...if 300,000 Navy personnel turn off their lights during lunch hour, they’d save $1.2 million in Navy operating costs and cut emissions of NOx by 51 million pounds.

---Navy Energy Web Site

The Base Profile:

Naval Air Station Lemoore is the U.S. Navy’s newest and largest master jet air station, supporting the Pacific Strike Fighter Wing with its essential homeport facilities. It is the staging area of the aircraft carrier-based Navy strike fighters, the F/A-18 Hornet. It is a $3 billion navy base encompassing 18,784 acres owned in fee simple, 11020 acres of aviation easements, forming one of the most sprawling compounds in the U.S. military.

During the development of the Resource Efficiency Management (REM) program, the base continued to grow, adding four new squadrons and another 1,000 military personnel. In total, Lemoore includes 280 major structures, collectively representing more than 3.3 million square feet, and another 1,500 homes totaling more than 2 million square feet of residential units, single-family, duplexes and triplexes.

The annual energy and water consumption, collectively representing a $5.4 million annual utility bill, breaks down as: 265,838 MMBtus of natural gas ($1,808,914 annually), 94,152 MWh of electricity ($3,257,846), and 995,629,000 gallons of water ($428,476).

In total, 27,100 people live and work at Lemoore, including about 7,000 military, 20,000 dependents/retirees and 1,100 civilian employees.

Energy Snapshot of Base:

NAS Lemoore receives its electricity services from the regional federal power marketing agency based in Colorado, the Western Area Power Administration (WAPA), which provides below-retail-priced supplies. As a result, paybacks for various energy saving and efficiency measures can be very long and difficult to justify from a cost/benefit standpoint. The difficulty in implementing energy saving projects lends added importance to the base’s achievement of a “gold” rating – second highest – on the Secretary of Navy’s annual energy management report for 2002, missing the “platinum” rating, by “a few points as required by the SecNav award,” according to the base REM.

With national goals established by the Navy in response to federal law and executive orders from the past decade, Lemoore’s REM has addressed three clear-cut goals: (a) cutting energy and water consumption, (b) improving efficiencies, and (c) slashing annual operating costs. The Navy is committed to dropping its overall energy/water use by 30% per ksf/MMBTu of 1985 levels as required by Executive Order 13123. The key for strategic military installations like Lemoore is to meet this goal with minimal impact on base mission requirements, military readiness, quality of life and safety.

Two of California’s major investor-owned utilities operate in and around Lemoore: San Diego-based Sempra Energy’s Southern California Gas Company (SoCalGas) utility and San Francisco-based Pacific Gas and Electric Co. Natural gas is the dominant fuel in California, and the vast bulk of it originates from various production areas in the Southwest, Rocky Mountains and western Canada. Electricity is mostly gas-fired or hydro-electric, although both PG&E and Edison operate large nuclear plants along California’s central and southern coast.

Lemoore is served from the SoCalGas transmission system, a four-inch diameter, high-pressure pipeline for its natural gas needs, and it maintains a local service network of 27 miles of 2-inch to 4-inch
diameter pipelines on the base, 12 miles for operations/administration and 15 miles for housing – all at 25 psi. Metering was one of the issues addressed in the REM program.

For electricity, Lemoore is served by two 20,000-kVA transformers coming off the PG&E electric utility’s 69-kV transmission line.

The water system consists of about 15 miles of 80 psi piping for the operation and administration buildings. Lemoore maintains the entire energy/water infrastructure on the base.

Energy service providers are split between federal government wholesalers and local utility transporter/suppliers. Natural gas is purchased in bulk by the Defense Energy Support Center and transported by SoCalGas. Electricity is provided by the federal marketer WAPA and transported by PG&E’s utility. Water is provided through the 36-inch diameter main of Westlands Water District.

So far, Lemoore has taken advantage of rebate and incentive programs from the California Energy Commission and other statewide energy efficiency programs that are administered by the local private-sector utilities.

Based on third-party analysis, REMs provide much better than a 10-year payback. They usually pay back within a year, according to western regional Naval energy contracting experts. Most of the REMs the Navy has put in place so far, such as at Lemoore, received more than $300,000 in rebates from the state of California, which is more than twice the cost of the REM. Thus, the position is viewed by the contracting professionals as a “good investment.”

SoCalGas in late 2001 agreed to fund a pilot REM by agreeing to a 50-50 split, each put in $50,000, first at Navy Base Ventura County, and later at Lemoore. Regional Navy contract managers determined there is more than enough work at each base for a REM.

On a separate but parallel track, a “utility energy service contract” (UESC) created a $4.5 million energy efficiency project with help from the local gas utility. The base expected to cut its annual energy bills by more than $600,000 as of the spring of 2003 when the program was announced. Lemoore’s previous Assistant Public Works Officer, Lt. A. J. Catalanotte, estimated the savings could be closer to $650,000 for natural gas, electricity and water at the base.

Through its UESC, Lemoore has completed a series of energy-efficiency improvements while strengthening its expanding role as the staging area for aircraft carrier-based Navy fighters. The energy improvements include:

- Installing more efficient lighting in 18 buildings.
- Replacing 20- to 30-year-old heating, ventilation and air-conditioning systems in 12 buildings.
- Installing a new energy management system, allowing central control and monitoring of systems serving 23 buildings.
- Automating the base irrigation system.
- Installing covers on base swimming pools.

REM—Before and After:

Before:

Historically, no one person or work unit at the base was focused on energy and water use. Local utility companies, such as Southern California Gas Co. and others highlighted the topic for the base leaders. An active Resource Efficiency Management (REM) program had sprouted at Ft. Lewis, WA, and word of it had spread throughout the Northwest and Southwest Navy Regions.

There was no “squeaky wheel” when it came to energy, as Ed Thibodo, Navy Contracting Officer, San Diego, said in recalling how he helped spread the experience in the Pacific Northwest throughout the Navy installations in the West. Indicative of NAS Lemoore’s absence of an energy focus, many base hangars lacked switches to turn off lights, even if someone had been present to try to do so. The “old” military never bothered to install switches when the hangars were built.

Federal laws and Presidential Executive Orders were in place, beginning with the 1992 federal Energy Policy Act and Executive Order 13123, challenging federal installations to drop their energy/water consumption through the first decade of the 21st Century. However, procedures were only as good as the paper on which they are written. People commitments were not present. Partnerships with local energy companies were not in place.
A few years ago, a previous Assistant Public Works Officer asked the open-ended question, “If you have all your time to devote to just one thing, what would that be?” The answers he got triggered the development of a REM position.

“Looking at all the functional positions, they picked energy because people felt it was one of the most neglected items,” says Matthew Dye, a mechanical engineer, who became the primary person filling the base REM slot since late 2001. “The base also wanted to improve its infrastructure. There was a lot of old equipment needing replacement, and people thought a REM would be a good tool for identifying areas where energy efficiency upgrades could be made to get that done.”

Dye’s predecessor and employer, Bob Demyanovich, a consultant hired with the help of Southern California Gas Co. said, “If you talked to someone and asked what the base had already done in terms of energy and water programs, a lot of people didn’t know. Some of it has to do with the high turnover rate (among public works personnel). People are trained and then leave for another assignment. The guy with a wealth of knowledge at Lemoore retired right after I got there!”

After:

Lemoore now has the upgraded infrastructure, close monitoring of 25 buildings that consume large quantities of energy, ongoing awareness programs, equipment that is more efficient, and a developing ethic to use energy wisely as military personnel, trained to use any strategic resource to maximize the base’s effectiveness in carrying out its mission. Most of all, the REM added professionalism to the handling of the energy/water portion of the base management.

The REM assisted in instituting regular meetings and communications on energy, distributing a periodic e-mail, and implementing an ongoing energy awareness program. In addition, publishing a handbook on managing building energy use.

Now when squadrons leave for overseas missions, such as the Iraq War, abandoning barracks and other facilities, someone with an eye for energy savings follows behind to shut down the physical plants, avoiding unnecessary costs. When a civilian employee leaves the base after some of the energy awareness meetings, he or she will stop to turn off lights in vacant parts of a complex. In short, the mindset is now entirely different.

Lemoore, like other federal government facilities, is “under the gun” to meet Federal Energy Management Program (FEMP) goals (35% reductions by 2010), according to the previous Assistant Public Works Officer, Lt. Catalanotte. He credits both the UESC and the REM’s work with moving Lemoore forward in its quest of the long-term goal.

Lessons Learned:

- REM candidates need engineering/people skills that cultivate respect and support from base command.
- Effective, persuasive and frequent communication is essential. Awareness builds change and eventually results.
- REM personnel must talk to people firsthand, find out how they are really operating their parts of the base and how much of the program they are implementing.
- A focus on on-the-job training and reinforcement changes behavior that translates into long-term, embedded savings.
- Continuous demonstrable benefits are essential to the REM position’s long-term future at any federal facility.
- Don’t exceed the gap between a commodity deal and the bundled cost of energy from the regular supplier. (example: WAPA prices vs. PG&E emergency power deal two years ago…$60,000 for three hours of summer peak power…).
- Pay attention to assumptions when energy calculations are completed.
Future:

Meeting the following objectives by the REM program:

1. Implement water/energy conservation measures and projects, such as the change-out of all lighting to T-8s from old fluorescents.

   “T-8’s lowered energy use and provided more light to work surfaces,” Dye said. “It saves the Navy money while improving buildings’ lighting output. I’d say we have done a pretty good job.”

2. When Dye became the REM, not all of the reimbursable accounts for each building were metered, and some of metered reimbursable accounts were not read regularly. Now, all of the reimbursable buildings are metered and they are read regularly. In addition, almost every major building on Lemoore that is a non-reimbursable is metered and read regularly as well.

   Results showed that the programs in place in summer 2002 with every squadron on the base and one of the hottest summers on record were very effective. That summer, NAS Lemoore didn’t exceed its load limits assigned by its federal supplier WAPA (20.8 MWh). Two summers before with a smaller footprint and fewer squadrons, the base exceeded its WAPA cap of 19.8 MWh. “The more efficient systems aren’t drawing as much power as the old ones,” Dye said.

3. Through the REM, support is provided to the cadre of people at the military base doing energy work as an adjunct to their full-time assignments. Energy work is a collateral duty. At NAS Lemoore, the Assistant Public Works Officer after 9/11 spent most of his time on security and safety concerns. Each building has an energy monitor, an employee in that building who takes on the added role.

   “It has helped. The problem is you can pass out information to the building energy monitors, but you can’t make them read or understand it. So, we have monthly meetings with the building monitors, and we try to keep those meetings centered around our handbook,” Dye said.

4. Distribute and get buy-in for the “Building Energy Monitoring Handbook” Bob Demyanovich developed it as a REM at Naval Base Ventura, and then customized a similar resource for Lemoore with Matt Dye’s help. It was written site specific, although Naval bases have a lot of common aspects that can be repeated in such a resource book.

   Ventura was where it was first created as a means of trying to enlist the support of building monitors or energy facilitators—the people responsible for a building or group of buildings.

   Topics covered in the Lemoore handbook include:
   - Water conservation
   - Air infiltration
   - Insulation
   - Lighting
   - Heating/Cooling/Ventilation
   - Galleys (kitchens)
   - Computer rooms
   - Building Checklist
   - “Did you know section?” “Myths-vs.-Realty”

5. Work with base staff to procure more efficient equipment for water and energy use. Ensure that, when equipment is replaced, it is replaced with the state-of-the-art energy and water saving equipment.

6. Nurture and expand energy awareness, which means “getting the message out” is a broad-based objective. NAS Lemoore developed base newsletters, e-mails, Energy Awareness Week activities (October), schoolchildren’s’ poster event, golf tournament, etc.
Spreading the energy ethic, the REM works with the Utility Specialist to develop ideas that are displayed on an electronic message board through the Air Station Administrative Office and articles in the base weekly newspaper. The Utility Specialist is responsible for getting the messages out.

7. Expand the REM’s “reach” through Utility Energy Service Contracts (UESC), and involvement of residential sector and military departments in the awareness programs.

“My first objective is to award contracts with utility companies which accomplish energy conservation programs under the UESC, and under that, I can award any contract that allows payback within 10 years,” said Ed Thibodo, the Navy’s western region contracting officer in San Diego.

“My expectation is that today (late-2003), we have only addressed the tip of the iceberg, and we will continue to develop more projects and a better awareness program. There is a huge base housing program at Lemoore, with on-base schools, that nearly equals what many other bases have collectively. I would like to see a REM get involved with an awareness program at the school level.”

8. Achieve higher levels of recognition within the Navy and the broader U. S. military.

NAS Lemoore achieved a “gold level” status in terms of the annual Secretary of Navy report for 2002. Before the REM, Lemoore had achieved a non-rating. Thus, reaching gold level, the second highest level, with Platinum being the highest, was a major achievement for the base, both Dye and Demyanovich said. To reach the gold level, the base met a whole set of criteria, including: (a) implementing energy projects, (b) completing relevant surveys of facilities, (c) implementing an energy awareness program, and (d) conducting quarterly building energy monitoring programs.

Reaching the gold status was “the direct result of a REM being on the base,” according to Thibodo.

Results (Current/Future):

1. Through the SoCalGas contract the site achieved 5.4 million kWh savings annually; 18,000 MMBtu of natural gas saved annually. It invested $4.5 million in the program, and realized a $685,000 saving through the project...lighting, HVAC, water and some energy management systems (direct digital controls (DDC), which will help pay it off in just under seven years through energy savings alone.

2. In the first half of 2003, Lemoore worked at “hibernating” hangars since 12 squadrons have been gone. Policing them every day, shutting down heaters and lights, saved one million kilowatt-hours roughly during the last three months.

3. For a phase II project under the UESC contract, a survey of the entire base for T-12 lights, found about 6,100 fixtures to retrofit with T-8s, equating to about $42,000 annually in savings. Payback is 8 years.

4. Hangars— “One of the monthly Base Energy Manager meetings was held in a hangar to give hands-on examples. Lights in many of buildings need to be turned off, but in hangars, no switches are installed in many instances,” Dye said. “In a lot of the old buildings, they never bothered to install switches, so we made up placards that could be used on the circuit breaker panels and label switches so people know where to shut off the lights. It is little things like that that we try to do to make people more aware.”

5. Working on a LED taxiway lighting for planes at Lemoore for FY ’05, through a Navy ECIP (Energy Conservation Improvement Project); however, there is lot less of an impact on the electric bill than might be initially expected. The airfield is 40 years old and will have to be upgraded eventually, so “why not make it energy efficient at the same time,” Dye said. “It has a 17-year payback, however. NAS Lemoore’s three cents-per-kilowatt-hour electricity cost makes it very difficult to justify projects for energy improvements.”

6. When squadrons leave, energy watchdog personnel follow behind them. “A lot of tenants are notorious for heading out to sea for six months and leaving lights, computers, and other energy
consuming devices on,” Dye said. “After the last squadron that left, we found all the hangar heaters running, the hanger lights on, and frequency generators running. We go in and shut as much of the buildings down as possible.”

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