Pennsylvania Public Utility Commission
ARRA Technical Conference
November 19, 2009
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Three times more energy reaches the customer with natural gas.

**Electricity**

- Source Energy: 100 MMBtu
- Extraction, Processing & Transportation: 95
- Conversion¹: 34
- Distribution: 32
- Delivered To Customer: 32

CO₂ emissions from typical household use*: 1.4 tons

CO₂ emissions: 10.1 tons

**Natural Gas**

- Source Energy: 100 MMBtu
- Extraction: Not Applicable
- Distribution: 93
- Delivered To Customer: 92

CO₂ emissions from typical household use*: 0.5 tons

CO₂ emissions: 6.4 tons

¹ Based on 2007 actual generation mix of all energy sources

* Energy consumed in space and water heating, clothes drying and cooking.
# Energy Efficiency Gas vs Electric

## Full-Cycle Energy Use (MMBtu/Year)

<table>
<thead>
<tr>
<th></th>
<th>Natural Gas</th>
<th>Electricity</th>
<th>Oil/1</th>
<th>Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating</td>
<td>74.3</td>
<td>31.5</td>
<td>74.3</td>
<td>74.3</td>
</tr>
<tr>
<td>Water Heating</td>
<td>25.4</td>
<td>16.6</td>
<td>29.1</td>
<td>25.4</td>
</tr>
<tr>
<td>Drying</td>
<td>3.8</td>
<td>3.3</td>
<td>3.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Cooking</td>
<td>3.3</td>
<td>1.8</td>
<td>1.8</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Site Use</strong></td>
<td><strong>107</strong></td>
<td><strong>53.2</strong></td>
<td><strong>108.5</strong></td>
<td><strong>107</strong></td>
</tr>
<tr>
<td><strong>Losses</strong></td>
<td><strong>14</strong></td>
<td><strong>114</strong></td>
<td><strong>28</strong></td>
<td><strong>18</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>121</strong></td>
<td><strong>167</strong></td>
<td><strong>137</strong></td>
<td><strong>125</strong></td>
</tr>
</tbody>
</table>

/1: Assume electric cooking/drying
Source: AGA
### CO2 Emissions For New Homes-Full Fuel Cycle (Metric Tons/year)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>6.4</td>
</tr>
<tr>
<td>Electricity</td>
<td>10.1</td>
</tr>
<tr>
<td>Oil</td>
<td>9</td>
</tr>
<tr>
<td>Propane</td>
<td>7.6</td>
</tr>
</tbody>
</table>
## Gas vs Electric Water Heating Example

<table>
<thead>
<tr>
<th></th>
<th>Installed Cost Premium vs Electric</th>
<th>Gas Annual Operating Cost savings</th>
<th>Payback on Incremental Investment</th>
<th>CO2 Avoided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Water Heater</td>
<td>$900</td>
<td>$200</td>
<td>4.5 years</td>
<td>1.6 Tons/year</td>
</tr>
</tbody>
</table>
# Energy Efficiency - Gas vs Gas Heating

<table>
<thead>
<tr>
<th></th>
<th>1st cost premium</th>
<th>Efficiency</th>
<th>Energy Savings (annual)</th>
<th>Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 year old furnace</td>
<td>N/A</td>
<td>70%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Standard new furnace-DOE Minimum</td>
<td>N/A</td>
<td>80%</td>
<td>$150</td>
<td>N/A</td>
</tr>
<tr>
<td>HE furnace</td>
<td>$800</td>
<td>92%</td>
<td>$180</td>
<td>4.5 years</td>
</tr>
</tbody>
</table>
Consumer Choices

• Consumers make decisions in a world where uncertainty, unclear transaction costs, and conflicting information prevail

• There is a tendency toward inertia; decisions require time and effort

• NRRI Study:
  ➢ “Consumers tend to overvalue current cost and undervalue future savings”
Programs/Rebates Will Prompt Better Choices

• Full Fuel Cycle analysis shows gas end-use advantages - *first cost premium*

• High Efficiency gas advantages over standard efficiency - *first cost premium*

• Consumers education to raise awareness of financial and societal consequences of action or inaction

• Consumers “nudged” to make optimal decisions-financial incentives work
NRRI* Study

• Grant rebates for electric to gas substitutions where gas is better
• Incentives to home builders to install gas
• Recognize and address impact on electric utilities when customers convert to gas

*National Regulatory Research Institute
ARRA*

- States should align utility financial incentives with helping customers reduce usage
- Timely cost recovery and earnings opportunities for measurable/verifiable energy savings

*American Recovery and Reinvestment Act
DOE and EPA Action Plan for Energy Efficiency

• Strong commitment to long term energy efficiency as a resource
• Sufficient, timely, stable program funding
• Align utility incentives and delivery of cost effective energy efficiency
• Modify ratemaking practices to promote energy efficiency
Guiding Principles

- Consumers should be educated on opportunities, costs, savings, environmental benefits
- Encourage conversions from electric to gas where it is cost effective
- Encourage high efficiency gas
- Integrated resource planning by utilities under state sponsorship
- Rate mechanisms that encourage utilities to pay customers to use less of their product
Integrated Resource Planning

• NRRI Study
  ➢ The standard IRP process is utility centric-risks ignoring switching as an option
  ➢ Utilities have profit maximizing stake which is counter to encouraging customer to use less or switch
  ➢ As competitors gas and electric utilities unable to cooperate to formulate joint plan
  ➢ Look to experience of other states-Missouri, Arkansas, Maryland, Texas, Florida
Questions?
Significant Opportunity In our Market

- UGI market share in our service area is < 50%-
  Conversion potential
- UGI Gas water heating market share among customers is ~ 75%-additional burner tips
- Drying and cooking market share are ~ 15% and 20% respectively-additional burner tips
- Primary use today for non-customers are oil and electricity
- Additional burner tips in customer homes mainly against electricity
Natural Gas Use Per Customer

Declining Use per Natural Gas Residential Customer Since 1970

Consumption per Residential Customer

Sources: U.S. Energy Information Administration and American Gas Association
Note: Data is "weather normalized" or adjusted to reduce the impact of abnormally warm or cold weather.
Customers/Total Consumption

Residential Natural Gas:
Average Consumption vs. Average Number of Customers

![Bar chart showing average total natural gas consumption and average number of households served over two periods.](chart.jpg)

Sources: U.S. Energy Information Administration and American Gas Association
Environmental Impact

Tons of CO2 Emissions* Per Residential and Commercial Natural Gas Customer

*From consumption of natural gas only
Source: Calculated from Energy Information Administration data
Environmental

U.S. Natural Gas Customers Lead in Reducing Greenhouse Gas Emissions

Rate Design Methods that Eliminate a Utility’s Disincentive to Promote Energy Efficiency (Source: AGA)