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## Federal and State Geothermal Heat Pump Incentives

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*Geothermal heat pump, ground source heat pump, Geo Exchange, tax*

### ABSTRACT

The Federal government and various State governments and utility organizations offer incentives for the installation of geothermal heat pump (GHP) systems. These incentives include tax credits and deductions, grants, loans and rebates, in addition to special electric rates and financing designed to offset first cost of GHP systems compared to conventional heating and cooling systems, as well as to improve the operational efficiency of electric utilities. While it is too early to assess the full impact of these incentives, industry participants project that GHP sales will increase dramatically. In order to make informed purchase decisions, potential GHP customers must understand the various incentives available. Likewise, GHP companies need to integrate these incentives into their marketing strategies and business plans in order to remain well aligned with rapidly changing market conditions.

### Introduction

Geothermal heat pump systems heat and cool buildings, and may also heat water for household or business use. (Note: geothermal heat pump systems do not generate electricity.) The US Environmental Protection Agency concludes that GHPs “are among the most efficient and comfortable heating and cooling technologies currently available.” Nevertheless, GHPs still represent less than 2% of the overall U.S. heating and cooling market. According to a recent report published by the U.S. Department of Energy’s Oak Ridge National Laboratory<sup>1</sup>, the primary barrier to rapid growth of the GHP market is the “high first-cost of GHP systems to consumers”. Further, the second most significant barrier is “lack of consumer knowledge and/or trust in GHP system benefits”. Incentives address both of these barriers by reducing the first-cost, and by under-pinning consumer confidence.

### Federal Legislation

As part of broader Federal initiatives to address energy and environmental objectives, a variety of incentives have been adopted into law. Equally significant are the amount of the tax credits and the length of time they are available. The current incentives are large enough to offset a significant percentage of the cost premium for GHP systems, and the credits extend through 2016, long enough for consumers to plan ahead and be able to count on the credit in making their design decisions. Further, the 8-year time horizon for this credit is long enough to encourage real estate developers and builders to incorporate GHP systems into their marketing strategies, as they struggle to differentiate themselves from their competition in a challenging real estate market. Finally, the 8-year time horizon is long enough to allow the GHP industry to develop the infrastructure needed to support a much larger GHP market, including manufacturing capacity and design and installation equipment and expertise.

**Residential** - Tax credits for residential installations of GHPs have increased from \$300 in 2005, to \$2,000 in 2008, and now 30% of “qualified geothermal heat pump property costs” from 2009 to 2016 (with no dollar cap).

The Federal residential GHP tax credit resulted from the combined effect of last October’s “Bailout Bill” (Public Law 110-343 the Energy Improvement and Extension Act of 2008) and last February’s “Stimulus Bill” (Public Law 111-5 the American Recovery and Reinvestment Act of 2009). Section 106 of Division B of the Bailout Bill amended Section 25D of the Internal Revenue Code by adding geothermal heat pump property to the existing personal income tax credit for “Residential Energy Efficient Property” that previously applied to solar systems. This law established a credit of 30% of “qualified geothermal heat pump property costs”, but limited the credit to \$2,000. In February, the Stimulus Bill removed the \$2,000 limit. Note that this credit applies to GHP equipment that meets Energy Star program requirements, but does not have to be for the taxpayer’s primary residence.

To take the credit, the homeowner files IRS Form 5695 with their income tax return. The IRS has not published the 2009 version of Form 5695 and has not issued detailed guidance on the ap-

plication of these tax credits as of June 2009, but they have issued Notice 2009-41 to provide initial guidance for implementation of this tax credit. As a result, at this time some questions remain as to the specific costs allowable in the calculation of the tax credit, including the ground heat exchanger, ductwork, etc. In addition, water-to-water GHP systems are not currently Energy Star qualified, but efforts are ongoing to address this issue.

In addition, Section 1332 of the Energy Policy Act of 2005 (Public Law 109-58) established a \$2,000 tax credit for the construction of new energy efficient homes. Qualifying homes must project annual heating and cooling energy consumption which is at least 50 percent below that of a comparable dwelling unit constructed in accordance with the International Energy Conservation Code. This tax credit is claimed on IRS Form 8908, is available during 2009 to “eligible contractors”, and the IRS has issued Notices 2008-35 and 2008-36 to provide additional guidance in the application of this credit.

**Commercial** – Section 105 of Division B of the Bailout Bill also modified Section 48 of the Internal Revenue code to establish a 10% tax credit for commercial GHP installations, available through 2016. The Stimulus Bill further enhanced this tax incentive by establishing equivalent grants that can be taken by taxpayers in lieu of the tax credit for property placed in service during 2009 or 2010. The tax credit is claimed on IRS Form 3468, and the Department of Treasury is currently developing the regulations to govern the grant program.

These incentives supplement an existing income tax deduction established by Section 1331 of the Energy Policy Act of 2005 and available through 2009. This provision established an IRC Section 179D tax deduction (not a tax credit) for energy efficient commercial buildings. The deduction is “equal to the cost of energy efficient commercial building property” up to a limit of \$0.60 per square footage of the building for “heating, cooling, ventilation, and hot water systems”. Note that other tax deductions are provided in the same law for interior lighting systems and the building envelope, for a total of \$1.80 per square foot. These deductions are subject to qualifications, including a 50% reduction in total annual energy and power costs compared to ASHRAE Standard 90.1, as certified by a qualified individual using software approved by the Department of Energy.

**Other** – Although not available to the general public, several other incentives for GHP deployment have been implemented by the Federal government.

The U.S. Department of Agriculture has been authorized through its Rural Utilities Service to provide long term competitive financing for energy efficiency programs operated by rural electric cooperatives, including geothermal ground heat exchangers.

The US Department of Energy’s Federal Energy Management Program administers the Energy Savings Performance Contract program for Federal agency facilities managers. This program allows Federal agencies to enter into long-term contracts with private 3<sup>rd</sup> parties (Energy Service Companies, or ESCOs) who use their own capital funding to install energy saving technologies in Federal facilities, to be repaid by the agencies with Operation and Maintenance funds saved as a result of the installed technologies.

Section 439 of the Energy Independence and Security Act of 2007 (Public Law 110-140) required the General Services

Administration to establish a program to accelerate the use of more cost-effective technologies and practices at GSA facilities, including geothermal heat pumps. Because the GSA is the world’s largest facility manager, this program will lead to the installation of more GHPs in GSA facilities and will promote the development of a more robust GHP industry infrastructure.

Finally, in addition to the above incentives and programs, as authorized by the Stimulus Bill, the Department of Energy announced \$50,000,000 of funding for their GHP program, including technology demonstration projects, data gathering and analysis and development of a national certification standard for the GHP industry.

**Pending Legislation** – As significant as all of the above Federal legislation is, energy legislation currently being debated in Congress could have even greater impact. The current version of the Senate Renewable Electricity Standard requires large electric utilities to obtain increasing percentages of electricity from renewable energy sources or energy efficiency. The proposed House climate change bill goes even further, including a similar Renewable Electricity Standard as well as a de facto national building energy efficiency code and a cap-and-trade system that would limit the emission of carbon. As currently proposed, any of these provisions would increase the cost of electricity and fossil fuel sources, providing significant incentives to utilize more efficient heating and cooling technologies like GHPs.

## State Incentives

A number of States have also adopted incentives to supplement the Federal programs, with corresponding processes for implementation. For example, the Georgia Environmental Facilities Authority administers the Georgia Clean Energy Property Tax Credit for Energy Star qualified GHPs, amounting to the lesser of 35% of the cost of the clean energy property or \$2,000 per dwelling unit. The Utah State Energy program administers a 25% residential and 10% commercial tax credit, with a limit of \$2,000 for residential systems and \$50,000 for commercial systems (and a reasonable cost limitation of \$4,000 per ton of installed GHP capacity). The Maryland Energy Administration manages a grant program not to exceed \$500 per ton of cooling capacity, limited to \$3,000 for residential systems and \$10,000 for commercial systems. The Oklahoma legislature is considering a bill that would establish a 5% income tax credit for both residential and commercial GHP system installations. These incentives typically apply in addition to Federal and utility incentives, in some cases reducing GHP system costs to levels comparable to conventional heating and cooling systems.

## Utility Incentives

Geothermal heat pump systems generally increase the kilowatt-hour sales of electric utilities at the same time that they reduce the utilities’ peak electric loads. This combination allows electric utilities to operate more efficiently and avoid costs for additional electric generation and distribution systems. As a result, some utilities have implemented GHP system incentives or pursued GHP loop leasing (or tariff) activities. GHP incentives may include assistance with feasibility studies and design for GHP systems,

training of local contractors for GHP system installation, special (lower) electric rates for customers with GHP systems, and rebates of a portion of GHP system costs. For example, Gulf Power offers a \$400 per ton incentive for single-family or multi-family dwellings. Connecticut Light & Power administers a program of the Connecticut Energy Efficiency Fund to provide a 2009 rebate of \$500 per ton with a limit of \$1,500. Delta-Montrose Electric Association in Colorado has installed about 500 residential GHP systems and now offers a Geothermal Loop Tariff under which it installs, owns and maintains the ground loop much the same as it manages its electric distribution system. The customer pays a flat monthly fee for the ground loop and avoids the costs of installing and maintaining it. Likewise, Plumas-Sierra Rural Electric Cooperative in California offers a geothermal loop lease program using a 30-year interest-free loan with a fixed monthly charge.

### Projected Impact on GHP Market

The US Department of Energy's Energy Information Administration publishes an annual report of GHP shipments. The latest report indicates that from 2002 to 2007, GHP shipments increased by 132%, and that the residential and commercial GHP markets are about the same size. States with the largest number of installations include Illinois, New York, Pennsylvania, Ohio and Indiana. Many of these States have provided incentives or implemented other programs to promote GHP technology. Market participants anticipate that current GHP incentives will significantly close the gap between the initial cost of GHP systems and conventional

heating and cooling systems, and thus lead to continued acceleration of GHP installations.

Finally, the Oak Ridge report highlighted two key issues that continue to impede the widespread adoption of GHP systems:

- Federal legislation continues to limit the qualification of GHPs in meeting renewable energy standards
- The primary GHP market failure is the expectation that building owners should finance the GHP infrastructure, or outside-the-building portion of the GHP system, such as the ground heat exchanger. GHP infrastructure will outlive the building and many generations of heat pumps, and is akin to utility infrastructure (poles and wires, underground natural gas piping). This begs the question—why do we expect building owners to finance GHP infrastructure on their own credit, but not other utility infrastructure?

These two barriers could be addressed by assuring that future policies assign GHP systems with appropriate credit for the renewable energy they provide, and by developing programs to provide universal availability of GHP ground loop infrastructure the same way that electric and gas utility infrastructure is made available.

### Reference

- <sup>1</sup>Hughes, PJ, 2008. "Geothermal (Ground-Source) Heat Pumps: Market Status, Barriers to Adoption, and Action to Overcome Barriers" Oak Ridge National Laboratory