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May 11, 2015

VIA eFILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
P.O. Box 3265
Harrisburg, PA 17105-3265

Re: **Technical Reference Manual 2016 Update - Docket No. M-2015-2469311**

Dear Secretary Chiavetta:

Pursuant to the Commission's March 26, 2015 Tentative Order in the above-referenced docket, enclosed please find **Comments of PECO Energy Company on the Proposed Update to the Technical Reference Manual**.

As instructed, the Comments have been mailed electronically, in Word format, to Megan Good (megagood@pa.gov) and Kriss Brown (kribrown@pa.gov).

Please do not hesitate to contact me if you have any questions.

Very truly yours,

Michael S. Swerling

Enclosure

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2016 Update	:	**Docket No. M-2015-2469311**

COMMENTS OF PECO ENERGY COMPANY ON THE PROPOSED UPDATE TO THE TECHNICAL REFERENCE MANUAL

Pursuant to the March 26, 2015 Tentative Order entered by the Pennsylvania Public Utility Commission (the "Commission") in the above-referenced docket, PECO Energy Company ("PECO" or the "Company") hereby submits comments on the Commission's proposed 2016 update to its Technical Reference Manual ("TRM").

PECO appreciates the Commission's efforts to complete an updated TRM that will serve as a more effective tool for validating savings and providing support for Act 129 goals. PECO agrees that the Commission should continue to broaden the scope of the TRM to reflect new energy efficiency and conservation ("EE&C") measures being implemented by electric distribution companies, as well as to clarify and streamline TRM protocols. PECO also supports the Commission's proposal to apply the 2016 TRM for the entirety of the Phase III EE&C program, and commends the Commission for clearly addressing upcoming federal energy standards and indicating which standards will be in effect during a given program year.

The Company's specific, section-by-section comments are attached to this document as Appendix A. PECO would also like to note that the Tentative Order contains a footnote concerning what kinds of demand reductions will be considered for purposes of complying with

the proposed Phase III demand reduction targets.[1] The Company believes that this clarification should have been included in the Phase III Tentative Order at Docket No. M-2014-2424864, which presented the Commission's recommended demand reduction targets.

Overall, the Company believes that great progress has been made through the TRM update process and looks forward to continued participation in the process. PECO appreciates the opportunity to comment on this important matter and believes that the Company's recommended revisions can improve the effectiveness of the Technical Reference Manual.

Respectfully Submitted,

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For PECO Energy Company

May 11, 2015

[1] *See* Tentative Order, p. 6, n.15 ("The Commission would like to clarify that it proposed peak demand reduction targets to be met through the implementation of demand response programs only, and not through the attainment of coincident peak demand reductions resulting from the installation of energy efficiency measures.").

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Implementation of the Alternative	**:**	
Energy Portfolio Standards Act of 2004:	**:**	
Standards for the Participation of	**:**	**Docket No. M-2015-2469311**
Demand Side Management Resources –	**:**	
Technical Reference Manual 2016 Update	**:**	

COMMENTS OF PECO ENERGY COMPANY ON THE

PROPOSED UPDATE TO THE TECHNICAL REFERENCE MANUAL

APPENDIX A

Contents

Cross-Cutting Comments to the Draft Pennsylvania PUC June 2016 Technical Reference Manual

Comments:

- Several protocols continue to have a *Measure Life* subsection, even though Measure Life was added to the introductory tables for every protocol. There is also a complete table in the updated TRM Appendix A: Measure Lives section. We recommend the *Measure Life* subsections be removed from each protocol and any supporting information to justify the measure life in the subsection be moved to TRM Appendix A to reduce the chance for errors if the measure life gets updated in one location and not the other.

- There are several cross reference errors throughout the draft TRM document. All table cross-references should be reviewed and corrected as necessary prior to releasing the final TRM. Where errors were observed they are listed in these comments, however, it is likely that PECO did not capture all errors during its review.

Section Specific Comments to the Draft Pennsylvania PUC June 2016 Technical Reference Manual

Section 1: Introduction

Section 1.2.3 End-use Categories & Thresholds for Using Default Values

Comments:

- In order to incorporate flexibility into the TRM for a five year phase, we recommend the following footnote from Section 3.1 (footnote 240 on page 231 of the draft 2016 TRM) be added to "Table 1-2: kWh Savings Thresholds" to clarify that it applies to all projects exceeding the thresholds.

  > *The Commission allows the EDCs to use alternative methods for obtaining customer-specific data where customer processes do not support metering. The EDCs are required to provide supporting documentation to the SWE for review if there are any such exceptions.*

  Inclusion of this footnote will provide needed flexibility to address unforeseen project circumstances that may not conform to the assumptions that the threshold metering requirements are based on.

Section 1.12.4 Verified Gross Adjustments

Comments:

- This section states that "if the number of widgets found on-site is more than what is stated on the application, the savings will be capped at the application findings." The basis of this requirement is that incentives only influence installation of individual units and that project owners make decisions at the individual unit level. We recommend this provision be removed because, based on the Company's experience, incentives generally influence customers at the project level, not the individual unit level.

  This requirement mostly affects lighting projects and other measures with high unit quantities like insulation or occupancy sensors. The decision to install "high volume" measures is generally made at the project level and the incentives given by the EDCs influence the overall decision to proceed with the project. Final quantities of such measures are not always known during the planning and pre-application stages when an owner makes the decision to move ahead with the project based on an expectation of receiving the incentives upon project completion. A decision must be made to move forward with a project based on assumed quantities that may increase or decreased during construction due to unforeseen issues. Owners understand that final quantities are prices may differ slightly upon completion and include contingency funds to accommodate such fluctuations.

  It is the Company's experience that final applications with widget quantities that differ from actual findings are typically due to errors in counting, not due to the customer not expecting the incentive for the units not counted correctly.

Section 1.14 Transmission and Distribution System Losses

Comments:

- The line loss factors ("LLF") listed for PECO in Table 1-4 should be updated to include the LLF value that PECO provided to the SWE (1.074) which was based on a recent study conducted by Navigant. This value was developed from PECO's 2012 published tariff weighted by rate classes.

Section 2: Residential Measures

Section 2.1 Lighting

2.1.1 ENERGY STAR Lighting

Comments:

- The Measure Life for residential LEDs is currently listed as 14 years in the introductory summary table of Section 2.1.1. Footnote 27 explains, "All LED bulbs listed on the qualified ENERGY STAR product list have a lifetime of at least 15,000 hours. Assuming 3.0 hours per day usage, this equates to 13.7 years. The average measure life may be higher than this minimum, so the lifetime was rounded to 14 years." This is a very conservative assumption. Of the 4622 LED bulbs listed on the ENERGY STAR Certified Products List as of April 21, 2015, only 65 bulbs have a lifetime listed less than 25,000 hours. Using 25,000 hours yields an estimated measure life of 22.8 years rather than the 14 years assumed by the SWE. We recommend the measure life for LED bulbs be increased to 15 years (the maximum measure life allowed by Act 129 to determine TRC ratios) in recognition that the measure life for the vast majority of LED bulbs will likely far exceed the 14 years proposed in the TRM.

Definition of Terms

Comments:

- In Table 2-1, the Component $Watts_{EE}$ includes "Wattage of CFL" in the description. This should be removed to reflect the fact that this protocol applies equally to all efficient lighting types including CFLs and LEDs.

Variable Input Values

Comments:

- We recommend Table 2-5 be updated to use only one set of hours of use ("HOU") and coincidence factor ("CF") values that most closely reflect the actual program savings. It is unrealistic to require a determination of percentage of a home's sockets that have efficient bulbs for an upstream lighting program. This is likely only possible in direct install programs, but it would be difficult to implement using two different HOU for similar homes without causing confusion among the implementers.
- If the Commission decides to keep both the "Efficient HOU" and "All Bulbs HOU" in Table 2-5, it should clearly explain when each set of values should be used.

Section 2.2 HVAC

2.2.5 Room AC (RAC) Retirement

Definition of Terms

Comments:

- EER_{ee} is defined as 12.1 in Table 2-18. Source 5 explains that 12.1 is derived using the ENERGY STAR version 4.0 Combined Energy Efficiency ("CEER") and the ratio of Energy Efficiency Ratio ("EER") to CEER defined in ENERGY STAR Version 3.1. However, the ENERGY STAR Version 3.1 does not specify a ratio of EER to CEER. CEER accounts for power consumption measured in standby/off mode. Dividing the EER by the CEER to obtain a ratio may therefore not be a reliable way to convert from a Version 4 CEER to an equivalent Version 4 value for EER. The explanation in Source 5 should be updated to better explain the listed EER_{ee} value of 12.1, or the value itself should be updated using another source.

2.2.7 Furnace Whistle

Definition of Terms

Comments:

- In Table 2-31, the source for $EFLH_{cool}$ contains an error message of **Error! Reference source not found**. Please update it with the appropriate cross-reference.

Section 2.3 Domestic Hot Water

2.3.1 Heat Pump Water Heaters

Definition of Terms

Comments:

- In Table 2-45, the source for EF_{ee} is not listed. Please update the table so that the source is included.

2.3.3 Fuel Switching: Electric Resistance to Fossil Fuel Water Heater

Default Savings

Comments:

- The units for Fossil Fuel Consumption in the third column of Table 2-55 do not agree with the units used in the Algorithms section. The units should be updated to MMBtu/yr.

2.3.4 Fuel Switching: Heat Pump Water Heater to Fossil Fuel Water Heater

Algorithms

Comments:

- The subscript for *EF* in the Fuel Consumption algorithm should be updated from $EF_{NG,inst}$ so that it is not specific to natural gas.

Default Savings

Comments:

- The subscript for *EF* in the Fossil Fuel Consumption algorithm should be updated from $EF_{NG,inst}$ so that it is not specific to natural gas.

2.3.7 Water Heater Pipe Insulation

Eligibility

Comments:

- The eligibility in this measure protocol states that it applies to "insulating **10 feet** of exposed pipe" which greatly limits the application. We suggest that this eligibility description be revised so it refers to "insulating exposed pipe" without any specific pipe length requirement. Implementers have expressed confusion in the past as to whether or not they can claim savings for sections of insulated pipe that differ from 10 feet, or if they have to use increments of 10 feet regardless of actual length insulated. Removing this language will increase the applicability of the protocol and reduce confusion.

Section 2.4 Appliances

2.4.4 ENERGY STAR Clothes Washers

Future Standards Changes

Comments:

- The last sentence in the first paragraph of this subsection refers to baseline data in Table 2-79. The correct reference should be to Tables 2-81 and 2-82.

Default Savings

Comments:

- The sentence that introduces Table 2-83 incorrectly references Table 2-79. Please revise the sentence to refer to Table 2-83.

Sources

Comments:

- Source 6 references an engineering assumption from the 2014 Illinois and Mid-Atlantic TRMs. The IL TRM references a RECS survey as the source, however, the value appears to be a simple assumption. The Mid-Atlantic TRM sites an Empower metering study, which is a more reliable reference than a RECS survey. We recommend the reference be updated to the original data source rather than another TRM that may change from year to year.

Section 2.6 Building Shell

2.6.1 Ceiling / Attic and Wall Insulation

Definition of Terms

Comments:

- In Table 2-106, footnotes 195 and 196 should be removed as they no longer apply. These are holdovers from earlier versions of the TRM and are misleading here. Similarly, the text in the Source column, "15 Assumes existing, un-insulated wall with 2x4 studs @ 16" o.c., w/ wood/vinyl siding" should be removed as well. The default values have since been changed which renders those references incorrect.

2.6.7 Crawl Space Wall Insulation

Default Savings

Comments:

- The sentence that introduces Table 2-119 incorrectly references Table 2-115. Please revise the sentence to refer to Table 2-119.
- In Table 2-122, the η_{heat} *Effective COP Estimate* values should be updated to use 3.412 rather than 3.413 to be consistent with the rest of the TRM.

2.6.8 Rim Joist Insulation

Default Savings

Comments:

- In Table 2-127, the η_{heat} *Effective COP Estimate* values should be updated to use 3.412 rather than 3.413 to be consistent with the rest of the TRM.

Section 3: Commercial and Industrial Measures

Section 3.1 Lighting

3.1.1 Lighting Fixture Improvements

Definition of Terms

Comments:

- The lighting HOU and CFs in Tables 3-5 and 3-6 no longer include several space and/or building type options that were available in previous TRMs. It is not clear why these building types were removed as some building types that were not part of the SWE Lighting Metering Study appear to have been retained, while others were dropped with no explanation. This change will hamper implementation efforts and increase the barriers to participation. We recommend that the space and/or building type options listed below, or their equivalents, be included in the tables once again.
    - Auto Related
    - Daycare
    - Libraries
    - Lodging – Guest Rooms
    - Lodging – Common Spaces
    - Multi-Family (Common Areas) – High Rise and Low Rose
    - Public Order and Safety
    - Public Assembly (One Shift)
    - Religious Worship/Church
    - Storage Conditioned/Unconditioned
    - 24/7 Facilities or Spaces

  Alternatively, we request that guidance be provided for allocating space and/or building types that were previously included into the current space and/or building types.

  Also, if HOU and CF are not specifically available for the screw-based lamps for the above listed building types, we recommend using the non-screw-based HOU and CF for each building type until such time as screw-based defaults can be developed.

- The Tentative Order specifically proposes to drop the "other" building type, explaining that it is no longer necessary because custom HOU and CFs can be used in the Appendix C calculator. The purpose of the "other" building type is to accommodate building types that do not fit into the provided categories regardless of the project HOU or CF. Removing the "other" building type will certainly lead to confusion on the part of implementers and evaluators as they try to apply the included building types to all buildings, even though a particular project may not clearly fit into any of the provided building types. We recommend the "other" building type be included in the tables once again.

Section 3.2 HVAC

3.2.1 HVAC Systems

Definition of Terms

Comments:

- Similar to the 2015 TRM, the Equivalent Full Load Hours ("EFLH") and CFs in Tables 3-25, 3-26 and 3-27 no longer include several space and/or building type options that were available in previous TRMs. We recommend that the space and/or building type options listed below, or their equivalents, be included in the tables once again as the tables leave out several common building types.
    - Manufacturing – 2 Shift Industrial
    - Manufacturing – 3 Shift Industrial
    - Lodging – Motel
    - Lodging – Dormitory
    - Lodging – Residential
    - Multi-Family - Common Areas
    - Museum/Library
    - Parking Garage
    - Penitentiary
    - Police/Fire Station (24 hr.)
    - Post Office/Town Hall/Court House
    - Warehouse – Not Refrigerated
    - Waste Water Treatment Plant

  For building types not listed in the tables, the TRM requires EFLH be "Based on Logging, BMS data or Modeling." These are burdensome requirements and create a barrier to participation. The Commission has not shown that the values in the previous TRMs for the additional building types were inherently unreliable, but they have been removed nonetheless. While we support the updates that were done to the included building types using the SWE's modeling data, we recommend the removed building types be included using the old references or updated references if available.

  "Multi-Family – Common Areas" is a building type of key concern as the Commission has recognized an increased focus on multi-family facilities in Phase II and the proposed Phase III. Most multi-family buildings do not have Building Management Systems in place and requiring modeling or logging to determine EFLH would be a significant barrier to participation for this important customer base.

- We recommend an "Other" building type be included in Tables 3-25, 3-26 and 3-27 to allow for buildings that do not fit cleanly into the provided building types. The values provided for this "Other" category could either be an average of the rest of the building types, or the TRM could require "EDC Data Gathering" to develop values.

- We request that the name of the Manufacturing – Bio/Tech option be updated to be more descriptive. For example, we request that it be made clear whether this option refers to biotechnology facilities, biological facilities, general technology facilities, or all of the above.

3.2.4 Ductless Mini-Split Heat Pumps – Commercial < 5.4 Tons

Definition of Terms

Comments:

- In Table 3-37, the $HSPF_b$ value for electric resistance should be updated to 3.412 rather than 3.413 to be consistent with the rest of the TRM.
- In Table 3-37, the $SEER_b$ value for new space or no cooling in an existing space is said to be the same as the Room AC value. We suggest that a footnote be added to explain the reasoning for this decision.

Section 3.4 Domestic Hot Water

3.4.1 Heat Pump Water Heaters

Algorithms

Comments:

- The 2014 Non-Residential End Use and Saturation Study does not appear to define the typical square footage for the building types listed in Table 3-69. The premises are included, as are the building stock square feet, but the detailed breakdown included in Table 3-69 is not in the document. We suggest that the information for this source be updated to include more details about the way the typical square footage for the listed building types was calculated. Alternatively, we suggest that the source include the reference to any supplemental analysis based on the 2014 Non-Residential End Use and Saturation Study that shows this breakdown.

Definition of Terms

Comments:

- Source 6 references an engineering assumption. We request that more details be added to explain the background of the engineering assumption. Alternatively, we suggest that another source be used for this parameter.

3.4.4 Fuel Switching: Electric Resistance Water Heaters to Gas/Oil/Propane

Definition of Terms

Comments:

- The variable for the baseline minimum energy factor in Table 3-78 should be updated so that it says EF_{base}.

3.4.5 Fuel Switching: Heat Pump Water Heaters to Gas/Oil/Propane

Definition of Terms

Comments:

- The variable for the baseline minimum energy factor in Table 3-82 should be updated so that it says EF_{base}.
- The values for E_{base} (which we recommended be updated to EF_{base}) in Table 3-82 do not reflect the updated federal standards. The values should be updated (see Table 3-78 for reference).

Section 3.5 Refrigeration

Comments:

- The measure protocols for refrigeration do not address the upcoming federal standards listed below.
    - Walk-in Coolers and Freezers Federal Standard update (compliance date of June 5, 2017)
    - Commercial Refrigeration Products Federal Standard update (compliance date of March 27, 2017)

  We recommend that the measure protocols be updated to include these upcoming standards.

Section 5: Demand Response

Section 5.1 Load Curtailment

Definition of Terms

Comments:

- Because a DR Aggregator program consisting of participants that do not already participate in PJM's Emergency Load Response Program ("ELRP") is likely to have hundreds of participants, optimizing the customer baseline ("CBL") calculation on a site by site basis may be impractical. We recommend that the first criteria listed for the CBL selected for each participating site in an EDC Load Curtailment program be changed to:
    - "Selected on a site-by-site basis where feasible, otherwise the most appropriate CBL for the program in aggregate should be selected."
- The second criteria listed for the CBL selected for each participating site in an EDC Load Curtailment program should be made more explicit. The language should be updated to say:

    "*Based on* the same *algorithm* for each DR event in a program year for a given site"

- The reference to each participating site in the final paragraph of the CBL selection section should be changed from "each participating site" to "each participating site or the program in aggregate."

Section 5.2 Residential Load Control

Comments:

- PECO currently has a cost effective small commercial direct load control program that it intends to integrate into its overall DR portfolio. PECO uses the same methodology to claim and evaluate savings for the small commercial customers as the residential customers due to similar expectations in performance characteristics. PECO recommends that all references to Residential Direct Load Control in this section be changed to Residential and Small Commercial Direct Load Control.
- PECO recommends that all references to a participant's "home" in this section be changed to a participant's "premises" to reflect the aforementioned change.