



EM&V Uniform Methods Project Refrigerator Recycling Steering Committee Update

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Agenda

- Program Description
- Author Introduction
- Review Process and Reviewers
- Overview of Protocol
- Reviewer Feedback

Refrigerator Recycling

Measure Overview

- Save energy by removing old-but-operable refrigerators from service using incentives, education, and free pick-up and decommissioning
- Program designed to encourage customers to:
 - Discontinue using secondary units
 - Relinquish units previously used as primary units when replaced (rather than keeping as second unit)
 - Prevent continued use in another household through direct transfer (giving it away or selling it) or indirect transfer (resale on the used appliance market or donation)

Author

- Lead Author: Doug Bruchs, The Cadmus Group
 - Assisting Author: Josh Keeling, The Cadmus Group
- Relevant Experience
 - 2006-2008 CPUC Appliance Recycling Evaluation (PG&E, SCE, SDG&E)
 - 2007-2011 Ontario Power Authority Great Refrigerator Roundup
 - Others recycling evaluations include: Ameren Illinois, Ameren Missouri, Progress Energy, Salt River Project, PacifiCorp, Detroit Energy, and Consumers Energy

Review Process

- TAG Kick-Off Meeting: November 18th
- Draft (v1) provided to TAG: December 27th
- Draft (v1) provided to SC: January 23rd
- SC Presentation: January 30th
- Revised Draft (v2) provided to TAG: March 28th
- Revised Draft (v3) provided to SC: April 23rd

Reviewers

Technical Advisory Group

- M. Sami Khawaja (Cadmus)
- Pete Jacobs (Building Metrics)
- Feitau Kung (NREL)
- M. Sheppy (NREL)
- Kristin Field (NREL)
- Ryan Del Balso (Navigant)
- Wayne Leonard (Navigant)

Steering Committee

- Steve Schiller (Schiller Consulting)
- Bill Newbold (DTE Energy)

Technical Expert

- Mimi Goldberg (KEMA)

Gross Savings

Addresses Gross and Net Savings

Recommended Approach:

- *In Situ* Metering Study
 - Protocol touches on sampling, study duration and timing, metering equipment, participant recruitment, and best installation and removal practices
 - Recommends leveraging existing *in situ* data should metering not be possible

Gross Savings (cont.)

Once metering study is complete (or existing data accessed)...

- Regression Modeling
 - Model annual energy consumption (dependent variable) as a function of various appliance characteristics (independent variables)
 - Use model coefficients to estimate annual energy of all recycled units (using detailed program data)
 - Calculate program average
 - Adjust for part-use to determine average per-unit gross savings

Net Savings

- Rely Multiple Sources
 - Participant surveys (recommend using iterative battery)
 - Nonparticipant surveys (to mitigate socially desirable response bias)
 - Market research (to understand natural lifecycle of old-but-operable refrigerators)
- Account for Induced Replacement
 - Replacement relevant only if the program causes purchase of new unit that otherwise would not have occurred
 - Otherwise, replacement is part of naturally turnover of appliance stock
 - The program focuses on avoiding the continued use of the replaced unit

Reviewer Feedback

- Part-use should be forward looking (change made)
- Regression model needs to account for both CDD and HDD (change made)
- “Kept but not used” freeridership option should be dropped (change made)

Reviewer Feedback (cont.)

Differing opinions regarding...

- The appropriate level of model specificity
 - Decision: Protocol does not specify exact terms, but provided list of variables that must be considered
- Whether induced replacement is a gross or net issue
 - Decision: Induced replacement is essentially negative spillover (the program caused load growth) and is separate from program savings generated by the recycling of refrigerators