Every Engineer can be an Energy Superhero

Garrison: Climate, Buildings, and Behavior

John Silkey

May 23, 2012

Empowering engineers, saving energy and protecting your assets.

milepost

The Life of an engineer

- Your front line defense against waste
- Good ones are hard to come by
- Underutilized resource that often is stretched too thin

"my light bulb burned out"

"my cubical is too cold"

"what's that smell in the NE corner?"

"hey, I'd like to save energy but I don't know how"

Energy Superheroes: The Opportunity

"you have so much work coming in day to day and you don't have a chance to get into the why of things happening"

Theory, Curriculum and Materials

TRAINING APPROACH

"When you are off on your own you get isolated and feel like you aren't growing for awhile and when you sit there by yourself you go crazy."

Theory behind the design

- Establish leadership support and reinforcement
- Make it simple
- Create a sense of "we"
- Embed this into existing decision-making processes
- Holistic approach
- On the job training – not a classroom approach
- Problem-based learning
- Connect change to emotion and logic

Energy Superheroes: The Design

Scoping 101

- Building energy use, measurement and evaluation tools
- Scoping process, what to lo

Instructor Led Walk-through

- Divide participants into tean
- Follow instructor conductin through

Scoping 201

- Review scoping and potenti
- Team creates an action plar

Team Led Walkthrough

- Two teams lead their own walk-through in different buildings with instructor trailing and guiding

Group Discussion

- As one group again, discuss new findings, lessons learned and create action plan

Follow Up

- Six to eight months later, instructor follows up with teams to review and discuss other findings since training

Energy Superheroes: "Homework"

BUILDING OPERATIONS MANUAL

[Building Name]

[Author Name]

[Date Created]

This Building Operations Manual is intended to serve as the key reference manual for all building operators/engineers and preventative maintenance staff to understand the building use characteristics, systems installed and other data pertinent to the maintenance and high performance of the building. The manual should be updated after major remodels and system upgrades and as contact information changes.

Symptom-Diagnosis Tool

Introduction

You may notice possible symptoms of poor energy performance in your building. For example, a chilled-water pump might operate significantly more hours than the chiller. You then face the task of finding and resolving the underlying cause of the symptom. The cause of the symptom may in fact be a problem (for example, incorrect control settings) or it may be a condition that is not a problem or cannot be avoided (for example, setpoints that are based on the needs of a process load and not on occupant comfort).

Finding the cause of a symptom of poor energy performance will involve inspecting your building and collecting and analyzing trend logs from your Direct Digital Control (DDC) system. For general guidance in getting ready for these two activities, see:

- Getting Ready to Find Problems by Inspection (PDF)
- Getting Ready to Find and Confirm Problems by Trend-Logging (PDF)

Identifying Problems

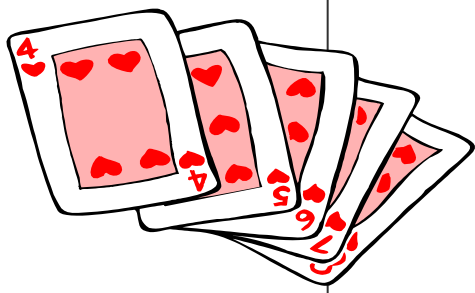
Now you are ready to tackle specific symptoms and find the underlying cause. This Symptom-Diagnosis Tool helps you identify and better understand what causes a large number of important symptoms.

To use the Symptom-Diagnosis Tool:

1. Select the appropriate equipment type below to display a list of possible symptoms.
2. Select a candidate symptom from that list.
3. Read specific advice on what might be causing that symptom in that equipment.

To begin, select the appropriate equipment type:

- Air Distribution
- Boilers
- Chillers
- Cooling Towers
- Digital HVAC Controls
- Motors
- Sensors
- Steam Distribution
- Terminal Units
- Water Distribution



Commitment, Capacity, Connectivity, Savings and Persistence

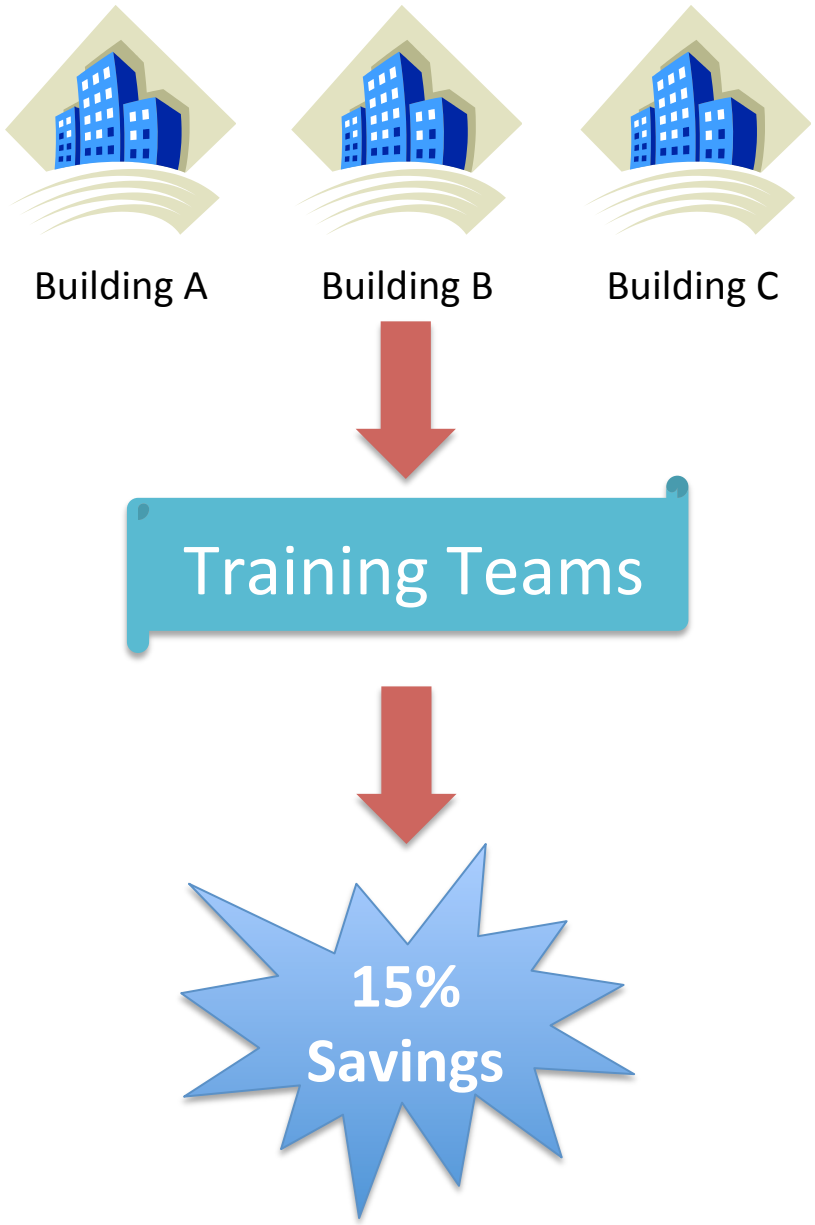
SUCCESS

WRIGHT RUNSTAD & COMPANY

Profile

- Privately held commercial office development and property management firm
- 6,000,000 ft^2 office space

Energy Superheroes: Success Stories



Trained 30 engineers (nearly 100%)

Cross-building teams established of 12 engineers

Every building has been scoped

WRIGHT RUNSTAD & COMPANY

"biggest value has been getting together with a bunch of other engineers and talking over things and going through buildings"

COMMITMENT

THE UNIVERSITY of TENNESSEE KNOXVILLE

Profile

- Public university ~30,000 students
- 236 buildings = >14,800,000ft^2
- Annual consumption =

  220,963,070 kWh ($15,661,570)
- Maintenance budget cut in half & operations budget cut $30M

Energy Superheroes: Success Stories

Building A

Shops

Managers/ Foreman

Trained 100+ engineers (nearly 100%)

Training Teams

Cross-building teams established of six operations/maintenance staff

20% Savings

10 buildings scoped and savings being realized – roadmap being implemented

THE UNIVERSITY of TENNESSEE KNOXVILLE

CAPACITY

"It's ok to let our guard down a little bit and accept some advice from other engineers…"

Empowered and Inquisitive

- Is a score of 12 good?
- We have steam traps? What's a steam trap?
- **Does this need to be running?**
- Should the sensor be on the South side?
- What happens when steam consumption goes down?

"…knowing how important your sequence of operations is – understanding it and that you **don't have things fighting each other**…"

Holistic View

- What happens at night?
- **How do dirty filters impact building performance?**
- When a tenant complains about smells what does that really mean?
- Is it okay that the equipment isn't tied to the building automation system?

Learning and Evolving

OPPORTUNITIES

"I love **the power of the follow up!** – to have Jim come back and ask me 'what are you doing'?"

Lessons & Opportunities

- Tons of savings to be gained with little out of pocket expense
- Coaching matters
- Cross-building training yields new perspectives and opportunities
- Tools (aka "homework") have to be simple
- Without a goal, it's just motion without progress

The Evolution

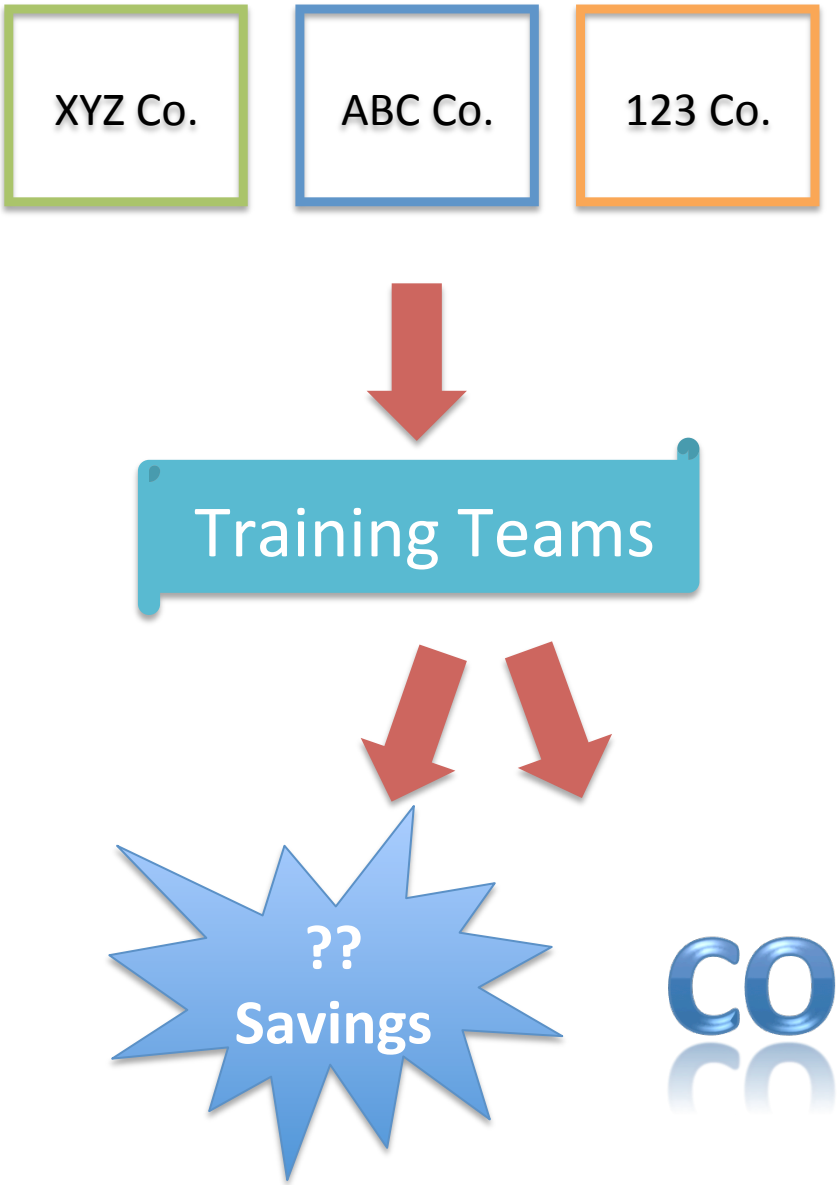
CREATING COMMUNITY

SEATTLE 2030 DISTRICT

Profile

- 50% reduction by 2030
- Better Buildings Challenge Community Partner
- Private sector collaboration ~28M ft^2
- Average Energy Star Score = 78

Energy Superheroes: The Evolution



10-15 Buildings <100,000 ft^2

Cross-company team established

1:1 training

Group coaching on “mentor” building

Establish a goal with management

CONNECTIVITY

Thoughts, Questions, Suggestions

WRAP-UP

Your perspective

- How can we build this sense of commitment, capacity and connectivity into other work we do in buildings?
- How might property and asset managers also benefit from this approach?
- How can our learning best be shared with this group?