

CalPlug Workshop Afternoon Session

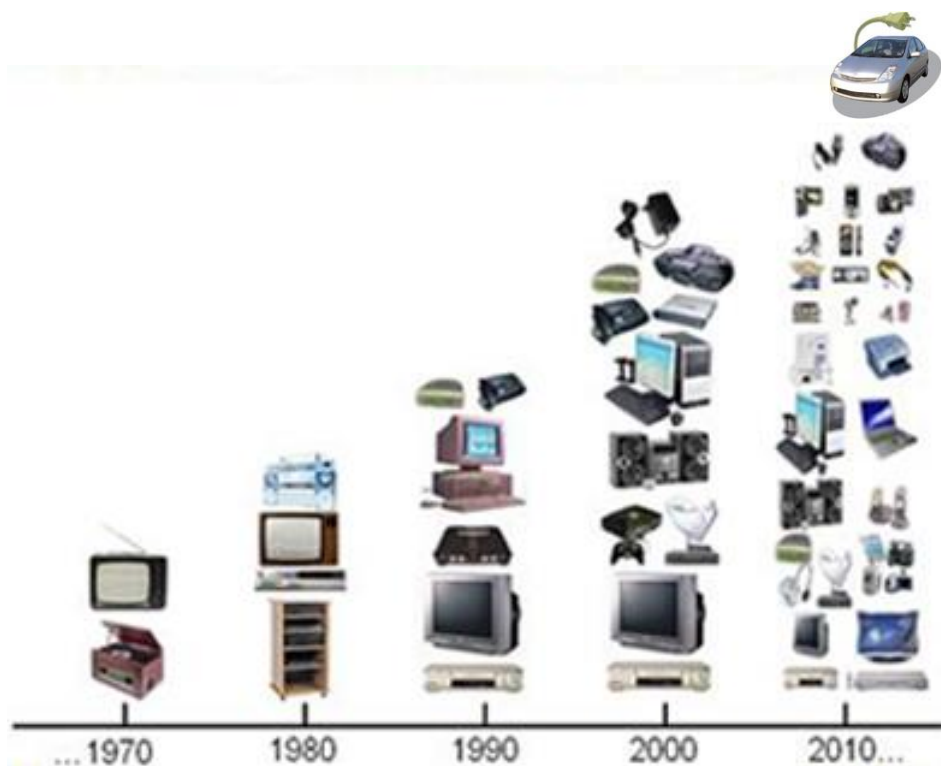
Future IT Infrastructure for ZNE Buildings

May 13, 2014

**G. P. Li, Director
California Plug Load Research Center
California Institute for Telecommunications and Information
Technology , UC Irvine**



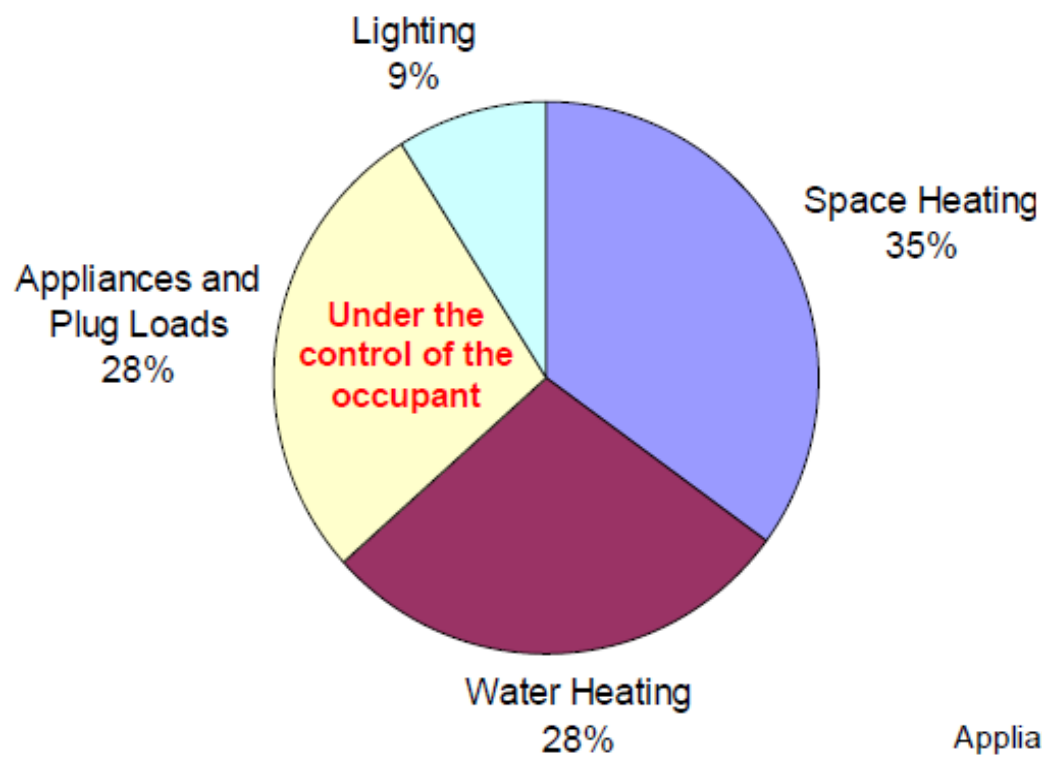
Residential and Commercial Plug Load Efficiency for ZNE



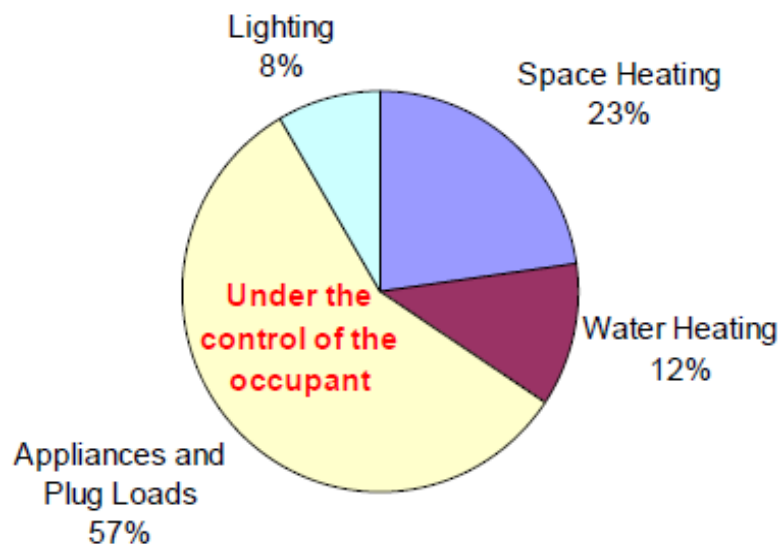
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Plug Load is More Significant in Zero Net-Energy Homes

Annual energy use in typical Habitat house

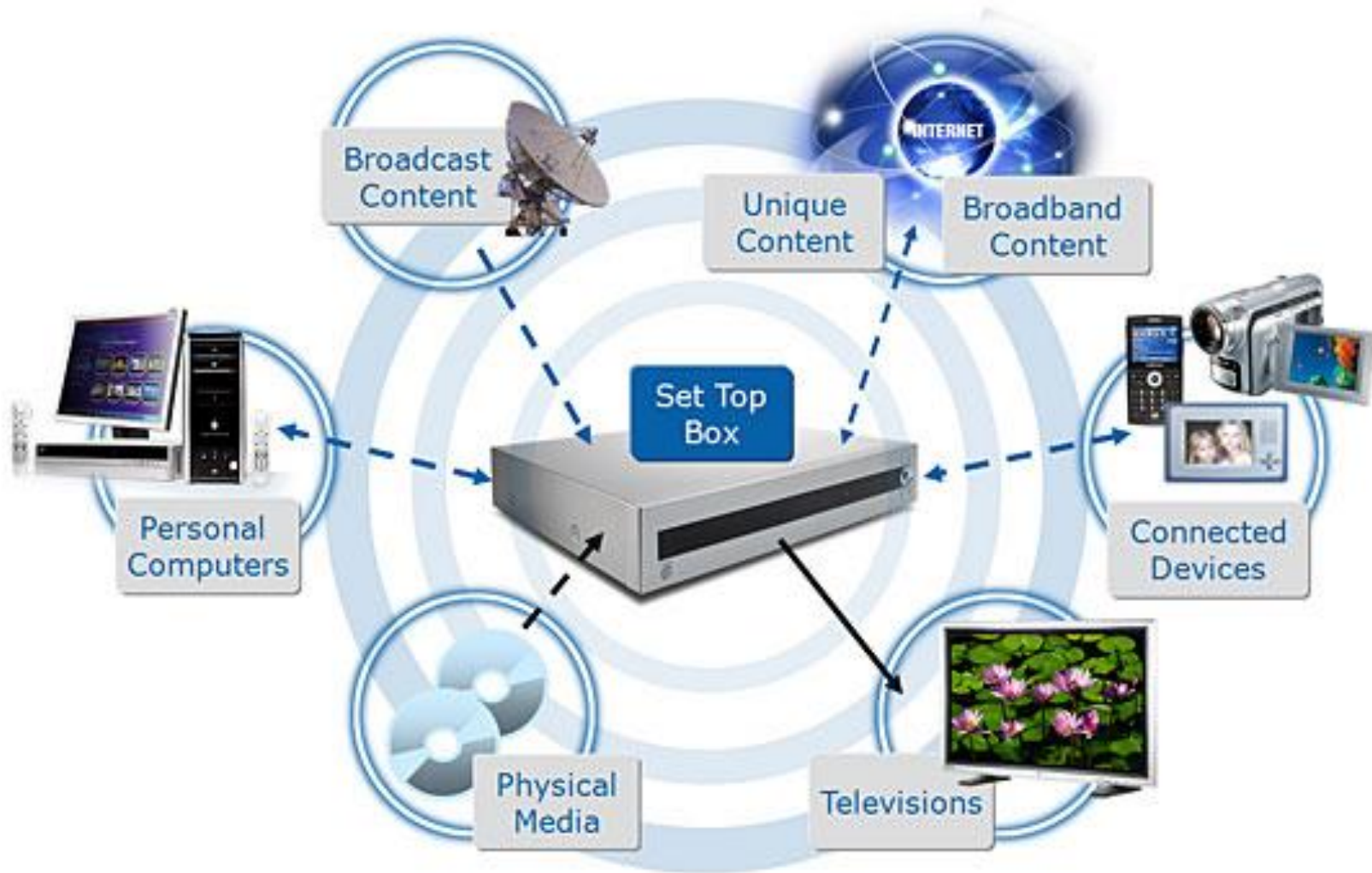


Annual energy use in Habitat ZEH



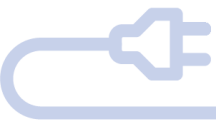
Source: "A Cold Climate Case Study for Affordable Zero Energy Homes", NREL and Habitat for Humanity, *Technical Report NREL/TP-550-43188*, June 2008

Current Plug loads: Home Entertainment Network



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Emerging Plug Loads: Home Energy Management Network



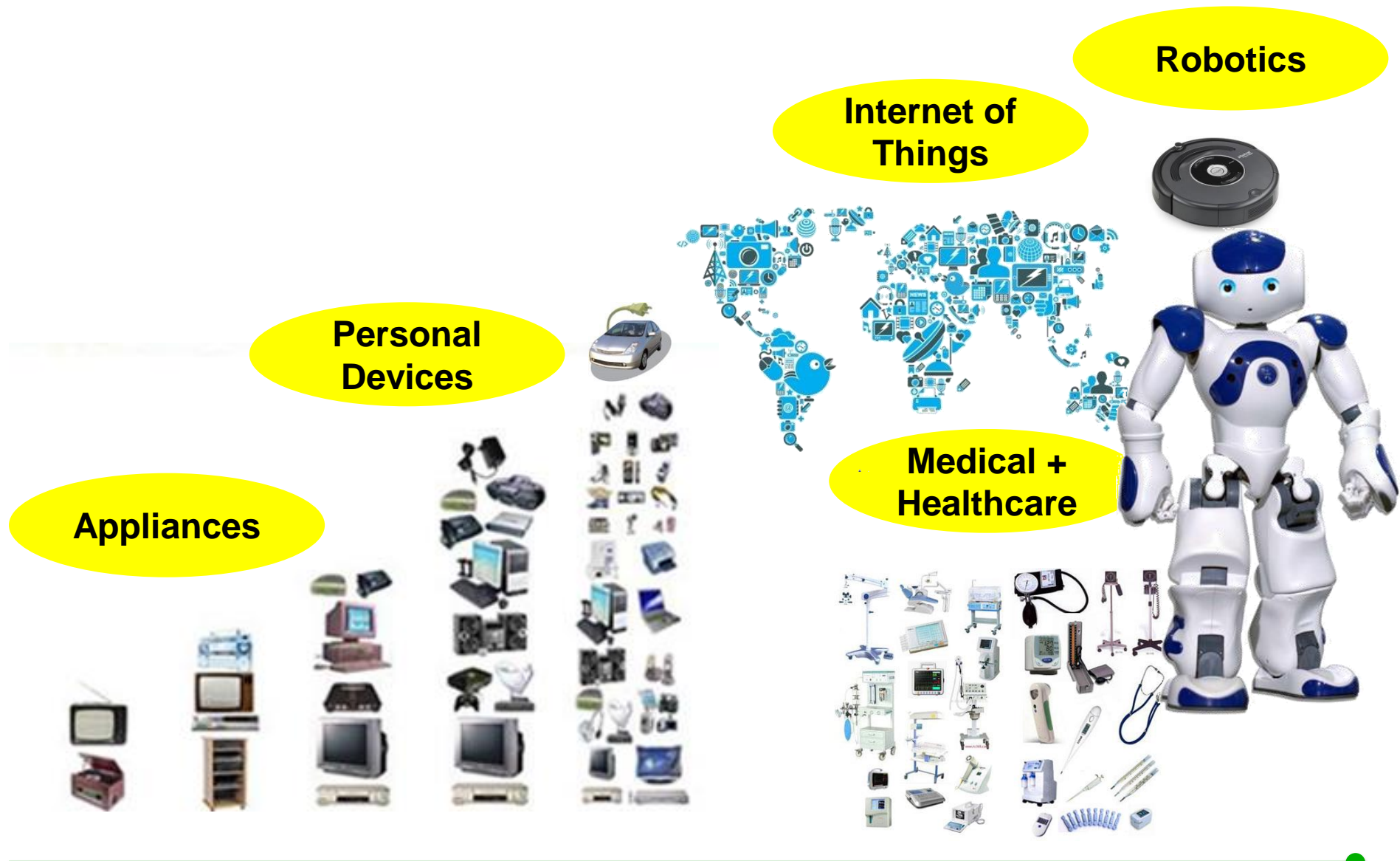
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Smart Home of the Future



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Residential and Commercial Plug Load Efficiency for ZNE



1970

1980

1990

2000

2010

2020

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UC Irvine Campus Building EE Initiatives

- UC Irvine has a history and reputation of being the top eco-friendly and green campus
- 19 MW cogeneration facility
- 20 GWh annual electricity savings since 2009
- Solar panels enough to power 500 homes
- All new buildings are required to be LEED Silver

Total LEED for New Construction: 83

Total LEED for Existing Buildings: 18

Total LEED for Commercial Interiors: 28

Total LEED for Homes: 13

Total LEED for Core and Shell: 1

TEN COOLEST SCHOOLS

By Avital Andrews

3: University of California, Irvine

← PREVIOUS 10/13 NEXT →



← PREVIOUS 10/13 NEXT →

3

UNIVERSITY OF CALIFORNIA, IRVINE
Irvine, California

SCORE: 794.30 | STUDENTS: 27,479

UC Irvine's 19-megawatt cogeneration facility and other energy-preserving projects have helped the school save 20 million kilowatt-hours of electricity per year since 2009—and solar panels generate enough power to run 500 homes for a year. The 1,475-acre campus is anchored by a 16-acre botanical garden, and all new buildings must be certified at least LEED Silver. Living green is important at UCI: Meatless Mondays are strongly encouraged, and a dozen student clubs focus on eco-issues. Above, graduate students in UCI's Earth System Science Department learn about Mono Lake's geology, ecology, natural history—and about environmentalists' efforts to protect the lake—during a spring-break field trip.

Photo courtesy of Kathleen Johnson/UC Irvine



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CalPlug

CALIFORNIA PLUG LOAD RESEARCH CENTER

Hewitt Hall

vs.

Gross Hall



Designed in 2001

- Exceeded Title 24 by 23.7%
- Biomedical research
- Lighting upgrade in 2009
- Exhaust Stack Discharge Velocity Reduction in 2009
- Re-Commissioned in 2010
- 76,905 Square Feet

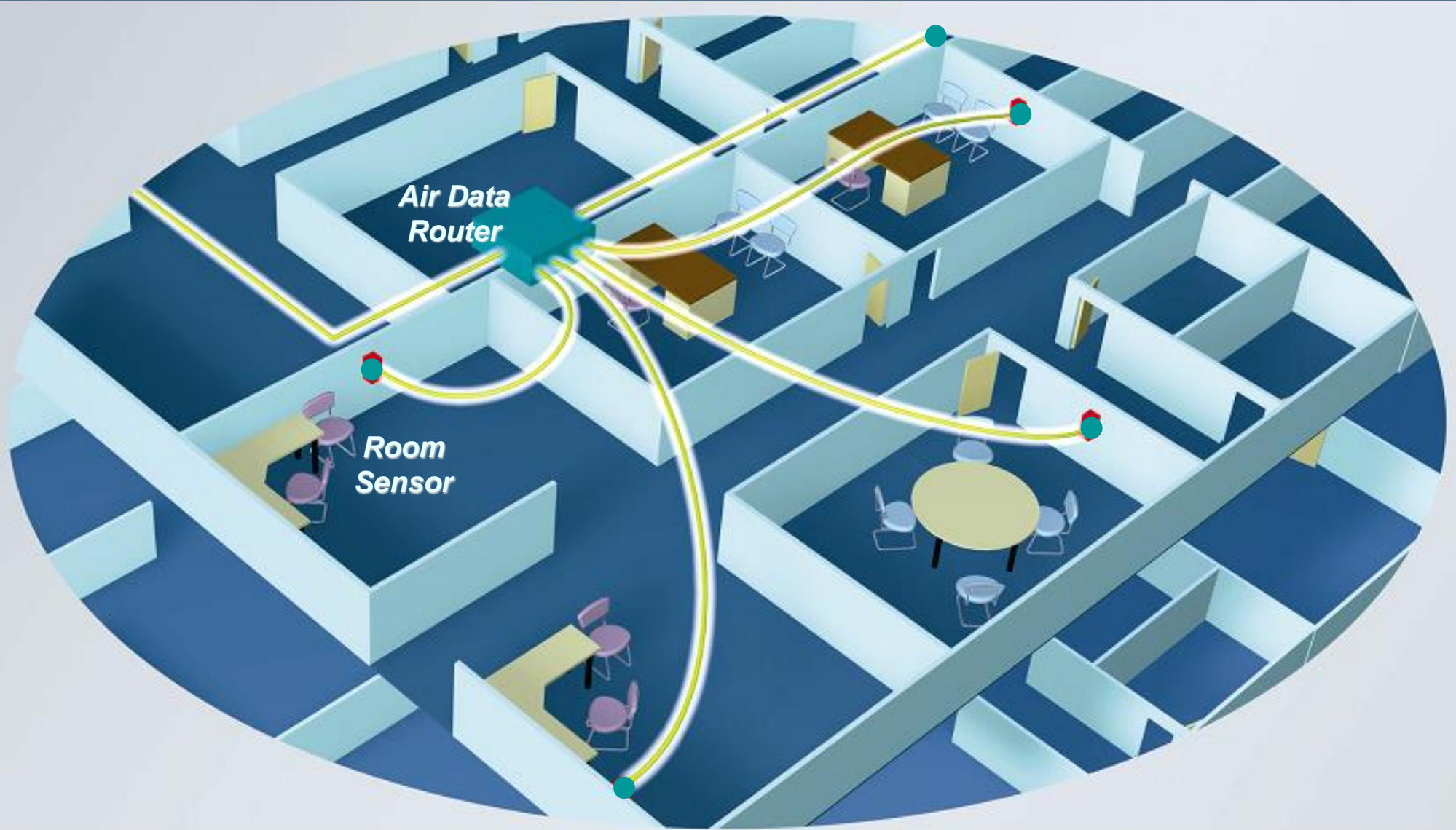


Designed in 2009

- Exceeded Title 24 by 50.4%
- Biomedical Research
- Submitted to USGBC for LEED Platinum certification
- 94,705 Square Feet

Matt Gudorf – Campus Energy Manager

Distributed, Multi-Point Air-Sampling Network

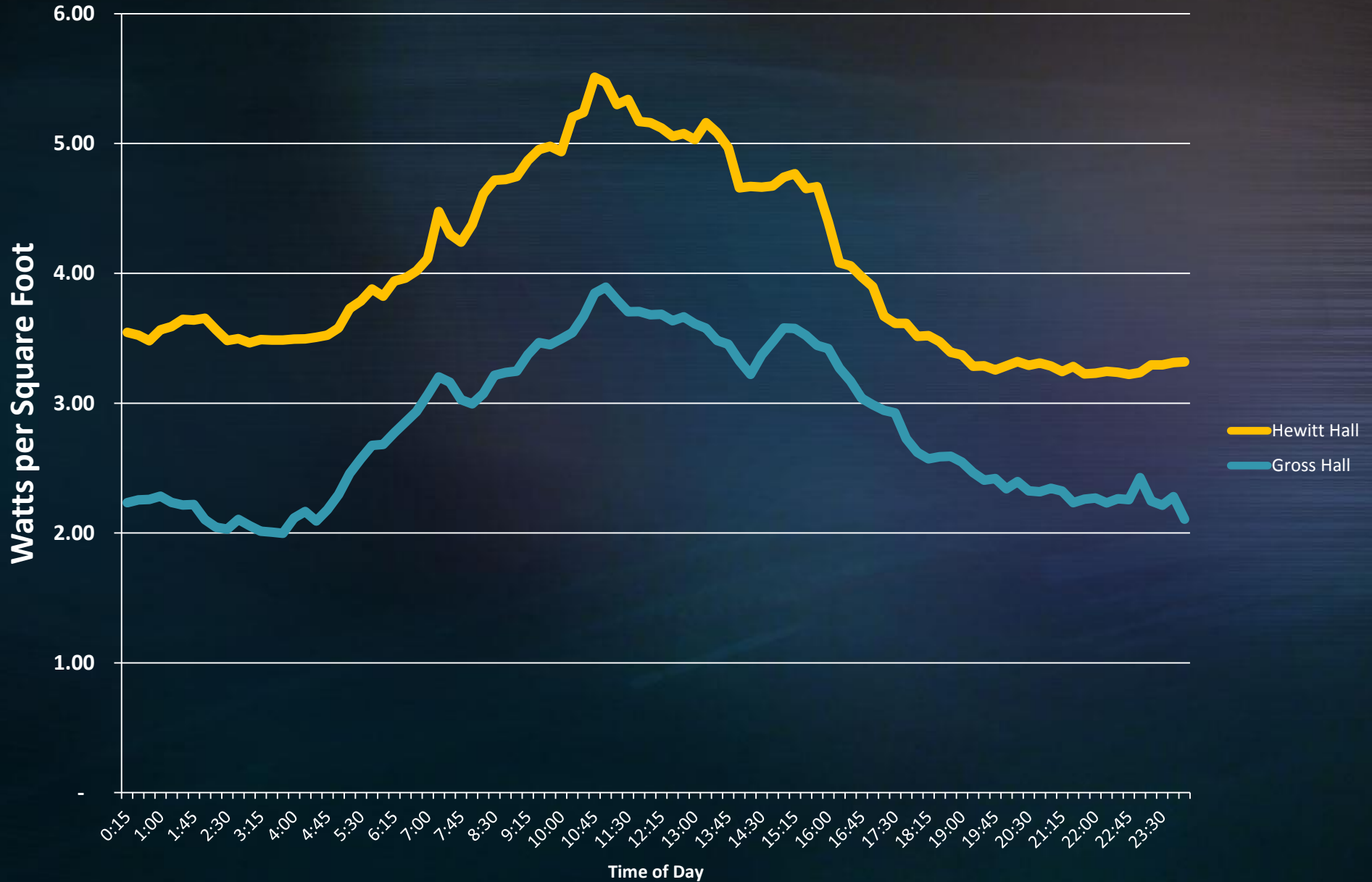


Wendell C. Brase
Chair, Climate Solutions Steering Group, University of
California



Building Load Per Square Foot

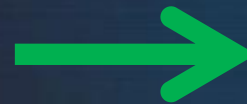
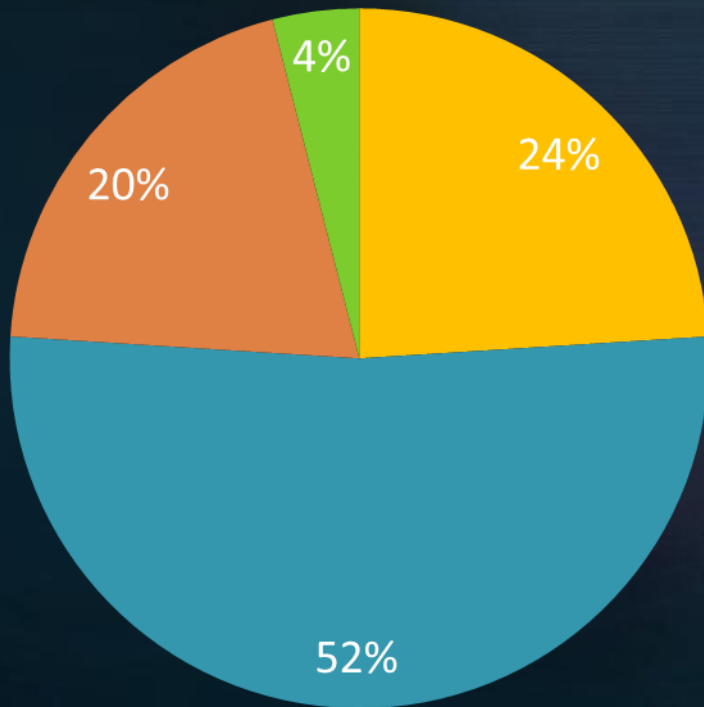
Watts / Gross Square Foot



Plug Load is the Next Obstacle in Energy Efficiency

Historical Lab Load

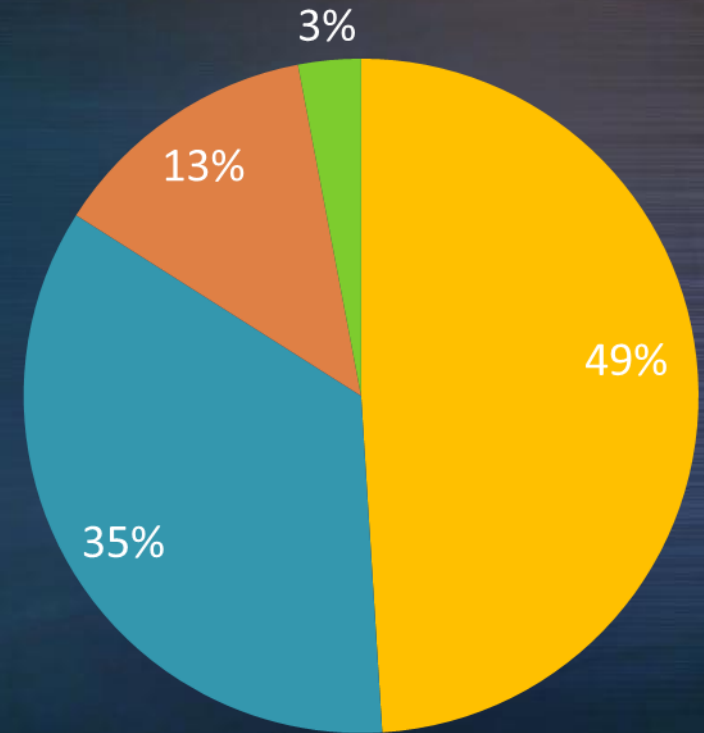
- Lab Equipment
- HVAC
- Lighting
- Office Equipment



44%
Load
Reduction

Smart Lab Load

- Lab Equipment
- HVAC
- Lighting
- Office Equipment



Lab energy use as a whole is being reduced but the efficiency gains are greatest in HVAC and lighting with plug load from lab equipment now quickly becoming the leading factor as a percentage of demand.

A Holistic IT Solution toward ZNE Buildings

- Majority of plug load devices powered by DC sources or via wireless chargers in the future (new trend)
 - How to improve efficiency in plug load devices ?
- Emerging market demands of plug loads in home entertainments, social network, smart home, smart buildings, etc.
 - New measure for networked plug load efficiency in terms of energy saving?
- Integrated demand side management : plug loads and buildings
 - New protocol for building informatics and people-centric plug load informatics?
- Behavior based incentive for rapid adoptions of ever-improved energy efficient plug loads
 - Short consumer product cycle vs standard?



Please join us at

California Plug Load Research Center

(Cal-Plug)

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