



## R1616/R1708 Residential Lighting Impact Saturation Study

Study Kickoff for Connecticut Energy Efficiency Board, Eversource, United Illuminating, and Stakeholders

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## Res Lighting Kickoff Agenda



- Background
- PSD and planning implications
- Methodology
- Task approaches
- Timing

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1

## Background – Project Tasks

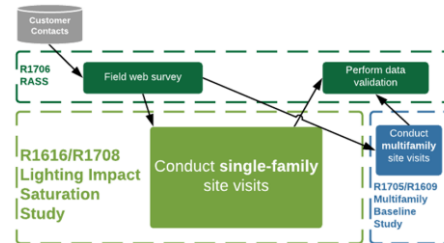


1. Kickoff Meeting
2. Sampling design and recruitment plan
3. Data collection plan
4. Data collection implementation
6. Analysis
7. Reporting

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## Background – Cross-Study Collaboration



## Single Family (R1708)

**Lead: NMR**

**Sites: 90**

### Lighting

- R1708 protocols
- R1708 QA/QC

### RASS

- R1706 (RASS) verification

### Weatherization

- None

### Timing

- Coordinated with R1705

## Multifamily (R1705)

**Lead: ERS**

**Sites: 145**

### Lighting

- R1708 protocols
- R1708 QA/QC

### RASS

- R1706 (RASS) verification

### Weatherization

- R1705 protocols

### Timing

- Coordinated with R1708

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## Background – Key Questions - Lighting



- Why study the residential lighting market?
  - Understand program impacts
  - Assessing progression in the marketplace
  - Help inform future of residential lighting programs (planning)
- What is a Residential On-site Lighting Study?
  - Trained technicians visit homes and quantify bulbs installed and stored
- Why perform a Residential On-site Lighting Study?
  - Informs planning and PSD
  - Higher data quality than customer self-report
- Why visit panel sites?
  - Understand sales patterns in panel homes over time
  - Assess replacement rates from storage and isolate newly obtained bulbs

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## Background – Key Questions - RASS



- What is a RASS verification visit?
  - Verifies self-reported data for nuanced, complex, and key measures
  - Results in or allows for “true-up” factors for RASS analysis and database
- Why perform RASS on-site verification?
  - Validates and expands on RASS
  - Respondent recall/knowledge is limited for important end-use measures
- Why integrate with lighting on-site visits?
  - Lighting inventory cannot be reliably self-reported – requiring on-sites
  - Leverages existing/planned efforts
  - Lighting on-sites require survey for recruitment

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## Background Project Goals



- Develop estimates of delta watts and ISR for PSD
- Assess changes in saturation
- Understand sales patterns in panel homes (replacement from storage and newly obtained)
  - *Only 81 possible panelists (63 SF and 18 MF) from 2015*
  - *May reach 30-50 homes*
- Inform strategy for the future of the residential lighting market
- Update HOU estimate based on changes in saturation

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## PSD and Planning Implications - Lighting



Current PSD/CL&M Plan	How could the on-site study test this?
Hours-of-use (Retail)	How has the location of newly installed LEDs impacted the household-level HOU for Connecticut? <i>Northeast Residential HOU Study designed to allow for updates based on changes in saturation over time. Update based on observed changes between 2015 and 2018.</i>
Delta Watt	What is the rated wattage of alternative lamps available in the marketplace? <i>The MAM will allow for the calculation of baseline wattage. Program records provide rated wattage of supported lamps.</i>

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## PSD and Planning Implications - Lighting



Current PSD/CL&M Plan	How could the on-site study test this?
In-service Rate (Retail)	What proportion of LEDs are installed within first year? Within lifetime? <i>On-site results will allow for calculation of first-year ISR. We will extrapolate to lifetime savings based on available data.</i>

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## Qualitative NTG Check



Current PSD/CL&M Plan	How could the on-site study test this?
NTG	How do the prospective NTG values align with on-site saturation derived values? <i>Qualitative check but won't necessarily be used to update the PSD. May be used to help inform direction moving forward. Using changes in saturation in both Connecticut and a comparison area (Upstate New York), the study will examine possible NTG values to help provide context and support for the values already derived as part of R1615.</i>

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## On-site Methodology



- Sample recruited through RASS random customer pull
- Visit 145 Multifamily and 90 Single-Family households
  - Multifamily = 5+ (conducted by ERS)
  - Single family = 1-4 units (conducted by NMR)
- On-site data collection will use a tailored data-collection form (DCF)
  - Collaboration between NMR and ERS
  - Single family will include two trained technicians at each site for lighting and RASS verification
- Instrument aligned with studies in Massachusetts and Rhode Island
- In field for 5-8 weeks

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## Preliminary Sample Design – Single Family



Dwelling type	Tenure	Total visits	Low-income visits
<b>Detached</b>	<b>All</b>	<b>66</b>	<b>22% (n=10)</b>
	Own	50	
	Rent	6	
<b>Attached</b>	<b>All</b>	<b>7</b>	<b>36% (n=3)</b>
	Own	4	
	Rent	3	
<b>2-4 Units</b>	<b>All</b>	<b>17</b>	<b>58% (n=10)</b>
	Own	5	
	Rent	12	

- Final sample design subject to RASS results
- Income targets based on census if sample allows
- Sample proportionally between Companies

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## Recruitment Status – As of Mar. 16, 2018



	R1616/1708 (SF)			R1705 (MF)
	Detached	Attached	2-4 Units	MF 5+
RASS Complete	1,132	282	137	235
On-site Recruits	602 (53%)	132 (47%)	54 (39%)	86 (37%)*
On-site Target	66	7	17	<b>145</b>

- Note: We increased the multifamily incentive after 153 completes and saw the on-site recruit rate increase from 31% to 44%.
- We have an additional wave of letters planned for late March. This wave will target multifamily (2-4 and 5+).

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## Lighting Data

## RASS Verification

- ✓ Room type (installed only)
- ✓ Fixture type (installed only)
- ✓ Bulb type
- ✓ Socket type
- ✓ Wattage
- ✓ Specialty characteristics
- ✓ LED Manufacturer and model number
- ✓ When purchased LEDs
- ✓ Where purchased recently obtained LEDs
- ✓ Stored bulb questions
- ✓ Count

- Verify or collect data for select end uses:
  - ✓ EV/Solar
  - ✓ Shell measures
  - ✓ HVAC equipment
  - ✓ Building characteristics

Includes LED, CFL, Incandescent, Halogen, Linear, and Grow lamps

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## Data Collection – RASS Verification Measures



Measure	Fuel	Presence	Count	Age	Use	Other
<b>High Priority</b>						
Heating (Primary, secondary, tertiary)	✓	✓	✓	✓	Frequency, Timing	System type, Nameplate or Model #
Cooling(Primary, secondary, tertiary)		✓	✓	✓		
Radiators (portable/non)	✓	✓	✓			
Ducts		✓				
Electric radiant heat (bath)		✓				
Water heater	✓		✓	✓		Temp. settings
Photovoltaic	✓		✓		kW size	
Energy storage batteries	✓	✓	✓			

Exclude: Hot water re-circulator, pipe insulation, water heater blanket, low-flow showerhead, faucet aerator, radon mitigation

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15

## Data Collection – Building Characteristics

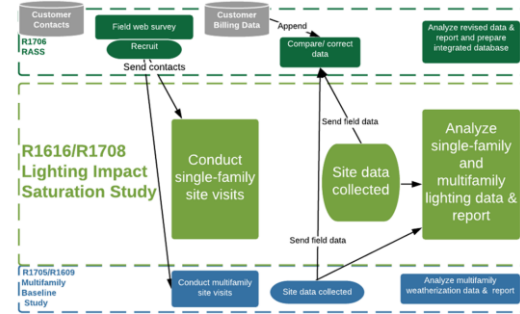


Building Characteristics	RASS Verification
<b>High Priority</b>	
Home type	✓
Stories	✓
<b>Low Priority</b>	
Conditioned floor area (MF only)	
Building shell (attic and wall insulation)	
Weatherization (MF only)	
Window panes and frames	✓

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## Detailed Research Plan



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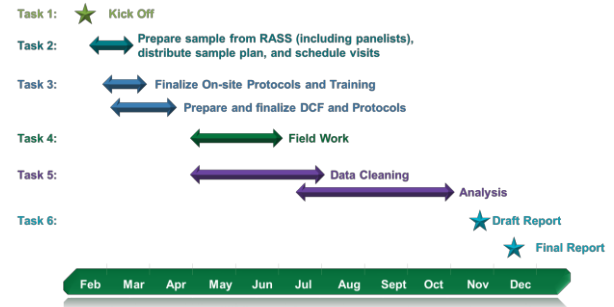
## Report Outline

- Executive summary
  - Recommendations, considerations, and guidance
- Introduction and Background
- Methodology
- Lighting Analysis
  - Changes in saturation over time
  - Comparison to other studies
  - ISR update
  - HOU update
  - Penetration
  - Purchase behavior
  - Storage behavior
  - Qualitative NTG assessment
  - Demographics
- Appendices
  - Additional methodology details
  - Additional analysis
- Database Incorporation
  - RASS adjustment factors
  - RASS lighting data
    - Saturation by technology added to RASS database
    - Additional detailed lighting database

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## Study Timing (Coordinated with R1705)



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## Recap and Next Steps



- Study will result in...
  - Recommendations for PSD and planning
  - Baseline characterization
  - RASS true-up values
- Coordination with R1706 and R1705
  - On-site protocols and DCF preparation underway
  - Coordination meetings with R1705 team occurring weekly
  - Awaiting final R1706 MF sample
  - Visit scheduling to commence in late March

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20

Questions?



Thank you