Keith Key, P.E.

Huntsville, AL
256-277-1992
kkey@geoengr.com
What You See
- Thermostat
- Outdoor Unit

What You Don’t See
- Efficiency
- Warranty
- Product
- Duct System
- Quality of Installation
1 Ton = 12,000 btus
Air Conditioning System

Air Handler (Indoors)

Refrigeration Lines

Condenser (Outdoors)
AIR SOURCE HEAT PUMP
HEATING EFFICIENCY

$1 Energy → $3 for heating

$2 Energy from the Air
Geothermal or Ground Source Heat Pump
Geothermal Cooling Mode
Geothermal Heating Mode
Geothermal Solar Collector
GEOTHERMAL HEATING EFFICIENCY

$1 Energy $4 Geothermal Energy $5 worth of heating
What is a Geothermal Heat Pump?
Approximate
EER vs SEER
Comparison
Geothermal Loops

- Closed Loops
  - Horizontal
  - Vertical
  - Pond/Lake

- Open Loops
  - Well water
Vertical Bore

Vertical Earth Loop—Multiple Bore Parallel
Bore Drilling
Polyethylene Pipe
Horizontal Earth Loop—Slinky Style
TVA closing 8 coal units at plants in Ala. and Ky.

By TRAVIS LOLLER
— Nov. 15, 2013 4:39 AM EST

FILE - In a Wednesday Nov. 30, 2011 photo, Donald Crabtree, a Tennessee Valley Authority project manager from Stevenson, Ala., leads a media tour around the old Bowling Green, Ky., power plant on Power St., which was torn down to allow for TVA expansion. The Tennessee Valley Authority's board voted Thursday, Nov. 14, 2013, to close six more coal-powered units in Alabama and replace two more in Kentucky with a new natural gas plant. (AP Photo/Daily News, Alex Slitz)

The nation's largest public utility is shuttering eight coal-fired boilers at plants in Alabama and Kentucky, and more reductions could be in store over the next few years.

The Tennessee Valley Authority relied on coal to generate a majority of its electricity for decades, but at a Thursday board meeting in Oxford, Miss., CEO Bill Johnson said he hopes to reduce coal to just 20 percent of the utility's portfolio over the next decade. It currently stands at 38 percent.
Putting a geoexchange system in a typical home is equal, in greenhouse gas reduction, to planting an acre of trees.

Source: Geothermal Heat Pump Consortium  www.geoexchange.org

Putting a geoexchange system in a typical home is equal, in greenhouse gas reduction, to taking two cars off the road.

Source: Geothermal Heat Pump Consortium  www.geoexchange.org
US Environmental Impact

- Nearly 1,295,000 cars taken off the road
- More than 385 million trees planted
- Reduce reliance on imported fuels by 21.5 million barrels of crude oil per year
UNDERSTANDING THE
FEDERAL TAX INCENTIVES
for RESIDENTIAL GEOTHERMAL HEAT PUMPS
The Energy Credit

In October 2008, geothermal heat pumps were added to section 25D of the Internal Revenue Code. This created a 30% tax credit for costs associated with qualified geothermal equipment “placed in service” through the end of 2016. Property is usually considered to be placed in service when installation is complete and equipment is ready for use. However, if the system is part of the construction or renovation of a house, it’s considered placed in service when the taxpayer takes residence in the house.

- 30% of total system cost
- No limit to credit amount for 2009 and beyond
- Can be used to offset AMT tax
- Can be used in more than one year
- Can be combined with solar and wind tax credits
- Can be combined with energy efficiency upgrade credits

What’s Eligible

Geothermal equipment that uses the stored solar energy from the ground for heating and cooling, and that meets Energy Star requirements at the time of installation is eligible for the tax credit. Covered expenditures include labor for onsite preparation, assembly, or original system installation and for piping or wiring to connect a system to the home. The structure must be located in the United States and used as a residence by the taxpayer, although primary residency isn’t required. In fact, if geothermal is installed in more than one home, there’s no limitation on the number of times the credit can be claimed.

What’s Not

The credit can’t be claimed for spending on equipment used solely for hot tub or pool conditioning, nor on previously used equipment.

How to claim the Credit

Use IRS Form 5695 (2008) to claim the Residential Energy Efficient Property Credit for 2008. Form 5695 for 2009 has not been published yet. For systems completed in 2008, the maximum tax credit is capped at $2,000. For property placed in service after the start 2009, there’s no limit on the credit amount. The tax credit can be used to offset both regular income taxes and alternative minimum taxes (AMT). If the federal tax credit exceeds tax liability, the excess amount may be carried forward into future years. Spending on geothermal heat pump property adds to your home’s cost basis, but also must be reduced by the amount of the tax credit received.
# Residential Energy Credits

**Part I** Residential Energy Efficient Property Credit (See instructions before completing this part.)

**Note. Skip lines 1 through 11 if you only have a credit carryforward from 2012.**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Qualified solar electric property costs</td>
</tr>
<tr>
<td>2</td>
<td>Qualified solar water heating property costs</td>
</tr>
<tr>
<td>3</td>
<td>Qualified small wind energy property costs</td>
</tr>
<tr>
<td>4</td>
<td>Qualified geothermal heat pump property costs</td>
</tr>
<tr>
<td>5</td>
<td>Add lines 1 through 4</td>
</tr>
<tr>
<td>6</td>
<td>Multiply line 5 by 30% (.30)</td>
</tr>
<tr>
<td>7a</td>
<td>Qualified fuel cell property. Was qualified fuel cell property installed on or in connection with your main home located in the United States? (See instructions)</td>
</tr>
<tr>
<td>b</td>
<td>Caution: If you checked the &quot;No&quot; box, you cannot take a credit for qualified fuel cell property. Skip lines 7b through 11.</td>
</tr>
<tr>
<td></td>
<td>Print the complete address of the main home where you installed the fuel cell property.</td>
</tr>
<tr>
<td>Number and street</td>
<td>Unit No.</td>
</tr>
<tr>
<td>City, State, and ZIP code</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Qualified fuel cell property costs</td>
</tr>
<tr>
<td>9</td>
<td>Multiply line 8 by 30% (.30)</td>
</tr>
<tr>
<td>10</td>
<td>Kilowatt capacity of property on line 8 above (x $1,000)</td>
</tr>
<tr>
<td>11</td>
<td>Enter the smaller of line 9 or line 10</td>
</tr>
<tr>
<td>12</td>
<td>Credit carryforward from 2012. Enter the amount, if any, from your 2012 Form 5695, line 18</td>
</tr>
<tr>
<td>13</td>
<td>Add lines 6, 11, and 12</td>
</tr>
<tr>
<td>14</td>
<td>Limitation based on tax liability. Enter the amount from the Residential Energy Efficient Property Credit Limit Worksheet (see instructions)</td>
</tr>
<tr>
<td>15</td>
<td>Residential energy efficient property credit. Enter the smaller of line 13 or line 14. Also include this amount on Form 1040, line 52, or Form 1040NR, line 49</td>
</tr>
<tr>
<td>16</td>
<td>Credit carryforward to 2014. If line 15 is less than line 13, subtract line 15 from line 13</td>
</tr>
</tbody>
</table>
Questions ?