

# Tax Credits and Accelerated Depreciation for Energy Efficient and Environmentally Beneficial Geothermal Heat Pumps

Submitted by the Geothermal Exchange Organization (GEO)  
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## Summary

Buildings are the largest single sector of total U.S. energy consumption. Geothermal heat pumps (GHPs) can efficiently and significantly reduce the heating and cooling loads of buildings, with positive benefits for our environment and economy. Yet GHPs claim less than 2% of the heating, ventilation and air conditioning (HVAC) industry marketplace.

Among competitive barriers to the nascent GHP industry, higher “first cost” is most problematic. Congress recognized GHP economic and environmental benefits when they amended the Internal Revenue Service (IRS) Code in 2008 with tax credits for commercial and residential GHP installations. The credits helped prevent a decline in GHP installations during the recent recession. Sales remain lower due to lagging business recover, home construction and sales, and lack of consumer awareness.

It will take time for the GHP industry to overcome short-term economic factors, and to increase its market share to the point where it will no longer need tax credit support. ***For these reasons, the GHP industry asks Congress to extend IRS Code sections 48(a) and 25D until the end of 2020.***

## Geothermal Heat Pump Systems

Buildings are the largest single opportunity available for cutting thermal loads and improving the demand-side efficiency of electrical energy use. According to the U.S. Department of Energy (DOE), buildings are the largest single sector of total U.S. energy consumption, accounting for 41% of primary energy use in 2010. Approximately 24% of the nation’s total energy use is for space heating, cooling and water heating.

This “thermal load” in commercial, business, industrial, institutional and residential buildings represents a huge cost, both in terms of energy supply and environmental damage. Energy efficient heating and cooling systems like GHPs can greatly benefit both by tapping abundant, free renewable energy in the ground under our feet.

GHPs—or ground source heat pumps—are a unique renewable energy technology that is available today, and has great potential to dramatically reduce the thermal energy demands of buildings across the United States.

A GHP is a central heating and cooling system that pumps heat to or from the ground instead of the air like conventional HVAC systems. GHPs take advantage of moderate temperatures in the ground to boost efficiency and reduce operation costs. During the winter, GHPs transfer heat energy from the ground to buildings for warmth. In the summer, they provide cooling by exchanging unwanted heat from buildings back to the earth, while providing free hot water.

GHPs hold profoundly positive potential for energy efficiency, lowering costs and preserving our nation’s environment. According to the U.S. Environmental Protection Agency (EPA), “GHPs are

among the most efficient and comfortable heating and cooling technologies currently available...” In addition, EPA’s Energy Star program website says that, “...qualified geothermal heat pumps are over 45 percent more energy efficient than standard options.”

Yet despite their potential benefits, GHPs are still a relatively nascent technology that has been slow to catch a foothold in the broader HVAC market. At current rates of installation (<100,000 average 3-ton capacity residential units per year), GHPs represent less than 2% of the total HVAC marketplace. Reason? Higher “first cost” incurred by drilling or excavation to place its ground-source heat exchange loop system near the building(s) which a GHP system serves.

## **Federal Tax Credits for GHP Systems**

Recognizing the important and potentially far-reaching economic and environmental benefits of GHPs—and to assist broader and more rapid deployment by helping reduce the first cost barrier—the U.S. Congress amended the Internal Revenue Code in 2008 to include tax credits for commercial and residential GHP installations.

Those credits were enhanced by Congress in 2009 under IRS Code section 48(a), which allows a tax credit equal to 10% of qualified expenditures of GHP systems for commercial buildings, plus provisions for scheduled 5-year depreciation of GHP installations. For homeowners, IRS Code section 25D currently allows individuals to claim a tax credit equal to 30% of qualified expenditures incurred for installation of an Energy Star-rated GHP at their residence. Both GHP tax credits are set to expire on Dec. 31, 2016.

With their life-cycle energy cost savings, the federal tax provisions make GHP systems more attractive to both commercial and residential HVAC consumers. The tax credits helped the GHP industry maintain sales during the recent tough recession and its aftermath for the housing industry, and would go far in helping GHPs win greater market share as a reviving economy spurs new development and construction. And more GHPs mean more benefits accrued to building owners and the nation with the renewable energy they produce; energy cost savings; flattening of electric utility load patterns; and reduction of pollution from burning fossil fuels.

## **GHP Benefits for Consumers and the U.S. Economy**

GHPs are truly American products that not only save money and protect the environment, but create jobs across the country.

- According to DOE, nearly three quarters of building owner’s monthly energy bills is for heating, cooling and producing hot water. GHPs can reduce residential and commercial heating and cooling bills by 40 to 70 percent. That money flows back into the pockets of consumers, bolstering the larger economy.
- GHP industry expansion will create new jobs in “green” manufacturing and ancillary products, as well as marketing, sales, system design, and installation of GHPs.

- GHPs are “Made in the USA,” with thousands of U.S. employees involved in manufacturing, distribution and sales. Thousands more employees across a variety of industries provide necessary products and services, including plastic pipe, tools and equipment, installation, engineering, drilling and excavation—jobs that can’t be outsourced to other countries.

## **GHP Renewable Energy and Efficiency Benefits for Utilities**

GHPs create unique opportunities for electric utilities to conserve power and reduce pollution, while promoting use of renewable energy. By utilizing GHPs, every electric utility in the country can improve its load factors; mitigate power price increases; reduce the strain on transmission grids; forestall the need for new generation capacity; reduce carbon emissions; and foster satisfied ratepayers with improved conditioned space.

- For every unit of energy used to power a GHP, 3 to 5 times more energy is produced by the exchange of thermal energy just below the earth's surface. GHPs provide highly efficient on-site (distributed) renewable energy for consumers.
- Renewable energy produced from the ground by GHPs can reduce the amount of electricity and pollution produced by coal- and natural gas-fired power plants.
- GHPs reduce utility peaks during the summer, and build load during the winter. This levels out demand throughout the year, helping make utility operations more efficient.
- GHPs avoid thermal loads for conventional energy suppliers. Every BTU of energy that a GHP produces from the ground eliminates a BTU that must be provided by an electric-powered heating or cooling system. In those terms, every megawatt of electricity that does not have to be generated due to the energy savings offered by GHPs is the equivalent of a “Negawatt.”
- GHPs help reduce the need for polluting power plants and costly transmission lines. According to Oak Ridge National Laboratory, every ton of installed GHP capacity equals 0.65 kilowatts of avoided electricity generation capacity.
- Current federal tax credits are integral to developing interest by utilities in GHPs. The industry encourages utility ownership of ground loop heat exchangers. By owning the loops, utilities reduce power demand as they avoid high, capital-intensive costs of building generation plants and transmission lines.

## **GHP Environmental Benefits for the Nation**

According to DOE’s Office of Geothermal Technologies, nearly 40% of all U.S. carbon emissions are a result of using energy to heat, cool and provide hot water for buildings. This number nearly equals emissions from all the cars, trucks and trains in America.

- GHPs have unsurpassed thermal efficiencies and produce local zero emissions. They produce 3 to 5 times the energy they consume.
- EPA says that GHPs can reduce energy consumption—and corresponding emissions—up to 44% compared to conventional air-source heat pumps, and up to 72% compared to electric resistance heating with conventional air-conditioning equipment. Recent advances in GHP efficiencies only buttress these facts.

- GHPs offer significant fossil-fuel emission reductions potential, particularly where they are used for both heating and cooling—and when electricity is produced from renewable resources.
- A 3-ton GHP system produces approximately one pound less carbon dioxide per hour than a conventional HVAC system.
- According to Oak Ridge National Laboratory, 100,000 average GHP installations reduce greenhouse gas emissions by almost 1.1 million metric tonnes of carbon during their average 20-year life spans. That’s the equivalent to taking nearly 60,000 cars off the road or planting over 120,000 acres of trees.

## **GHP Federal Tax Credit Program Success**

Even with all its potential benefits to the country, the nascent GHP industry claims less than 2% of the HVAC marketplace in the United States. Though approximately 2 million GHP systems have been installed—and Energy Star-endorsed GHP equipment efficiencies are better than ever—many competitive barriers remain for the industry. As already noted, foremost among these barriers is higher “first cost.”

During the recession, the federal tax credits for GHP systems helped prevent a crash in GHP installations. Though more recent GHP sales have declined, the industry believes this can be attributed to still lagging home construction and sales, as well as continued lack of consumer awareness. As the housing economy improves, the tax credits will reduce first cost and allow GHPs to make significant contributions to efficient heating and cooling in new and retrofit projects of all sizes.

With improving sales and installations will come greater recognition of GHPs, and an expanding HVAC market share. With that, the positive impact of the federal tax credit program will be assured. Indeed, the GHP tax credits are already helping the nation with consumer cost savings, good jobs, more efficient energy use, enhanced electric utility operations, improved air quality and a better environment for all Americans.

Even so, it will take time for the geothermal heat pump industry to increase its market share from 2% to 20% or higher for the industry to move beyond its need for tax credit support. In the interim, Congress can help the GHP industry achieve greater market share by extending IRS Code sections 48(a) for business and commercial installations, and 25D for residential GHP applications, to the end of 2020.

Respectfully Submitted,



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*GEO—the Geothermal Exchange Organization—is the Voice of the U.S. Geothermal Heat Pump Industry. GEO is a non-profit trade association representing the interests of its members through outreach to government and the public about the economic and environmental benefits of geothermal heat pumps. For more information, visit [www.geoexchange.org](http://www.geoexchange.org).*