VEIC Training Series

HVAC: Unlocking opportunities to maximize energy savings

May 29, 2020
We’re on a mission to generate the energy solutions the world needs.

VEIC works with organizations across the energy landscape to create immediate and lasting change. Since 1986, we’ve served as an objective partner for our clients as they navigate complex energy challenges. With expertise in energy efficiency, building and transportation electrification, and new approaches for a clean and flexible grid, we bring new solutions to the market that meet goals and make change.
Together with our clients, we’ve been delivering customized trainings to the market to build expertise and drive value with end-use customers.
Our HVAC expert

Rachael Mascolino
Senior Energy Consultant

Rachael is a subject matter expert. She specializes in HVAC, energy management systems, and controls and has extensive experience working within the healthcare and industrial sector.

Her specialization has evolved through her evaluations for engineering best practices of design and energy-saving opportunities across multiple measures.
Characterizing buildings for energy savings opportunities

Top thermal and electrical measures

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United States Energy Use

United States Energy Use

- Industry: 32%
- Transportation: 28%
- Residential Buildings: 22%
- Commercial Buildings: 18%

Commercial Building Energy End Use

- HVAC: 44%
- Refrigeration: 10%
- Plug Load: 21%
- Lighting: 10%
- Other: 15%

Source: US Energy Information Administration, 2012 Commercial Building Energy Consumption Survey
HVAC Energy end use by market
Characterize your customer

• Before you start talking about efficiency, identify the foundational system to which the efficiency will be applied
  • Primary operation and building use
  • 2 years of historical usage; electrical and thermal
  • Project and efficiency utility engagement history
A little goes a long way.

With a little information, you can facilitate a succinct and personalized conversation about a customers energy use and opportunities.
Characterize your customer

• Lead with relevance
• Make the invisible visible
• Provide technical value as soon as possible in the first engagement
• Don’t be the author of another dust collecting report
• Money is cheaper than time
Thermal measures

**Steam**
- Burners
- Traps
- Condensate return
- Pipe, fitting, tank insulation

**Water**
- Burners
- Boiler staging/ idling
- Supply temperature reset
- Pipe, fitting, tank insulation
- Air and dirt separation
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<table>
<thead>
<tr>
<th>Measure</th>
<th>Simple Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam trap audit &amp; repair/replace failed traps</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Optimize boiler staging</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Reduce boiler pressure</td>
<td>&lt;1 week</td>
</tr>
<tr>
<td>Add insulation to steam pipes and valves</td>
<td>&lt;18 months</td>
</tr>
<tr>
<td>Add outside air temperature reset control to hot water boilers</td>
<td>&lt;2 years</td>
</tr>
<tr>
<td>Enable differential pressure control of hot water pump VFDs</td>
<td>&lt;2 months</td>
</tr>
<tr>
<td>Add O2 trim to boiler burner controls</td>
<td>1 year</td>
</tr>
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</table>
Demand side efficiency

Thermal and Electrical Savings

• What are you asking your equipment to do?

• You don’t need to be a controls savant or programmer. Follow the communication path.

• Visibility = energy savings.
  • kw/ton of the chiller
  • Air flow
  • Damper and valve positions
Demand side efficiency

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# Demand side efficiency

## Thermal and Electrical Savings

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<td>Space no longer requires 100% OA. Add damper actuator and controller.</td>
<td>&lt; 6 months</td>
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<tr>
<td>Calibrate air flow stations</td>
<td>&lt; 3 months</td>
</tr>
<tr>
<td>Correct schedule to reflect occupancy</td>
<td>&lt; 1 month</td>
</tr>
<tr>
<td>Complete differential pressure SOO. Take VFDs out of hand</td>
<td>&lt; 1 month</td>
</tr>
<tr>
<td>Add supplemental cooling to critical zone</td>
<td>&lt; 3 years</td>
</tr>
<tr>
<td>Air balance to correct excessive air changes</td>
<td>&lt; 1 year</td>
</tr>
<tr>
<td>Optimal start stop logic</td>
<td>&lt; 1 year</td>
</tr>
</tbody>
</table>

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Ventilation

• Significant and invisible
• Required for human health and productivity
• Where to look for efficiency:
  • Energy recovery
  • Damper actuators and controls
  • Coupled vs decoupled strategy and associated controls
Hours where OA is in a higher energy state than indoor air.
Hours where OA has a lower energy state than indoor air.
Ventilation Strategies

**Pre Pandemic**

- Meet but do not exceed 62.1
- Occupancy schedules
- What is ACH?
- “there is ventilation air in the hallway, it will get into the conference room.” (magic?)
- MERV 8 filters will keep the pollen out

**Pandemic Mode**

- Energy use will undoubtedly increase.
- Over ventilate, as much as possible.
- Pre and post occupancy flush for 2 hours.
- Evaluate use of MERV 13 filters
- RH control 50 +/- 10%
- Control, visibility, proof.

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Pre and post occupancy flush for 2 hours.

Evaluate use of MERV 13 filters.

RH control 50 +/- 10%.

Control, visibility, proof.

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ASHRAE has published two statements to define guidance on managing the spread of COVID-19 with respect to the operation and maintenance of HVAC systems in buildings. ASHRAE recommends operators continue to run systems during this time to help control the spread of the virus. Read the official statements and affiliated guidance on ASHRAE's official COVID-19 page. [www.ashrae.org/covid19](www.ashrae.org/covid19)

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Coronavirus Disease 2019 (COVID-19)

Be a building scientist and a building psychologist. There is an art to motivating change, and it isn’t about the money.

Manage expectations of savings vs. expense. Don’t lead with capital improvements. Help build confidence with savings momentum.

Invest the time and resources to bolster the foundation of your mechanical systems knowledge (or hire VEIC to do it for you).
Trainings, services, and more…

Energy Efficiency
Building Electrification
Transportation Electrification
Clean & Flexible Grid
Thank you!

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