The Importance of Natural Gas in Multifamily Energy Efficiency: Project Overview

Charlie Haack
Manager
ICF International
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Introduction

- AGF commissioned this study to help expand the benefits of gas service to multifamily buildings
- Multifamily construction is **UP** over the past 5 years
Introduction

- During the same time gas market share has declined
Organization of the report

Three main areas of focus:

- **Barriers**: technical, economic, physical, market, regulatory

- **Benefits**: energy, environmental, economic, other benefits at the technology, building, and national levels

- **Solutions**: policy, program, and other solutions that gas utilities and their allies can use
<table>
<thead>
<tr>
<th>Water Heating</th>
<th>Gas</th>
<th>Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NAECA Min.</td>
<td>ENERGY STAR</td>
</tr>
<tr>
<td>Energy Factor</td>
<td>0.62</td>
<td>0.67</td>
</tr>
<tr>
<td>Annual input</td>
<td>151</td>
<td>136</td>
</tr>
<tr>
<td>(Therms for gas; kWh for electric)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site MMBTU</td>
<td>15.1</td>
<td>13.6</td>
</tr>
<tr>
<td>Source MMBTU</td>
<td>16.6</td>
<td>15.0</td>
</tr>
<tr>
<td>Annual Water Heating Required (output in Btu)</td>
<td>9,385,422</td>
<td>9,385,422</td>
</tr>
<tr>
<td>Total Annual Water Heating Cost ($)</td>
<td>$191</td>
<td>$171</td>
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## Barriers

### Technology Barriers: efficiency comparisons

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<tr>
<td></td>
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<tr>
<td><strong>AFUE/HSPF</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80%</td>
<td>90%</td>
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<td>117</td>
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<td><strong>Site MMBTU</strong></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>13.2</td>
<td>11.7</td>
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<tr>
<td><strong>Source MMBTU</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.5</td>
<td>12.9</td>
</tr>
<tr>
<td><strong>Annual Fuel Cost</strong></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>$166</td>
<td>$147</td>
</tr>
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Barriers

Physical constraints on gas equipment

- Supply piping chases
- Air intake/ventilation ducting
- Limited space in mechanical closets
- Sizing/efficiencies gas equipment in low heating load climates
Barriers

Policy Barriers

1. Building Codes
2. Metering Policies
3. Energy & Environmental Policies
4. Ratemaking Policies
Barriers

Ratemaking policies

Source: American Gas Association
Barriers

Economic and market barriers

- **First costs** of gas service, and gas end-use equipment—all-electric designs seen as lowest-cost solutions

- **Split-incentive**, owner-tenant barrier—owners care about first costs, tenants care about operating costs

- **Information barriers**—tenants, owners, managers, contractors, designers not informed on gas benefits, technologies, practices
## Benefits

- Source energy and operating cost savings—per unit

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Benefits

- Nationwide benefits for MF space heat/hot water conversion could total $2.2 billion in lower energy bills, and 182 Trillion Btu in source energy savings.
Benefits

- Reduced air pollutant emissions: up to 20 MMT CO2 nationally

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</tr>
<tr>
<td>tons CO₂ Emissions</td>
<td>0.8030</td>
<td>0.7220</td>
</tr>
<tr>
<td>tons SO₂ Emissions</td>
<td>0.0000040</td>
<td>0.0000036</td>
</tr>
<tr>
<td>tons NOₓ Emissions</td>
<td>0.0006</td>
<td>0.0006</td>
</tr>
</tbody>
</table>

Assumptions:
- Electricity emission factors from US10 Data, eGRID 9th edition Version 1.0
- Natural gas emissions data from:
  - NOx SO2 [http://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf](http://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s04.pdf)
Benefits

- Reduced air pollutant emissions: up to 20 MMT CO2 nationally

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<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>tons CO\textsubscript{2} Emissions</td>
<td>0.6980</td>
<td>0.6204</td>
</tr>
<tr>
<td>tons SO\textsubscript{2} Emissions</td>
<td>0.0000035</td>
<td>0.0000031</td>
</tr>
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Benefits: Building Case Study

- Energy Solutions Center-commissioned study shows gas systems use less source energy and cost less to operate

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<tr>
<td>AFUE / Energy Factor</td>
<td>3.2 COP</td>
<td>90 / 0.9*</td>
<td>80 / 0.82</td>
<td>85 / 0.8*</td>
</tr>
<tr>
<td>Annual input (therms)</td>
<td>3,084 kWh</td>
<td>202</td>
<td>216</td>
<td>192</td>
</tr>
<tr>
<td>Site MMBTU</td>
<td>10.5</td>
<td>20.2</td>
<td>21.6</td>
<td>19.2</td>
</tr>
<tr>
<td>Source MMBTU</td>
<td>33.2</td>
<td>22.3</td>
<td>23.7</td>
<td>21.1</td>
</tr>
<tr>
<td>Annual Fuel Cost per unit/apartment</td>
<td>$301</td>
<td>$189</td>
<td>$201</td>
<td>$179</td>
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Solutions

Gas technologies

- Tankless water heaters
- Condensing furnaces
- Combination space heat/hot water systems
- Small capacity heating systems
- Renewable natural gas (RNG)
Solutions

- Utility initiatives
  - Marketing programs
  - EE programs

- Public policy initiatives
  - State PUC proceedings
  - Fed/state/local environmental regulations

- Technical society/NGO initiatives
  - ZNE—DOE definition uses source energy calculation
  - ASHRAE
  - ICC energy codes
Solutions

AGA Member Case Studies

- Atlanta Gas Light
- Atmos Energy
- CenterPoint Energy
- Con Edison
- New Jersey Natural Gas
- PSEG
- Washington Gas Light
Contact information

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Discussion