R1705 MULTIFAMILY BASELINE AND WEATHERIZATION STUDY

Kickoff Webinar

Patrick Hewlett & Kerri-Ann Richard, ERS
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AGENDA

- Study objectives
- Data collection
  - Data requests
  - Sample design
  - Field verification
  - Weatherization
- Analysis
  - Analysis objectives
    - Statewide statistics
    - RASS verification
    - Baseline & savings potential
- Deliverables
- Management
- Schedule

STUDY OBJECTIVES

- Study serves five primary research objectives:

1. Determine statewide statistics
   - MF unit count, demographics, equipment saturation
2. Assess compliance with weatherization standard
   - Apply similar protocols as 2014 single-family study
3. Verify RASS self-reported information
   - Lighting, HVAC, appliances, demographics
   - Validate or true-up RASS data
4. Calculate savings potential
   - Pair saturation data with secondary load shapes and statewide statistics
5. Based on the above, provide recommendations to programs serving MF customers

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UTILITY DATA REQUESTS

- Requested and already received:
  - MF contact data for RASS survey – underway

- For visited MF tenants:
  - Unit-level monthly electric and gas billing data
  - AMI data, if available
  - This request will be coordinated with the RASS request
  - Expected April 2018
- For visited MF tenants who have participated in EE programs:
  - PDF application files, if available
- For programs serving MF buildings/tenants:
  - Master tracking spreadsheets or databases with measure-level info
  - Expected April 2018

OTHER DATA SOURCES

- ❑ RASS study respondents self-reporting as MF and agreeing to host a site visit:
  - ➢ RASS information on equipment saturation, demographics
- ❑ For statewide analysis, additional sources of public housing data, including:
  - ➢ 2010 U.S. Census data
  - ➢ CT Dept. of Housing data
  - ➢ Housing authority data
  - ➢ Tax parcel data
- ❑ For equipment operation:
  - ➢ Secondary load shapes

SAMPLE DESIGN

- ❑ ERS and NMR are monitoring RASS participation and count of MF customers willing to host a visit
  - ➢ $200 incentive offered
- ❑ We estimate that 145 sites will be sufficient to achieve statewide savings potential results at 90/10 confidence/precision.
  - ➢ This number may be refined as RASS data comes in and preliminary research on the statewide population is completed.
- ❑ Due to differences between HES and HES-Income Eligible programs, we plan to calculate results by the following segments:
  - ➢ Low income vs. market-rate
  - ➢ Building size (e.g., high/medium/low based on number of floors)

RECRUITING PLAN

- ❑ Potential study participants have already cooperated by completing the RASS and indicating they are interested in hosting a visit.
- ❑ However, MF customers can be difficult to schedule around. We plan to:
  - ➢ Offer tenants flexible windows for visits, including nights and weekends
  - ➢ Offer a $200 gift card for hosting the site visit
  - ➢ Prior to recruitment calls, send out advance letters in English and Spanish to remind them of the study's objectives and incentives

Recruitment/ Scheduling → In-unit inventory → Digitized data collection → Database

DATA COLLECTION

- ❑ Unit data collection protocol includes:
  - ➢ Demographic survey
  - ➢ Equipment inventory
  - ➢ Lighting inventory protocol
  - ➢ Weatherization assessment protocol
  - ➢ Photos

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DATA COLLECTION - EQUIPMENT

- All visited MF units will receive an equipment inventory:
  - Characterize all major energy-consuming equipment, emphasizing largest, most variable, and/or that addressed by a program measure
  - For all RASS-surveyed equipment: validate self-report quantity data

Recruitment/Scheduling → In-unit inventory → Digitized data collection → Database

DATA COLLECTION - DEMOGRAPHICS

- All heads of household will be administered a 10-min demographic survey
- Allows possible post-hoc segmentation of results
- Demographics of interest include:
  - Number of occupants & ages
  - Own vs. rent
  - Payment of utilities
  - Work schedules / number of jobs
  - Work at home?
  - Pets
  - Education level
  - Income level
  - Aware of and/or participated in CT EE programs?

Recruitment/Scheduling → In-unit inventory → Digitized data collection → Database

DATA COLLECTION - WEATHERIZATION

- Assess building envelope components for comparison with weatherization standard (per 2014 R15 Single Family Weatherization study's protocol):
  - Insulation
  - Air sealing
  - Windows
  - Duct sealing
  - Duct insulation
- In lieu of blower door testing, inspection and measurement of air/duct gap geometry
  - Qualitative scoring/feedback on potential program opportunities

Recruitment/Scheduling → In-unit inventory → Digitized data collection → Database

DATA COLLECTION – COMMON AREAS

- While in-unit data collection is the focus, we will attempt to collect relevant common area data where possible through:
  - Contacting building management
  - Accessing relevant common spaces (e.g. laundry room)
- Anticipated common area data collection includes:
  - Lighting (predominant fixture type)
  - Central HVAC systems
  - Central water heating
  - Laundry
  - Building envelope
  - Others: solar PV, EV charging, CHP, pool pump/heater, parking lot lights, etc.

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DATA COLLECTION - AGGREGATION

- ❑ Field data will be continuously aggregated and reviewed
- ❑ Field auditors will cross-check digitized data with supplementary notes/files
  - ➢ Photos
  - ➢ Equipment spec sheets
- ❑ Continuous senior review of database
- ❑ Project manager review before aggregate analysis phase

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ANALYSIS – SITE LEVEL

- ❑ Site-level analysis will include:
  - ➢ Assessment of whether each sampled unit's systems meet the efficiency threshold of current program offerings
  - ➢ Assessment of compliance with the weatherization standard, as assessed by R15 SF Weatherization study
  - ➢ Estimation of existing equipment energy use by combining collected characteristics with secondary load shapes
  - ➢ Supplemental utility bill analysis to determine normalized HVAC energy usage and inform savings potential for weatherization upgrades

ANALYSIS – LOAD SHAPES

- ❑ For equipment of interest, we will reference secondary data on equipment operation to assess energy use and savings potential:
  - ➢ Lighting
  - ➢ Window A/C
  - ➢ Refrigerator
  - ➢ Other appliances
  - ➢ Power strips
- ❑ Data references expected to include:
  - ➢ TRMs
  - ➢ Whitepapers
  - ➢ Technical potential studies
  - ➢ Other similar baseline studies

Figure 1. Average AC Demand Profile for Site #197 Pre & Post
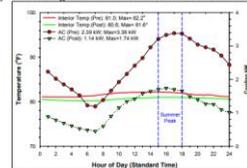
ANALYSIS – SAVINGS POTENTIAL

- ❑ Site-level analyses will be aggregated to inform statewide savings potential.
- ❑ This is where researched statewide census/housing authority/tax data will be valuable.

Site-level results
- Equipment saturation
- EE compliance
- Potential savings by measure

✖

Statewide data
- Number of units
- Market rate vs. LI
- Ave. number bedrooms, tenants

✖

Statewide savings potential
- By measure
- Per unit: market and LI
- Other post hoc?

DELIVERABLES

- ❑ Our final report and presentation will feature the following deliverables:
  - ➢ **Statewide statistics** on MF unit count and key demographics, when available
  - ➢ Verified **equipment saturation** in CT multifamily units, as well as average key characteristics such as quantity, size, age, and efficiency level
  - ➢ Referenced **load shapes** for equipment of interest
  - ➢ Assessment of compliance with the residential **weatherization standard**
  - ➢ Examination of the **accuracy/expandability of RASS** responses
  - ➢ Estimate of **statewide savings potential** by combining collected data with researched statewide data
  - ➢ **Recommendations** for programs offering measures to MF customers, and recommendations for future study
  - ➢ Comprehensive, well-documented **dataset** with full data dictionary for archive purposes

## MANAGEMENT & COORDINATION

- ❑ Coordination with other studies
  - ➢ **RASS** – As discussed, RASS will form the basis of the MF sample and will provide points of comparison with verified data.
  - ➢ **R1708 SF Lighting –** For aggregation/comparison of results, ERS will follow this study's lighting data collection protocols
  - ➢ **Residential weatherization (R15)** –ERS will follow data collection guidelines from prior weatherization studies, formatted similarly when possible, to allow aggregation/comparison.
  - ➢ **Technical potential** – ERS will seek to collaborate with recent or ongoing potential studies that address MF customers in CT.
- ❑ Biweekly meetings with Evaluation Advisory team
  - ➢ Track progress
  - ➢ Identify and mitigate issues
  - ➢ Relay any relevant field information
- ❑ Monthly reports submitted with invoices

SCHEDULE
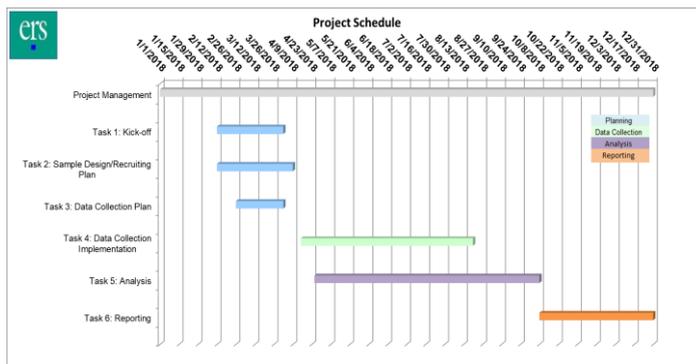
WHAT'S NEXT?

- ❑ Finalize list of MF customers for potential site visit (mid-April)
- ❑ Request billing data and AMI (mid-April)
- ❑ First site visits (late April)
- ❑ Data aggregation and review (April – August)
- ❑ Draft report submittal (December)

QUESTIONS?

CONTACTS

Project managers:

Patrick Hewlett

phewlett@ers-inc.com

(978) 478-5305

Kerri-Ann Richard

krichard@ers-inc.com

(978) 332-5828

ERS portfolio manager:

Jon Maxwell

jmaxwell@ers-inc.com

(979) 696-5465