



R1706 Residential Appliance Saturation Survey (RASS)

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

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FOUNDED IN 2001

OFFICES IN CA, CO, FL, MA, ME, NY, TX, VA, & VT

41 EMPLOYEE OWNERS




RASS Kickoff Agenda



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

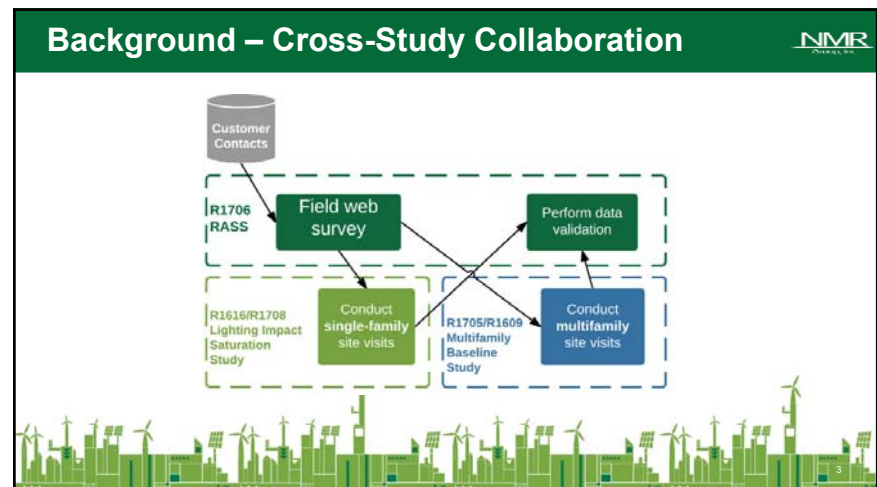
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Background – Project Task



1. Workplan and kickoff (and data request)
2. Sampling design and recruitment plan
- 3a. Instrument development
- 3b. Data collection and analysis plan
4. Data collection implementation
5. Billing data attachment
6. Data cleaning and analysis
7. Reporting

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Background – Key Questions



- What is a RASS?
 - Residential Appliance Saturation Survey
 - Characterizes single and multifamily customer homes, equipment, and occupants
- Why perform a RASS?
 - Establishes a baseline
 - Depicts market needs and identifies sailed ships
 - Informs planning and PSD
- Why integrate with onsite visits?
 - Validates and expands on RASS

Background Project Goals



- Connecticut residential baseline characterization
 - Appliances
 - Consumer electronics
 - Lighting
 - Shell characteristics
 - HVAC and water heating
 - Fuel types
 - Occupant demographics
 - Home comfort, etc.
- Recommendations for PSD and planning
- Recruit for onsite studies

PSD and Planning Implications

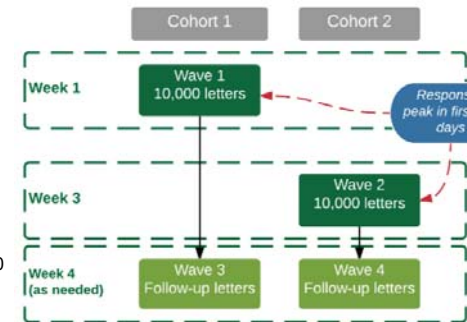


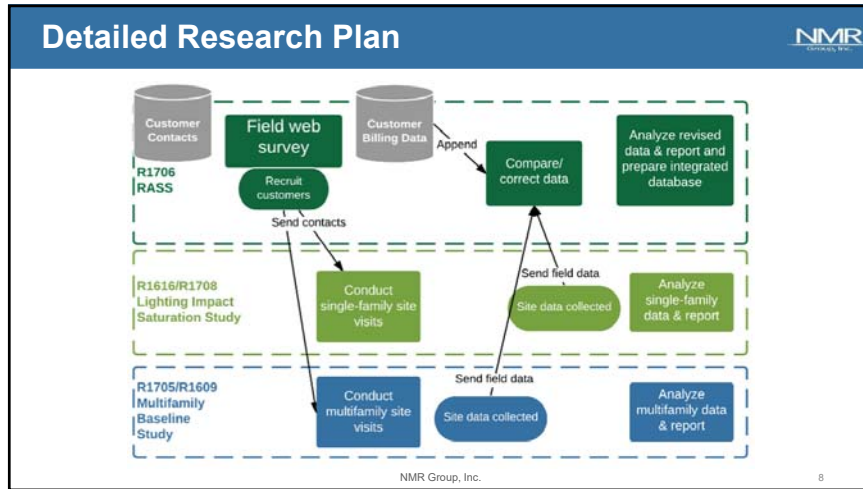
Measure	Current PSD/CL&M Plan	How could RASS test this?
PSD Planning		
Water Heater thermostat settings	If unknown, before and after reset temps are assumed to be 140F and 125F.	What are the average settings? <i>Should average temperature setting assumptions be revised?</i>
Thermostats	No difference in electric savings between programmable and manual thermostat baselines for low-income sites	Do customers set their thermostats differently if they are programmable? <i>Should electric savings be differentiated by thermostat type among low-income consumers?</i>
Central AC	If EER is unknown, installed-efficiency is assumed to be the average of a 15-year old unit.	What is the average age of existing central AC units? <i>Should unknown EERs be associated with a different equipment age?</i>
Market Needs		
Thermostats	Companies are currently piloting wi-fi thermostat for CAC and GSHP	What percentage of thermostats are wi-fi enabled <i>Is there adequate market potential to support this program in the long-term?</i>

Survey Methodology



- Web-based survey with single and multifamily customers (n=2,000)
 - Randomly-selected customers
 - R154 LED Lighting Study panelists
 - Oversample of MF customers
- Recruitment through mailed invitations
 - Four mailings with Company letterhead
 - \$10 Amazon guarantee and \$500 gift card sweepstakes
 - QA/QC!





- ### Survey Sample
- Sample frame
 - Single family and multifamily customers
 - R154 lighting panelists from NMR records (n=81)
 - Data request
 - 40,000 random customer contacts to accommodate sub-sampling and QA/QC
 - Participation, other flags, and billing data
 - Sample
 - Strata based on population data
 - Energy Information Administration
 - Residential Energy Consumption Survey
 - U.S. Census Bureau data
 - Stratify by home type
 - Possible stratification by electricity consumption
 - Oversampling of multifamily occupants
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- ### Home Type Definitions
- Single family detached
 - Includes mobile homes
 - Single family attached
 - Townhouse, duplex, or row house
 - Apartment or condominium in building with 2 to 4 units
 - Multifamily
 - Apartment or condominium in a building with 5+ units
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Dwelling Type

Which of the following best describes your home?

Response	Census Category
Single-family detached	Single-family
Duplex	
Triple decker (e.g., three story house with each floor being a separate unit)	
Row house/Townhouse	
Mobile home	
Apartment/condo in a 2-4 unit building	Multifamily
Apartment/condo in a 5+ unit building	


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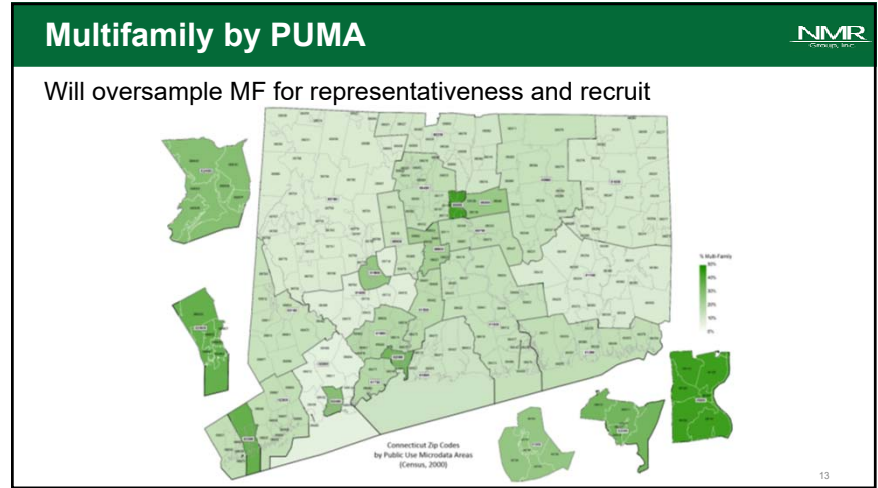
Sampling





Sector	Home Type	Tenure	Income	Population	Sample	Relative Precision
All	All	All	All	1,352,586	2,000	2%
Multifamily	All	All	All	447,831	1,000	3%
		All	All	218,376	488	4%
		Own	Low Income	18,300	41	13%
	2-4 Units	Own	Non-LI	32,707	73	10%
		Rent	Low Income	107,570	239	5%
		Rent	Non-LI	59,799	134	7%
	5+ Units	All	All	229,455	513	4%
		Own	Low Income	13,005	29	16%
		Own	Non-LI	28,976	65	10%
		Rent	Low Income	118,129	264	5%
Rent		Non-LI	69,345	155	7%	
All		All	904,755	1,000	5%	
Single Family	Attached	All	All	76,025	84	9%
		Own	Low Income	12,791	14	23%
		Own	Non-LI	38,245	42	13%
	Detached*	Rent	Low Income	14,560	16	21%
		Rent	Non-LI	10,429	12	25%
		All	All	828,730	916	3%
	Detached*	Own	Low Income	152,326	169	6%
		Own	Non-LI	604,554	668	3%
		Rent	Low Income	33,641	37	14%
		Rent	Non-LI	38,209	42	13%


*Include Mobile Homes






- ### Instrument and Fielding
- 
- Instrument aligned with other studies
 - CA, NY, MA, Midwest, NV, WA, VT
 - Identify items to verify onsite
 - Field over three months
 - Recruit onsite study participants
- 

Data Collection – HVAC and DHW




Measure	Fuel	Presence	Count	Age	Use	Other	Mode
High Priority							
Heating (Primary, secondary, tertiary)	✓	✓	✓	✓	Frequency, Timing	System type, Nameplate or Model #	Both
Cooling		✓	✓	✓			Both
Radiators (portable/non)	✓	✓	✓				Both
Ducts		✓					Both
Electric radiant heat (bath)		✓			Frequency, Timing		Both
Water heater	✓		✓	✓		Temp. settings	Both
Thermostat		✓		✓	Avg. temp. by season	Features, connected	Web only
Low Priority							
Furnace fan (new models)		✓					Onsite only
Whole-house fan		✓					Both
Circulator pumps		✓					Web only
Ceiling fans		✓					Web only
HRV or ERV		✓					Onsite only
Low-flow shwd/aerator		✓					Web only

Exclude: Hot water re-circulator, circulator pumps, furnace fans, pipe insulation, water heater blanket



Data Collection – Appliances




Measure	Fuel	Presence	Count	Age	Use	Other	Mode
High Priority							
Clothes washer		✓	✓	✓	Loads per week by temp.		Web only
Clothes dryer	✓	✓	✓	✓	Loads per week		Web only
Dishwasher		✓	✓	✓			Web only
Refrigerator (Primary, secondary, tertiary)		✓	✓	✓	✓	Location	Web only
Freezer		✓	✓		✓	Location	Web only
Food prep. habits	✓				✓		Web only
Low Priority							
Ice maker		✓					Web only

Exclude: Oven, range, grill, microwave, toaster, blender, juicer, insulation blanket, coffee maker, kitchen fan, hot water dispenser, wi-fi connected appliances

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Data Collection – Consumer Electronics




Measure	Presence	Count	Age	Use	Mode
High Priority					
Desktop/laptop PC	✓	✓		Plugged in? HOU/Standby	Web only
Monitor	✓	✓			Web only
Smart strip	✓	✓		Connected devices	Web only
TV by size	✓	✓			Web only
Game console	✓	✓			Web only
TV-sound system	✓				Web only
Cell phone	✓	✓			Web only
Low Priority					
Modem	✓				Web only
Printer	✓				Web only
Router	✓				Web only
Standalone sound equip.	✓				Web only
Tablet	✓				Web only

Exclude: Landline phones, answering machines, phone charger, battery charger, radio, clocks, toys

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Data Collection – Electric Vehicles/Solar



Measure	Presence	Count	Age	Use	Other	Mode
High Priority						
Electric-only vehicle	✓	✓	✓		Specify	Web only
Plug-in hybrid	✓	✓	✓		Specify	Web only
Dedicated charging station	✓		✓			Web only
Photovoltaic	✓		✓		kW	Both
Energy storage batteries	✓	✓	✓			Both
Low Priority						
Electric Golf Cart	✓					Web only

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Data Collection – Other Measures



Measure	Fuel	Presence	Count	Age	Other	Mode
High Priority						
Lighting*		✓	✓		Watt, shape, location, in-use, auto-devices	Onsite only
Sump pumps		✓				Web only
Well pumps		✓				Web only
Pool		✓				Web only
Pool and spa heaters	✓	✓				Web only
Whole-home generator	✓	✓		✓		Web only
Dehumidifier		✓			Usage	Web only
Other large users?		✓			Specify	Web only
Low Priority						
Humidifier		✓				Web only
Aquarium		✓				Web only
Air purifier		✓				Web only
Waterbed		✓				Web only

* Lighting: LED, CFL, Incandescent, Halogen, Linear, and Grow lamps
Exclude: Radon mitigation

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Data Collection – Demographics/Building Chars. NMR GROUP, INC.

Demographics	Mode	Building Characteristics	Mode
High Priority		High Priority	
Own vs. rent	Web only	Home type	Both
Occupancy (e.g., seasonal)*	Web only	Stories	Both
Occupants by age	Web only	Age	Web only
Education	Web only	Last major renovation (date)	Web only
Income	Web only	Bedrooms	Web only
Payment of utils.	Both	Full / half baths	Web only
Work from home**	Web only	Low Priority	
Low Priority		Conditioned floor area	Web/MF onsite
Years of occupancy	Web only	Building shell***	Onsite only
		Weatherization	MF onsite only
		Windows	Both

* Seasonal Occupancy will be recorded as months used per year
** Hours per week
***Includes shell measures: Window frames, and attic and wall insulation

Exclude: Kitchens

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Other Web-only Data Collection NMR GROUP, INC.

- Program participation
- Up to 10 bonus questions
 - Awareness of energy efficiency
 - Energy attitudes
 - Non-energy home characteristics

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Database NMR GROUP, INC.

- Append one or two years of billing data to survey responses in Excel/CSV format
- Include measure details
- Supports future studies
- Develop interactive variables categorizing respondents by **key characteristics**:
 - Energy usage
 - Income and key demographics
 - Dwelling type
 - Program participation (based on Company data)

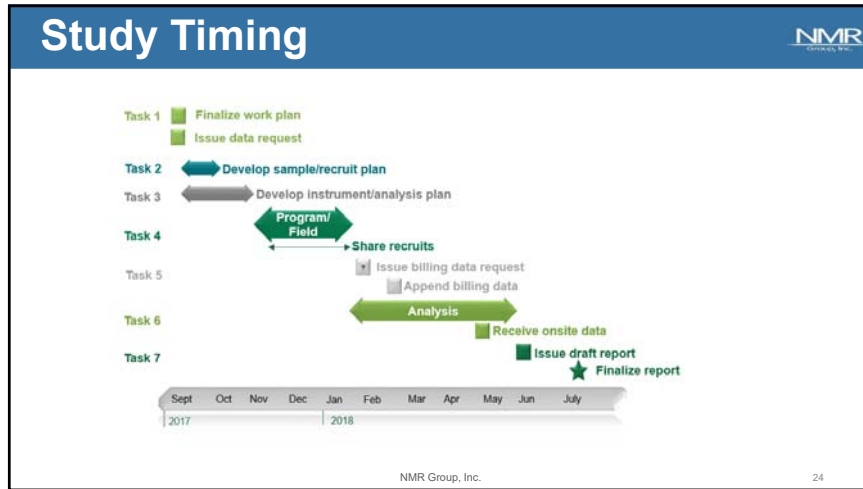
Respondent ID	Water Features						Household Characteristics														
	Survey	Type	Model	Age	Fuel	Temperature Category	Temperature	Peak kW	Total kW	Electric	Gas	Oil	Coal	Wood	Other	Occupants	Income	Qualify	Participation	Feature	
101	Web only	Storage	10/21/10	5 to 10	Propane	None	100	122	5,000	Low	1	Market	MF Sr	None	None						
102	Web only	Heat pump	Not asked	3	Electric	Medium	100	800	12,000	High	1	Low	10	None	None						
103	Web only	Don't know/Not asked	11 to 20	Gas	High		180	177	8,434	Medium	2	Market	MF Adm.	HEI	None						

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Reporting Approach NMR GROUP, INC.

- Concise abstract and executive summary
 - Recommendations for PSD and baseline assumptions
 - Implications for planning (both process and impact)
- Methodology description
- Benchmarking
- Analysis
 - **Updated** with onsite-verified data
 - **Weighted** by key characteristics
- Tables
 - **Detailed statistics** (CV / error ratio)
 - **Cross tabulated** by key characteristics
- Appendices
 - Additional methodology details
 - Less critical crosstabulations
 - Survey instrument

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- ## Recap and Next Steps
- Study will result in...
 - Recommendations for PSD and planning
 - Baseline characterization
 - Comprehensive database
 - Recruits for onsite studies

 - Time is of the essence
 - Survey instrument preparation underway
 - Customer contact data delivery critical
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Study Budget (if needed)

Task	Total
Task 1: Kickoff	\$14,500
Task 2: Sampling design and recruitment plan	\$11,000
Task 3: Instrument dev. and data coll. and analysis plan	\$21,750
Task 4: Data collection implementation	\$115,000
Task 5: Billing data attachment	\$4,500
Task 6: Data cleaning and analysis	\$42,750
Task 7: Reporting	\$40,500
Total	\$250,000

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