Are the Lights Really ON? Leveraging a Cost Effective Approach to Estimate Lighting Usage in Nonresidential Buildings

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Lighting Load Shapes
How are Lighting Usage Profiles Created?

- Lighting loggers
  - Expensive equipment
  - Extensive on-site verification
    - Installation *and* extraction of monitoring equipment
    - Extended period of monitoring time

- Alternatives….?
Lighting Load Shapes

Average Weekly HOU for Office Area in Small Offices (Linears)

- How To Best Represent *Actual* Monitored Hours?
Background
Using Logger Data, Business Hours and Customer Self-Reports to Create Lighting Load Shapes

- Method first presented at the 2011 IEPEC conference
  - Based on data collected from 2006-2008 CPUC Small Commercial Impact Evaluation
    - >1,200 on-site visits
      - Business hours collected
      - Self-reported hours of lighting usage collected (by activity area)
  - Logger installation
    - Over 7,000 loggers installed on rebated CFL and Linear measures
Background
How are these results different?

- More Data
  - 2010-12 CPUC Nonresidential Downstream Lighting Impact Evaluation
    - > 800 additional on-site visits
    - > 4,000 additional logger installations
    - Additional building types and activity areas monitored
    - Includes LED lamps
Development

Application of Adjustment Factor and Business Usage Rates

Open Shoulder Rate 12.6%
Closed Rate 5%
Closed Shoulder Rate 23.6%

(Self-Report) x (Adjustment Factor) (.69) x (.76)
Development *At the Site Level First*

Application of Adjustment Factor and Business Usage Rates

Open Shoulder Rate 12.6%
Closed Rate 5%
Closed Shoulder Rate 23.6%

(Self-Report) x (Adjustment Factor)
(.69) x (.76)
Development *Aggregated to the Sample Level*

Application of Adjustment Factor and Business Usage Rates

![Graph showing percent on over time for Small Office - Office Areas]
Results

Aggregated to the Building Type Level (All Activity Areas)

Linear Small Office

CFL/LED Small Office

Linear Small Retail

CFL/LED Small Retail
Application of Results

- On-site verification
  - Collect detailed business hours
    - Includes seasonal operations and holiday hours
  - Collect detailed customer self-reported usage
    - Each activity area within the facility
  - Create hourly bins
    - Open, Closed, Open/Closed Shoulder
  - Apply adjustments and business hours
    - Site-activity area level \textit{first}
    - Aggregate to the building type level
Questions?