



FACT SHEET: REDUCING PLUG LOAD ENERGY CONSUMPTION

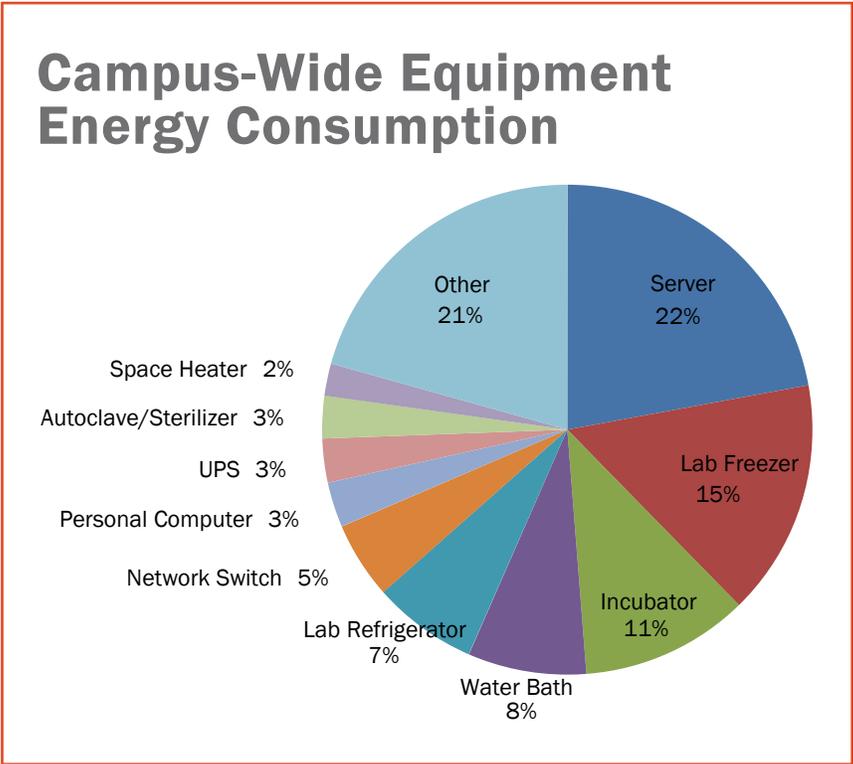


SUSTAINABILITY OPPORTUNITY

Stanford University completed a comprehensive 220 building equipment inventory in 2014 to quantify plug load related electricity consumption on campus. The goal of the project was to collect high resolution plug load data to inform systemic and targeted plug load reduction strategies. In the next few years, Stanford will be reducing plug load related energy consumption via existing and new programs pathways, which could save from \$260,000 to \$2.3 million annually.

PLUG LOAD ENERGY REDUCTION PROGRAMS

- **Energy Retrofit Program:** Energy consumption of several types of equipment, such as computers and printers, can be reduced through upgrading to more energy efficient models or plugging them into timers or smart power strips. Stanford's Energy Retrofit Program will fund this equipment through rebates.
- **Space Heater Reduction:** The inventory revealed close to 1000 space heaters on campus. This program will check the temperature of buildings with a high space heater count and make sure that it falls within a comfortable range. If the temperature is out of range, the building's heating set points will be adjusted if possible. Building occupants will be encouraged to keep their space heaters off if comfortable or upgrade to a more energy efficient model if additional heating is still needed.
- **Sustainable IT:** Existing Sustainable IT initiatives, including server consolidation and virtualization and adjusting computer and copier sleep settings, can be further extended to capture energy savings from computing equipment.
- **Green Labs:** Forty-nine percent of the plug load energy use on campus comes from lab equipment. Energy reduction for lab equipment will be part of a comprehensive Green Labs program that will address water, waste, and green chemistry along with energy. The program will be researched and planned in 2015.
- **Procurement:** Three program options involve "phasing out" specific types of equipment and will require action through Stanford's Procurement Department.



MORE INFORMATION

SUSTAINABLE.STANFORD.EDU/PLUG-LOAD-INVENTORY

Contact: Moira Hafer, Sustainability Analyst, mbhafer@stanford.edu

Rashmi Sahai, Sustainability Assessments Program Manager, rsahai@stanford.edu





FACT SHEET: REDUCING PLUG LOAD ENERGY CONSUMPTION

INVENTORY SUMMARY

Twelve student interns inventoried nearly nine million square feet of building space, comprising 86% of the main campus (Student Housing was not included in the study for privacy reasons). LBRE IT developed a smart phone/tablet application to facilitate the data collection effort. The application combined electronic floor plans of campus buildings and a secure web application for data entry to track equipment room by room. In addition to inventorying 55 types of electronic equipment, student interns also collected data on water fixtures, occupancy, environmental safety measures, and motion sensors.

The inventory revealed that plug loads comprise approximately 22% of total campus electricity consumption and cost \$6.8 million per year. Some of the largest “energy hogs” include servers, laboratory freezers, and space heaters.

TRENDS

- Of the ten types of equipment with the highest electricity consumption, five were types of lab equipment, three were types of networking equipment, and two were types of office equipment. This illustrates the importance of engaging labs in plug load reduction efforts.
- The ten buildings with the highest plug load energy consumption consume approximately 30% of total campus plug load consumption. This demonstrates that targeting some individual buildings in reduction efforts could also be an effective strategy.
- Results for individual buildings will be distributed to building managers to provide a breakdown of their buildings’ equipment and inform building-level plug load reduction efforts.
- Calculations based on the equipment inventory data of Stanford’s Knight Management Center reinforce studies using measured submeter data of the same complex, demonstrating that plug loads in these buildings comprise between 0.11 and 0.25 W/ft² on average. This data can inform how much plug load capacity Stanford allocates for its new buildings and will help accurately size electrical infrastructure and cooling systems.



Collection Process by the Numbers

5
months

12
student interns

2,760
student work hours

55
types of equipment

220
buildings

17,077
rooms inventoried

110,536
pieces of equipment

49,457,539 kWh
consumed per year

MORE INFORMATION

SUSTAINABLE.STANFORD.EDU/PLUG-LOAD-INVENTORY

Contact: Moira Hafer, Sustainability Analyst, mbhafer@stanford.edu

Rashmi Sahai, Sustainability Assessments Program Manager, rsahai@stanford.edu

