



Energy Exchange

Federal Sustainability for the Next Decade
U.S. Department of Energy

Kathleen Judd

*Pacific Northwest
National Laboratory*

Getting Results from Behavior-based Conservation Projects:

A Case Study at Pacific Northwest National Laboratory

August 13, 2015

What's special about behavior change on campuses?

- Top-down approach
 - ◆ Opportunity for economies of scale in communications
 - ◆ Ability to influence with site-specific policies and procedures
- Bottom-up approach
 - ◆ Can be harder to track and influence decentralized activities
- Both are needed



Lessons Learned from Campus Case Studies

- Know your audience and what drives their behavior
- Call for actions that are specific and relevant
- Use multiple strategies to educate, enable, and engage
- Use known and trusted sources to deliver messages, such as a building-level advocate
- Measure and share results



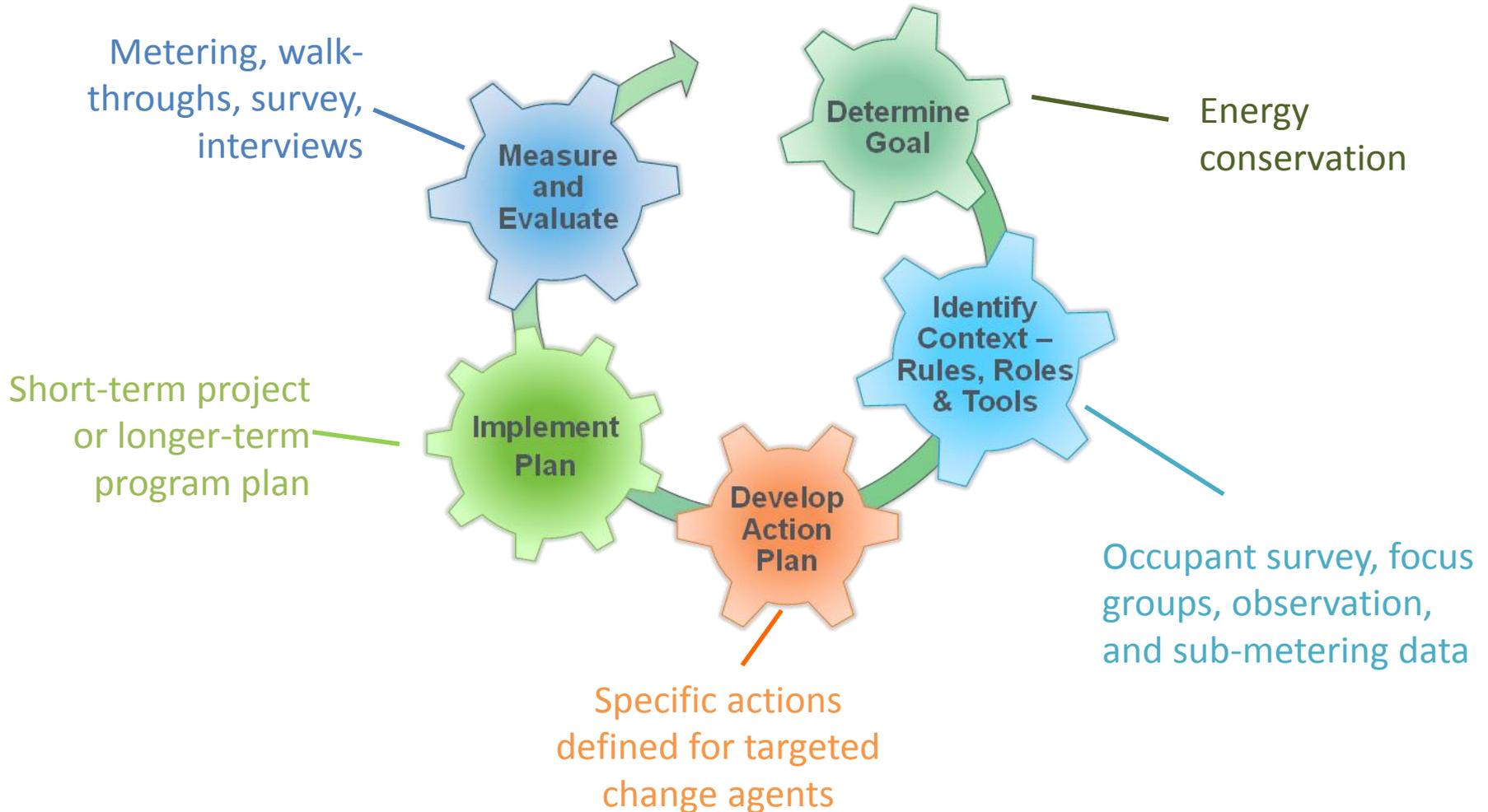
Pacific Northwest National Laboratory (PNNL) Behavior Change Case Study

- About PNNL's campus
 - ◆ 4,300 scientists, engineers and non-technical staff
 - ◆ 80 buildings on main campus
- *Rock the Watt* energy conservation campaign
 - ◆ 3-month campaign in FY15
 - ◆ Implemented by Sustainability Program
 - ◆ 14 buildings on main campus participated



Manage behavior change like an energy efficiency measure

FEMP Institutional Change and Continuous Improvement Cycle



Know your audience and the opportunity for change

- Gathered input from facilities management and occupants during office building walk-throughs
- Developed laboratory sustainability assessment checklist and evaluated representative set of labs

PNNL Sustainable Laboratory Assessment Form			
Building and Room #:			
Date of Assessment:			
Lab Type (Biological, Chemical, Instrumentation):			
Cognizant Space Manager:			
Number of Lab Users:			
Typical Hours of Use:			
1 Energy		Answer	
1.1 Fume Hoods and Biosafety Cabinets			
Document fume hood/BSC type and use.			
Are fume hood sashes closed when not in use (for those without automated sashes)? What percent of the time?		Y	N N/A
Does the lab have any visual cues (e.g. signs, marks) to encourage energy efficient use of fume hoods?		Y	N N/A
Are fume hoods/biosafety cabinets routinely turned off when not in use? (if it is safe to do so)		Y	N N/A
1.2 Cold Storage			
Document type and condition of refrigerators and freezers.			
Are cold storage materials labeled with clear descriptions of contents, ownership, and expiration?		Y	N N/A
Are all of the materials currently in cold storage associated with active uses or stored because of archiving requirements?		Y	N N/A
Are the materials in cold storage arranged to maximize storage capacity?		Y	N N/A
Are freezers cleaned out, defrosted and maintained (e.g. coils vacuumed) on a regular schedule? How often? Who is responsible?		Y	N N/A

Call for specific and locally relevant actions

In Office Spaces

- Choose power settings that put **computers to sleep** when away
- Install a **smart power strip** in workstations with 3+ peripherals
- Enter a service request to fix HVAC issues and **eliminate space heaters**
- **Remove personal refrigerators** and use the shared refrigerators
- **Turn off lights** when not in use or when natural or task lighting is adequate
- Use networked printers and **remove personal printers**

In Lab Spaces

- **Close the sash** on fume hoods
- **Turn off unused equipment** or request a timer
- **“Chill up” ultra-low temperature freezers** from -80°C to -70°C
- **Label, inventory, and clean out** expired samples in cold storage
- Choose high **efficiency refrigerators and freezers** when purchasing



Define strategies that educate, enable, and engage

Educate

- Let occupants know *what* actions to take and why it matters (e.g. \$ saved, equipment life extended)

Enable

- Removed barriers to action (e.g. limited space in shared refrigerators)
- Aligned key institutional stakeholders on messaging (e.g. IT support for computer power mgt)

Engage

- Relied primarily on building sustainability champions (BSCs) to interface with occupants
- Encouraged *personal* outreach when possible

WIN A PRIZE! ROCK THE WATT

You may be eligible for a Sustainability t-shirt or tote bag. Contact your Building Sustainability Champion or Sustainability@pnl.gov if you take energy saving actions between now and January 2015.

ROCK THE WATT

\$ PNNL's weekly energy bill averages **\$100,000**. We can all do our part to lower our bills at work, just like at home. Every little bit helps!

COMPUTERS

If 1 in 4 people switch computer power settings from always on to "go into sleep mode" after 30 minutes
= **~\$20,000 savings/year**

LIGHTING

If 1 in 8 people turn off overhead lights and use task lighting for part of the day
= **~\$4,300 savings/year**

SPACE HEATERS

If 100 people work with Facilities to address heating issues in their workspace and eliminate space heaters
= **~\$2,400 savings/year x 100**

COMPACT REFRIGERATOR

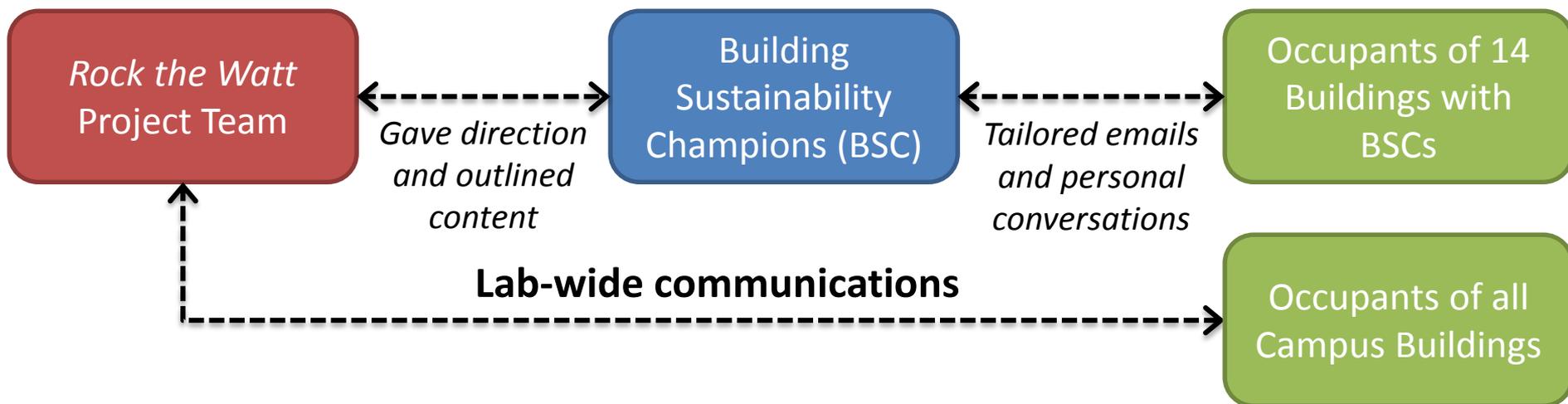
If 100 people start using shared refrigerators and unplug private refrigerators
x 100 = ~\$1,400 savings/year

PNNL is operated by Battelle for DOE

Use known and trusted sources to deliver messages

- BSC correspondence with occupants frequently prompted dialogue
 - ◆ Occupants shared > 50 suggestions with BSCs; many resulted in energy savings
- 5 lab-wide messages reached up to 4,000 people; received one direct response

Targeted building communications



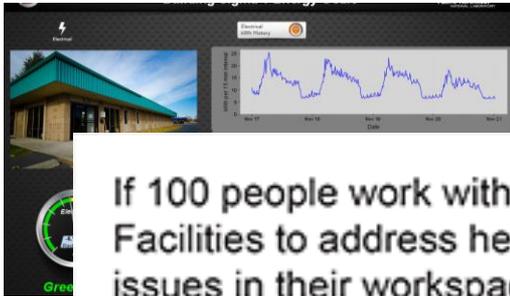
Example Communications and Tools



WIN A PRIZE!
ROCK THE WATT



Building XYX Energy Use



Actions with Impact in I
Thank you to **Joe Smiley** initiative to get computers in the EIOC into power-s He is also powering down machines that aren't needed.

If 1 in 4 people switch computer power settings from always on to "go into sleep mode" after 30 minutes
= ~\$20,000 savings/year

Making a Difference
Karen Smith, who has

ice with a smart strip and started power her computer off at night, **Don Jones**, who has made a request to the Building Management regarding office temperatures, and **Ann Lewis** who have been turning off unoccupied meeting room lights.

If 100 people work with Facilities to address heating issues in their workspace and eliminate space heaters
= ~\$2,400 savings/year



X 100

More



Step 1:
Select CONTROL PANEL or SYSTEM PREFERENCES (Mac) from the START menu.



Step 2:
Select POWER OPTIONS or ENERGY SAVER (Mac) from the CONTROL PANEL window.



Step 3:
Windows: Select CHANGE SETTINGS. Set timers to display and put computer Mac: Click the lock at bottom to make changes. Adjust sleep and Enable Power Nap.

recommended.
Put computer to sleep after



X 100

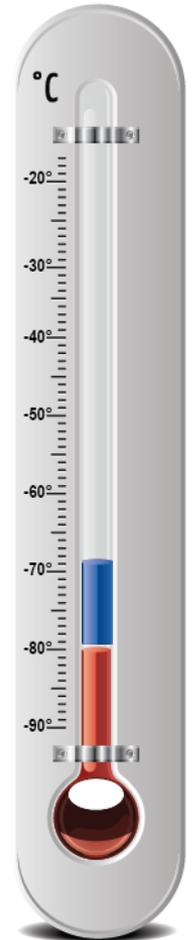
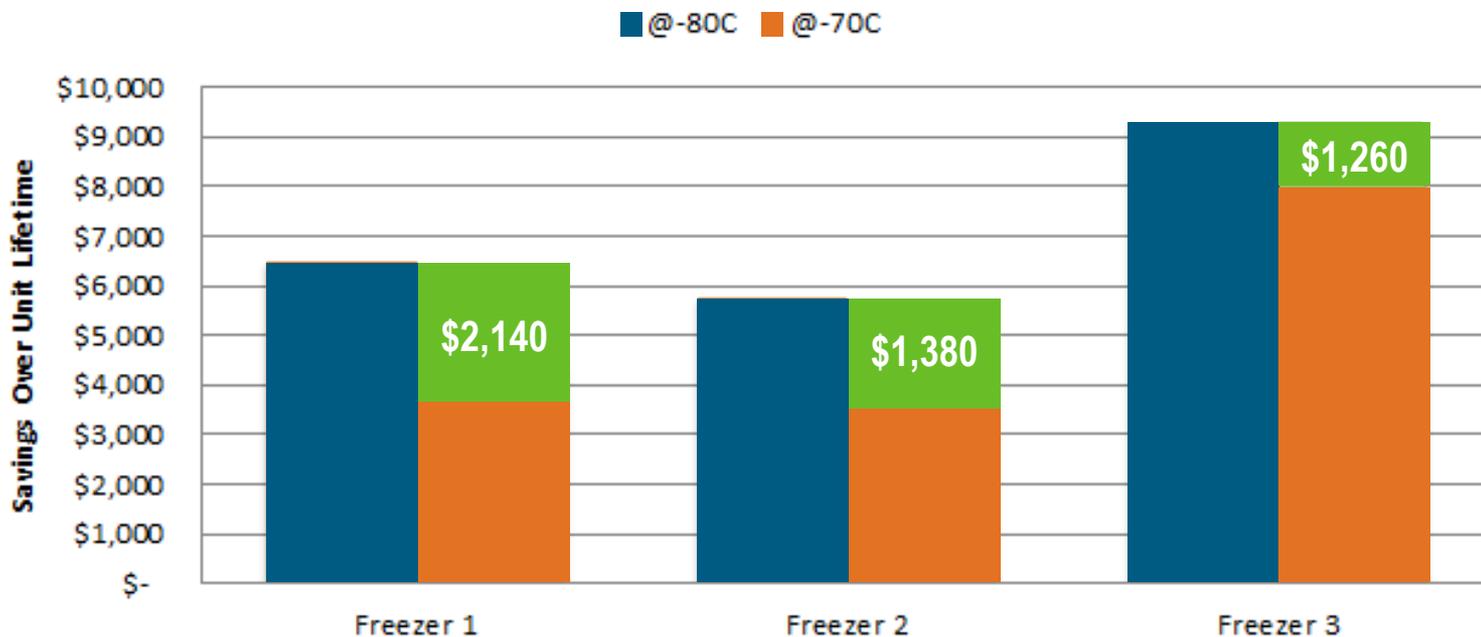
If 100 people start using shared refrigerators and unplug private refrigerators
= ~\$1,400 savings/year

Visit the Rock the Watt web site for more information on actions with impact.

Take time to measure and evaluate impact

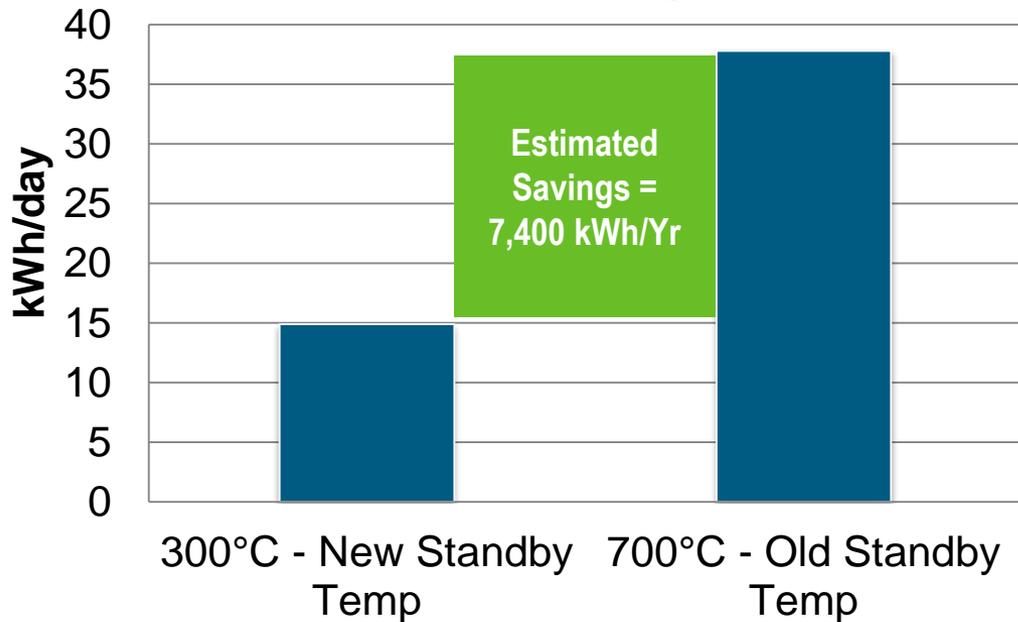
“Based on feedback from senior staff and the internet search I performed, I found no reason to not make this change.” –PNNL scientist who turned up the temp on a freezer

Impact of 10°C Change in Ultra-Low Temp Freezer Setpoints



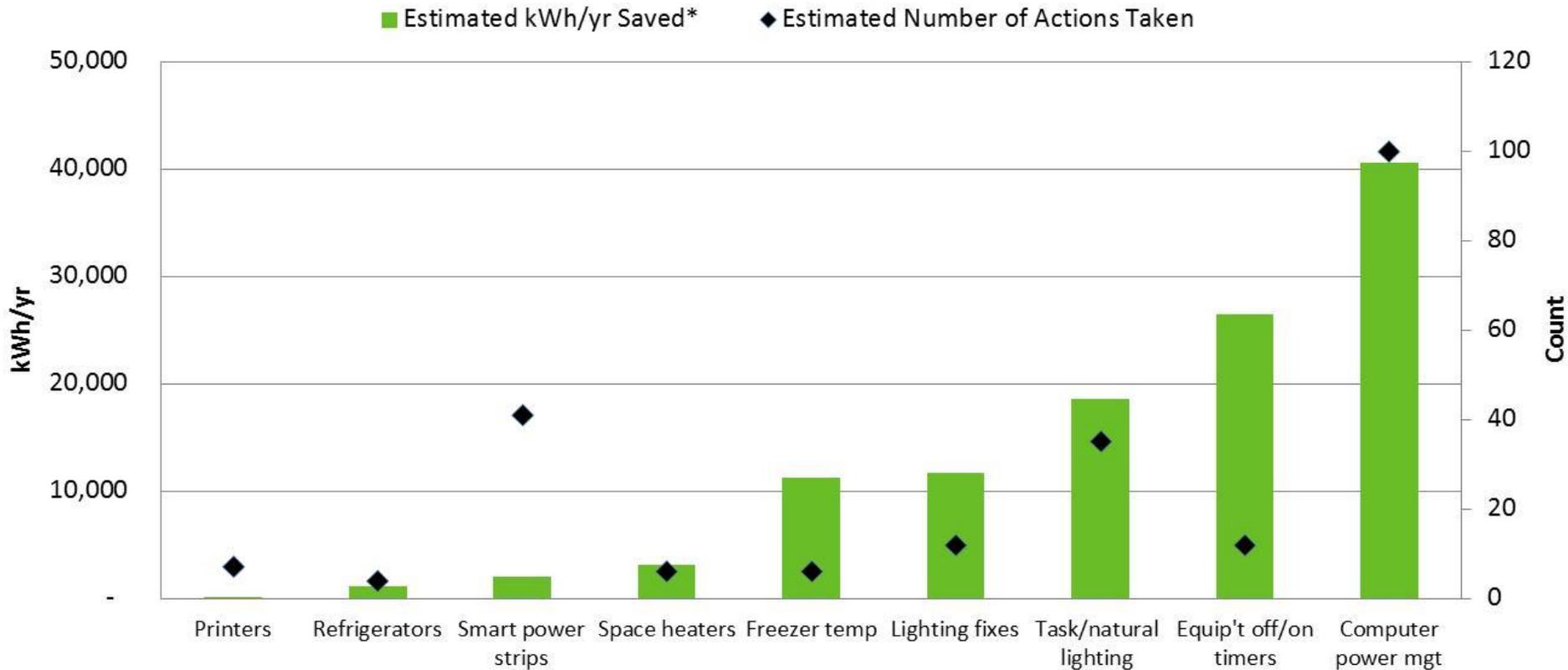
Take time to measure and evaluate impact

Impact of Changing Standby Temperature of Large Lab Oven



Estimated Minimum Impact of Campaign

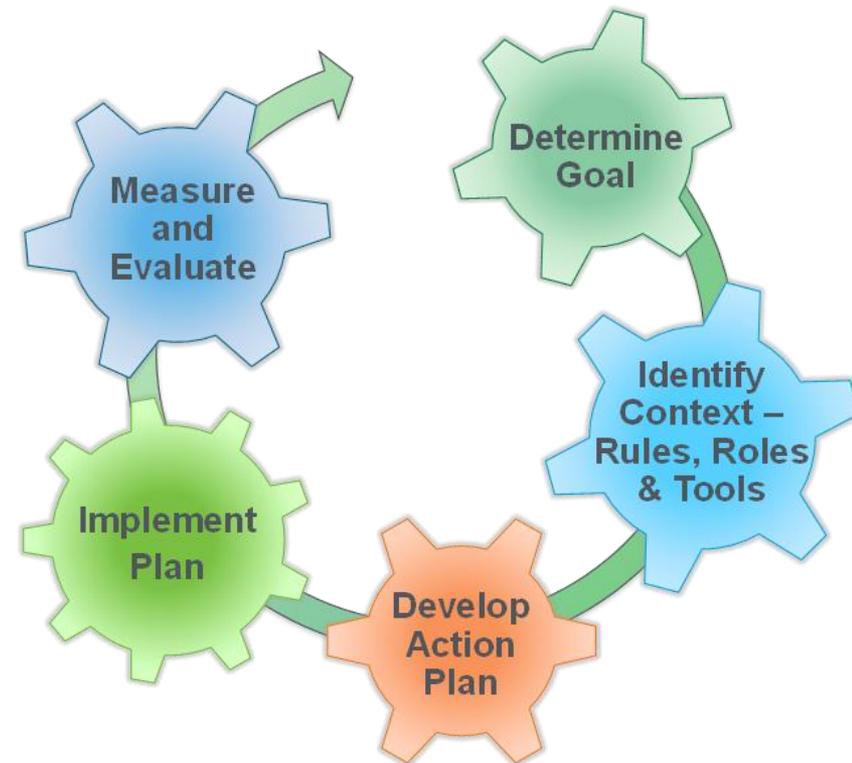
- > 200 actions taken in 3 months – many unsolicited
- 117,000 kWh/year annualized*



*accounts for reduced cooling loads part of the year

Conclusions about Behavior Change Projects

- Plan, implement, and evaluate like any energy project
 - ◆ Know your buildings and occupants
 - ◆ Focus on actions that matter
 - ◆ Use strategies that educate, enable *and* engage
 - ◆ Expect an ROI and evaluate impacts
 - ◆ Share results to prompt further action and convey the value of behavior change



Questions?



Pacific Northwest
NATIONAL LABORATORY

*Proudly Operated by **Battelle** Since 1965*

Kathleen Judd

Senior Research
Scientist and Team Lead

BUILDING
PERFORMANCE TEAM

Kathleen.Judd@pnnl.gov

www.pnnl.gov