Building Technologies Office

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Better Buildings Alliance

Plug and Process Loads (PPL) Project Team Teleconference

July 20, 2016

Technical Lead Lab: NREL

Agenda

- Introductions
- BBA PPL Technical Team Updates & Events
  - Updates
  - PPL events
  - New & upcoming publications
  - News from the field
- Technical Presentations
  - Measuring our Ability to Reduce Office PPLs; Scott Hackel, Seventhwave
  - Flip the Switch; Jaxon Love, Shorenstein
- Open Discussion and Q&A
- Additional Member Updates

Around the Phone

- Rois Langner will call out the organization name. Please state your name when your organization is called.

PPL Team

Updates & Events

Conferences

- DOE's Better Buildings Summit
  - *Engaging Building Occupants: How to Reduce PPL Energy Use*
  - Christine Wu, GSA; Moira Hafer, Stanford University
  - May 9-11, 2016 – Washington DC
  - http://betterbuildingsinitiative.energy.gov/presentations/engage-building-occupants-how-reduce-plug-load-energy-use
- ACEEE Summer Study on Energy Efficiency in Buildings
  - Engaging Tenants in Reducing Plug Load Energy Use
  - Marta Schantz, Waypoint Building Group
  - August 21-26, 2016, Pacific Grove, CA
- GreenBuild 2016
  - Myth-Busting Market Barriers to Plug Loads – *They Matter!*
  - Rois Langner, NREL; Marta Schantz, Waypoint Building Group; Eugenia Gregorio, Tower Companies; Moira Hafer, Stanford University
  - October 5-7, 2016 Los Angeles, CA

PPL Team Updates & Events

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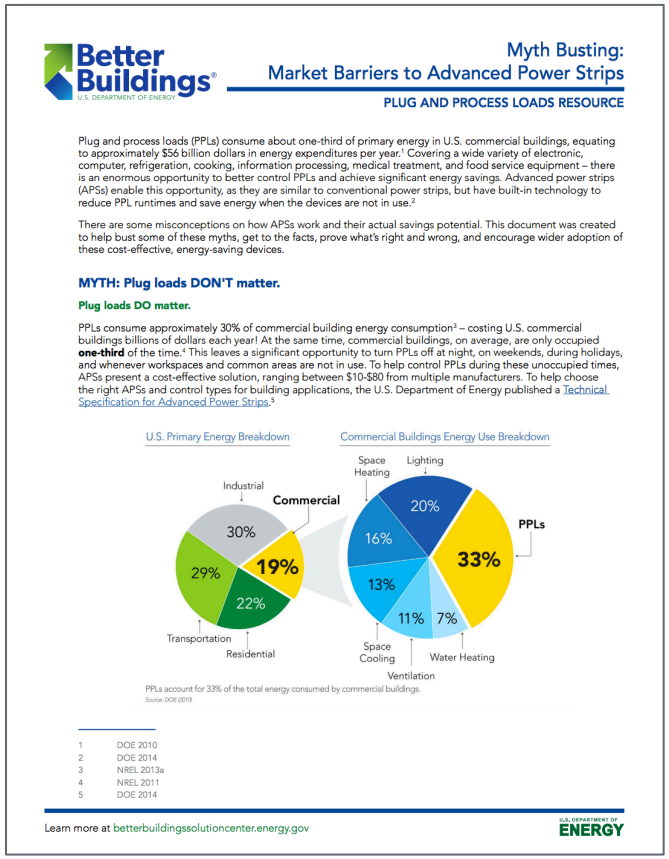
NEW PUBLICATIONS & EFFORTS:

- Myth Busting: Market Barriers to Advanced Power Strips



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Myth Busting:
Market Barriers to Advanced Power Strips

PLUG AND PROCESS LOADS RESOURCE

Plug and process loads (PPLs) consume about one-third of primary energy in U.S. commercial buildings, equating to approximately $56 billion dollars in energy expenditures per year.[1] Covering a wide variety of electronic, computer, refrigeration, cooking, information processing, medical treatment, and food service equipment – there is an enormous opportunity to better control PPLs and achieve significant energy savings. Advanced power strips (APSs) enable this opportunity, as they are similar to conventional power strips, but have built-in technology to reduce PPL runtimes and save energy when the devices are not in use.[2]

There are some misconceptions on how APSs work and their actual savings potential. This document was created to help bust some of these myths, get to the facts, prove what's right and wrong, and encourage wider adoption of these cost-effective, energy-saving devices.

MYTH: Plug loads DON'T matter.

Plug loads DO matter.

PPLs consume approximately 30% of commercial building energy consumption[3] – costing U.S. commercial buildings billions of dollars each year! At the same time, commercial buildings, on average, are only occupied **one-third** of the time.[4] This leaves a significant opportunity to turn PPLs off at night, on weekends, during holidays, and whenever workspaces and common areas are not in use. To help control PPLs during these unoccupied times, APSs present a cost-effective solution, ranging between $10-$80 from multiple manufacturers. To help choose the right APSs and control types for building applications, the U.S. Department of Energy published a Technical Specification for Advanced Power Strips.[5]

U.S. Primary Energy Breakdown

Commercial Buildings Energy Use Breakdown

PPLs account for 33% of the total energy consumed by commercial buildings.

Source: DOE (2010)

1 DOE 2010
2 DOE 2014
3 NREL 2013a
4 NREL 2011
5 DOE 2014

Learn more at betterbuildingssolutioncenter.energy.gov

U.S. DEPARTMENT OF ENERGY

http://betterbuildingssolutioncenter.energy.gov/alliance/technology-solution/plug-process-loads

PPL Team Updates & Events

NEW PUBLICATIONS & EFFORTS:

- Myth-Busting Rumors About Advanced Power Strips
- Updated list of utility incentives for PPL controls
- Wayne N. Aspinall Federal Building and US Courthouse case study
- Technology & behavioral study: zero clients (virtual machines) vs. traditional computing systems

PPL Team Updates & Events

NEWS FROM THE FIELD:

- Residential Coalition for Home Electronics Energy Reduction (CHEER) Program
- Research Topics of Interest:
  - Plug load energy management with demand response
  - Quantifying savings from intelligent efficiency controls
  - Enabling all devices to go into low power mode or standby mode
  - Enabling policies to limit standby power
- GSA Green Proving Ground RFI solicitation for technologies to pilot in GSA buildings

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Seventhwave
Measuring Our Ability to Reduce Office Plug Loads

Scott Hackel

U.S. DEPARTMENT OF ENERGY

seventhwave

Measuring our ability to reduce office plug loads

July 20, 2016 – Better Buildings Alliance

cee seventhwave LHB

Background | Our project opportunity

- Characterize plug loads: **35 offices**
- Measure individual loads: **8 offices**
- Measure reduction strategies: **5 strategies**
- Gauge user satisfaction: **291 users**

Background | Our project opportunity

CREDIT: prweb.com

Strategies | Five strategies to test

- APS – Occupancy sensor
- APS – Foot pedal
- Basic timer
- Computer power management
- Behavior campaign

CREDIT: Tricklestar

Strategies | Behavior campaign

POWER DOWN

TOGETHER, WE CAN REDUCE PLUG LOAD ENERGY USAGE IN THE 1902 BUILDING.

AS A CITY, we have made great strides in reducing our environmental footprint–**but we can do more**– especially in the area of plug load energy.

You'll notice we've tried some technological strategies (and are measuring those as part of a research project) to reduce plug loads at some of the workstations in the 1902 Building. **But now it's time to get EVERYONE involved in trying to save energy through individual actions.** As part of this effort, you'll notice some workstations have received blue, microwatt LEDs to remind occupants to turn off their equipment. We hope these will also serve to remind us ALL to turn equipment and lights off.

To help inspire everyone, **your efforts will be rewarded by treats** (in addition to that warm, fuzzy feeling) if we catch you in the act of saving energy!

TO GET STARTED, SOME ACTIONS YOU CAN TAKE INCLUDE

- **Hit the switch** to turn off unneeded plug loads whenever leaving your desk
- **Unplug** any electronics that are only rarely used (printers, radios, chargers)
- At the end of the day, **shut down or hibernate** your computer (when you won't need remote access)
- **Brag** about your energy-saving actions to co-workers and get them saving too!

We'll follow up with more energy-saving ideas in the coming weeks.Thank you for your participation!

Sincerely,
Shann Finwall on Behalf of the Green Team

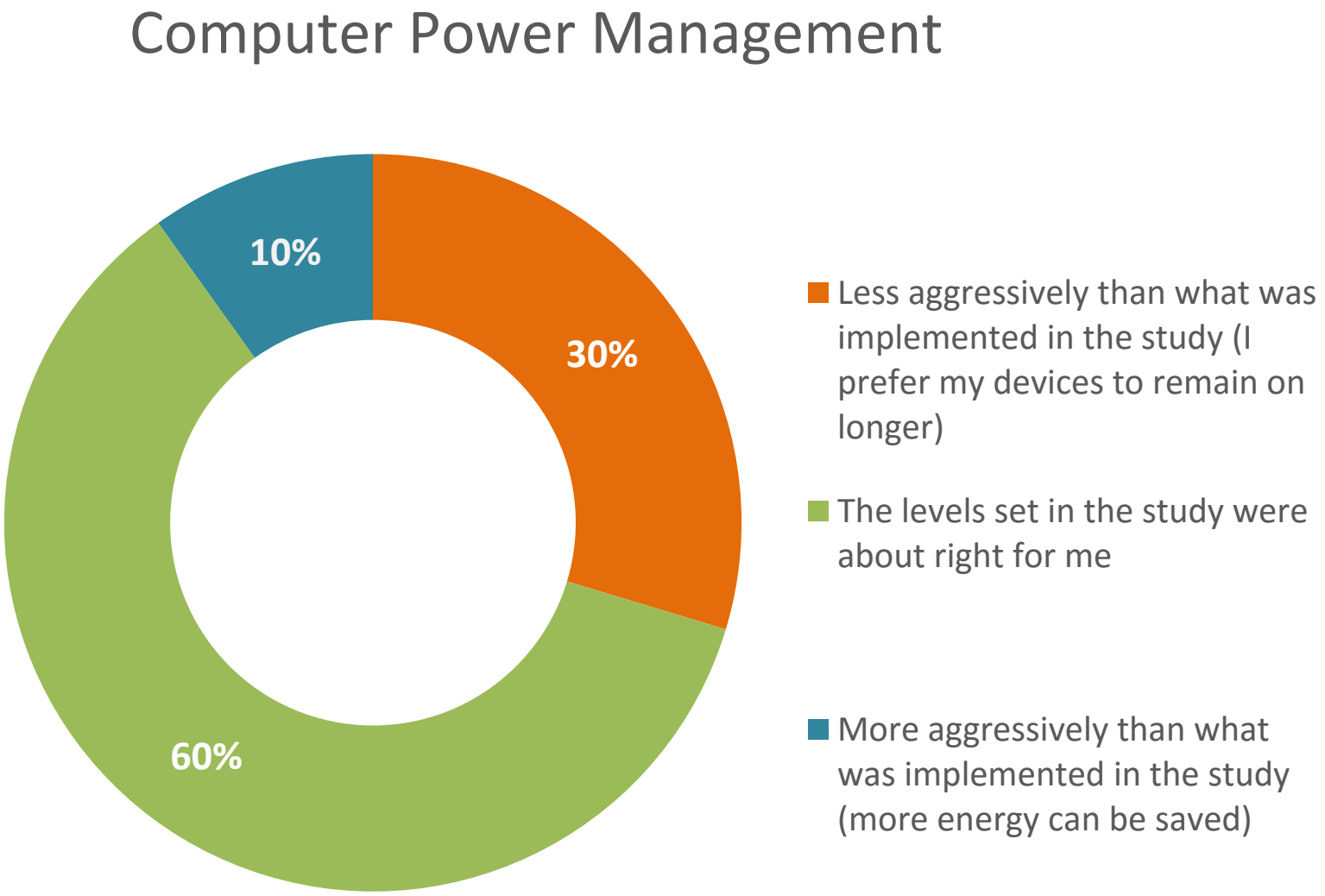
CREDIT: LHB Architects

Results | Characterization

	Self-reported	
	Average	Range
Square feet per person	280	170 - 600
Desktop per workstation	0.65	0 - 1.4
Laptop per workstation	0.43	0 - 1
Monitor per workstation	1.32	0.2 - 2.4
Phone per workstation	1.00	0.6 - 1.8
Task light per workstation	0.80	0 - 2.6
All other equipment	1.40	0 - 4.8

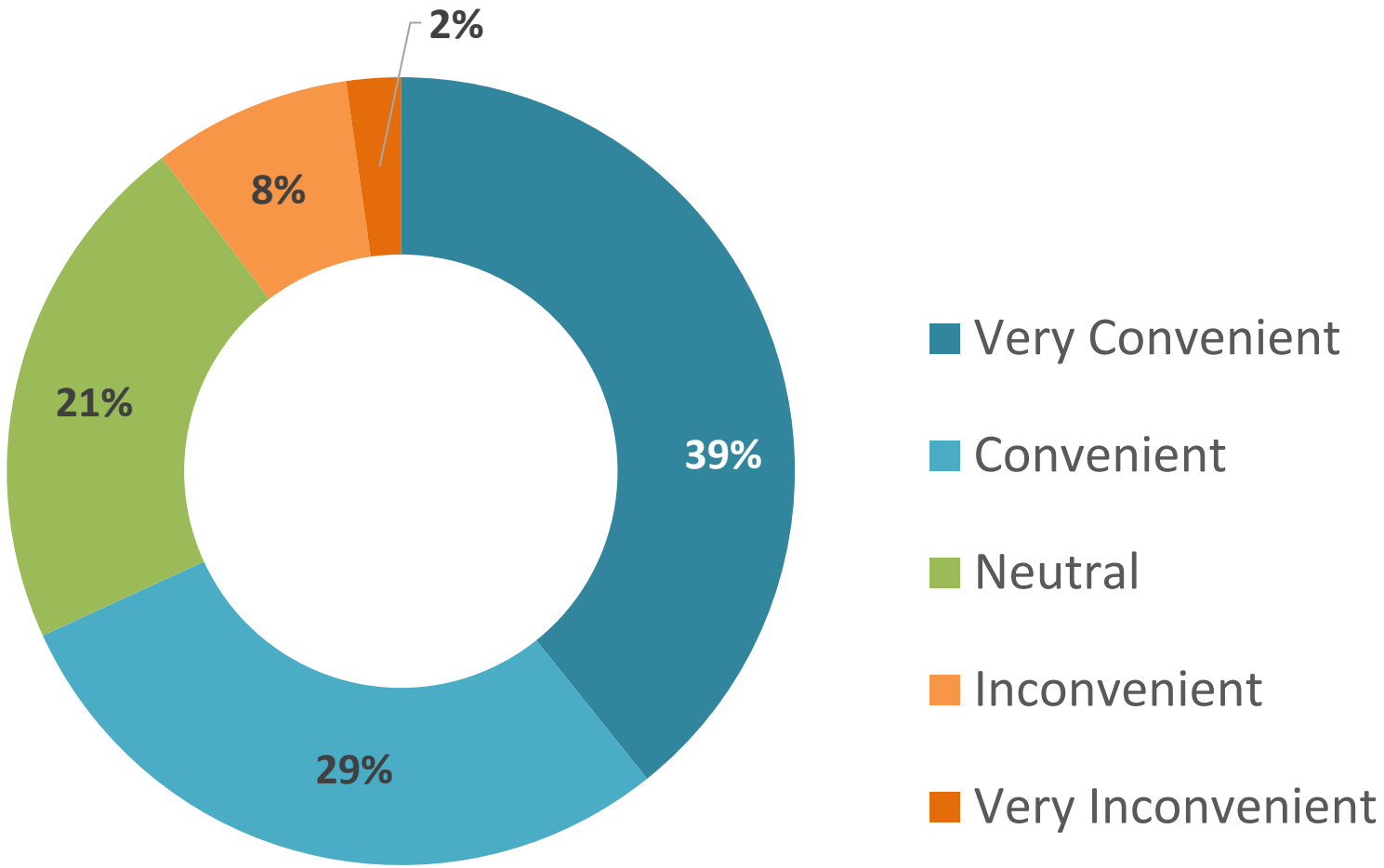
Results

User satisfaction



Results

User satisfaction



Results | Stay tuned….

- Baseline usage
- Savings for each strategy
- Code implications
- Context – plug load vs. whole building energy
- Costs and economics
- Utility program implications
- IT and operational issues

Thank You | Continuing the discussion…

Contact me

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Learn about our team

- **seventhwave.org/research**
- **mncee.org/research/overview**
- **lhbcorp.com**

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Shorenstein Realty Services
Flip the Switch

Jaxon Love

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SHORENSTEIN

Flip the Switch

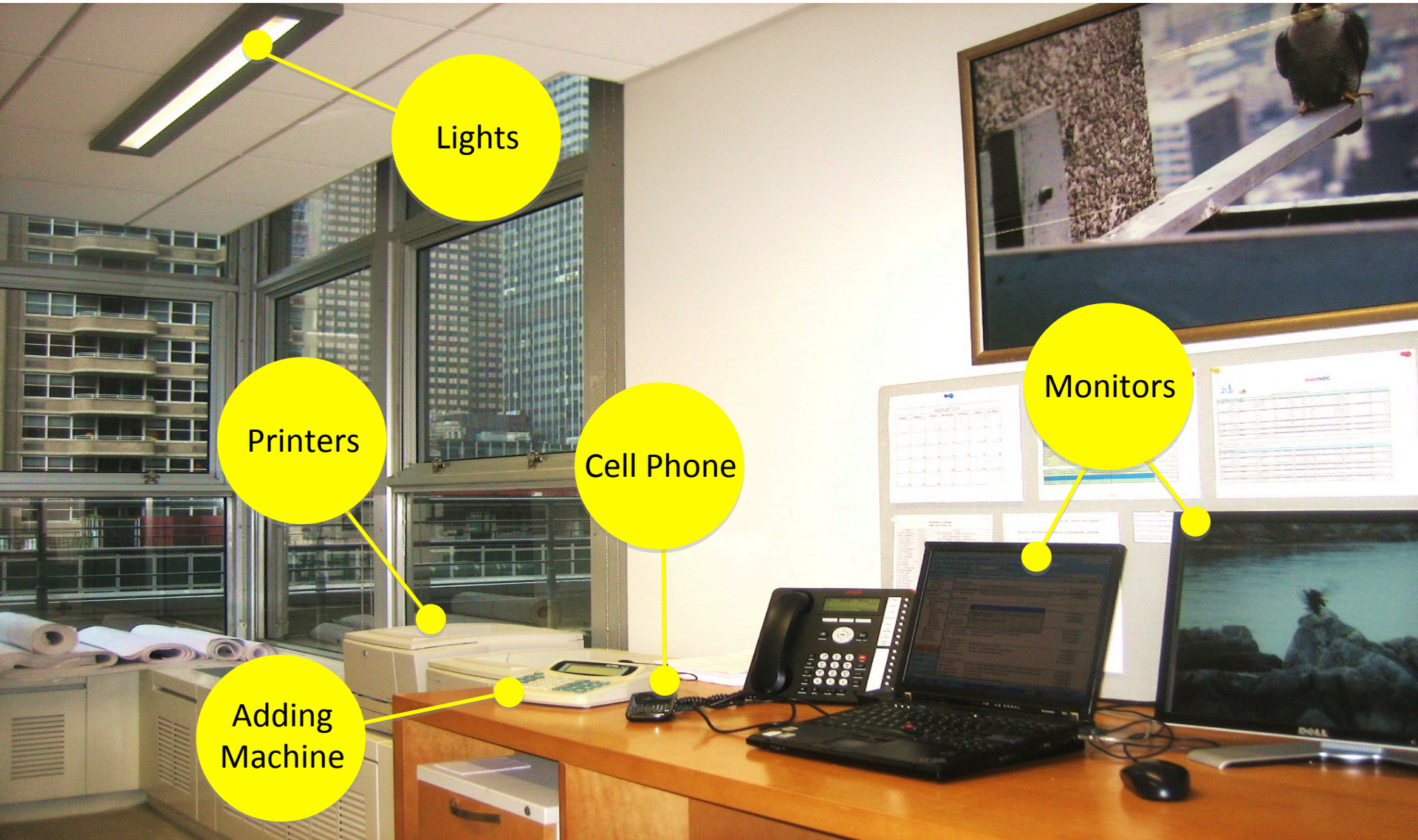
for a greener tomorrow

Presentation Outline

- Why sustainability matters
- Shorenstein's efforts
- Sustainability strategies for tenants

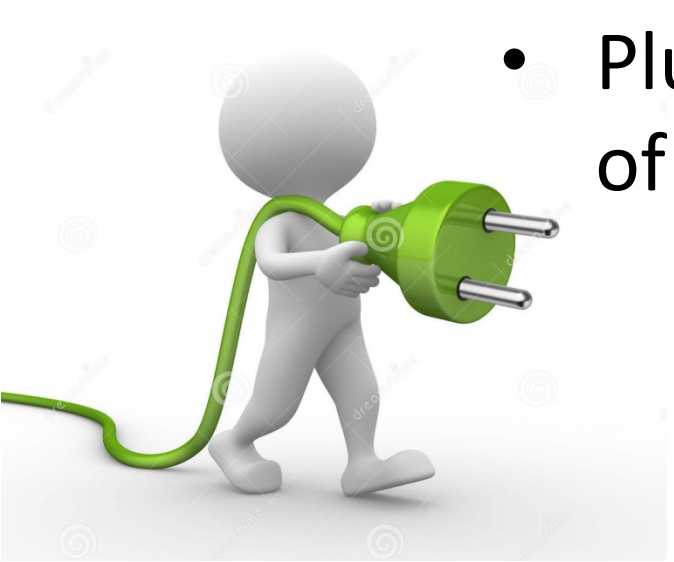
What Can You Do?

Electricity in an Office



What is Plug Load?

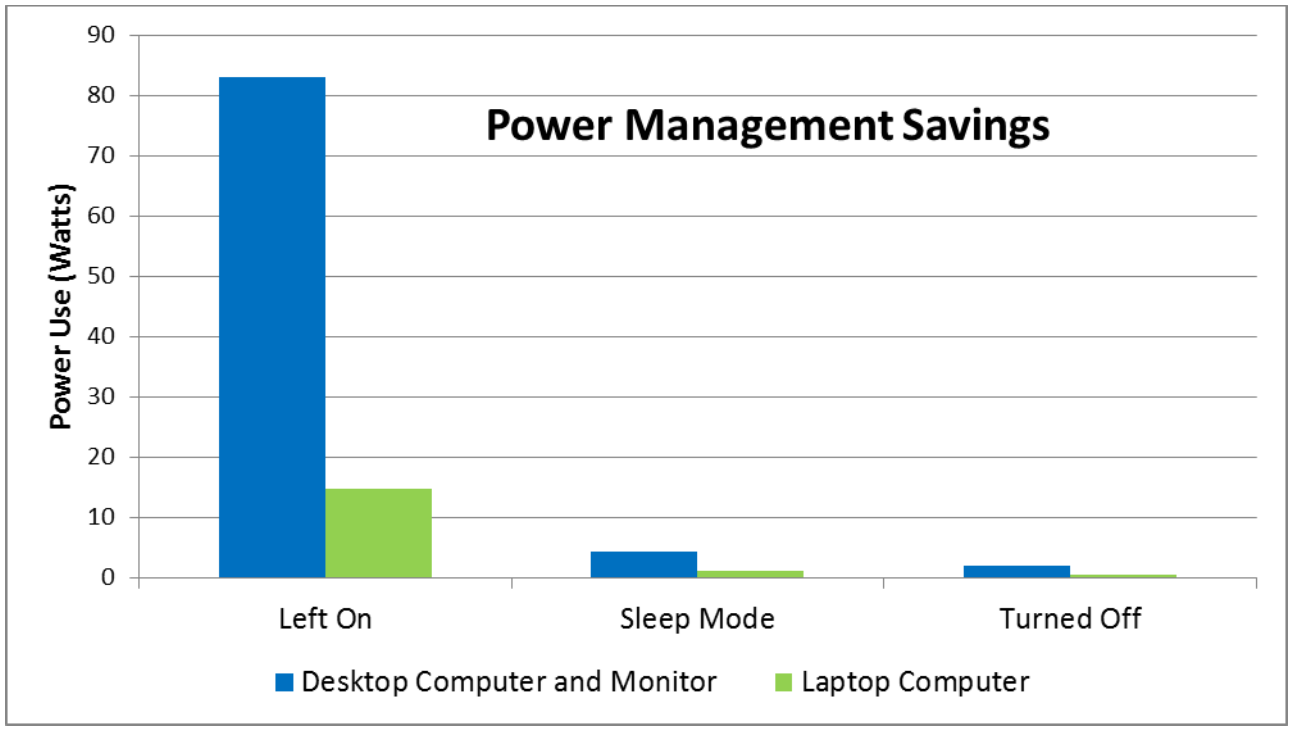
- Anything that is plugged into a wall outlet
  - Even if an appliance is not in use, it will still draw electricity if plugged into the wall



- Plug loads typically account for 30% of building energy use
  - Reducing plug loads also reduces heat generated by appliances
  - For every 100-watt reduction in computer energy consumption, there's a corresponding 28-watt drop in cooling loads

Source: ENERGYSTAR.gov

Computer Power Management



An office with 100 desktop computers and 50 laptops can save **$22,000 per year** and reduce the equivalent of **28 cars worth of CO_2** by using sleep mode.

Source: EPA ENERGY STAR

Purchase ENERGY STAR

When buying electronics, look for the ENERGY STAR logo

Shorenstein's Energy Savings Challenge

- A pre-packaged employee engagement program for Shorenstein tenants
- Real energy savings and a fun incentive for participation

ThinkEco
modlet®

I WILL IF YOU WILL

2014 Tenant Energy Challenge

I WILL IF **YOU WILL**

Tenant Energy Challenge:

- 31 tenants
- 1 million square feet
- 221 devices
- 3 months

Average Results:

- 27% energy savings
- 1 ton of avoided carbon emissions
- 91 trees saved

Join other Shorenstein tenants in the challenge!

I WILL IF YOU WILL

Flip the Switch
for a greener tomorrow

Tenant Star

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) are creating a program that recognizes tenants who operate energy efficient spaces. Look for more info coming soon!

EPA

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SHORESTEIN

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Tenant Star

GreenBiz Insights Events Videos Sustainability Energy Buildings Cit

From Energy Star to Tenant Star: The next frontier in building efficiency

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Adam Sledd
Friday, July 10, 2015 - 1:30am

Adam Sledd

Program Director, Commercial Real Estate Engagemen
Institute for Market Transformation

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Questions and Member Updates

- Any updates on progress in reducing PPLs in your building or portfolio of buildings?
- Comments/questions on the BBA PPL Team updates?
- Comments/questions on the technical presentations?
- What is your biggest issue in implementing PPL solutions?
- What information would members like?
- What are interesting topics for future projects?

BBA PPL Membership

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PARTNERSHIPS

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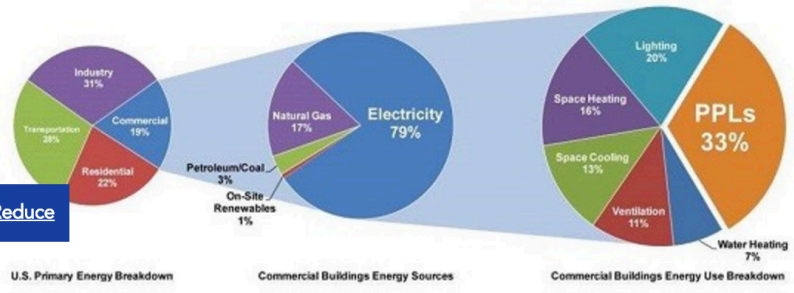
Better Buildings Initiative » Better Buildings Alliance » Plug & Process Loads

Technology Solution: Plug & Process Loads

Plug and process loads (PPLs) consume about one third of primary energy in U.S. commercial buildings. As buildings become more efficient, PPL efficiency has become pertinent in achieving aggressive energy targets. Through the PPL technolgoy solutions team, partners participate in a platform to share experiences and learn from their peer, and work together to create resources on PPL energy reduction strategies and their applications, covering a wide variety of electronic, computer, refrigeration, and cooking devices, including equipment essential to information processing, medical treatment, and food service businesses.

Plug Load Energy: Assess and Reduce



http://betterbuildingssolutioncenter.energy.gov/alliance/technology-solution/plug-process-loads

Thank you!

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