TRM Lighting Work Group Meeting

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Agenda

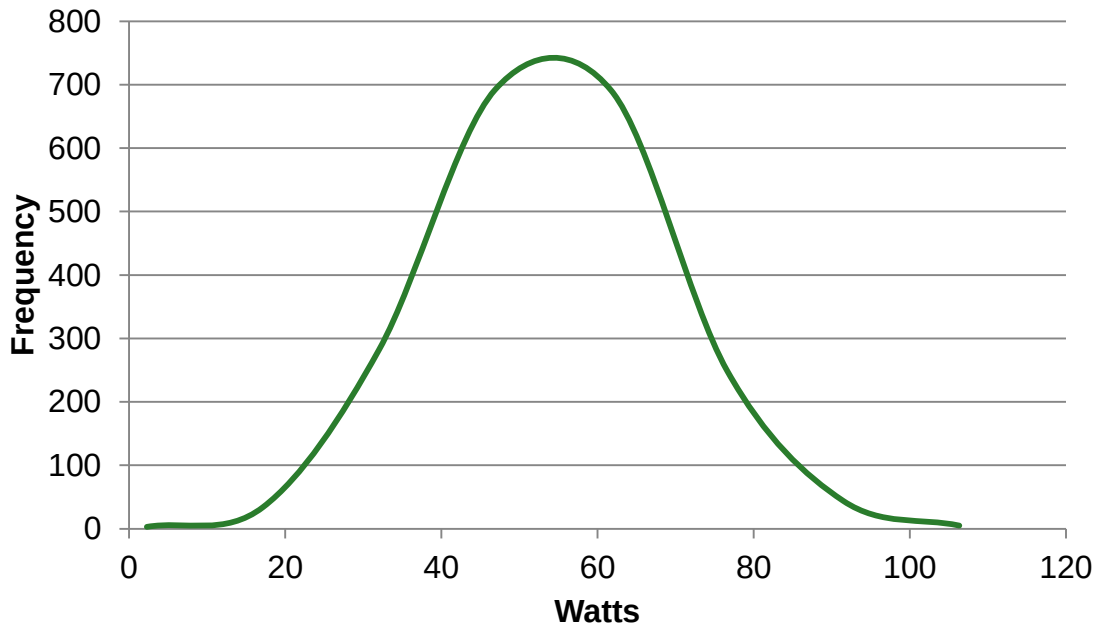
10:00	Introductions
10:10	New Residential LED Measure
10:45	Lighting Measure Design
11:00	C/I Lighting Assumption Changes
11:30	Other Issues
11:45	Wrap-up/Next Steps

Residential LEDs

- **Measure design considerations:**
  - **TRM should present a general solution with different implementation options**
  - **Discuss: how are your lighting programs designed?**
    - Delivery model (incentive vs. direct install)
    - Incentive type (down/mid/upstream)
    - New construction vs. retrofit
    - Instant rebate vs. customer application
    - Retail partners
    - Implementation partner

Residential LEDs

- **Meas. design considerations cont'd**
  - **Use of customer/vendor inputs versus deemed averages**



Trade-offs:
- Accuracy vs Admin Ease
- Savings vs Admin Ease
- Participation vs Accuracy

Residential LEDs

- **Meas. design considerations cont'd**

Unit kWh Savings per Year = (kW_Base - kW_EE) x Hrs x HVAC_cooling_kWhsavings_factor

Unit Peak kW Savings = (kW_Base - kW_EE) x CF x HVAC_cooling_kWsavings_factor

Unit Dth Savings per Year = (kW_Base - kW_EE) x Hrs x HVAC_heating_penalty_factor

Input Variables: What should be deemed vs collected?

- kW_base
- kW_EE
- Hrs
- HVAC System
  - Heating Fuel
  - Cooling/Heating Capacity
  - Cooling/Heating Efficiency
  - Cooling/Heating Setpoints
- Building type
- Incremental cost
- Product lifetime

Residential LEDs Examples from FES

LED A-Line and Globe

LED A-Line lamps for 40, 60, 75, and 100W replacement
Michigan Savings:
40W inc – 26 kWh, 0.0315 kW
60W inc – 40 kWh, 0.0475 kW
53W halogen – 31 kWh, 0.0370 kW
72W halogen – 44 kWh, 0.0520 kW

LED Globe lamps for 25W and 50W replacement
Michigan Savings:
25W inc – 18 kWh, 0.0220 kW
50W inc – 36 kWh, 0.0422 kW

Residential LEDs Examples from FES

LED Flood/PAR and Downlights

LED Flood for an average 78W replacement
Michigan Savings:
78W average inc – 54 kWh, 0.0640 kW

LED downlight for 65W replacement
65W inc – 44 kWh, 0.0530 kW

Measure Life = 15 years for all

Lighting Measure Design

- Comments on lighting groupings
  - Grouped by existing technology
  - Different technologies, incremental cost, lifetime in one measure
- Rationale
  - Name by existing technology to suggest replacement options
  - Limit # of options per measure
- What would an ideal grouping look like?

Lighting Revisions Methodology

- Past hours and CFs from two studies in 1993 and 1994
- Reviewed neighboring TRMs, located sources for hours and CF values
- Values in recent IL TRM were found representative and recent
  - Hours from IL M&V from 2008-2010
  - CFs from CA and IL M&V 2006-2008
- Felt representative for statewide Midwest TRM

Lighting Hours

Hours of Use Values			
Building Use	Original 2008	New 2012	Percentage Change
24-Hour Facility	8,700	8,766	1%
College	5,010	3,540	-29%
Exterior Lighting	4,380	4,903	12%
Grocery/Supermarket	4,612	5,802	26%
Health Care	3,392	5,095	50%
Hospital	4,532	6,038	33%
Hotel/Motel	2,697	3,044	13%
Industrial	4,745	4,745	0%
Manufacturing	5,913	5,200	-12%
Office	3,435	4,439	29%
Other	2,278	4,576	101%
Restaurant	4,156	3,673	-12%
Retail	3,068	4,719	54%
Safety or Code Required	8,760	8,766	0%
School	2,080	3,367	62%
Warehouse	2,388	4,746	99%
Average	4,384	5,089	16%

Lighting CFs

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Coincidence Factor Values			
Building Use	Original Values 2008	New Values 2012	Percentage Change
24-Hour Facility	0.94	1.00	6%
College	0.71	0.81	14%
Exterior Lighting	0.00	0.00	0%
Grocery/Supermarket	0.94	0.69	-27%
Health Care	0.84	0.75	-11%
Hospital	0.84	0.75	-11%
Hotel/Motel	0.51	0.21	-59%
Manufacturing	0.96	0.92	-4%
Office	0.78	0.70	-10%
Other	0.96	0.66	-31%
Restaurant	0.94	0.80	-15%
Retail	0.94	0.83	-12%
Safety or Code Required	1.00	1.00	0%
School	0.73	0.65	-11%
Warehouse	0.96	0.70	-27%
Average	0.86	0.75	-13%

Lighting Lifetime and Incremental Cost

- **Lifetime**
  - **2012 TRM**
    - Lamp replacements: (rated lifetime) / (annual hours)
    - Fixture replacements: 20 years
  - **2014 TRM**
    - Deemed lifetime by technology <u>except</u>:
      - CFL std to low wattage: 8,000 / Hrs
      - T8 std to low wattage: 36,000 / Hrs
    - See next slide…
  - **Incremental Costs**
    - Kept the same except updated where needed

Lighting Lifetime

Replacement Technology	Lifetime (yrs)
Ceramic Metal Halide	13
Ceramic Metal Halide, Integrated Ballast	13
CFL, Low Wattage Plug-in	8,000/Hrs
CFL, Pin-based	1.8
Controls (Daylighting & Occupancy)	8
Fluorescent, High Bay	15
Fluorescent, Parking Garage	15
Fluorescent, T5	15
Fluorescent, T8	15
Fluorescent, T8 Delamping	15
Fluorescent, T8 low wattage (New Construction)	15
Fluorescent, T8 low wattage (Retrofit)	36,000/Hrs
LED Exterior (Wall & Area, New Construction)	10.2
LED Exterior Canopy (New Construction)	10.2
LED Exterior Retrofit	50,000/Hrs
LED Lamps (New Construction)	2.3 **7.9**
LED Lamps (Retrofit)	7.9
LED Luminaire (New Construction)	3.4 **7.9**
LED Luminaire (Retrofit)	7.9
Pulse Start Metal Halide	15

Other Issues

- **Parking lot**
- **Other ideas – new combinations, new measures, research, etc.**

Wrap-up/Next Steps

- DER to distribute lighting tables with latest info from Xcel for review (early January)
  - Incandescent wattages reduced
  - Xcel dropping T12 retrofits
  - We will continue T12 retrofits with reduced lifetimes
  - Insert in Appendix B of TRM (separate document)
- Discuss next steps

Thank you!

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