U.S. DEPARTMENT OF ENERGY

2017 Protocol Updates – Presentation of Proposed Revisions

April 4, 2017

UNIFORM METHODS PROJECT

Agenda

U.S. DEPARTMENT OF ENERGY

Estimated Timing (Eastern Time)	Protocol	Update Type
2:10 - 2:20	Refrigerator Recycling	Minor
2:20 - 2:30	Residential Behavior	Minor
2:30 - 2:45	Whole Building Retrofit with Consumption Data Analysis	Major
2:45 - 2:55	Compressed Air	Minor
2:55 - 3:10	Small Commercial and Residential Unitary and Split System HVAC Cooling Equipment-Efficiency Upgrade	Major
3:10 - 3:20	Commercial and Industrial Lighting	Major
3:20 - 3:30	Residential Lighting	Major
3:30 - 3:40	Peak Demand and Time-Differentiated Energy Savings	Minor
3:40 - 3:50	Estimating Net Savings: Common Practices	Minor

Refrigerator Recycling

Doug Bruchs, Cadeo
Jason Christensen, Cadmus

Refrigerator Recycling

1. **Drop Induced Replacement.** Confusing, difficult to implement accurately, and counter-intuitive. Not impactful enough to offset negatives.

2. **Update UEC Regression Model.** Only if additional metering data exists. Is anyone aware of any new data?

3. **Include Freezer UEC Regression Model.** Section 7.2 mentions the protocols applicable for freezers but does not include freezer-specific UEC coefficients.

4. **Add Emphasis re: High Satisfaction Levels.** Even if only moderately cost-effective, ARPs are an overwhelming positive experience for utility customers and lead to participation in other programs.

Residential Behavior

Jim Stewart, Cadmus
Annika Todd, LBL

Residential Behavior

1. **Update protocol with latest findings regarding comparative efficacy of RCT/REDs vs. other regression methods**
   - LBNL paper comparing RCT with propensity score matching and regression discontinuity
2. **Provide more guidance about estimating impacts of BB programs on efficiency program participation (EE program uplift)**
3. **Incorporate Allcott and Rogers (2014) "Post-only" model into regression specification section**
4. **Update discussion about statistical power analysis with findings of Burlig, Preonas, and Woerman (2017)**

Whole Building Retrofit with Consumption Data Analysis

Miriam Goldberg, DNV GL
Ken Agnew, DNV GL

Whole Building Retrofit with Consumption Data Analysis

1. **Expand Allowable Modeling Options.** Include pooled with comparison group, randomized encouragement design, instrumental variables and inverse Mills ratio. Balance caveats.

2. **Clarify Language Around Comparison Group and Net Savings.** No fundamental change here but language can be improved.

3. **Clarify Scope.** Can be used beyond whole-house, but is not only approach for whole house. Expand to daily but leave hourly for another chapter.

4. **Gather more Input.** Discussions still in process.

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Compressed Air

Nathanael Benton, Nexant
Patrick Burns, Nexant

Compressed Air (1 of 2)

1. **Provide more specific guidance on baseline assumptions for new construction and replace on failure applications.**
   - Generally most stringent of 1) applicable state or local building code, 2) market industry average practice in state, or 3) ASHRAE 90.1-2007/2009 IECC.
2. **Provide further guidance for load/unload compressor units with varying receiver capacities.**
   - Add performance curves for 5 gal/CFM and demonstrate method for developing unique performance curve through interpolation. Eliminate part-load values from *Table 1. Average Percent Power Versus Percent Capacity for Rotary Screw Compressors* for On/Off Controls as this is misleading. On/Off should simply be 0% when off and 100% load when on.
3. **Provide M&V guidance for developing CFM bins.**
   - Use average hourly estimates. Discuss advantages of incorporating day types into analysis. Identify when historical trend data can be used in lieu of independent metering.

Compressed Air (2 of 2)

4. **Emphasize the use of ultrasonic leak detectors as a means for identifying compressed air leaks, not quantifying them.**
   - Reductions in leakage should be quantified trough pre and post leakdown tests. Add an example calculation demonstrating proper use of adjustment factors in Table 3.
5. **Correct/Simplify Equation 3: Correcting for Full-Load Performance.**
   - Algorithm currently uses exponent of ((0.395/1.395)-1), but should simply be (0.395/1.395).
6. **Provide additional default performance curves for other air compressor/control system types.**
   - Centrifugal air compressors with Inlet Butterfly Valves w/ Blowoff or Inlet Guide Vanes w/ Blowoff. Reciprocating compressors w/ On/Off or Load/Unload controls.

Small Com/Res Unitary and Split System HVAC Cooling Equipment-Efficiency Upgrade

Jarred Metoyer, DNV GL

David Jacobson, Jacobson Energy Inc.

Small Com/Res Unitary and Split System HVAC Cooling Equipment-Efficiency Upgrade (1 of 2)

1. **Expand to include some heating equipment.** Include basic upgrade from standard to high eff for DMSHP, GSHP, and ASHPs.
   - No fuel switching - like higher replacement only
   - GSHP may end up being too complex
   - No early replacement (usually not cost-effective)
2. **Update regression model.** Include heating and fact that most new high efficiency units are variable speed or two stage. Change point model.
3. **Update example protocols listed.** Current ones are dated; many programs are upstream.
4. **Update data requirements.** Include more detailed model numbers with imbedded information

Small Com/Res Unitary and Split System HVAC Cooling Equipment-Efficiency Upgrade (2 of 2)

5. **Variable Refrigerant Flow (VRF).** Not included as too complex.
6. **Calibrated Simulation.** Will downplay calibrated simulation as true EM&V option for this measure.
7. **No Expanding to Additional Features.** Not covering dual enthalpy economizers, heat recovery, multi-unit controls, solar-assist, etc. due to budget
8. **Continue with no mention of demand savings.** In separate protocol.
9. **AMI.** No adoption of AMI recommendation.

Commercial and Industrial Lighting

Dakers Gowans, Left Fork Energy
Chad Telarico, DNV GL

C&I Lighting (1 of 2)

1. Midstream programs, new section

- Distinguishes between incentive/rebate, upstream, midstream programs
- Adapts incentive/rebate program procedures for midstream conditions
- Includes methods to collect measure and site data needed for evaluation
- Adds in-service rate to savings algorithm as an independent variable

2. Duration of metering, update

- Provide additional detail on recommended metering length of time
- Compare reliability of estimated hours of use for 3, 12 month metering periods

3. Interactive effects, update

- Add subsection on estimating site-specific interactive effects

C&I Lighting (2 of 2)

4. LED lamp/fixture wattage, update

- Provide guidance for creating fixture codes for LED fixtures not currently found in most look-up tables.

5. Reporting uncertainty, update

- Provide formulae and worked example to estimate uncertainty of verified savings.
- Draws on material in new uncertainty section in IPMVP
- Does not replace UMP Sample Design protocol

6. New construction, update

- Apply the controls requirements of IECC 2012 / 90.1-2010 to estimate of baseline hours of use.

Residential Lighting

Scott Dimetrosky, APEX Analytics

Residential Lighting

1. **Focus on LEDs.** Language is still focused on CFLs.
2. **Update in-service rate.** Simplify for lifetime ISR.
3. **Cross-sector sales/Leakage.** Provide some example values.
4. **Address EISA changes.** Expansion of GSLs, reflectors, and lifetime of lamps given post-2020 changes.
5. **Hours of use.** Update with any new metering studies
6. **For discussion:** Value line LEDs – baseline or NTG?

Peak Demand and Time-Differentiated Energy Savings

Frank Stern, Navigant

Peak Demand and Time-Differentiated Energy Savings

1. **Expand definition of coincidence and diversity factor.** Other definitions exist, mention IEC60050 definition.
2. **Interval metered data analysis.** Expand discussion to include recent work related to non-intrusive load monitoring.

Estimating Net Savings: Common Practices

Dan Violette, Navigant
Pam Rathbun, Tetra Tech

Estimating Net Savings: Common Practices

1. **Expand the discussion of Algorithms and their use within survey methods.** There have been some workshops on this topic and reviews of the literature that have produced new insights and a number of strong additions to the literature.
2. **There have been advances in matching as part of quasi-experimental designs.** We now have examples of the Use of AMI data, and more recent matching studies.
3. **Update the Common Practice Baseline work with examples of how CPBs have been set.** The theory of CPB is pretty well presented but can be smoothed out, but we would like to add a discussion of how CPBs have or might be developed in practice. Some work from NW, CA and MA are candidates for addition as citations.

Other areas where a some text will added and citations updated are:

- **Top-down methods to include the work in New England.**
- **Market transformation and spillover work**