Training Building Operators to be Energy Champions

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Special Thanks To: Kady Cowan and Ben Futrell

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What's The Big Idea?

- How much do operators – frontline mechanics – really understand about energy?
  - Their decisions have a huge impact on energy consumption!
- What do these "guys" even do?
- What kind of training do they really require?

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Our Program

- UNCC partnered with Atrium Health to train frontline mechanics
- Started work in 2016
- Developed the Energy Connect program using a series of IEA Task 24 workshops

Atrium Health

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Energy Connect

- Energy Connect includes 5 interventions:
  - Make energy data visible
  - Educate non-facilities staff about the role of maintenance staff
  - Develop energy champions
  - Track manual overrides
  - Best practices for common maintenance issues – the hot/cold call
- Also – Provide training and education to frontline staff
- But – What training is really needed?

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A Day in the Life of An Operator…

- Start a PM on an air handler
- Get a call about a broken toilet
- Fix the toilet
- Back to the PM
- Get a call about an office worker / patient who is uncomfortable
- Go deal with the uncomfortable person
- Back to the PM

"Juggling hand grenades and putting out fires…"

"Occupants are a driving force for operators …"

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How Do Frontline Mechanics Think About Energy Savings?

- What responses do we get when we ask operators about how they can save energy?

"Every day I come in here and the lights are on"

"New and good equipment makes it easy to save energy"

- What's wrong with these answers?

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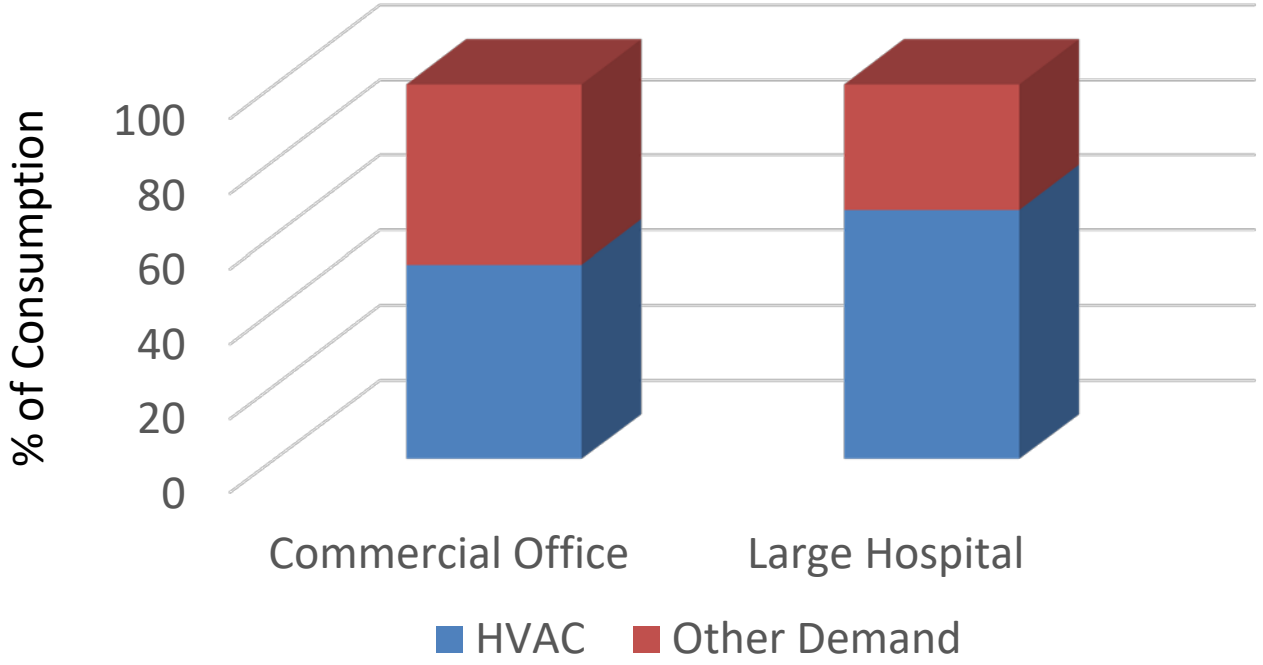
Why Care About the Frontline Staff?



- HVAC is a large component
- HVAC deals with energy transport
- ***Energy transport can be controlled!***

Sources: CBECS 2012 (Commercial office); Targeting 100! (Large hospital)

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Example: Driving with The Brakes

Much of that excess energy wasted in friction braking!

- You could drive a sports car by “flooring it” and working the brake
- Why is this a bad idea?

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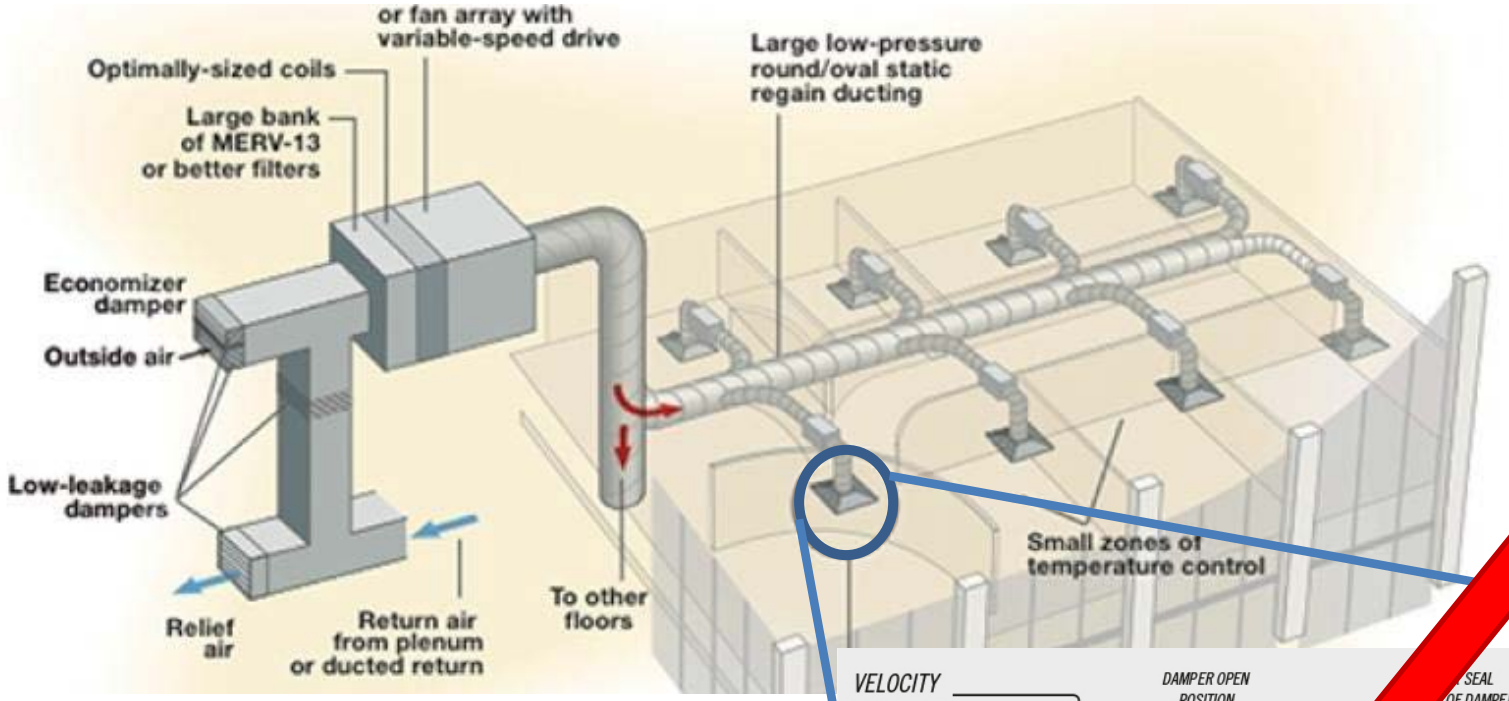
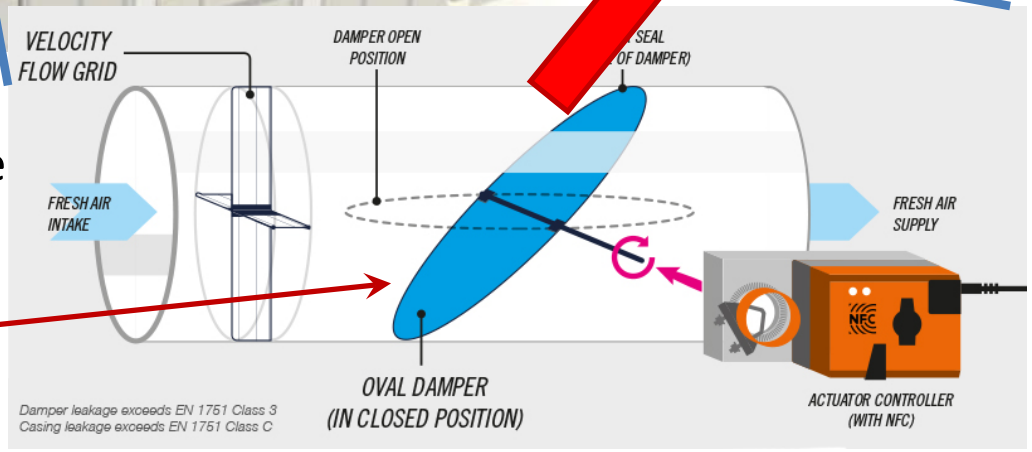
VAV – The Sports Car Analogy

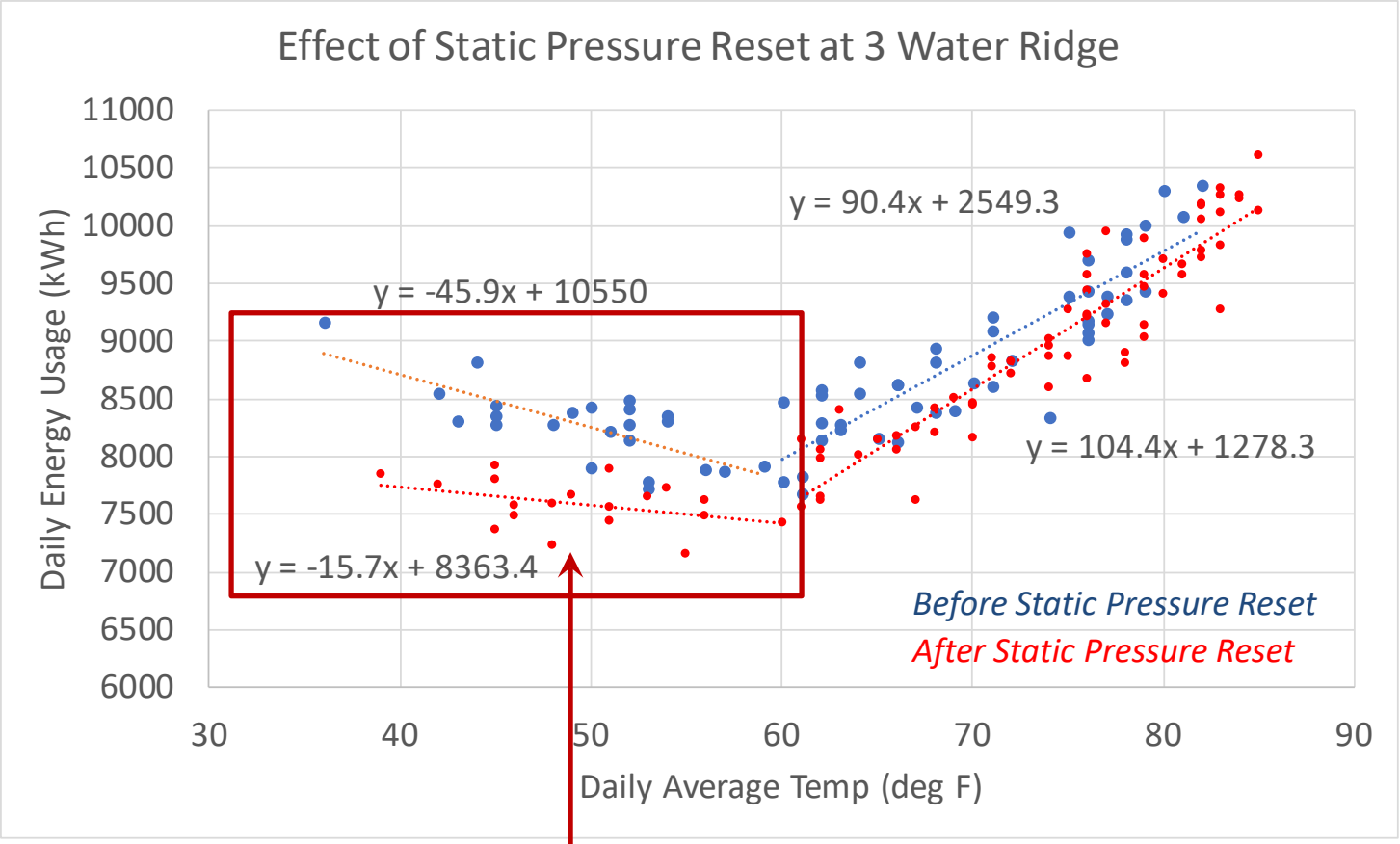


Excess fluid energy wasted!



- Fan requires energy to pressurize the ducts
- If rooms don't need air, the dampers close – hitting the brakes!
- Why not just "let off the gas" at the fan?

What's the Effect?



Big benefit in milder weather, 3% annualized savings

This is just one example – there are others

How Do We Teach This?

- General characteristics of frontline staff:
  - Male
  - Often 40+
  - Generally non college-educated (although changing)

    "We hire for attitude, not aptitude"
- Frontline staff are not:
  - Energy managers
  - Engineers
  - Building commissioning agents
- But they can be "reverse commissioning agents"

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Findings in the Atrium Portfolio

- Two types of facilities
  - Acute care hospitals
  - Outlying facilities
- Acute-care hospitals:
  - Supervisor
  - Mechanic Level 3 and 4 – generally most experienced, sometimes certified
  - Area mechanics assigned to different parts of hospitals
  - Some trade expertise – plumbing, electrical, etc.
- Outlying facilities:
  - Medical offices, behavioral health, rehab centers, long-term care, emergency departments
  - Generally have one to two staff
  - Often staff are responsible for multiple sites

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Energy Connect Training

- Basic training:
  - Who: All frontline staff
  - What: Review of basic energy metrics and concepts
  - When: 1 hour
- Intermediate training:
  - Who: Area mechanics
  - What: What control do you have in your day-to-day job?
  - When: Two to three hours
- Advanced training:
  - Who: Advanced staff; mechanic at larger, outlying facilities
  - What: How can we develop “systems thinking” and “energy troubleshooting”?
  - When: Multiple sessions

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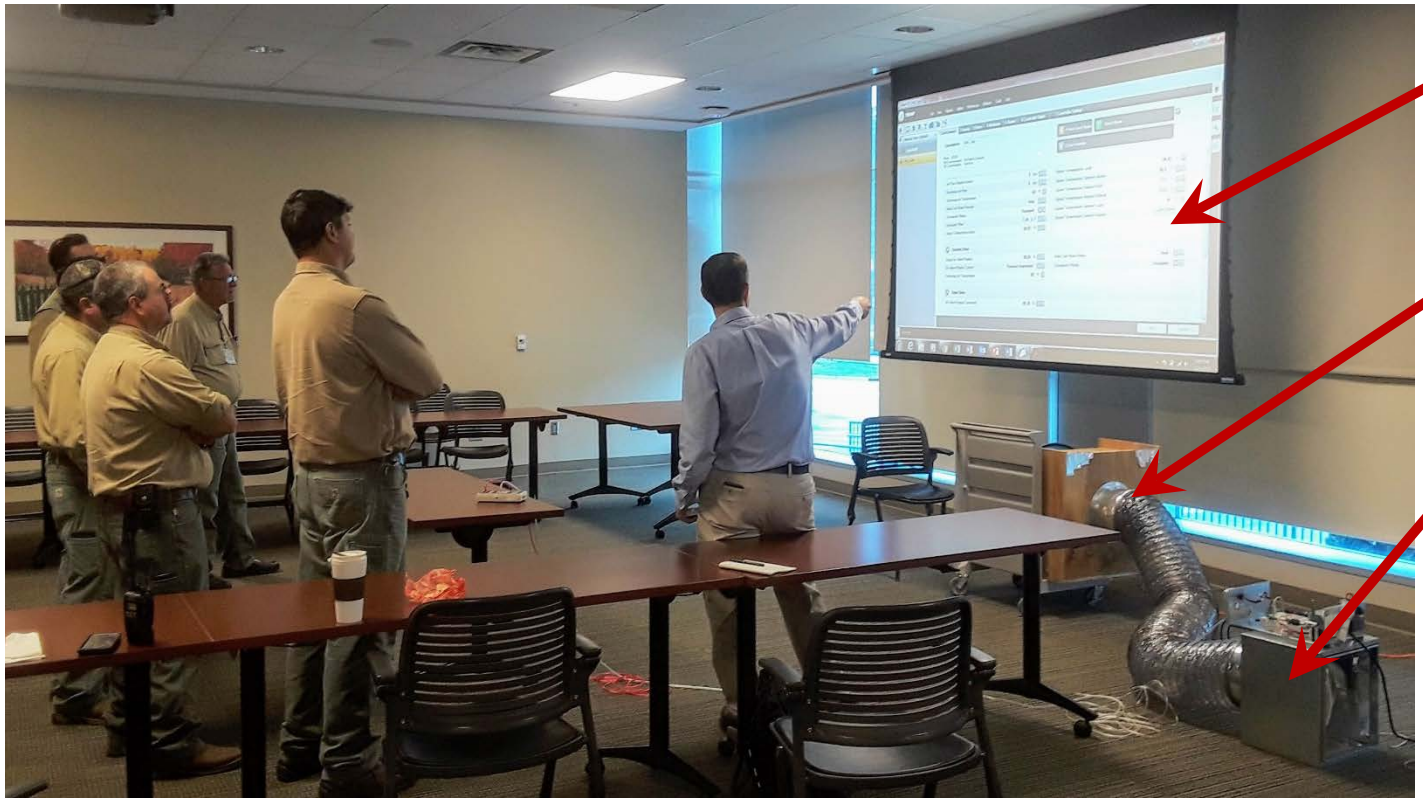
Intermediate Training: Approach

- Walk operators through the basics



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Intermediate Training: Intended Outcomes

- Learn basic principles of how commercial HVAC works
- Explain how a VAV box operates
- Learn how to approach a comfort complaint

- Started a follow-up, logging results from comfort complaints

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Advanced Training: Intended Outcomes

- Proper equipment scheduling
- Proper zone-level maintenance
- Proper energy transport settings
  - Air side:
    - Static pressure settings for fans
    - Supply air temperature settings
  - Water side:
    - Chilled water temperature
    - Condenser water temperature
    - Differential pressure settings
- Show that it's easy and manageable to track system performance

Advanced Training: Approach

- Before first meeting – Identify a problem onsite
- First meeting – Track down the problem and build rapport
  - Example – Stuck damper throwing off static pressure adjustment:

    "Huh, I always get complaints from that office…"

  - Example – Discharge air temperature in the high 40s F in December:

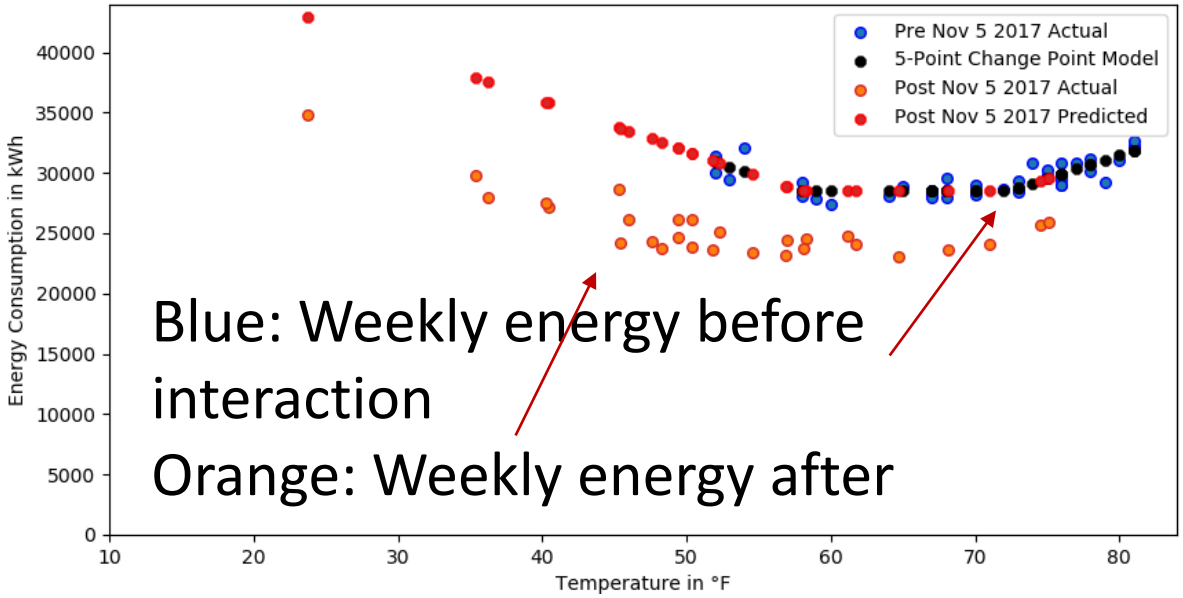
    "I've been wondering why I'm getting more complaints lately"

- Second meeting – Make an example "ongoing commissioning plan" together for a particular system
- Homework assignment – You make an ongoing commissioning plan for a similar system
- Third meeting – Review assignment
- Fourth meeting – Continue to build confidence and serve as a mentor

Example

- Medical office located just outside of Charlotte, NC
- Scheduling and settings inappropriate

- ***"I never knew it could help me to look into this BAS!"***
- Energy usage down 20%
- $0 to fix



Conclusions & Next Steps

- Continue to track progress of the program
  - Regular quizzes to our advanced trainees
  - Quarterly follow-ups for the area mechanics
  - Track energy savings
- How do we manage the interaction with corporate “smart buildings team”?
- There is a need to address soft skills
  - Advanced trainees have standing with their peers, but they are not naturally leaders in most cases

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For More Information

- It's Not my Job: Changing Behavior and Culture in a Healthcare Setting to Save Energy
  - Presented at ACEEE 2018 Summer Study
  - Presents findings from culture surveys and interviews
- Special thanks to my partners-in-crime:
  - Kady Cowan
  - Dr. Ben Futrell

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