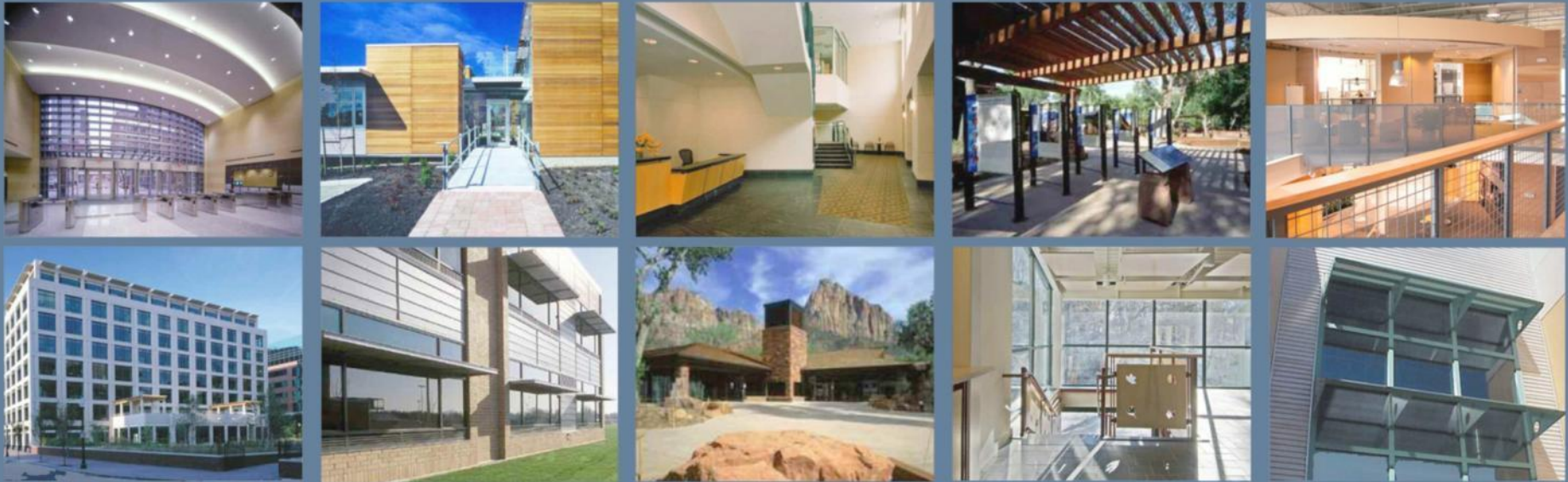


# Better Buildings Alliance

Leveraging the Advanced Power Strip (APS)

Technical Specification for Commercial Buildings



July 8, 2015

Technical Lead Lab: NREL

- **Introduction and overview of the APS Technical Specification**
  - Rois Langner, National Renewable Energy Laboratory (NREL)
- **Use Cases**
  - Marta Schantz, Waypoint Building Group, Inc.
- **Interests and promotion**
  - Claire Miziolek, Northeast Energy Efficiency Partnerships (NEEP)
- **Applications**
  - Christine Wu, U.S. General Services Administration (GSA)
- **Questions and discussion**
  - Please type questions into the chat box

*Please note: this webinar is being recorded.*



**Members work with DOE's network of research and technical experts to develop and deploy innovative, cost-effective, energy savings solutions.**



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### Activities

#### Technology Solutions Teams

Lighting & Electrical

Space Conditioning

[Plug & Process Loads](#)

Food Service

Refrigeration

### Plug & Process Loads

Plug and Process Loads (PPL) consume about one third of primary energy in U.S. commercial buildings. PPLs cover a wide variety of electronic, computer, refrigeration, and cooking devices, including equipment essential to information processing, medical treatment, and food service businesses. Each of these categories contains hundreds of types of devices.

PPLs account for an increasingly large percentage of commercial building energy use. The primary energy use associated with PPLs is projected to grow from 30% to 35% of total commercial building energy use between 2010 and 2025, due to an increase in the number of plug-in devices and the energy intensity of those devices. Due to the wide range of commercial building types, uses, sizes, and vintages found in the United States, PPL

<https://www4.eere.energy.gov/alliance/activities/technology-solutions-teams/plug-process-loads>



# Technical Specification for Advanced Power Strips

*Rois Langner, NREL*

## Plug & Process Loads

Plug and Process Loads (PPL) consume about one third of primary energy in U.S. commercial buildings. PPLs cover a wide variety of electronic, computer, refrigeration, and cooking devices, including equipment essential to information processing, medical treatment, and food service businesses. Each of these categories contains hundreds of types of devices.

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[Contact us](#) to join the Plug & Process Loads team or for additional information.

*Visit the BBA Plug  
and Process  
Loads Website*

### Take Action

Activities	Selected Resources
Assess and reduce plug and process loads in your building	
Select appropriate control strategies for your plug and process loads	S
Incorporate efficient plug and process load solutions into building designs	F S C R
Discover utility incentives and purchase advanced power strips	
Institutionalize policies and procedures for plug and process load reduction	

[www4.eere.energy.gov/alliance/activities/technology-solutions-teams/plug-process-loads](http://www4.eere.energy.gov/alliance/activities/technology-solutions-teams/plug-process-loads)

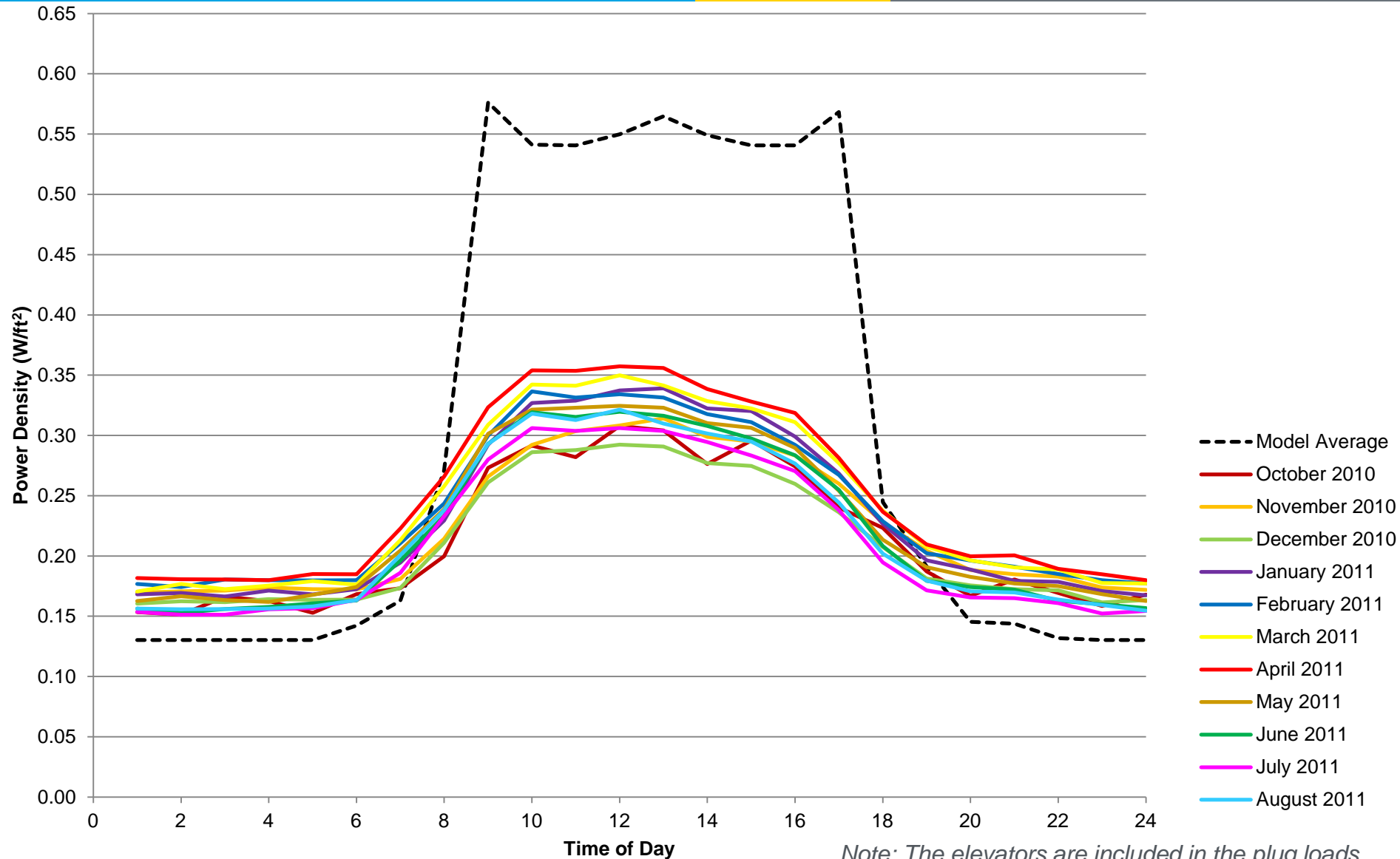


## Why did the BBA create this tech spec?

- Office equipment accounts for 7% of commercial building energy use
- Very diverse and diffuse making them hard to manage and control
- Can be over 50% of a building's load
- Adds to cooling loads



# Motivation: *Plug Load Power Density*



Note: The elevators are included in the plug loads



# Motivation: *Day vs. Night* *Plug and Process Loads*

Only occupied about  $\frac{1}{3}$  of the time

-Nights

-Weekends

-Holidays



**Unoccupied!**

## Annual Plug Load Energy Use Intensity (kBtu/ft<sup>2</sup>)

### Unoccupied Hours Power Density (W/ft<sup>2</sup>)

		Unoccupied Hours Power Density (W/ft <sup>2</sup> )														
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20	1.30	1.40	1.50
Occupied Hours Power Density (W/ft <sup>2</sup> )	0.10	3.0	5.2	7.4	9.7	11.9	14.1	16.3	18.6	20.8	23.0	25.2	27.4	29.7	31.9	34.1
	0.20	3.8	6.0	8.2	10.4	12.7	14.9	17.1	19.3	21.5	23.8	26.0	28.2	30.4	32.7	34.9
	0.30	4.5	6.8	9.0	11.2	13.4	15.6	17.9	20.1	22.3	24.5	26.8	29.0	31.2	33.4	35.6
	0.40	5.3	7.5	9.7	12.0	14.2	16.4	18.6	20.9	23.1	25.3	27.5	29.7	32.0	34.2	36.4
	0.50	6.1	8.3	10.5	12.7	15.0	17.2	19.4	21.6	23.8	26.1	28.3	30.5	32.7	35.0	37.2
	0.60	6.8	9.1	11.3	13.5	15.7	17.9	20.2	22.4	24.6	26.8	29.1	31.3	33.5	35.7	38.0
	0.70	7.6	9.8	12.0	14.3	16.5	18.7	20.9	23.2	25.4	27.6	29.8	32.1	34.3	36.5	38.7
	0.80	8.4	10.6	12.8	15.0	17.3	19.5	21.7	23.9	26.2	28.4	30.6	32.8	35.0	37.3	39.5
	0.90	9.1	11.4	13.7	15.9	18.2	20.5	22.8	25.1	27.4	29.7	32.0	34.3	36.6	38.9	41.2
	1.00	9.9	12.1	14.4	16.6	18.8	21.0	23.2	25.5	27.7	29.9	32.1	34.4	36.6	38.8	41.0
	1.10	10.7	12.9	15.1	17.3	19.6	21.8	24.0	26.2	28.5	30.7	32.9	35.1	37.3	39.6	41.8
	1.20	11.4	13.7	15.9	18.1	20.3	22.6	24.8	27.0	29.2	31.4	33.7	35.9	38.1	40.3	42.6
	1.30	12.2	14.4	16.7	18.9	21.1	23.3	25.5	27.8	30.0	32.2	34.4	36.7	38.9	41.1	43.3
	1.40	13.0	15.2	17.4	19.6	21.9	24.1	26.3	28.5	30.8	33.0	35.2	37.4	39.7	41.9	44.1
	1.50	13.7	16.0	18.2	20.4	22.6	24.9	27.1	29.3	31.5	33.8	36.0	38.2	40.4	42.6	44.9

## Solution: *Advanced Power Strips*

- Retrofit option for controlling outlets
- Savings potential is 830 trillion Btu primary energy annually
- Automatically turn off outlets when not needed
- Low-procurement cost
- Can be done in phases
- Easily applies to all buildings





## Definitions

**Activity Monitor Power Strip** – A power strip that detects activity in a room (via infrared or by other means) and turns off outlets if no activity is detected.

**Advanced Power Strip** – A block of electrical sockets, used for plugging multiple electronic devices into a wall outlet, that has built-in technology to reduce PPL runtimes and save energy when the devices are not in use.

**Always On Outlets** - Outlets that are always energized and are not controlled by the built-in functionality of the APS.

**Controlled Outlets** - Outlets that are energized and de-energized according to the APS's built-in control functionality.

**De-energize** - A process by which an electrical device is disconnected from an electricity source ("turned off").

**Energize** - A process by which an electrical device is connected to an electricity source ("turned on").

**Master-Controlled Power Strip** – An APS that automatically turns off (de-energizes) controlled outlets, where peripheral devices (such as a task light or printer) are plugged in, when a user turns off a primary device (such as a computer or television).

**Masterless Power Strip** – A power strip that completely turns off power to controlled outlets, including parasitic loads, when all the controlled electrical devices are turned off.

**Parasitic Load** - Power draw of an electrical device in its "off" state, also referred to as vampire or ghost loads. [5]

**Power Strip** - A block of electrical sockets, used for plugging multiple electronic devices into a wall outlet.

### Power Switching Threshold –

- ▶ **Fixed Power Switching Threshold** – The level at which a master-controlled or master less power strip de-energizes and energizes controlled outlets. The power level threshold is set by the manufacturer or manually set by the user. The APS does not set the power level automatically.
- ▶ **Dynamic Power Switching Threshold** – The power level threshold is determined automatically by the APS and is dependent on the connected electrical devices. The APS achieves this by sensing both current and outlet voltage to determine the exact power switching threshold for the connected devices.

**Remote Switch Power Strip** – A power strip that the user can turn off via distant switches, without making physical contact with the strip.

**Timer Power Strip** – A power strip that automatically turns off outlets based on a preset schedule.

**Vacancy Timer** - An occupant-controlled timer that turns on the power strip for a set period and automatically turns off at the end of this period.

## Definitions

### List of definitions including:

- Always on outlets
- Controlled outlets
- Power switching threshold
- Parasitic load

## Hardware Requirements

For a power strip to be considered an APS, it must:

- ▶ Have a feature that automatically **de-energizes** plug-in electrical devices according to APS product manufacturer specifications.
- ▶ Connect and reconnect power<sup>2</sup> according to the product specifications.<sup>6</sup>

### Safety Features

The following are safety features and hardware requirements that must be included for an APS to meet this specification. The APS must:

- ▶ Comply with UL 1363 (Relocatable Power Taps) Standards if corded.<sup>6</sup>
- ▶ Comply with UL 498A (Current Tap) Standards if non-corded.<sup>7</sup>
- ▶ Include an electromagnetic interference/radio frequency interference (EMI/RFI) filter.
- ▶ Feature a resettable circuit breaker.
- ▶ Incorporate **power switching** devices that are rated for 100,000 switching cycles at full load (equivalent to roughly 10 years of use).
- ▶ *Optional: Comply with UL 1449-3 (Surge Protective Devices)*
  - *Rated for 1080-Joule surge protection or higher*
  - *≥ 72,000 amp protection*
  - *A light to indicate grounding status.<sup>3</sup>*

### Physical Configuration

The following physical features are required to comply with this specification:

- ▶ Clearly labeled and/or color-coded **always on outlets**.
- ▶ Clearly labeled and/or color-coded **controlled outlets**.

*Optional: physical features:*

- ▶ A light to indicate that the APS has power supplied to it.
- ▶ A light to indicate when the **controlled outlets** are turned on.
- ▶ Manual on/off or user override control.<sup>4</sup>
- ▶ A form factor or mounting hardware that will allow the APS to be held securely in place on a desktop.
- ▶ Wire management and/or retractable power cords to control longer power cord lengths.
- ▶ A bar code on each APS for inventory management.

<sup>2</sup> The term *connect and reconnect power* is synonymous with *turning on and turning off power to the controlled outlets*.

<sup>3</sup> Improper grounding renders surge protection ineffective.

<sup>4</sup> Some utility companies will not provide rebates for APSs that have user override control.

## Hardware Requirements

- Requirements for the APS to be defined as an APS
- Safety features
- Physical configuration

## Ease of Installation

The following required features allow for easy installation, have a high likelihood of user acceptance, and promote high energy savings.

- ▶ Packaging must contain user instructions that specify how to properly install, set up, and troubleshoot the APS to maximize energy savings. User instructions must provide guidance on specific electrical devices that should not be plugged into **controlled outlets**. For **activity monitor** APSs, instructions should include information about where to place the motion sensor and how to adjust its timeout settings.
- ▶ *Optional: Packaging features and user instructions should include:*
  - *Guidance on National Electric Code and International Fire Code compliant installation with packaging.*
  - *Dynamic and interactive Web-based instructions. This would include “standard configurations” for a set of applications (e.g., office computer workstation, office printer room, office break room).*
  - *Labels on the APS make and model to make it easy for users to look up Web-based instructions.*
  - *Labels on the APS and packaging describing the control strategy that the APS uses; this will help users purchase APSs that have the best control strategy for their needs.*
- ▶ *Optional: For APSs with metering and/or control, and remote accessibility via a computer (or other smart device):*
  - *Map plugged-in equipment to outlets on the APS during installation and streamline locations in a local or Web-based user interface (e.g., Web-based portal). Provide users with standard options for equipment types (laptop, printer, monitor, etc.).*
  - *Map APSs to building areas (floor, wing, room number, etc.) during installation and streamline locations in a local or Web-based user interface (e.g., Web-based portal).*

## Ease of Installation

- Features that will allow for easy installation

## Usability

The following required features make APSs easier to use.

- ▶ The **power switching** feature of the APS functions with desktop and laptop personal computers.
- ▶ For APSs with local control (not internet-protocol-based): the power strip must be intuitive and user friendly so that a "non-expert" user can make adjustments to the installation and control settings (e.g., change the clock on the APS to Daylight Saving Time).
- ▶ *Optional: Power/current sensing APSs (**master-controlled** or **masterless**) adjusts automatically to each plug-in electrical device and automatically determines the correct **power switching threshold**.*

## Usability

- Features that make APSs easier to use



## Energy Saving Functionality

There are two ways to maximize the energy savings potential of an APS: minimize its parasitic load, and select the optimal built-in control functionality for a given application.

### Maximum Parasitic Load

- ▶ The APS must use less than 1 Watt at all times while connected to the wall outlet unless also providing wireless communications.

### Control Strategy

To be considered an APS, a power strip must have at least one of the control features listed in the following sections. These features increase the energy savings potential of the built-in control functionality of the APS. The APS options are described briefly in Section 2 "Definitions".<sup>5</sup>

### Timer Power Strip

There are two types of timer power strips: programmable timer power strips and vacancy timer power strips.

- ▶ For programmable timer power strips:
  - The user must be able to program the days and times that a circuit can be **energized** and **de-energized** (pre-programmed schedules are preferred).
  - The user must be able to program a different schedule for each day of the week (e.g., weekdays and weekends).
  - The internal clock must be accurate within  $\pm 15$  seconds per month.
  - The internal clock must be visible.
  - The internal clock must be backed up by a battery so that settings are not lost during a power outage.
- ▶ For **vacancy timer** power strips:
  - The user must be able to power up the device (e.g., with the push of a button) to stay on for a set period. A maximum of 12 hours is allowed.
  - *Optional: The user must be able to set the period that the APS stays on.*

### Master-Controlled Power Strip

- ▶ No additional steps are needed to operate the plugged in electrical devices (e.g., waking the APS by pressing a button is not required to turn on the master device).
- ▶ *Optional: The APS has a **power switching threshold**. This can be manually or automatically set.*

### Masterless Power Strip

- ▶ **Power switching threshold** must be manually adjustable (**fixed power switching threshold**) or set automatically (**dynamic power switching threshold**) to accommodate multiple electrical devices being plugged in to the APS.

### Remote Switch Power Strip

- ▶ **Remote switches** must be easily accessible (i.e., designed to sit on a desktop).

### Activity Monitor Power Strip

- ▶ Printed instructions with the APS packaging must include information on where to place the motion sensor, and how to adjust the timeout settings.

## Energy Savings Functionality

- Maximum parasitic load
  - >1 W at all times
- Control Strategies
  - Timer
  - Master Controlled
  - Masterless
  - Remote Switch
  - Activity Monitor

## Life Cycle Impacts

*Optional: The following features should be related to the embodied energy and life cycle impacts of APSs.*

- ▶ The APS comes in environmentally sustainable and/or recycled packaging.
- ▶ The APS is made from environmentally sustainable and/or recycled materials.
- ▶ The APS is designed to be easily disassembled for recycling at end-of-life.
- ▶ The manufacturer offers a “take back” or recycle program.

## Life Cycle Impacts

- APSs are available in environmentally sustainable and/or recycled:
  - Packaging
  - Materials
- APS is designed to be easily disassembled for recycling
- Manufacturer offers a “take back” or recycle program

- How to Use the Specification:
  - Check for utility rebates and incentives
  - Pick a control “style”
    - Timer
    - Motion sensor/activity monitoring
    - Remote switch (easy to turn off circuits)
    - Master outlet (power sensing)
    - Masterless (looks at entire strip—for vampire loads)
  - Compare the specs of the APS that you would like to buy to the tech spec.
    - If it complies with the spec, buy it!
  - Reach out to the BBA PPL Project Team to share success stories or ask for help



# Thank you!

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

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# Use Cases/Applications for the APS Tech Spec

*Marta Schantz, Waypoint Building Group*

## BBA Plug & Process Load Team Website

### APS Publications:

- APS Technical Specification
- APS “How-To” Guide
- Utility rebates/incentives list

The screenshot shows the website for the Better Buildings Alliance, specifically the Plug & Process Load team page. The header includes the U.S. Department of Energy logo and navigation links for EERE Home, Programs & Offices, and Consumer Information. The main navigation bar features links for Sectors, Activities, Events, About, and Join. The page content is organized into sections: Activities, Technology Solutions Teams, and Market Solutions Teams. The Technology Solutions Teams section lists various areas like Lighting & Electrical, Space Conditioning, and Plug & Process Loads. The Plug & Process Loads section is highlighted with a blue box and contains a list of publications, including 'Technical Specifications for Advanced Power Strips (Version 1.0)' and 'How To Use Advanced Power Strips in an Office Setting (Graphic)'. The Market Solutions Teams section lists 'Plug Load Control: Advanced Power Strips Decrease Energy Consumption (Case Study)' and 'Saving Energy Through Advanced Power Strips (Graphic)'. The footer contains links for Home, U.S. Department of Energy, Contacts, Web Site Policies, Security & Privacy, FOIA, No Fear Act, and USA.gov.

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HOME » TECHNOLOGY SOLUTIONS TEAMS » PLUG & PROCESS LOADS » PPL: SELECT APPROPRIATE CONTROL STRATEGIES

### Activities

#### Technology Solutions Teams

- Lighting & Electrical
- Space Conditioning
- [Plug & Process Loads](#)
- Food Service
- Refrigeration
- Laboratories
- Energy Management Information Systems
- Renewables Integration

#### Market Solutions Teams

### Select appropriate control strategies for your plug and process loads

Numerous control strategies exist for reducing plug and process load (PPL) energy. Selecting the correct control strategy for particular devices, building types, and occupant needs is extremely important to maximize energy savings. Different strategies range from manual control of devices to advanced power strips that limit power and runtime, and/or building integrated smart systems. The PPL technical solutions team has collected a series of resources to assist in selecting the appropriate control strategies for your plug load applications.

#### Select appropriate control strategies

- [Flowchart for Selecting a Control Strategy for Plug and Process Loads \(Graphic\)](#)
- [Selecting a Control Strategy for Plug and Process Loads \(Report\)](#)
- [Plug-Load Control and Behavioral Change Research in GSA Office Buildings \(Technical report\)](#)

#### Install and procure advanced power strips

- [Technical Specifications for Advanced Power Strips \(Version 1.0\)](#)
- [How To Use Advanced Power Strips in an Office Setting \(Graphic\)](#)
- [Reducing Office Plug Loads through Simple and Inexpensive Advanced Power Strips \(Conference Reports\)](#)
- [Plug Load Control: Advanced Power Strips Decrease Energy Consumption \(Case Study\)](#)
- [Saving Energy Through Advanced Power Strips \(Graphic\)](#)

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*The APS Tech Spec has relevance to stakeholders across the commercial building market no matter the building type*

## Procurement Guide:

- Require vendor or procurement officer to comply with all aspects and whichever optional aspects appeal to the building owner or tenant

## Reference Guide:

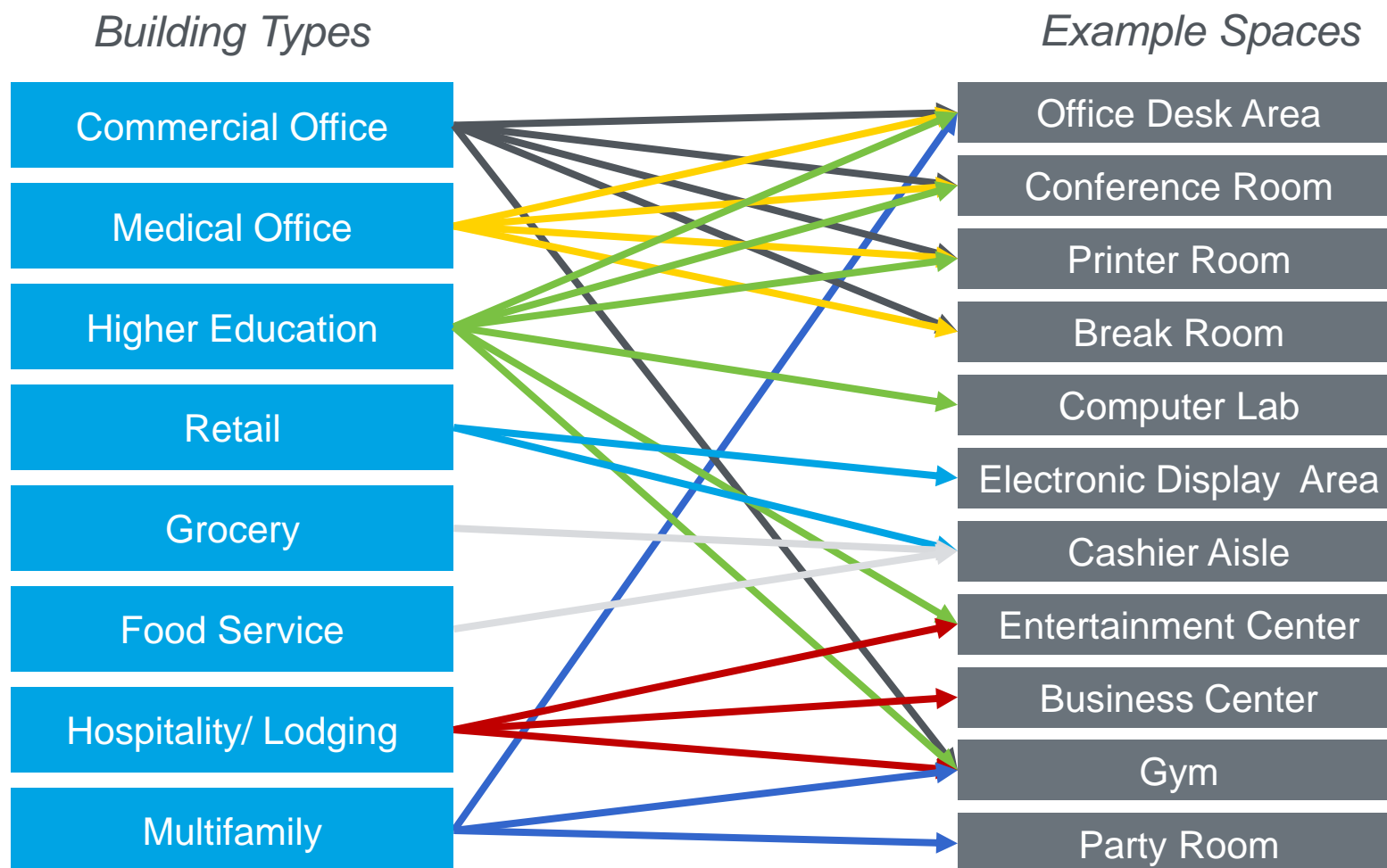
- Use APS Tech Spec as a resource for specific APS aspects that apply to a particular scenario
- Incorporate into organization's own unique specification

Stakeholder	APS Tech Spec Relevance
Tenant/ Occupant	Acquiring APSs for personal devices and workspaces
Owner/ Manager/ Facilities Engineer/ Procurement Officer	Acquiring APSs for devices and equipment in a commercial building or portfolio of buildings
APS Manufacturer/ Vendor	Encouraging manufacturers to meet spec requirements, and vendors or clients to purchase products that meet spec for commercial building spaces
Utility/ Energy Efficiency Organization	Enabling utilities to create incentive programs for APSs



# Example Commercial Building Spaces that can use APSs

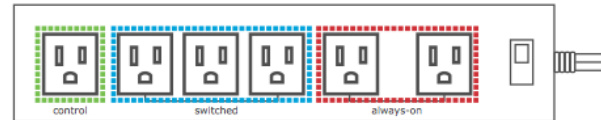
*It's not just Commercial Office Spaces that can benefit from APSs!*



*Uncertain how to use an APS? Building owners, facility engineers, and tenants can follow this easy guide for set-up and use of an APS at an office desk*

## ADVANCED POWER STRIPS (APS)

### HOW TO USE IN AN OFFICE SETTING



Each APS has three outlet types for equipment with various electricity needs:



#### Primary Outlet

COMPUTER/LAPTOP

The primary outlet acts as the “control,” or “master,” outlet because it turns off the power to secondary outlets when the device connected to it is turned off. The primary outlet typically powers your computer’s central processing unit because most other devices connected to the power strip at an office desk depend on your computer for their functionality. For example, you need to turn on your computer to use your monitor and to print documents.



#### Secondary Outlet

MONITOR, PRINTER, DESK LAMP

The secondary outlets act as the “controlled” outlets and typically power peripheral devices, such as your computer monitor(s), desk lamp, and printer. When the device connected to the primary outlet is turned off, the power will automatically be shut off to the device connected to the secondary outlets. For example, turning off your computer automatically shuts off the power to your monitor or printer. The amount of energy you save with an advanced power strip depends on the energy usage of the devices connected to the secondary outlets.



#### Always-On Outlet

LANDLINE PHONE, FAX, MINI FRIDGE

The always-on outlets are not controlled by the primary outlet. Important office desk devices, such as landline phones and fax machines, that are plugged into the always-on outlet will receive constant power regardless of the primary outlet device.

Learn more about plug and process loads: [www4.eere.energy.gov/alliance/activities/technology-solutions-teams/plug-process-loads](http://www4.eere.energy.gov/alliance/activities/technology-solutions-teams/plug-process-loads).

NREL is a national laboratory of the U.S. Department of Energy,  
Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.



## Master-Controlled Power Strip

### COST



### FEATURES

When a primary device (such as a computer or TV) is turned off by the user, the power strip automatically turns off the controlled outlets where the peripheral devices (such as the printer or game console) are plugged in.

### POSSIBLE DRAWBACKS

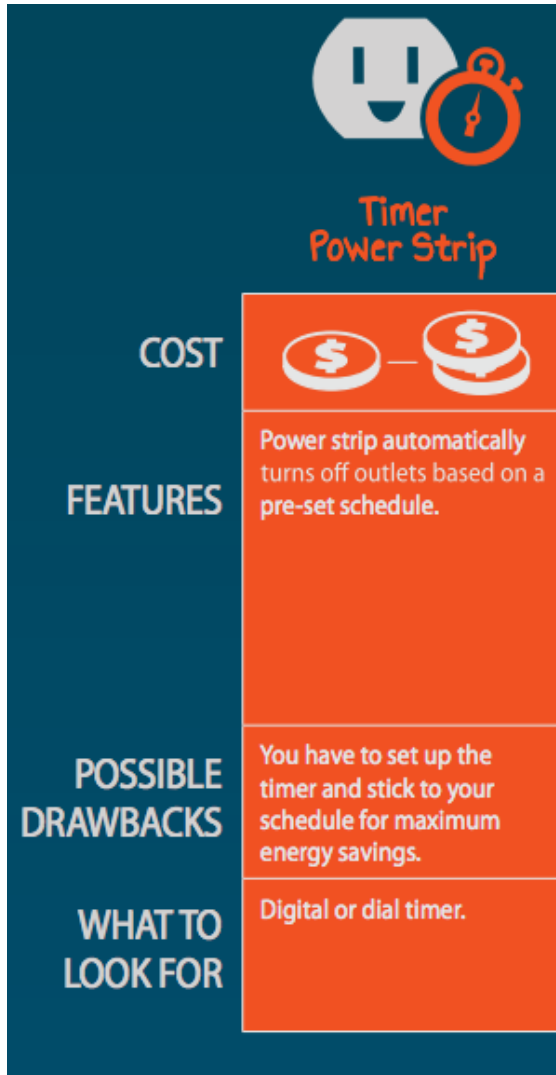
It can be tricky to select which appliance should be your "master" device.

### WHAT TO LOOK FOR

One outlet is labeled as the "master."

Master-Controlled power strips turn peripheral devices off when a primary device is turned off by the user.

- **Office Desk Area/Computer Lab:** Desktop/Laptop connected to Control/Master outlet. Monitors/lamps/phone charger connected to "Switched" outlet.
- **Hotel Room Entertainment Centers:** TVs connected to Master outlet. DVD players, speakers, etc., connected to Switched outlet. Exceptions include cable boxes or other always-on devices.
- **Multifamily Room Entertainment Centers:** TVs connected to Master outlet. DVD players, Xbox, speakers, lamps, etc. connected to Switched outlet. Exceptions include cable boxes or other always-on devices.



The infographic is set against a dark blue background. At the top, there is a white smiley face icon and an orange stopwatch icon. Below them, the text 'Timer Power Strip' is written in orange. The infographic is divided into four horizontal sections, each with a label on the left and content on the right. The 'COST' section features two white dollar signs on a red background. The 'FEATURES' section has a red background with white text. The 'POSSIBLE DRAWBACKS' section has a red background with white text. The 'WHAT TO LOOK FOR' section has a red background with white text.

**Timer Power Strip**

**COST**

**FEATURES**

Power strip automatically turns off outlets based on a pre-set schedule.

**POSSIBLE DRAWBACKS**

You have to set up the timer and stick to your schedule for maximum energy savings.

**WHAT TO LOOK FOR**

Digital or dial timer.

## Timer power strips automatically turn off outlets based on a pre-set schedule.

- **Conference Rooms:** Projectors, monitors, speakers, etc. Optional motion sensors can be used to turn equipment on or off if meetings end early or if unplanned meetings occur.
- **Break Rooms:** Toaster, microwave, coffee maker, or any other powered kitchen device.
- **Printer Rooms:** Printers, copiers, fax machines, laminators, pencil sharpeners, hole punchers, etc.
- **Electronic Display Area:** TV displays, computer/cellphone try-out stations, cosmetic lights/mirror stations, jewelry light stations, etc.
- **Cashier Aisles:** Cash registers, conveyor belts, aisle lights, etc.
- **Gyms in Hotel or Multifamily Spaces:** Workout equipment such as treadmills and elliptical machines, TVs, sound systems, etc.
- **Multifamily Game Room/ Party Room:** TVs, speakers, other plug-in equipment.



## Activity Monitor Power Strip

### COST



### FEATURES

Power strip looks for signs of activity in the room, and turns off outlets if none is detected.

### POSSIBLE DRAWBACKS



Motion sensors don't always work perfectly.

### WHAT TO LOOK FOR

Motion sensor or an infrared "eye" that detects remote control use around the TV or stereo.


Activity monitor power strips turn equipment on or off in response to motion detected in a room.

- **Office Desk**
  - Commercial Office, Medical Office, Higher Ed Research Office, Multifamily Leasing Office
- **Conference Rooms:** Projectors, monitors, speakers, etc.
- **Break Rooms:** Non-critical appliances
- **Hotel Business Centers:** Computer monitors, printers, etc.
- **Game Room/ Party Room Multifamily:** TVs, speakers, other plug-in equipment.


	 Remote Switch Power Strip
COST	
FEATURES	Power strip can be turned off by the user via a remote switch.
POSSIBLE DRAWBACKS	To save any energy, you have to remember to turn off the power strip each time.
WHAT TO LOOK FOR	A tethered switch or a remote switch.

Remote switch power strips enable users to easily turn off a power strip via a remote switch.

- **Office Desk Areas:** Computers, monitors, task lamps, printers, miscellaneous plug-in office equipment.
- **Computer Lab:** Computers, monitors, task lamps, printers, etc.
- **Hotel Room Entertainment Centers:** TVs, speakers, other plug-in equipment.
- **Electronic Display Area:** TV displays, computer/cellphone try-out stations, cosmetic lights/mirror stations, jewelry light stations, etc.
- **Cashier Aisles:** Cash registers, conveyor belts, aisle lights, etc.
- **Game Room/ Party Room Multifamily:** TVs, speakers, other plug-in equipment.



**Masterless Power Strip**

<b>COST</b>	
<b>FEATURES</b>	When all of the controlled devices are turned off, the power strip turns off power to those outlets completely, eliminating all of the vampire loads.
<b>POSSIBLE DRAWBACKS</b>	Turning off one high-powered appliance could turn off the entire power strip.
<b>WHAT TO LOOK FOR</b>	No "master" outlet. Description may include "automatic switching" or "power detection."

Masterless power strips turn off power to outlets completely when the controlled devices are turned off, eliminating vampire loads.

- **Office Desk Area:** Computers, monitors, task lamps, printers, miscellaneous plug-in office equipment.
- **Electronic Display Area:** TV displays, computer/cellphone try-out stations, cosmetic lights/mirror stations, jewelry light stations, etc.
- **Cashier Aisles:** Cash registers, conveyor belts, aisle lights, etc.
- **Conference Rooms:** Projectors, monitors, speakers, etc.



*Not sure they're worth the cost?  
Check if your local utility has an  
incentive available to reduce the  
up-front cost of the APSs*

Take Action	
Activities	Selected Resources
Assess and reduce plug and process loads in your building	
Select appropriate control strategies for your plug and process loads	S
Incorporate efficient plug and process load solutions into building designs	F S C R
Discover utility incentives and purchase advanced power strips	
Institutionalize policies and procedures for plug and process load reduction	

## Discover utility incentives and purchase advanced power strips

The Better Buildings Alliance aims to develop and deploy innovative, cost-effective energy-saving solutions and resources that lead to better technologies, more profitable businesses, and better buildings across the United States. The Plug and Process Load (PPL) Solutions Team is focused on reducing energy consumption associated with electronic, computer, and other devices that are plugged into standard wall outlets and power strips. Combined, these devices consume about one-third of primary energy in U.S. commercial buildings.

Advanced power strips (APSs) are one way of controlling the energy consumption of PPLs. APSs look just like ordinary power strips, except that they have built-in features designed to reduce the amount of energy used by many electronic devices and help save money on your electricity bill. Incentive programs are available for purchasing APSs in commercial properties. The following resource provides a summary of these incentive programs. This resource will be updated periodically to ensure accurate and current information about each incentive program. For more information about APSs, visit the [PPL Team website](#).

### Utility Incentives for Purchasing Advanced Power Strips

Incentive Sponsor	State	Utility/ State/City Incentive	Rebate/ Incentive Amount	Limit	Fund	Application	Termination Date	Type of Incentive
<a href="#">Pacific Gas and Electric Company</a>	CA	Utility	\$15	NA	NA	Residential, Commercial	12/31/13	Incentive
<a href="#">Ameren Illinois</a>	IL	Utility	\$10	NA	Less than \$250K	NA	5/31/2014	Rebate
<a href="#">Act On Energy</a>	IL	State	\$10	6	NA	Residential	May 31, 2014 or until funding expires.	Rebate
<a href="#">Indiana Michigan Power</a>	IN	Utility	\$15	No limit	NA	Residential	2012	Rebate

# Thank you!

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

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Northeast Energy Efficiency Partnerships

# APS Tech Spec Webinar

Claire Miziolek, Market Strategies Program Manager  
Northeast Energy Efficiency Partnerships

# ABOUT NEEP



## MISSION

Accelerate energy efficiency in homes, buildings and industry in the Northeast - Mid-Atlantic region.

## VISION

The region wholly embraces energy efficiency policies and solutions as a cornerstone of a sustainable energy policy, a vibrant economy, and a healthy environment for people to live and work in.

## APPROACH

NEEP brings key stakeholders together with expertise and leveraged resources to innovate and apply best practices across the region.

*Serving the Northeast & Mid-Atlantic states since 1996*

# ABOUT NEEP



## A Regional Energy Efficiency Organization (REEO)



One of six REEOs designated by U.S. DOE to support state efficiency policies.

# NEEP STRATEGIES & PROJECTS



## 2015 BUSINESS PLAN

### NEEP MISSION

Accelerate energy efficiency in homes, buildings & industry in the Northeast - Mid-Atlantic region.

### 2015 GOAL

Keep the region a national efficiency leader by advancing innovation and best practices, and leading-edge policies, programs and strategies that deepen, broaden and accelerate energy efficiency on a regional scale.

## 2015 STRATEGIES



Reduce Building Energy Use



Speed High Efficiency Products



Make Energy Efficiency Visible



Advance Knowledge & Best Practices

# NEEP BELIEVES IN ADVANCED POWER STRIPS



- While not the only answer to reducing energy use, they are an important strategy
- From 2013 NEEP *Business and Consumer Electronics: A Strategy for the Northeast* Report:
  - Strategy: “Aggressively Focus on Savings from Advanced Power Strips”
  - “Ultimately, we think the Northeast Mid-Atlantic region could achieve a 20 percent penetration rate of APS by 2020”
- Savings: Residential: from 50-100kWh (Tier 1) to 250-350kWh (Tier 2), Commercial: 26-50% energy reduction

The screenshot shows a web browser window with the URL [neep.org/initiatives/high-efficiency-products/advanced-power-strips](http://neep.org/initiatives/high-efficiency-products/advanced-power-strips). The page features the NEEP logo and navigation menu (ABOUT NEEP, INITIATIVES, EVENTS, NEWS/BLOG, NETWORK, RESOURCES). A green banner reads "ADVANCED POWER STRIPS" above a photo of various power strips. Below this is a section titled "Advanced Power Strips (APS)" with a small image of a power strip and text explaining that APS technology reduces phantom and standby power loss. To the right, a "HIGH EFFICIENCY PRODUCTS" sidebar lists items like Advanced Power Strips, Advanced Rooftop Units (ARTU), Air-Source Heat Pumps, Appliance Efficiency Standards, Commercial Advanced Lighting Controls (CALC), Commercial Lighting, and Design Lights Consortium.



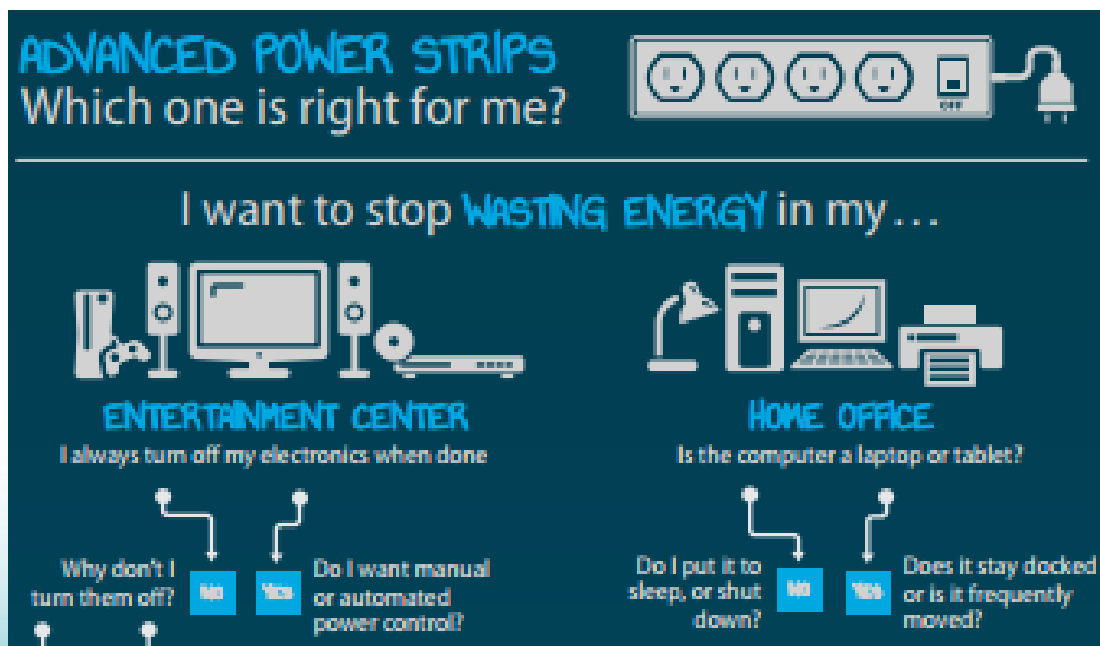
# TIER 1 VS TIER 2 APS

- Tier 1: takes a signal and powers down unnecessary devices
- Tier 1: have appropriate usage in residential and commercial applications
- Tier 2: senses absence and powers down unnecessary devices
- Tier 2: significant savings seen, especially in home AV situations
  - Tier 1 savings < Tier 2 savings
  - Tier 2 applications < Tier 1 applications
- NEEP promotes appropriate use of both Tiers of APS
- Many good product are available, it's important to recognize merit of both technologies
- It is crucial to find the right product for your needs.

# APS RESOURCE BACKGROUND



- NEEP's APS Working Group:
  - Mostly Residential focus, meeting on and off since 2010
  - Focused on breaking down APS adoption barriers
  - Adding resources to this space:
    - [Common Terminology Document](#)
    - [Deemed Savings Methodology](#)
    - [Test Protocol](#)
    - [Tier 2 Case Study](#)
    - [Getting to know APS](#)
    - [NREL Decision Tree](#)



# APS ADOPTION BARRIERS

- The biggest barrier we've found that's limited the uptake of APS is: public understanding and appreciating their value
- Whether a home owner or a building manager, the savings are there to be achieved
- However:
  - motivation and interest in investing in APS is very hard to muster
  - Existing power strips rarely fail
  - Some efficiency program incentives exist, though not everywhere or for every application
  - Installation can be tricky
- That's where...



# APS TECH SPEC TO THE RESCUE!



- Focused on commercial buildings
- Allows for building managers to more easily know what APS products will work well in their space
- Provides set of key requirements for use of APS in a building:
  - Hardware
  - Installation
  - Usability
  - Energy Savings
  - Life Cycle





# APS TECH SPEC APPLICATIONS

- Opportunities to use and advance the tech spec for:
  - Building managers
    - As working to meeting energy goals, use APS to help
    - The specification can help ensure you're getting products that will work well for your needs
  - Efficiency programs
    - Opportunity to expand commercial APS promotion
    - Refer to products that meet the tech spec to ensure high satisfaction
  - DOE/NREL
    - Opportunity to maintain a qualified products list of APS that meet the tech spec
  - Manufacturers
    - Work to have existing and new products meet the spec
    - Use that as marketing/leverage for commercial business



# CONCLUSION

- NREL/DOE/BBA/NEEP/Others have a flurry of resources to help make achieving plug load efficiency easier
- The spec is available and ready to use—what's stopping you?



**WE WANT YOU!**  
**TO USE THE APS TECH SPEC!**



# Thank you!

Please feel free to follow up with me directly:

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# APS: Real-World Testing and Application

Green Proving Ground Program | U.S. General Services Administration | Presenter: Christine Wu







**Green Proving Ground leverages GSA's real estate portfolio to evaluate innovative sustainable building technologies.**

# “THE GOVERNMENT’S LANDLORD”

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- 8,721 assets
  - Owned: 1,574 assets
- 377M square feet
  - Owned: 183M square feet
- \$380M annual energy costs
  - 52.7 BTU/GSF (43% more efficient than National CBECS office average)
- 1.1 million federal employees

## Efficiency results from innovation and policy

- *EISA 2007*
- *E.O. 13693*

# WHAT DOES GPG DO?

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Identify promising technologies at the edge of commercialization



Pilot technology installations within GSA's real estate portfolio



Partner with Department of Energy national laboratories to evaluate real-world performance



Recommend technologies with broad deployment potential

# GPG PROGRAM INVESTMENTS

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## ENERGY MANAGEMENT

09.12—Advanced Power Strips\*  
03.12—Wireless Sensor Networks\*  
Central Plant Optimization Strategy  
Passive Thermal Storage Platform  
Predictive HVAC Optimization  
Socially Driven HVAC  
Variable-Speed Chiller Plant Control

## LIGHTING

05.15—Wireless Lighting Controls  
08.14—Integrated Daylighting Systems\*  
09.12—Occupant Responsive Lighting\*  
LED Lighting with Integrated Controls  
LED Replacement Lamp for CFLs  
Networked Lighting  
T-LED Retrofit for Fluorescent  
Luminaires

## BUILDING ENVELOPE

05.15—Electrochromic Windows for LPOEs\*  
01.15—Applied Solar Control Retrofit Films\*  
03.14—Chromogenic Windows  
03.14—Vacuum Insulated Panels  
10.13—High R-Value Windows \*†  
Electrochromic Windows  
Low-Emissivity Window Film

## HVAC

03.15—Wireless Pneumatic Thermostat\*†  
07.14—Condensing Boilers, Updated\*†  
03.14—Indirect Evaporative Cooler  
03.14—Synchronous & Cogged Fan Belts \*  
10.13—Variable Speed Maglev Chiller\*†  
12.12—Variable Refrigerant Flow  
High Efficiency HVAC  
Modular Absorption Chiller  
Variable Speed Screw Chiller

## ON-SITE POWER & RENEWABLES

01.15—Photovoltaic-Thermal Hybrid System  
06.14—Wood-Pellet-Fired Biomass Boilers  
10.13—PV Guidance  
12.12—Photovoltaic Systems  
Honeycomb Solar Thermal Collector

## WATER

04.15—Wireless Moisture Irrigation System  
03.15—Catalyst-Based NCWT\*  
01.15—Weather Station Irrigation Control\*

*More information available at [gsa.gov/GPG](http://gsa.gov/GPG)*

### M&V STATUS (as of June 2015)

(MM.YY) = Completed —23

Continuing Evaluation —15

Deployed/Pending Deployment— 6

\* Identified for Broad Deployment – 13

† Deployed through ESPC – 4

# GPG PLUG LOAD CONTROL STUDY

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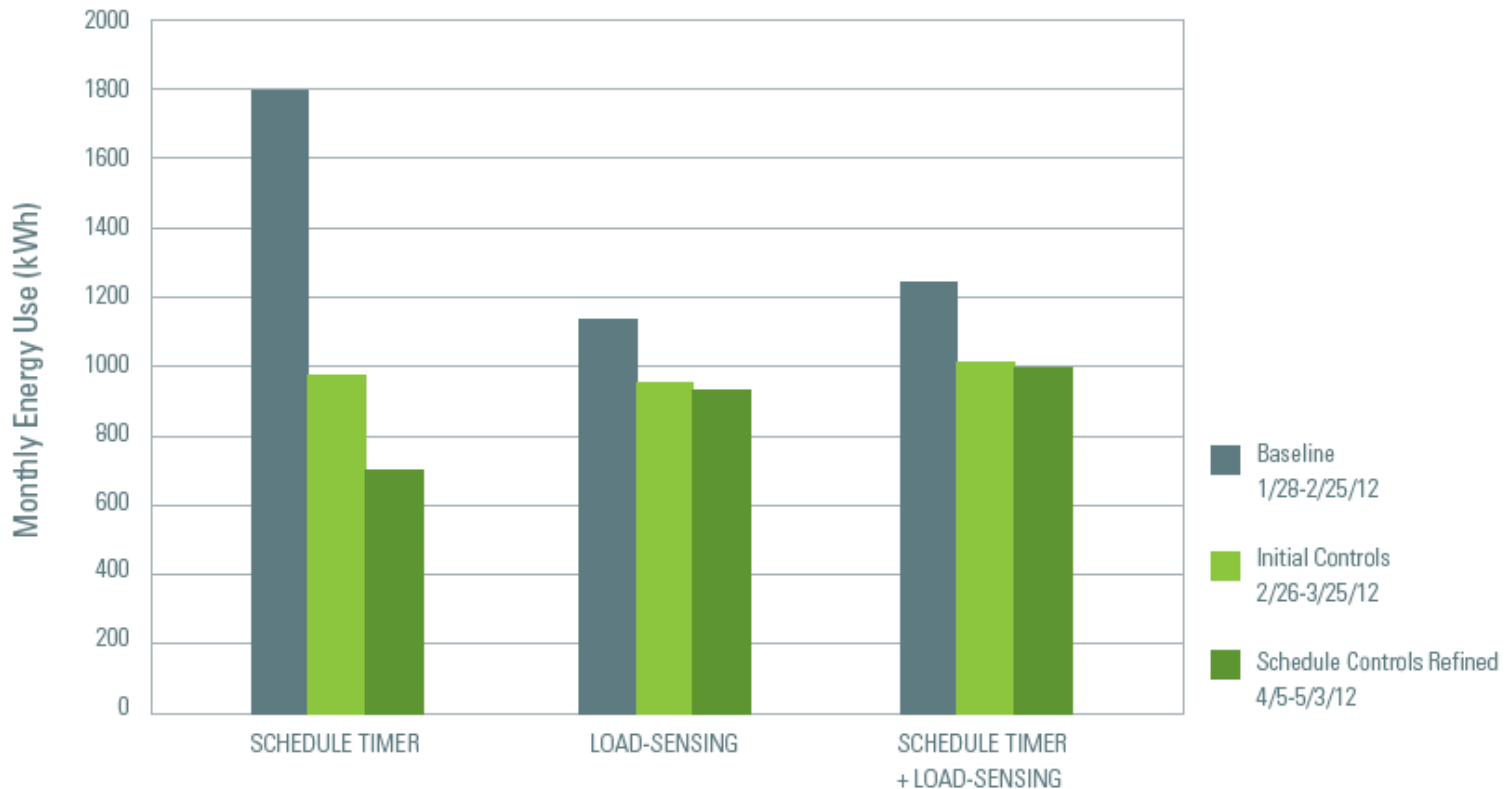
- **Opportunity:** 20-25% of building electricity consumption goes to plug loads.
- **What We Did:** In 2012, NREL tested the effectiveness of three plug load reduction strategies in eight federal office buildings throughout GSA's Mid-Atlantic Region.
- **Technology:** Tested strategies included 1) schedule-based control, 2) load-sensing, and 3) a combination of the two. Schedule-based control was found to be most effective.
- **Energy Savings:** 26% energy reduction at workstations with advanced computer management already in place, 50% energy reduction in kitchens and printer rooms.
- **Cost-Effectiveness:** 2 year payback.
- **Available Online:** <http://gsa.gov/portal/content/164611>



# GPG PLUG LOAD CONTROL STUDY

## Energy Reduction for Tested Control Strategies

Schedule timer controls resulted in energy reduction averaging 48%





# APS NATIONAL DEPLOYMENT

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## One-Touch Desktop Button

Use the Desktop Button to turn your Timed Outlets on and off. These outlets automatically turn off after 11 hours to save power. The blinking LED status indicator notifies you when your outlets are about to be turned off. Press the button to keep outlets on for another 11 hours.

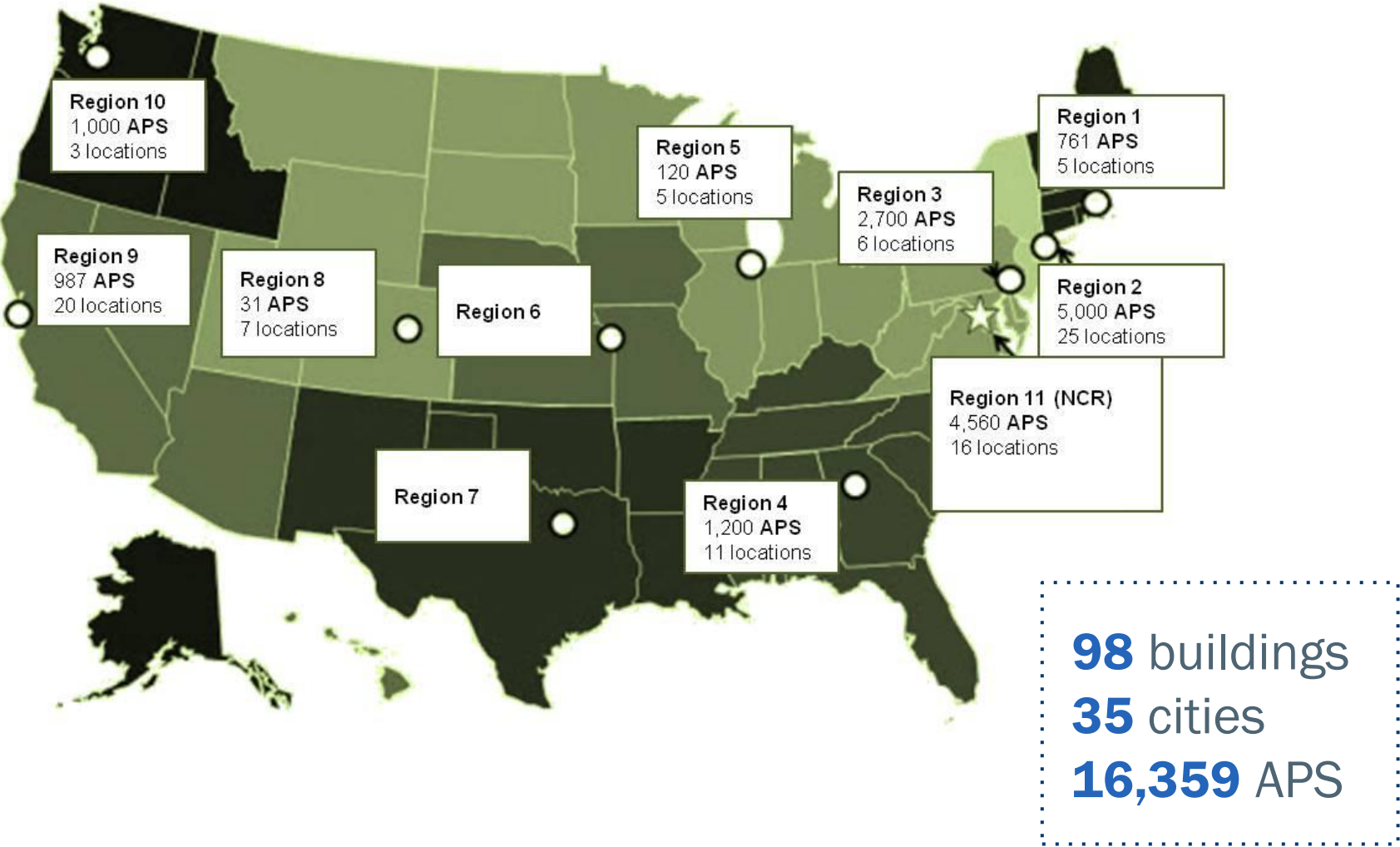
## 6 Auto-Off Timed Outlets

Timed outlets automatically turn off after 11 hours. Use these outlets for devices that don't require constant power (24/7), such as laptop computers\*, monitors, phone chargers, printers, and desk lights.

## 2 Always-On Outlets

Use these outlets for devices that require power at all times, such as desktop computers, phones and clocks.

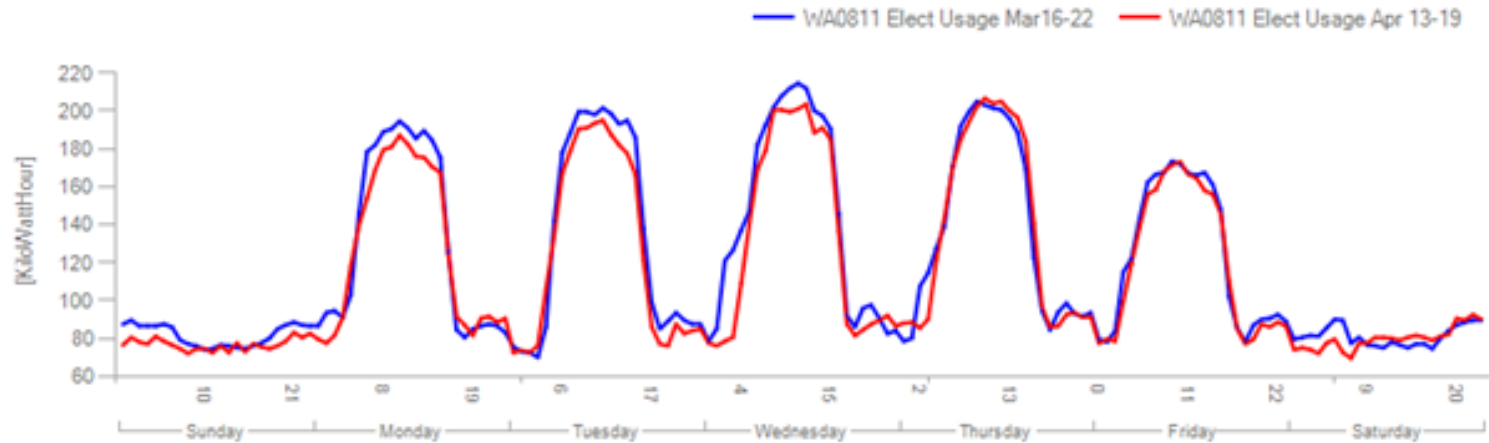
# APS NATIONAL DEPLOYMENT





# NORTHWEST/ARCTIC REGION RESULTS

Mar 16 2014 to Apr 20 2014



	Baseline (Before)	After	Energy Reduced kWh	% Change
Sunday	1960.00	1842.50	-117.50	-6%
Monday	3194.00	3075.00	-119.00	-4%
Tuesday	3225.50	3063.00	-162.50	-5%
Wednesday	3480.00	3224.50	-255.50	-8%
Thursday	3345.00	3342.50	-2.50	0%
Friday	2988.00	2911.00	-77.00	-3%
Saturday	1949.50	1916.00	-33.50	-2%
	20142.00	19374.50	-767.50	-4%

# APS NATIONAL DEPLOYMENT

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**\$1.6M** lifecycle energy cost avoidance

**1,500 MWh** annual energy savings

**2-year** payback



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[gsa.gov/GPG](http://gsa.gov/GPG)

# Thank you!

U.S. DEPARTMENT OF  
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