California Plug Load Research Center
APS Tier 2 Workshop

University as A Living Lab of the Future Plug Loads

Designing Testing Labs and Methodology:

A Key Component to Delivering Integrated Solutions

March 4 , 2015

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California Plug Load Research Center

California Institute for Telecommunications and Information Technology

Creating Connections. Powering Innovation. Boosting Efficiency.

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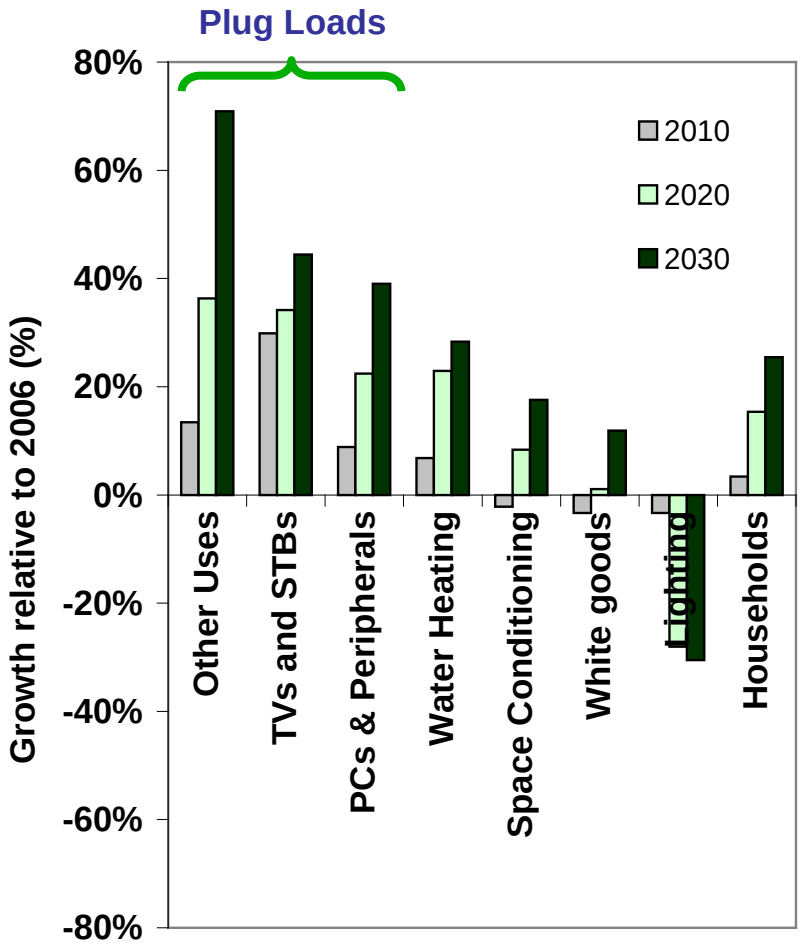
California Plug Load Research Center

CalPlug Purpose

- **Help California and U.S. improve energy efficiency in appliances and electronic devices**
- **In the residential and commercial sectors**
- **Through research, demonstration, education**
- **About engineering, incentives, codes and standards, and user behavior**



Residential and Commercial Plug Loads

Internet of Things

Personal Devices

Appliances

Medical + Healthcare

Robotics

1970 1980 1990 2000 2010 2020

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CalPlug Plug Load Energy Efficiency Roadmap

CALIFORNIA PLUG LOAD RESEARCH CENTER

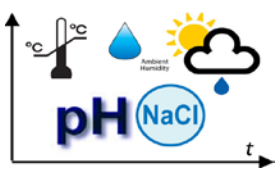
STB Energy Efficiency:5W5s

PC Power Management

Energy Reporting and Display

Internet of Home Entertainment

Internet of Water



Internet of Things

Medical + Healthcare

Robotics

2010 — 2015 — 2020 — 2025

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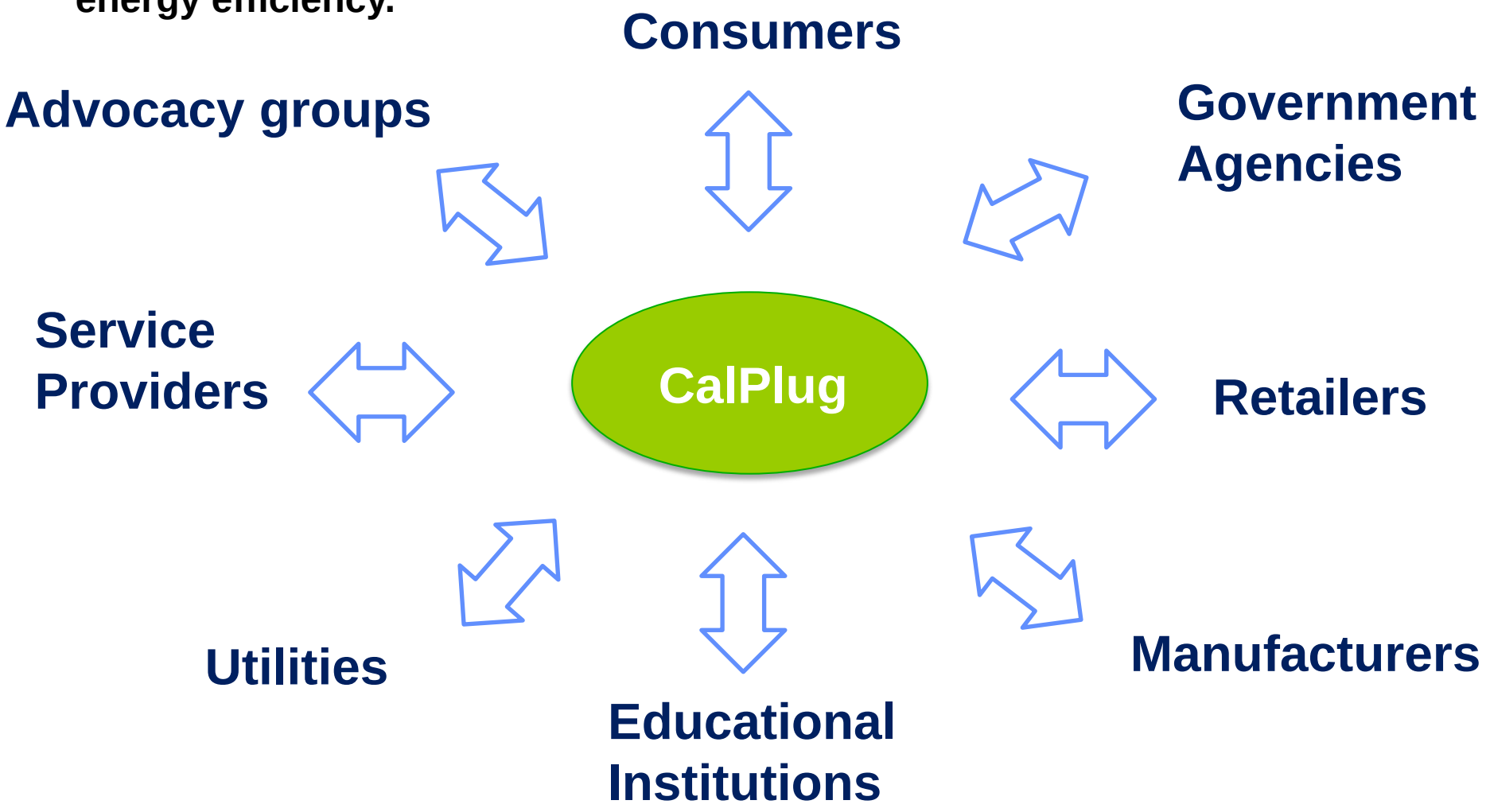
CALIFORNIA PLUG LOAD RESEARCH CENTER

Center Interactions with Key Stakeholders

Neutral playing ground for diverse groups with various challenges and approaches to explore common objectives and goals with the ultimate goal of energy efficiency.



CalPlug APS T2 Workshop

Goal:

To have an open forum for APS Tier 2 device information exchange among stakeholders, and to reach an agreement on device testing methodology, category definition, and go-to-market roadmap

Anticipated outcome:

To form an APS tier 2 working group with strong collaborations among key players including research centers, manufacturers, service providers, utilities and government agencies

Guiding Principles:

- **Data, facts driven analysis and discussion**
- **Open, inclusive innovation process**
- **Neutral playground for all stakeholders**

CalPlug Workshop

- **9:30 am - Draft definition, methodology and roadmap to market for Tier 2 APS**
- **10 am - Representatives from Utilities and Vendors (rebate programs, field test results, etc.)**
- **10-10:15: Domenico Gelonese/Embertec**
- **10:15-10:30 Jon Lanning/Tricklestar**
- **10:30-10:45 Jia Huang/PG&E**
- **10:45-11am Martin Vu/RMS Energy Consulting**
- **11 am - Discussion: category definition, methodology, roadmap**

CalPlug Plug Loads Evaluation Initiatives

- ***University as A Living Lab of the Future Plug Loads***
- ***Designing Testing Labs and Methodology for Individual Loads or a Group of Loads***
- ***Identifying Connected Loads as a Key Component to Delivering Integrated Solutions***
- ***Evaluating User Adaptation of Solutions***

Energy Efficiency Testing Lab : Bench Top Tests

ENERGY STAR

Consumer Electronics Association

IEC

Creating Connections. Powering Innov

dish NETWORK

ecova

DIRECTV

ECHOSTAR

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Energy Efficiency Testing Lab : SIM-Labs

SIM Living Room

SIM Office

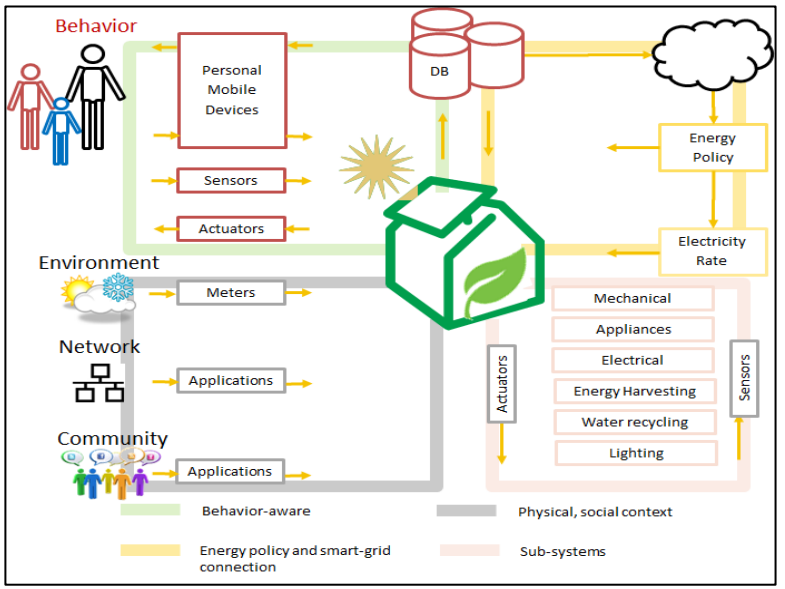
Purpose

To bridge the gap between bench-top tests and large scale pilot programs

Energy Efficiency Testing Lab : SIM-Home

Team Orange –Solar Decathlon 2015

- Behavior Adaptive Smart Home
- Designed to Imitate Billions of Living Organisms



Behavior Adaptive Smart home System (BASS)

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U.S. DEPARTMENT OF ENERGY

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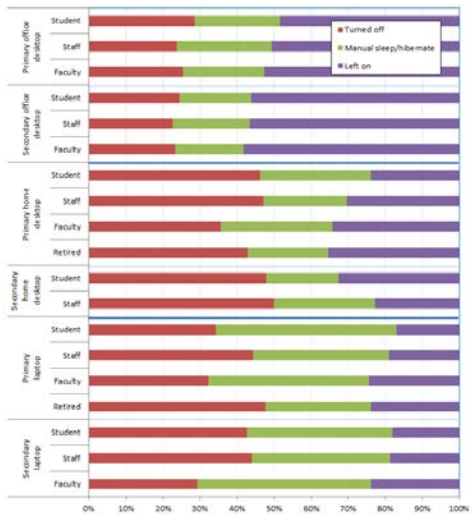
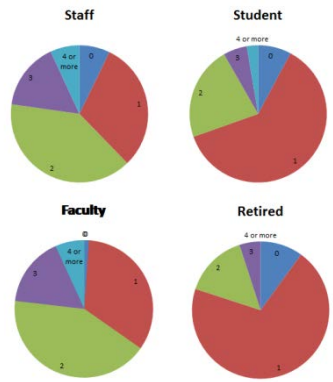
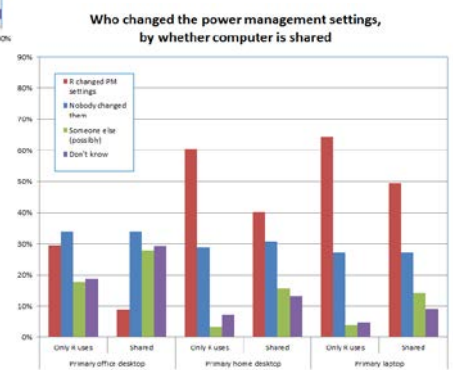
Energy Efficiency Solutions Field Evaluation: User Adaptation

Behavior Research: PC Power Management

- Target demographics
- Survey questions design
- Delivery instrument
- Data collection
- Analysis and report





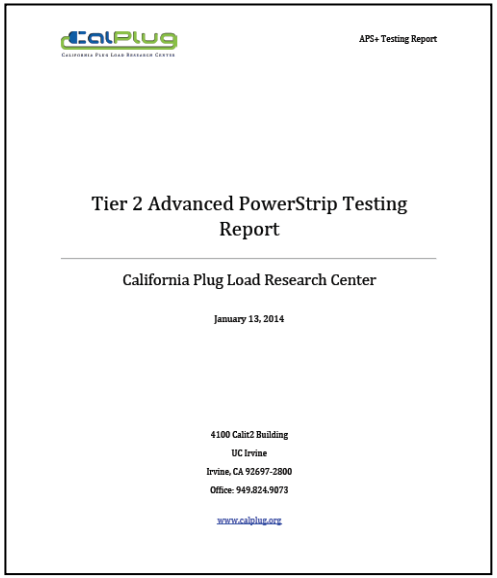


New ET Initiatives at CalPlug

- **SIMHome Project: to demonstrate and evaluate emerging technologies in a wholist, transparent view**
- **Plug Load 5 Year Roadmap: to define market and technology trends for top three products with high savings potential**
- **SIMLab category benchmark: inviting efficiency leaders of consumer electronics categories to participate**

CalPlug White Papers

- **CalPlug provides white paper reports to vendors in order to facilitate communications with utilities and clients**
- **CalPlug works on promoting product categories with strong savings potential and credible technical innovation**


APS+ Testing Report

Tier 2 Advanced PowerStrip Testing Report

California Plug Load Research Center

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We welcome opportunities for collaboration.

Thank you!