



# DOE–FEMP’s Geothermal Heat Pump (GHP) Technology-Specific Super ESPCs

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GHP Super ESPC Contracting Officer’s Rep  
Federal Energy Management Program



# GHP Tech-Specific Super Energy Savings Performance Contracts (Super ESPCs)

- Streamlined Super ESPC procurement
  - Financing
  - Access to private-sector expertise
- FEMP Services support
  - Contracting Officer's Reps
  - FEMP Project Facilitators
  - FEMP GHP Core Team



# GHP Super-ESPC ESCOs

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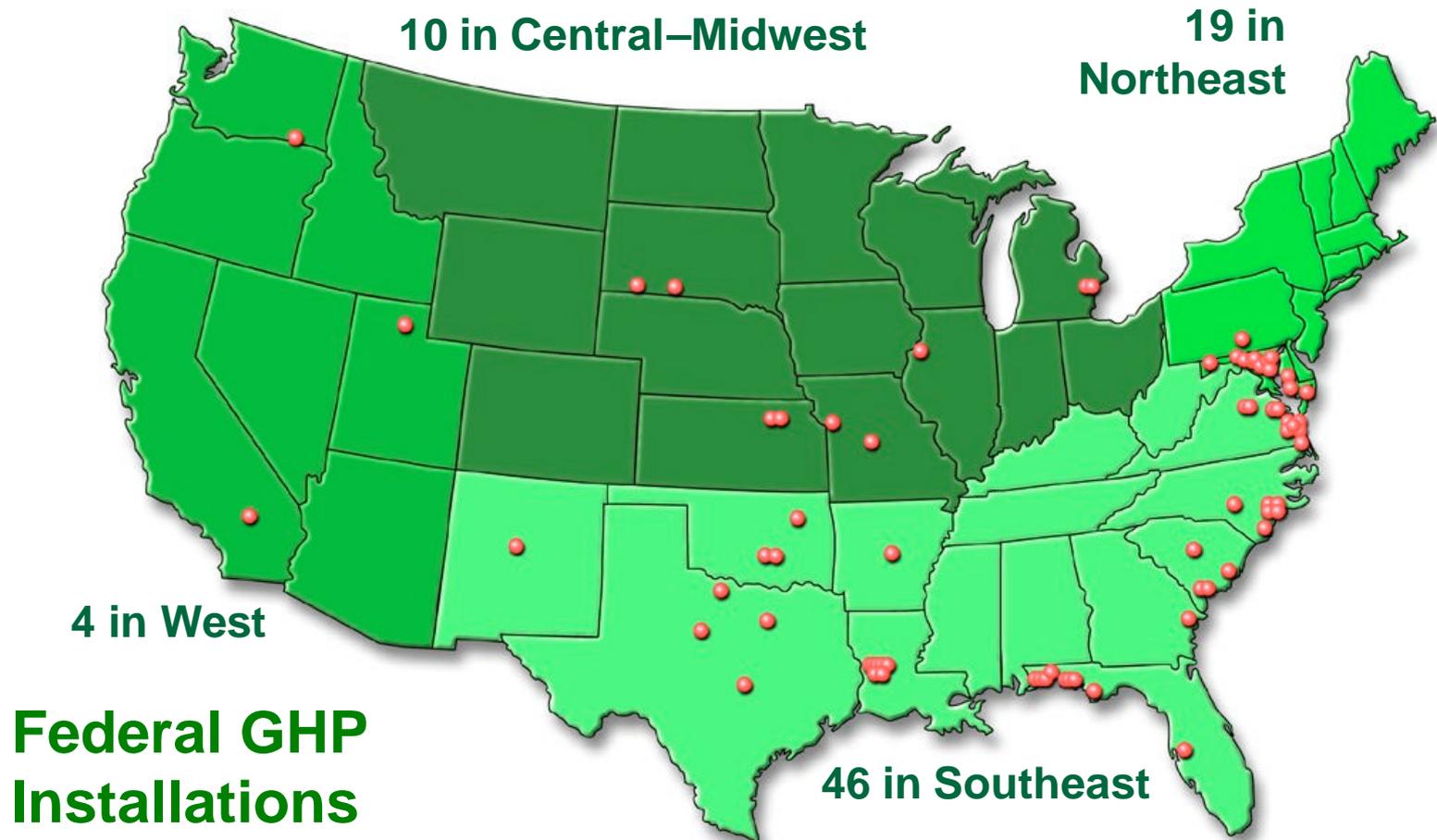
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[http://www.eere.energy.gov/femp/financing/espc/tech\\_contacts.html#ghp](http://www.eere.energy.gov/femp/financing/espc/tech_contacts.html#ghp)

GHPs are FEMP's most successful tech-specific program — federal investment in GHPs now totals more than \$200 million?





# \$55 Million in GHP Super ESPC Projects

- Patuxent River Naval Air Station \$4.8
- State Department, Seoul, Korea \$5.6
- Aberdeen Proving Grounds \$5
- Marine Air Corps Station Beaufort \$11.2
- Rock Island Arsenal \$7.8
- Carlisle Barracks, Army \$9.4
- Oceana Naval Air Station and Little Creek Amphibian Base \$8.2
- 8th Army, Korea \$2.8



# GHPs offer numerous advantages

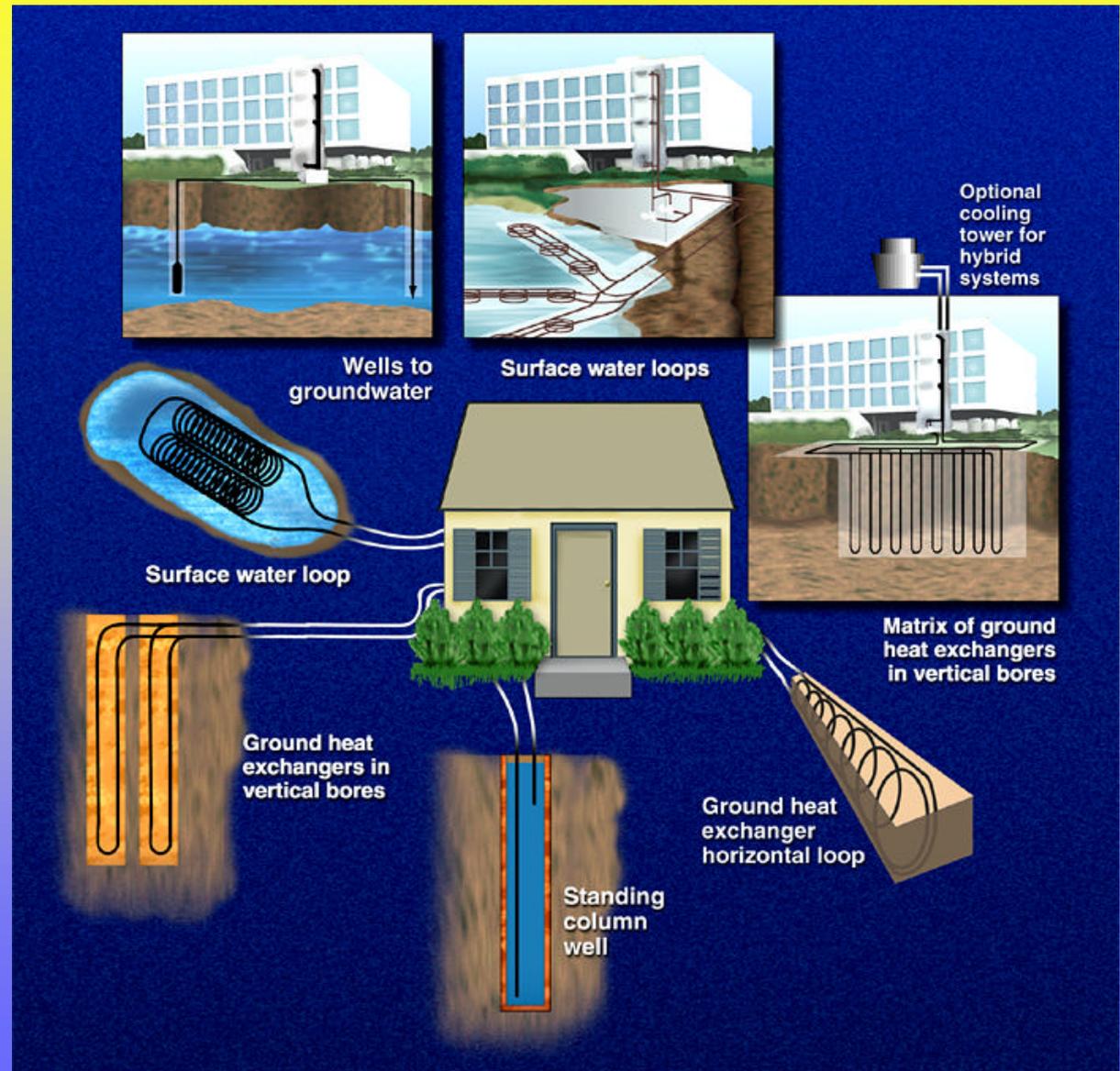
- Reduced energy cost
- Reduced energy demand
- Reduced maintenance costs
- Smaller machine room
- Simple if done right
- Low life-cycle cost
- Reliable, modular
- Improved comfort
- Recognition
  - Energy Star
  - LEED (1st Platinum)
- Progress on EO goals
  - Site energy reduction
  - Emissions reductions
  - Renewables

# GHPs are adaptable to almost any type of building —

residential or commercial

- Military family housing
- Barracks
- Office buildings
- Etc.

GHPs can be configured to fit a wide range of sites and circumstances





# Expertise of the GHP Core Team Ensures Success

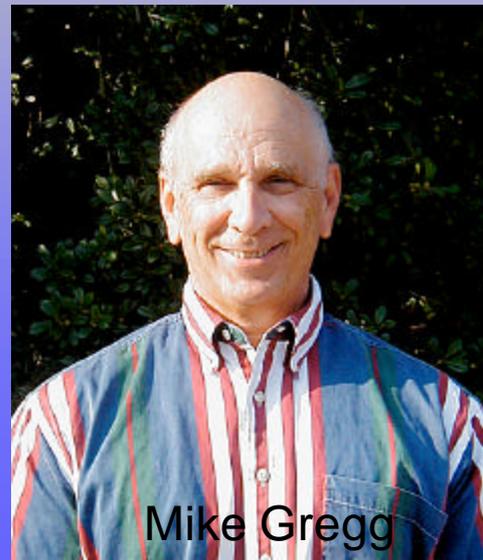
- Benefits of GHPs are achieved only when the technology is applied properly
- The standard tools of the trade and experienced suppliers and installers were not available for GHPs
- The core team helps to make GHPs just as easy for federal facilities to procure and install as more conventional ECMs



# GHP Core Team Strategy

- Provide support to FEMP project facilitators for Super ESPC projects
- Provide technical assistance to other projects
- Use project data and experience to
  - prove techniques
  - provide data for tools and guides
  - Resolve technical issues to assist federal sites
- Leverage work already done or ongoing by GHPC, IGSHPA, ASHRAE, others

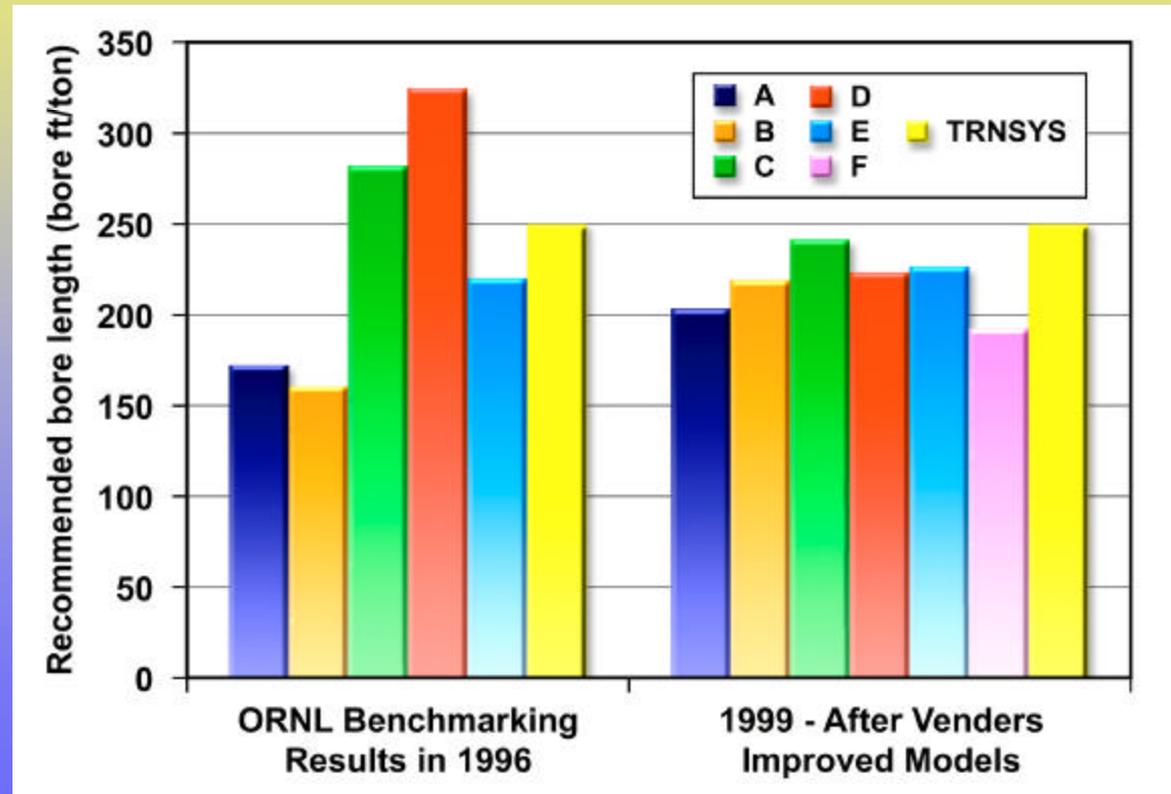
# GHP Core Team



- Lead – John Shonder  
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- Reviews of
  - Survey reports
  - In-situ test reports
  - Feasibility studies
  - Borefield sizing
  - Overall system design
  - Technical proposals
  - Price proposals
  - Baselines
  - Savings calculations
  - M&V

# Example of Technical Assistance: *Reliable Design Tools*

- **Ground loop size dominates system cost**
- ORNL benchmarked widely used sizing methods in 1996 — sizes varied by 100%.
- Spurred by ORNL's study, vendors improved their methods significantly by 1999.





# Success Story — Oceana Naval Air Station

- Investment — \$8,230,000 (GHP \$6,467,276)
- Price/Payment — \$14,785,546
- Incentive Fund Payment — \$823,000
- Construction Period Savings — \$588,000
- Savings — \$15,028,808



# Oceana Success Story

- ECM's — GHP, lighting, motors/drives, plug load, water, and HVAC
- Term — 14 years, 11 months
- Award Date — December 24, 2002
- Agency Contact — Bob Harvey



## Rules of Thumb

- Typical savings from replacing conventional HVAC systems with GHPs (total building energy use)
  - Nonresidential buildings — 15 - 25%
  - Residential — as high as 40%
- Spaces conditioned at least 40 hours per week are best candidates
- Replacing older, less efficient equipment is most economical

# Rules of Thumb

- Higher energy costs generally favor GHP economics
- Economics are improved by using waste heat generated during cooling (i.e., dumping heat into water heaters via desuperheaters)
- Bundling GHPs with ECMs with relatively short payback periods improves project economics
- Maintenance cost savings from GHPs are often significant and can make them the most cost-effective choice
- Capital cost is reduced if parts of existing system (i.e., ductwork) can be used with new GHPs



# Getting Started

- Contact Doug Culbreth
  - 919-870-0051
  - [carson.culbreth@ee.doe.gov](mailto:carson.culbreth@ee.doe.gov)
- Mini-feasibility studies can be done at no cost to the agency to determine whether GHPs will work at site
- Services of a FEMP project facilitator are **FREE** through the initial proposal stage



## **FEMP HQ Contacts**

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## **FEMP Web Site**

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