California Plug Load Research Center Workshop

The Ninth Semiannual Workshop on Energy Efficient Plug Loads

May 12, 2016

Dr. G. P. Li

California Plug Load Research Center

California Institute for Telecommunications and Information Technology

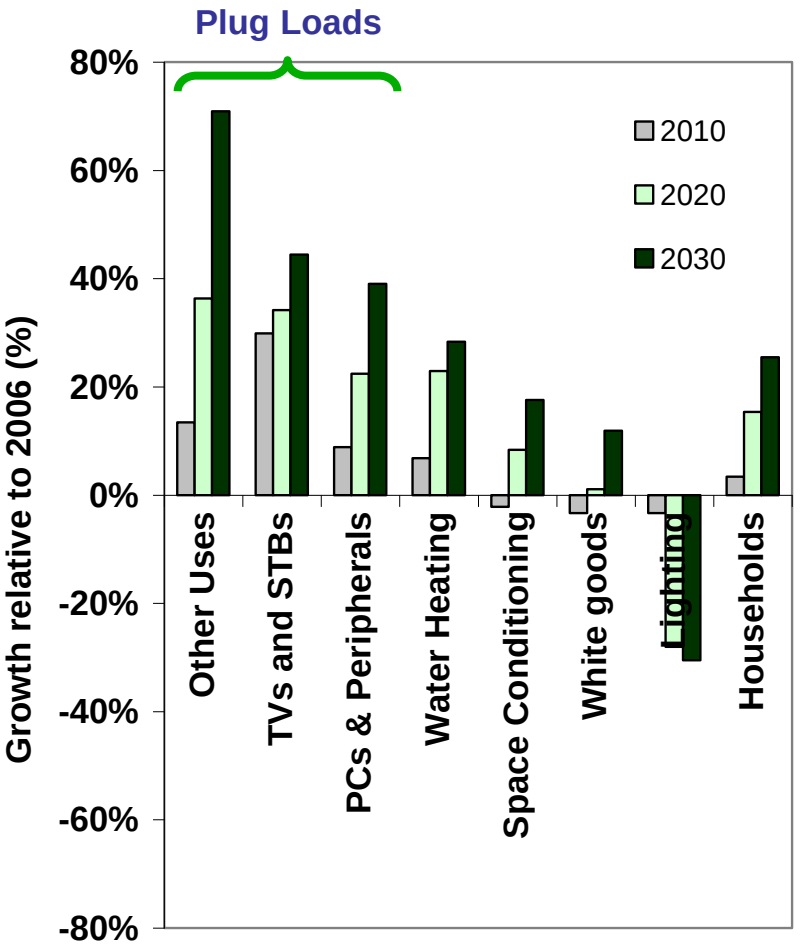
Creating Connections. Powering Innovation. Boosting Efficiency.

CalPlug

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 (basic and applied), demonstration, and education**
- **About engineering, incentives, codes and standards, and user behavior**



Residential and Commercial Plug Loads

Internet of Things

Personal Devices

Appliances

Medical + Healthcare

Robotics and Industry

1970 1980 1990 2000 2010 2020

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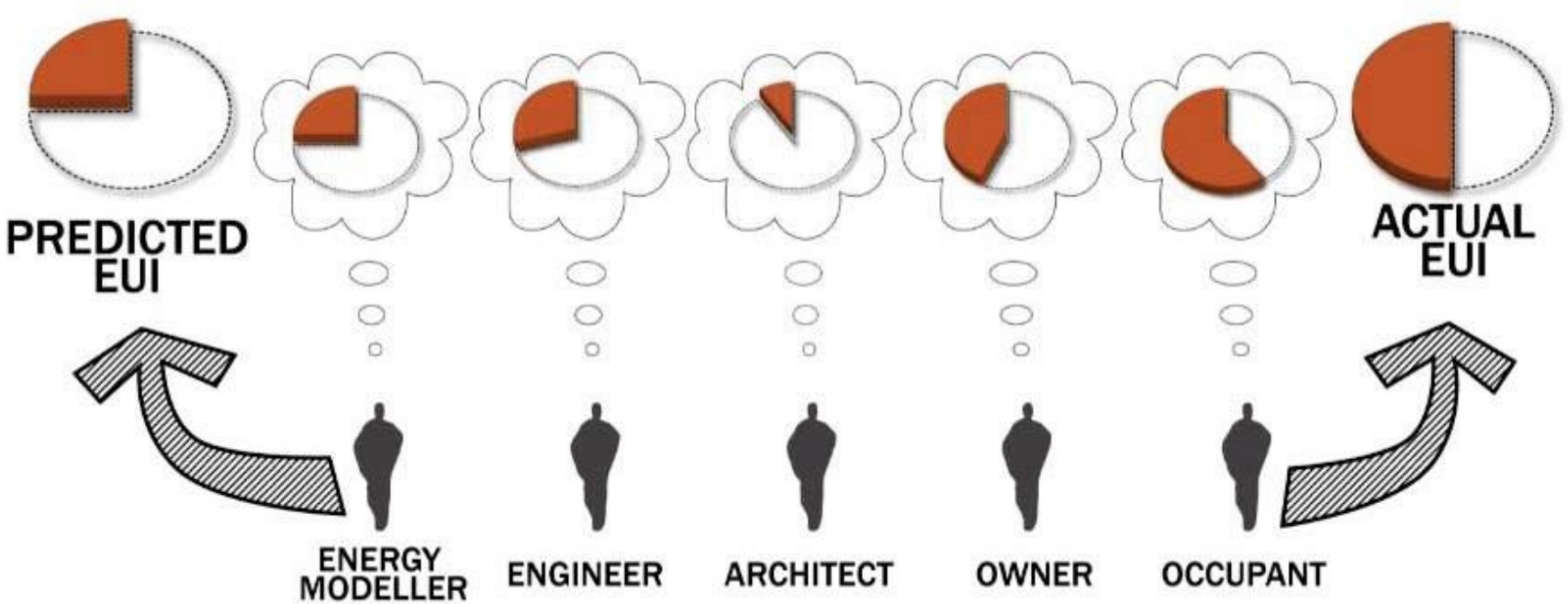
Integrating ZNE Building Design with Personal Energy Footprint Management

ENERGY USE

PREDICTED vs. ACTUAL



Clark Brockman, AIA LEED Fellow

Principal, SERA Architects

CalPlug Workshop

- **Goal:**

  To have an open forum for plug loads information exchange and to accelerate their energy efficiency by all means including innovation in hardware and software, codes and standards, and incentives and rebates

- **Anticipated outcome:**

  To create an energy efficiency working group for strong collaborations among players including research centers, manufacturers, service/content providers, utilities and government agencies

CalPlug Workshop

- **Morning sessions** will report progress on CalPlug projects including i). consumer-centric engagement for plug loads energy management, ii). opportunities and challenges for deep energy savings using connected devices, and iii). practical implementation consideration of smart energy efficiency solutions.
- **Afternoon sessions** will report opportunities and challenges in “Smart Energy” IoT solutions, and Energy efficiency champions leading Today and Tomorrow’s energy space in California.
- **Afternoon networking reception** including lab demos by students.

Acknowledgements

- **CTA and its member companies for support and guidance in plug load research and related projects**
- **SCE – support for plug loads projects**
- **CEC– EPIC project support**
- **CalPlug member companies and sponsors**
- **Speakers and panel members**
- **CalPlug & Calit2 staff and students**

CalPlug Faculty Research Accomplishments

- **Affiliate Faculty Research Paper Update**
- Optimal Allocation of Heterogeneous Smartgrid Traffic to Heterogeneous Networks
- Fast Anomaly Detection in SmartGrids via Sparse Approximation Theory
- Consumer in-the-Loop: Consumers as Part of Residential Smart Energy Systems
- Residential Demand Response Using Reinforcement Learning
- Scale Invariance and Long-Range Dependence in Smart Energy Grids
- A Model-based Design of Cyber-Physical Energy Systems
- GridMat: Matlab Toolbox for GridLAB-D to Analyse Grid Impact and Validate Residential Microgrid Level Energy Management Algorithms
- Home Energy Management as a Service over Networking Platforms
- RAMP: Impact of Rule Based Aggregator Business Model for Residential Microgrid of Prosumers Including Distributed Energy Resources
- Demo Abstract: Energy Management as a Service over Fog Computing Platform
- Battery Lifetime-Aware Automotive Climate Control for Electric Vehicles
- Design Space Exploration for the Profitability of a Rule Based Aggregator Business Model Within a Residential Microgrid
- Managing Residential-Level EV Charging Using Network-as-Automation Platform (NAP) Technology
- Modeling and Simulation of the EV Charging in a Residential Distribution Power Grid
- Intelligent and Collaborative Embedded Computing in Automation Engineering
- Battery-Aware Energy-Optimal Electric Vehicle Driving Management
- EDA for Cyber-Physical Energy Systems Design

We welcome opportunities for collaboration.

Thank you!