Market Impact of the ASHRAE
Advanced Energy Design Guides

Presentation of Final Results

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Research objectives

- Determine the market impact of the AEDG series, including awareness, usage, and energy savings impacts.

- Understand the market impact of other whole-building design resources as compared with the ASHRAE guides.

- Obtain insight about potential improvements in the content, format, delivery method, and other aspects of the AEDGs to maximize their effectiveness.
Presentation of results

- Energy impact estimates
- How the guides are being used
- Comparative awareness/use of AEDGs
- Barriers to AEDG use
- Suggestions for improvement
Research tasks

- 716 ASHRAE members participated in an online survey of AEDG awareness and use
- 54 AEDG users participated in telephone interviews that elicited detailed information about how the guides are used and suggestions for improvement
- Secondary market analysis explored alternative approaches for distributing and promoting the AEDGs in order to increase market awareness and use
## Member survey response rate

<table>
<thead>
<tr>
<th>Sample Group</th>
<th>Surveys Sent</th>
<th>Unable to Contact</th>
<th>Responses</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members</td>
<td>1000</td>
<td>144</td>
<td>138</td>
<td>16%</td>
</tr>
<tr>
<td>Targeted job/firm</td>
<td>2500</td>
<td>215</td>
<td>423</td>
<td>19%</td>
</tr>
<tr>
<td>Downloaders</td>
<td>750</td>
<td>75</td>
<td>155</td>
<td>23%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>4250</strong></td>
<td><strong>434</strong></td>
<td><strong>716</strong></td>
<td><strong>19%</strong></td>
</tr>
</tbody>
</table>
Technical interview recruitment

- Multi-mode approach:
  - 9 survey respondents agreed to participate in follow up interview
  - 14 participants recruited through cold calls
  - 31 participants recruited through email solicitations
# Energy impact analysis

<table>
<thead>
<tr>
<th>Market</th>
<th>Projects Used for Energy Impact Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>13</td>
</tr>
<tr>
<td>K-12</td>
<td>8</td>
</tr>
<tr>
<td>Retail</td>
<td>3</td>
</tr>
<tr>
<td>Warehouse/self-storage</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>
Energy impact analysis approach

Example: K-12 school in Climate Zone 5

End use energy consumption of building @ code

- Heating
- Cooling
- Lighting
- Hot water
- Ventilation
- Other
- Total

End use energy consumption of sampled building

- Heating
- Cooling
- Lighting
- Hot water
- Ventilation
- Other
- Total

Energy consumption of sampled building scaled to 90.1-1999

- Heating
- Cooling
- Lighting
- Hot water
- Ventilation
- Other
- Total

23% below code

37% below 90.1-1999
Energy savings impact in sampled buildings

- All buildings (n=24)
- K-12 (n=7)
- Office (n=13)

Estimated savings achieved by sampled buildings
Potential reduction from 90.1-1999
Outer-bound energy savings estimate

% reduction in energy use

- All buildings (n=24)
- K-12 (n=7)
- Office (n=13)

- Conservative estimate
- Outer bound estimate
- Potential reduction from 90.1-1999
AEDG influence

- 1-1.99: 37%
- 2-2.99: 8%
- 3-3.99: 5%
- 4-4.99: 16%
- 5: 3%
- No response: 3%

n=39
Energy savings attribution

All buildings (n=24)  Office (n=13)  K-12 (n=7)

% of achieved energy savings

AEDG  Code  Other
AEDG influence

AEDG has a lot of influence

AEDG has some influence

AEDG has no influence

Use AEDGs often

Used AEDGs once or twice

n=175
Implementation of AEDG recommendations

% of AEDG recommendations adopted

- Cooling
- Heating
- Envelope
- Lighting
- Water Heating

- All buildings (n=24)
- Office (n=13)
- K-12 (n=7)
Efficiency improvements made for the first time after reading the AEDGs

- Lighting efficiency improvement, 17%
- Water heating efficiency improvement, 7%
- HVAC efficiency improvement, 26%
- Envelope efficiency improvement, 36%

n=20
AEDG user ratings

- Credible: 90% Agree, 10% Neither agree nor disagree
- Easy to obtain: 90% Agree, 10% Neither agree nor disagree
- Technical content detailed enough: 90% Agree, 10% Neither agree nor disagree
- Effective at reducing energy use: 90% Agree, 10% Neither agree nor disagree
- Well organized: 90% Agree, 10% Neither agree nor disagree
- Flexible: 90% Agree, 10% Neither agree nor disagree

n=175
User ratings of AEDG components

Recommendations by climate zone

How-to tips

Case studies

Discussion of integrated design process

Very useful

Useful

Neutral

Not very useful

Not at all useful

No response

n=175
Distinct types of AEDG users

- **Comprehensive users**: Individuals who follow AEDG recommendations in a systematic way across all major components of the building design.

- **Selective users**: Individuals who rely on the AEDGs for specific components of the building design—e.g., envelope design or HVAC equipment efficiency specifications—but do not refer to the resource for other elements of the building design.

- **Reference users**: Individuals who use the AEDG recommendations as a back-check or quality assurance benchmark.
## Communications value of AEDGs

<table>
<thead>
<tr>
<th>User group</th>
<th>Number of AEDG users</th>
<th>% who used AEDGs for communications purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive</td>
<td>21</td>
<td>48%</td>
</tr>
<tr>
<td>Selective</td>
<td>21</td>
<td>43%</td>
</tr>
<tr>
<td>Reference</td>
<td>12</td>
<td>25%</td>
</tr>
</tbody>
</table>
Comparative awareness and use

n=565
Reasons for not using AEDGs

- Use Other Resources
- Plan to Use
- Cost-Effectiveness Concerns
- Don't Need
- Opposition from Client
- Difficult to Find Info
- Technical Content Concerns
- Opposition from Team

n=235
Barriers to AEDG use

- No reason given, 36%
- Not applicable to current work, 20%
- Haven't had need/opportunity yet, 17%
- Haven't had time to use/review, 9%
- Don't need, 2%
- Downloaded for others to use, 2%
- Don't remember downloading, 11%
- Use other resources instead, 2%
- Other, 1%

n=142
Marketing ideas from AEDG users

- Increase AEDG marketing to architects, building owners, and other clients:
  - Marketing collateral for viral distribution
  - AEDG courses qualified to fulfill AIA sustainable design continuing education requirements
  - White papers and conference presentations
  - Distance learning opportunities
User suggestions on AEDG content

- Keep the guides flexible to accommodate different types of users:
  - Develop a calculator tool for analyzing tradeoffs
  - Create an online forum for AEDG users
  - Provide cross-references to sources of application-oriented technical guidance on key topics (ventilation, commissioning, duct sealing, etc.)
Conclusions

- On average a 24% reduction in design energy use below Standard 90.1-1999 is achieved by the buildings in our sample.
- A majority of AEDG users rate the resource favorably in terms of credibility, technical content, and effectiveness in reducing energy use.
- The AEDGs are used in a variety of ways, so ensuring flexibility is important to maintaining their value over the long term.
- A large number of users value the AEDGs as a communications tool. New marketing strategies could enhance that value and promote broader use of the AEDGs.
Questions?

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