A Data-Driven Approach to Plug Load Energy Reduction Programs

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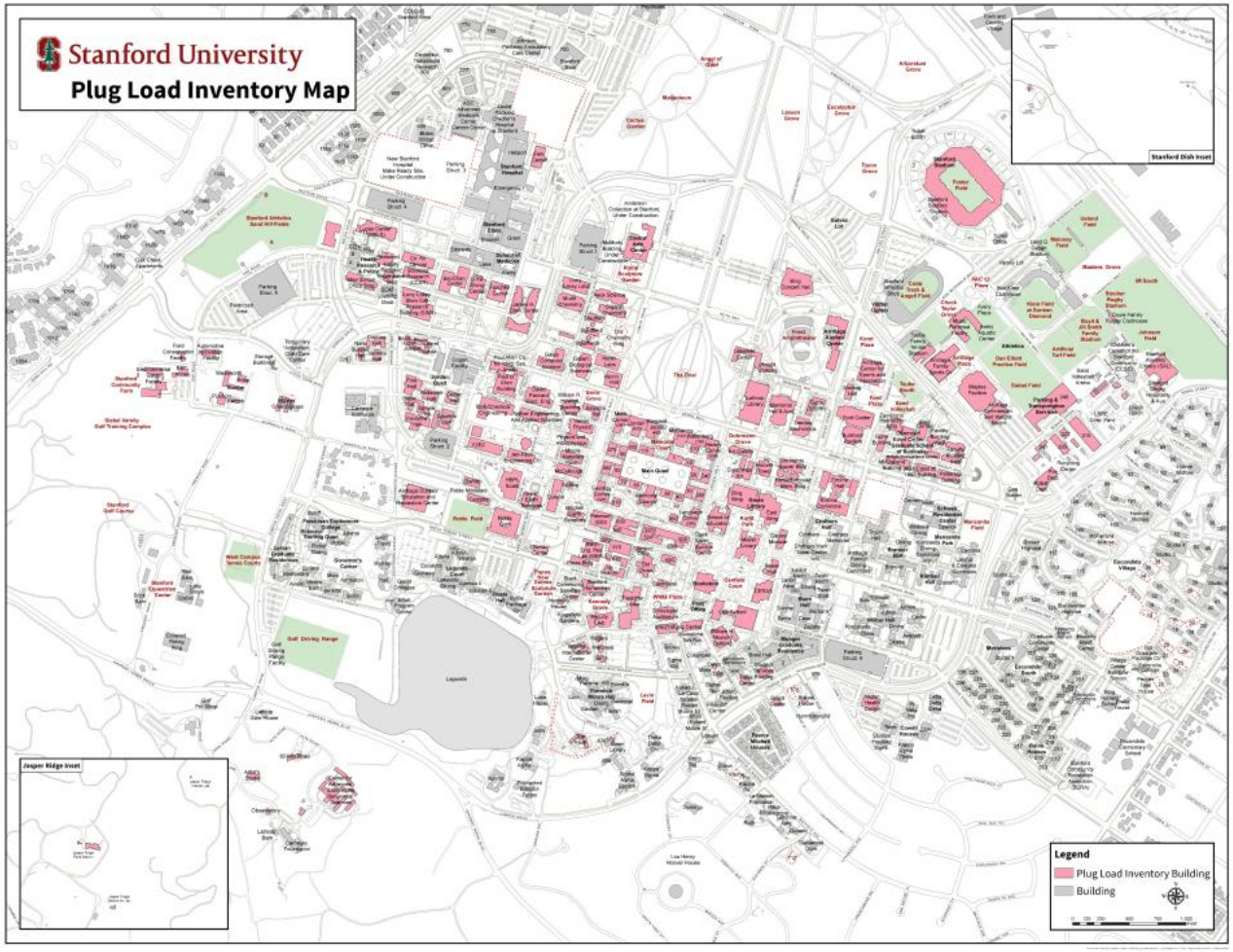
Overview

- Comprehensive equipment inventory at Stanford in summer 2014
- Highlighted viable plug load reduction opportunities
- First group of measures field tested in spring 2015
- Timer direct install program launches in fall 2015



Equipment Inventory Overview

Goals:

1. Quantify campus plug load energy consumption and understand its composition
2. Identify viable plug load energy reduction opportunities

Smart phone application used for data collection →

Attributes collected for each type of equipment to better estimate energy consumption

Collection Process by the Numbers

5 months

12 student interns

2,760 student work hours

55 types of equipment

220 buildings

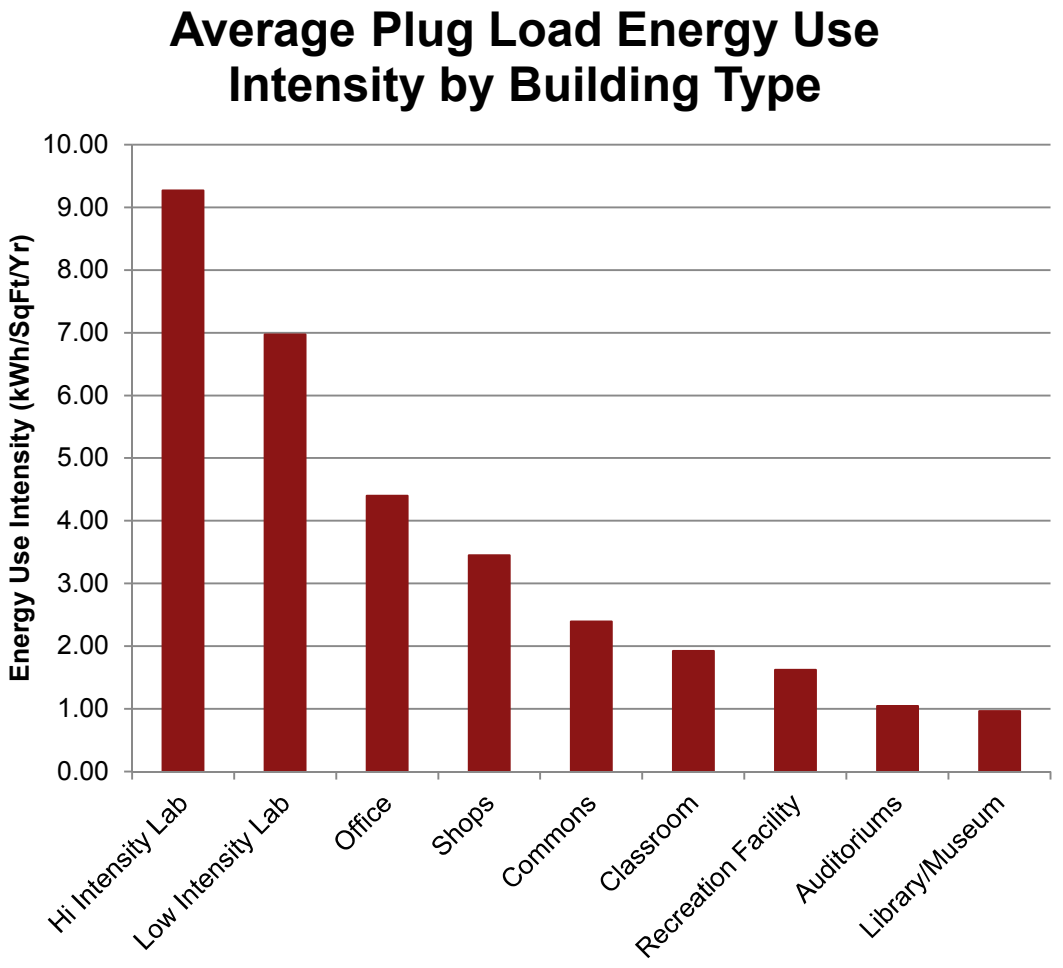
17,077 rooms inventoried

110,536 pieces of equipment

49,457,539 kWh consumed per year

Equipment Inventory Results

Total Equipment Count	**110,000**
Total Energy Consumption (kWh/yr)	**49,500,000**
Total annual cost	**$6,840,000**
Plug Load as % of Total Campus Electricity Use	**22%**
Plug Load as % of Electricity Use of 220 Bldgs	**32%**

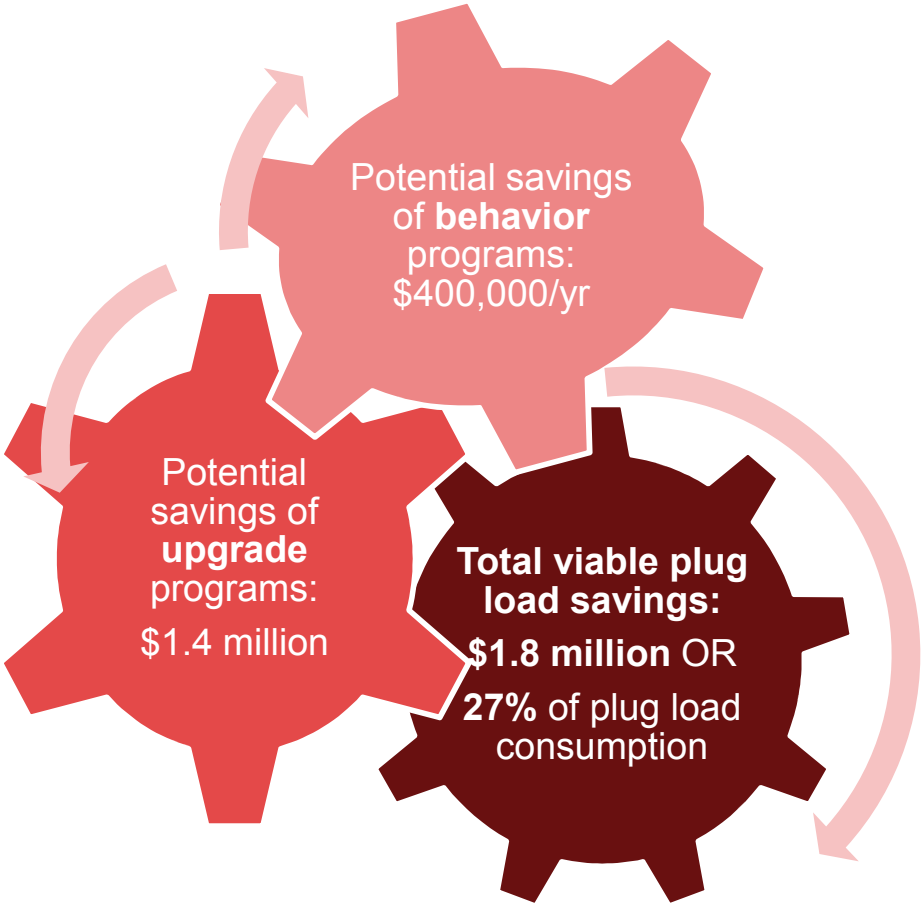


Plug Load Reduction Strategies

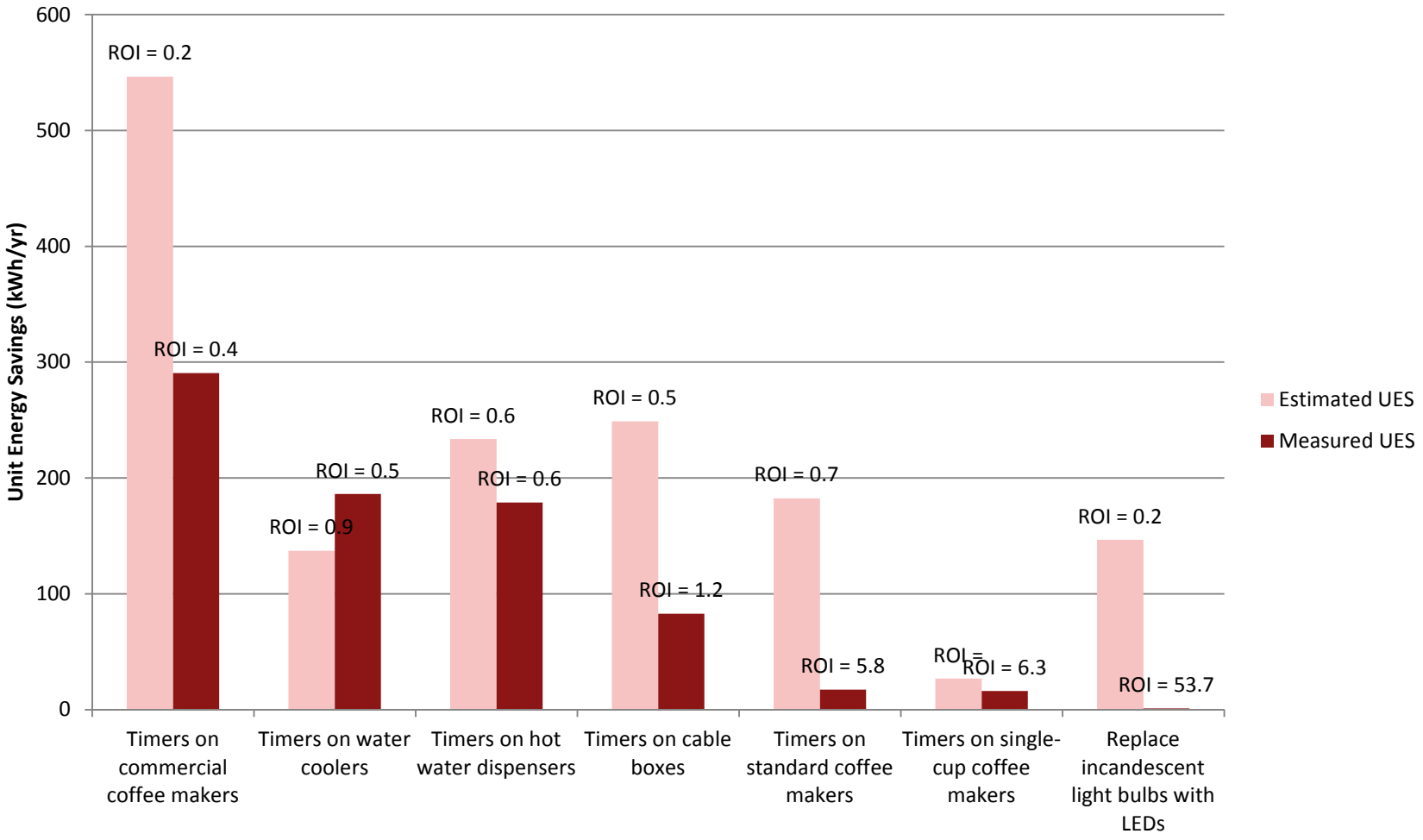
Plug Load Reduction Programs

- Basic energy efficiency upgrades
  3.9% plug load reduction
- Electric space heater minimization
  0.6% plug load reduction
- Sustainable IT
  10.6% plug load reduction
- Green Labs
  10.4% plug load reduction
- Procurement
  1.2% plug load reduction

Potential savings:



Basic Energy Efficiency Measures – Field Test



Launch of Timer Direct Install Program

Item	Number of Equipment	Adoption Rate	Total cost	Total Annual Savings	Overall ROI
Cable boxes	194	50%	$1,823	$1,111	1.64
Hot water dispensers	106	50%	$975	$1,312	0.74
Industrial coffee makers	109	90%	$1,838	$3,946	0.47
Water coolers	565	75%	$8,258	$10,923	0.76
Total	**974**		**$12,893**	**$17,292**	**0.90**

Program Design:

- Funded through existing Energy Retrofit Program
- Timers purchased up front so no cost borne to departments
- Interns lead timer installations
  - Discuss timer scheduling preferences and functionality with occupants during install
  - Follow protocol by equipment type and fill out forms for each timer
- Occupants “pledge” to use timer correctly by signing form next to timer
- Prizes for buildings with the highest number of pledges
- Interns will check timers after 3 months to monitor persistence