BOSS™

CASE STUDY:

City of Pittsburgh Plug Load Energy Management

In Partnership With:

NIST GLOBAL CITY TEAMS CHALLENGE usignite

Smart Plugs Reduce Energy Consumption

The City of Pittsburgh, BOSS Controls, Carnegie Mellon University and other private entities have joined forces to showcase that it is possible to optimize the human experience with autonomous energy efficiency and demand response load shedding. What was once a concept is now reality and together they are participating in the Global City Teams Challenge (GCTC) to prove it.

As part of the Global City Teams Challenge program, BOSS and its partners demonstrated the ability of plug load power measurement and control to achieve rapid energy savings for buildings. At no cost to the City, BOSS Controls installed smart plugs on various devices in City of Pittsburgh buildings, Carnegie Mellon University, and the US Steel Tower. Devices are being installed on, but not limited to window air conditioning units, vending machines, and water coolers. When not in use, the devices will turn off, and result in energy and cost savings.

What is the Global City Teams Challenge?

The National Institute of Standards and Technology (NIST) and US Ignite launched the GCTC in the fall of 2014 and since then, this challenge has captured the attention of public-private partnerships that together have adopted and accelerated Internet of Things (IoT) deployments within smart city/smart community environments.

BOSS. Smart Buildings Start Here.

Case Study

Equipment connected to building receptacles draw a considerable amount of power, often on a 24/7 basis. Based on US Department of Energy estimates, this “plug load” accounts for approximately 25% of the electricity used within commercial buildings. The BOSS Smart Plug family of products is designed to address this opportunity to enable energy and operational savings. Through intelligent scheduling of device off times to match periods when the equipment is not utilized or when the building is unoccupied, facilities are able to achieve significant energy savings with simple paybacks of under one year for deployment of Smart Plugs. By leveraging existing network infrastructure, the BOSS Smart Plugs family enables centralized monitoring and control of the connected devices via standard web browsers and mobile applications. Furthermore, the connected Smart Plugs provide a means to support advanced applications including demand response and peak load management.

BOSS and the GCTC Project Summary

- The project goal was to demonstrate plug load power measurement & control and achieve rapid energy savings to buildings
- Prove ability to aggregate plug loads across multiple buildings for demand response events
- Provide utilities a virtual power plant and reduce peak demand costs and emissions
- Prove ability to provide autonomous energy efficiency capability, while adjusting to multiple inputs such as real time energy costs to enable additional savings
- Optimize end user experience

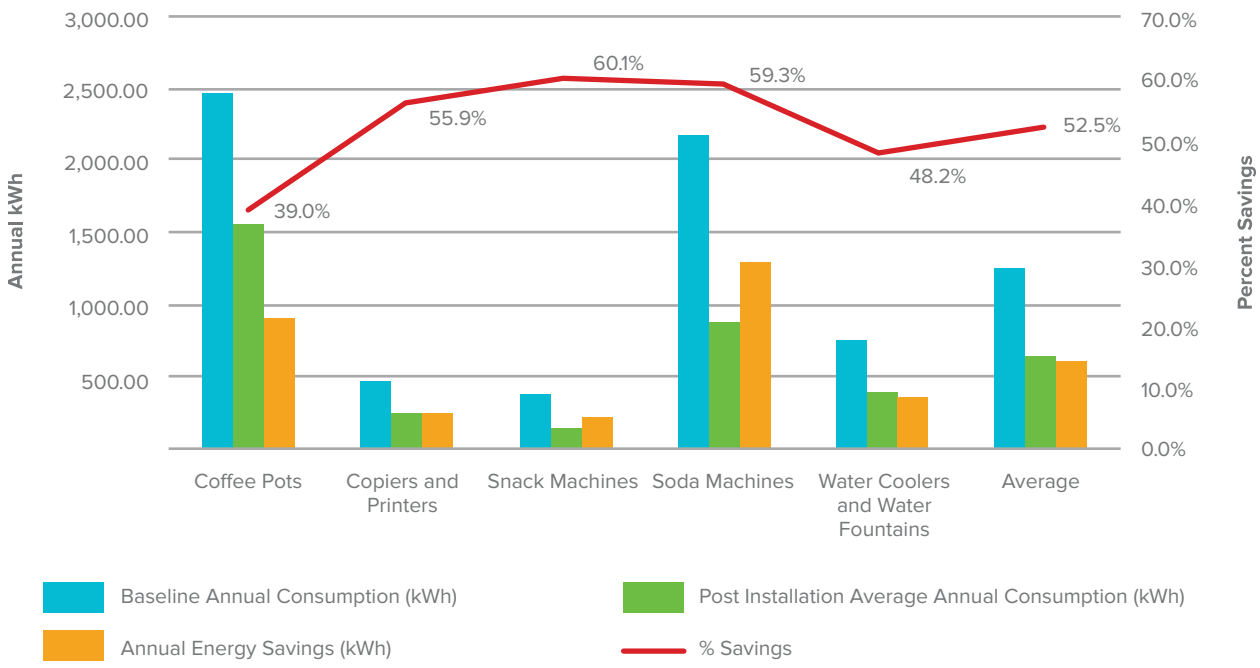
This case study provides comprehensive information on achieving over 53% energy and electricity expenditure reduction by utilizing the BOSS Smart Plugs.

What We Did

BOSS Controls installed Smart Plugs on various devices in City of Pittsburgh buildings, Carnegie Mellon University, the US Steel Tower. The selected facilities are dispersed over the Pittsburgh, Pennsylvania region and with a variety of building types including commercial office high rise, university, and municipal facilities. Within those facilities the BOSS team selected a variety of plug loads including: water coolers and water fountains, coffee pots, and vending machines. The BOSS Smart Plugs have integrated power measurement and reporting capabilities which simplified the data collection and reporting.

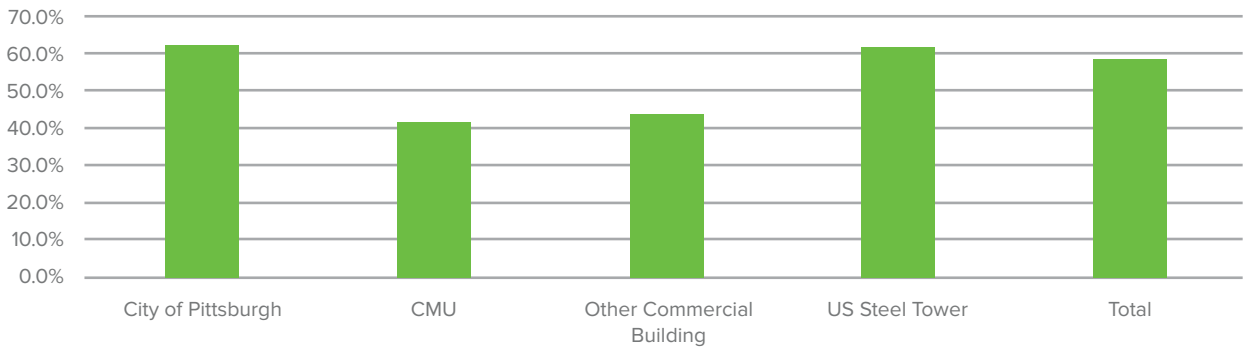
The Smart Plugs were installed and connected to those devices to collect baseline data for a minimum period of 14 days.

Commercial Building Plug Load Control: Operation with Shutdown During Unoccupied Periods



After the baseline data collection period, schedules were implemented to turn the devices off during unoccupied periods. These unoccupied periods were typically weekdays before 6:00 AM, weekdays after 6:00 PM, and during weekends. The Smart Plugs were run with the implemented schedule for a minimum of 14 days to measure and validate the energy savings.

Commercial Building Plug Load Control: Percentage Savings with Operation with Shutdown During Unoccupied Periods



Demonstrated Results

The program demonstrated the following key results:

Schedule-based control has substantial energy savings. Use of schedule-based shutdown during unoccupied periods results in substantial energy savings in excess of 50%.

Equipment with the Highest Energy Consumption has the greatest benefit. On a total energy savings basis, the benefit is the largest for the equipment with the highest energy consumption (e.g., soda vending machines) with a lower benefit for equipment that has low consumption or low unoccupied consumption (e.g., water fountains, copiers)

Short Payback Period. For the Smart Plugs installed in this study, the simple payback for all areas is less than 1 year with simple payback as short as 4 months for high energy consuming equipment.

Justification for Wide Deployment. The energy savings, short simple payback, and verifiable results substantiate wider deployments throughout the selected facilities.

Additional Findings and Benefits

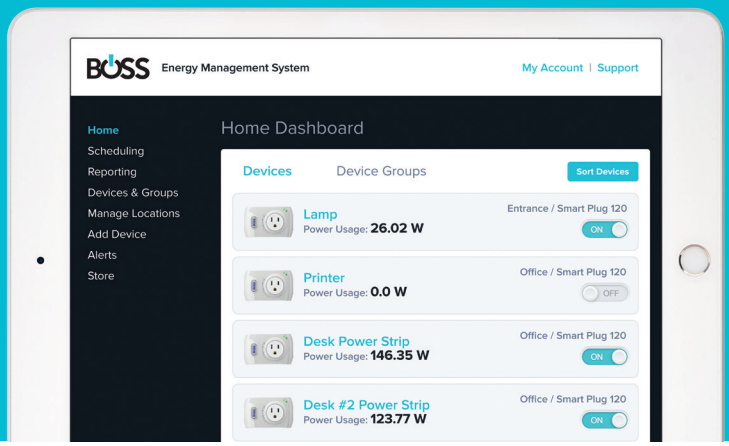
The program demonstrated the following key results:

- Integrated measurement and real time reporting capabilities that enabled rapid feedback on energy savings
- Provided end user feedback with automated controls, optimizing energy savings and end user experience
- Cloud-based control provided a mechanism to support Automated Demand Response Events down to the plug load with measurement verification
- Based on 2015/16 PJM Annual DR Program values, the contribution of each Smart Plug is another $9.10 of average value to the facility
- Operational Savings through:
  - Schedule-based controls continue to reduce operating hours and extends equipment operating life
  - Automated alerts for unscheduled on/off, power levels exceeding thresholds, enable peak equipment operating performance

BOSS™

Case Study

ATMOSPHERES



BOSS Smart Plug Product Features

- Single 120V (15 Amp) or 220V (20 Amp) grounded plug-in controller
- Use your existing WiFi network with no additional networking infrastructure required
- Controlled via mobile device or computer with internet connection
- Program with 7-day schedules and easily upload saved schedules to large groups of devices simultaneously
- Monitor real-time and peak power usage (watts)
- Monitor and graph energy consumption (kilowatt hours)
- Group and simultaneously control multiple devices by location, device type or any user defined category

Don't just manage, **BOSS.**

Contact our sales team today by calling **1-855-708-4990**

or Email us at **info@bosscontrols.com**