



## Better Buildings Tools and Resources for Achieving Energy Savings

Boston Green Tourism

December 8, 2018

Cindy Zhu

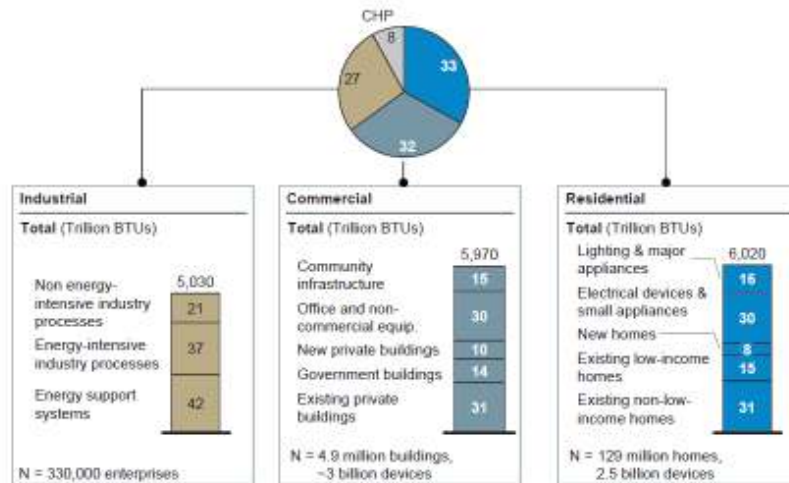


# Agenda

- Better Buildings Challenge
- Case Studies
- Financing Navigator Tool
- Smart Energy Analytics Campaign

# Problem we are trying to solve

Percent, 100% = 18,410 trillion BTUs of primary energy



U.S. spends \$600 billion each year to power homes, plants, & buildings

- Great opportunities in residential, commercial and industrial sectors
- 20%+ savings average; cost effective
- Other benefits: Jobs, Environment, Competitiveness

BUT persistent barriers exist....

- Efficiency not integrated into business planning & corporate decision making
- Perceived risk
- Confused by options; lack of unbiased information
- High hurdle rates
- Split incentives /tenant-employee behaviors at odds with efficiency goals
- Not enough/qualified workforce



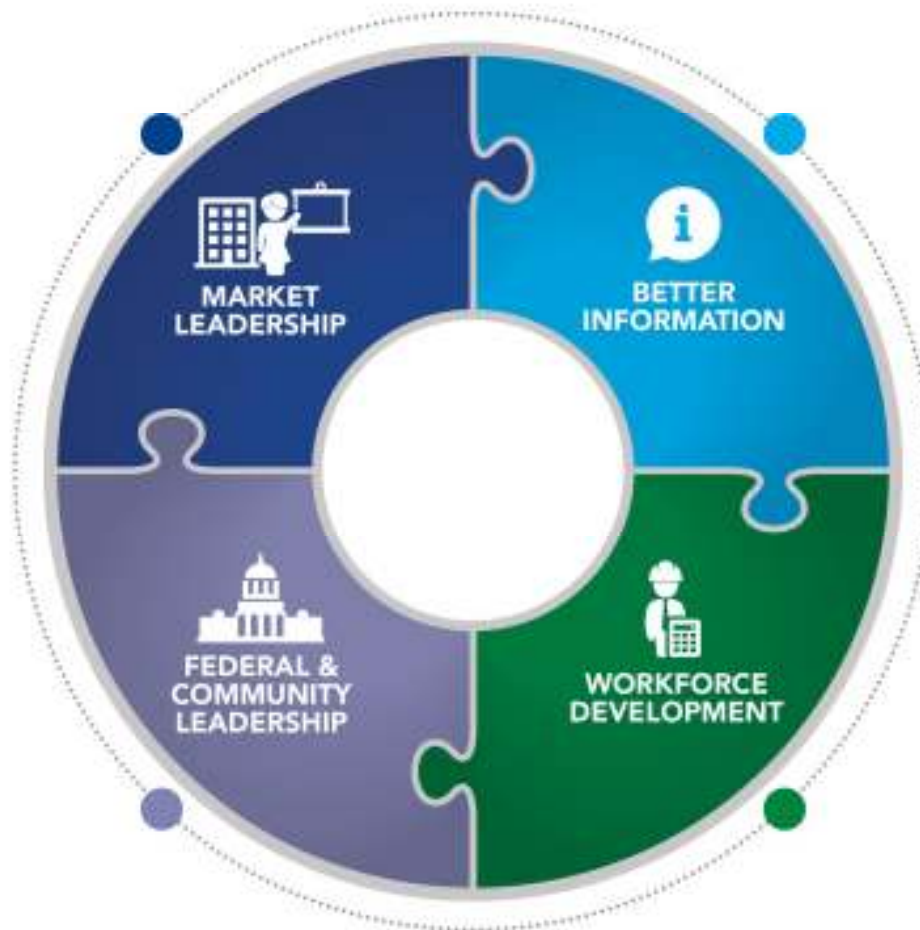
Developing Innovative,  
Replicable Solutions  
with Market Leaders

- ▶ Better Buildings Challenge
- ▶ Better Buildings Alliance
- ▶ Better Buildings, Better Plants
- ▶ Better Buildings Accelerators
- ▶ Better Buildings Residential
- ▶ Superior Energy Performance



State, Local, and  
Federal Governments  
Leading by Example

- ▶ Better Communities Alliance
- ▶ Performance Contracting



Making Energy  
Efficiency Investment  
Easier

- ▶ Better Buildings Solution Center
- ▶ Financing Navigator
- ▶ Improved Data Consistency and Access
- ▶ Tools to Assess the Efficiency of Buildings/Homes
- ▶ Tools for Energy Management



Expanding  
the Workforce

- ▶ Better Buildings Workforce Guidelines
- ▶ Industrial Energy Management Workforce

# Results to date

**\$1.9 Billion** saved

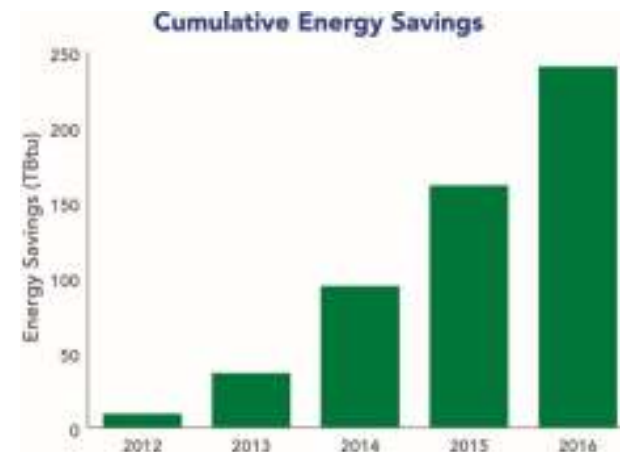
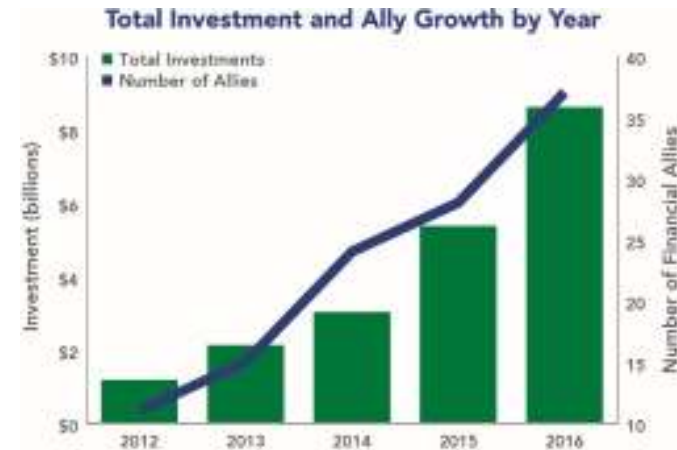
**\$7 Billion** in financing committed

**240 Trillion** BTUs of energy saved

**4 Billion** gallons in water saved

**900+** Better Buildings Partners

**1000+** solutions published



## Better Buildings Partners Are

**30**

of the Fortune 100 Companies

FORTUNE  
**100**

**13%**

of all U.S. Commercial Building Space

**8**

National Laboratories

**93**

Local Governments

**28**

State Governments

**12**

of the Top 25 U.S. Employers

**12%**

of the U.S. Manufacturing Energy Footprint

# Better Buildings Hospitality Partners



NEEMA HOSPITALITY

# Through Better Buildings ....

- Profile leadership
- Demonstrate the value of sharing solutions and ideas – ACROSS industries, building types and ownership models
- Make energy efficiency tangible, real and even, entertaining
- Get out of the boiler room and into the C-suite
- Leaders know they can always be better and continue to learn, evolve and act.....



# Better Buildings Solution Center



**More than 1,000 solutions are available publicly in the Better Buildings Solution Center**

## **Showcase Projects:**

- Large and small buildings
- All sectors
- Specific building types such as schools, hospitals, hotels, grocery stores, universities, civic centers, libraries, offices and labs

## **Implementation Models (Playbooks):**

- Overcome barriers: finance, data, energy management, staff training, community and customer outreach, partnering with utilities, and more
- Multi-faceted and applicable across sectors

[www.BetterBuildingsSolutionCenter.Energy.Gov](http://www.BetterBuildingsSolutionCenter.Energy.Gov)

# Partner Playbooks

## ✓ FINANCE

- Facilities Infrastructure Pool
- Update Internal Purchasing Systems To Facilitate A Portfolio-Wide Energy Upgrade With Maintenance Funds
- Energy Finance Strategy
- Building Upgrade Value Calculator
- On-Balance Sheet, Off-Debt Capacity Performance Contracting
- Internal Green Revolving Fund
- Capital Set Aside Fund
- Green Initiatives Trust Fund
- Utility Savings Initiative
- ESA in BAE Facilities Nationwide
- Commercial PACE Financing at Pier 1
- On-Bill Financing

## ✓ DATA/ENERGY MANAGEMENT

- Energy Looking Glass Dashboard
- Real-Time Energy Monitoring And Weekly Engagement With Field Staff
- Accessing Tenant Utility Data in Triple-Net Leased Buildings
- Data Update and Certification Scorecard
- Centralized Energy Management And Capital Set-Aside Fund
- Submetering Initiative and Energy Dashboards
- Uniform Methodology To Measure Energy Efficiency Improvement
- Inventory and Tracking Process
- Designing A Comprehensive Energy Plan
- Mass Benchmarking
- Energy Benchmarking Program

## ✓ EMPLOYEE /CUSTOMER ENGAGEMENT

- Engaging Clinicians To Reduce Resource Use In Operating Rooms
- Chasing Quarters With Energy Set-Points
- Student Fellowships To Kickstart In-House Energy Programs
- Eco-Treasure Hunts at Fulfillment Centers
- Leveraging Green Leases To Reduce Energy And Water Use
- Wyndham Vacation Ownership Green Certification Program
- Leverage Student-Faculty Research
- Linking Energy Efficiency to Performance-based Compensation
- Energy Champion Program
- Operations Management Leadership Program

## ✓ OVERCOMING ORGANIZATIONAL HURDLES

- Enterprise-wide Coordination
- Good, Better...BEST Standards of Sustainability
- Developing an Integrated "Smart Lab" Program
- Integrated Model For Long Term Campus Energy Planning
- Creating a Culture of Energy Efficiency
- Streamlined Tri-resource Efficiency Programs

## ✓ INTEGRATING EMERGING TECHNOLOGIES

- Gallery Walks
- Lessons Learned from EMIS Pilot & Deployment
- Near-Zero Net Energy Retrofits for Low Income Housing
- Smart Meter Resident Energy Savings Program
- Using Technology to Meet Portfolio-Wide Energy Reduction Goals
- Energy Dashboards
- Project Energy Saver

# Habits of successful organizations

- 1 Know the goal.
- 2 Data matters.
- 3 Look beyond technology.
- 4 It takes an (energy) champion and a team.
- 5 Learn, teach and evolve.

# Fab Four Energy Buddy Program and Checklist

Engaging employees from the top down in maintenance procedures and smart operations to achieve the full value of energy efficiency projects



## **BARRIER**

How to engage employees and motivate your organization

## **SOLUTION**

- Fab Four leaders from the most energy-intensive departments (Housekeeping, engineering, Kitchen, and Banquet)
- Fab Four and intradepartmental Energy Buddies responsible for identifying and carrying out energy savings measures
- Weekly and Daily [Energy Checklists](#)

## **PROGRAM SUCCESS FACTORS**

- Creating a green culture
- Fab Four teams recognized for highest energy savings
- “What’s the Buzz?” newsletter

# Implementing Energy Set-points

Using an energy set-point standard operating procedure as a low cost mechanism for achieving energy savings without compromising guest comfort



## **BARRIER**

Lack of standard operating procedure for key energy set-points for HVAC systems, Domestic Hot Water and Food & Beverage areas at managed properties

## **SOLUTION**

Partner with chief engineers and hotel department heads to develop and certify building-specific temperature set-points and implement standard operating procedures for set-point maintenance

## **PROGRAM SUCCESS FACTORS**

- Educate Chief Engineers about set-points
- Enhance the hotel's ability to read and adjust set-points
- Increase visibility into set-points for hotel staff by using educational tools
- Make adjustments gradually

Example set-point SOP and other resources [here](#)

# Saunders: Comfort Inn & Suites Boston Logan



Saunders Comfort Inn and Suites Boston

Showcase Project: Comfort Inn & Suites  
Boston Logan International Airport

### SECTOR TYPE

Commercial

### LOCATION

Boston, Massachusetts

### PROJECT SIZE

115,200 Square Feet



Saunders Hotel Group

[Read more here](#)

## Annual Energy Use



Energy Savings:

**21%**

## Annual Energy Cost



Cost Savings:

**\$24,900**


## BETTER BUILDINGS FINANCING NAVIGATOR

There are many ways to finance energy efficiency projects in buildings you own or occupy. The Navigator helps you cut through this complexity to secure financing that works for you.

What would you like to do?



Explore financing options >



Find financing that fits your needs >



Connect with Financial Allies >

# The Better Buildings Financing Navigator

The Navigator is an online tool that helps public and private organizations find financing solutions for energy efficiency projects.



With the Navigator, you can...

1

**Explore:** Learn the basics of the efficiency financing market

2

**Find:** Answer a few simple questions to see which financing options might be a fit for your project

3

**Connect:** Speak to Better Buildings Financial Allies who may be able to finance your project

Now available at: <https://betterbuildingsolutioncenter.energy.gov/financing-navigator>



# Smart Energy Analytics Campaign

U.S. DEPARTMENT OF  
**ENERGY**

# Smart Energy Analytics Campaign

- Tech support for EMIS and MBCx
- Publish research on EMIS cost, savings, use
- Recognition Program
- Participation to date
  - 77 organizations
  - 100+ supporting partners



[smart-energy-analytics.org](http://smart-energy-analytics.org)

# Campaign Participation To Date

## As of Feb 2018:

62 organizations  
4000+ buildings  
329 million sq ft

## Goals for 2018:

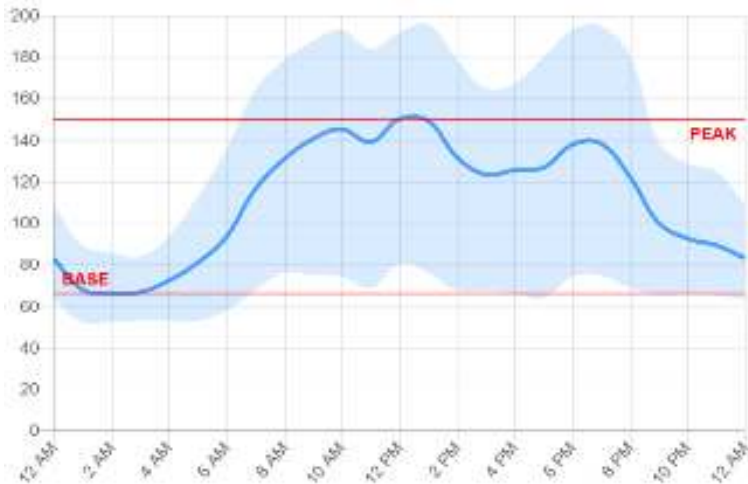
80 organizations  
Varied market sectors

## Participating Organizations

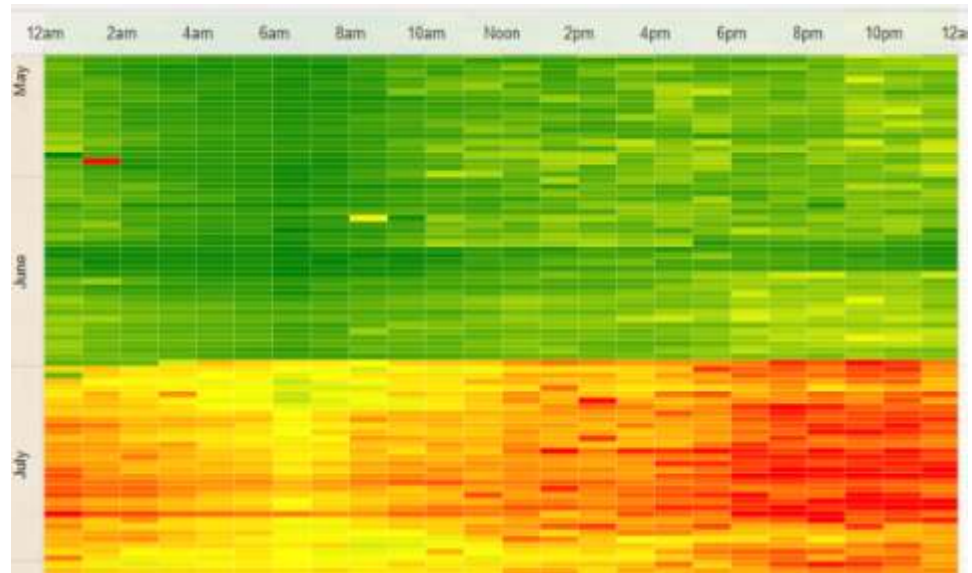
20 Higher education  
21 Office  
8 Hospital  
5 Laboratory  
4 K-12 Schools  
2 Retail  
1 Food service  
1 Grocery

# Energy Information Systems (EIS)

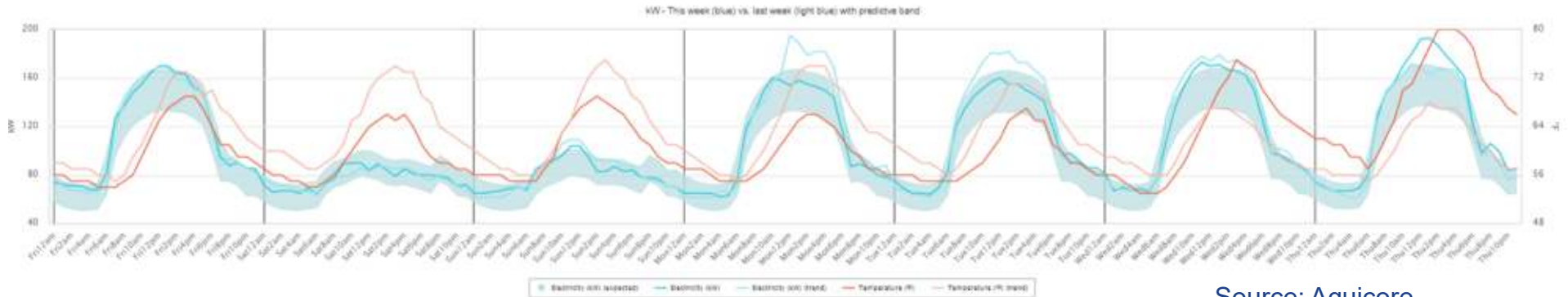
Average Day Pattern Campus Center



Source: Macalester College Sustainability Data Portal



Source: Lucid BuildingOS



Source: Aquicore

# Fault Detection & Diagnostics (FDD)

## Top 5 Issues

Energy			
Building	Equipment	Notes	Cost/Qtr.
Anon Hospital	AHU_6_CAVs	Low Damper Position – opportunity for static pressure reset.	\$11,120
Anon Hospital	AHU_11	No supply temp reset. Cooling valve issues.	\$7,778
Anon Hospital	AHU_6	No supply temp reset. Cooling valve issues.	\$6,163
Anon Hospital	AHU_5	Supply temp lower than setpoint. No supply temp reset. Cooling valve issues.	\$5,029
Anon Hospital	AHU_4	Supply temp lower than setpoint. No supply temp reset. Cooling valve issues.	\$4,318

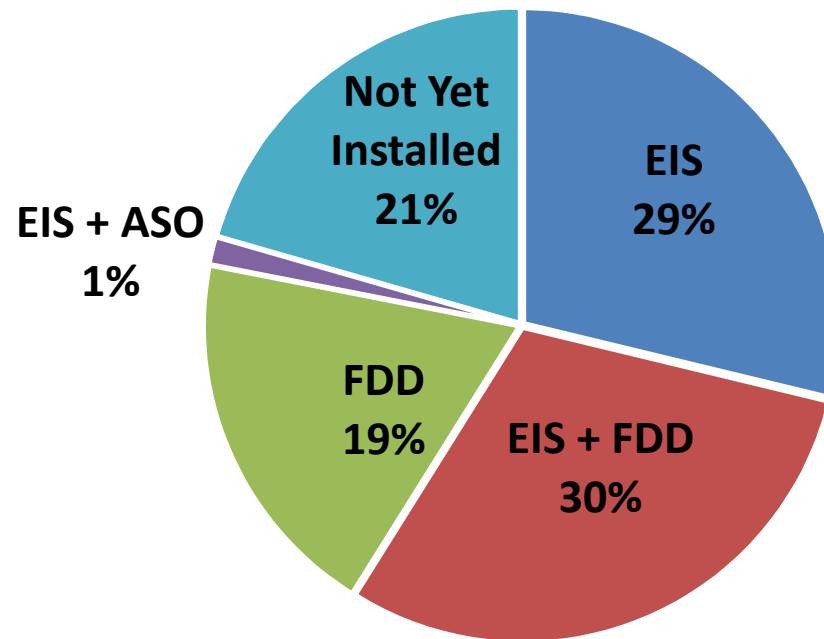
Maintenance			
Building	Equipment	Notes	Severity Priority
Anon Hospital	AHU_11	Static pressure lower than setpoint. Supply fan speed constant. Return fan speed constant.	6
Anon Hospital	AHU_10	Static pressure lower than setpoint. Supply fan speed constant.	6
Anon Hospital	CAV8_2	Room temp lower than setpoint. Stuck reheat valve.	4
Anon Hospital	CAV5_82	Supply flow lower than setpoint. Stuck reheat valve. – May be sensor error.	4
Anon Hospital	CAV3_11	Sensor error. Stuck reheat valve.	4

Image : Schneider Electric Building Analytics

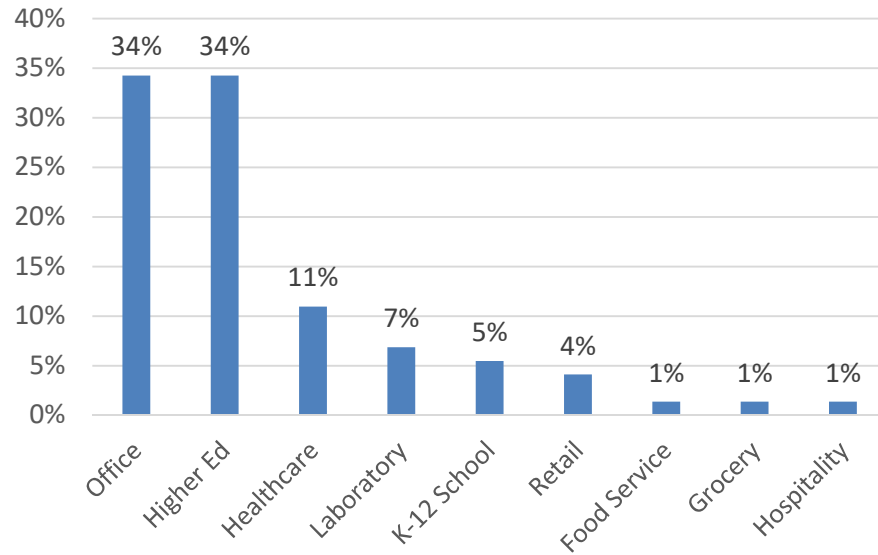
# Year 2 Results: Smart Energy Analytics Campaign

## Participants

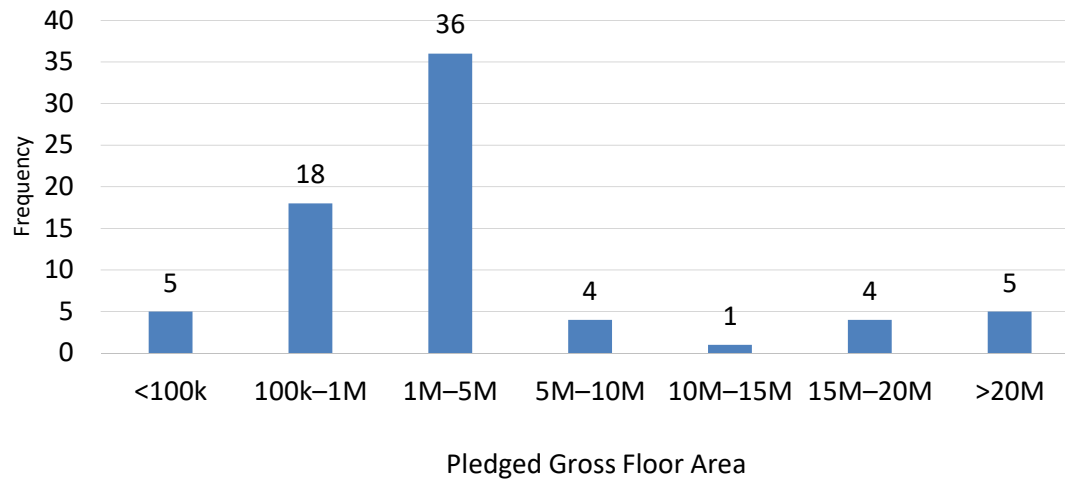
- 77 organizations
- 5000+ buildings
- 400+ million sq ft



# Who are the Campaign Participants?

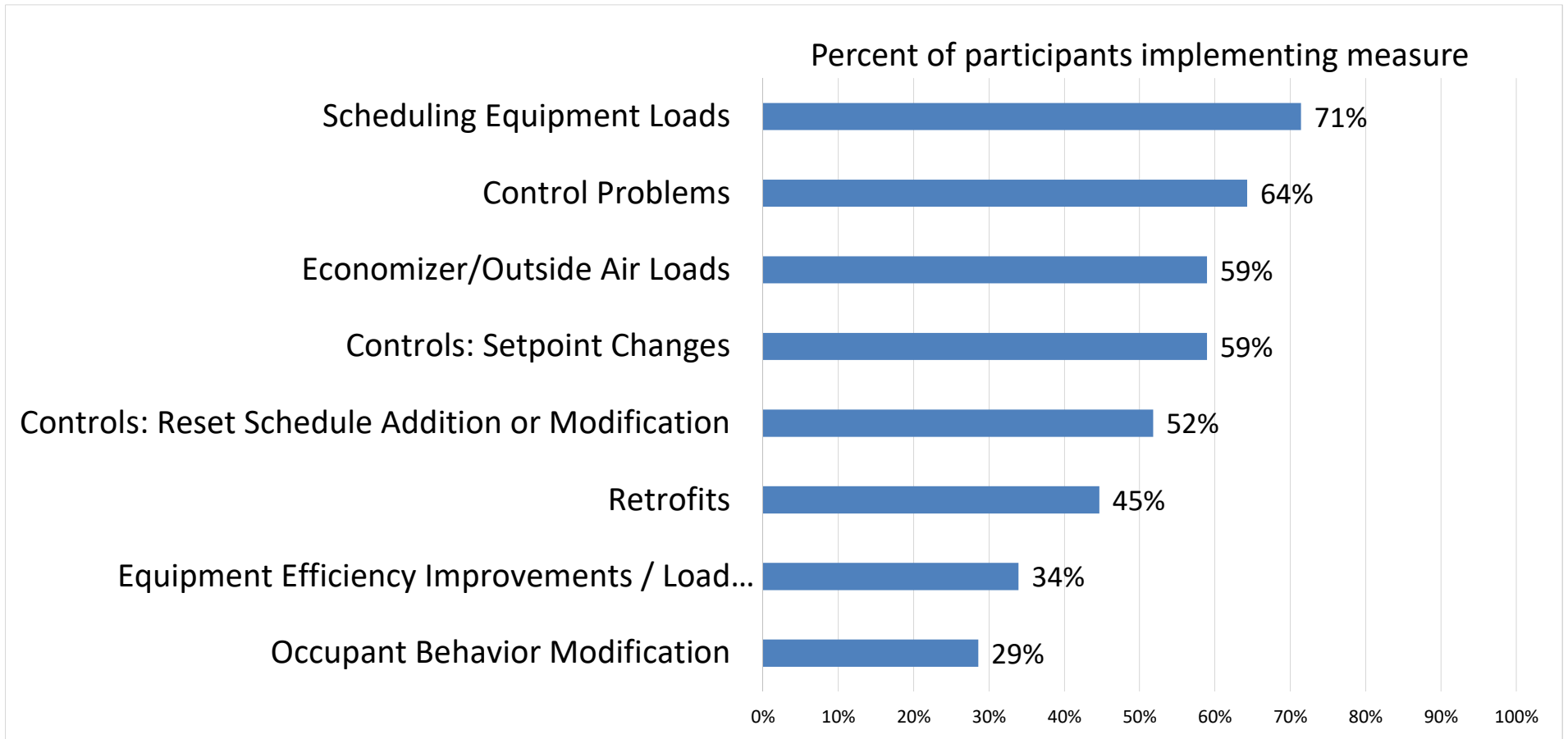


Primary Market Sector



Distribution of Portfolio Floor Area

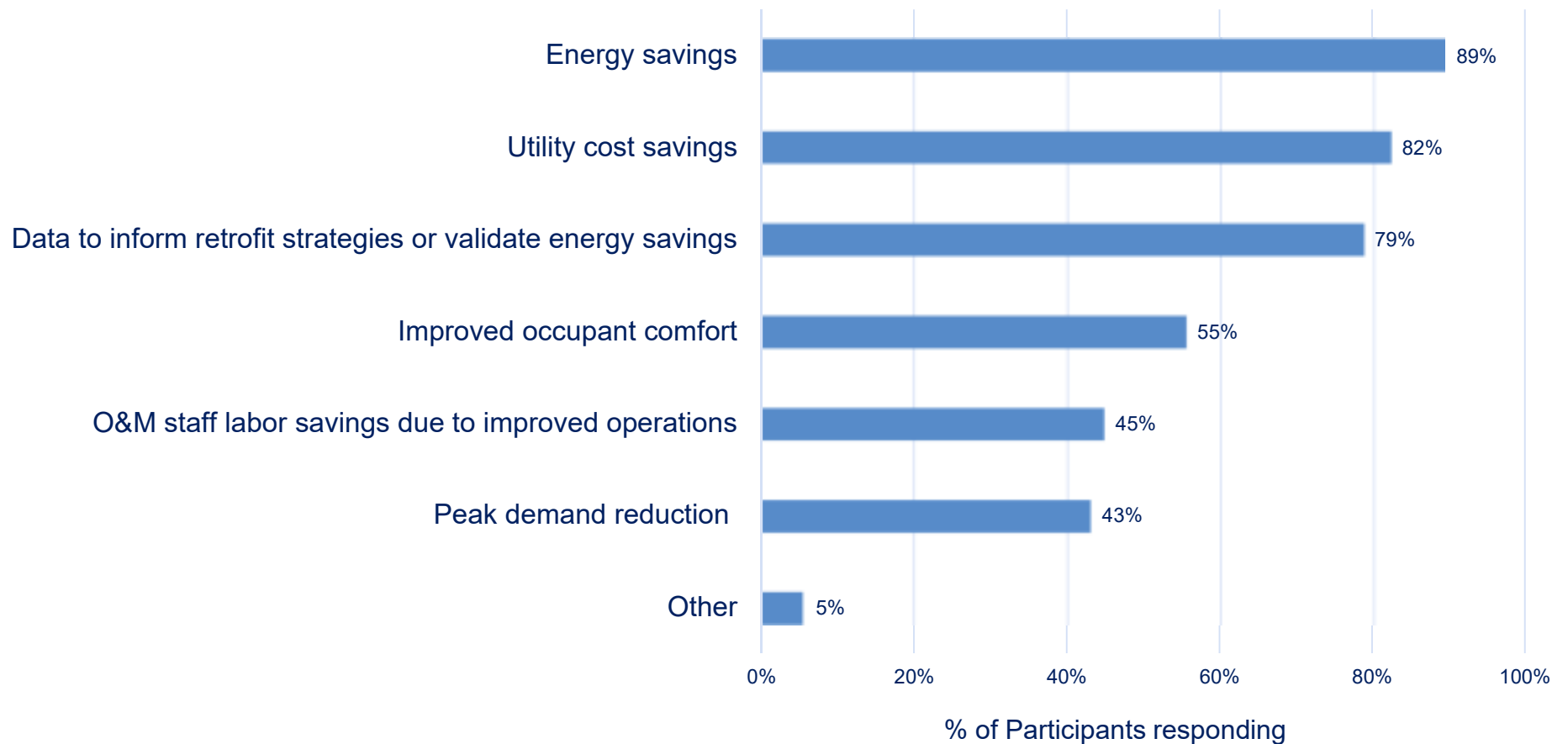
# Top Measures Implemented from EMIS Insights



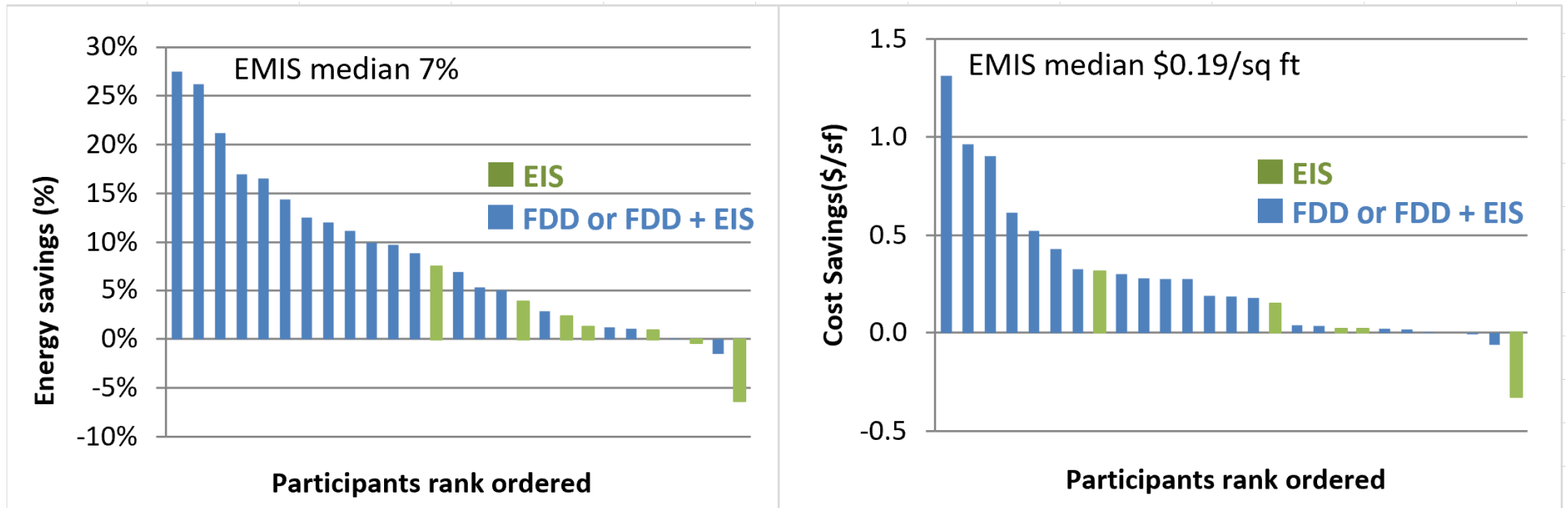


# Benefits of Implementing EMIS

## Important benefits of implementing EMIS (Participants may select multiple benefits)

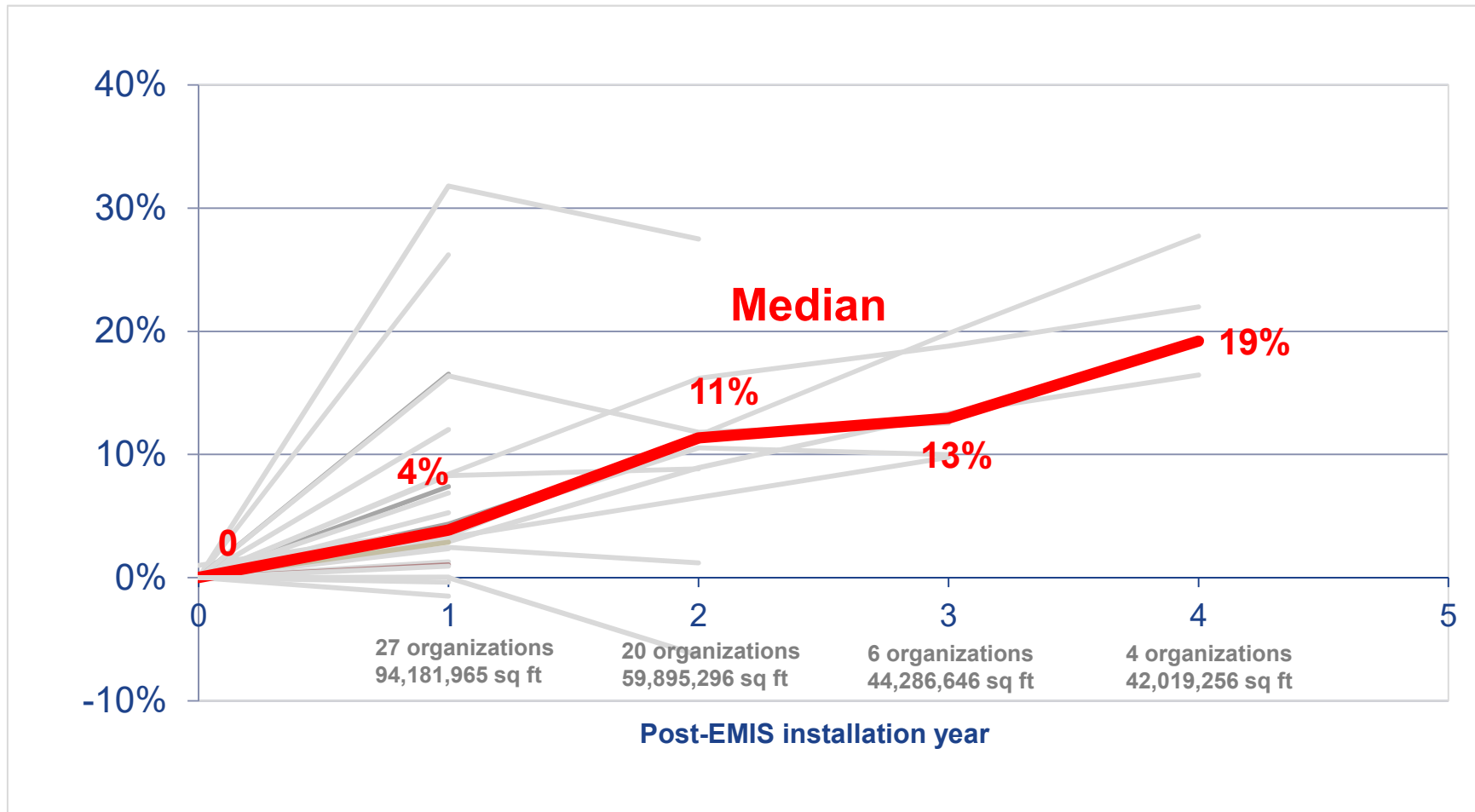


# Overall Energy and Cost Savings Since EMIS Installation (27 organizations, 679 buildings, 94 million sq ft)



**Median savings = 7%; \$0.19/sq ft**

# Energy Savings Since EMIS Installation by Year (27 organizations, 679 buildings, 94 million sq ft)



Percent reduction in energy use, relative to the year before EMIS installation

## EIS and FDD Costs (preliminary)

<b>EMIS Type</b>	<b>Base software &amp; install cost (\$/sq ft)</b>	<b>Recurring software/ service cost (\$/sq ft-yr)</b>	<b>In-house labor cost (\$/sq ft-yr)</b>
<b>EIS (n=12)</b>	\$0.01	\$0.01	\$0.03
<b>FDD and FDD + EIS (n=23)</b>	\$0.05	\$0.02	\$0.04
<b>EMIS Overall (n=37)</b>	\$0.03	\$0.02	\$0.03

# Smart Energy Analytics Campaign Participants Recognized ([smart-energy-analytics.org/success-stories](http://smart-energy-analytics.org/success-stories))

## Spring 2017



## Fall 2017



## Spring 2018



## Fall 2018



CLISE PROPERTIES



# THANK YOU!!

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VISIT: [betterbuildingsolutioncenter.energy.gov](http://betterbuildingsolutioncenter.energy.gov)