leased facilities meet energy and water goals. The intent is to have the landlord make appropriate investments in energy efficiency, which can be amortized in the lease, provided the new total cost (energy costs plus lease cost) does not exceed total costs without improvements. Leases should amortize the investments over the economic life of the improvements. Build-to-lease solicitations for Army facilities contain criteria encouraging sustainable design and development, energy efficiency, and verification of building performance.

## **Department of Navy**

Leased space must also comply with the energy and water efficiency requirements of the Energy Policy Act of 1992. The Navy must rely upon GSA to ensure the above provisions are included in buildings that they lease for the Navy. The Department of Navy currently leases 57.5 million square feet of building facilities.

## **Air Force**

The Air Force evaluates all leased properties for location, cost/GSF, and availability and energy efficiency. All these factors are reviewed before accepting a lease.

## **DeCA**

DeCA uses GSA as a leasing agent for its few leased facilities. Lease-back facilities include the DeCA East regional office (closing in FY 2007); San Antonio, TX, office B/3030; Harrison Village Commissary, IN; DeCA West office facilities, Sacramento, CA; and the McClellan Commissary, Sacramento, CA. No new region facility leases were negotiated or initiated in FY 2006. All DeCA East San Antonio leased facilities are required to be within energy and water conservation code compliance of the host municipality as written within each lease agreement. The DeCA East, Virginia Beach, VA office (closed at the end of FY 2006) incorporated the requirement to use current commercial energy efficient design standards. This office space is located in a GSA negotiated leased building and was closed at the end of FY 2006.

Consideration was given on all procurements to include high efficiency systems for HVAC and water use. Devices that meet or reduce current flow rates for water use are used. The regional office contracted for the space and requested that the building owner incorporate current commercial energy efficient design with set back thermostats and state-of-the-art equipment seasonal energy efficiency ratio (SEER) ratings. The plumbing fixtures in the office are all of the low-flow type and meet commercial plumbing criteria. The energy and utility costs are included in the lease agreement so the rent includes these costs.

This makes it beneficial to the owner to use the most cost effective energy-using equipment to maximize their energy savings. No new DeCA West office facility leases were negotiated or started in FY 2006. Our regional office facilities and the McClellan Commissary are being occupied under a lease-back through the Air Force Real Property Agency (AFRPA). These facilities were occupied in an “as-is” condition, and energy efficiency measures (i.e., occupancy sensors, low-flow type fixtures, energy efficient lighting) have been installed at DeCA’s expense to reduce energy costs. DeCA Europe continues to work with the Base Installation Command or the US Army Garrisons to negotiate with the leased property owners. We ensure that the existing facilities meet energy efficiency and water conservation requirements, by requiring all plumbing fixtures to be water saver types, with energy efficient lighting, and insulated walls and roof.

### **Other DoD Agencies**

NGA occupied a third leased building on the Reston site in FY 2006. The use of energy efficient technologies was incorporated into lease provisions, resulting in the installation of energy reducing devices including Energy Star<sup>®</sup> appliances, heat exchangers, low flush toilets, electronic water valve controls and variable speed fans.

Most of the space leased for WHS uses GSA leases. There are, however, three Defense Facilities Directorate leases, which use the same GSA lease provisions. The typical solicitation for offerors tells the lessors to comply with the government’s energy conservation guidelines and the Lease Facilities Directorate supports that in their day-to-day lease administration. When the Leased Facilities Directorate adds equipment for special requirements, they try to influence the lessors to use energy efficient applications.

The majority of DFAS Central and Field sites pay for utilities through lease arrangements with local reuse authorities, or GSA, or through base operations agreements with active military host installations. DFAS has six sites in leased space where the agency directly pays the utilities:

Limestone, Maine

Rome, New York

San Bernardino, California – Closed per BRAC, Jun 06

Dayton, Ohio – Closing per BRAC, Dec 06

Charleston, South Carolina – Closing per BRAC Dec 07

Orlando, Florida – Closing per BRAC Aug 07

Note: Orlando site has become a tenant in the building they occupy as of Oct 1, 2006 and will no longer pay for their utilities directly.

## **H. Industrial Facility Efficiency Improvements**

DoD continues to make progress toward energy reduction goals. The following highlights several FY 2006 DoD Industrial Facility Improvement Projects:

### **Department of Navy**

- Naval Amphibious Base Little Creek, VA constructed a gas-fired steam plant to replace an inefficient coal-fired plant. Large compressed air systems at the corrosion control facility and the landing craft, air cushioned facility were investigated for efficiency improvements.
- Norfolk Naval Shipyard, VA awarded an ESPC contract that included HVAC controls, plumbing fixture retrofits, and compressed air system improvements.
- Naval Station Norfolk, VA awarded a contract to recover treated water from the Camp Allan wastewater treatment plant for use as feedwater in the central steam plant. They also conducted extensive surveys of the central steam system to identify leaks and failed steam traps and surveyed compressor systems.
- Naval Weapons Station Yorktown, VA installed high efficiency boilers, new HVAC systems and DDC, replaced radiator control valves, relined water lines; converted from oil-fired boilers to heat pumps, installed a new oil-fired boiler; and switched part of base power distribution system from 4.160 kv to 13.2 kv.
- Naval Station, Great Lakes, Chicago, IL overhauled two existing backpressure steam turbine generators for more efficient steam production.
- Naval Air Weapons Station China Lake, CA installed a high efficiency pool boiler at an indoor pool.
- Naval Air Facility Atsugi, Japan replaced on/off pump control to the inverter control at the main potable water plant and installed heat-resistant water softener for condensate return at the main boiler plant.

### **Air Force**

- 611 ASG at Elmendorf AFB, AK is evaluating primary power generation for more efficient use and operation
- Eielson AFB, AK installed T5HO lights at the locomotive roundhouse reducing energy usage while increasing lighting quality at this facility.

## DeCA

DeCA installs dual-path air conditioning to control commissary store humidity as an alternative to natural gas or propane fired desiccant dehumidification systems. DeCA has increased the use of heat-pipe technology for dehumidification and heat reclaim. Domestic hot water and HVAC heat reclaim systems are standard in most large commissary systems. A QSR at each commissary monitors refrigeration and HVAC maintenance contract performance. DeCA conducts remote diagnostic monitoring of RMCS at approximately 191 individual stores to ensure that refrigeration and lighting systems are being operated and maintained at their design specification. Discrepancies are forwarded to our maintenance contractors on a daily basis for correction. Lighting controls were monitored and adjusted by this same method in FY 2006. This surveillance resulted in improved contractor maintenance and improved equipment operation and less energy consumed. Web-based energy monitoring control systems are being evaluated for DeCA-wide use. Energy efficient lighting and occupancy sensors are installed in all new construction and renovation projects. Computers are turned off at night and on weekends. Automatic lighting systems are installed in most refrigerated cases to turn off lights after business hours. Plastic or metal swing air curtain doors are installed where feasible. A lighting study is currently underway to identify new lighting equipment and strategies in order to reduce the energy consumption (watts per square foot) in order for commissary facilities to meet the requirements of the ASHRAE Standard 90.1. The proposed design is expected to reduce the life-cycle lighting costs by 12 to 30 percent. Regional UTFs are active in DeCA East, West, and Europe Regions. This integrated approach to solving energy efficiency and billing problems has been successful in identifying actual and potential energy savings with the objective of reducing total operating costs. DeCA UTFs evaluated high energy use facilities to determine causes and what should be done to correct problems. Each store's unit cost for utilities is monitored; all that are indicated as exceeding other stores in the same sales band are investigated for causes and recommended for correction. Identification of utility costs as a category of the unit cost program has intensified the store management's interest in the cost of water, electricity, and other utilities that are billed to the store. Stores, where restroom facilities have been upgraded, have been fitted with the low-flow-type fixtures and, where applicable, the sensor activated faucets and flush valves. The process is ongoing. DeCA awarded lighting efficiency upgrades through group re-lamping and lighting retrofit projects for DeCA commissaries at Iwakuni MCAS, Japan; Columbus AFB, MS; NSWC Dahlgren; Langley AFB, VA; MCRD Parris Island; Shaw AFB, SC; Ft Polk, LA; Ft Rucker, AL; NAS Patuxent River, MD; Edwards AFB; Los Angeles AFB; March ARB; MCAS Miramar, CA; and White Sands Missile Range, NM.

DeCA should receive a Sacramento Municipal Utility District (SMUD) energy rebate in the amount of \$9,833. Store sales area designs include energy efficient ballasts and lamps, state-of-the-art HVAC systems, and lighting circuited and controlled by time-of-day schedules through the RMCS. DeCA Europe continues to identify and replace refrigeration systems with newer more energy efficient refrigeration systems. Several small projects were initiated in FY 2006 to replace portions of aging refrigeration systems. During FY 2006, significant energy efficient replacement refrigeration systems projects were completed in DeCA East commissaries at the US Air Force Academy, CO; Ellsworth AFB, SD; Fort Greely, AK; Fort Rucker, AL; Hill AFB, UT; NAS Key West, FL; Kirtland AFB, NM; Offutt AFB, NE; and Wiesbaden, Germany. RMCS at locations which have lighting controlled through the RMCS are re-programmed to turn

off major lighting circuits during holiday periods (Thanksgiving, Christmas and New Years Day). This action, at approximately 112 locations, representing 7,982,468 square feet, results in an estimated annual energy savings of 574,700 kWh and an estimated cost savings of \$34,500.

## **I. Highly Efficient Systems**

DoD encourages the components to combine cooling, heating, and power systems in new construction and/or retrofit projects when cost effective. The following provides examples of efforts to reduce energy consumption through the implementation of efficiency technologies and projects.

### **The Army**

The Army policy will use high efficiency equipment in the operation of central heating and cooling systems where large quantities of energy are used. The Army is preparing for a second round of a centrally-funded program to modernize aging central heating systems. Central heating systems at 14 major installations were modernized under a five-year, \$300 million effort which ended in FY 2002. Some installations are adding DDC and other automated controls to better monitor and control energy. Installations also use O&M funds to implement energy saving projects such as: upgrading boilers and distribution systems, improving high efficiency pumps and motors, and updating control system. Army regions and installations, along with USACE, evaluate the use of high-efficiency energy systems for new construction and major retrofit projects and incorporate these systems where cost-effective.

### **Department of Navy**

DON cogeneration capacity is 38 MW. Plants at Portsmouth Naval Shipyard, Kittery, ME; Marine Corps Air-Ground Combat Center, Twenty-Nine Palms, CA; Marine Corps Recruit Depot, Parris Island, SC; Naval Submarine Base, New London, CT; Naval Surface Warfare Center, Indian Head, MD and Naval Training Center Great Lakes, Chicago, IL continue to operate and provided cogeneration credits contributing 4 percent of DON energy reduction. Cogeneration capacity will double in 2008 with the addition of the 39 MW plant in Yokosuka, Japan.

No local natural resources (biomass, geothermal, etc.) were available to utilize in these projects.

### **Air Force**

Elmendorf AFB, AK reduced its natural gas consumption by about two-thirds as a result of its ESPC project that was construction complete as of FY 2006.

### **DeCA**

No Combined Heat and Power (CHP) systems were designed or installed in FY 2006. Geothermal heat pump systems are considered as design alternatives when cost effective.

PV systems are surveyed and a PV project at Los Angeles AFB Commissary was funded in FY 2006 for construction in FY 2007. New refrigeration systems utilize electronic controls, heat reclaim, and refrigeration compressor “floating head” to reduce energy usage. Utilities are normally provided by host installations to DeCA. Designs include heat reclaim on refrigeration for HVAC and domestic hot water. All new and/or renovated facilities have a combined/integrated cooling, heating, and refrigeration monitoring system incorporated as a standard design. Combined and integrated cooling, heating, and refrigeration systems are a standard design concept for installation of new or replacement refrigeration systems in the commissaries. Significant energy efficient replacement refrigeration system projects were completed in FY 2006 at the DeCA East Maxwell AFB Commissary and Gulfport Commissary. Similar projects that incorporate energy efficient refrigeration systems are ongoing and will be complete in FY 2007 at Mayport Commissary, Key West Commissary, and Seymour Johnson Commissary. Several roof projects were completed in FY 2006, including the replacement of deteriorated insulation. Installation of a light reflective roof surface improved the energy efficiency of the entire roof system. Energy monitoring and control systems to ensure energy efficiency of the facility’s overall operation are installed in all new/renovated facilities as standard design criteria. The DeCA headquarters facility replaced existing HVAC air handlers with variable speed drives in conjunction with control replacements. The savings are considerable as the motor uses far less power in its adjustments than running the fans 100 percent and adjusting the louvers.

## **WHS**

Pentagon Wedge 2 energy requirements encouraged a holistic design strategy to meet the necessary target. The energy target is 120,000 Btu/GSF, which has been met in the design and will be verified in FY 2007 after completion of the Wedge’s one year, post-construction performance period. The Wedge 2 M&V Program, using over 200 submeter installations, will be utilized to evaluate the performance of the building’s design.

## **J. Distributed Generation**

DoD is pursuing distributed and off-grid generation where it is life cycle cost-effective to provide peak saving opportunities and energy security. Typical applications include micro-turbines, fuel cells, cogeneration plants, flywheels and back-up generators. The following provides examples of DoD’s off-grid generation projects.

### **Department of Navy**

- DON utilizes distributed generation primarily for island installations, remote applications and in technology demonstrations.
- Wind farms and PV systems continue to provide power at numerous installations. New renewable power systems were made operational at: NAF El Centro, CA, Naval Base Point Loma, CA and Naval Base Kitsap – Bangor, WA. Marine Corps Base Camp Pendleton, CA added 100 solar-powered street lights bringing their total to 300, including solar-powered

lighting at bus stops, carport electric vehicle charging stations, wastewater overflow detection stations, and notification and communication systems.

- DON continues to validate the performance of fuel cells.
- In other fuel cell developments, PEM fuel cell power plants, powered by an onboard supply of methanol, and incorporating a new design non-fluorinated Membrane Electrode Assembly, were brought on line at Naval Air Station, Pearl Harbor, HI. .
- Marine Corps Base Camp Pendleton, CA completed commissioning tests for a 500 kW Molten Carbonate Fuel Cell and when complete the total capacity of this fuel cell installation will be 750 kW. An additional 300 Kw Molten Carbonate fuel cell installation is planned for Pacific Missile Range Facility, HI. These installations will validate performance and cost in a combined heat and power application.
- As part of the Office of Naval Research's (ONR) Small Business Innovative Research (SBIR) Wave Energy Technology (WET) program, the Marine Corps will deploy a 2nd generation wave power buoy at the Marine Corps Base Hawaii (MCBH) test site in early 2007. The WET buoy is expected to generate 40 kW during peak output (wave) conditions. Once operational, net positive electrical power from the WET system will be fed to MCBH and offset energy costs for the base by supplying renewable wave energy directly to the grid. The 1st generation wave buoy, rated at 20 kW, was deployed in 2005 and recovered in early 2006 due to a structural failure and is not scheduled for redeployment. A 3rd wave energy buoy, also 40 kW, is scheduled for deployment at the MCBH test site in late 2007.
- Phase III of an ONR SBIR program to develop an Ocean Thermal Energy Conversion (OTEC) system at Naval Support Facility Diego Garcia (NSFDG) is moving forward with support from the US and British commands. In March 2006, the prime contractor provided SBIR Phase II Preliminary Design and Environmental Study reports and is now forming a technical and financial team to support Phase III efforts. The major elements of Phase III, final design and construction, will be privately funded. Based on current cost of electrical power production at NSFDG, a net energy savings of \$2M per year is expected when the OTEC system becomes operational. The Navy expects the review and design/construction process to proceed throughout 2007 and 2008, cumulating with a power purchase agreement and commissioning of the NSFDG OTEC system in the 2009 time frame.

### **Air Force**

- Nellis AFB, NV awarded a contract on July 31, 2006 to build the world's largest photovoltaic array in the world. The array will be a minimum of 15 MW and provide approximately one third of the base's power needs.
- Dyess AFB, TX awarded an ESPC contract to construct a 5.5 MW waste-to-energy plant.
- March AFB, CA installed a 330 kW photovoltaic array.

- Luke AFB, AZ installed a 270 kW photovoltaic roof on their Base Exchange.

### **DeCA**

If the installation cannot provide dependable power to the commissary, DeCA's programming and design team reviews what other sources are available to supplement the power for the commissary building. DeCA typically uses generators for backup power of Point of Sale and emergency lighting systems only.

## **K. Electrical Load Reduction Measures**

Below are several examples of projects that are being pursued by the various DoD components:

### **The Army**

Army installations use a variety of methods to reduce peak load and demand. In FY 2005, many Army installations in the Western part of the United States continued to take advantage of the Western Power Grid Peak Demand and Energy Reduction Program of FY 2004. These studies provided a site-wide assessment of the energy-saving potential at the installation.

Other installations use other energy consumption and cost savings measures. For example, Fort Gordon employs diesel generators to manage its peak load. Fort Gordon leases 13.5 MW of diesel generator assets from the 249<sup>th</sup> Engineer Battalion Prime Power Program. The generators allow Fort Gordon to peak shave the electrical load shape, which amounts to at least \$300K in annual savings or credits. Fort Lewis has various energy projects in which they do load shedding. Other installations use EMCS and UMCS to do peak shaving.

### **Department of Navy**

DON is validating the performance of energy technologies such as cool roofs, heat pipes, air conditioning compressors with integrated variable speed drives, air conditioning duct sealants, high efficiency air conditioning systems, scotopic lighting and destratification fans. The results of the demonstrations will be used to guide installations on the life cycle cost benefits of using these technologies to reduce electrical loads. Other electrical load reduction measures taken in FY 2006 are shown below:

All installations were directed to operate spaces at no cooler than 78F during cooling season and no warmer than 68F during heating season.

Naval Station Norfolk, Naval Air Station Oceana, Naval Amphibious Base Little Creek, and Atlantic Ordnance Command Yorktown in Virginia established a Resource Efficiency Manager programs in FY 2006 to help identify and implement load reduction measures, worked with the local utility provider to reduce demand, surveyed compressor systems to reduce demand and consumption, worked with Building Energy Monitors and tenant commands to secure unnecessary lighting and equipment.

Weapons Station Charleston, SC delamped every third roadway light.

Naval Support Activity Orlando, FL is participating in a duct sealing demonstration project. The technology is reported to seal low-pressure ductwork to reduce air handler unit fan energy consumption.

Naval Support Activity Panama City, FL added timers to photovoltaic street lights, replaced high bay lights with hi-efficiency high bay lights, implemented the new NMCI computer shutdown policy, banned space heaters, implemented voluntary peak load shifting, widened temperature setpoints, and updated their Activity Energy Policy and Building Energy Monitor checklist.

Naval Air Station Whiting Field, FL reduced the peak demand an average of 11.48 percent per month and MWH usage compared to FY 2005 by 8.8 percent. They assigned an informed Building Energy Monitor to each building and provided each with a monthly breakdown of that facility's usage compared to the same month of the previous year. They secured streetlights except at intersections and crosswalks, minimized parking lot lighting by at least 50 percent, secured all exterior lighting at buildings except at entries, performed periodic night inspections to insure lighting is off in unoccupied buildings and encourage the use of occupancy sensors, installed window film, adjusted doors and repaired weather-stripping, installed additional ceiling installation and ceiling fans, strictly adhered to thermostat settings (68F-heat and 76F-cool), installed or upgraded direct digital controls systems, replaced existing air conditioning systems with energy efficient systems, and installed programmable thermostats to allow setup/set back routines to control building temperature during unoccupied hours.

Naval Construction Battalion Center Gulfport, MS reduced the number of lights used at night, removed light bulbs, reset thermostat settings, and installed lock boxes on thermostats that were not on digital controls.

### **Air Force**

- Misawa AB Japan T5HO lighting replacement in hangars and old supply buildings
- Eielson AFB, AK Intelligent Parking Lot controllers installed on 80 head bolt outlets to reduce energy used to keep vehicles functional in winter.

### **DeCA**

Lighting measures - California stores turn off 50 percent of sales area lighting during load reduction warning periods. All stores with electronic RMCS turn off 50 percent of sales area and all display case lighting during non-business hours.

Appliance-measures printers and personal computers not being used as servers are turned off at the end of each business day and on weekends. Energy Star<sup>®</sup> power-down features are activated on most electronic equipment. Personal appliances such as coffee pots and radios are turned off.

DeCA's standard practice is to install motion sensors and separate lighting circuits to allow turning off unneeded lights.

### **Other DoD Agencies**

NGA's largest facility in St. Louis has an established electrical load shed plan consisting of using the EMCS to cycle or shed all non-essential loads, such as air handlers serving administrative areas, non-essential lighting and other non-production loads.

WHS -- the Pentagon has developed a plug load management program to reduce electrical usage in its office spaces. The program functions with the use of energy saving power strips such as the Watt Stopper. A planning process is underway to implement a beta testing phase to review the Watt Stopper's effectiveness.

## **IV. Data Tables and Inventories**

A. Assessment of FY 2003 Energy Data for EPACT'05 Baseline Foundation





**B. FY 2006 Annual Energy Management Data Report**













C. Energy Scorecard for FY 2006







D. Excluded Facilities Inventory

## 2006 DoD Excluded Facilities Inventory

Installation Name	Reason for Exemption
<b>Navy</b>	
NSB NEW LONDON CT	Cold Iron
NSY NORFOLK VA	Cold Iron
NAVFAC MID-ATLANTIC, VA	Cold Iron
LANTORDCOM DET CHARLESTON SC	Cold Iron
NAS KEY WEST FL	Cold Iron
NAVSUPACT PORTSMOUTH, NH	Cold Iron
NSB KINGS BAY GA	Cold Iron
NAVSURFWARCEN COASTSYSTA PANAMA CITY FL	Cold Iron
NAB LITTLE CREEK VA	Cold Iron
NAVSTA NEWPORT RI	Cold Iron
NAVSTA ROTA SP	Cold Iron
NAVSTA INGLESIDE TX	Cold Iron
NAVBASE SAN DIEGO CA	Cold Iron
NAVBASE CORONADO SAN DIEGO CA	Cold Iron
NAVSHIPYD PUGET SOUND WA	Cold Iron
NAVMAG INDIAN ISLAND WA	Cold Iron
COMFLEACT CHINHAE KS	Cold Iron
COMFLEACT YOKOSUKA JA	Cold Iron
NAVBASE GUAM	Cold Iron
COMFLEACT SASEBO JA	Cold Iron
NAVSTA PEARL HARBOR HI	Cold Iron
NAVBASE POINT LOMA, CA	Cold Iron
SUBASE BANGOR WA	Cold Iron
NAVSTA EVERETT WA	Cold Iron
NAVBASE VENTURA COUNTY, CA	Cold Iron
LANTORDCOM DET CHARLESTON SC	Simulator
NAVBASE SAN DIEGO CA	Simulator
NAVBASE CORONADO SAN DIEGO CA	Simulator
NAS KINGSVILLE TX	Simulator
NAS LEMOORE CA	Simulator
NAVSURFWARCENDIV PORT HUENEME CA	Simulator
NAVBASE POINT LOMA, CA	Simulator
MCAS MIRAMAR, CA	Simulator
NAVAIRENGCEN LAKEHURST NJ	Simulator
NAVBASE CORONADO SAN DIEGO CA	Transmitter
NAVRADTRANFAC SADDLEBUNCH KEYS, FL	Transmitter
NAVAIRENGCEN LAKEHURST NJ	Transmitter
NAVRADSTA T JIM CREEK OSO WA	Transmitter
NAVBASE SAN DIEGO CA	Private Party
NAVBASE CORONADO SAN DIEGO CA	Private Party
NAVMECDCEN SAN DIEGO CA	Private Party
NAVAIRWARCENWPNDIV CHINA LAKE CA	Private Party
COMFLEACT YOKOSUKA JA	Private Party
NAF ATSUGI JA	Private Party
CBC GULFPORT MS	Private Party

Installation Name	Reason for Exemption
MCAS IWAKUNI JA	Private Party
NAVFAC HAWAII	Private Party
NAVFAC HAWAII	Private Party
NAVSTA ROTA SP	Private Party
NAS LEMOORE CA	Private Party
NAVBASE POINT LOMA, CA	Private Party
CG MCAGCC TWENTYNINE PALMS CA	Private Party
MCAS MIRAMAR, CA	Private Party
SUBASE BANGOR WA	Private Party
NAVBASE VENTURA COUNTY, CA	Private Party

**Air Force**

BARKSDALE AFB	Private Party – Military Family Housing
BEALE AFB	Private Party – Military Family Housing
DAVIS MONTHAN AFB	Private Party – Military Family Housing
DYESS AFB	Private Party – Military Family Housing
HOLLOMAN AFB	Private Party – Military Family Housing
LANGLEY AFB	Private Party – Military Family Housing
SHAW AFB	Private Party – Military Family Housing
USAF ACADEMY	Private Party – Military Family Housing
ALTUS AFB	Private Party – Military Family Housing
COLUMBUS AFB	Private Party – Military Family Housing
GOODFELLOW AFB	Private Party – Military Family Housing
KEESLER AFB	Private Party – Military Family Housing
LACKLAND AFB	Private Party – Military Family Housing
LAUGHLIN AFB	Private Party – Military Family Housing
LITTLE ROCK AFB	Private Party – Military Family Housing
LUKE AFB	Private Party – Military Family Housing
MAXWELL AFB	Private Party – Military Family Housing
RANDOLPH AFB	Private Party – Military Family Housing
SHEPPARD AFB	Private Party – Military Family Housing
TYNDALL AFB	Private Party – Military Family Housing
VANCE AFB	Private Party – Military Family Housing
EGLIN AFB	Private Party – Military Family Housing
ROBINS AFB	Private Party – Military Family Housing
TINKER AFB	Private Party – Military Family Housing
WRIGHT PATTERSON	Private Party – Military Family Housing
FAIRCHILD AFB	Private Party – Military Family Housing
MCCHORD AFB	Private Party – Military Family Housing
MCGUIRE AFB	Private Party – Military Family Housing
SCOTT AFB	Private Party – Military Family Housing
TRAVIS AFB	Private Party – Military Family Housing
ELMENDORF AFB	Private Party – Military Family Housing
HICKAM AFB	Private Party – Military Family Housing
HURLBURT FLD	Private Party – Military Family Housing
F E WARREN AFB	Private Party – Military Family Housing
LOS ANGELES AFS	Private Party – Military Family Housing
PATRICK AFB	Private Party – Military Family Housing
PETERSON AFB	Private Party – Military Family Housing

Installation Name	Reason for Exemption
VANDENBERG AFB	Private Party – Military Family Housing
ARNOLD AFB	Aero propulsion Systems Test Facility
	(ASTF) Testing Complex
ARNOLD AFB	Propulsion Wind Tunnel (PWT) Testing
	Complex
ARNOLD AFB	Von Karman Gas Dynamics Facility (VKF)
EDWARDS AFB	Birk Test Center
EDWARDS AFB	Ridley Flight Control Center
EDWARDS AFB	Anechoic Test Center
EGLIN AFB	Climatic Lab Facility
HILL AFB	Computer Data Center
ROBINS AFB	Physical Science Lab
ROBINS AFB	Computer Labs
ROBINS AFB	Avionics Complex
WRIGHT-PATTERSON AFB	Computer Data Centers
WRIGHT-PATTERSON AFB	Research Testing Labs
WRIGHT-PATTERSON AFB	Security Analysis Facilities
ANDERSEN PEAK	Transmitters – Communication Sites
MOLOKAI AFS	Transmitters – Communication Sites
PILLAR POINT AFS	Transmitters – Communication Sites
SANTA YNEZ PEAK	Transmitters – Communication Sites