

# ADVANCED LIGHTING CONTROLS

California Energy Efficiency Strategic Plan  
Research and Technology Action Plan

Stakeholder Workshop

July 11, 2011

Sacramento, California



## A Case Study

**How an industry came together to identify challenges, organize, and collaborate to overcome barriers and begin making progress towards meeting California's energy efficiency and Zero Net Energy (ZNE) goals.**

- Opportunities
- Challenges
- Strategies and Solutions
- Accomplishments / Success Factors
- Transforming the Market
- What We've Learned



**CALIFORNIA**

**C**alifornia  
**A**dvanced  
**L**ighting  
**C**ontrols  
**T**raining  
**P**rogram

CA  
SCE

ADVANCED  
CLTC

LIGHTING  
IBEW

CONTROLS  
NECA

TRAINING  
CA COMMUNITY COLLEGES

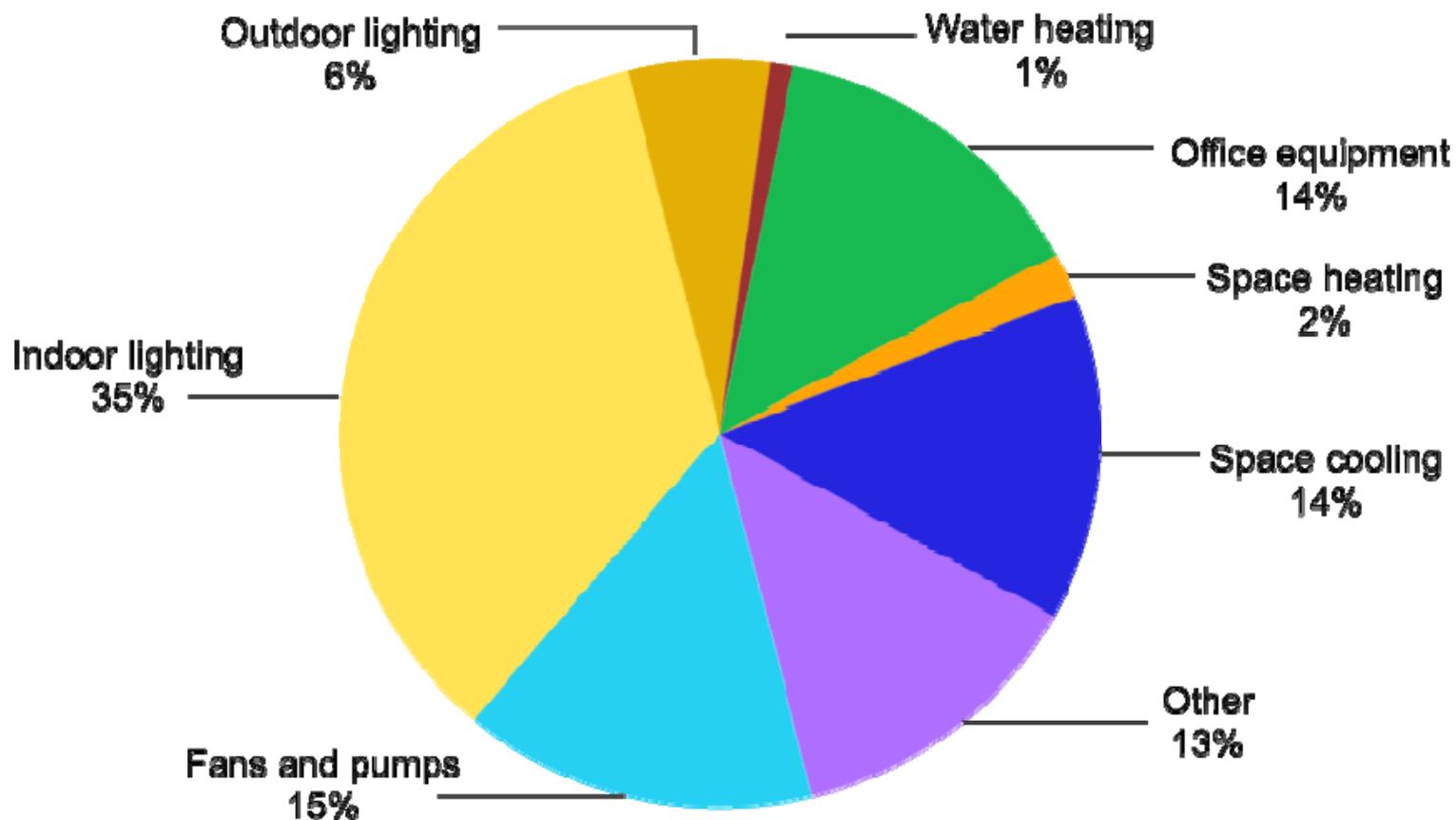
## Advanced Lighting Controls (ALC) OPPORTUNITIES

- Save Megawatts of Wasted Energy
- Make significant progress towards Zero Net Energy (ZNE) at reasonable cost
- Increase business activity for contractors
- Create jobs for skilled electricians
- Many more jobs via multiplier effect
- Boost U.S. manufacturing activity, revenue, and employment

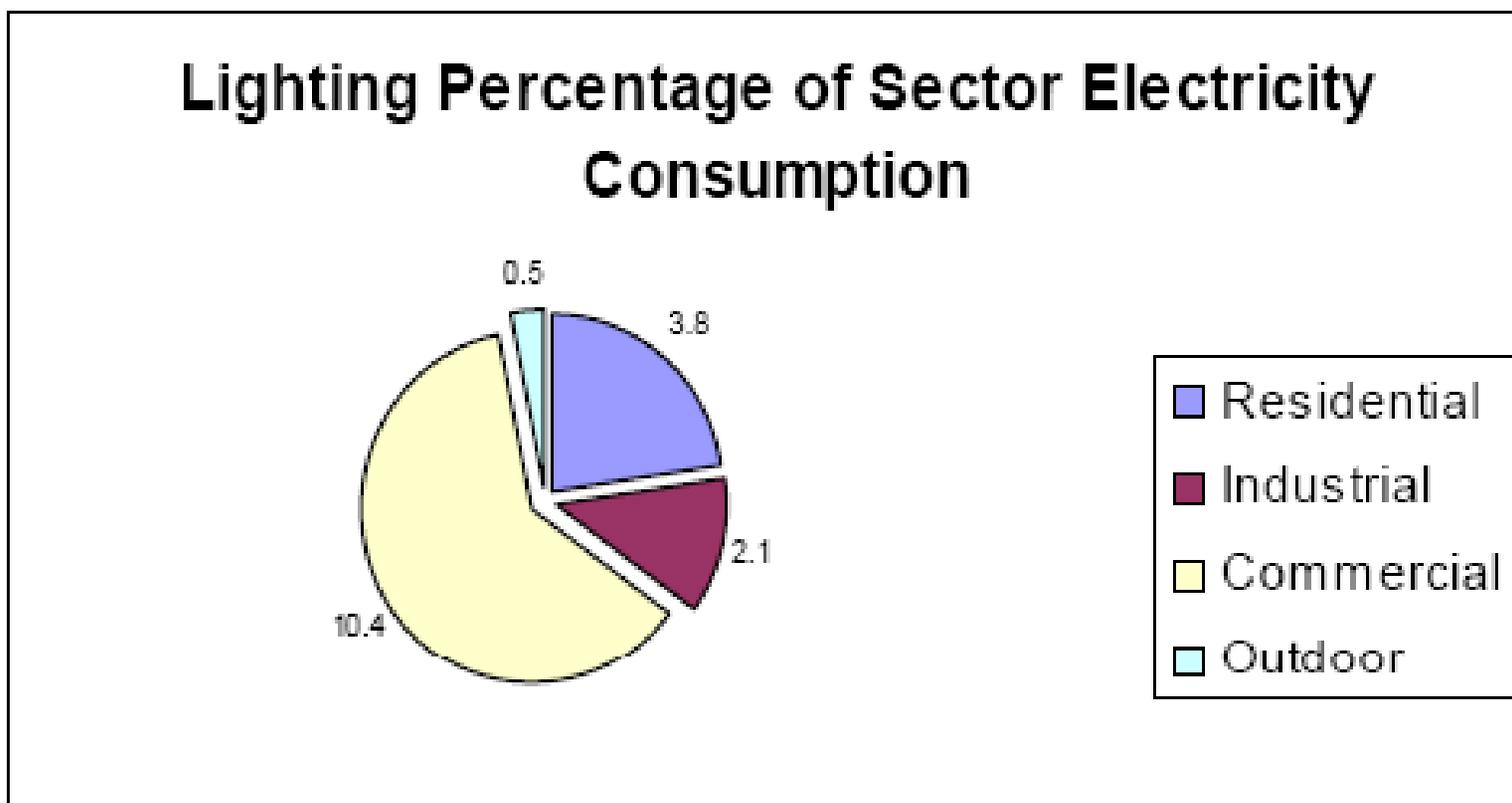


# Lighting: 33 - 41% of Existing Facility Electrical Energy

**Electrical Energy Costs in Non-residential Buildings**



# Approximately 3/4 of Lighting Load is Non-Residential



Source: SDG&E

## An Enormous Opportunity To Save Energy By Retrofitting

- Approximately 8.5 billion sq. feet of existing indoor non-residential facility space in California
- Lamp efficiency is improving
- **Controls are the biggest opportunity to save energy**
- Vast majority of facility space does not have comprehensive advanced lighting control systems
- **Retrofitting, with systems that work, is key**



# The Indoor Opportunity



Old Lighting System

1.1 watts per square foot



Advanced Lighting System

0.5 watts per square foot

➤ **55% Energy Load Reduction**



## And the Outdoor Opportunity



## Example: Outdoors

### Pre-Retrofit: 175W Metal Halide



- Average 205 W per fixture / 898 kWh per year per fixture
- 10,250 W for lot with 50 fixtures / **44,895 kWh per year**

## Post-Retrofit (Low Mode) Bi-level Smart, LED Fixtures



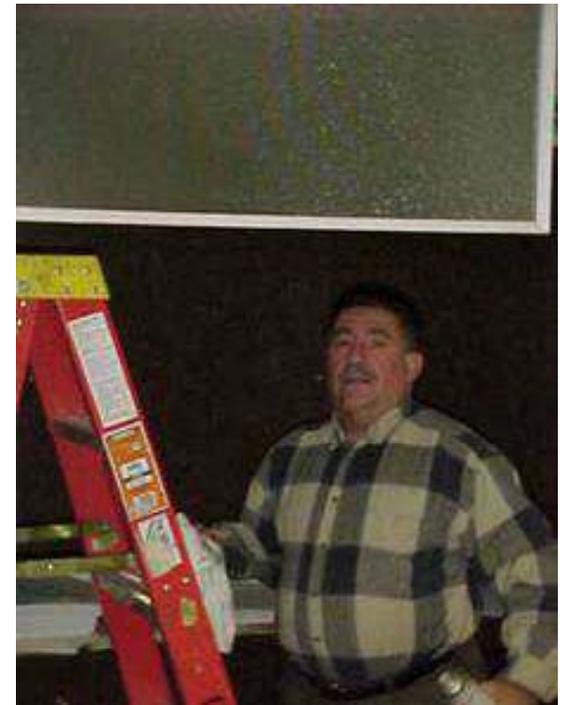
- Average 42 W per fixture / 182 kWh per year per fixture
- 2,075 W for a lot with 50 fixtures / **9,090 kWh per year (LM)**
- **55 – 70% Energy Savings (Depending on Traffic and Usage)**

## BARRIERS and CHALLENGES to Broad ALC Adoption

Sophisticated and complicated ALC technical systems haven't generally meet their considerable energy saving potential for many reasons, including:

### Lack of Contractor Experience

- Over-bid projects
- Unfamiliar technology
- Poor installations and performance
- Call-backs and customer complaints



## Systems Not Properly Installed



- Systems not commissioned or calibrated
- System overrides by customers because of problems
- Considered “bad” technology



## Installation Instructions That Don't Work

- Manufacturers instructions are overly complicated
  - Installation literature hard to read and follow
  - Little or no time to learn on the job



## Additional Challenges

- Providing contractors with the motivation and the tools to promote ALC via effective marketing and sales campaigns
- Obtaining utility and government incentives
- Educating, training and motivating the “Specifiers” (Architects, engineers, & designers)
- Adequate, available, affordable project financing
- Motivating property owners, and managers to invest in the technology



## CALCTP Has Created SOLUTIONS Via Industry Partnership

Criteria for **industry-wide** partnership

- Recognition of the challenge
- Shared goals
- High standards
- Enthusiasm and resources
- Inclusiveness and broad participation
- Long term commitment



## CALCTP Founding Members



- California Lighting Technology Center (CLTC) at U.C. Davis
- Southern California Edison
- The National Electrical Contractors Association (NECA) and the IBEW



## A Collaborative Effort



- CLTC / CEC
- SCE
- IBEW
- NECA
- PG&E
- SDG&E
- SMUD
- CA Community Colleges
- Manufacturers



## California Advanced Lighting Controls Training Program (CALCTP) Mission

- Established to provide business marketing and sales education, and technical training to select, install, commission, and maintain lighting systems for new and existing commercial, industrial and institutional facilities that are:
  - Energy-efficient and cost effective
  - Installed and function correctly
  - Improve the quality of the lighting for facility occupants



# Comprehensive Three Level Training, Education & Certification

Addresses Promotion, Design, Quality, and Performance Factors

- The **PROJECT** must be CALCTP certified
- Three certifications required
  1. Contractor top management: Business Dev.
  2. Middle management: ALC Systems
  3. Electricians: Technical



# 1. CALCTP Rigorous Technical Training and Certification

- For state certified general electricians
- Builds on existing state certification regulations
- U.C. Davis CLTC reviewed and updated technical curriculum
- Over 60 hours of training
- 12 hours pre-requisite reading
- 10 hours of lecture
- 40 hours of hands-on lab exercises and commissioning
- Demanding exams, third party oversight



## 2. CALCTP Business Development Seminars

- For licensed C-10 electrical contractors (the employers)
- Builds on existing state licensing regulations
- New construction is way down; retrofitting is the big countercyclical opportunity for contractors
- Full day class
  - Marketing
  - Sales
  - Public Relations
  - Project Development
  - Finance
- One element in utility recognized CALCTP contractor and project certification



### 3. CALCTP Systems Training for Middle Managers

- For C-10 contractor staff
- 12 hours of pre-requisite reading
- 10 hours of lecture
- First line of defense to review designs and specifications that may be inadequate
- Second Element of training required for contractor certification



## The Critical Role of Certification

- Standardizes entry level qualifications
- Based on secured exams
- Assures technical competence
- Ongoing assured competence through continuing education requirement
- Empowers consumers to differentiate contractors based on credentials recognized by utilities
- Accelerates adoption and market transformation



## Plus Sales Training

- Not part of certification requirement
- Funded by Tom Steyer's TomKat Foundation
- 50 hours of immersion training to sell sustainable energy projects
- For unemployed or underemployed sales professionals
- Sacramento, Los Angeles, Alameda County, Orange County, San Jose, San Diego



## Statewide Partnership Reflected in CALCTP Training Coverage

- Training held at 6 California Community College Advanced Transportation Technology (ATTE) Campuses
- Also at 21 California Electrical Training Centers
- Supported by 9 California WIB Partners
- Open to all non-union and union state certified general electricians



## **CALCTP is Recognized and Funded By**

- U.S. Department of Labor
- State of California Employment Training Panel
- Investor-owned utilities (IOUs)
- California State Labor Management Cooperation Committee (NECA - IBEW)
- California Energy Commission Clean Energy Workforce Training Program (CEWTP)
- TomKat Charitable Foundation (Sales Training)



## Training, Education & Certification of Contractors and Electricians

- Over 1,000 electricians trained & certified
- More than 150 contractors have completed at least one of the two requirements
- CALCTP certified contractors and electricians have completed ALC projects around California with very positive performance, and customer satisfaction outcomes



## Resulting Performance Begins Transformation of Market

- ✓ **Systems are installed correctly the first time**
  - ❑ Technology & controls strategy understood
  - ❑ Inadequate designs/specs rejected
  - ❑ Able to correct component issues on site
  - ❑ Able to commission system and train users
- ✓ **Utility incentive program under development**
  - ❑ Standard custom incentive for controls, Considering a kicker for those installed in CALCTP certified projects



## Other Advantages

- Building emerging technology training on foundation of existing skilled workers
  - **Training is minimal and much lower cost**
- Knowledgeable contractors promote and sell advanced control systems
  - Reach many businesses (and some homes) that have historically not participated in utility incentive programs
- Increased economic activity, in addition to job opportunities for electricians



# The Importance of Marketing

## CALCTP Brochure for Contractors and Electricians



# CONTROLS

**CALCOTP** California Advanced Lighting  
Controls Training Program

Connect to *Greater Opportunities* with

**IMPORTANT TRAINING  
AND CERTIFICATION**  
in Advanced  
Lighting Controls



## Get **CALCTP** Certified. Get a Competitive **Edge**.

*"PDE is a CALCTP certified contractor. The certification and resources available through CALCTP give PDE an additional level of credibility when we are educating our clients on energy efficiency projects. PDE's CALCTP certification prepares our organization to capture additional "green" projects."*

—Shelley Keltner, Chief Executive Officer,  
**PDE Total Energy Solutions**

When properly installed, advanced lighting controls can reduce lighting energy use by 40-60 percent—improving energy efficiency and saving money. That's why demand is growing for contractors and electricians with the *experience, expertise, and confidence* to complete advanced lighting controls projects in commercial buildings.

Be ready to meet the demand by registering for the California Advanced Lighting Controls Training Program (CALCTP).

CALCTP educates and certifies licensed C-10 electrical contractors and trains state-certified general electricians in the proper design, installation, and commissioning of advanced lighting control systems.

**Nominal cost**—Some California training is supported by federal and state grants

**Convenient locations**—Offered at nearly 30 International Brotherhood of Electrical Workers and National Electrical Contractors Association Joint Apprenticeship and Training Committee centers and Community College Advanced Transportation Technology Education campuses throughout California

**Flexible scheduling**—Courses you want, when you want them

# CONTROLS

## CALCTP Specs Are Here and So Are the Opportunities

More municipal, federal, and private projects are calling for CALCTP job specs. CALCTP certification shows you have the know-how to compete for—and win—these projects.

Become CALCTP certified and be eligible to install the energy efficiency measures that customers want.

## Three Steps to Becoming CALCTP Certified

### **Top Management: CALCTP Business Development Seminars**

**Completion**—One-day, 8-hour session for owners and top-level executives. Focuses on marketing, sales, finance, and creating an advanced lighting controls brand for your company.

### **Mid Management: CALCTP Systems Course Completion and Certification**

—10-hour course for contractor staff who do not hold a current state certification. Systems Course is needed for contractor certification.

### **Certified Electricians: CALCTP Technical Course Completion and Certification**

—50-hour course for state-certified general electricians and all supervisory staff who hold a current certification. Combines classroom lecture with interactive and hands-on components, including group discussions, device demonstrations, calculation exercises, and laboratory installations.

## Make the Connection to a Successful Future!

Learn more about CALCTP courses, locations, and schedules at [www.calctp.org](http://www.calctp.org).

*"CALCTP has taught me how to properly install advanced lighting controls. With this knowledge, M.B. Herzog Electric is more confident bidding and winning advanced lighting controls jobs. Certification was critical to my company winning and installing a Lutron QS system at Brookfield Properties Landmark Square building."*

—Mike Goodwin, Project Manager,  
M.B. Herzog Electric



[www.calctp.org](http://www.calctp.org)



## Increase Your Visibility, Boost Your Success

All CALCTP certified contractors and electricians are featured in an online directory that is the go-to source for advanced lighting controls referrals.

## CALCTP Partners

Southern California Edison

University of California, Davis—California Lighting Technology Center

California State Labor Management Cooperation Committee for the International Brotherhood of Electrical Workers and the National Electrical Contractors Association

National Electrical Manufacturers Association

California Energy Commission

San Diego Gas and Electric

Sacramento Municipal Utility District

Pacific Gas and Electric

California Community College System

## CALCTP Funders

U.S. Department of Labor

State of California Employment Training Panel

Investor-Owned Utilities

California State Labor Management Cooperation Committee

TomKat Charitable Foundation

California Energy Commission Clean Energy Workforce Training Program

CALCTP received a \$5 million grant awarded under the American Recovery and Reinvestment Act of 2009: Energy Training and Partnership Grants, as implemented by the U.S. Department of Labor's Employment and Training Administration. One hundred percent of the grant funds are used to support this program.

CALCTP is an equal opportunity program. Auxiliary aids and services are available upon request to individuals with disabilities.

## The Importance of Marketing

**CALCTP Brochure for  
Prospects, Customers  
and Specifiers**



# CONTROLS



## Maximizing **Energy Efficiency**, **Sustainability**, and **Return** on Investment

CALCTP—the California Advanced Lighting Controls Training Program—helps property owners, managers, architects, engineers, designers, and builders save energy and money by optimizing the operation and efficiency of advanced lighting controls equipment and systems. CALCTP certification is the key to realizing the highest return on your sustainable energy investment.



### What Is CALCTP?

CALCTP is a statewide nonprofit, public/private partnership initiative to increase the effectiveness, efficiency, convenience, and use of lighting controls in commercial, industrial, and institutional facilities. CALCTP educates, trains, and certifies C-10 licensed electrical contractors and state-certified general electricians in the proper installation, calibration, programming, commissioning, and maintenance of advanced lighting controls systems. Advanced lighting controls systems include devices such as dimmers, occupancy sensors, photo-sensors, electronic ballasts, and high-efficiency lamps and fixtures, as well as communication-based control equipment.

### Why Do We Need CALCTP?

Advanced lighting controls systems are sophisticated and complex.

Unfortunately, in the past, many advanced lighting controls were not correctly installed and did not achieve the expected energy savings. CALCTP is correcting that weakness with rigorous comprehensive training and certification that allows you to identify the contractors and electricians who will do the work properly and deliver an advanced lighting controls system that will perform optimally.

California currently has 9 billion square feet of commercial, industrial, and institutional space. Advanced lighting controls present an enormous opportunity to improve energy efficiency and save billions of dollars in energy costs. Your facility could benefit substantially from an advanced lighting controls system. Look for CALCTP certified contractors and electricians. They have the training and expertise to provide you with an advanced lighting controls system that produces value—the functionality, convenience, and return on investment you deserve.

### Who Is CALCTP?

CALCTP is a nonprofit collaborative effort of the following organizations:

- University of California-Davis  
California Lighting Technology Center
- Southern California Edison
- California Energy Commission
- California Community College System
- San Diego Gas and Electric
- 14 Lighting and Control Manufacturers
- California State Labor Management Cooperation Committee
- Pacific Gas and Electric
- Sacramento Municipal Utility District
- National Electrical Manufacturers Association

CALCTP is funded by:

- U.S. Department of Labor
- State of California Employment Training Panel
- Investor-Owned Utilities
- California State Labor Management Cooperation Committee
- TomKat Charitable Foundation
- California Energy Commission Clean Energy Workforce Training Program

### How Is CALCTP Addressing the Challenge and Potential of Advanced Lighting Controls?

At the program's core is a rigorous, comprehensive course developed by the University of California-Davis' California Lighting Technology Center. The training regimen is composed of 10 hours of prerequisite study material, followed by 10 hours of lecture, plus 40 hours of hands-on lab work. Each lecture is followed by a lab segment where participants apply what they have learned by installing the devices on electrical lab boards, under the supervision of CALCTP certified instructors. To be certified, all participants must pass every lab practicum, and a demanding written exam.

CALCTP partner utilities, which serve more than 90 percent of the California market, strongly support the use of CALCTP certified contractors and electricians on all advanced lighting controls projects.

CALCTP received a \$5 million grant awarded under the American Recovery and Reinvestment Act of 2009: Energy Training and Partnership Grants, as implemented by the U.S. Department of Labor's Employment and Training Administration. One hundred percent of the grant funds are used to support this program.

More information is available  
on the CALCTP website at:

[www.calctp.org](http://www.calctp.org)

# The Importance of Marketing

The CALCTP  
Website

[www.CALCTP.org](http://www.CALCTP.org)



Username or e-mail:

Password:

Remember me

### CALCTP SAVES ENERGY

Commercial buildings can save up to 40% in energy savings by simply turning lights off in unoccupied offices, conference rooms, and restrooms during business hours.

The expansion of advanced lighting controls is essential for the development of a highly reliable and efficient electric smart grid system.



### ABOUT THE PROGRAM

The California Advanced Lighting Controls Training Program (CALCTP) is a statewide initiative aimed at increasing the use of lighting controls in commercial buildings and industrial facilities.

Through proper installation, advanced lighting controls improve energy efficiency in commercial facilities and save significant dollars. CALCTP will educate, train and certify licensed electrical contractors, and state certified general electricians in the proper design, installation and commissioning of advanced lighting control systems.



### FIND A CALCTP-CERTIFIED CONTRACTOR

A CALCTP-Certified contractor is:

- A state licensed C-10 electrical contractor.
- Successfully completed the CALCTP Business Development Training program.
- Successfully completed the CALCTP Technical Installation program.
- Employs CALCTP-certified general electricians.
- Proficient in Advanced Lighting Controls.

[Click here to find one in your area](#)

### BECOME A CALCTP-CERTIFIED ELECTRICIAN

CALCTP partner utilities, which encompasses over 90% of the California market, will require CALCTP-certified contractors and CALCTP-certified general electricians for installation.

[Click here for more information](#)

### FAST FACTS

LCA projects an investment in advanced lighting controls pays for itself in as little as



## What We've Learned

- Draw industry stakeholder leaders together to review the technologies, the market, the opportunities, and the challenges
- Keep meeting, reviewing and brainstorming until an effective action plan consensus is established
- Collaborate, cooperate and commit to a program that will overcome the barriers to adoption
- Be prepared for, and committed to, a consistent, multifaceted, long term campaign



## Conclusions

- Technologies that work technically are just the beginning
- Understand the construction/retrofit industry technical obstacles and what enables contractors and trades people (the “Trade” category)
- Create comprehensive high standards certified training/education to address those issues
- Keep costs down by utilizing skilled trades people who require minimal training
- Recognize, recommend, and then require the technical certification



## Conclusions

- Understand the construction/retrofit industry business obstacles and what motivates contractors and trades people to adopt and promote the technology
- Provide business and work incentives that are based on skill certification (not just equipment) to drive the above
- Train, educate and market to the “Specifiers” (architects, designers & engineers)
- Understand the adoption motivation of facility owners, operators and managers (the “Decision makers”)



## Conclusions

- Employ financial incentives to drive trade and decision maker categories
- Create consistent, long term, attractive, broadly available financing programs
- Market the above and sell to decision makers
- Influence public/consumer opinion with public relations and marketing
- Each step in this process must be funded adequately, consistently and for the long term because market transformation absolutely requires it



## Conclusions

- All the above creates the proof of concept platform, and takes the first important steps in the process of market transformation. Also prepares the market for mass acceptance of energy action measures
- **Regulatory and legislative REQUIREMENTS must follow and are ESSENTIAL to gain the comprehensive adoption rates necessary to complete the process of market transformation and achieve our ZNE goals.**

(What would have been the adoption rate of insulation, or double pane windows, without building code requirements?)

## Conclusions

- This blueprint is particularly applicable to trade driven construction/retrofit market segments (HVAC, building envelope, plumbing, etc.)
- The Plug-in Electric Vehicle Industry has adopted the CALCTP format for infrastructure training and certification. The industry-wide collaborative program is the ELECTRIC VEHICLE INFRASTRUCTURE TRAINING PROGRAM (EVITP)



## Progress at Risk

Federal and state funding of the California Advanced Lighting Controls Training Program (CALCTP) expires in March/April, 2012.

*Thank You.*