



## Modeling Plug Load Controls

This technical topic expands on the guidelines within **P4P Existing Buildings Program Guidelines v4.1, section 4.6.3.10 (page 4-32)**, for EEMs savings energy by eliminating or reducing idle or stand-by power consumption of connected plug loads through the use of the following eligible plug load controls. The percentages presented in the following tables represent the maximum energy reduction percentage that can be claimed for the plug load control.

**LOAD SENSING CONTROLS:** Monitors a specific devices power state and de-energizes connected auxiliary units when the monitored devise enters a low power state.

Load Sensing Control	
Space Type	Percent Energy Reduction from Baseline
Workstation	4%
Print Rooms	32%

**OCCUPANCY SENSING CONTROLS:** Automatically de-energize devices when no user is present for a set period of time.

Occupancy Control	
Space Type	Percent Energy Reduction from Baseline
All	21%

**SCHEDULED TIMER CONTROL:** Allows users to set a schedule to energize and de-energize devices based on the devices usage pattern and space schedule.

Schedule Timer Control	
Space Type	Percent Energy Reduction from Baseline
Workstation	26%
Print Rooms	50%
Break Rooms	46%

### Modeling Methodology

The appropriate percent energy reduction may be applied as either a power adjustment or a schedule adjustment, not both. The percent energy reductions should only be applied to plug loads connected to specified plug load controls. For example, if one out of ten computer

# Modeling Plug Load Controls

monitors is outfitted with occupancy controls, then the percent energy reduction should only be applied to 10% of the computer monitor load.

The annual energy used for each plug load type should be taken from **Table 4-8** in the **P4P Existing Buildings Program Guidelines v4.1, section 4.6.3.10 (page 4-34)**, (Figure 1 below). As an alternative to this table, values from the [COMNET Plug Loads Technical Support Document](#) (page 13), and/or [EPA Savings Calculator for ENERGY STAR Qualified Office Equipment](#) (listed under “IT and Electronics”) may be used. If the modeled EEMs pertain to plug loads not mentioned in **Table 4-8** (Figure 1 below), please provide documentation for how the controlled load was determined.

Annual Energy Use for Energy Star and Conventional Office Equipment		
Device	Annual Energy Use (kWh/y)	
	Conventional	ENERGY STAR
Desktop Computer	408	275
Laptop Computer	125	85
Computer Monitor	72	57
Scanner	67.6	65
Copier		
Laser- Monochrome	146	73
Laser- Color	550	514
FAX Machine		
Ink Jet	28	14
Laser	156	78
Multifunction Device		
Ink Jet	27	12
Laser- Monochrome	156	78
Laser- Color	551	328
Printer		
Ink Jet	27	16
Laser- Monochrome	78	52
Laser- Color	452	287

*Figure 1: (above) Annual energy use (kWh/yr) for typical plug loads*

## ERP Documentation

The existing devices, quantity, and annual energy use should be included in the ‘*Other Equipment*’ tab of the [ERP Tables](#). The proposed devices and quantity of devices controlled as well as the type and total number of controllers should be included in the ‘*Measure Descriptions*’ tab.

Additionally, to support modeling inputs and for ease of review, Partners should submit a supporting spreadsheet that includes kWh savings calculations, which align with modeled kWh reduction in miscellaneous equipment loads. The spreadsheet should clearly detail the existing equipment types, existing annual energy consumption, type of proposed control, percent

# Modeling Plug Load Controls

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energy reduction, proposed energy consumption, and energy savings. Treating this measure using 'Custom Calculations' and entering the results into the 'Measure Simulation' tab of the ERP Tables is not acceptable as this does not capture interactivity with HVAC systems.

## References

1. Metzger, I., M. Sheppy, and D. Cutler. "Reducing Office Plug Loads through Simple and Inexpensive Advanced Power Strips." National Renewable Energy Laboratory (2014)
2. Eley, Charles. "COMNET Plug Loads Technical Support Document." COMNET Commercial Buildings Energy Modeling Guidelines & Procedures (2015)
3. "Savings Calculator for ENERGY STAR Qualified Office Equipment." Office of Energy Efficiency & Renewable Energy (2015)