

Connecticut LED Lighting Study (R154)

CT EEB Presentation
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NMR
Group, Inc.

Report available here:
<http://tinyurl.com/CT-LED-R154>



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Motivations

- Lighting represents largest source of residential savings
- Market is changing rapidly
 - Energy Independence and Security Act
 - Switch from CFLs to LEDs
- Connecticut has been tracking lighting market indicators since 2009
- Recent socket saturation studies in MA and NY offered unique opportunity for comparisons

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Study Objectives

- To provide a basis for reliable estimates of the current use of various bulb types and updated calculations of Connecticut socket and savings lighting potential. These results will be used in combination with inputs from previously conducted Connecticut studies.
- To provide data on baselines and delta watts suitable for the PSD, savings estimates, and program planning.
- To provide data on first-year in-service rates suitable for the PSD, savings estimates, and program planning.
- To provide the customer, product, and market data needed to support program targeting and planning needs.

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Data Sources

Connecticut Data

- 2015 (Current Study)
 - 151 telephone surveys
 - 81 on-site visits
- Previous research
 - 95 on-site visits (2009)
 - 100 on-site visits (2012)
 - 90 on-site visits (2013)

Comparison Area Data

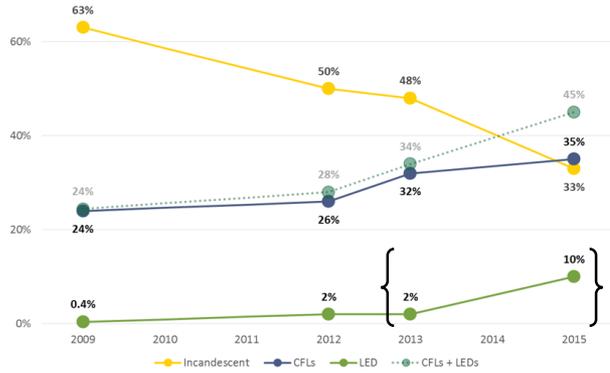
- **Massachusetts (2009, 2010, 2012, 2013, 2014, & 2015)**
- **New York (2013 & 2015)**
- Kansas (2010 & 2014)
- Georgia (2010 & 2014)
- Maine (2011 & 2014)
- Rhode Island (2013)
- The Northeast Energy Efficiency Partnerships (NEEP)
 - The State of Our Sockets

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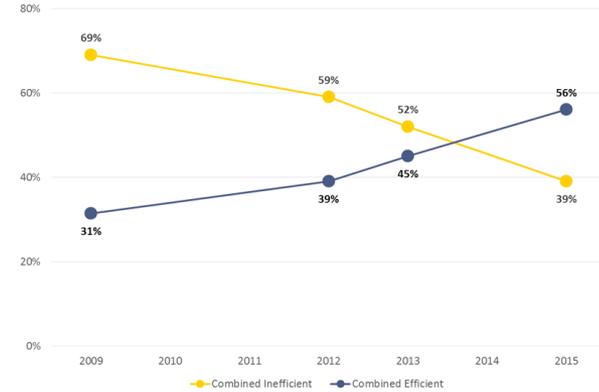
Significant LED Increases

Figure 1: Connecticut Saturation Trends, 2009-2015



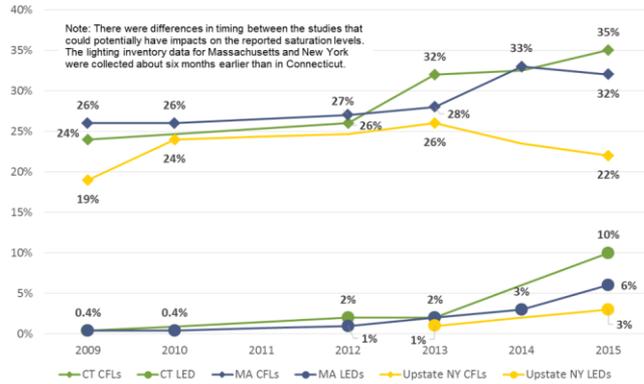
Efficient Majority Reached

Figure 8: Efficient and Inefficient Bulb Saturation, 2009-2015



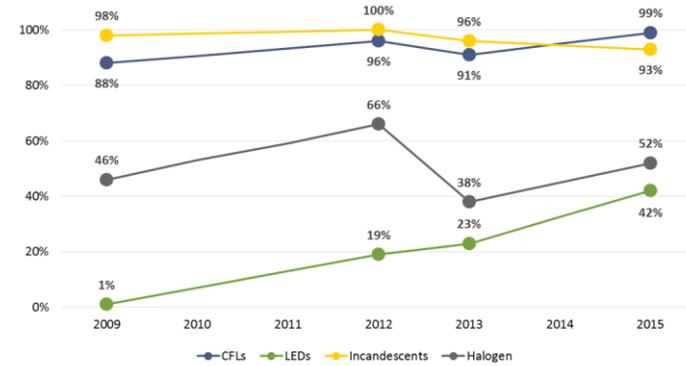
Comparing Trends

Figure 2: CFL and LED Saturation in CT, MA, and Upstate NY, 2009-2015



Penetration Trends

Figure 3: Connecticut Penetration Trends, 2009-2015



Room-by-room Penetration

- LED penetration has skyrocketed
 - In 2009 screw-base general service LED bulbs were present in only one home
 - In 2015 present in 34 of 81 homes (42%)
- LED penetration increased for all room types
 - LEDs present in all room types in 2015
 - Most common in:
 - Living spaces (28%)
 - Kitchens (25%)
 - Exteriors (24%)
 - Bedrooms (22%)
 - Bathrooms (20%)

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Familiarity and Satisfaction

- Familiarity by technology (consumer survey)
 - 66% familiar with LEDs – up from 35% in 2012
 - 89% familiar with CFLs – up from 75% in 2012
 - 57% familiar with halogens – similar to 54% in 2012
- Satisfaction with LEDs and CFLs
 - 84% of LED users were satisfied with them
 - 72% of CFL users were satisfied with them
- Preference among LED and CFL users
 - 59% prefer LEDs over CFLs
 - 4% prefer CFLs over LEDs
 - 26% say it depends on situation
 - 11% unsure

Source: Tables 5, 6 and 7

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Sources of New Bulbs

Figure 17: Where Bulbs Obtained
(Base: All bulbs obtained within the past year)



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Influence of Direct-Install

- Proportion of Direct-Install Participants
 - 3% of population served by HES or HES-IE in 2014
 - 6% of on-site participants confirmed as direct-install participants (confidence interval of 2-10%)
- Effect of Direct-Install Participants on Study Results
 - Calculated key saturation estimates with and without
 - No impact on key saturation estimates
- Direct-Install Bulbs as a Percent of Lighting Activity
 - Estimate 13% of all supported bulbs from direct-install based on program records
 - Confirmed on-site participants accounted for 14% of all bulbs reported obtained in past year

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Purchased Bulbs

Figure 18: Where Bulbs Purchased

(Base: All bulbs purchased within the past year; excludes self-reported direct-install bulbs)



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Storage Trends

- 80% of homes store at least one bulb
- Most bulbs stored for future use
- 17% of homes report stockpiling
- Incandescent storage declining

Table 18: Stored Bulbs by Bulb Type over Time

	2012	2013	2015*
Sample Size	100	90	80
Total Stored Bulbs	1,995	1,169	1,214
Avg. # of Stored Bulbs	5	13	15
Median	4	4	8
Incandescent	63%	61%	52%
CFLs	30%	27%	35%
Fluorescent	4%	3%	4%
Halogen	4%	9%	5%
LED	<1%	1%	4%
Other	0%	0%	<1%

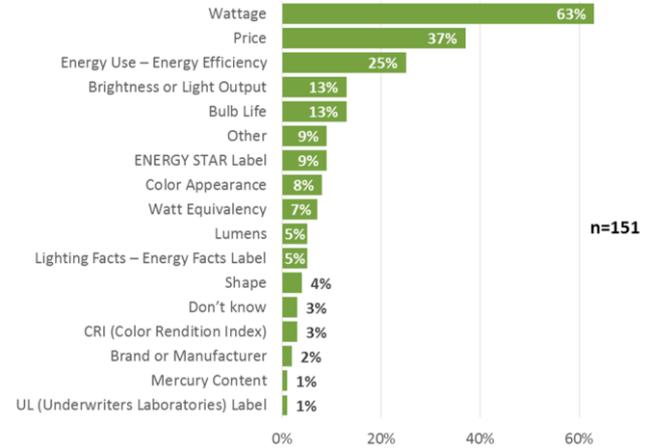
*One outlier was removed for this analysis.

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Figure 20: Information Looked for on Bulb Packaging

(Base: All Respondents; Multiple Response)



In-Service Rates

Figure 21: First Year In-Service Rate for Newly Purchased CFLs and LEDs

(Base: All bulbs purchased within the past year; excludes self-reported direct-install bulbs)

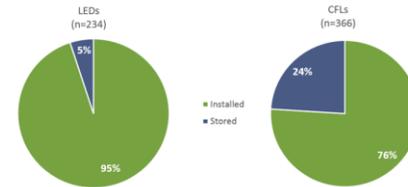


Table 21: Three Year In-Service Rates

	CFLs	LEDs
First Year ISR	76%	95%
Second Year ISR	86%	97%
Third Year ISR	93%	98%
Fourth Year ISR	97%	100%

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EISA Analysis

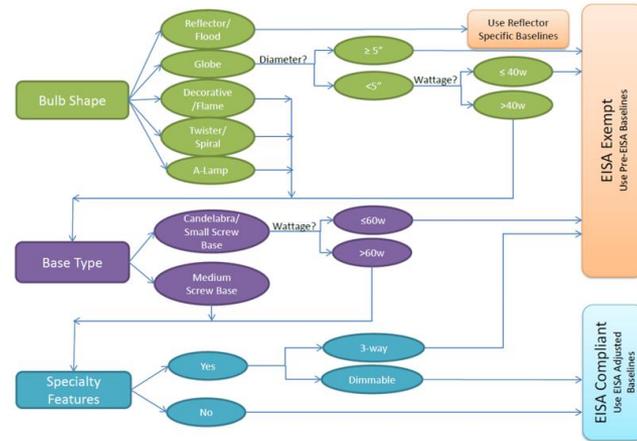
- NEEP “State of Our Sockets” report examined residential lighting market in the context of EISA
- Categorized each bulb as:
 - General Service covered by EISA
 - General Service exempt from EISA
 - Non-General Service Lighting (excluded from EISA scope)
- R154 examined bulbs in Connecticut in this context
- Conclusions from both analyses are similar
 - Substantial opportunities remain in the residential lighting market

<http://www.neep.org/sites/default/files/resources/StateOfOurSocketsFinal.pdf>

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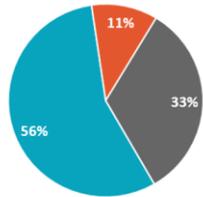
Figure 22: EISA Categories²²



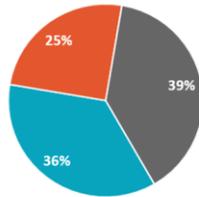
Bulbs by EISA Category

Figure 5: Bulbs by EISA Category

CT Installed Bulbs by EISA Category



NEEP Residential Lighting Product Breakdown



- 62% of EISA-covered bulbs are EISA-compliant
- 60% of EISA-covered bulbs are efficient

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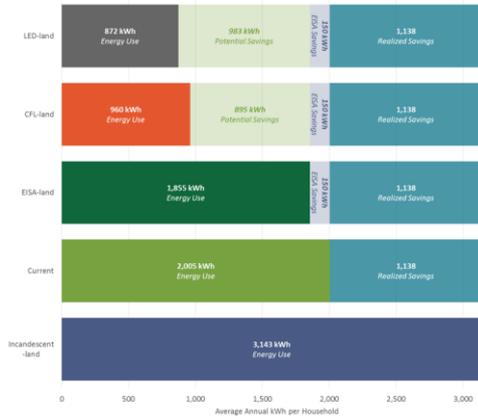
Five Scenarios

1. Incandescent-land: if all screw-base bulbs were incandescent (hypothetical)
2. Current market: based on current lighting inventories (actual)
3. EISA-land: if all non-compliant bulbs covered by EISA were replaced with minimum EISA-compliant bulbs (hypothetical)
4. CFL-land: if all inefficient screw-base bulbs were replaced with CFLs (hypothetical)
5. LED-land: if all inefficient screw-base bulbs were replaced with LEDs (hypothetical)

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Figure 20: HOU and Energy Savings Potential



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Lighting Electric Use

- Households in Connecticut served by Eversource used, on average, 8,395 kWh in 2014
- Current market: 24% of household usage
- EISA-land: 22% of household usage
- CFL-land: 11% of household usage
- LED-land: 10% of household usage

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Conclusions and Discussion

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Conclusions

- Historically, lighting has been the largest source of residential energy savings.
- Evidence from Connecticut and the comparison areas of Massachusetts and New York indicates that programs appear to have a strong impact on saturation levels.
- The potential energy savings analysis in this study demonstrates that there are substantial savings yet to be realized in the residential lighting market.
- EISA at most only applies to just over one-half of all bulbs currently installed in Connecticut.

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Potential Next Steps

- The residential lighting market is in a period of rapid change, which creates opportunities to see significant changes in saturation across even partial years.
- Secondary research relying on other states may benefit Connecticut.
 - Massachusetts is once again studying the residential lighting markets in Massachusetts and New York.
- Primary research in Connecticut may offer greater insight. The EEB should consider the benefits of a panel study, which could directly observe changes taking place in Connecticut.

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Thank You



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