At Fort Polk, Louisiana, the installation of over 4,000 GHPs has enabled US Army energy managers to reduce energy and maintenance costs while avoiding cuts in service or salaries on the base. About half of the base’s energy bill was for housing energy consumption. With the new GHP system, savings in utility and maintenance bills are expected in the range of $3.3 million annually, or a net present value of $44 million over the 20-year life of the project.

Financed by a private company, the energy and maintenance-saving project bears no up-front costs to the government. The $18-million contract was signed in February 1994, and the project was completed in August 1996.

The entire housing stock, consisting of 4,003 units ranging in size from 1,073 to 2,746 square feet in 1,296 buildings, was retrofitted with GHPs. About 80% of the units had air-source heat pumps and electric water heaters. The remainder had central A/C and were heated by natural gas forced-air furnaces.

Some 23,000 military personnel and their families live in the base housing on the 300 square mile facility. In this part of the country, cooling is the main requirement. Since the new system was installed, service calls on hot summer days have dropped from 90 per day to almost zero.

The GHP system is expected to account for 23.3 million kWh of the conservation project’s annual energy savings of over 33.6 million kWh (equal to 57,593 barrels of fuel oil per year), and virtually all of the 19,800 MMBtu of gas savings. The balance of the savings is derived from added insulation, lighting improvements, installation of low-flow hot water outlets, and hot water generation with the use of desuperheaters in the GHP system. In summer, hot water is free.

Cleaner air locally is another benefit of the system. Annual pollutant emissions reductions are estimated at approximately 38,480 tons of carbon dioxide (CO₂), 100 tons of sulfur dioxide (SO₂), and 90 tons of nitrogen oxide (NOₓ).

**Project Information**

**NAME AND LOCATION:**
- Fort Polk, Louisiana

**COMPLETION DATE:**
- August 1996

**HOUSING TYPE:**
- 4,003 living units ranging in size from 1,073 to 2,059 square feet

**SYSTEM:**
- Approximately 6,600-ton closed loop GHP system
- 4,003 ClimateMaster VZ series GHPs, ranging from 1.5–2.5 tons
- Over 8,000 boreholes and almost six million feet of 1” polyethylene pipe
- Borehole depths of 130–325 feet

**DOD PROJECT ENGINEER:**
- Greg Prudhomme
  Environmental Engineering

**DOD PROGRAM MANAGER:**
- Bob Starling
  US Army Corps of Engineers

**PROJECT ENGINEER:**
- Richard Gordon
  Applied Energy Management Techniques

**ENERGY SERVICES CONTRACTOR:**
- Bob Howell, Project Manager
  Co-Energy Group

**EQUIPMENT MANUFACTURER:**
- Brian Haggert
  ClimateMaster
Shared Energy Savings

The Fort Polk project is financed and managed by Co-Energy Group, an energy services firm, under a contract awarded by the Huntsville Engineering and Support Center of the Army Corps of Engineers, and administered by Fort Polk.

The GHP installation is expected to yield annual electric, natural gas, and maintenance savings totaling about $3.3 million. Annual savings on the utility bill for the base are expected to be almost $2 million. Because the equipment will be serviced and maintained by the energy services company (ESCO) for the life of the contract, the entire baseline maintenance costs, estimated by the army at about $1.3 million annually, will be saved.

Under the shared energy savings (SES) contract, Fort Polk will keep 22.5%, or $742,500 of the expected annual energy and maintenance savings for 20 years. The Department of Defense (DOD) will return 77.5% of the savings to ESCO. At the end of the 20-year contract period, Fort Polk will own the equipment.

The contract will enable the army to shift maintenance to a vendor and to cap its future expenditures for family housing HVAC maintenance at about 18 cents per square foot per year and $262 per housing unit per year. This amount is about 72% of the army’s estimated baseline maintenance costs.

In comparison, data from a 1994 survey by the Building Owners and Managers Association show an average HVAC maintenance cost of 29 cents per sq ft per year for federal, state, and local government buildings.

Fort Polk managers acknowledge that without the shared savings contract, the procurement process for the large-scale GHP system would have been extremely difficult. The joint DOD/DOE Strategic Environmental Research and Development Program (SERDP) is collecting energy and maintenance data from the Fort Polk GHP installation to lay the groundwork for similar projects at other bases.

GHPs are now being installed at facilities operated by all three branches of the armed services.

GHP Benefits

- **Lower Utility Costs:** The GHP system is projected to save about 50% of the former heating, cooling, and water heating bills, totaling 32 million kWh annually.
- **Capital Costs:** $0 for Fort Polk. Co-Energy, a private company, provided the capital in return for 77.5% of the energy and maintenance savings.
- **Peak Electrical Demand Reduction:** Peak demand has been reduced by four megawatts annually.
- **Improved Comfort:** Residents are very happy with the new system. Service calls have dropped from 90 per day to nearly zero on hot summer days.
- **Environmentally Safe:** Meeting new government energy standards, the GHP refrigerant circuits are precisely sealed at the factory and will seldom require recharging.
- **Vandalism:** All equipment is indoors, minimizing the risk of vandalism, theft, or corrosion from weather.

("The beauty of it all is that the onus to save Btus is on the contractor. I’m a happy camper knowing that I have a single entity that I am going to deal with over the next twenty years, an entity with a profit motivation for saving energy and maintenance dollars."

—Jim Kelley, Manager of Engineering and Planning, Directorate of Public Works, Fort Polk

To order additional copies of this or other case studies, please contact:

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