X1941: Multifamily Impact Evaluation

CT-TRC/EATeam 2 Eastern

December 6, 2019

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Today's Agenda

- Objectives and study need
- Background on multifamily programs
- Overview of study activities
- Data collection & analysis
- Anticipated challenges & solutions
- Key study outputs
- Proposed schedule

https://www.energizect.com/events-resources/energy-articles/multi-familyfacilities

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Study Objectives

1. Provide recommended updates for the 2019 PSD with multifamily (MF) specific values for measure level savings
   – Conduct a thorough, data-driven review focusing on the most impactful measures

2. Compute program-level realization rates for programs with high MF retrofit savings
   – Based on a comparison of reported vs. installed measures
   – Adjusted by extrapolating findings from on-site field verification for a sample of projects

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Why is this study needed?

• No recent PSD review of MF assumptions

• No recent impact evaluations of MF retrofit programs
   – HES Impact Evaluation of 2015-2016 program years excluded MF (R1603, 2019)
      • Only single family was included in the billing analysis
      • MF dwelling units could not be identified in billing data for many projects
   – Process evaluations of the Multifamily Initiative (R157) and HES & HES-IE programs (R4) have been conducted, but identify program improvement opportunities, not savings verification (NMR 2015, 2016)
   – NTG Study for CT Residential New Construction (R1707) studied net-to-gross (NTG) assumptions (NMR 2018)

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EnergizeCT Multifamily Initiative

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- Overview
  - Provides tiered incentives for direct-install and add-on measures
  - Treats MF buildings holistically
    - Incentivizes tenant and common area measures
    - Provides "single touch point" for customer
  - Provided through Home Energy Solutions (HES) and HES-Income Eligible (HES-IE), Energy Opportunities (EO)
- Project tracking varies by utility
  - Eversource: tracks tenant and common area measures through HES and HES-IE
  - UI: tracks tenant measures through HES and HES-IE; projects with only common area measures are tracked through EO
    - No multifamily "flag" in EO

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Overview of Study Activities

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Objective	Study Activity
Update the 2019 PSD with multifamily (MF) specific values	Data Collection: • Identify MF measures in 2019 PSD for revision • Compare assumptions with other states' TRMs
	Analysis: • Perform engineering review of prioritized measures • Propose revisions to PSD values
Compute realization rates for programs with high MF retrofit savings for 2016-2018* program years	Data Collection: • Review Multifamily Initiative documents and databases • Conduct engineering review and field verification for a sample of projects
	Analysis: • Calculate realization rates for sampled projects • Extrapolate to program-level and (where possible) measure-level realization rates

*Also evaluate the 2019 program year if possible

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PSD Update: Data Collection   ⟫ TRC

- Review Connecticut's 2019 PSD for MF assumptions
- Speak with utilities and technical consultants
- Identify TRMs from other states for comparison
  - MidAtlantic, NY, IL, ME, VT, and others
- Identify priority MF measures for revision based on impact on overall savings:
  - High savings per measure
  - High installation volume
  - High level of uncertainty due to age of reference and number of embedded assumptions
- Review recent applicable codes and standards to inform baseline for "lost opportunities" savings
  - Coordinate with ERS to avoid duplicating efforts

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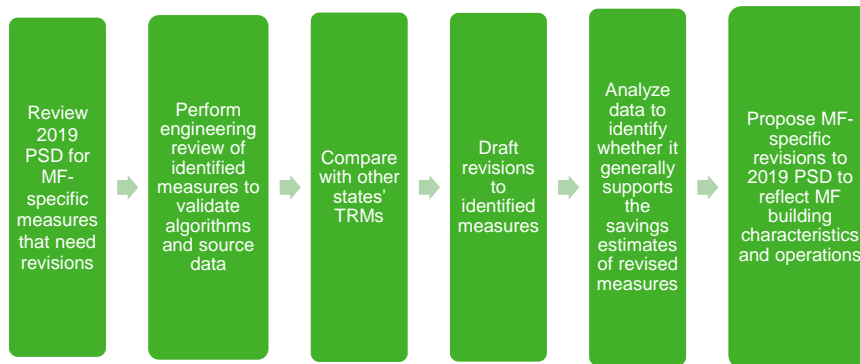## PSD Update: Data Collection   ⟫ TRC

- MF measures to be reviewed for possible update include:
  - Frequently installed measures
    - Common area and exterior lighting
    - Water conservation (faucets and aerators)
    - High performance windows
    - HVAC upgrades
  - Measures expected to be installed more frequently in the future
    - Heat pumps
    - W-fi thermostats
- MF measures that need revised calculations include:
  - Air sealing
  - DHW equipment upgrades (including HPHW)

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PSD Update: Process

Review 2019 PSD for MF-specific measures that need revisions → Perform engineering review of identified measures to validate algorithms and source data → Compare with other states' TRMs → Draft revisions to identified measures → Analyze data to identify whether it generally supports the savings estimates of revised measures → Propose MF-specific revisions to 2019 PSD to reflect MF building characteristics and operations

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Realization Rate: Data Collection

- Review previous evaluation reports
- Submit data request using approved procedures
  - Expected data requests
    - Access to 2016-2018 HES, HES-IE, and EO program documents & databases
    - Project files for sampled projects
    - Billing data for sampled projects
  - Piggy back on existing data requests where possible
- Review program documents & databases
- Conduct engineering review and field verification for a sample of projects (details on upcoming slides)

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Realization Rate: Sampling Plan ⟩ TRC

1. Identify MF projects from HES, HES-IE, and EO programs from 2016-2018 program years

2. Design sample for 90% confidence / 10% precision for both utilities' territories, where possible
   - Sample 82 projects total, 41 projects from each utility:
     - 30 from HES and HES-IE
     - 11 from EO (if MF projects found)
   - Use stratified ratio estimation to capture high savings projects

3. Stratify sample by kWh and maximize confidence/ precision for gas

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Realization Rate: Field Data Collection ⟩ TRC

- Conduct comprehensive field verification at sampled sites. Verify:
  - All measures in common areas
  - Tenant measures in a sample of dwelling units (depending on accessibility)

- Purpose is to identify actual installed conditions

https://www.energizect.com/sites/default/files/MF-Initiative-Bayview-Towers-Case-Study.pdf

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Realization Rate: Analysis

- Compute project-level realization rates
  - Use existing PSD algorithms and baseline assumptions
  - Adjust project-specific inputs based on field findings and other data collected on-site
  - Calculate project-level realization rates

- Extrapolate from project-level to program-level realization rate based on project case weights

TRC staff identifying light fixture ballast type

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Anticipated Study Challenges

- Challenge:
  - MF projects tracked in multiple program databases, at least in UI
  - MF projects not always flagged
- Solution:
  - Treat HES and HES-IE evaluation separately from EO evaluation
  - Prioritize resources on evaluating HES and HES-IE
  - Estimate savings from MF projects in EO and typical adjustment factor
- Challenge:
  - Billing data is limited
  - Some measures may not be matched to building IDs or to specific dwelling units
- Solution:
  - Use a combination of billing analysis and engineering principles to adjust realization rates

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Key Study Outputs

Objective	Deliverable
PSD update	Recommended specific revisions to 2019 PSD values and algorithms to reflect MF building characteristics and operations *From engineering review of PSD and comparison with other states' TRMs*
Impact Evaluation	Compute program-level and some measure level realization rates for each program with high MF retrofit savings • MF-specific savings and realization rate for HES & HES-IE, calculated for each utility • Average savings and realization rate for MF projects in EO (with sample size caveat) *From engineering review and field verification of sample projects*

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Proposed Schedule

Stage	Proposed Schedule
Project Design & Kickoff	September – November **Kick off meeting:** December 6, 2019
Data Collection (Literature review and engineering review)	October – January
Data Collection (On-site verification)	January – March
Draft PSD Revisions	February – March
Analysis and Reporting	March – July **Draft report:** June 2020 **Final report:** July 2020

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Thank you

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