

FEMP's Geothermal Heat Pump Program

Technical assistance and financing help bring the benefits of geothermal heat pumps to federal facilities



Program Overview

If you're a federal facility or energy manager, you know that energy-efficiency improvements must enhance support for your agency's critical missions while saving energy and money. Geothermal heat pumps (GHPs, also known as ground-source heat pumps or GeoExchange systems) can do both, and can help your agency meet its energy, emissions-reduction, and renewable-energy goals.

If you've hesitated to pursue a project because you think GHPs are too close to the cutting edge or you might not be able to find qualified service providers—think again. GHP technology has gained a well-deserved reputation as a proven, reliable, efficient, and cost-effective choice for space heating, cooling, and water heating in federal facilities. Federal investment in GHPs is booming—the cumulative total since 1993 reached \$200 million in 2001. About 40,000 tons of GHP capacity is now installed in federal facilities, which equates to at least 15,000 individual GHPs.

Although the industry is growing quickly, you're still among the majority if you're unfamiliar with GHP engineering and applications. However, help is available to bring you up to speed—the Federal Energy Management Program (FEMP) offers technical and financing assistance that can make GHPs just as easy to implement in your facilities as the more conventional, less efficient alternatives.

Advantages of GHPs

GHPs achieve extraordinary energy efficiency by using the ground rather than ambient air as a heat source and sink. Ground temperatures are cooler than the air in the summer and warmer during the coldest months, so GHPs benefit from pumping heat

over smaller temperature differences—and therefore more efficiently—year round.

Replacing conventional heating and air conditioning systems with GHPs typically saves 15–25% of total building energy use in nonresidential buildings; in residential buildings savings can be as high as 40%. GHPs reduce peak load as well: A 4000-home comprehensive GHP retrofit at the U.S. Army's Fort Polk in Louisiana reduced summer peak electric demand on the base by 7.5 MW, or 43%. GHPs can also contribute to meeting your agency's emissions-reduction goals because they use less electricity than conventional equipment to provide the same levels of cooling and heating.

Besides their intrinsic efficiency, GHPs offer other benefits that are highly valued at federal facilities. At U.S. Marine Corps Base Camp Lejeune, a GHP retrofit that cut the energy use of almost half the base's family housing units by about 33% is also seen as an investment in the troops' morale and quality of life. Base residents are more comfortable in their homes because the new GHPs operate reliably and quietly and provide better humidity control.

GHPs are adaptable to almost any type of building, and their popularity for use in schools, office buildings, barracks, and bachelor officers' quarters is growing quickly. GHP systems can make tremendous improvements in comfort levels in nonresidential buildings because they provide better zone-level temperature control than conventional equipment. For example, GHPs can provide heating or cooling as needed to each separate zone of a building at any time throughout the year.

Many facility managers appreciate the low cost of



Thousands of family housing units on U.S. military bases like those at Marine Corps Base Camp Lejeune (pictured above) have been retrofitted with GHPs. At left, a construction worker discharges the refrigerant from an old heat pump in preparation for removing it. After installation, a small white box at foundation level (seen in the lower left corner of the photo at right) is the only outdoor evidence of a new GHP.

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maintaining GHPs as much as their lower energy costs. The technology is simpler and inherently less prone to malfunction, requires less maintenance, and has a longer service life than air-source heat pumps. GHPs have no outdoor equipment to be tampered with, filled with leaves or other debris, or buffeted by the weather.

How can FEMP help with your GHP project?

FEMP's GHP Program can provide expert technical and financial assistance to help you develop and implement your GHP project and ensure that it delivers maximum value to your facility —

- GHP Technology-Specific Super Energy Savings Performance Contracts (GHP Super ESPCs)
- Authoritative, unbiased technical assistance
- Experienced FEMP project facilitators
- Technical tools and resources

Financing through GHP Super ESPCs

Federal facilities anywhere in the world can take advantage of DOE's GHP Super ESPCs for financing and access to private-sector GHP expertise. Under these contracts, prequalified energy service companies (ESCOs) develop, finance, and implement GHP projects that are paid for over the term of the contract using the cost savings generated by the improvements. Best-value projects are generally comprehensive, including all the standard energy-conservation measures that make sense for the facility, but must be centered on GHPs. For more information on GHP Super ESPCs, see www.eren.doe.gov/femp/financing/escp/geothermal_heat_pumps.html.

Electric utilities have also been strong proponents of GHPs, and many offer financing and services to federal agencies through utility energy service contracts (UESCs). Visit www.eren.doe.gov/femp/utility.html for information on UESCs.

Assistance from FEMP's GHP Core Team and Project Facilitators

FEMP's qualified, experienced project facilitators can guide you through the entire process of building an acquisition team and developing, implementing, and verifying savings from an energy project. Agencies that use FEMP project facilitators benefit from having an expert consultant and a "customer representative" in their corner when negotiating with private-sector partners. You can ask the FEMP representative in your DOE regional office to assign a FEMP project facilitator to help with your GHP project.

The FEMP GHP Core Team, based at Oak Ridge National Laboratory, can provide you with the most authoritative technical assistance on GHPs available anywhere. Working directly with your agency or

through FEMP project facilitators, the GHP team supports all kinds of federal GHP projects, whatever their funding source. The combination of project facilitators and the specialists from the GHP Team can provide whatever level of technical assistance you need, whether you're wholly inexperienced with GHP systems or just not quite ready to go it alone. The following are examples of the services available:

- Assistance in establishing criteria for selecting qualified engineers and design/build contractors for GHP projects
- Design reviews
- Reviews of equipment submittals
- Technical assistance during GHP system commissioning and acceptance

FEMP project facilitators supported by specialists from the GHP Core Team have the practical engineering design and construction experience to ensure that the job is done correctly.

Technical Tools and Resources

Besides providing support directly to agencies, the GHP Core Team develops GHP tools, guides, and other resources to make implementing GHPs easier and less expensive. These resources can be downloaded from the GHP pages on FEMP's web site at www.eren.doe.gov/femp/financing/escp/ghpresources.html.

For More Information

To get started with a GHP project or for more information, get in touch with one of the program or technical contacts listed below, or go to www.eren.doe.gov/femp/financing/escp/getting_started.html to contact the FEMP representative in your DOE Regional Office.

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