



# FACT SHEET: REDUCING PLUG LOAD ENERGY CONSUMPTION



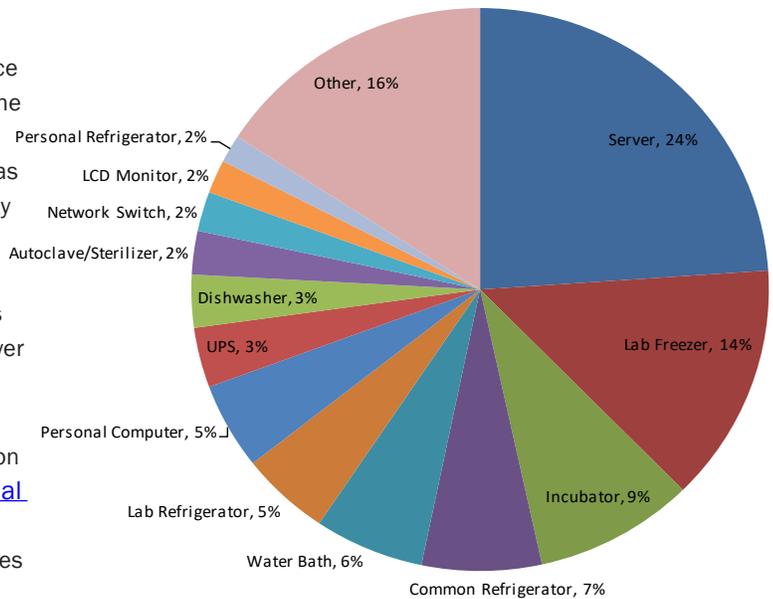
## SUSTAINABILITY OPPORTUNITY

Stanford University completed a comprehensive 220 building equipment inventory in 2014 and 2015 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. The inventory helped inform plug load energy reduction program pathways that Stanford has since pursued that could save up to \$2.3 million in electricity costs per year.

## 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 funds this equipment through both [direct install programs](#) and rebates.
- Space Heater Reduction: The inventory revealed close to 1,000 space heaters on campus. Buildings with a high space heater count were initially evaluated to better understand the need for space heaters. After making adjustments in those buildings, a campus-wide [Space Heater Swap](#) program was launched that allows any member of the campus community to turn in their space heater in exchange for a Sustainable Stanford-branded fleece jacket.
- Sustainable IT: The [Sustainable IT program](#) offers rebates for server virtualization and relocation from distributed server closets to the main campus data center. It also offers a [streamlined rebate](#) for efficient server upgrades.
- Green Labs: Forty-nine percent of the plug load energy use on campus comes from lab equipment. As a result, the [Cardinal Green Labs](#) program was launched in 2015. The program now offers a timer direct install program, streamlined rebates for efficient ultra-low temperature freezers and bio-safety cabinets, room temperature sample storage, and custom rebates for other types of lab equipment.
- Procurement: Procurement efforts focus on "phasing out" old, inefficient equipment and ensuring that new equipment purchases meet specific sustainability standards, such as [EPEAT](#).

Equipment Energy Consumption



### MORE INFORMATION

[SUSTAINABLE.STANFORD.EDU/PLUG-LOAD-INVENTORY](https://SUSTAINABLE.STANFORD.EDU/PLUG-LOAD-INVENTORY)

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## INVENTORY SUMMARY

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.

Fourteen student interns inventoried over ten million square feet of building space, comprising 61% of the main campus. Data for the Student Housing spaces inventoried were extrapolated to cover all Student Housing, resulting in 91% of total building space covered by the inventory.

The inventory revealed that plug loads comprise approximately 34% of total campus electricity consumption and cost \$9.1 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, two were types of networking equipment (with servers being the single highest consumer!), and three were types of office equipment. This illustrates the importance of engaging each of these types of spaces in plug load reduction efforts, with a particular focus on labs.
- The ten buildings with the highest plug load energy consumption consume approximately 55% 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 were distributed to building managers to provide a breakdown of each building’s equipment and inform building-level plug load reduction efforts.
- Plug load data from Student Housing spaces revealed that there is approximately one personal printer for every three students, one mini fridge and one fan for every 2 students, and 1.25 desk lamps per student. Programs to encourage sharing of these devices and to reduce the number of new devices entering campus could save over \$1 million per year.
- 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/ft<sup>2</sup> 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

**14**  
student interns

**3,200**  
student work hours

**55**  
types of equipment

**263**  
buildings

**10,278,972**  
square feet

**19,909**  
rooms inventoried

**129,774**  
pieces of equipment

**79,313,779 kWh**  
consumed per year

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