The Fort Lewis program demonstrated that maintaining support at high command levels and having a dedicated REM in place are critical for success. Implementation of a Resource Efficiency Manager (REM) program (a Washington State University Cooperative Extension Energy offering) in late 1996 spearheaded the Army post's mission to promote energy-efficient measures and boost energy awareness by changing energy-user behaviors. The main focus for the program were troop units and family housing on the installation. A full-time REM was hired to implement the program and facilitate energy-saving initiatives.

Program objectives were: Minimize energy consumption and costs, reduce water consumption, and increase recycling efforts. These were to be done while meeting all operational mission requirements to provide quality working and living conditions for all Fort Lewis troops, their families, and civilian personnel. The plan's action elements included:

- Better operations and maintenance procedures.
- Installation of energy-efficient equipment.
- Comprehensive energy-tracking system.
- Troop BEMs (Building Energy Monitors).
- Customer-focused conservation practices.
- Energy-savings competitions among units on post.

The REM program was implemented at Fort Lewis thanks to grants from the Federal Energy Management Program (FEMP) and the Pacific Northwest National Laboratory (PNNL). The effort is self-sustaining now, with annual cost savings to taxpayers well exceeding the yearly program cost of approximately $110,000. The REM program is the latest in a series of energy campaigns the fort has conducted over the years.
In the mid-to late 1980s, in response to national energy concerns, the fort began to implement cost-effective, energy-saving projects. Staff cutbacks in the 1990s caused energy use to increase and energy awareness of fort personnel to deteriorate. Energy costs increased from $10 million in 1990 to $12 million in 1995 and energy consumption was going up in direct opposition to federal energy goals. The REM program has turned this trend around and the fort is back on track toward a federally mandated goal of 35 percent energy reduction from a 1985 baseline by the year 2010 (Executive Order 13123 “Greening of the Government through Efficient Energy Management).

The 2001 strategic energy plan of the U.S. Army Forces Command (FORSCOM) for its installations, including Fort Lewis outlines a broad strategy for achieving the EO 13123 goals by 2010. The justification is clear, as stated in the plan itself: “A secure and cost-effective energy supply is critical to FORSCOM’s mission to train, mobilize, and deploy Army ground forces in defense of the nation. The ability of the energy system to support troop mobilization and deployment at a moment’s notice must be unquestioned. Further, a cost-effective energy supply will help ensure that training excellence and soldier quality of life are not compromised, while stretching limited appropriated funds for other mission requirements.”

REM objectives
A Resource Efficiency Manager (REM) is a full-time person hired to supplement the efforts of an installation energy manager. The REM is employed under the condition that the annual contract cost is covered by energy cost savings. At Fort Lewis, Charles Howell has been the REM since 1997. The REM program, cited in FORSCOM’s energy strategy has achieved “substantial success.” The arrangement has worked so well that Howell has become “the de facto energy manager at the fort.”

When Howell started, his responsibilities were to:

- Support Fort Lewis energy program.
- Provide technical assistance on energy issues.
- Develop and conduct energy training for troops and personnel.
- Track, report, and analyze energy use in facilities.
- Develop and recommend energy policies and programs to reduce energy use.
- Support procurement of energy-efficient equipment and implementation of cost-effective energy projects.

By 2001, he continued to handle those duties, but had picked up other tasks as well, including:

- Co-manage the fort’s energy savings performance contracting (ESPC) program.
- Support energy team/utility activities.
- Develop and identify energy-efficiency projects for current and future years.
- Provide design review for energy efficiency on projects.
- Calculate reimbursable utility costs.
- Provide support to HVAC Team activities.
- Recommend heat on/off schedule while handling complaints.
- Recommend set points and set backs for facilities on the installation.
- Develop an energy component for the Major Subordinate Command IG inspection program.

Operation Energy
Launched in September 1998 as a one-year demonstration project to reduce energy use in military family housing at Fort Lewis by 3 percent, the mission was completed with far greater success – 10 percent less energy used from the previous year, the equivalent of $130,000 saved.

The campaign was the first of its kind nationwide – generating data-driven, precedent-setting insights into the effectiveness of persuasive strategies applied to military housing communities in the absence of personal utility bills. The project stemmed from a Pacific Northwest National Laboratory proposal to the U.S. Department of Energy. USDOE funded the effort through its FEMP program. Fort Lewis was targeted because it represented a huge potential for savings: Forty percent of the fort’s energy costs come from the base’s 3,500 on-base homes for military families. One challenge, however, was the fact that the 12,000 on-base residents had little incentive to save energy in their homes because they did not have to pay their own utility bills. Preliminary research revealed the need to focus on benefits such as thermal comfort and convenience. Competition, patriotism, and altruism emerged as important factors to stimulate audience participation.

Messages were keyed to specific desired behaviors including: Turning off lights when they aren’t needed, turning down thermostats at night, keeping windows closed when the heat was on, cleaning lint traps and furnace filters, using compact fluorescent lights, and using washers and dryers efficiently. A video program was produced and shown frequently to demonstrate target behaviors.

Continued on page 6
**Major accomplishments**
The Resource Efficiency Manager engaged the end user to generate occupant participation in energy-saving practices. The REM identified short-range and long-range projects and procedures to optimize energy savings. Fort projects covered a wide range – from closing down or demolishing inefficient buildings to new construction, upgraded equipment, or boiler operator training to improve tune-up and operational techniques.

Through an intensive outreach campaign and monthly training seminars, the REM expanded the number of active building energy monitors (BEMs) in Fort Lewis buildings and units. As part of a family housing energy conservation effort, the REM developed and distributed thousands of flyers, posters, energy tips, videos, and brochures to boost energy awareness. A troop incentive awards program was designed and implemented to reward troop units that conserved energy. As part of that specific endeavor, the REM used energy accounting software to develop a database of troop unit buildings to track energy cost and consumption, and analyze energy use at the building and troop unit level. Energy consumption reports were used to determine incentive awards.

The REM recommended the installation of electric submeters in 26 previously unmetered buildings to better track energy use at the facility level. The REM used temperature-monitoring equipment to analyze heating systems in facilities. Results of this analysis were forwarded to appropriate shop, troop, command, and housing personnel as supporting evidence for actions to maximize heating system efficiency.

The battle for energy efficiency is continuing on a number of fronts at Fort Lewis.

**Project Assessment**

**Goal # 1: Generate energy savings**

Table containing partial list of REM projects 1997-2001

<table>
<thead>
<tr>
<th>Project</th>
<th>Annual savings</th>
<th>Cost</th>
<th>Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDC controls, thermostats, fans</td>
<td>$100,000</td>
<td>$1.2 million</td>
<td>10 years</td>
</tr>
<tr>
<td>Troop Incentive Program</td>
<td>$33,000</td>
<td>$17,000</td>
<td>6 months</td>
</tr>
<tr>
<td>Operation Energy</td>
<td>$130,000</td>
<td>$92,000</td>
<td>9 months</td>
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<tr>
<td>Boiler plant efficiencies</td>
<td>$40,000</td>
<td>$20,000</td>
<td>6 months</td>
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<tr>
<td>ESPC project</td>
<td>$846,000</td>
<td>$6 million</td>
<td>7 years</td>
</tr>
<tr>
<td>Fuel cell D (Camp Roberts)</td>
<td>$200,000</td>
<td>$1.2 million</td>
<td>6 years</td>
</tr>
<tr>
<td>10,000 compact fluorescent lights</td>
<td>$116,000</td>
<td>$60,000</td>
<td>6 months</td>
</tr>
<tr>
<td>1,000 vending misers</td>
<td>$44,000</td>
<td>$128,000</td>
<td>2.9 years</td>
</tr>
<tr>
<td>Hot water heaters</td>
<td>$50,000</td>
<td>$20,000</td>
<td>5 months</td>
</tr>
</tbody>
</table>

**Goal # 2: Leverage OPM (other people’s money)**

REMSought OPM (Other People’s Money)

<table>
<thead>
<tr>
<th>Source</th>
<th>Project</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPU</td>
<td>Post-wide CFLs</td>
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<tr>
<td>DOE</td>
<td>Operation Energy</td>
<td>$75,000</td>
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<tr>
<td>JCI</td>
<td>ESPC</td>
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<tr>
<td>PSE</td>
<td>Vending misers</td>
<td>$10,000</td>
</tr>
<tr>
<td>DOE</td>
<td>Vending misers</td>
<td>$64,000</td>
</tr>
<tr>
<td>AAFES</td>
<td>Vending misers</td>
<td>$64,000</td>
</tr>
<tr>
<td>TPU</td>
<td>Fuel cell</td>
<td>$1.2 million</td>
</tr>
<tr>
<td>DOD</td>
<td>SATCOM-CAL</td>
<td></td>
</tr>
</tbody>
</table>

(Note: TPU is Tacoma Public Power, DOE is Department of Energy, JCI is Johnson Controls Inc., PSE is Puget Sound Energy, AAFES is Army Airforce Exchange Service, and DOD is Department of Defense)
Goal #3: Program continuation and replication

The Fort Lewis REM program has grown to include many projects and to boost energy awareness. It is self-sustaining, and is being used as a model for success at other military installations and federal buildings around the Pacific Northwest, West Coast, and rest of the nation.

The REM is a point of contact for other energy partners in Washington state, the Northwest region, and the federal level. The REM has been instrumental in implementing energy initiatives and in improving energy policies regarding energy issues.

Evaluation

The Resource Efficiency Manager (REM) program has been a worthwhile investment at Fort Lewis. After an initial first-year federal grant, the program became self-sustaining with energy-saving dollars supporting cost. For instance, $91,000 invested in the fiscal year 1998 generated savings of nearly 167,000 MBTUs or 1.82 MBTUs for every dollar invested. In addition, the fort avoided $591,000 in energy costs for a six-to-one return on investment.

Energy-efficiency efforts are also saving the environment. By substantially reducing the amount of fuel oil and natural gas combustion emissions, Fort Lewis has made a significant contribution to maintaining EPA regional attainment status for carbon monoxide and other pollutants. For example, in 1998, the fort reduced its combustion emissions by 117.2 tons for sulfur dioxide, 23.5 tons for carbon monoxide, 12.8 tons for nitrogen oxide, and more than 15,500 pounds for particulates.

A major part of the REM program has been educational outreach designed to influence occupant behavior. While certain aspects of the program focus on better operation and maintenance practices and procedures, it still relies on the end user to make wise choices to conserve energy. Marketing has been aimed at the estimated 25,000 troops, family members, and civilian personnel working and living on the base.

Monthly energy awareness seminars gave building energy monitors (BEMs) insights into fort energy cost and consumption patterns and provided them with tools to better identify energy-saving opportunities. The number of BEMs skyrocketed from 10 to 140 in the first year of the program, but has now settled down to 40. Troop movement, deployment, and other personnel changes contributed to the decline. Another factor was the restructuring of resources and priorities as the installation responded to national crises, such as the September 11, 2001, terrorist attacks.

The program has proven to be easily transferable. Major components have been replicated at other military installations. Those include: Awareness training to recruit BEMs, energy accounting system, operating incentive programs, revising energy policies, and marketing energy conservation.

The Fort Lewis program demonstrated that maintaining support at high command levels and having a dedicated REM in place are critical for success. But troop and family support are just as essential. The tendency for any program is to pile more duties on the REM, as occurred at Fort Lewis. It is important for the REM to delegate some tasks to others, as needed. There has been less emphasis on incentive programs and other customer-behavioral programs since the REM took on other duties.

Analysis of energy-efficiency projects at the fort revealed that total efficiency is not possible without the participation of building occupants and users. It takes constant vigilance, widespread publicity, and an aggressive awareness program to take full advantage of energy-saving opportunities.

Conclusions

The REM program at Fort Lewis should be continued and expanded. The investment potential cannot be ignored. This resource reduction program has proven that it can attain a typical return of 300 to 400 percent for large federal facilities.

In these times of volatile energy prices and finite energy resources, it is important to have such energy-efficiency programs. FORSCOM, in its strategic energy plan, advocates for a more aggressive energy management focus to “ensure the availability of energy commodities to meet critical mission needs, and to manage costs so that resources are available for other uses, including maintenance and repair of utility systems.”

In fiscal year 2000, FORSCOM spent $141 million on the purchase of energy commodities for its 11 installations, which include Fort Lewis. In 2001, FORSCOM estimated that total would reach $187 million due to increases in natural gas prices for all installations. In fiscal year 2002 that FORSCOM expenditure is expected to rise even further to $193 million.

Fort Lewis expended a total of $19 million in FY 01, a 50 percent increase from the previous year. All of the increase was attributable to increased energy costs since the installation actually reduced energy usage by 2 percent over FY 00. Based on a 2 percent reduction goal and static energy prices, Fort Lewis was expected to spend about $18.5 million in FY 02.

FORSCOM has gotten off course in its energy conservation “glidepath” – a graphic depiction of the linear reduction in energy use intensity that will bring its military installations into compliance with 2005 and 2010 energy reduction goals. In FY 01 Fort Lewis was very nearly at its glidepath – slightly below (or better) than the FORSCOM average.
More energy must be saved not only to keep pace with rising costs but also to get back on the reduction glidepath and stay there.

More attention needs to be paid to the design of new buildings, the retrofit of existing ones, the appropriate operation and maintenance of energy-related facilities, the procurement of energy-efficient equipment, and the continued promotion of occupant behaviors to save energy. These will ensure attainment of the federal energy goals. It is not a time to do less.

And it is extremely important that REM stays as a weapon in the military’s energy arsenal.

**Lessons Learned**

Fort Lewis REM Charles Howell offered some insights on the program’s impact on the Army’s installation, located near Tacoma, Washington.

**Q. What did you learn your first year?**

**A.** I began to figure out what worked and didn’t work. I realized one needed to have patience because it is a long process to get into the structure of the organization, to understand it, and to make them understand where you fit in.

**Q. Was it mostly trial and error?**

**A.** Well, everything is wrong until you hit something right. I realized that the Army has polices and SOPs (standard operating procedures) that will work, and luckily for me all I had to do was tie energy programs into those.

**Q. What is your role?**

**A.** I’m not starting a new process. I’m an enforcer of existing rules and regulations, and I have specific responsibilities. What it comes down to is I’m an energy coordinator.

**Q. Is it hard to get an agenda?**

**A.** When resources go away and energy prices go up, it’s easy. In the beginning (late 1996), I was pointed in the direction of a scope of work, such as training troops to boost energy awareness. I sent out e-mails, prepared staff summaries, explained programs and regulations, made presentations to commanders and others, and got permission to contact families. That same approach works today because you’re working within a structure of regulations and a chain of command.

**Q. How does the REM influence decisions?**

**A.** A REM brings a scope of work to the table, and gets into the organization. Eventually, you fill other needs not in the original scope. When the REM contract is renewed each year, you recreate the scope. There are new tasks piled on, and that means less time for some, but you learn to prioritize.

**Q. What is the key to success?**

**A.** Multi-tasking. I’m the energy manager to the fort. I have many jobs, including training staff, helping others make presentations, participating as an HVAC team member, and providing design review for construction. And that’s only part of what I do.

**Q. What were your expectations and attitude going in and what was the result?**

**A.** Because of my earlier experience with RCM in schools, I had a sense of how to set it up at the fort. That proved not to be an edge at all. I came in with false expectations. The step-by-step RCM approach is supposed to work. It doesn’t work here. But I didn’t lose sight of my vision that energy management cannot fail. I had to work within the structure of Fort Lewis and the Army to make it happen. Fortunately, the Army and the federal government already had thought it out. They had manuals of procedures. I had to educate myself and re-educate others. And keep at it. My vision remains clear. I just keep working. Never stop learning. And, there’s so much to learn.

**Q. How do you take advantage of opportunities?**

**A.** Stay on top of things that are happening, continually educate yourself, and communicate with others. That allows you to take actions and respond to opportunities. You need to adapt to changes. For example, the privatization of family housing will occur in 2002. A developer – a consortium – will be responsible for meeting the energy needs of 3,500 buildings and oversee the demolition of 600 inefficient wood structures and the construction of 800 new, energy-efficient buildings over the next 10 years. I’ll still have a role, but it will be a working relationship from a program perspective only and no longer a hands-on function with energy equipment.

**Q. How do you deal with top brass?**

**A.** Realize that you have a mission to do, just as they do. Try to get comfortable communicating with them. It’s easy to get intimidated looking at all the rank on their shoulders. But don’t. Give them the information they need to make good decisions.

**Q. What has worked best, thus far?**

**A.** The troop incentive program worked well, giving out dollars and cents. It was a one-year program. Although not continued, it is “on the table” again for consideration.

**Q. What didn’t work so well?**

**A.** Even though Operation Energy was considered a success story, I felt it didn’t work as well as it could have. It was hard to brief people. The promised reward didn’t materialize because we couldn’t get permission to dispense it.
Q. What advice would you offer to other REMs?

A. Be open. Learn. Don’t come in with a set of expectations set in concrete. Let them crumble and blow in the wind. Listen and understand how the organization works. Learn how to communicate – from the ground level to the 30,000-foot level. Keep in mind there are both similarities and differences in REMs because each installation is different. But the outcome is the same – save energy. That’s your vision. Do what you can, but don’t change the vision.

Other promotional methods included: Flyers, posters, articles in base newspapers, readerboard messages, educational exhibits at fairs, communication with troops through their chains of command, and letters from the housing department to high natural gas users.

A planned mid-course evaluation of the one-year effort uncovered some problems that were addressed. Information sharing was difficult due to troop movements and high turnover of families. Promised incentives did not materialize when base officials determined operational constraints prevented it. The energy team worked creatively around obstacles. An existing educational energy game was adapted for children. Energy-related items were obtained through donations and given away to children and parents. Residential communities were praised in articles in base newspapers.

While saving energy and boosting user awareness may have been enough of an award, Fort Lewis received a national honor – a 1998 Secretary of the Army Energy and Water Management Award and a 1999 FEMP Energy Management Award. A handbook of lessons learned from Operation Energy was produced and widely disseminated through USDOE’s FEMP program.

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