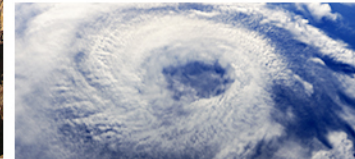




CADMUS



MEMD Calibration Research: Housing Vintage Study

Presented to EWR Collaborative

November 21, 2017



Background

- Currently, the MEMD uses housing type (single family, multi-family) and three vintages (old, average, and new) to assess residential energy savings
 - **Old:** Poorly insulated building constructed in the 1950s or earlier
 - **Average:** Building conforming to 1980s-era building codes
 - **New:** Recent construction conforming to the Michigan State Energy Code
- Phase I results found that in nearly all cases the MEMD vintage parameters do not align well with actual home data. That conclusion triggered Phase II of this study.

	Vintage Mapping	Climate Zone	Attic (R-value)	Walls (R-value)	Basement (R-value)	Crawlspace (R-value)	Rim Joist (R-value)
Old	1979 or older	All	11.0	7.0	2.0	2.0	2.0
Average	1980 - 2004	All	19.0	11.0	6.0	6.0	11.0
New	2005 - present	CZ 5	38.0	20.0	10.0	10.0	30.0
		CZ 6	49.0	20.0	15.0	10.0	30.0
		CZ 7	49.0	21.0	15.0	10.0	38.0



Phase II: Research Plan & Objectives

Plan:

Collect primary field data from Michigan homes to support new input parameters for the MEMD

Objectives:

- Assess envelope and equipment efficiency levels from stratified sample of Michigan homes
- Propose updated or alternative vintage schema for MEMD adoption (via workpaper process)
- Recommend implementer data collection protocols to ensure that all necessary data points are captured





Task 1: Data Request and Transfer



- Obtain a representative sample of Michigan homes
 - Request data for Consumers Energy and DTE residential customers
 - Following site visits, request AMI and/or billing data for all sampled homes
 - Qualified Cadmus personnel will clean, store and manage all data



Task 2: Planning



Preliminary Design:
80 homes in CZ-5,
80 homes in CZ-6

- Prepare for primary data collection and analysis
 - Draw sample from utility account lists
 - Draft customer communications documents
 - Refine data collection instruments
 - Prepare for planned field mobilizations
 - Notify stakeholders prior to beginning of customer contact



Task 3: Scheduling and Site Visits



- Capture data reflecting actual conditions in Michigan homes
 - Request customer participation and-schedule visit that fits efficiently into the field mobilization plans
 - Collect data:
 - Home type (single family, etc.)
 - Year built, year renovated
 - Floor area
 - Exterior envelope size and orientation
 - Insulation levels
 - Window and door thermal ratings
 - Heating, cooling, and domestic hot water system ratings





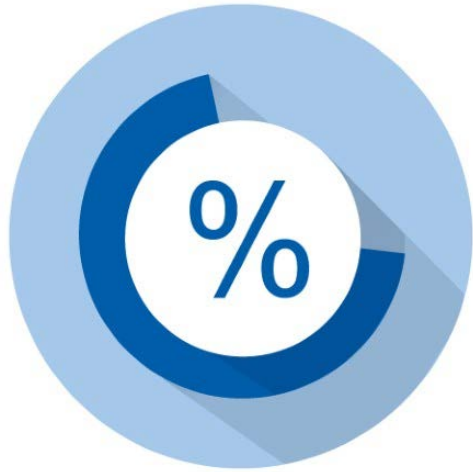
Phase II: Analyze Collected Data



- Characterize envelope conditions and equipment in Michigan homes of various vintages
 - Inspect and clean all data, removing boundary conditions and erroneous values, and using interpolation (where appropriate) to replace data
 - Calculate average parameter values for envelope (R, U, area), equipment (SEER, AFUE), and other key parameters across different population subgroups (CZ-5, single family homes, etc.).



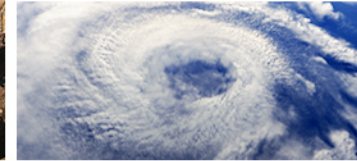
Phase II: Reporting



- Recommend modifications to measure parameter values associated with home vintages in the MEMD
 - Draft a report which details methodology, findings, and conclusions
 - Draft an MEMD workpaper which proposed updates or adjustments to existing MEMD measure parameters



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