Results from the Field: An Analysis of Existing Building Commissioning Measures

Joan Effinger
Technical Manager
PECI
Outcomes

What are you going to learn today?

• Commissioning Providers

• Building Owners

• Utility Program Managers
Outline

• Approach
• Background
• Results
• Conclusions
• Future Recommendations
Two similar studies


Goal: Cost benefit analysis of EBCx measures

Research Questions

• Most common measures?
• Simple payback?
• Highest savings?
• Older and smaller buildings?
Data

- Utility-incented programs
- 122 projects
- 950 measures
- Building characteristics
  - Type
  - Size
  - Age
  - ASHRAE climate zone
Results – Cost Effectiveness

Metric: simple payback

- Gas + electric savings
- Implementation cost

Implemented measures were cost effective

- Building characteristics
Results - Systems and Equipment

50% of implemented measures affected the air handling units

- Air Handling Unit*, 252
- Pumps**, 47
- Chiller Plant, 44
- Boiler Plant, 26
- Exterior Lighting, 3
- Interior Lighting, 17
- Cooling tower, 26
- OTHER***, 88
- VAV terminal unit, 8
- Thermal storage, 1
Question

What measures do you see in your programs?

Why do you see these measures?
8 measures have the highest savings/sf

- Example:

But, low frequency!

Source: http://www.ctvweb.com/rkmills/images/boiler-logo-1.jpg
Results - Frequency of Implementation

13 measures are implemented most frequently

• Example:

But, low savings!

Source: http://natashawilson.files.wordpress.com/2009/02/cfl.jpg
## Frequency vs. Savings/sf

<table>
<thead>
<tr>
<th>Most Frequently Implemented</th>
<th>Top Savings/sf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimize airside economizer</td>
<td>Tune / Upgrade Controls</td>
</tr>
<tr>
<td>Reduce equipment runtime</td>
<td>Add / Optimize HWST reset</td>
</tr>
<tr>
<td>Reduce / reset DSP setpoint</td>
<td>Relocate / shield temp sensor</td>
</tr>
<tr>
<td>Revise control sequence</td>
<td>Add / optimize boiler lockout</td>
</tr>
<tr>
<td>Add / optimize SAT reset</td>
<td>Add small A/C unit</td>
</tr>
<tr>
<td>Add VFD to pump</td>
<td>Add VFD to chiller</td>
</tr>
<tr>
<td>Other</td>
<td>Add / optimize chiller staging</td>
</tr>
<tr>
<td>Reduce lighting schedule</td>
<td>Lower / reset VAV box flow</td>
</tr>
<tr>
<td>Replace/repair/calibrate sensor</td>
<td>Optimize waterside economizer</td>
</tr>
</tbody>
</table>
# Results – Cumulative Savings

<table>
<thead>
<tr>
<th>Measure</th>
<th>% of Total Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revise control sequence</td>
<td>21%</td>
</tr>
<tr>
<td>Reduce equipment runtime</td>
<td>15%</td>
</tr>
<tr>
<td>Optimize airside economizer</td>
<td>12%</td>
</tr>
<tr>
<td>Add / optimize SAT reset</td>
<td>8%</td>
</tr>
<tr>
<td>Add VFD to pump</td>
<td>6%</td>
</tr>
<tr>
<td>Reduce coil leakage</td>
<td>4%</td>
</tr>
<tr>
<td>Reduce / reset DSP setpoint</td>
<td>4%</td>
</tr>
<tr>
<td>Add / optimize optimum start/stop</td>
<td>3%</td>
</tr>
<tr>
<td>Add / optimize CWST reset</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>75%</strong></td>
</tr>
</tbody>
</table>
Conclusions

- Customized approach
- Include top savings measures
- Applicable to all buildings
Future Recommendations

• Expand the data set
  ○ Standard data format

• Implemented vs. non-implemented measures

• Smaller and older buildings
Key Takeaways

What interested you about this study?

How could you apply this?

Source: http://www.stmatthewssalfordpriors.org.uk/content/pages/uploaded_images/131.jpg
Portland Energy Conservation, Inc is a registered provider with The American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members are available on request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.
Thank-you!

Joan Effinger

jeffinger@peci.org

(503) 575-4103