Geothermal Heat Pump
Federal Legislative Successes

HR 2990
- 30% of system cost homeowner investment tax credit - $2000 cap
- 10% of system cost business investment tax credit – no cap
- 42 bipartisan cosponsors

S. 2314
- Mirrors HR 2290
- 20 bipartisan cosponsors

SUCCESS! HR 1424 – Just 2 days after Nashville
- Includes 8 years of HR 2990 provisions for geothermal heat pumps
- Signed into law on October 3rd 2008

RIGHT PLACE, RIGHT TIME! HR 1 (Stimulus Bill)
- The American Recovery and Reinvestment Act of 2009 (ARRA)
- Removed $2000 cap for residential
- Adds outright grant in lieu of tax credit for businesses
- Signed into law on February 17th 2009
Geothermal Heat Pump
Residential Tax Incentives

Federal Income Tax Credit:

- 30% of total GHP system cost
- Credit capped at $2000 for 2008
- Credit unlimited for 2009 thru 2016
- Can be used to offset AMT tax
- Can be combined with other tax credits
- Can be used in more than one year

Eligibility:

- Home must be located in the U.S.
- Includes houses, cooperatives, condos, mobile homes
- Does not have to be your main home
- GHP must meet Energy Star requirements
- Placed in service between 1/1/2008 and 12/31/2016
Geothermal Heat Pump
Business Tax Incentives

Federal Income Tax Credit:

- 10% of total GHP system cost
- Credit is not limited
- Can be used to offset AMT tax
- Can be used in combination with subsidized financing
- Can be used in more than one year

Accelerated Depreciation:

- 5 year MACR depreciation for entire GHP system
- Eligible for bonus depreciation in 2009 (50% write-off in first year)

Eligibility:

- Building located in the U.S.
- Original use begins with taxpayer
- Placed in service between 10/3/2008 and 12/31/2016
- Can be used by regulated utilities
- Must be claimed by the owner of the property (effects non-taxable)
**Example Commercial GHP Economics**

Geothermal HVAC Cost: $300,000 50 tons at $6000 per ton
Conventional HVAC Cost: $125,000 50 tons at $2500 per ton
Additional Cost: $175,000

Income Tax Rate: 35%
Energy Credit: 10%
Utility Rebate: $15,000 50 tons

Annual Energy Cost Savings: $20,000 $1 per sq ft per year
Energy Inflation: 3%

<table>
<thead>
<tr>
<th>Year</th>
<th>Added Cash Outlay</th>
<th>Energy Credit Tax Benefit</th>
<th>Depreciation Tax Benefit</th>
<th>Energy Cost Saved</th>
<th>Annual Cash Flow</th>
<th>Cumulative Cash Flow</th>
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</table>

Depreciation reduces 7 yr payback to 1.5 yrs!

Simple Payback: 1.5 yr
IRR: 57%
Geothermal Heat Pump
Tax Incentive Issues and Concerns

Residential:

- Water-to-water units excluded by IRS
- Hot water generation required for Energy Star qualification
- Un-founded confusion with air-source heat pump tax incentives
  ~ only for existing homes - NO
  ~ matched system requirement for splits - NO
  ~ loss of AMT exclusion in 2010 - NO
- Grey Areas
  ~ dedicated water heating unit
  ~ duct system
- Future guidelines by IRS likely

Business:

- Dedicated water heating units
- Non-taxable owners
- Future guidelines by IRS likely
Questions and Confusion....

- IRS asking questions of EPA
  - Is loop included? (loop is not Energy Star qualified)
  - Is ductwork included? (you need it anyway)

- Contractors asking questions of IRS
  - Are lake construction costs included?
  - Are surface water loops included at all?
  - Are radiant floor heat systems included?
  - Be aware of who you are asking!
    - 800 number IRS tele-responders are not tax experts
    - You risk awaking a sleeping dog
    - Forgiveness is much easier than permission
Geothermal Heat Pump
Tax Incentive Issues and Concerns

Solutions Sought

- Amendments to law
  - Change “equipment” to “property’
  - Add hot water heating
  - Add surface and reclaimed water
  - Add ducts
  - We were directed to JCT for scoring

- Clarification by JCT or IRS
  - Discussed same matters
  - Hit a brick wall with JCT and quit while we were ahead

- Revise Energy Star GHP specification
  - Not easy, but this route was our best option
Geothermal Heat Pump
Energy Star FAQ Information

Is there a tax credit for water-to-water geothermal heat pumps?

Currently, water-to-water geothermal heat pumps cannot qualify for the tax credit, because the law requires geothermal heat pumps to be ENERGY STAR qualified for the tax credit.

EPA is in the process of revising the ENERGY STAR geothermal heat pump specification. Water-to-water geothermal heat pumps are included in the draft specification.
Does a geothermal heat pump have to include water heating to qualify for the 30% tax credit?

The current ENERGY STAR specification requires some or all of the domestic water heating be provided through the use of:
  • a desuperheater
  • an integrated demand water heater or
  • a separately installed compressor that provides demand water heating.

EPA is in the process of revising the ENERGY STAR geothermal heat pump specification. The water heating requirement is removed in the draft specification.
What parts of a geothermal heat pump are covered by the tax credit?

The majority of the geothermal heat pump property and it's installation is covered by the 30% tax credit.

There may be some add on components that will not be covered such as an emergency back up system and the ducts. These components are not directly related to the efficiency of the covered geothermal heat pump property.
Are installation costs covered by the tax credits?

The tax credit for geothermal heat pumps is 30% of the total cost (product + installation), **with no upper limit.**

The law specifies installation costs include: "labor costs properly allocable to the onsite preparation, assembly, or original installation of the property and for piping or wiring to interconnect such property to the home."
Are the energy efficient tax credits limited by the Alternative Minimum Tax (AMT)?

"Section 25 D" products (which include geothermal, solar, and wind, at 30% with no upper limit) are NOT limited by the AMT at all.
Geothermal Heat Pump
Energy Star 3.0 Specification

Proposed Effectivity is December 1, 2009

- Public Comment Period Over

New Manufacturer Commitments

- Use trained loop installers that offer 2 yr warranty
- Promote use of GHP hot water heating capabilities
  ~ no longer mandatory

New Definitions

- Broad and clear definition of a GHP
- Broad and clear definition of loop configurations
- Water-to-water added
Geothermal Heat Pump
Energy Star 3.0 Specification

GHP Definition

- Provides space conditioning and/or water heating
- Water-to-air, water-to-water, GDX
- Provided in one or more assemblies
- Can incorporate pumping, storage, air cleaning, humidity control
- System consists of GHPs, GHX, distribution system, controls, storage

GHX Definition

- Horizontal, Vertical, or surface water closed loops
- Ground water, surface water, or reclaimed water open loops
- GDX loops buried or submerged in surface water
Geothermal Heat Pump
Energy Star 3.0 Specification

New GHP Requirements

- 2 yr all parts and 5 yr major parts warranty with labor
- 14.1 EER goes to 16.1 EER in 2010 and 17.1 EER in 2012
- 3.3 COP goes to 3.5 COP in 2010 and 3.6 COP in 2012
- Must be AHRI certified starting in 2010
Geothermal Heat Pump
Other Stimulus Incentives

Small Business:
- $250,000 in section 179 immediate expensing for 2009

Schools:
- $22 billion in tax-exempt construction bonds
- $39.5 billion in additional funding to local school districts

Energy:
- 30% tax credit ($1500/yr cap) for home efficiency upgrades in 09-10
- $2000 energy efficient home tax credit for builders
- $1.80 per sq ft energy efficient commercial building tax credit
- $6.3 billion in energy efficiency and conservation grants
- $5.0 billion in weatherization assistance
- $4.5 billion to upgrade Federal building energy efficiency
- $6.5 billion to military bases to modernize and improve efficiency
- $4.0 billion to improve public housing and upgrade efficiency
- $45 million specifically for GHP technology (asked for $40 million)
Current Federal Policy Initiatives
Buildings Dominate U.S. Energy Use and Carbon Emissions with Heating, Cooling, and Water Heating being the Largest Contributors

- 43% of U.S. Carbon Emissions
  - Industry: 377 MMTC (26%)
  - Buildings: 668 MMTC (43%)
  - Transportation: 482 MMTC (32%)

- 71% of U.S. Electricity

- 53% of U.S. Natural Gas

- 39% of U.S. Primary Energy Consumption

Thermal Loads

- Heating: 9.2%
- Cooling: 4.3%
- Hot Water: 3.8%
- Total: 17.3%

~ 20% of all U.S. Carbon Emissions
Potential of Demand-Side Efficiency

Global CO₂ Emissions Outlook – IEA 2006

65% EE
“The Fruit on the Ground”
Current Federal Policy Initiatives

- **RPS and EEPS**
  - RPS does not include “thermal” technologies at present
  - EEPS is “electricity-only” at present
    - No consideration of GHP FF savings
    - Same issues exist at state level in EE program rules
    - We are caught up in the “fuel switching” battles

- **Cap and Trade**
  - No direct incentive for GHPs at present
  - Will increase natural gas and electricity prices
  - Will put a “market” price on carbon emissions
  - Refrigerant (R410a) is a direct hit (cap cost and phase down)
  - Free emission allowances are where the action will be
    - Who gets them? (being used to garner Senate votes)
    - How will the beneficiaries use them?

- **Other Energy Bill Provisions**
  - Programs to improve retrofit lending availability
  - Strengthen efficiency standard levels, scope, and timing
  - Tougher building codes
  - Building energy labeling (new and existing)
Current Federal Policy Initiatives

- **Regional Minimum Efficiency Standards**
  - 14 SEER in <5000 DD Climates (12.2 EER in West) in 2015
  - 90% AFUE in > 5000 DD Climates in 2013
  - Agreement between AHRI, ACEEE, ASE, CEC at present

- **Building Codes (new IECC Baseline by 2013)**
  - 15 SEER in <5000 DD Climates (12.5 EER in West)
  - 14 SEER in >5000 DD Climates (15 SEER HP)
  - 90% AFUE everywhere (92% in >5000 DD and West)

- **Building Codes (IECC and ASHRAE 90.1)**
  - In 2010, 30% below old baseline of IECC 2006 and ASHRAE 90.1-2004
  - In 2015, 50% below old baseline
  - Every 3 years thereafter additional 5% below old baseline
  - Baseline calculations will drive use of HERS ratings and RESNET raters
How Should GHPs Fit Into Energy Policy?
### How do GHPs Impact Energy Use?

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Geothermal</th>
<th>Heat</th>
<th>Cool</th>
<th>HW</th>
<th>Heat Pump</th>
<th>Heat</th>
<th>Cool</th>
<th>HW</th>
<th>Natural Gas</th>
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<tbody>
<tr>
<td></td>
<td></td>
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<td>MWh</td>
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If GHP benefits are looked at in terms of MWh only we don’t fare well.
# How do GHPs Impact Carbon Emissions?

<table>
<thead>
<tr>
<th>Main Heating Fuel Type</th>
<th>Geothermal</th>
<th>Baseline</th>
<th>Heat Pump</th>
<th>Natural Gas</th>
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<td>MWh</td>
<td>CO₂e</td>
<td>MWh</td>
<td>CO₂e</td>
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<td>8.6</td>
<td>17.0</td>
<td>33.2</td>
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<tr>
<td>OR Portland</td>
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<td>2.3</td>
<td>10.0</td>
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<td>8.2</td>
<td>15.2</td>
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<td>12.3</td>
<td>8.4</td>
<td>15.4</td>
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In total carbon emissions we fare extremely well.
How do GHPs Impact Carbon Emissions?

### Annual \( \text{CO}_2 \text{e} \) Emissions

2000 Sq. Ft. Existing Home

<table>
<thead>
<tr>
<th>Census Region</th>
<th>Housing Units (millions)</th>
<th>Baseline ( \text{CO}_2 \text{e} ) Emissions (Mtons/yr)</th>
<th>Geothermal ( \text{CO}_2 \text{e} ) Emissions (Mtons/yr)</th>
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<td>Weighted Average</td>
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Carbon estimated to trade for $10 - $100 per metric ton per year
What is the Societal Cost for the GHP Benefits?

- Average for U.S. Grid Electricity is 11.4 ¢/kWh
- Average for Solar Electricity is 16 to 30 ¢/kWh
- Average for Wind Electricity is 8.5 ¢/kWh
- Average for Geothermal Steam Electricity is 6.5 ¢/kWh
- Average for Residential GHP is 5 ¢/kWh (2.7 ¢/kWh w/ incentives)
- Average for Commercial GHP is negative 4.1 ¢/kWh (negative 4.6 ¢/kWh w/ incentives)
What is our Greatest Challenge?

To get this message out there!
Questions?