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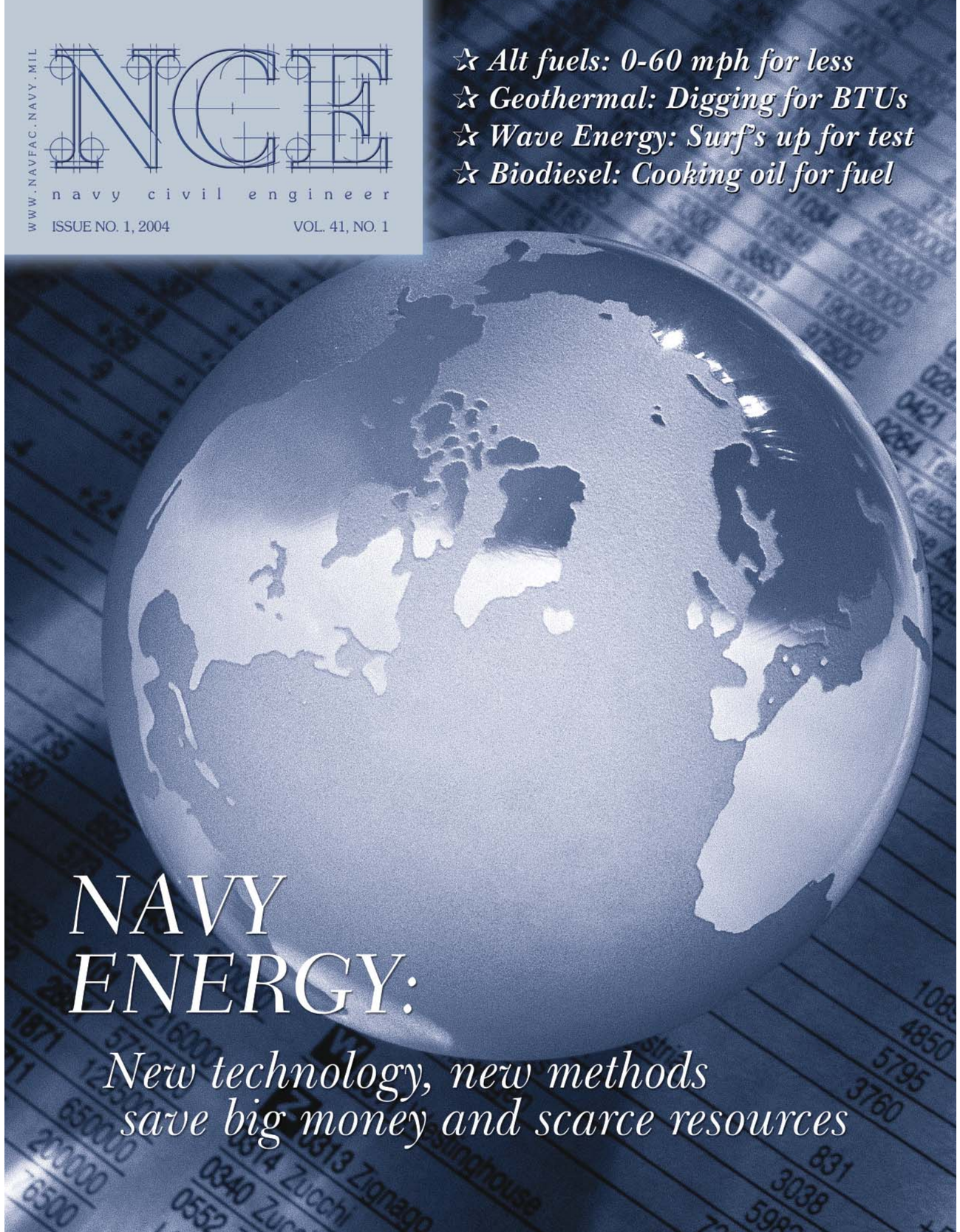
- ☆ *Alt fuels: 0-60 mph for less*
- ☆ *Geothermal: Digging for BTUs*
- ☆ *Wave Energy: Surf's up for test*
- ☆ *Biodiesel: Cooking oil for fuel*

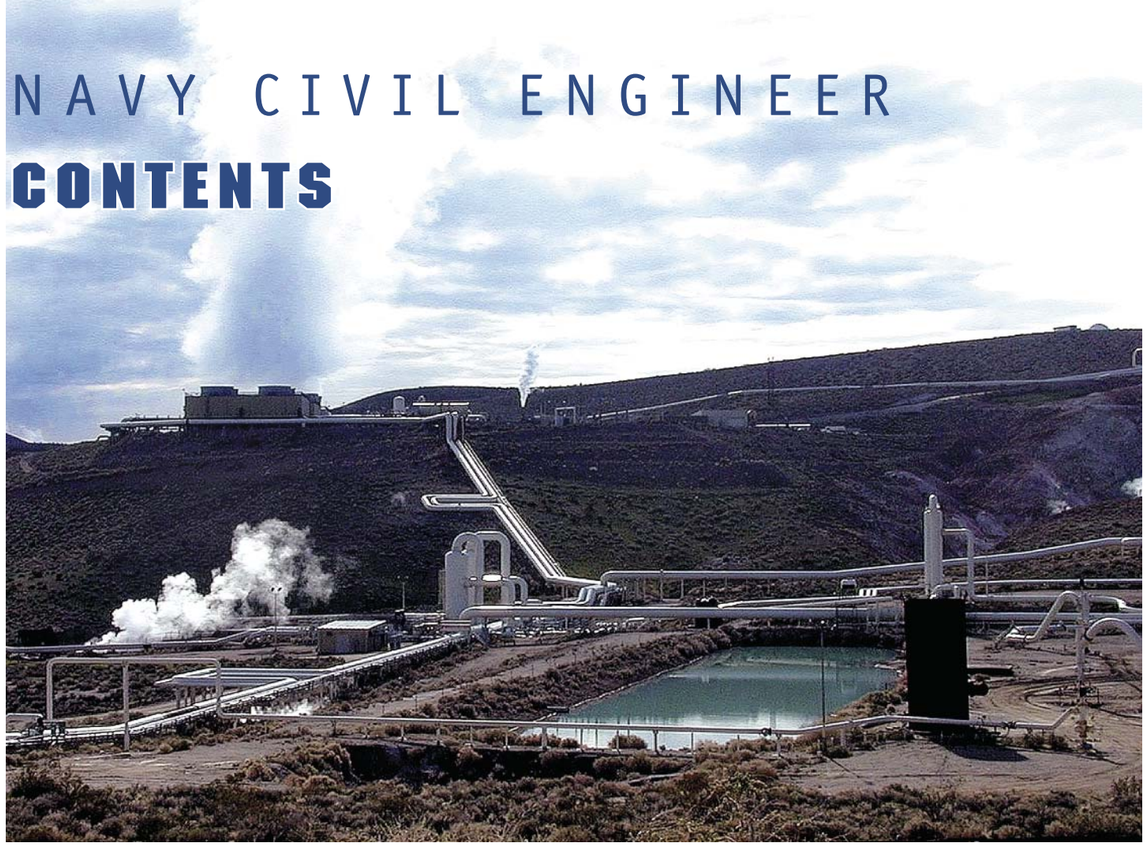


NAVY ENERGY:

New technology, new methods save big money and scarce resources

NAVY CIVIL ENGINEER

CONTENTS



Navy Geothermal Power Plant Coso at Naval Air Weapons Station, China Lake, Calif.

18 COVER STORY: THE NAVY ENERGY ISSUE NAVFAC's Naval Facilities Engineering Service Center in the "owner and operator" of the complete energy conservation program for the Navy and Marine Corps, including new-technology development. And it works: Since 1985, the Navy energy program produced a cost avoidance of more than $500 million per year. It's science, but it works like magic.

DEPARTMENTS

4
FROM THE CHIEF
The superstar NFESC team has done a phenomenal job to save money and resources for the Navy and the federal government.

6
CHIEF ENGINEER'S BENCHMARK
The new Whole Building Design Guide is the place to obtain public domain versions of critical DOD construction criteria.

8
CIVIL ENGINEER UPDATE
Southdiv engineer Mike Reavis presented with the Presidential Energy Award; **Great Lakes** family housing completes $131 million worth of whole-house renovation projects; **NFELC** hq is named for Rear Adm. John R. Perry, CEC; **President Bush** recognizes the Navy Energy Program's outstanding performance; **Innovative** port security barriers, licensed by NAVFAC, made their debut for the Queen Mary II's first U.S. port call; **Marine Corps** Base-Hawaii's

"Leathercollars" got a new home; **MCBH** reaps $113k energy rebate; **Navy** wins big in energy awards program; **PACDIV** takes USAF design award – again; **Aid** wins hearts and minds in the Philippines; **Campbell** is 2003 Moreell winner; contracting and supply functions assessed; **PWC** San Diego gets energy awards; **SWDIV** 'best place to work' finalist; **SAME** announces 2003 Fellows; **RADM** Eugene J. Peltier, former Chief and right-hand man to ADM Moreell, died Feb 14.

NEWS

5
TRANSFER OF AUTHORITY CHANGES SEABEE ROLE IN IRAQI CONTRACTS
By Patrick Peterson, Biloxi Sun Herald

With the handover of authority in Baghdad, Iraqis took over the CEC and Seabees' former job of awarding rebuilding contracts. CEC and Seabee personnel will continue to assist the administration and will continue to train local Iraqi workers in the building trades.

FEATURES

7
NFESC ENERGY & WATER FACTS
The Federal government pays an $8 billion annual energy bill. If all federal agencies purchased energy-efficient products, the U.S. could save up to $900 million per year and reduce annual CO_2 greenhouse gas emissions by as much as *11 million metric tons*.

18
NAVY ENERGY PROGRAM USES DIVERSE ALTERNATIVE FUELS, SAVES MONEY
By John Lippert
Then President Bill Clinton wanted the federal government — the nation's largest energy consumer — to better control energy management costs. In June 1999, he signed an executive order for the government to lead the nation in energy efficient building design, construction and operation. It works.

20
NAVY GEOTHERMAL ENERGY IS HOT
By Francis C. Monestero
Naval Air Weapons Station China Lake pioneered the exploitation of a renewable energy resource that was available on its base in the western U.S. China Lake personnel came up with an idea for tapping into abundant local geothermal resources—and uncorked enough hidden underground energy to provide electricity for upwards of a million and a half people.

24
WAVE ENERGY EXPERIMENTS WITH PULLING POWER FROM THE SURF
By Don Rochon
The Wave Energy Project in Hawaii is a demonstration program to plant the bobbing PowerBuoy™ generator in the path of ocean waves. The juice flows to shore via a subsurface cable.

28
BIODIESEL FUEL FROM COOKING OIL: YOU WANT FRIES WITH THAT?
Alternative fuels don't get any more "alternative" than the NFESC test to produce usable motor vehicle fuel in a process that re-purposes cooking oil.

30
'CLEAN CAR' INITIATIVE MOVES PWC WASHINGTON TO AN ALT-FUEL FLEET
By John Verrico
With the arrival of 14 compressed natural gas (CNG) Ford Crown Victoria pool sedans, this PWC completed a 100 percent change-over to CNG. Now, this forward-looking department is examining fuel cells and other methods.

31
'CLEAN CAR' II: NAS MAYPORT & JACKSONVILLE TEST A GEM OF A CAR
By Sue Brink
Gasoline-electric hybrid vehicles are becoming more common as volume automakers produce more of these units every year — but all-electric transportation still lives for short-distance tasks, such as people-moving around large bases. "Super golf carts" from Global Electric Motors are in test right now.

32
NEW ELECTRICAL METERS SAVE MONEY
By Karlin Canfield
Knowing how much electricity is being used at an installation, and when, is knowledge that can be used to manage consumption. New-design, high-technology electrical metering systems are meeting that need — and can even connect to your local area network for real-time monitoring.

34
THE LAST PAGE
CECOS graduates 70.

NAVFAC Naval Facilities Engineering Command

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2003 Chief of Information Merit Award
Honorable Mention
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NCE and SEABEE are available online

NCE: Navy Civil Engineer can be found at http://www.navfac.navy.mil/nce/

Check out SEABEE magazine at http://www.navfac.navy.mil/seabee/

REAR ADM. MICHAEL K. LOOSE, CEC USN, COMMANDER NAVFAC AND CHIEF OF CIVIL ENGINEERS

The urgency of energy conservation

This issue of *NCE: Navy Civil Engineer* is dedicated to the extraordinary—and extraordinarily successful—Navy Energy Program.

On the heels of the 34th annual observance of Earth Day, NAVFAC joined several other Navy and Marine Corps commands at the Navy Memorial in Washington, D.C. to celebrate energy conservation awareness and present some of its many benefits.

NAVFAC has done a phenomenal job to save energy and water consumption for our nation. This is an important goal for not only the Department of Defense, but also the federal government at large. Our energy team has won numerous federal government awards, including two from President George W. Bush.

More than a decade ago, NAVFAC recognized the benefits of changing the behavior toward energy and water consumption among Navy and Marine Corps personnel and their families. Out of this need, the Navy Energy Program was born.

In this issue of *NCE*, you will learn about some of the great products and services that have come out of the Navy Energy Program, including alternative energy sources to combat pollution, conserve resources and save taxpayer money.

The program benefits are numerous. Replacing aging, outmoded equipment with state-of-the-art gear improves reliability and performance—important factors affecting mission capability. Replacing decrepit buildings with sustainable and energy-efficient facilities provides a healthier, more comfortable place for Navy and Marine Corps personnel to live and work and contributes to a more productive workforce. Reducing consumption of fossil fuels and taking advantage of renewable energy sources contributes to a better environment and reduces reliance on imported oil, enhancing our national security.

Since 1979, the 270-megawatt geothermal power plant at China Lake, Calif., has provided cheaper electricity and valuable funding to the energy program. For example, from 1987 through 2003, Naval Air Weapons Station China Lake reduced its electrical bill by an estimated $43 million—while generating 26 million megawatt/hours for the California electrical power grid. This is enough electricity to power 180,000 homes.

For decades, the automobile industry has experimented with electric and natural gas-powered cars. The Navy has jumped into that experiment as well. Naval Station Mayport and Naval Air Station Jacksonville have leased electric vehicles from Global Electric Motors. Meanwhile, Naval District Washington has transformed its entire fleet of vehicles into energy-efficient, natural gas-powered vehicles.

Biodiesel fuel, pioneered by NFESC, is another promising alt-fuel energy source the Navy is investigating for wider applications. One of the principal ingredients is discarded cooking oil, so the gentle aroma of french fries might one day greet you at a stoplight.

The creative NFESC minds and NAVFAC Pacific Division have also joined up with the Office of Naval Research and Ocean Power Technologies to experiment with generating electricity by harnessing the ocean's wave power at Marine Corps Base Kaneohe Bay, Hawaii. When the surf is running on this beach, the electricity flows, too.

The federal government is still the nation's largest energy consumer; we each must always do our absolute best to conserve energy and water usage.

I congratulate all the superstars in the Navy Energy Program and the commands and individuals who have contributed to its many gains. We're on the right track and we are accelerating our speed.

I could not be prouder of your drive and your successes. *Well done.*

Transfer of authority changes Seabee role in Iraqi contracts

STORY BY PATRICK PETERSON
Biloxi Sun Herald

CAMP FALLUJAH, Iraq — With the handover of authority here, Iraqis will take over the Seabees' job of awarding contracts, funded by Iraqi oil money, to rebuild the province northwest of Baghdad.

In awarding $100 million in contracts during the past two months, Seabees have demonstrated American contracting methods, selecting experienced Iraqi builders who gave the lowest bids. Seabees now will stand ready to assist the Iraqis in administering funds from the country's oil revenues.

"It remains to be seen whether they will use our process or start a new process," said Rear Adm. Charles R. Kubic, commander of the First Naval Construction Division (1NCD).

Seabee engineers have issued 160 contracts with Iraqi companies, with one as large as $4 million. Competitive bidding was a new process to the Iraqis.

"Some of them were used to a system where they would be handed money for contracts, not having to bid," Kubic said.

Seabees received only a only a few bids for the first few jobs they advertised. The number of bidders, however, increased until a recent road project received more than 104 bids.

"We began to learn of the tremendous capability here," Kubic said. "And it didn't take them long to understand how capitalism works."

Tensions in Fallujah escalated with the March 31 killing of four U.S. contractors and the cordoning off of the city by U.S. Marines.

The fighting delayed the Seabees' plans to begin contracting with Iraqis, but Kubic remained optimistic they could complete that mission before the recent hand-over of power.

"In less than 100 days, we put together from scratch about $100 million worth of work. The success of the design and contracting effort has been phenomenal," said Kubic, who added that some contracts were abandoned when Iraqis were threatened by insurgents.

"In some cases, the contractors who worked with us had to be very courageous. In some cases they've had to pull back and weren't able to work with us," Kubic said.

"There's a tremendous desire of the Iraqi professionals to get on with rebuilding their nation. They very much want to be apolitical. It's difficult for them to talk about the past. They've all suffered."

Fallujah has no central authority, but the political situation seems to be improving.

"They're beginning to see the mayor himself have a little more influence and be able to control his city," said Kubic, who noted the city's long history of unrest.

"They haven't just been at odds with us," he said. "They've been at odds with each other."

Of the 160 projects, Kubic believes the 16 schools, border patrol stations, sewage treatment plants and water purification plants will be the most important in winning citizens' support.

"That's going to touch everybody," Kubic said. "Saddam never put sewers in Fallujah."

Kubic also believes the construction apprenticeship program, off to a slow start due to the fighting, has the potential to create bonds between Iraqis and U.S. citizens. Young Iraqi workers have been invited to work with Seabees while building projects and at sites outside Fallujah.

"This is much harder than you would think for these young folks, because there still is this intimidation factor," Kubic said. "In some cases they find they can't even continue, because their families are intimidated.

"But of anything we're doing, this has the biggest potential for changing the outlook of the average Iraqi towards the average American."

Seabees perform similar humanitarian missions around the world.

"Every time we move, every time we go to a site (in Iraq), we really have to live our 'We build. We fight,' motto," Kubic said.

NCE
NAVY CIVIL ENGINEER

NAVAL FACILITIES ENGINEERING COMMAND

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DR. JAMES W. WRIGHT, P.E., NAVFAC CHIEF ENGINEER & DIRECTOR OF CAPITAL IMPROVEMENTS

Apply sustainable development principles throughout the lifecycle of a facility

Energy-efficient design and proper operation and maintenance of facilities is essential for the Navy to meet mandated energy reduction goals set forth in Executive Order 13123. One major way of incorporating energy efficiency strategies is the application of sustainable development principles throughout the life cycle of a facility. In 2002, the Naval Facilities Engineering Command (NAVFAC) adopted the Leadership in Energy and Environmental Design (LEED™) rating system as a tool to measure the application of sustainable design in new and retrofit Navy construction.

The application of LEED rating criteria is a significant initial step towards incorporating energy efficiency during the design and construction of facilities. This will help the Navy not only achieve energy reduction, but provide a healthier, more efficient place for Navy and Marine Corps personnel to live and work, contributing to a more productive workforce.

NAVFAC took another step forward in promoting efficient energy design by signing last year a Memorandum of Agreement with key members of the National Institute of Building Sciences, the U.S. Air Force, the U.S. Army Corps of Engineers and the Office of the Deputy Under Secretary of Defense. It establishes the Whole Building Design Guide as the sole online point to access official, public domain versions of DoD facility criteria. This central point makes it easier for DoD personnel and contractors to access sustainable design strategies applicable to military construction. The use of the Whole Building Design Guide will promote energy efficiency throughout shore facilities. The guide is a central source for the application of integrated design processes. It addresses not only the requirements for supporting various building types, but also addresses building systems, operation and maintenance strategies that ensure energy efficiencies.

When accessing the Whole Building Design Guide Web site [www.wbdg.org] you can find an array of integrated strategies to meet your needs in designing an energy efficient building. Topics include:

- Reduce heating, cooling and lighting loads through climate-responsive design and conservation practices;
- Employ renewable energy sources such as day lighting, passive solar heating, photovoltaics and geothermal;
- Specify efficient HVAC and lighting systems that consider part-load conditions and utility interface requirements;
- Optimize building performance and system control strategies with the use of occupancy sensors and air quality alarms;
- Monitor project performance through a policy of commissioning, metering and annual reporting.

Energy management doesn't stop at the application of energy-efficient design and construction strategies. Energy management principals must be continuously applied throughout the life-cycle of facilities. Building systems should be continuously monitored to achieve optimum performance for the current operating conditions. NAVFAC has adopted a Total Building Commissioning Policy. It requires incorporating total building commissioning (TBC) into "all phases of the acquisition process."

As NAVFAC pushes forward with TBC, the energy savings designed into our facilities will be validated and documented. Establishing the initial performance will enable sustainable energy conservation by means of performance tests, comparing results and making corrective adjustments over the life of the facility.

The final step in integrating energy efficiency into the life cycle of a building will require occupants, energy managers and facilities operation and maintenance teams to work closely together to continuously improving building performance. This includes making process upgrades, replacing antiquated equipment with energy efficient equipment and identifying and implementing energy efficient methods that accomplish the mission at a lower cost.

Achieving energy efficiency throughout the lifecycle of the building requires occupants to become aware of the importance of energy conservation strategies and identify mission changes that result in optimizing energy usage. The Facilities Management Team should be tasked with continually adjusting building performance to achieve optimum energy efficiency to meet the current mission. Building energy managers should continually monitor the building's performance against baseline standards; promote maintaining facilities at optimum performance; and recommend energy and cost-saving improvements.

For specific energy conservation strategies and methods, the Navy Energy Program posts all executed energy projects and new program and technology developments at its comprehensive Web site at https://www.energy.navy.mil.

Integrating energy management into the lifecycle of a building is an important business decision — and makes economic sense. Having an integrated approach for design, construction and operation and maintenance saves resources that can be redirected towards the Navy's mission and secure our future.

NFESC Energy and Water Facts:

Wind energy is a renewable resource now being investigated by the Navy for wider application.

The Federal government pays an $8 billion annual energy bill. If all federal agencies purchased energy-efficient products, the U.S. could save up to $900 million per year and reduce annual CO_2 greenhouse gas emissions by as much as 11 million metric tons.

The U.S. government spends more than $70 billion a year to purchase supplies and equipment, of which an estimated $10-20 billion are energy-related products.

Navy and Marine Corps installations pay for their pattern of electricity use through "demand charges" levied by their utility, along with the quantity of electricity used. Demand charges can make up as much as 50 percent of a facility's electricity bill.

Supplying shore electricity to a submarine for one hour can cost from $77 at off-peak times to as much as $22,500 at peak demand times. Managing demand charges provides one of the best opportunities to reduce electricity costs.

Navy shore energy consumption has dropped by 23.75 percent per square foot since 1985, avoiding more than $300 million in energy costs — an amount equivalent to lighting one million night games at Yankee Stadium.

Collectively adding up the millions of small savings achieved by such energy efficiency measures such as caulking and sealing now provides our country with two-fifths more energy than does the entire domestic oil industry.

For the end user, power quality problems translate into huge costs for lost productivity, scrapped product and damaged equipment. Power interruptions alone are believed to account for up to $25 billion in annual losses for U.S. businesses.

The use of solar and renewable energy sources is expected to double by the year 2010, creating more than 350,000 new jobs—as many as employed by the nation's largest automaker.

In 1995, more than 45,000 jobs were directly or indirectly related to energy efficiency and renewable energy programs.

The cost of extending an electric power line from the electric grid averages from $20,000 to $80,000 per mile, with even higher costs in urban areas.

Typically two-thirds of the energy in electricity is lost during conversion and transmission before it gets to your house or office.

Fossil fuels dominate the nation's and the world's energy supplies, providing more than 87 percent of the nation's energy (40 percent oil, 25 percent natural gas and 22 percent coal) and about 90 percent of the world's energy (40 percent oil, 23 percent natural gas and 27 percent coal).

Since 1983, the year the rise in real energy prices peaked, actual energy use per capita has been growing at about 1.85 percent annually.

Between 1973 and 1996, energy efficiency and renewable energy provided more than four-fifths—83.5 percent—of all new energy needs in the United States.

The U.S. is the world's second-leading consumer of coal, burning upwards of 23 percent of the world's annual supply.

Today, coal fuel supplies 55 percent of electricity, while natural gas makes a smaller contribution to U.S. electricity needs. By 2015, however, the Energy Information Administration predicts that coal will still account for 50 percent of electricity but the contribution of natural gas will rise to 20 percent.

Oil accounts for about 35 percent of the world's commercial energy supply, while natural gas accounts for 23 percent.

DOE's report *U.S. Electric Utility Demand-Side Management 1996* indicates that demand-side management programs saved 64 billion kilowatt-hours in 1996, or the equivalent output from 12 one-gigawatt power plants.

Next-generation industrial plant design is uncovering 50-75 percent savings with lower capital cost, faster construction and better performance.

According to Congressional Research Service Report 97-88, *Oil Price Volatility*, recent analysis indicates that global oil demand grew by about two million barrels per day, or three percent, in each of the past two years.

For more information:

Find a wealth of additional energy-saving information with only a few key clicks on your computer. Point your Web browser to http://energy.navy.mil and see the complete spectrum of the Department of the Navy Energy Web site hosted by our own Naval Facilities Engineering Service Center. Energy awareness and conservation should be incorporated into daily life as well as all project planning. NFESC's energy site can greatly assist in those efforts, or call DSN 551-1371.

SOUTHDIV Engineer Receives Presidential Energy Award

STORY AND PHOTOGRAPHY BY GARY GROVE

Mike Reavis, an engineer from the Base Operations Support Business Line at NAVFAC's Southern Division (SOUTHDIV) in Charleston, S.C., received a Presidential Award for Leadership in Federal Energy Management in a White House presentation.

The Navy Energy Program has generated significant results for the Navy and Marine Corps. To date, it has reduced energy consumption per gross square foot by 26 percent in standard buildings relative to the FY1985 baseline.

Energy intensity in industrial and laboratory facilities has also declined by 27 percent relative to the FY1990 baseline. Investments of $200 million in energy saving projects made during FY2002 are expected to reduce energy consumption by more than 900 billion btu per year — enough energy for 600 typical office buildings.

As a member of the Navy energy team, Reavis received the presidential award for outstanding performance by demonstrating a comprehensive approach to efficient energy management through implementation strategies, institutionalization of policies and practices, outreach and net results.

The award included a trophy and a certificate signed by President George W. Bush and Vice President Dick Cheney.

Reavis is SOUTHDIV's representative on the Navy Energy Project Execution Team and is responsible for all energy conservation work within SOUTHDIV's area of responsibility.

"The Navy Team is responsible for overall direction and execution of the Energy Conservation Program worldwide for the Navy and Marine Corps," said Reavis, who has been a team member since 1993.

Mike Reavis, right, and his wife Kim were presented with the Presidential Award for Leadership. Present for the ceremony was NAVFAC Commander and Chief of Civil Engineers RADM Michael K. Loose.

Great Lakes Family Housing Completes Whole-House Renovation Projects

STORY AND PHOTOGRAPHY BY MARCIA GOODS

Great Lakes Family Housing celebrated a milestone with the completion of the $131 million Whole-House Revitalization (WHR) projects.

The WHR projects were a direct result of the CNO's Neighborhood of Excellence Program in 1991. Phases 3 and 10 were the last of the 1,302 Whole House units renovated at Naval Station Great Lakes.

The renovations began in 1991 when builders Joseph J. Henderson and Son Inc. won the initial contract. The two-phase design-build contract called for the design, construction and associated site work improvements to 147 wood-framed, split-level Cape Hart units in Forrestal Village and 27 wood-framed split-level housing units throughout Halsey Village.

Housing representatives said the renovations of these buildings, constructed during the 1960s, have made life much better for the Sailors and their families assigned to duty at Naval Station Great Lakes.

"With the family housing renovations, we have improved on our living and storage space, conserved energy, reduced maintenance costs and created a more appealing community for our residents," said E. E. Barnes, Family Housing Division director.

With the project completed an impressive 10 months ahead of schedule, Facilities Team Midwest Commanding Officer CAPT Tom Bersson gave a "hats off" to the project and the employees who worked on it.

Some of the renovations included new roofs and Energy Star®-compliant insulation, replacement of electrical systems and plumbing, new heating/cooling systems and modern windows.

NFELC Headquarters Renamed for Rear Adm. John R. Perry

The Naval Facilities Expeditionary Logistics Center (NFELC) renamed its headquarters building "The Rear Adm. John R. Perry Building" during a ceremony Jan. 12 in Port Hueneme, Calif. The late admiral and former chief of civil engineers was cited for his significant contributions to the Seabees and the Civil Engineer Corps.

The command's name was changed from the Naval Construction Battalion Center to NFELC in July 2003 to better reflect its logistics-focused mission. Now the building where that logistics work is accomplished also has a name with historical ties to that mission. More than 180 NFELC employees carry out the work of outfitting today's Seabees in the Rear Adm. John R. Perry Building.

"In many ways, then CDR Perry was the first officer to equip the Seabees and it is befitting to name this building in his honor," said CAPT Jim Cowell, commanding officer of NFELC.

The ceremony was attended by more than 100 guests, including Perry's daughter Linda Philpott and granddaughter Elizabeth Perry Philpott.

Perry spent 37 years in the Navy, enlisting as a Seaman Apprentice during World War I. He began his career with the Civil Engineer Corps as an ensign in 1927.

His first assignment was with the Bureau of Yards and Docks—the forerunner of today's Naval Facilities Engineering Command (NAVFAC)—a command to which he would return in numerous capacities over the course of his career.

He was instrumental in the formation of the Seabees while serving as director of administration and personnel at the Bureau beginning in December 1941.

"The Chief of Civil Engineers at the time, ADM Moreell, realized that a new type of naval force would be necessary—one that could rapidly construct advanced bases, depots and airfields in support of force projection and mobility," remarked RADM Michael K. Loose, Commander NAVFAC and Chief of Civil Engineers, guest speaker at the ceremony. "This was a radically new concept and one that would be difficult to execute.

"At Moreell's side was then LCDR John Perry," Loose continued. "Perry did the real legwork on the hard stuff — how to find, recruit, equip, train and deploy this new naval construction force. Never batting an eye, he made more than 70,000 Seabees available for the fight. This mostly Reserve force carved the path for today's Reserve Seabees—who today make up 56 percent of our modern naval construction force.

"Innovation and expeditionary warfare are the reasons that today's Naval Facilities Expeditionary Logistics Center exists," Loose said. He added that it has evolved from various organizations into a highly specialized, innovative, objective oriented organization that seeks to perfect the values and tactics begun more than 60 years ago by Perry.

A permanent Perry exhibit is on display in the building lobby, including a display case containing memorabilia of Perry's naval career and a large bronze bas-relief memorial plaque that was dedicated to Perry in 1956.

— Linda Wadley

President Bush Recognizes DoN Energy Program for Outstanding Performance

Navy Energy Team members (from left) include Gil Siqueido, CECOS; Bev Thompson, PWC Norfolk; Mike Reavis, SOUTHDIV; Dan Magro, NFESC; Donna Munyon, NAVFACCO; RADM Mike Loose, Chief of Civil Engineers; Jose Maniwang, NAVFAC Energy Program Manager; Clay Johnson, Office of Management and Budget Deputy Director for Management; Jim Heller, NFESC; Clyde Hoelzer, LANTDIV; Matt Kelly, SWDIV; Bill Tayler, NAVFAC Team Leader; H.T. Johnson, ASECNAV.

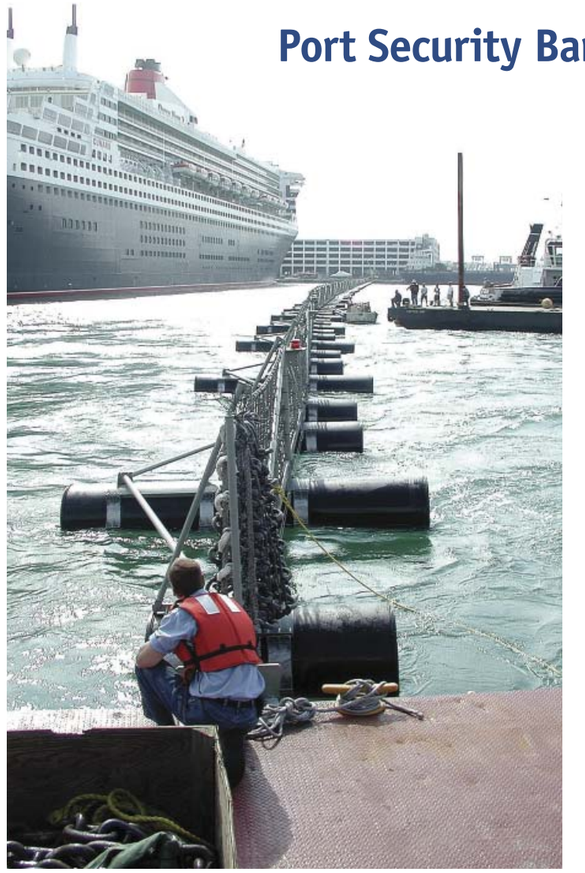
The Department of Navy Energy Program was the focus of several high-level awards this year.

In a ceremony held in October 2003 at the Old Executive Office Building in Washington, D.C., Clay Johnson, deputy director for management, Office of Management and Budget, presented the Energy Team the Presidential Award for Leadership in Federal Energy Management in the category of outstanding performance.

The energy team includes the Naval Facilities Engineering Command headquarters, the Naval Facilities Engineering Service Center, Naval Facilities Contracting Office, all Engineering Field Divisions and all Public Works Centers.

The Energy Award is one of five Presidential Awards for Leadership in Federal Energy Management the Bush Administration presented this year.

Port Security Barriers Make Commercial Debut



STORY BY BRIGETTE A. MORITZ
PHOTOGRAPHY BY JIM ANDERSON

When the *Queen Mary II* made its maiden voyage to the United States in January 2004, Port Everglades in Florida had a unique opportunity to demonstrate its special security measures.

Enter Harbor Offshore Inc. (HOI) from Ventura, Calif., a marine construction and commercial diving company.

HOI had signed an exclusive commercial license for Port Security Barriers (PSB) and Near Shore-Port Security Barrier technology with the Naval Facilities Engineering Command in December 2003 and didn't waste time using the technology.

A PSB is a floating barrier system designed to prevent unauthorized surface craft from entering a port area.

The modular, steel pontoon structure can weather heavy seas and to stop a wide range of threats in a variety of sites and security requirements.

Founded in 1997, HOI's steel fabricators and net manufacturers had already built more than 11,000 ft of PSBs for the Navy—but had never built one for commercial use.

The Port Everglades project would be one of the first commercial uses of this technology, so no PSBs were pre-fabricated for the *QMII* visit. Fabrication normally takes between 90-120 days.

In just 12 days of steel and component fabrication, HOI's team fully assembled and staged 30 PSBs one day ahead of schedule. The PSB configuration consisted of 30 PSBs at 50 ft per segment, totaling 1,500 ft.

The *QMII* spent six days at Port Everglades. Since the ship's departure, the port is considering PSBs for protection of its own refinery slips and tanker terminals.

A Port Everglades employee secures lines (above) to the Port Security Barrier surrounding the *Queen Mary II,* making her first U.S. stop (below).

Left and right, the *Queen Mary II* sits at Port Everglades in Florida surrounded by Harbor Offshore's Port Security Barrier, licensed from NAVFAC.

'Leathercollars' Dig In

Hawaii Working Dogs Get New Kennels

STORY AND PHOTOGRAPHY BY RICK SALTZMAN

Some residents at Marine Corps Base Hawaii (MCBH) have special housing needs—kennels.

The Resident Officer in Charge of Construction (ROICC) MCBH and contractor Anonui Builders worked on a kennel project to improve the quality of life for base "working dogs" used for security.

"The contractor has to keep on schedule because the dogs can only be relocated for a limited time," said Dave Robbins, ROICC MCBH. "We face challenges, due to the extensive degree of existing structural corrosion and conflicting existing conditions."

The security dog squad includes German Shepherds, Dutch Shepherds and a smaller but similar breed known as Belgian Malinois.

The pedigreed project includes adding new exterior dog runs to the existing facility and building a fence around the nearby interim kennels. The temporary quarters are just a short distance from the renovation site and do not interfere with construction activity.

The improvements promise to dramatically improve the living areas for the current 18 Marine working dogs, an elite military security force in the Marine Corps Pacific Command.

"Our goal will be to work with our ROICC Team and the base customer to ensure the final product results in a functional and compliant facility," Robbins said, adding that four additional holding pens, with more square footage per pen, will be added to the facility.

"They'll actually be like lanais," Robbins said. A lanai is a traditional Hawaiian structure. "This is quite an upgrade to the facility. A lot of structural work has to be done with the roof. Because of corrosion, the interior steel components have to be sand-blasted and painted."

The additional square footage will double the dogs living quarters when the new dog runs are installed. The four-legged Marine "Leathercollars" will have open access to fresh-air lanais that will filter veranda sunlight and keep their fur coats healthy and help make their kennels cooler during warm summer days.

The base veterinarian, Army Capt. Rebecca Evans, is responsible for the world-traveling dogs' health and welfare.

"She's been instrumental in giving us early preparatory phase input," Robbins said. "We had to do major design revisions to accommodate the needs of the base. We worked out all the issues before we started construction."

Modifications for kennel drainage address sanitary waste disposal issues that were defined with the temporary kennel facility.

Renovation work included selective demolition, removal, sand-blasting and painting of miscellaneous metals, plus many sanitary site utility work improvements needed with the construction of temporary dog kennels facilities for the current "residents."

Top, Sgt. Adam Black, left, and Sgt. Justin Arnold, demonstrate dog handling. The working dog is a 5-year-old Belgium Malinois named Max. Above, ROICC MCBH employees prepare the new working-dog kennels.

Harnessing Solar Energy Pays Off

$133,500 energy rebate awarded to Marine Corps Base Hawaii

STORY AND PHOTOGRAPHY BY GRACE HEW LEN

Living in paradise has its rewards. Marine Corps Base Hawaii (MCBH) was recently awarded a hefty check of $133,500 simply for harnessing the bountiful energy of the sun to heat up the base's new family housing neighborhood, Pa Honua.

According to the Hawaiian Electric Company (HECO), it's the largest single rebate check the company has given to the Department of Defense.

Marine Corps Brig. Gen. Jerry McAbee, MCBH commanding officer, recognized the teams whose collaborative and innovative efforts led to a successful and energy-efficient project, including Naval Facilities Engineering Command Pacific Division (PACDIV) and its Resident Officer in Charge of Construction (ROICC) office on MCBH; MCBH Family Housing and Public Works Departments; contractor Hunt Building Corp.; and HECO.

"It is great to work with an innovative customer who enthusiastically supports pursuing alternate energy initiatives to reduce consumption and minimize lifecycle costs," said CDR Christine Lonie, ROICC MCBH, adding that the project met federal project "green" procurement requirements. "MCBH continues to emphasize source reduction of energy, water, waste, land and other material on all our projects."

The HECO rebate incentive program is used to encourage residential, commercial and industrial activities to utilize energy efficient building components or systems in new construction and re-novations. HECO provides a $750 rebate for each HECO-approved system.

The rebate to MCBH resulted from the installation of solar hot-water heating systems throughout the family housing complex, home to junior enlisted military families. A total of 178 systems were installed at Pa Honua, the first housing area at the base to have solar water heating designed into the units, costing $750 for each of the new systems. The ROICC, who oversaw the design and construction of the new houses, is managing another 212 units under construction that will also use the passive, energy-saving system.

Each home can save up to 90 percent of solar water heating costs per month, or about $5 to $10 per person. The system is projected to save 456,000 kwh of electricity or $48,000, a significant savings of fossil fuel.

HECO estimates that more than 800 barrels of oil will be saved annually based on a typical family of four — more than 12,000 barrels over the system's service life (calculated at a minimum of 15 years).

In addition, annual smokestack emissions avoided include about 420 tons of carbon dioxide and 1.2 tons of sulfur dioxide.

"HECO is proud and honored to provide this rebate to the Marine Corps Base Hawaii Family Housing, one of our largest commercial customers," said Stephen Luckett, HECO's Dept. of Defense federal accounts manager. "It further recognizes all the associated benefits resulting from this and future solar water heating projects in military housing."

ROICC MCBH engineer Neal Kawamoto emphasized the team effort involved in the project, with support from the PACDIV Design and Project Management project managers and contractor partners.

"Working the details for the HECO rebate payment required additional support from our comptroller and close co-ordination with the MCBH public works officer," said Kawamoto. "Seeing a satisfied customer makes the whole effort worthwhile."

Marine Corps Base Hawaii received a $133,500 refund check from HECO. Accepting the check (from left) were Tim Stengle, Hunt Building Corp. project engineer; David Waller, Manager, Energy Services Dept., HECO; Neal Kawamoto, ROICC MCBH civil engineer; Bill Nutting, Base Energy Manager, MCBH; J.O. Park, Housing Director, MCBH; Brig. Gen. Jerry McAbee, base commanding general; and CDR Ian Lange, MCBH Public Works Officer.

All new homes at Marine Corps Base Hawaii, Kaneohe Bay, sport specially designed and unobtrusive energy-saving solar panels.

Navy a Big Winner in Prestigious Energy Awards

WEDGED IN BETWEEN the Navy and Presidential awards ceremonies, the U.S. Department of Energy's (DoE) Federal Energy Management Program (FEMP) presented its annual awards for energy and water management during a ceremony in Washington, D.C.

This year, the Navy walked away with nearly a dozen awards, representing 30 percent of the entire federal government take:

√ Navy Public Works Center San Diego EMS/DDC Team *(Energy Efficiency/Energy Management to a Small Group)*

√ Camp Pendleton Facilities Maintenance Retrofits Group *(Energy Efficiency/Energy Management to a Small Group)*

√ USS Rainier *(Mobility Energy Efficiency)*

√ Squadron VT-10 *(Mobility Energy Efficiency)*

√ USS Iwo Jima *(Mobility Energy Efficiency)*

√ The Department of the Navy Energy Savings Performance Contracts Team *(Alternative Financing (AF) to a Small Group)*

√ 29 Palms MAGTFTC Chiller Replacement & Cogeneration Plant Groups *(Alternative Financing)*

√ Naval Station Great Lakes *(Alternative Financing)*

√ Marine Corps Air Station Cherry Point *(Alternative Financing)*

√ Navy Public Works Center San Diego *(Renewable Energy)*

√ Marine Corps Base Camp Butler *(Water Conservation)*

This San Diego carport, covered with electricity-harvesting solar cells, was cited as "ground-breaking" in the FEMP award citation for PWC San Diego.

PACDIV Wins Coveted Pacific Air Forces Design Award — Again

Aircraft maintenance hanger, Anderson AFB, Guam

Anderson AFB fitness Center

For the third time in the past four years, the Naval Facilities Engineering Command Pacific Division (PACDIV) at Pearl Harbor received the prestigious U.S. Pacific Air Forces (PACAF) Design Agent of the Year Award. PACDIV will compete for the worldwide U.S. Air Force Design Agent award.

PACDIV was recognized for projects in Guam, Wake Island and Diego Garcia worth nearly $150 million — including the extraordinary contract award of a $35 million hangar in less than six months.

"I applaud this recognition of technical engineering proficiency and individual achievement," said RADM Gary Engle, PACDIV commander. "Receiving an award like this in one year is certainly an honor, but receiving it for the past three out of four years is really remarkable."

Clyde Morita, chief engineer and design division director, accepted the Air Force honor on behalf of PACDIV's Design and Project Management (DPM) department.

"Congratulations and thanks to each of you for the professional performance in exceeding the expectations of our Air Force clients," said Morita to the DPM staff involved in the Air Force projects.

PACDIV also provided specific managerial ability by being very responsive and keeping the customer involved and constantly updated. The key management focus was to ensure a close working relationship between PACDIV and Air Force personnel in defining project goals and requirements.

PACDIV was recognized for exceeding PACAF's design milestones, including project cost and schedule. PACDIV managers minimized lost design effort with proactive design management and use of Funtional Analysis Concept Development (FACD).

FACD combines early value engineering analysis with senior leadership involvement and decisions, allowing designs to be completed with minimum changes and lost design effort.

In addition to validating the FACD process, PACDIV has proven the value of a modified Design/Build delivery strategy. Design/Build has shown outstanding success in obtaining best value and maximum contractor involvement for the best price, while ensuring that specific user requirements are appropriately addressed.

— Don Rochon

Humanitarian Assistance Winning Hearts and Minds in Southern Philippines

Students at Canibungan Elementary finally had real classrooms in June 2003.

STORY AND PHOTOGRAPHY BY JAY LUTZ

In August 2002, students at Canibungan Elementary studied in thatched huts.

Naval Facilities Engineering Command's Pacific Division (PACDIV) completed an impressive $2.2 million Humanitarian Assistance (HA) construction program on Basilan Island in the southern Philippines in 2003.

Funded by the U.S. Pacific Command, the projects were in support of the Joint Special Operations Task Force (JSOTF), headquartered in Zamboanga City in the southern Philippines.

Basilan Island is a part of the Sulu archipelago. Located approximately 10 miles south of Zamboanga City, the southern-most city on Mindanao, the island became infamous for being the primary headquarters of the Abu Sayaff Group (ASG), a terrorist group of Muslim separatists. U.S. forces deployed to the island in January 2002 to help advise and assist the Armed Forces of the Philippines in their attempts to stop the ASG terrorists.

A large part of the overall counter-insurgency strategy was to execute construction projects that strengthen ties between the government and the local populace, thereby weakening the influence of terrorists. The U.S. Army Civil Affairs component of the JSOTF identified various projects on Basilan Island to help improve the local water, school and health-care infrastructure.

PACDIV engineers deployed to Basilan in July 2002 to conduct site surveys and design projects that would best fill the many needs of the local populace. Following the surveys, the team designed two hospital renovations, a large water distribution project, 25 deep water wells, 14 new school buildings and five new health centers.

Under the competitively bid Construction Capabilities (CONCAP) contract, PACDIV tasked Kellogg Brown and Root (KBR) with completing the design work and providing construction management services. The contract stipulated that local subcontractors were to be hired to execute the construction, and that those subcontractors employ a majority of laborers from Basilan Island to help maximize the economic impact of the program on the local population.

After a challenging effort to identify responsive subcontractors, KBR mobilized its team to Basilan in September and construction began in October 2002. Renovation of the island's two public hospitals, in Isabela City and Lamitan, the latter being the scene of an infamous ASG kidnapping siege the previous year, were the first projects to start.

PACDIV engineers and local workers dug a new water facility.

A new above-ground water pipeline was part of the project.

The scope of work included a complete interior architectural renovation, replacement of the existing electrical system, installing a new 30 kwh emergency generator, repairing and replacing portions of the roof and upgrading the water and sewage systems.

Teaching the local subcontractor and workers the finer points of construction quality and safety, along with phasing the construction to minimize the impact on hospital operations, were work hurdles that were quickly overcome. The renovations were substantially completed in January 2003.

The water well projects were designed to bring potable water to local towns with the most need. The wells are generally 160-260 feet deep and operated by hand pumps, since electricity is scarce or unreliable throughout the island. In light of documented failures to find groundwater at numerous locations on the island, an extensive hydro-geologic survey was conducted to ascertain groundwater availability in the identified towns. Twenty four of the 25 wells drilled are now producing water.

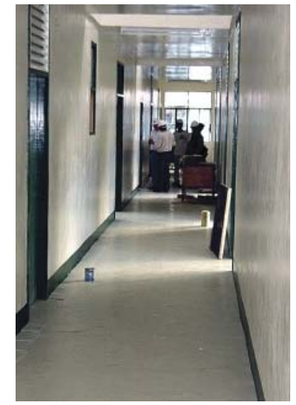
Drilling conditions were extremely difficult, with large boulders and basalt formations in all locations. Drilling started in November 2002 and was completed in July of last year.

The largest project undertaken consisted of establishing a new water source and tying it into the existing water distribution system for the city of Maluso. A new weir and sedimentation tank were constructed near the head of the Maluso river and 1.8 miles of new PVC pipe was laid and tied into a sophisticated rapid sand filtration plant that was not operational due to an insufficient water supply. This project started in January 2003, with construction scheduled to be completed by July 2003.

Fourteen new school buildings were constructed on existing elementary and high school campuses, with two buildings built in each of the island's seven counties) Many of the new school buildings were planned to replace old buildings burned by the ASG in an attempt to control the local population by terrorizing it.

The new health centers were constructed in remote areas where nurses and midwives routinely saw patients outside under shade trees or in the cramped homes of local leaders.

Delays in receiving funding for the schools and health centers, coupled with the large number of new buildings to be built, necessitated the use of a partially pre-fabricated construction method to ensure timely completion of the work. Materials and construction experts from Manila were dispatched to Basilan to assist the local subcontractors in constructing the schools. Construction began in January 2003 and was completed in early July '03.



Left, a worker at Lamitan Hospital walks down dark halls before the renovations; above right, Lamitan Hospital after a complete architectural and electrical renovation.

The Armed Forces of the Philippines (AFP) played a critical role by providing project site security, material deliveries and transportation to and from the jobsites. In addition, they opened their camps throughout the island to contractor personnel, which provided secure lodging close to each jobsite. At the height of construction activity, up to 15 construction sites were operating on any given day, so the AFP's duties were no small chore. Local leadership also played a vital role in the successful completion of the projects by looking out for the contractor personnel and projects under their jurisdiction.

In a very austere and potentially dangerous environment, 47 construction projects were designed and built without significant safety or security problems.

Nearly $2 million was pumped into a local economy in desperate need of stimulus. Hundreds of local laborers were given jobs, training and construction experience.

Thousands of island residents will drink better water and receive better health care service. Thousands of school children will have a new and better place to learn.

And finally, countless hearts and minds have been won over as a result of the efforts of many people from the U.S. and Philippines working on the projects.

Campbell Named 2003 Moreell Medal Winner

The Society of American Military Engineers (SAME) selected CDR Joseph A. Campbell to receive the Moreell Medal for 2003.

Presented annually since 1955, the award is named in honor of ADM Ben Moreell, founder of the Seabees. The award is given to an officer of the Navy Civil Engineer Corps (regular, reserve or retired) or to a civilian employee of the Naval Facilities Engineering Command in recognition of outstanding contribution to military engineering through achievement in planning, design, construction, public works, administration, research or development. The Medal was presented May 19 during the SAME 2004 National Education & Training Conference in San Antonio, Texas.

Campbell, a Virginia native, was selected for the medal for distinguishing himself as operations officer for Task Force Charlie, U.S. Marine Forces Central Command and Task Force Mike, I Marine Expeditionary Force Engineer Group during Operations *Enduring Freedom* and *Iraqi Freedom*.

Among other accomplishments, Campbell directed the completion of a 21-acre concrete parking apron and 30 acres of AM-2 matting, the largest single Seabee contingency project since Vietnam.

"The biggest challenge was getting all the people and equipment over there," said Campbell, 40, now Thirtieth Naval Construction Regiment Ops Officer. "It was a huge job."

Campbell also drove the development of Task Force Mike's operations plan to support Coalition operations during the Iraqi campaign. He and his troops trained in Kuwait while they waited to move to Iraq.

Once in Iraq, Campbell coordinated the construction of six bridges, upgrade and maintenance of more than 500 km of road and improvement of several forward air bases. As combat subsided, he organized survey teams to evaluate and coordinate the restoration of critical public services to the Iraqi populace.

Contracting, Supply Chain Management Assessed

The leadership from Naval Sea Systems Command, Naval Air Systems Command, Space and Naval Warfare Systems Command and Naval Supply Systems Command (NAVSUP) is working together to identify redundant processes and achieve numerous cooperative efficiencies in overall business management.

Senior leadership from these groups met with Commander, Navy Installations last October to generate a Memorandum of Agreement (MOA), identifying ways to achieve these greater efficiencies.

Under the MOA, an Integrated Program Team (IPT) was formed and facilitated by NAVSUP. It includes representatives from the affected commands. The mission of this IPT is to define and execute a plan to transfer shore installations' management contracting and Navy supply chain management functions currently outlined in the "Navy Supply Chain Alignment MOA" to NAVSUP's Commander, Fleet and Industrial Supply Centers. The transfer would include associated staff, IT tools, space and processes to provide the most effective and efficient operation.

A specific data call was issued in December that will enable members of the IPT to better assess where the material chain billets and resources are today and recommend how to best achieve efficiencies.

Currently, team members are analyzing the information and preparing recommendations. The results of this effort may lead to process changes as well as workload and workforce changes.

The ultimate goal of this effort is to bring about better alignment and more consistent processes that will result in cost savings for fleet recapitalization.

— J.D. McCarthy

PWC San Diego Wins Two National Energy Awards

The Navy Public Works Center San Diego (PWCSD) has won two 2003 Federal Energy and Water Management awards — one for the Energy Management System/Direct Digital Controls (EMS/DDC) Team and one for the Naval Base Coronado 750-kilowatt (kwh) photovoltaic parking system.

PWCSD won a small-group award for Energy Efficiency and Energy Management. The EMS/DDC Team won the award for their efforts that are enhancing the operation, maintenance and readiness of hundreds of facilities at 17 Navy and Marine Corps bases in the San Diego area. The San Diego region-wide EMS/DDC program is one of the most successful and best-known programs in the Navy.

The EMS/DDC Team overcame technical, financial and institutional obstacles to put in place one of the most highly integrated, functional EMS/DDC networks in the federal government. The projects developed and executed by the team will save about 128,000 mbtu—a savings of about 4.5 percent—and reduce associated air emissions by more than 23,000 tons a year.

PWCSD won an organizational award for Renewable Energy for the Naval Base Coronado 750 kwh photovoltaic (PV) parking system. This electric system is the world's largest covered parking solar-cell system and the second largest ever installed by the federal government. It's among the 20 largest such systems of any kind in the world.

All the energy produced is used on the base to provide about 1 percent of Naval Base Coronado's North Island Station's annual electric consumption and 3 percent of the base's peak summer demand. The PV system also provides covered automobile parking for 444 vehicles.

— John Duke

SWDIV ROICC Selected as Finalist in 'Best Companies to Work For in San Diego'

Naval Facilities Engineering Command's Southwest Division's (SWDIV) Resident Officer in Charge of Construction (ROICC) Marine Corps Base, Camp Pendleton, was selected as a finalist for the San Diego Business Journal Magazine's fifth annual Best Companies to Work for in San Diego.

The office was recognized for its work to create environments conducive to mission accomplishment, high employee satisfaction and critical thinking.

"We are proud of this award and of ROICC Camp Pendleton," said CAPT Chris Schanze, commander, SWDIV. "As the only federal workplace finalist, the selection reflects well on the field office, SWDIV and NAVFAC as a corporation."

Companies are judged on their innovative ability to work within institutional constraints to achieve complete satisfaction from employees, clients and business partners. Camp Pendleton's team is the largest ROICC Office in NAVFAC, with 56 employees and an average yearly work-in-place of more than $150 million.

Southwest Division Wins Second Place Merit Award

NAVFAC's SWDIV has won a second-place merit award in the 2003 Associated Builders and Contractors (ABC) National Excellence In Construction competition for Renovation. The command will receive the honor in February during the 2004 ABC National Convention in Honolulu, Hawaii. The award is in the $10-99 million category, for work on the Bachelor Enlisted Quarters 26 Renovation in San Diego, Calif.

The ABC awards program recognizes the quality and innovation of merit shop construction and honors all members of the construction team, including the contractor, owner and design team.

ABC is a national association representing 23,000 merit shop construc-tion and construction-related firms in 80 chapters across the United States. For more infor-mation, visit WWW.ABC.ORG.

— Dee Chandler

SAME's 2003 Fellows

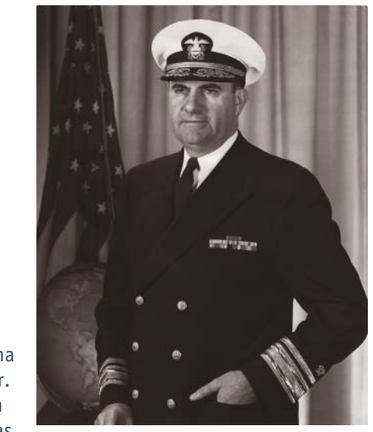
The Society of American Military Engineers (SAME) has announced its 2003 Navy Fellows.

The 2003 inductees include RDML Gary A. Engle; CAPT Diann Karin Lynn; CAPT Paul E. Marshall; CAPT Leonard P. Scullion, and Quartermaster 2nd Class Paul J. Kennedy.

The SAME Academy of Fellows was created by the Society in 1995 to recognize members' outstanding service to the Society and the engineering profession. The Academy of Fellows now boasts more than 800 inductees.

The membership is a cross-section of individuals who have distinguished themselves with their service to the United States. In keeping with SAME's goal of providing ongoing opportunities for education, Fellows are responsible for mentoring young members (age 35 and younger) in order to encourage their professional development and career advancement.

Rear Adm. Eugene J. Peltier 1910-2004



Rear Adm. Eugene J. Peltier, 93, former Chief of the Bureau of Yards and Docks and Chief of Civil Engineers, died Feb. 13 in Shawnee, Kan.

Peltier was born March 28, 1910 in Concordia, Kan., the son of Frederick and Emma (Falardeau) Peltier. He graduated with honors from Kansas State University in 1933 with a bachelor's degree in civil engineering.

From 1933 to 1940, Peltier worked with the Kansas Highway Department as a resident engineer. He was commissioned into the Navy in 1940 and, after a distinguished career, subsequently advanced in rank to rear admiral.

He served as Chief of the Bureau of Yards and Docks and Chief of Civil Engineers from 1957-1962.

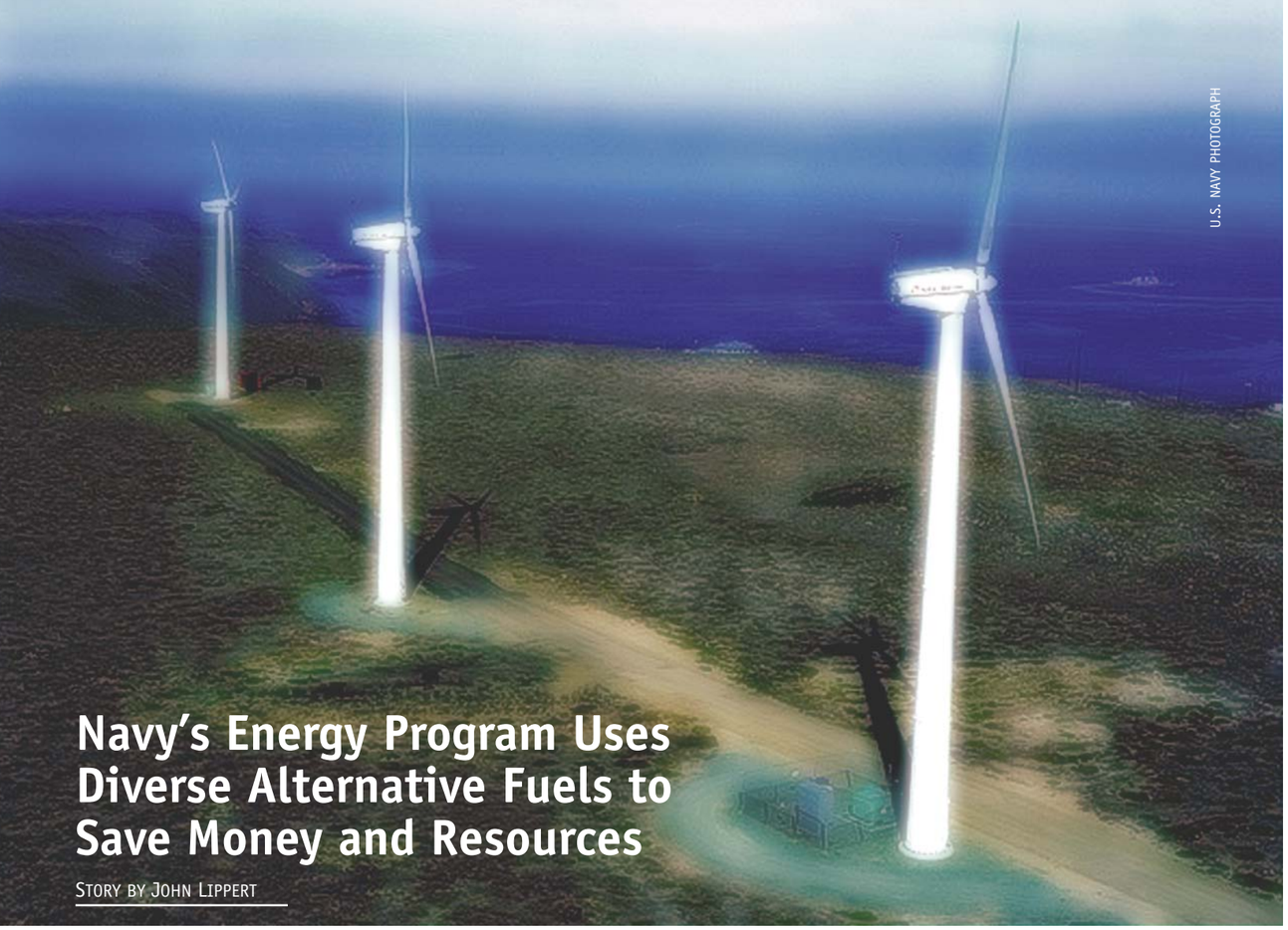
He retired from the Navy in 1962 and received the Legion of Merit Medal. He joined the architectural and engineering firm of Sverdrup and Parcel and Associates in St. Louis, where he served as president and chief executive officer before retiring in 1975.

RADM Peltier was widely recognized in his field. He was selected as one of the Top Ten Public Works Men of the Year by the American Public Works Association in 1960.

He was elected to the National Academy of Engineering in 1979.

Since 1960, the Society of American Military Engineers has presented the Peltier Award, named in honor of RADM Peltier, to the most outstanding active-duty Naval Mobile Construction Battalion.

Memorial contributions may be sent to the Eugene J. Peltier Scholarship Fund at the Seabee Memorial Scholarship Association in Silver Springs, Md., or in care of the Warren-McElwain Mortuary at 120 West 13th St., Lawrence, Kan. 66044 For more information, call (785) 843-1120.



U.S. NAVY PHOTOGRAPH

Navy's Energy Program Uses Diverse Alternative Fuels to Save Money and Resources

STORY BY JOHN LIPPERT

In the late 1990s, President Bill Clinton saw the need for the Federal Government, the nation's largest energy consumer, to control energy management costs. He signed Executive Order (E.O.) 13123 on June 8, 1999. It called on the federal government to lead the nation in energy efficient building design, construction and operation.

The Navy took on the challenge long before the E.O. and has been far ahead of the pack in finding ways to lower its energy and water usage—both of which consume a significant portion of the Navy's operating budget.

A decade ago, Naval Facilities Engineering Command (NAVFAC) commissioned a study to develop a comprehensive plan for a new program on training and awareness to ultimately change behavior toward energy and water consumption among Navy and Marine Corps personnel and their families. The DoN Energy Awareness Program and international energy management training courses, vital elements of the Navy Energy Program, grew out of this effort.

The energy program provides tremendous value to the Navy. NAVFAC established a unique, results-oriented program that demonstrates a tremendous investment and commitment to energy efficiency. Since 1985, the Navy's energy program has saved taxpayers more than $500 million, inflation adjusted, per year. The Navy's energy costs in FY03 were down $72 million compared to FY02.

The program benefits are numerous. Replacing aging, outmoded equipment with state-of-the-art equipment improves reliability and performance — important factors affecting mission capability. Replacing decrepit buildings with sustainable and energy-efficient facilities provides a healthier, more comfortable place for Navy and Marine Corps personnel to live and work, contributing to a more productive workforce. Reducing consumption of fossil fuels and relying more on renewable energy sources contributes to a better environment and reduces reliance on imported oil, increasing our national security.

More importantly, perhaps, in an era when government is trying increasingly to be run like an efficient business, the energy program improves the bottom line. By operating its installations in a more efficient manner, the Navy frees up valuable resources—time, personnel and funds that can be reprogrammed toward the warfighter.

The energy team, which includes NAVFAC headquarters, the Naval Facilities Engineering Service Center, Naval Facilities Contracting Office, Engineering Field Divisions and Public Works Centers, implements the energy program—remarkable for its broad and comprehensive scope. It reaches facilities located not only throughout the United States, but throughout the world.

It includes state-of-the-art, cutting-edge technology and design, as well as time-proven, top-of-the-line commercially available energy-efficient products. It places importance on the people element, emphasizing conservation and improved operations and maintenance strategies.

NAVFAC spearheads a program that provides investment in energy efficiency, water conservation and renewable energy technologies, awareness campaigns and the important tools, training, technical assistance, financial incentives/assistance, and recognition and award programs. NAVFAC has long recognized that success depends on the interdependency of all these elements.

A well-financed program without the proper technical assistance, a highly motivated energy manager without the proper tools and resources, or well-intentioned directives without the proper training and motivation are all combinations prone to failure.

"Maintaining energy conservation can only go so far toward reducing energy usage," said William Tayler, Department of Navy Shore Energy Office director. "It is only by raising the awareness of people who use energy that real savings will be obtained. The Department of Navy's energy program emphasizes training energy and utility personnel in the techniques and opportunities for reducing energy consumption."

Their work, Tayler said, coupled with base-wide energy awareness promotions, can educate base personnel and their families at home on the economic and quality of life benefits that can be gained from turning off lights and adjusting the thermostat.

NAVFAC also recognizes the importance of progressive legislation that emphasizes, encourages and enables the government to aggressively pursue and achieve energy-saving opportunities. As a result, NAVFAC works on Capitol Hill with energy legislation, solidifies support from Congress and the Pentagon on energy policy and works with top-level officials within the Navy and Marine Corps to establish directives and programs in support of energy efficiency, renewable energy and sustainable design.

The Navy Energy Program was honored this past year with several high-level awards. Most notably, President Bush recognized the Naval Facilities Engineering Command with a Presidential Award for Leadership in Federal Energy Management in the category of "Outstanding Performance." The award was one of five Presidential Awards presented in 2003.

The Department of Energy's Federal Energy Management Program honored the Navy with 12 energy and water management awards, representing 30 percent of the entire federal government. Additionally, the Navy was awarded one of five "Stars of Energy Efficiency Awards" by the Alliance to Save Energy, a non-profit coalition of business, government, environmental and consumer leaders that promotes energy efficiency worldwide to achieve a healthier economy, a cleaner environment and energy security.

The Navy Energy Program's success comes from implementing a results-oriented program, focused on maintaining mission readiness with a tremendous commitment to energy efficiency. The program integrates a variety of approaches including Public Private Venture, Energy Savings Performance Contracts and Utility Energy Service Contracts.

As part of this effort, Navy has launched a variety of innovative projects:

Geothermal Power Plant

The Navy's 270-megawatt (mwh) geothermal power plant at Naval Air Weapons Station China Lake, Calif., has generated 26 million mwh since its inception, enough to power 180,000 homes of nearly pollution-free energy. The project has reduced greenhouse gas emissions by 4.5 million metric tons carbon equivalent.

The Navy's geothermal plant provides an alternative energy source that allows this shore facility to become less dependent on hydrocarbon fuels.

Wave Energy Technology

The Office of Naval Research (ONR) implemented the Wave Energy Technology (WET) Project, which converts the mechanical energy of ocean waves into electricity. ONR teamed up with Ocean Power Technologies to develop and deploy a wave energy converter system called the WET PowerBuoy™ in Kanehoe Bay, Hawaii. The PowerBuoy outputs on average about 20 kilowatts of electricity, enough to power about 10 homes.

Photovoltaic System

The Department of Navy provided the largest federal photovoltaic project ever constructed with the installation of a 1.1 mwh alternating current photovoltaic (PV) power generating plant at Marine Corps Air Ground Combat Center, Twentynine Palms.

PWC Washington has completely converted its entire motor pool to compressed natural gas.

The Navy constructed the largest 750-kilowatt PV-covered parking area at Naval Air Station North Island, Calif. This PV system generates enough electricity to supply 935 homes, equating to 2,488 barrels of crude oil annually that would have been needed to generate the equivalent amount of power.

Water

Since 2000, the Navy has reduced its annual water demand more than two billion gallons by institutionalizing water best-management practices, and increasing awareness. This initiative improved the environment by reducing use of chlorine related to treatment of potable water and treatment of wastewater.

Wind

To reduce the use of diesel fuel and prevent harmful emissions, the Navy installed three 225-kilowatt wind turbines (facing page) on San Clemente Island, Calif.

The giants have already produced more than two million kilowatt-hours of electricity, providing approximately 13 percent of the island's electricity needs.

At Naval Station Guantanamo Bay, a 3.8-mwh wind farm is under construction. The facility will replace electricity previously produced by diesel generators.

Passive Solar

The Navy is pursuing sustainable design concepts that include passive solar.

At Naval Base San Diego, 10,000 square feet of thermal solar heating was installed that provides about 4,140 million btus per year to heat a large swimming pool.

Many disparate, seemingly small efforts add up to huge savings for warfighters.

Geo Thermal

NAVFAC's Geothermal Program Office has pioneered a hot new Navy energy program

Story by Francis C. Monastero

IN THE 1970s, THE DEPARTMENT OF THE NAVY pioneered the exploitation of a renewable energy resource that was available on one of its bases in the western U.S. Personnel at Naval Air Weapons Station (NAWS) China Lake came up with the idea of tapping into the base's abundant underground geothermal resources and using the energy to produce electricity. NAVFAC brought this idea to fruition.

Today, four geothermal power plants boasting nine 30-mwh turbine-generator sets are located within the main production area of China Lake's Coso Geothermal Field. Since the plant went online in 1987, the resulting 180-megawatt (mwh) geothermal power plant at China Lake has provided cheaper electricity to the Navy and has supplied a source of valuable funding for the Navy Energy Program—the plant has put more than 26,000 gigawatt-hours (gwh) of electricity into the western power grid.

At its peak, the project produced more than 273 mwh of electricity that is sold into the local utility grid under a long-term power sales agreement.

The NAVFAC Geothermal Program Office (GPO) and the base are in the process of awarding a contract second geothermal plant at Naval Air Station Fallon, Nev.

The NAVFAC GPO at China Lake manages the all-service military geothermal program. Though it's a Navy office, it has the broader mandate to oversee exploration for and development of geothermal resources wherever they occur on lands under the control of any of the nation's military services.

The office executes two broad functions: resource development and resource management. It also lowers front-end risk and secures project financing without a large initial capital outlay by the geothermal developer, a model with which the industry is familiar. In addition, it encourages development and exploitation of renewable resources — required by U.S. Department of Defense policy — by providing pre-investment knowledge developed by the NAVFAC GPO. Finally, it cuts down dramatically on the likelihood of fruitless encroachment by speculators who may secure the developmental rights but don't have the capital to conduct the requisite technical investigations to prove the resource.

The China Lake plant provides an energy source that allows the facility to be less dependent on hydrocarbon fuels. It also provides a savings on utility bills. From 1987 through 2003, the NAWS China Lake facility reduced its electrical bill by an estimated $43 million.

How it works

High temperatures (200-328° C) within the field permit use of double-flash technology for steam extraction. Water, heated naturally by underground processes, is brought to the surface through the production well. Upon being released from the pressure of the deep reservoir, some of the water flashes into steam in a separator. The steam is ducted to power turbines that generate electricity.

At any given time, there are approximately 80 or 90 production wells feeding more than 14 million pounds of mass per hour into the system. Each turbine-generator set requires one-half million pounds of steam per hour to operate at maximum capacity. Approximately 30 to 40 wells are used for injection at various times, depending on how much fluid must be handled and where pressure support is required.

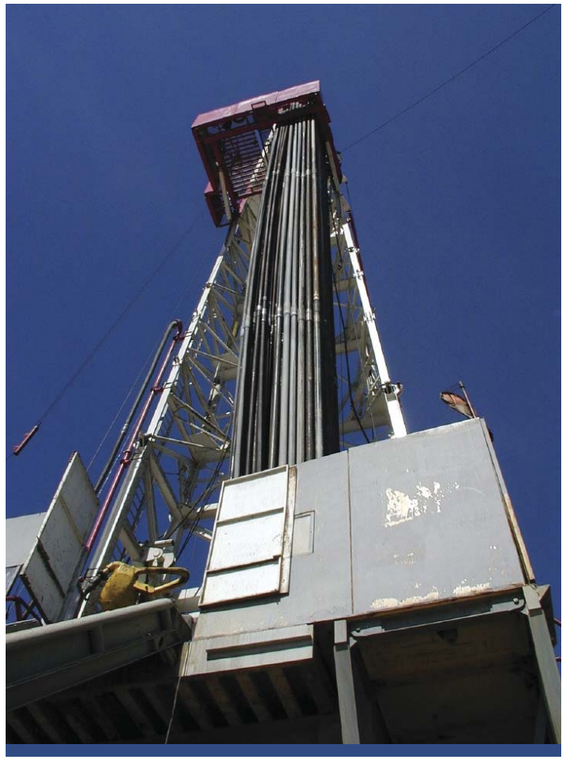
Location and Geologic Setting

The Coso Geothermal Field is located in the central Coso Range, which is part of the triangle-shaped area known as the Southwest Basin and Range Geographic/Geologic Province

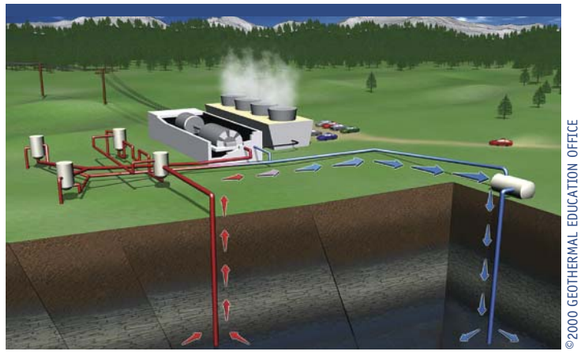
Several geological fault zones, including the Walker Lane Belt on the northeast, the Garlock fault on the south and the Sierra Nevada Range on the west, surround the area. The site is approximately 160 miles north-northeast of Los Angeles, Calif., in a highly active seismic zone along the eastern margin of the Sierra Nevada. Indeed, the faults play a very important role in determining the location of the geothermal production area itself. The Coso field is totally within the boundaries of the NAWS China Lake, which presents some unique operating circumstances and opportunities.

According to Joe LaFleur, an independent geological consultant who used to work for the developer of the Coso project, the Coso hydrothermal system occurs in a large fault-bounded block of Mesozoic granitic rock that has been subjected to both basin and range extensional tectonics and the right-lateral strike-slip faulting generated by the San Andreas fault system.

Faults within Coso have acted as conduits for ascending magmas, producing the volcanos and associated volcanic deposits that cover most of the field. Recent faults and associated fractures provide the permeability that facilitates the >>



Geothermal drilling rigs, like the one above at Coso Geothermal Field at NAWS China Lake, Calif., provide alternate energy sources, allowing the Navy shore facility to become less dependent on hydrocarbon fuels. Production from Coso is equivalent to 18 percent of all electricity comsumption by Navy shore facilities. The Coso field has helped the China Lake facility reduce its electricity bill by tens of millions of dollars.



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Natural steam at temperatures from 200-328° C comes up from the production wells to power the turbine generators. The steam is condensed by evaporation in the cooling tower and pumped back down an injection well to sustain production.

The Coso geothermal production is important to the Navy and the world because it's a relatively non-polluting alternative source of energy that doesn't burn hydrocarbons. It supplies the electrical needs for more than 250,000 families.

hydrothermal system.

Most significantly, the young, silica-rich rhyolite-dome volcanoes evidence a relatively shallow intrusive body that provided a high heat flux to the area. The most recent replenishing heat flux is seemingly proved by a 39,000-year-old basaltic eruption on the south end of the field. Drilling has demonstrated that the south end of the field contains the upflow zone where water heated at great depth ascends toward the surface. This ascending plume migrates northward, producing a tongue of hot water that has deep roots on the south end of the field and pinches out relatively shallow on the north end.

Because Coso is situated within active fault zones, the field is not heat limited. In fact, the field has actually increased by an estimated average of 30 degrees centigrade during the past one million years — and the magma heat source has been migrating upward from a depth of 10 km to as shallow as 5 km. These observations are consistent with a youthful geothermal system.

Further evidence of the youthful character of the Coso geothermal system is found in the thermal features that abound in the area. Hot springs, mud pots, mud volcanoes and fumaroles cover a nearly 6,424-acre area, confirming an extensive, active and near-surface resource. These features vary considerably in surface activity, as might be expected in natural systems, though the causes of such variability are less well understood.

The Coso Hot Springs area is considered sacred by the local Native American Paiute and Shoshone tribes, and is protected from exploitation under an agreement with the California State Historic Preservation Office.

Coso Project History

The Coso geothermal project was the brainchild of Dr. Carl Austin. As a research rock mechanics scientist at China Lake, he recognized the huge potential of the geothermal resource. In the early 1960s, Austin began a campaign to convince the Navy that it was in its best interest to develop the geothermal resource, despite the fact that such an activity was not part of the fundamental Navy mission.

The major issue was encroachment management, a topic that pervades the decision-making process of the military regardless of the project. A second, equally important part of the campaign was convincing anyone who would listen that there was a viable geothermal resource located beneath the Coso Range. In particular, the U.S. Geological Survey believed that the resource was too small to support an economically meaningful project. Finally, Austin had to convince industry that the Navy was an entity with which they could do business.

By 1977, a full-scale scientific and engineering investigation of the Coso geothermal resource was underway with the drilling of 17 heat flow holes, acquisition of large amounts of geophysical and geological data and drilling one deep test hole. The results of those experiments, summarized in a special volume of the Journal of Geophysical Research (1980), substantiated the existence of a large, viable geothermal resource at Coso and set the stage for future development.

The 1,476-meter-deep test hole proved that commercial temperatures and fluid flow rates were possible, providing the springboard for a third-party contract with California Energy Co. Inc. (then located at Santa Rosa, Calif.), which was executed in December 1979.

The first successful production well was completed in December 1981. It was declared a success Jan. 19, 1982, by then Secretary of the Navy, John F. Lehman. Subsequent reservoir testing showed that production capacity was in excess of 30 mwh; no one involved with the project suspected at the time that the ultimate capacity would be more than 270 mwh.

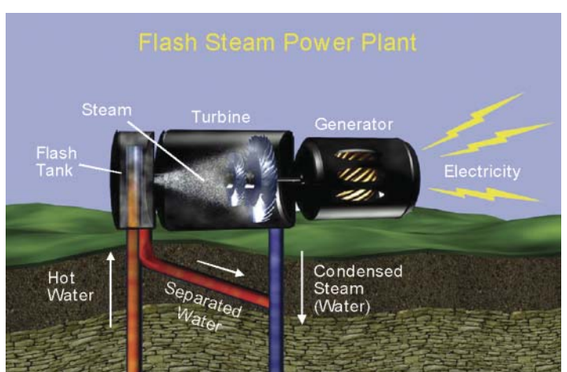
One megawatt of electricity can provide enough power to meet the needs of approximately 1,400 households. Presuming an average of four people per household, Coso's 270 mwh output provides enough power to serve approximately 1.5 million people. In addition, generating 270 mwh of geothermal electricity for one year is equivalent to saving 4.163 million barrels of oil or 945,000 tons of coal. The facility has effectively reduced greenhouse gas emissions by 4.5 million metric tons carbon equivalent.

Between 1981 and 1987, when the first power-generating unit (Navy 1, Unit 1) came online, issues regarding financing, power sales and revenue sharing had been resolved. The first electricity from the Coso project was delivered to the Southern California Edison power grid July 15, 1987. Subsequent drilling confirmed an even larger resource than was first believed, giving rise to construction of eight more units and boosting the total output capacity to 270 mwh. Since January 1990, when the last of units were brought online, average online availability of the Coso geothermal power plants has been 98 percent with a record production of 2,318 GWh in 1995.

"The Coso production is important because it's a relatively non-polluting alternative source of energy that doesn't burn hydrocarbons," LaFleur said.

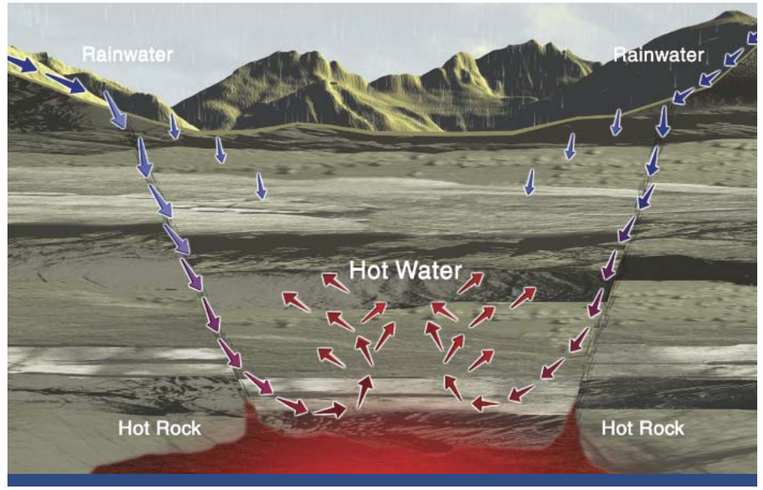
The plant is expected to provide electricity to the local economy for the next 50 years.

As hot water is released from the deep reservoir in a flash tank, some if it flashes to steam.



Portions of this story first appeared the Sept/Oct 2002 issue of the "GRC Bulletin," the bimonthly publication of Geothermal Resources Council.

Left, characteristics of wells and reservoirs are tested by "flowing the well." In the diagram below, when the rising hot water and steam is trapped in porous rocks under a layer of impermeable rock, it can form a geothermal reservoir that can be tapped for energy.



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U.S. NAVY PHOTOGRAPH

Kelly Ambrecht, a Coso geothermal operation staff member, monitors a readout at the plant.

Wave Energy Technology

When the Navy began experimenting with Wave Energy Technology to test its large-scale viability for extended use, the results were ... well, electrifying.

Story by Don Rochon
Photography by Grace Hew Lin

The Wave Energy Technology (WET) project is an Office of Naval Research (ONR) research and development undertaking to convert the mechanical energy of ocean waves into electricity. A small demonstration project, in progress now off the coast of Marine Corps Base Hawaii (MCBH), is intended principally to develop and validate the technology base required to design and reliably operate wave energy converters in the ocean and connect them to an electrical grid. The first deployment phase of the WET project began in at MCBH in September 2003.

Using its Small Business Innovative Research (SBIR) program, ONR contracted with Ocean Power Technologies (OPT) of New Jersey to develop and deploy a clever wave energy converter system dubbed the PowerBuoy™.

ONR acts as project contractor and program manager. Naval Facilities Engineering Service Center (NFESC) provides project management and technical oversight. Naval Facilities Engineering Command Pacific Division (PACDIV) coordinated the National Environmental Policy Act requirements and is the on-site project manager.

The idea to harness the ocean's wave power is not new. It dates back to the times of the Crusades, when water wheels turned by waves dotted the English coast. More recent attempts have involved fixed and floating systems.

OPT originally developed its original WET method to recharge batteries for underwater vehicles in concert with another research project under the Navy's SBIR program.

"We believe that Ocean Power Technologies has developed a new approach to generating electrical power from the enormous energy within ocean waves," said Dr. Al Tucker, director of ONR's Ship Hull, Mechanical Science and Technology Division. "OPT is a good example of the Navy's interest in supporting technologies that help accomplish our mission worldwide, and that also have wide commercial application."

The PowerBuoy itself is a large, cylindrical buoy 15 ft. in diameter and approximately 45 ft. in length. It is designed to rest in place about five to 10 ft. below the ocean surface. As it bobs with the waves, the up-and-down motion of an integral piston pushes hydraulic fluid in the buoy to a hydraulic motor, which turns a generator producing electricity.

The juice flows to shore via a shielded underwater cable. The PowerBuoy outputs

>>

on average about 20 kilowatts of electricity, enough to power about 10 homes.

Hawaii was chosen as the test site because its waves have, on average, some of the highest recorded wave power in the world.

"We are very pleased that the company has been selected by the Navy to build this wave power station," said Dr. George W. Taylor, OPT president and chief executive officer. "Hawaii is an ideal location from the standpoint of indigenous wave resources, local production facilities and the opportunity to assist the Navy in expanding its commitment to sustainable development."

During the September evolution, a crane barge towed 100 tons of dead weight from Honolulu Harbor to the project site, some 3,900 feet off the MCBH runway in 16 and a half fathoms (100 feet) of water. The weight anchors the PowerBuoy to the ocean floor, thereby making it less likely to move even in strong storm conditions.

Before the actual PowerBuoy could be placed in the water, however, the anchor for it and the undersea cable that takes the electricity back to shore had to be installed.

The cable that provides both electricity and data for the buoy was placed on the ocean floor, from the shore to the buoy site, Sept. 23, 2003.

"Sea Engineering, Inc. (SEI) of Honolulu, did a remarkable job in placing the subsea cable on the floor of the ocean," said PACDIV's Kendall Kam, on-site project manager. "The engineering requirements to do something like this are particularly difficult."

Offshore, between SEI's 72-ft-long workboat *Huki Pau* and a linear cable engine from NFESC in Port Hueneme, Calif., the cable was payed out from the shore to the buoy site. Several divers were put in the water to make sure the cable didn't get hung up or snagged during the placement.

Split pipe (two halves of a pipe bolted around the cable) was placed from the shore to beyond the wave break to ensure the cable wasn't subject to damage from wave actions constantly scrubbing it against the ocean floor.

After the cable had been placed, its power and fiber-optic components were tested for continuity. The total operation lasted from sunrise to sunset and, despite big challenges, was a huge success.

At this writing, the WET PowerBuoy was in the final phase of fabrication at Pacific Shipyards International in Honolulu with deployment of the buoy set to take place in April 2004.

Benefits of Wave Power

- **Provides a portable source of renewable, non-polluting energy, with no noise and limited visual impact**
- **Promises to generate significant savings in Navy/Marine Corps facility operation costs for energy**
- **Complies with Presidential Executive Order No. 13123 that emphasizes development of renewable power resources at federal installations**
- **Complements federal energy policy to reduce the nation's dependence on foreign oil**

The PowerBuoy device (above, left) is equipped with sensors that continuously monitor the performance of various subsystems and surrounding ocean environment. In the event of very large incoming waves, the system automatically disconnects its electric flow and essentially battens down until what it interprets as a storm has passed. When wave heights return to normal, the system reconnects and automatically commences energy conversion and transmission. Left, the contractor workboat *Huki Pau* unspools more than 4,000 feet of electrical/data cable that will transmit electrical power and operational data from the wave energy converter to shore.

Bio Diesel

You want fries with that, mister? The Navy investigates cooking oil as a hot alt-fuel ingrediant

PHOTOGRAPHY BY RUSS TEAL

Biodiesel Industries' Kurt Buehler combines biodiesel reactants before transferring the combination to the main reactor.

Culinary Specialist 3rd Class Shaquita Williams, assigned to Patrol Squadron (VP) 45, prepares for the lunch crowd at the NAS Jacksonville Base Galley. The recycled cooking oil Williams discards could one day be used to make Navy biodiesel fuel.

U.S. NAVY PHOTO BY PH2 TOIETE JACKSON

With the price of crude oil in flux on a good day, finding alternative vehicle fuels is imperative. The Navy, perhaps the world's largest diesel fuel user, has an innovative solution to this challenge.

Contributing to domestic energy security, the Navy plans to recycle its used cooking oil by processing it into cleaner burning biodiesel for use in its diesel vehicles. Biodiesel is an established, commercially available fuel that works in any diesel engine, and the Department of Energy calls it the fastest growing alternative fuel in America.

The Naval Facilities Engineering Service Center (NFESC) is partnering with Santa Barbara-based Biodiesel Industries, Inc., a biodiesel manufacturer and technology provider. Using a modular biodiesel processing unit, the base will collect its used cooking oil and transform it into biodiesel fuel through a chemical process known as transesterification, whereby the glycerin is separated from the fat or vegetable oil. The process leaves behind two products: methyl esters (the chemical name for biodiesel) and glycerin (a valuable byproduct usually sold to be used in soaps and other products).

Biodiesel can be made from any fat or vegetable oil, such as soybean oil. It's nontoxic, biodegradable and works in any diesel engine with few or no modifications. Although biodiesel contains no petroleum, it can be blended with petroleum diesel at any ratio of mixture, the most common blend level being 20 percent biodiesel mixed with 80 percent diesel (B20).

The U.S. military is one of the largest users of B20, but this is the first attempt to create a self-sustaining plant. If the project is successful, ultimately the Navy could send portable biodiesel processing units overseas to produce its own fuel while on missions abroad.

"This is the culmination of fours years of working with the U.S. Navy," explained Russell Teal, president of Biodiesel Industries. "Our research and development of the modular production unit has been completed and implemented in our civilian plants in Las Vegas and Australia. Now, with the cooperation of NFESC, we hope to continue making improvements so that it can soon be deployed at military installations around the world."

Kurt Buehler, a chemical engineer at NFESC, believes this is a win-win situation for everyone.

"By producing our own biodiesel from used cooking oil, we can minimize a solid waste disposal problem on bases," Buehler said. "In return, our diesel vehicles will burn cleaner, and we'll use less foreign oil."

"I think it is significant to note that the Navy is charged with protecting shipping routes to import petroleum to the United States," said Joe Jobe, executive director of the nonprofit National Biodiesel Board. "I admire the military leaders who have the foresight to use their existing resources to create cleaner burning biodiesel. The Navy is the largest diesel fuel user in the world, and they're working proactively and creatively to use more renewable fuel. It's truly groundbreaking."

The Biodiesel Production Plant Validation Program was dedicated in October 2003 at a demonstration site on Naval Base Ventura County at Port Hueneme, Calif. >>

The demonstration validation plant's annual capacity is about a million gallons. The base plans to use 20,000 gallons of biodiesel a year. Nearby Channel Islands National Park, which has used biodiesel for several years to help meet its goal of making the islands petroleum-free, will use 20,000 gallons a year. Ventura County, Calif. will also consume 20,000 gallons annually in its municipal fleet.

The U.S. currently imports approximately 60 percent of its oil—of that, 800,000 barrels of oil a day reportedly come from the Middle East and Arabian Gulf area.

"If you look at what it costs to send a gallon of diesel overseas, there is a potential to reduce the logistics trail when deploying since we're already sending vegetable oil overseas anyway to cook for the troops," Buehler said. "It also gives us energy security for Navy bases. If petroleum gets cut off, we can keep the base running on biodiesel. So in addition to reducing dependence on foreign oil, producing our own biodiesel could provide a tactical advantage in case of crisis."

The U.S. Navy, Army, Air Force and Marines all use B20 at different bases and stations throughout the country, including U.S. Marine Corps Base Camp Lejeune in North Carolina; Air Force Space Command, Peterson Air Force Base, Colorado Springs, Colo. and Fort Leonard Wood Army Base in Missouri. Naval Station Everett, located in the Puget Sound area, has used about 50,000 gallons of B20 a year since 2001.

The switch to biodiesel was virtually seamless, according to Everett's Transportation Director Gary Passmore.

"Older equipment took a filter change, but newer equipment needed nothing," Passmore said. "It went so smoothly that no one really noticed."

Biodiesel is the only alternative fuel to have completed the rigorous health effects testing required by the Clean Air Act. Results show biodiesel fuel poses less of a risk to human health than petroleum diesel. The Environmental Protection Agency (EPA) recently released a comprehensive technical report of biodiesel emissions data that shows the exhaust emissions of particulate matter from pure biodiesel are about 47 percent lower than overall particulate matter emissions from diesel, which is good. Breathing particulates has been shown to be a human health hazard.

Biodiesel fuel can generate similar horsepower, torque and BTU content compared to petroleum diesel. It offers excellent lubricity and higher cetane than diesel fuel.

About 350 major vehicle fleets currently use biodiesel nationwide.

A sample of the biodiesel brew is captured in a glass tube. The sample is then tested to verify that the vegetable oil has fully reacted with the other biodiesel ingrediants.

Buehler observes the biodiesel reactor fluid flow.

For more information on biodiesel issues, visit the Biodiesel Information Board Web site at www.biodiesel.org.

Crown Vics Get Energy Efficient

PWC Washington motor pool helps to clear the air

Story by John Verrico
Photography by JOC Daniel Charles Ross

"We are open to any technology that will help us reduce emissions as well as our reliance on foreign oil."

— Bob Gill, PWC Washington Transportation Department

With the arrival of 14 compressed natural gas (CNG)-powered Ford Crown Victoria sedans to replace the last of the gasoline-powered vehicles in the fleet, 100 percent of NDW's Executive Motor Pool now uses alternative fuel.

Then President Bill Clinton signed an executive order in June 1999 that required federal government fleets to increase the use of alternative fuels and reducing consumption of petroleum. This set a goal for the federal government to reduce fuel consumption by 20 percent from the 1999 baseline.

"This reduction is to be accomplished through a three-pronged approach," said Bob Gill, head of PWC Washington's Transportation Department. "Fewer vehicles, more fuel efficient vehicles and more alternative fuel vehicles."

All of the vehicles in PWC's Executive Motor Pool now run on natural gas or ethanol, a ingrediant made from corn. The fleet includes 28 sedans and minivans that make as many as 60,000 trips a year in the local Washington, D.C. area. >>

Top right, Leroy Tillery drives one of the new energy-efficient Crown Victorias; above, the engine in a natural gas-powered car looks quite like that in a gasoline-powered car; bottom left, a natural gas pump in the PWC motor pool; bottom right, the natural gas is safely stored above ground in these canisters.

Approximately 175 other vehicles in PWC Washington's fleet also run on alternative fuels, including sedans, vans, pickup trucks and shop vehicles.

This is not only significant for being compliant with the executive order, but it's of additional importance in the Washington, D.C. area, where the Environmental Protection Agency has downgraded the ambient air quality from merely "serious" to "severe."

With the staggering number of vehicles on the roads in the Washington, D.C. area every day, cleaner emissions are paramount to improving air quality.

"We are also investigating hydrogen fuel cell technology and the use of biodiesel," Gill said. Biodiesel is fuel made in part from recycled cooking oil. "We're open to try any technology that will help us reduce emissions as well as our reliance on foreign oil."

Leroy T. Tillery, PWC Washington motor vehicle operator supervisor, pumps natural gas into a new energy-efficient Crown Victoria.

Each car has a notice on the window, reminding the driver that the car only uses natural gas.

CAPT Charlie Khan, PWC JAX/EFA Southeast commanding officer, drives a Global Electric Motors (GEM) vehicle. Accompanying him are CAPT Larry Cotton, Navy Region Southeast (CNRSE) chief of staff, front seat; Galen Carver, CNRSE executive director, back seat behind driver; and RADM Annette Brown, CNRSE commanding officer.

Naval Station Mayport and NAS Jax To Test-Drive New Mini Electric 'Cars'

New clean-fuel cars good for environment, affordable

Story and Photography by Sue Brink

They look cartoonish, but the Navy's new mini alternative vehicles are real gems — Global Electric Motors (GEMs), that is.

To conserve energy and save money, Navy Public Works Center Jacksonville (PWC JAX) purchased five GEMs, two for Naval Station Mayport and three for Naval Air Station Jacksonville.

PWC JAX is leasing these vehicles across the Southeast Region. GEM users will have a choice of either a two- or four-passenger vehicle. The lease will have minimum three-year contract.

"Providing this lease program will save our customers money. The trend of alternative fuel vehicles is moving toward such electric vehicles and we must be proactive in bringing these opportunities to our customers," says PWC JAX Commanding Officer CAPT Charlie Khan.

The annual cost for renting a compact pickup is $4,257 per year, a passenger van goes $5,561 — and a GEM is $2,371. These totals include the monthly rental plus the fuel cost. Customers could see savings of up to 57 percent per year.

GEMs are street-legal vehicles that can be used on any road with a speed limit of 35 mph or less, on or off base. Fully charged GEMs have a top speed of 24 mph and comply with the all motor vehicle safety equipment regulations required by the National Highway Traffic Safety Administration.

"The weather in the south is perfect for this vehicle," asserted Frank Rogers, PWC JAX transportation specialist. "They're especially fine for getting around on the base."

The vehicles are a gem to operate and can run up to 30 miles before recharging.

Meter base with safety switches

High-Tech Electrical Metering Improves Energy Management and Reduces Costs

Story by Karlin Canfield

The cost of electricity tends to increase, so there is a a close-coupled interest today in improved metering at many federal facilities.

Accurate metering helps Navy commands control their costs. Installing new-tech meters and using the meter data can reduce costs, provide improved accountability and better energy management.

In part, this is driven by proposed legislation requiring installation and use of meters for all federal buildings to the maximum extent possible. The proposal establishes guidance that accounts for the cost and potential savings from metering.

Several Naval activities already have pioneering metering programs. Naval Base Ventura County, whose program is 15 years old, is working on a Supervisory Control and Data Acquisition program. This is a software-driven system based on electronic control of the electric system, consisting of efficient switching and reading meters.

New meters can only be installed during periods of scheduled electrical outage. Proper meter installation allows commands to replace or work on the meters without requiring potential outages. Meters can also be removed and replaced safely, if necessary, without a power outage, by using safety switches.

Most electrical meters are rated for 600 volts. When the electrical system is higher than 600 volts, potential transformers are used. Current transformers (CTs) are typically required for electrical metering of larger buildings. For most Navy installations, solid-core CTs are used.

Solid-core CTs are robust and are not as prone to corrosion compared to split core, always a concern in coastal or marine conditions. It is vital to ensure that CTs are installed correctly; otherwise, incorrect readings are possible. Some electronic meters include on-board diagnostics to help install the meter correctly and some even install automatically. They also allow the installer to connect to a computer in order to program the meter, diagnose problems and download the raw meter data.

Metering is fairly basic, but it's surprising how poorly it can be done. Planning (including a safety plan), inspection and testing are requirements for a successful installation.

Meter installation costs will vary. A reasonable cost for an electrical meter for a typical building is $4,000 plus the cost of the meter. Some buildings will have more than one electrical service and a meter will be required for each service.

An electronic meter is usually the choice for accurate billing and consumption information. Normally, if billing is the only thing the meter will be used for, a meter that does cumulative consumption and is read once a month is adequate.

This type of meter costs around $1,000. The meter display can be read and recorded by a person, but that's unreliable because it's unlikely the meter will be read the same day and time every month. A better method is to specify a meter that stores consumption data and uses an optical probe to query the meter. As long as the meter is read within a reasonable period, the consumption data will be available.

An automatic meter reading system is the best meter reading method. Automated data collection can be accomplished using various methods, such as wireless or hardline communications. Wireless communications include includes radio, microwave or cellular telephones. Hardline systems include a power-line carrier or dedicated communication lines, such as fiber-optic or twisted pair cable.

Other methods include connection to an existing local area network (LAN) or to an existing control system (Direct Digital Control (DDC), Energy Management System (EMS), Supervisory Control and Data Acquisition (SCADA) system, etc. The Navy/Marine Corps Internet (NMCI) contract has a provision that allows meters, control systems, fire alarms and security systems to connect to the LAN for transferring data.

Monthly consumption is only one factor in determining where and how an electric utility can be effectively managed. More information is usually required. An electronic meter with a load-profile option helps commands identify anomalies in electrical usage. A meter with this option usually costs between $1,200 to $1,500. Typically, the meter will keep track of consumption in "15 minute buckets"—the consumption for every 15 minutes is recorded—providing a profile of the load.

Fifteen minutes periods are fairly common, though the meters can typically be set to record "buckets" ranging from five to 60 minutes, and high usage periods and anomalies can be identified. Significant savings can result when problems are corrected and equipment is replaced or rescheduled.

A well-planned electrical metering system with good data analysis will result in better management of electricity—and significant energy and cost savings.

The Last Page:

NAVFAC at Earth Day

NAVFAC and other Navy commands joined together April 28 to celebrate Earth Day at the Navy Memorial in Washington, D.C. At NAVFAC's display booth, local school children that stopped by learned about the Navy's Energy Program, which includes the efforts at creating solar, wind and geothermal energy. "I knew that the Navy was doing things for the environment," said James McCreary, a touring parent, "but I didn't know to what extent. It's most encouraging."

Civil Engineer Corps Officer School Basic Qualification Course Graduates 70

CECOS Class No. 227 graduated Nov. 7, 2003

ENS Jeffrey Allen, ENS Kory Anglesey, LT Young Ki Bang, ENS Peter Benson, ENS Travis Bunt, LT Jason Chung, LT Craig Clutts, LT Andrew Cozier, ENS Brett Daniel, ENS Daniel de Robles, ENS Jeff Dong, ENS Elizabeth Durika, ENS Neil Ebuen, ENS Anthony Fitzpatrick, LTJG Michael Gabiga, ENS Crystine Good, ENS Geoffrey Hickman, ENS Adam Kushner, ENS Donnell Long, ENS Eric Martens, ENS Marcia Martins, LTJG Glen Messer, LT Edward "Ben" Miller, ENS Scott Olsen, LTJG Megan Pagano, ENS Justin Perry, ENS Robert Piasecki, LTJG Emil Pieski, ENS Roberto Porro, ENS Joseph Sargent, ENS Jacob Segalla, LT Karen Strange, ENS Robert Warren, ENS Chris Wells.

CECOS Class No. 228 graduated March 19, 2004

ENS Charity Anderson, CWO2 Edward Bichard, ENS Chris Casne, ENS Luke Cowley, ENS Christopher Asper, ENS Nicholas Bloomer, ENS Adam Christopher, ENS Antoine Crite, ENS Majed Awad, ENS Lakisha Brown, ENS Michael Collins, ENS Antonio Crite, ENS Jayson Dooley, ENS Paul Forrester, ENS Nathaniel Herron, ENS Laura Juette, ENS Joseph Dunaway, ENS Jason Godusky, ENS Andrew Hunt, ENS Chin Ming Kao, LTJG Rebecca Farley, ENS Kellen Headlee, ENS Todd Jorgenson, ENS Peter Lane, ENS Nicholas Leinweber, ENS Jerod Mccully, ENS Andrew Oddo, ENS Robert Ramsey, LT Andrew Litteral, ENS Gareth Montgomery, ENS Mitchell Ortiz, ENS Francis Tay, ENS Syreeta Martin, ENS Marc Nelson, ENS Alfonso Patlan, ENS Cheron Thornton.