

"Make Energy a Consideration in All We Do"

ENERGY express

The Air Force Facility Energy Center Newsletter

March 2012

Ms. Nancy Coleal
HQ AFCESA/CENR

How would you like to get a \$3.67 million refund from your electric company? That's exactly what happened at Edwards Air Force Base, Calif., after an extensive review of eight years of utility bills. The Utilities Rate Management Team (URMT) at AFCESA, Tyndall AFB, Fla., reviewed Edwards' bills in preparation for an upcoming contract negotiation and discovered there were some questionable charges.

The URMT is a group of engineers and expert regulatory economist consultants who review utility contracts and bills looking for discrepancies, rate increases, and issues to help the Air Force save millions of dollars each year. They also provide support to bases during utility contract negotiations.

Edwards AFB, like many Air Force installations, has unique arrangements for the delivery and supply of electricity. As a result, they are not billed in the same way as other customers. The charges in question relate to the recovery of costs associated with the California electricity crisis of 1999 when emergency electricity purchases were made on behalf of customers at extremely high prices. These charges were designed by Southern California Edison (SCE) to recover the unusually high power costs from the emergency purchases and were allocated to customers as a group (e.g., residential, commercial, industrial). But because Edwards is a unique customer and is not billed in the same manner as other customer groups, the charges

\$3.67M overcharge discovered at Edwards AFB



Edwards AFB, Calif., uses a tremendous amount of electrical power for its day-to-day operations. A recent audit shows the base has overpaid by millions for that power over the last eight years. (photo by Ms. Jennifer Elmore)

should have been applied differently.

The URMT discovered Edwards had been billed improperly; using the same rates charged all large customers. The monthly bills reviewed by base personnel appeared correct because the charges on the bill were based on the published rate schedules. Edwards had underpaid their obligations in some years and overpaid in other years, but the net result was, Edwards paid more than its fair share of costs.

In the fall of 2010, the URMT initiated an assessment of the cost responsibility surcharges going back to 2003. The review of eight years of bills took several months and involved significant effort in researching and understanding the regulatory environment in which these charges were created.

All parties, SCE, Edwards, and AFCESA now agree the Air Force is due a refund

of nearly \$3.7 million. The total is about 4 percent of the base's total electric bill over the eight year time frame. Edwards pays an average of \$12 million per year in electricity costs. Throughout the process, the URMT worked with Edwards and SCE as partners, preserving the amicable relationship between the two entities. Because prior fiscal year money is involved in the refund, the full amount will be returned to the U.S. Treasury. If the issue had been corrected in the same fiscal year, a bill credit or refund check could have been issued for base use.

The URMT works closely with bases, reviewing utility bills for errors and helping energy managers understand utility rate charges and issues. The team can provide support as base energy managers review every monthly bill and note irregularities. If you have questions about your installation's utility bill, contact the URMT for support at 850-283-6295.

AFSPC Taking Steps To Reduce Energy Use

1st Lt Keturah Spence
6th SWS

Electricity consumption is a major cost for the 6th Space Warning Squadron, located at Cape Cod Air Force Station, Mass., as it carries out its missile warning and space surveillance missions – \$153K a month. Looking for ways to save energy and the associated costs to purchase that energy, staff at Cape Cod AFS, along with 21st Civil Engineer Squadron and Headquarters Air Force Space Command, started working toward reducing energy consumption.

One of the first steps was partnering with the Cape Light Compact. The CLC, a public-private partnership that manages energy conservation initiatives on Cape Cod, was able to arrange for energy audits of the facilities. At the request of 6th SWS, auditors recommended lighting retrofits throughout the installation and variable frequency drives on pumps and motors for heating, ventilation, and



Two, new 450-ton chillers provide chilled water for the radar and other subsystems. The two old chillers (pictured) were installed when the site was originally constructed and consumed a significant amount of electricity. The new chillers not only save energy, but use significantly less refrigerant making them more environmentally friendly. (U.S. Air Force photo)

air conditioning systems. The CLC then developed projects to implement those recommendations totaling almost \$300K in work, resulting in savings of more than \$150K per year at no cost to the Air Force.

The 6th SWS also looked at how it procures electricity. Instead of just buying electricity provided by the local utility company, it was able to take advantage of a regional electricity supply contract managed by the Defense Logistics Agency. Joining with other DLA customers in the Northeast, 6th SWS was able to enter into two-year electricity supply contracts at lower than current market rates, resulting in a savings of \$40K annually.

Another Cape Cod AFS initiative was the replacement of two, 450-ton chillers that provide chilled water for the radar and other subsystems. The two legacy chillers were installed when the site was originally constructed and consumed a significant amount of electricity. The new chillers not only save energy, but use significantly less refrigerant making them more environmentally friendly. The new chillers also incorporate new variable frequency drives, digital controls, and a plate and frame heat exchanger to further reduce energy consumption. When completed, these upgrades are estimated to save almost \$100K per year in electricity costs.

It is no surprise that Cape Cod AFS is leading energy efficiency initiatives; Cape Cod AFS helped charter the Massachusetts Military Reservation Energy Committee. This group brings together all the organizations on the MMR and reviews energy savings opportunities. The committee consists of members from the Air Force, Army National Guard, Air National Guard, U.S. Coast Guard, Veterans Administration, and the Department of Agriculture. The committee shares energy savings



Two 1.6 megawatt wind turbines, similar to the ones pictured, are planned to offset nearly 50 percent of Cape Cod AFS's energy consumption. The turbines will stand almost 400 feet tall and provide clean, renewable power for the installation. (U.S. Air Force photo)

ideas from the different organizations and provides MMR commanders recommendations on energy-saving projects.

In what could be the most visible change to Cape Cod AFS's energy programs, AFSPC plans to install two 1.6 megawatt wind turbines to offset nearly 50 percent of Cape Cod AFS's energy consumption. These two turbines will each stand almost 400 feet tall and provide clean, renewable power for the installation. The project is planned for FY12 contingent upon funds availability, and will be managed by the 6th SWS site support officer.

If the past is any indication, you can expect more energy innovation from Cape Cod AFS in the months and years to come.

Air Force and Army Team Up to Fight Energy Waste

Ms. Amy Ausley
HQ AFCESA/CEBH

A new, Joint Service, multi-organizational program aimed at reducing the energy demand for expeditionary shelter systems will soon be putting all of the lessons learned to date to good use in the AOR.

The Director of Operational Energy Plans and Programs from the Department of Defense, Ms. Sharon Burke, recently funded the first year of a three-year joint program titled "Advanced, Energy Efficient Shelter Systems for Contingency Basing and Other Applications" in the amount of \$6 million.

This project will continue and expand upon joint efforts to develop energy efficient expeditionary shelters in three phases: an initial joint demonstration of state-of-the-art energy efficient shelter systems in the AOR; continued research into advanced liners, materials, coatings, thermal performance modeling, and expansion of the research into large shelters; and a follow-on demonstration of next-generation shelter systems incorporating all of the findings will complete the program. The goal is to optimize shelter systems that meet Joint Service needs with a 50 percent reduction in power consumption.

The program will be led by Natick Soldier Research, Development and Engineering Center (NSRDEC) in partnership with BEAR Global Management Office, AFCESA, AFRL, ERDC-Construction Engineering Research Laboratory (ERDC-CERL), and the Army Materiel Command-Product Manager Force Sustainment Systems.

The Air Force and the Army have partnered before on expeditionary energy through the Net Zero Joint Capability Technology Demonstration. Together they have developed and evaluated a combination of shade



A shade fly with photovoltaic panels for generating power is just one of the energy saving technologies being tested and implemented in the new program, "Advanced, Energy Efficient Shelter Systems for Contingency Basing and Other Applications". (Photo by Mr. Rod Fisher)

flies, photovoltaic (PV) flies, insulated liners, solar shades, more efficient environmental control units (ECUs), and energy-efficient lighting, which could mean almost a 40 percent reduction in power consumption in expeditionary bases.

Now, according to Mr. Rod Fisher, Expeditionary Modernization Engineer at HQ AFCESA, it's time to pull all the pieces together. "We don't have any shelters in place currently which incorporate all of the technologies we've developed and evaluated over the past three years. With this new program, we will be able to put together complete shelter systems, send them to the AOR, and get real world data on how they work."

Phase one of the "Advanced, Energy Efficient Shelter Systems for Contingency Basing and Other Applications" is an initial demonstration in which the Air Force and the Army will each put together eight small shelter systems to send to the AOR. That demonstration is expected to be ready to go to the AOR by spring or summer 2013. The Air Force will deploy four systems of two shelters each

incorporating the best PV flies, shade flies, and insulated liners. Two shelters will be cooled with a single ECU versus the current one-on-one system.

Simultaneously, phase two, which is technology development, will have the Army and the Air Force working in three other areas. The Army's ERDC-CERL will study modeling, simulation and analysis. This involves looking at the interaction between the shelter fly, shelter skin and thermal liner to create a more efficient design. They will also be looking at energy efficiencies for rigid wall shelters.

NSRDEC will work on Advanced High Performance Insulation to develop an insulation which provides an improved thermal barrier, minimizes the logistics burden and withstands harsh environments. Meanwhile, AFRL at Tyndall Air Force Base, Fla., will research large shelter energy efficiencies to try to maximize energy security for BEAR assets in the field while reducing energy consumption. All of these efforts will cross-feed information to achieve the best possible results.

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Travis completes AMC's first human-powered gym

Mr. David Musselwhite
60th CES Asset Management Flight Chief

Ten elliptical machines at the Travis Air Force Base Fitness Center are now connected to the base's power grid through an innovative system that converts human energy into no-cost carbon-free electricity.

The system is an ideal education tool at a base that has a strong emphasis on both physical fitness and energy conservation, according to Fitness Center Director Mr. Dean Fazio.

"You're doing something for yourself and the planet," Fazio said. "It may even help you get a higher quality workout."

"The harder (a person) works out, the more power (that person is) putting back into the building," he said.

A 30-minute workout can power a laptop for an hour, but a sweat-dripping athletic workout can power as many as four laptops. The system takes human energy and makes a usable form of renewable energy. A device attached to each elliptical machine converts the kinetic energy from each step into a direct current and sends it to the system. It then converts the direct current into an alternating current, allowing that energy to be used to power the building.

Each elliptical machine connected to the system has an identifying sticker.

The user can increase the resistance level of the machine to create a more challenging workout and generate more electricity.

Ms. Allison Greco, Travis energy manager, called the system of ten machines AMC's first "human-powered gym." A flat-screen television in front of the elliptical machines broadcasts how much power each individual machine is creating at that moment.

"You can see how the calories you are burning are turning into real energy to power the gym," she said. "When you see how much energy other exercisers are creating, it may inspire some friendly competition."

In 2010, Travis AFB, Calif., received first place in the AMC Energy Incentive Award, capturing the \$100,000 top prize. The base's Energy Management Steering Group chose to spend part of the award money on the renewable energy elliptical machines. The team hopes the system will inspire Travis personnel to reduce energy consumption both at work and at home.

Air Force, Army Team-up

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Phase three will consist of a follow-on demonstration in the AOR in FY13 and FY14. This includes building optimized shelter systems based on the lessons learned in the initial demonstrations and the technology development phases. The goal is for the new shelters to demonstrate energy savings of at least 50 percent in a relevant environment.

When deployed into future expeditionary bases, these new systems will reduce energy demand, fuel requirements, and convoys, ultimately saving lives. For more information on the Advanced, Energy Efficient Shelter Systems for Contingency Basing and Other Applications program, contact Mr. Rod Fisher, HQ AFCEA/CEXX at 850-283-6701 or rod.fisher@tyndall.af.mil. For information about Department of Defense energy initiatives go to <http://energy.defense.gov/>.



1st Lt. Jennifer Shin and 1st Lt. Jessica Gutierrez, 60th Medical Group, exercise on elliptical machines that power the gym at the Travis Fitness Center. (Photo by A1C Nicole Leidholm)

Texas base rewarded for lighting projects

Mr. Robert Goetz
JB San Antonio-Randolph Public Affairs

CPS Energy of San Antonio has again rewarded Joint Base San Antonio-Randolph for its energy conservation efforts -- this time for a \$320,000 project to replace high-bay, low-efficiency lighting in 11 of the base's hangars with fluorescent light fixtures.

This month Ms. Yvonne Haecker, the utility company's energy solutions manager, presented Col Scott Peel, 902nd Mission Support Group commander, and other JBSA-Randolph representatives with a \$49,119 mock check representing a rebate that will reduce the base's utility bill.

"The CPSE rebate program is a win-win for both the utility and Randolph," Mr. Ruben Ramos, base utilities manager, said. "Rebates currently received help to lower the actual monthly payment to the utility, which in the big picture frees up capital. The utility in turn benefits from the energy reduction across their distribution system, as well as lower

critical peak demand times during the summer months."

The base replaced nearly 2,400 high-pressure sodium and metal halide lights in the hangars with fluorescent lighting during November and December.

Mr. Ramos said the new lighting will save about \$30,000 per year, contributing to the base's energy conservation efforts, which he said has resulted in savings of about \$300,000 per year for the last four years.

"It will also reduce our peak demand during the summer," he said. "If we lower our demand cost more, we will be paying less during the year."

Mr. Bruce Dschuden, 902nd Civil Engineer Squadron resource efficiency manager, said the project will also improve the quality of light in the hangars.

"This has been a great project; there is no downside," he said. "The occupants of those hangars are all very happy. There's

more high-quality lighting in their space. With fluorescent lighting, there is better color rendition."

Not only are the fluorescent lights more efficient, Dschuden said, they can be turned off when natural light is sufficient.

"The old lighting took 15 to 20 minutes to reach full brightness, so they were always left on during the workday," he said. "Fluorescent lights reach full brightness right away. They also burn cooler, which will improve the comfort level inside the hangars."

Dschuden said another project planned for this fiscal year is the replacement of 27,000 lights in the base's office buildings.

A long-term energy conservation project that continues to progress is the base's chilled-water loop, a system of centralized water chillers, thermal energy storage units and piping designed to meet the air conditioning needs of much of JBSA-Randolph's commercial sector. Much of the system is already complete.

The rebate presented last week is one of several CPS Energy credits JBSA-Randolph has received in the last few years. The most recent one came in November -- a \$26,666 rebate for summer energy conservation.



Mr. Toby Burns, a contractor, hangs new high-bay lighting in Hangar 41 at Randolph Air Force Base, Texas. The new lighting is more energy efficient and lasts longer than the existing Hangar 41 lighting. (U.S. Air Force Photo by Mr. Don Lindsey)



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Cleaning up with Renewable Energy

Ms. Amy Ausley
HQ AFCEA/CEBH
and
Ms. Susan Walker
HQ AFCEE/TDN

When the Air Force has an environmental remediation project on its hands, it can mean high costs and lots of energy use. Many of the sites are located in remote areas and are not supported by the power grid. Getting power to the site can be a logistical nightmare, but the use of renewable energy is helping to make some environmental remediation projects more cost effective and energy efficient.

The use of renewable energy is one aspect within a broad category of technologies labeled green and sustainable remediation, or GSR.

One of the most notable and visible Air Force environmental clean-up projects using renewable energy is underway at the Massachusetts Military Reservation. Three 1.5 megawatt wind turbines provide 100 percent of the power needed to clean more than 12 million gallons of ground water a day. The Air Force is also using solar-powered remediation systems at 13 other sites across the nation, which will produce at least 4.7 kilowatts when fully functional. Most of the projects are smaller-scale, pilot projects and have non-permanent solar arrays which are removed after completion of the study.

One of the pilot projects showing promise is a solar-powered recirculation system treating ground water contamination at Air Force Plant PJKS, Systems and Components Area, in Colorado. The former Air Force property

is now owned by Lockheed Martin. The site was originally the testing ground for the Titan missile, and as the original owner, the Air Force is responsible for the clean-up. The technology is showing better than expected GSR results and will continue to be evaluated for another year. It could move to full-scale remedy if results continue to be favorable.

Another approach to reducing energy in the Air Force clean-up program is the use of more passive treatment technologies. Examples include monitored natural attenuation, bioremediation using natural materials such as vegetable and mulch, passive soil vapor extraction, and using plants to extract or treat contaminants in groundwater. These technologies are not dependent on a continuous energy source, like pump and treatment systems require, but rely on natural processes within the soil and groundwater to breakdown the contaminants.

How can bases determine whether a renewable energy source or a passive treatment technology is best for a

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A rentable solar power skid unit - 960 watt photovoltaic array (eight 120 watt fixed mount panels) is shown here at the Air Force Plant PJKS, Systems and Components Area, in Colorado. The solar unit is powering a recirculation system treating ground water contamination. (Photo by Dr. Paul Jurena)

Cleaning Up

STORY CONTINUED FROM PAGE 6

project? Researchers from the Air Force, in conjunction with industry, created two products to help provide answers. The first is the Sustainable Remediation Tool, which allows users to estimate sustainability metrics for specific technologies for soil and ground water remediation. Dr. Paul Jurena of the Air Force Center for Engineering and the Environment's Technical Support Division, who oversees SRT, said, "This free, easy-to-use, Excel-based tool allows you to evaluate your particular remedy to see if you can use GSR remedies at your site."

The second tool, CleanSWEEP, or Clean Solar and Wind Energy in Environmental Programs, is scheduled to be finalized in September.

CleanSWEEP assesses the potential to switch from non-renewable energy to renewable energy to power remediation systems. It also evaluates the use of renewable energy based on a site's location away from the power grid. Jurena says this new tool may have uses beyond environmental remediation.

"Many people have expressed interest in using CleanSWEEP, not only for environmental restoration sites, but for other site uses as well," Dr. Jurena said. "If you're off the grid for any type of project, why not have a tool to evaluate your power need? Just enter your power requirements and list the percentage of wind and solar you want to use. It will evaluate your location and determine whether renewable energy is feasible and economical for the power requirements of your site."

With the proper evaluation tools in place and the data beginning to show good results, renewable energy could be the wave of the future for environmental remediation.

For more information about the SRT, visit the Web at <http://www.afcee.af.mil/resources/technologytransfer/programsandinitiatives/sustainableremediation/srt/index.asp>. To contact the SRT and CleanSWEEP team at AFCEE, email afcee.ttoo@us.af.mil.

Adjusting Flushes Saves Water

by Mr. Mark Patoka
AF PECEI Manager AF/A1MR

In an effort to reduce water consumption, RAF Mildenhall identified a potential source of water savings in the automated urinal flushing systems. Base-wide, urinal systems were set to flush every 10 minutes, 24 hours a day, 7 days a week, regardless of whether or not they were being used. This equated to over 12,500 gallons of water annually per urinal. Introducing timers on the urinal systems base-wide yielded dramatic reductions in water consumption and is projected to save almost \$70,000 annually.

Mildenhall leaders wanted to reduce water consumption without impacting operations or living conditions. After surveying the base water usage, they realized adjusting the automatic flush system down to twice an hour during normal base work hours, as well as one "hygiene" flush a day during the weekends and non-occupancy days, could reduce water usage by 80 percent. This reduced the overall amount of water being used by Mildenhall facilities, cutting waste and ensuring compliance with water regulations.

A PECEI Project

The project was funded through the Productivity Enhancing Capital Investment (PECEI) Program. The PECEI program's mission is to provide expedited funding for capital acquisition projects which provide measurable benefits and real savings to the Air Force. Every PECEI project falls into one of two categories. The first is the Productivity Investment Fund, in which the project costs over \$250,000, must have a payback within four years and is approved at the Air Staff level. The Mildenhall project is in the second category, Fast Payback Capital Investment. This means it costs under \$250,000, has a payback within two years and is approved at the MAJCOM level. Mildenhall focused on investing in modifications of existing systems. An economic analysis of the project

estimated the payback period at 1.53 years with an annual savings of \$69,261. This equates to saving an estimated 11.5 million gallons of water annually.

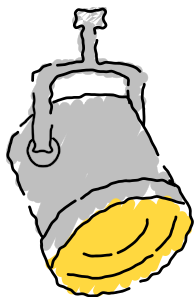
PECEI Performance: Lifecycle Savings

Lifecycle savings is the total amount of expected savings over the life of a project. The cumulative savings accrued during the life of a project is the heart and soul of the Air Force PECEI program. Each year PECEI invests \$10 to \$11 million to net an average life cycle savings of approximately \$112 million. While each project's lifecycle will differ, the longer the lifecycle of a project, the more savings a project can generate beyond the payback period of the initial outlay of funds. Lifecycle savings can make a dramatic impact even with smaller projects. Over time, those savings can continue to be re-applied to other needs at the base or across the MAJCOM.

Over the past five years, PECEI projects have yielded a total lifecycle savings of nearly \$500 million, or nearly \$100 million per year.



By reducing the automatic flush system for urinals at RAF Mildenhall to twice an hour during normal base work hours and once a day during weekends and non-occupancy days, water usage was reduced by 80 percent. (photo by Mr. Steve Perry)



Spotlight on Success



Strategic Sourcing Water Leak Surveys and Repair Estimates

Potable water systems invariably have leaks that go undetected without a professional survey of the system. AFCESA drafted a Statement of Work to seek a strategically sourced contract to perform leak detection surveys and repair cost estimates at multiple bases. Central funding is a possibility for a few bases after award. A combination of high water intensity, water scarce locations, and high water costs will define which bases top the list. The contract will allow bases to accurately and cost effectively program and prioritize leak repairs to reduce utility costs. (Mr. McLellan, HQ AFCESA/CENI, DSN 523-6453)

Air Force Energy Reporting System Inputs Status

A7Cmemorandum "Energy Reporting Updates and Policy Revisions," 05 Apr 2010, requires data be input into AFERS by installations, and reviewed and approved by MAJCOMs no later than 45 days after month's end. As of 6 March 2012, Oct 2011 data is 45 percent MAJCOM approved, Nov 2011 data is 26 percent approved and Dec 2011 data is 37 percent approved. (Ms. Stone, HQ AFCESA/CENE, DSN 523-6556)

Encroachment Management Working Group Update

AFCESA/CENR staff briefed the EMWG for the first time on upcoming renewable energy projects. The update included information on both Power Purchase Agreements and Air Force Funded projects. The brief identified challenges in the interactions between developing encroachment improvements led by EMWG and renewable energy efforts managed through AFCESA. Improvements in coordination and staffing briefs were identified and will be addressed by AO-level staff at SAF/IEI and AFCESA. (Mr. Gray, HQ AFCESA/CENR, DSN 523-6357)

Guard Energy Video

HQ AFCESA produced a 9-minute video highlighting renewable energy and conservation initiatives throughout the Air National Guard. The video was shown 19 March at the 2012 Installations and Mission Support Conference. More than 100 copies were distributed to attendees from ANG bases throughout the U.S. The video can be viewed at <http://www.youtube.com/watch?v=bO-mRmHLGw4> and downloaded from www.afcesa.af.mil. (Ms. Elmore, HQ AFCESA/CEBH, DSN 523-6572)

Aging Air Force Water Systems

2012 Utility Activity Management Plan data shows over 66 percent of all Air Force Water systems (water, wastewater [domestic and industrial]) are between 50 to 95 years old. The average life-use of a water system is 50-75 years if well maintained and installed in an ideal environment. The AFCESA Water & Wastewater Subject Matter Expert leads five Air Force Water Panel Sub-working groups with the goal of developing a plan to resolve infrastructure concerns. MAJCOM/base personnel can submit proven best practices to the Air Force Water Panel members for incorporation into sub-working group plans Ms. Venus Larson. (Ms. Larson, HQ AFCESA/CEOA, DSN 523-6437)



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