MEMD Calibration Research

Presentation to Energy Optimization Collaborative

April 21, 2015

DTE Energy

Consumers Energy
Count on Us

NAVIGANT
ENERGY

CADMUS

EMI CONSULTING

Agenda

1. Calibration History
2. Status of Current Studies
3. Calibration Planning Update
4. Proposed Near-Term Studies
   - 4a Appliance Recycling
   - 4b Home Energy Reports
5. Collaborative Feedback (Discussion & Decision)

Calibration History

- Major research efforts completed:
  - Residential lighting hours of use studies
  - C&I lighting controls
  - Metering of recycled appliances
  - Domestic water heating use metering
  - Upstream lighting impact attribution study
- Several of these studies considered industry benchmarks and are being used in other states

Status of Current Studies

- DTE Energy, Consumers Energy, EMI Consulting and Navigant now finishing two calibration studies:
  - Commercial Thermostat Study
  - C&I Lighting Hours of Use Study
- Results and recommendations for 2016 MEMD updates will be presented at June 2015 EO Collaborative meeting

Calibration Planning Update

- DTE and Consumers Energy are working on a new comprehensive review of calibration research priorities using established criteria:
  - Magnitude of savings opportunity
  - Level of uncertainty
  - Changes in baseline
  - *Time since last reviewed (not in original criteria, but applicable now that the MEMD has been in place 5+ years)*
- Next round of recommended priorities, research & timelines to be presented at upcoming collaborative meetings in Q3/Q4 ‘15 for late ‘15 or early “16 kickoff to improve 2017 MEMD

Proposed Near-Term Studies

- During review, identified 2 studies that could be completed quickly because they are updates on existing research models:
  - Study 1: Appliance Recycling Savings Update
  - Study 2: Home Energy Reports Modeling Update
- If study plan was approved by Collaborative today, could provide results at June meeting
- Collaborative would still have time to review, discuss and make decisions on any savings recommendations related to 2016 MEMD

Study 1: Update to Appliance Recycling Savings Model

- Current savings based on the Appliance Recycling metering study:
  - MEMD Technical Memo_Appliance Recycling_20120812
- Metering of 200 refrigerators and freezers found:
  - Older units use more energy due to year-over-year efficiency degradation.
  - Units manufactured before the 1993 NAECA standard consume more energy.
  - Larger units consume more energy.
  - Single-door refrigerators consume less energy.
  - Side-by-side refrigerators have higher energy consumption.
  - Chest freezers use more energy than upright units.
  - Primary appliances have higher consumption.
  - Refrigerators consume slightly more energy at higher temperatures.

Study 1: Unit Energy Savings

- Average energy use of recycled units (i.e., energy savings) modeled as a function of equipment age, size, configuration and usage (primary or secondary unit; conditioned or unconditioned space)

Participation Characteristics: 2009 through Q1 2012

	Refrigerator	Freezer
Age	26.4 years	32.0 years
Percent Manufactured before 1993	76%	91%
Size	18.3 cubic feet	16.4 cubic feet
Configuration	7% single door 23% side-by-side	34% chest freezer
Usage	55% primary units	

Study 1: Proposed Calibration Activity

1. Assess changes in age, configuration, size and usage characteristics of appliances recycled statewide from 2013-2014
   - JACO collects unit model codes for the majority of units collected from which this information can be obtained
2. Update unit energy savings estimates using recent participant characteristics
3. Recommend updated values for 2016 MEMD

Study 2: Update to Home Energy Reports Savings Model

- Opower is proposing an update to the specification of the regression model used in developing savings estimates for Home Energy Reports
- Current Year 1 through Year 4 savings estimates use a Fixed-Effects model specification
- Opower claims the proposed Post-Only model specification provides slightly more precise savings estimates (i.e., tighter confidence intervals)
- Both models produce unbiased savings estimates

Study 2: Possible Impact of Change in Savings

- Opower provided a comparison of savings estimates for Year 1 through Year 4 using both model specifications
- Results suggest new model specifications would increase deemed savings values
- Confidence intervals were not provided

	Usage Band	Year 1		Year 2		Year 3		Year 4	
		Updated	Fixed-effects	Updated	Fixed-effects	Updated	Fixed-effects	Updated	Fixed-effects
Electric High Usage Band	9k – 11k kWh	1.22%	1.20%	1.72%	1.68%	2.04%	1.82%	**2.20%**	**2.00%**
Electric Average Usage Band	7k – 9k kWh	0.97%	1.05%	1.37%	1.34%	1.63%	1.45%	**1.76%**	**1.59%**
Gas Usage Band	900 – 1,100 therms	0.84%	0.64%	0.94%	0.71%	0.94%	0.72%	**0.98%**	**0.65%**

Source: Opower presentation to Consumer's Energy.

Study 2: Proposed Calibration Activity

1. Desktop Review
   - Review of Opower's Fixed-Effects and Post-Only model specifications
   - Review of Opower's results for DTE Energy, Consumer's Energy, and Average for Year 1 through Year 4, including both savings estimates and confidence intervals

2. Independent Evaluation
   - Conduct and report on an independent evaluation of DTE Energy's Home Energy Report program using both model specifications for Year 1 through Year 4
   - Report findings from an independent evaluation of Consumer's Energy's Home Energy Report program using both model specifications

3. Recommendation
   - Provide a recommendation to the EO Collaborative regarding measure calibration

Collaborative Feedback (Discussion & Decision)

- Study 1 – Update to Appliance Recycling Savings Model:
  - Questions?
  - Group discussion/decision on proposed research?

- Study 2 – Research on Potential Update to Home Energy Reports Savings Model
  - Questions?
  - Group discussion/decision on proposed research?