



University of California, Davis

**CLTC**

CALIFORNIA LIGHTING TECHNOLOGY CENTER

# **PIER Lighting Technology Candidates for 2008 Title 24**

**CEC Commercial Sector  
Workshop Oct. 25, 2005**

**Don Aumann, PE  
Director of Programs, CLTC**

**RESEARCH • INNOVATION • PARTNERSHIP**

1554 DREW AVE | DAVIS, CALIFORNIA 95616 | [CLTC.UCDAVIS.EDU](http://CLTC.UCDAVIS.EDU) | TEL: 530.757.3444 | FAX: 530.757.3443

# Overview

- PIER Buildings Program has supported development of numerous technologies
- Today—summarize capabilities of the best Title 24 candidate lighting technologies
- Full “code analysis” not started

# Integrated Classroom Lighting System (ICLS)

## *Overview*

- High-performance lighting system  
... saves energy & demand
- High-quality direct-indirect light  
... happy users



# Integrated Classroom Lighting System (ICLS)

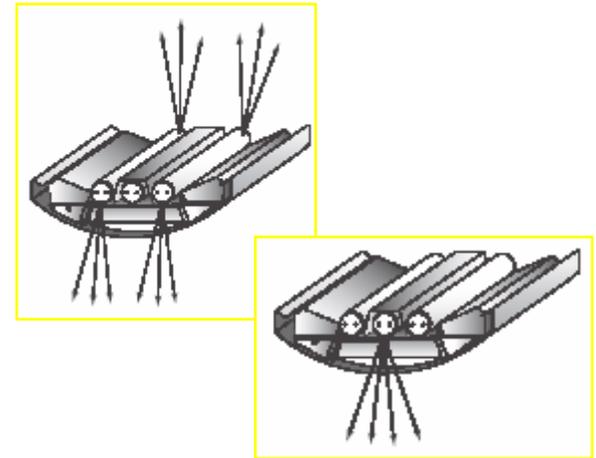
## *Overview*

- Commercially available
  - ... as a system, currently from one supplier
  - ... as components, from “anybody”
- No new technology
  - ... “state of the shelf”
- Publicly available product specification

# ICLS

## *Key Features*

- Direct/indirect lighting
- “White” board lighting  
... functions like task lighting
- High-efficiency components  
... “super” T8 lamps  
... premium electronic ballasts  
... 96% reflectivity paint



# ICLS

## *Key Features*

- “A/V” mode for low-ambient use  
... teacher control center
- Integrated occupancy controls
- 1-hour “quiet time” over-ride for tests



# ICLS

## *Key Features & Benefits*

- ~0.82–0.92 W/sq-ft connected load
- Additional savings from occupancy sensors
- ~\$2.71/sq-ft for basic system  
...vs. ~\$2.86/sq-ft for standard troffers
- High-quality lighting  
... very happy users

# ICLS

## *Code Opportunity*

- Reduce allowable classroom lighting power density  
... 1.0 W/sq-ft clearly attainable  
(w/o controls credits)
- Require occupancy sensors

# Bi-level Stairwell Fixtures

## *Overview*

- Low light level during unoccupied periods
- Full light level during occupied periods
- Meets code requirements



# Bi-level Stairwell Fixtures

## *Overview*

- Commercially available from three manufacturers
  - ... LaMar, Daybrite, Cooper
- LaMar details
  - ... Relatively new product... released ~2003
  - ... Cost ~\$150

# Bi-level Stairwell Fixtures

## *Key Features*

- Integrated ultrasonic occupancy sensor
- Fixture options: 1 or 2 lamp; 120V or 277V; 2- and 4-foot lamps
- Ballast options: 5, 10, or 33% of full light level
- Meets 1 fc code (local and national)
- Meets new ANSI code (10 fc)

# Bi-level Stairwell Fixtures

## *Key Benefits*

- Provides light only when needed
- Stairwells are often unoccupied
  - ... 11-25% occupancy in 3 CA demos
  - ... 32% occupancy at UC Berkeley demo
- ~40-60+% energy savings in CA demos
- 2 to 8 year simple payback (new bldgs.)

# Bi-level Stairwell Fixtures

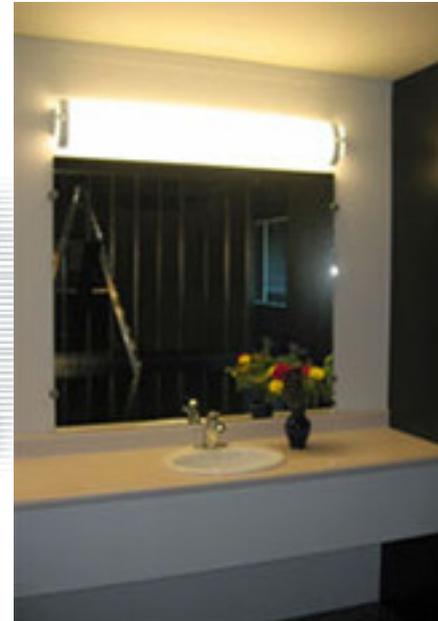
## *Code Opportunity*

- Require high-low lighting with occupancy sensors in stairwells

# “Smart” Bathroom Lighting

## *Overview*

- Integrated LED nightlight
- Integrated vacancy sensor
- Two versions
  - ...wall switch or full fixture
- Great application in hotels, assisted living, dorms



# “Smart” Bathroom Lighting

## *Overview*

- Wall-switch version available from two manufacturers; one since 2002 (~\$25-35 ea)
- Full fixture
  - ... pre-production demos @ \$175 ea; production @ ~\$135 or less
  - ... other, lower-cost manufacturers in discussion



# “Smart” Bathroom Lighting

## *Key Features & Benefits*

- Integrated 1-Watt LED nightlight doesn't “walk away”
- Integrated occupancy sensor eases design and installation
- 1-hour off-time ensures satisfied occupants
- Integrated battery backup = improved safety

# “Smart” Bathroom Lighting

## *Key Features & Benefits*

- ~50% energy savings
- 1-hour off-time captures most savings & ensures happy occupants
- Integrated design = low-cost installation
- LED night light
  - ... doesn’t “walk away”
  - ... improves night lighting compared to operating bathroom light all night

# “Smart” Bathroom Lighting

## *Code Opportunity*

- Require occupancy sensors in bathrooms for hotels, dorms, assisted living
- Consider requiring integrated LED nightlights

# Hybrid LED Exterior Fixtures

## *Overview*

- 5-Watt LED operates all night
- High light level triggered with occupancy
- Wall-mount for buildings
- Post-mount for walkways



# Hybrid LED Exterior Fixtures

## *Overview*

- Wall- & post-mount commercially available  
... “High-cost” version (~\$200)  
from one supplier now  
... “Low-cost” version (~\$85)  
from another supplier in early 2006
- Publicly available product specification

# Hybrid LED Exterior Fixtures

## *Overview*

- Universal “mounting plate” in development  
... possible in 2006
- “Security” version in discussion
- Other manufacturers interested too



# Hybrid LED Exterior Fixtures

## *Key Features*

- Very low-wattage all night  
... beats CFLs
- “Full” lighting when needed  
... built-in security indicates occupancy
- LED life ~10-20+ years  
... beats CFLs
- Integrated occupancy controls

# Hybrid LED Exterior Fixtures

## *Key Benefits*

Higher energy savings than operating CFLs all night

## *Code Opportunity*

Stimulate use of high-low exterior lighting

# Summary

- All products commercially available ... or will be within 6 months
- Most products have multiple manufacturers or generic, non-proprietary specifications ... more manufacturers “coming soon”