

# STATEWIDE EVALUATION TEAM

## 2013 TRM UPDATE – C&I MEASURES

*Pennsylvania Public Utility Commission  
Stakeholder Meeting  
August 07, 2012*

# MEETING AGENDA

1. TRM Update Methodology
2. High Priority Measures
3. Minor Update Measures

# TRM UPDATE METHODOLOGY

# UPDATE PRIORITIES

- Focus resources on high priority measures
  - Highest savings based on MPS
  - Highest savings based on results through PY2
  - Qualitative feedback from EDCs
- Update sources
  - Collaborative review with EDCs
  - Primary data, PA-specific, contemporary
  - Literature review, adjoining states

# C&I HIGH PRIORITY MEASURES

# C&I HIGH PRIORITY MEASURES

- C&I Lighting (Section 3.2)
- C&I HVAC (Section 3.6 and 3.18)
- C&I Motors and VFDs (Section 3.3 and Section 3.4)
- Office Equipment Network Power Management Systems (Section 3.22)

# C&I LIGHTING

- Key Updates
  - Update lighting HOU and CF values
  - Update list of building types
  - Update control technologies and savings factors
  - Account for EISA 2007 code changes for linear fluorescent lamps
  - Update temperature ranges for space types for IF values
  - New Construction calculator

# C&I LIGHTING

- Update lighting HOU and CF values
  - Some of the current HOU and CF values use 2009 NJ TRM, which does not provide exact source information
  - Performed a cross-sectional study, reviewing previous evaluations, metering studies and TRMs
  - Data collected through PA evaluations not sufficient to update current TRM assumptions

# C&I LIGHTING

- Update HOU and CF values using the Mid-Atlantic TRM as the primary source
- Where building types not listed in the Mid-Atlantic TRM:
  - HOU values not updated. (Sources remained the same as 2012 TRM (DEER 2011, 2012 IL TRM, 2011 OH TRM, 2010 WI deemed savings manual and 2012 CT TRM)
  - CF values updated with average CF value from Mid-Atlantic TRM

# C&I LIGHTING

## Summary of Lighting HOU and CF values for 2013 PA TRM

Building Type	Updated HOU 2013 PA TRM	Updated CF 2013 PA TRM
Auto Related	4,056	0.62*
Daycare	2,590	0.62*
Dusk-to-Dawn / Exterior Lighting	3,833	0
Education – School	1,632	0.31
Education – College/University	2,348	0.76
Grocery	4,660	0.87
Health/Medical – Clinic	3,213	0.73
Hospitals	5,182	0.8
Industrial Manufacturing – 1 Shift	2,857	0.57
Industrial Manufacturing – 2 Shift	4,730	0.57
Industrial Manufacturing – 3 Shift	6,631	0.57
Libraries	2,566	0.62*
Lodging – Guest Rooms	914	0.09
Lodging – Common Spaces	7,884	0.9
Multi-Family (Common Areas) - High-rise & Low-rise	5,950	0.62*
Nursing Home	4,160	0.62*
Office	2,567	0.61
Parking Garages	6,552	0.62*
Public Order and Safety	5,366	0.62*
Public Assembly (one shift)	2,610	0.62*
Public Services (nonfood)	3,425	0.62*
Restaurant	3,613	0.65
Retail	2,829	0.73
Religious Worship/Church	1,810	0.62*
Warehouse	2,316	0.54
Storage Conditioned/Unconditioned	3,420	0.62*
Other	Varies	Varies

0.62 represents the average of all coincidence factors by building type listed in the Mid-Atlantic TRM

# C&I LIGHTING

- Update list of building types
  - Balance of specificity and simplicity
    - Specificity – Building types are granular enough to capture HOU and CF variations from one building type to another
    - Simplicity – Reduce number of building types for ease of implementation & customer usability
  - Add 3 new building types:
    - Public assembly
    - Public services
    - Multi-family

# C&I LIGHTING

- Add new control technologies and savings factors
  - Current control technologies and savings factors taken from the NJ TRM
  - Propose five control strategies with updated SVG factors
  - Based on a study “A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings,” conducted by Lawrence Berkeley National Laboratory (LBNL) in September 2011.

# C&I LIGHTING

## List of Control Technologies and Savings Factors

### LBNL Study, 2011

### PA TRM

Strategy	Definition	Technology	Savings %
Occupancy	Adjusting light levels according to the presence of occupants	Occupancy Sensors	24%
		Time Clocks	24%
		Energy Management System	24%
Daylighting	Adjusting light levels automatically in response to the presence of natural light	Photosensors	28%
		Time Clocks	28%
Personal Tuning	Adjusting individual light levels by occupants according to their personal preferences; applies, for example, to private offices, workstation-specific lighting in open-plan offices, and classrooms	Dimmers	31%
		Wireless on-off switches	31%
		Bi-level switches	31%
		Computer based controls	31%
		Pre-set scene selection	31%
Institutional Tuning	Adjustment of light levels through commissioning and technology to meet location specific needs or building policies; provision of switches or controls	Dimmable ballasts	36%
		On-off or dimmer switches for non-personal tuning	36%
Multiple Types	Includes combination of any of the types described above. Occupancy and personal tuning, daylighting and occupancy are most common.	Occupancy and personal tuning/ daylighting and occupancy	38%

Control Type	SVG
Light Switch	0%
Occupancy Sensor	30%
Controlled Hi-Low	30%
Fluorescent Control	30%
Controlled HID	30%
Daylight Dimmer System	50%

This study represents the most recent comprehensive research regarding latest control types and savings

# C&I LIGHTING

- EISA 2007 code changes
  - Requires higher efficiency standards for linear fluorescent bulbs
  - SWE proposes maintaining existing baseline conditions and updating baselines during future updates
  - Based on review of other jurisdictions, measure life, stockpiling
  - EDCs to collect robust sales data to assess market penetration of more efficient lighting and determine the appropriate timing to adjust the baseline

# C&I LIGHTING

- Update temperature ranges for IF values
  - TRM lists interactive factors (IF) values for different space types defined by temperature ranges
  - Temperature ranges adjusted to fill in gaps
    - Cooled space: (>60 °F – 80 °F)
    - High-temperature refrigerated spaces:(>40 °F – 60 °F)

# C&I LIGHTING

- New Construction calculator
  - Calculator to simplify calculations for implementers
  - Functionality to address code baselines and options in ASHRAE 90.1
  - Similar to Appendix C for retrofit lighting projects
  - Optional for EDC implementers

# C&I HVAC

- Update HVAC EFLH values
  - EFLH values in 2012 PA TRM calculated by adjusting EFLH values from the CT TRM with a scaling methodology
  - SWE reviewed assumptions from other jurisdictions, but focused efforts on neighboring states (using Mid-Atlantic TRM and DE TRM) in order to minimize differences in weather conditions
  - Secondary information does not provide any substantial improvement over the current methodology
  - Propose use the existing EFLH values in 2012 PA TRM until more accurate information is available
  - Run eQUEST models for 2014 TRM updates to provide state-specific values that do not need degree-day scaling.

# C&I MOTORS AND VFDs

- Update ESF/DSF values for VFDs and Motor/VFD operating hours
  - Propose using existing ESF and DSF values for VFDs
  - Propose updating annual run hours for motors/VFDs with 2012 Connecticut Program Savings Documentation
  - Recommend revising ESF, DSF and run hour values for motor and VFD measures using a modeling approach

# OFFICE EQUIPMENT NETWORK POWER MANAGEMENT SYSTEMS

- Update deemed savings
  - Current deemed savings are 148 kWh/unit and 0.020 kW/unit, based on a project in Duquesne's service territory and SCE study respectively
  - Proposes updating deemed savings to 135 kWh/unit and 0.0078 kW/unit based on the evaluation study conducted in PNW.

# MEASURES WITH MINOR UPDATES

# MINOR UPDATE MEASURES

- LED Channel Signage (Section 3.30)
- Refrigeration Measures (Section 3.26 and 3.33)
- Low Flow Pre-Rinse Sprayers (Section 3.31)
- Refrigeration – Evaporator Fan Controllers (Section 3.26)
- Geothermal Heat Pumps (Section 3.18)
- Motors & VFDs – Appendix D

# MINOR UPDATES

- LED Channel Signage
  - Update algorithm, add reference to controls savings factors, and clean up definitions
- Refrigeration Measures
  - Ensure consistency of EFLH values for refrigeration protocols
- Low Flow Pre-Rinse Sprayers
  - Add option for TOS/Retail Measure to incorporate code flow rate as baseline; Only retrofit applications now
- Refrigeration – Evaporator Fan Controllers
  - Update algorithm/assumptions, clean up definitions
- Geothermal Heat Pumps
  - Clarify language and definitions, add conversion factor for SEER to EER
- Motors & VFDs – Appendix D
  - Make tweaks to the worksheet to be consistent with the protocol in the TRM

# QUESTIONS?

