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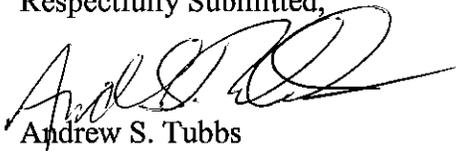
Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor North
P.O. Box 3265
Harrisburg, PA 17105-3265

RE: Implementation of the Alternative Energy Portfolio Standards of 2004: Standards for the Participation of Demand Side Management Resources - Technical Reference Manual 2013 Update - Docket Nos. M-2012-2313373 & M-00051865

Dear Secretary Chiavetta:

Enclosed for electronic filing are the Comments of PPL Electric Utilities Corporation in the above-referenced proceeding.

Respectfully Submitted,



Andrew S. Tubbs

AST/jl

Enclosure

cc: Kriss Brown, Law Bureau (*via E-mail*)

Megan G. Good, Bureau of Technical Utility Services (*via E-mail*)

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Implementation of the Alternative Energy	:	
Portfolio Standards of 2004: Standards for	:	Docket Nos. M-2012-2313373
the Participation of Demand Side	:	M-00051865
Management Resources - Technical	:	
Reference Manual 2013 Update	:	

**COMMENTS OF
PPL ELECTRIC UTILITIES CORPORATION**

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

I. INTRODUCTION

By Tentative Order entered September 13, 2012, the Pennsylvania Public Utility Commission (“Commission”) requested comments on the proposed 2013 update of the Commission’s Technical Reference Manual (“TRM”).¹ PPL Electric Utilities Corporation (“PPL Electric” or the “Company”) has actively participated in all of the proceedings instituted by the Commission to implement Act 129 of 2008, 66 Pa.C.S. § 2806.1 (“Act 129”). The Company appreciates this opportunity to comment on the Commission’s proposed 2013 revisions to the TRM (“2013 TRM”).

PPL Electric generally agrees with many of the changes proposed in the 2013 TRM. However, the Company has identified some areas that it believes require modification and/or clarification. Although PPL Electric generally supports the proposed changes set forth in the 2013 TRM, PPL Electric maintains its previously presented legal arguments relative to the Commission’s use of the TRM process to modify the Company’s Commission-approved Energy

¹ *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2013 Update* (Order entered September 13, 2012), Docket Nos. M-2012-2313373 and M-00051865 (“Tentative Order”).

Efficiency & Conservation plan (“EE&C Plan”)² and the potential adverse affect that the TRM process could have on an electric distribution company’s (“EDC”) compliance with Act 129. PPL Electric incorporates by reference its previously stated legal arguments in this docket on these issues.³

II. PPL ELECTRIC’S COMMENTS ON THE 2013 TRM UPDATE

PPL Electric provides specific technical comments on the proposed modifications contained in the proposed 2013 TRM. As noted above, the Commission undertakes an annual review and update of the TRM. PPL Electric supports this process, as it provides necessary guidance to EDCs in identifying new measures that may be added to their existing EE&C Plans through established procedures and provides needed clarifications and corrections. Further, the continued updating of the TRM serves to provide the EDCs with a useful tool in preparing for possible future EE&C Plans following the conclusion of their existing programs. Generally, PPL Electric agrees with the proposals contained in the *Tentative Order*, however, as discussed below, the Company requests that the Commission revise certain aspects of the proposed 2013 TRM and clarify certain determinations made in the *Tentative Order*.

In the following sections PPL Electric provides its technical comments on proposals contained in the *Tentative Order*, PPL Electric has organized its technical comments in the same order that the topics are addressed in the *Tentative Order*. However, PPL Electric does not

² See, e.g., *Petition of PPL Electric Utilities Corporation for Approval of its Energy Efficiency and Conservation Plan* (Order entered October 26, 2009), Docket No. M-2009-2093216; *Petition of PPL Electric Utilities Corporation for Approval of its Energy Efficiency and Conservation Plan* (Order Entered February 17, 2010), Docket No. M-2009-2093216; *Petition of PPL Electric Utilities Corporation for Approval of its Energy Efficiency and Conservation Plan* (Order Entered May 6, 2011), Docket No. M-2009-2093216.

³ Specifically, PPL Electric incorporates the legal arguments contained in the “Comments of PPL Electric Utilities Corporation” filed on December 27, 2010 at Docket No. M-00051865, pp. 29-46 (as applicable), and its Petition for Review of the Order approving the 2011 TRM.

provide technical comments on every Commission proposal; therefore, all of the numerical headings contained in the *Tentative Order* are not reproduced below.

A. RESIDENTIAL EE&C MEASURE PROTOCOLS AND PROCESSES

1. Electric HVAC Protocols

a. Sizing Algorithm

As explained by the Commission in the *Tentative Order*, in the 2011 TRM,⁴ an algorithm existed for savings associated with the installation of a properly-sized air conditioner, but this algorithm was removed in the 2012 TRM.⁵ *Tentative Order*, p. 13. According to the Commission, the new cooling estimated full load hours (“EFLH”) values, noted above, will account for over-sizing and there is currently no algorithm for the proper sizing of air conditioners. EDCs that have programs which require contractors to prove proper sizing of equipment to receive a rebate will not receive the savings credit associated with proper sizing. *Id.* The Commission proposes reinserting the proper sizing savings algorithm for cooling HVAC, *i.e.*, heating, ventilation, and air conditioning, equipment to allow EDCs to claim savings for a properly-sized HVAC and continue offering programs that require proper sizing as a condition to receive rebates. *Id.*

PPL Electric supports the addition of the proper sizing savings algorithm. Notably, the proposed algorithm was added to Section 2.1.1 of the TRM and that section is applicable to central air conditioners and air source heat pumps. Therefore, PPL Electric requests that the Commission add a comparable algorithm for the proper sizing of air source heat pumps or adjust

⁴ See *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual Update* (Order entered February 28, 2011), Docket No. M-00051865 (“2011 TRM”).

⁵ See *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2012 Update*, (Final Order entered December 16, 2011), Docket No. M-00051865 (“2012 TRM”).

the algorithm to account for the savings in heating mode due to proper sizing. This will permit EDCs to claim savings for properly-sized air source heat pumps as well as for cooling HVAC equipment.

2. ENERGY STAR Appliances

a. Future Federal and ENERGY STAR Standards

In the *Tentative Order*, the Commission explained that there are several federal minimum efficiency and ENERGY STAR standards updates that will be occurring over the course of the next three years. *Tentative Order*, p. 21. The Commission proposes the changes to the baseline and efficient appliances and their effective date, which is to coincide with the beginning on the appropriate program year, for each appliance's respective protocol. *Id.* According to the Commission, because the federal standards changes would affect room air conditioners in 2014 and refrigerators, freezers and clothes washers in 2015, the Commission proposes that these protocols be reviewed during future TRM updates. *Id.*

Concerning this proposal, PPL Electric only notes that there appears to be a typographical error in the title for Table 2-48 in the proposed 2103 TRM. The title currently reads as follows, "Federal Freezer Standards Effective as of the 2015 TRM." However, the table refers to "refrigerators," therefore the title of Table 2-48 should reference "refrigerators" and not freezers.

3. Refrigerator/Freezer Replacement and Recycling Protocols

As explained in the *Tentative Order*, the Commission previously directed the Technical Working Group ("TWG") to investigate and evaluate alternative savings protocols for refrigerator/freezer replacement and recycling used in other jurisdictions to inform future TRM updates. *Tentative Order*, p. 23. The SWE and Commission Staff reviewed the three following

methods for calculating the annual kWh savings relating to removal and/or replacement of refrigerators and freezers.

- Calculation based on the US Environmental Protection Agency (“US EPA”) ENERGY STAR calculator for removed refrigerators and freezers;
- Calculation based on regression analysis of metered data on kWh consumption from other states; and
- Calculation based on an *in situ* metering study conducted in Pennsylvania.

The Commission, in the *Tentative Order*, proposes the use of the second method, a regression analysis of metered data from other states, to determine deemed kWh savings for removed and/or replaced refrigerators and freezers. *Tentative Order*, p. 23. Furthermore, the Commission proposes to report deemed energy savings for the following three scenarios: (1) refrigerator/freezer removed but not replaced; (2) refrigerator/freezer removed and replaced with an ENERGY STAR unit; and (3) refrigerator/freezer removed and replaced with a non-ENERGY STAR unit.

As noted above, for removed refrigerators, the Commission proposes using the regression equation in the *Tentative Order* (p. 26) with Program Year 3 data for removed refrigerators. Since PPL Electric and all other Pennsylvania EDCs have not issued their Program Year 3 Final Annual Reports (with verified savings) as of this *Tentative Order* comment period, the Program Year 3 data that the Commission plans to use in the regression analysis must be unverified, raw data provided by the appliance recycling contractor. Based on preliminary results of the Program Year 3 impact evaluation, the raw data provided by the recycling contractor (which the Commission proposes to use for the 2013 TRM regression equation) for replacement rates, for determining primary/secondary status of the units, and for the location of the unit at time of pick-up are not reliable. This data does not represent where the unit was kept and used because the homeowner often moves the unit to a different location to accommodate pickup. Therefore, PPL

Electric recommends the Commission use evaluator-collected data; the evaluator-collected data is more accurate.

a. Refrigerator Deemed Savings

As explained by the Commission in the *Tentative Order*, the SWE and Commission Staff reviewed multiple documents and data sources to obtain the regression equation used to develop the proposed deemed savings for removal and/or replacement of a refrigerator in Pennsylvania. *Tentative Order*, p. 24. The Commission proposes, in the *Tentative Order*, to use the regression equation from the US DOE Uniform Methods Project (“DOE UMP”) for the 2013 TRM as the basis for deemed savings for refrigerator removal/replacement. *Id.*

PPL Electric believes that the portion of the DOE UMP protocol that applies to estimating gross savings should be used in total in Pennsylvania. However, PPL Electric believes the deemed savings values proposed by the Commission in the *Tentative Order* are derived from the portion of the DOE UMP that applies to net savings. The portion of DOE UMP applying to estimating net savings should not apply because gross savings is the basis for compliance in Pennsylvania. Applying the net savings portion of the DOE UMP protocol to Pennsylvania would significantly underestimate the savings for Pennsylvania since net savings are much lower than gross savings.

Pursuant to the DOE UMP, replacement is only something to be accounted for if the program induces the replacement. That is, the participant would not have replaced the unit without the program. The goal of appliance recycling programs is not to keep participants from buying a new appliance, but rather to keep appliances from being transferred to another party or

kept as a secondary appliance. The following is an excerpt from the DOE UMP, applicable to this situation:⁶

In most cases, the per-unit gross savings attributable to the program is equal to the energy consumption of the recycled appliance (rather than being equal to the difference between the consumption of the participating appliance and its replacement, when applicable). This is because the energy savings generated by the program are not limited to the change within the participant's home, but rather to the total change in energy consumption at the grid level.

This concept is best explained with an example. Suppose a customer decides to purchase a new refrigerator to replace an existing one. When the customer mentions this to a neighbor, the neighbor asks for that existing refrigerator to use as a secondary unit. The customer agrees to give the old appliance to the neighbor; however, before this transfer is made, the customer learns about a utility-sponsored appliance recycling program. The customer decides to participate in the program, since the incentive helps offsets the cost of the new refrigerator. As a result of program intervention, the customer's appliance is permanently removed from operation in the utility's service territory.

From the utility's perspective, the difference in grid-level energy consumption—and the corresponding increase in program savings—is equal to the consumption of the recycled appliance and not (emphasis added) to the difference between the energy consumption of the participating appliance and its replacement. In this example, it is important to note that the participant planned to replace the appliance. In general, the purchase of new refrigerators is part of the naturally occurring appliance lifecycle, generally independent of the program, and tantamount to refrigerator load growth. It is not the purpose of the program to prevent these inevitable purchases, but rather to minimize the grid-level refrigerator load growth by limiting the number of existing appliances that continue to operate once they are replaced.

However, when a recycling program induces replacement (i.e., the participant would not have purchased the new refrigerator in the absence of the recycling program), evaluators must account for the replacement. This issue is addressed in the Net Savings section, which also discusses recycling program's impact on the secondary market and how evaluators should account for these effects. This protocol focuses on the actions of would-be recipients of refrigerators recycled through the program (that otherwise would have been transferred to a new user) when the recycled unit is not available.”

⁶ US DOE, draft Uniform Methods Project protocol titled “Refrigerator Recycling Evaluation Protocol”, prepared by Doug Bruchs of the Cadmus Group, October 2012, <http://ump.pnnl.gov/showthread.php/4902-refrigerator-recycling-evaluation-protocol> Page 14.

Therefore the portion of the DOE UMP protocol that applies to estimating gross savings should be used by the Commission and the description within DOE UMP on estimating net savings should not apply. This is because gross savings are the basis for compliance.

If the Commission decides to use the DOE UMP regression model, the values should be updated, ideally per EDC, but at minimum after each program year across all EDCs. This information, in addition to induced replacement and part-use, should be collected by the evaluators, and not provided by the appliance recycling contractor. The evaluator-collected data are much more accurate. Furthermore, the Commission should be aware that the coefficients for the DOE UMP regression model have been updated for the UMP and are shown below.⁷

Independent Variable	Estimate Coefficient (Daily kWh)
Intercept	0.582
Appliance Age (years)	0.027
Dummy: Manufactured Pre-1990	1.055
Appliance Size (square feet)	0.067
Dummy: Single Door Configuration	-1.977
Dummy: Side-by-Side Configuration	1.071
Dummy: Primary Usage Type (in absence of the program)	0.6054
Interaction: Located in Unconditioned Space x CDDs	0.020
Interaction: Located in Unconditioned Space x HDDs	-0.045

While the coefficients above are part of the latest draft version of the Uniform Methods Project protocol, it may be appropriate for the Commission to defer their use in Pennsylvania until the final version is available. However in any event, the DOE UMP regression model values should be updated, per EDC, or after each program year across all EDCs, as noted above.

⁷ US DOE, draft Uniform Methods Project protocol titled "Refrigerator Recycling Evaluation Protocol", prepared by Doug Bruchs of the Cadmus Group, October 2012. <http://ump.pnnl.gov/showthread.php/4902-refrigerator-recycling-evaluation-protocol>. Page 10 (compare to the July 2012 version).

B. COMMERCIAL AND INDUSTRIAL EE&C MEASURE PROTOCOLS AND PROCESSES

1. Lighting Protocols

a. Hours of Use and Coincidence Factor Values

The Commission explained in the *Tentative Order*, that the Hours of Use (“HOU”) and Coincidence Factor (“CF”) values have not been through a major update since 2009. *Tentative Order*, p. 38. According to the Commission, the SWE and Commission Staff researched improving the current assumptions. *Id.* The SWE and Commission Staff conducted a cross-sectional study to compare HOU and CF values by building type found in the 2012 TRM with TRMs from other regions, and the SWE and Commission Staff found that the HOU and CF values varied widely depending on the actual source. *Tentative Order*, p. 39. In the *Tentative Order*, the Commission determined that the 2011 Mid-Atlantic TRM was the most applicable source for Pennsylvania in the absence of Pennsylvania-specific primary data, and proposes to use it as the primary source for reporting HOU and CF values in the 2013 TRM. *Tentative Order*, p. 39. The Commission explained that the HOU and CF values reported in the 2011 Mid-Atlantic TRM are based on a secondary research study conducted by Itron, Inc. in December, 2010, entitled *Development of Interior Lighting Hours of Use and Coincidence Factor Values for EmPOWER Maryland Commercial Lighting Program Evaluations*, which was presented to the Maryland Public Service Commission. The results reported in the study were derived from the California 2006-2008 Commercial Lighting Study supplemented by the California Database for Energy Efficiency Resources (“DEER”) 2008 Database.

PPL Electric recommends, for the following several reasons, that the Commission maintain the lighting HOU for commercial buildings as stated in the 2012 TRM until such time as Pennsylvania-specific primary data are determined from a Pennsylvania-specific metering

study (light logging). Non-residential lighting comprises a significant proportion of total savings for Pennsylvania EDCs and it is, therefore, important to ensure the savings estimates are reasonably accurate. First, there is no evidence that the existing HOU values for Pennsylvania are inaccurate. PPL Electric's independent evaluator determined from 179 site visits and from metering 27 sites that the actual HOU of the buildings in Program Years 2 and 3 were slightly greater (101% to 117%) than the default values in the 2012 TRM. Appended to these comments as Attachment No. 1 is a report from PPL Electric's independent evaluator regarding the verification of savings from nonresidential lighting measures installed under the Company's EE&C Plan. Program Year 3 uses the 2011 TRM HOU which are nearly identical to the 2012 TRM. Attachment No. 1 demonstrates the HOU in the 2012 TRM are reasonably accurate because the report concludes that on average the estimates of lighting HOU are 101% of metered HOU. Therefore, if the 2013 TRM reduces those HOU, lighting savings based on the proposed 2013 TRM would significantly under-report the true savings. If the Commission implements the HOU specified in the *Tentative Order*, the EDC or its evaluator would perform extensive light logging for most-to-all projects in the population or the random sample because the TRM requires logging if the actual HOU are believed to be "significantly different" than the default HOU specified in the TRM. That additional light logging is costly for the EDC, takes time which could delay a customer's project (for pre-metering), could delay a customer's rebate (for post-metering), is inconvenient and intrusive for customers, and could discourage customers from pursuing a rebate.

Second, there is no evidence that the HOU values in the Mid-Atlantic TRM (or any other states' TRM or secondary research) are more accurate or more representative of Pennsylvania buildings than the HOU values currently in the Pennsylvania 2012 TRM. As the Commission

notes in the *Tentative Order* (p. 39), the HOU in the Mid-Atlantic TRM are based on secondary research conducted by Itron in December 2010 (for Maryland) and that the results in the Maryland study were derived from the California 2006 – 2008 Commercial Lighting Study. The California metering study conducted in 2006 – 2008 may not be representative of Pennsylvania or current 2012 conditions. Using values based on research conducted in other states increases the uncertainty of the savings values for Pennsylvania. Differences in building stock, day-lighting hours, customer attitudes towards energy efficiency, local economies and hours of operation, electricity rates, and other factors will influence the HOU of buildings.

PPL Electric cannot locate any research that concludes California-specific factors such as these are comparable to Pennsylvania, in this regard. Importantly, the California study identified several, significant variations in HOU for the same building type in different EDC service areas within that state alone. The California study also identified significant variations in HOU for the same building type depending on how the program was delivered (such as customer-installed, upstream versus downstream incentives, incentive levels, direct-install by the EDC's contractor/trade ally, *etc.*) within that state.⁸ The California study concludes the following for its lighting logger analysis:

Do not aggregate operating hour analysis across different program delivery mechanisms. Program delivery mechanisms were found to result in different estimates of annual hours of use, even within a market segment and activity area. Therefore, its analysis is being done across a variety of programs with various delivery mechanisms (e.g., upstream, downstream, prescriptive, or direct install), it is important to compare intermediate results by program type, market segment

⁸ Small Commercial Contract Group Direct Impact Evaluation Report, prepared by Itron for the California Public Utilities Commission, February 9, 2010. Table 4-7 shows an example for a warehouse (the most common building type that received incentives from PPL Electric's lighting program) where the HOU varies from 2,805 for SCE to 3,980 for PG&E, a 42% variation. There are several similar examples for other building types in Tables 4-4, 4-5 and 4-7. Table 4-4 shows significant variations in HOU for many specific building types in an EDC territory depending on program delivery mechanism. For example, the HOU for the "small retail" building type in SDG&E are 2,534 hours for direct install and 4,055 hours for the "express" delivery mechanism, a 60% variation.

and activity area to determine if analysis can be combined across program types, or if it needs to be performed by program type.⁹

This conclusion demonstrates that a single HOU value is not likely appropriate for all buildings of that specific building type in California, let alone that same building in another state such as Pennsylvania.

Additionally, the results of the Maryland study referenced by the Commission do not appear to be consistent with the Maryland Baseline Study conducted at the same time.¹⁰ Figure 4-8 of the Maryland Baseline Study shows the HOU for many commercial buildings. Those HOU are fairly close to the HOU currently in Pennsylvania's 2012 TRM and are significantly greater than the HOU proposed for the 2013 TRM. Also, page 9-2 of the Maryland Baseline Study recommends an end-use metering study to more accurately determine EFLH. Therefore, it appears that Maryland does not believe its own HOU values are reliable. Given the uncertainty of relying on research from other states, PPL Electric recommends leaving the 2012 TRM HOU data as-is until the accuracy of that data can be determined from a statistically valid, Pennsylvania-specific metering study (light logging).

Third, the Commission's research noted that HOU for a specific building type vary significantly between different states. This is further evidence that it is not appropriate, nor more accurate, to adopt HOU or CF values from another state:

The SWE and Commission Staff conducted a cross-sectional study to compare HOU and CF values by building type found in the 2012 TRM with TRMs from other regions (2011 Mid-Atlantic, Wisconsin, California, Connecticut, New York, Vermont, Ohio, Delaware, Illinois, Massachusetts, and Maine. The SWE and Commission Staff found that the HOU and CF varied widely depending on the actual source.

⁹ California study, page 5-8.

¹⁰ Maryland Baseline Study – Commercial and Industrial Sectors, December 3, 2010, Submitted to Director, Demand Side Management of the Maryland Public Service Commission. Submitted by Itron working as a subcontractor to KEMA.

Tentative Order, pp. 38 and 39 (footnotes omitted).

Fourth, the Commission's proposed HOU for the 2013 TRM are significantly lower than those in the 2012 TRM and that will directly reduce savings for lighting projects and will reduce customer incentives (since incentives are usually based on savings). Some examples are shown below for the building types that comprise most of the lighting in PPL Electric's EE&C program:

- Warehouses decreased 41%, from 3900 hours to 2316.
- Retail decreased 35%, from 4368 hours to 2829.
- Universities decreased 23%, from 3073 hours to 2348.
- Groceries decreased 20%, from 5824 to 4660.
- Hospitals decreased 21%, from 6588 to 5182.
- Schools (average of primary and secondary) decreased 13%, from 1872 (average) to 1632.
- Restaurant (average of fast food and sit down) decreased 32%, from 5278 (average) to 3613.

Since lighting is a significant portion of the market potential and savings in an EDC's EE&C Plan, there must be a sound basis for reducing the HOU and the customer's incentives. The Commission should not jump to a premature conclusion that the results of a 2006 – 2008 study in California or any other states are applicable to Pennsylvania in 2013, especially since the actual HOU determined from PPL Electric's commercial lighting projects in Program Years 2 and 3 confirm that the existing default HOU in the Pennsylvania 2012 TRM are fairly accurate and the 2012 TRM requires logging whenever a building's actual HOU are expected to deviate significantly from the default values in the TRM.

b. Building Types

In the *Tentative Order*, the Commission proposes to add three new building types to the 2013 TRM to provide additional granularity to the stipulated measure assumptions resulting in

reduced uncertainty from averaged values. *Tentative Order*, pp. 41-42. The proposed list includes public assembly (one shift), public services (nonfood), and multifamily (common areas) building types. *Id.*, p. 42. The Commission explains that it elected to minimize the number of additional building types to reduce administrative burden on the EDCs. *Id.*

PPL Electric recommends not consolidating building types and recommends further granularity. Notably the net change is a reduction in building types from 36 to 27. The number of building types does not increase administrative burden on the Company. In fact, it reduces administrative burden such as light logging. Furthermore, consolidating building types results in average “default” HOU values that may have a more significant variation than the actual building that is changing its lighting. That will cause an EDC to conduct light logging because the TRM requires logging when there is a significant difference between a building’s actual HOU and the default HOU in the TRM. Light logging is costly for the EDC, takes time which could delay a customer’s project (for pre-metering), could delay a customer’s rebate (for post-metering), is inconvenient and intrusive for customers, and could discourage customers from pursuing a rebate.

The Company proposes the following suggested building types to expand the granularity of the list:

- Expand Warehouse to Warehouse – single shift, Warehouse – 2 shifts, and Warehouse – 3 shifts 7 x 24.
- Expand Retail to Retail – open 2000 – 2500 hours per year (such as small stores), Retail – open 4500 – 5000 hours per year (such as big box stores), and Retail – open 7 x 24 such as convenience stores.
- Expand Restaurant to Restaurant – open (2000 – 2500 hours per year), Restaurant – open 4500-5000 hours per year, and Restaurant – fast food open 7000 – 8760 hours per year.
- Expand Education – school to Education-primary and Education – secondary.

- Expand Public Safety to the separate building types in the 2012 TRM.

c. Lighting Control Technologies

In the *Tentative Order*, the Commission proposes to add 13 lighting control technologies with savings factors to the 2013 TRM based on a more recent comprehensive study conducted by the Lawrence Berkeley National Laboratory in September 2011, entitled *A Meta-Analysis of Energy Savings from Lighting Controls in Commercial Buildings*. *Tentative Order*, p. 42. According to the Commission, the lighting protocol was constructed in such a way to account for energy savings only for lighting control retrofits and the savings algorithms do not account for demand savings. Therefore, the Commission proposes to modify the savings algorithms to allow the EDCs to claim demand savings for lighting control retrofits in addition to the energy savings. *Id.*

The Company notes that while the Commission proposes to modify the savings algorithm so that EDCs can claim demand savings for lighting control retrofits, the draft 2013 TRM and Appendix C do not appear to reflect these proposed changes. PPL Electric supports the Commission's proposal to modify the savings algorithm because it will provide greater accuracy in reported savings and, therefore requests that it be added to the TRM and Appendix C.

d. New Construction Calculator

In the *Tentative Order*, the Commission explains that based on feedback from the EDCs, it will provide a New Construction calculator used to calculate the savings impacts for new construction lighting projects as an optional tool for the EDCs. *Tentative Order*, p. 43.

PPL Electric supports the addition of the New Construction Calculator as an optional tool for EDCs. Adopting a statewide calculator will provide uniform means of estimating ex-ante savings, as is the case with the PA Lighting Form for retrofit lighting projects. PPL Electric

believes that it will also be simpler for lighting contractors that serve multiple EDC service areas to calculate savings estimates.

e. Federal Legislation and Regulations

As discussed by the Commission in the *Tentative Order*, the Commission previously directed the TWG to investigate the impacts of new lighting standards and recommend future adjustments to the TRM when necessary. The Energy Policy Act of 2005 (“EPAAct 2005”)¹¹ and EISA 2007 standards introduced new efficacy standards for linear fluorescent bulbs and ballasts, effectively phasing out magnetic ballasts (effective October 1, 2010) and T-12 bulbs (effective July 14, 2012). *Tentative Order*, p. 43. The SWE and Commission Staff conducted research of existing energy efficiency programs from various jurisdictions to understand the full impact of these upcoming regulatory changes. *Tentative Order*, p. 44.

In the *Tentative Order*, the Commission stated that it believes that the assumptions made by the 2012 Illinois TRM are reasonable and that the same methodology could be used in future TRM updates to account for new code changes. *Tentative Order*, p. 44. The Commission determined that the baseline for a lighting retrofit project will be the existing lighting system until 2016. According to the Commission, this is to reflect the time required for the market to adjust to the new code standards, taking into account the fact that end-users may have an existing stock of T-12s and do not need to purchase new replacement lamps for several years. *Id.* For Phase II, Program Year 1, the Commission will assume the baseline is the T-12 system, but this will be revisited in subsequent TRMs.

PPL Electric agrees with the Commission’s proposal to maintain the existing definition of the “baseline” for lighting retrofit projects until 2016. The baseline will remain the existing

¹¹ See 42 U.S.C.A. § 6295(g)(8) (West Supp. 2011).

lighting system and this provides PPL Electric's customers and trade allies with certainty and consistency for the Phase II lighting program's design, rules, and incentives. PPL Electric, however, requests that the Commission clarify that the use of the term "2016" is intended to mean the Act 129 EE&C program year that begins June 1, 2016, not the calendar year starting January 1, 2016. Maintaining the baselines until the end of the program year and making potential revisions thereafter would be consistent with the Commission's treatment of other proposed baseline changes. *See Tentative Order*, p. 21 ("The change in baseline or ENERGY STAR standard is to coincide with the beginning on the appropriate program year in order to prevent implementation and evaluation problems relating to changing deemed savings over the course of a program year.").

Furthermore, PPL Electric notes that the statement from the *Tentative Order* (p. 44) quoted below conflicts with the Commission's recommendation to define the baseline as the existing lighting system until 2016. In the *Tentative Order* the Commission states that, "[f]or Phase II, Program Year 1, we will assume the baseline is the T-12 system, but this assumption will be revisited in subsequent TRMs." *Tentative Order*, p. 44. If the customer's existing lighting system ("the baseline") is comprised of T-12 light fixtures and that baseline is to remain in effect until 2016, then it is not consistent to revisit, and possibly change, that baseline before 2016. Therefore, the Commission should clarify that it will assume the baseline is the T-12 system until May 31, 2016. Maintaining T-12 fixtures as the baseline for the entire Phase II period is important. The definition of "the baseline" directly impacts an EDC's program design, specifically the minimum eligibility requirements for measures. If the baseline changes during the Phase II period, the EDC would have to redesign its program and must communicate that to

customers as early as possible so customers can plan their lighting replacement projects and have some certainty about savings and incentive levels.

2. Motor and Variable Frequency Drive Protocols

In the *Tentative Order*, the Commission proposes to update the Energy Savings Factor (“ESF”) and Demand Savings Factor (“DSF”) values for Variable Frequency Drives (“VFDs”) using the 2012 Connecticut TRM as the primary source. *Tentative Order*, p. 46. The Commission also proposes to use the 2012 Connecticut TRM to update the motor and VFD operating hours listed in the 2012 TRM, similar to the source used for ESF and DSF values to accurately estimate savings. *Id.* Specifically, the updated list has 6,000 hours for heat pumps in every facility type.

PPL Electric requests confirmation of the accuracy of these values, because it seems unlikely that the hours would be identical across every facility type. The operating hours and the hours-of-use for motor-driven equipment at customers' facilities vary significantly. Also, prior versions of the TRM show different HOU (or equivalent full load operating hours) for different buildings and equipment. PPL Electric also recommends removing the following sentence from the definition of Load Factor (“LF”) in section 3.4 of the TRM applicable to VFDs: “Variable loaded motors should use custom measure protocols,” because motors on which VFDs are installed are almost always “variable-loaded,” and removing this restriction would clarify the intent of this protocol and would prevent an unnecessary, costly custom approach.

3. Office Equipment Network Power Management Systems

As explained by the Commission, in the *Tentative Order*, the 2012 TRM deemed savings for the Office Equipment Network Power Management System measure are 148 kWh per unit and 0.020 kW per unit. *Tentative Order*, p. 47. The Commission proposes to update the deemed

savings to 135 kWh per unit and 0.0078 kW per unit based on a recent evaluation study conducted in Pacific Northwest. *Id.*

PPL Electric supports the Commission's proposal to update the deemed savings for this measure. The savings in the 2012 TRM were sourced from studies conducted with narrow samples or over short timeframes. The updated savings are likely more accurate estimates considering they are based on a more recent evaluation conducted on a broader, more representative sample.

Furthermore, in the Office Equipment Network Power Management System section of the proposed 2013 TRM (Section 3.22), the Commission states that:

The energy savings per unit found in various studies specific to the Verdiem Surveyor software varied from 33.8 kWh/year to 330 kWh/year, with an average savings of about 200 kWh/year. This includes the power savings from the PC as well as the monitor. Deemed savings are based on a research study conducted by Regional Technical Forum which involves actual field measurements of the Verdiem Surveyor product.

PPL Electric recommends that the Commission clarify that qualifying software is not limited to the Verdiem Surveyor software (mentioned in the above quotation) that was used to determine the deemed savings estimates in Section 3.22 of the 2013 TRM.

4. LED Channel Signage

In the *Tentative Order*, the Commission proposes to update the savings algorithms and assumptions table for the LED Channel Signage measure. *Tentative Order*, p. 47. The Commission proposes to revise the algorithm to $KW = KW/foot * L$. *Id.*

PPL Electric agrees with the proposed revisions to the LED Channel Signage Protocol. PPL Electric, however, recommends removing the first source listed in Section 3.30 of the proposed 2012 TRM because the variable to which it refers (Q, or Average Stroke Length/Letter Width) has been removed.

5. Refrigeration

As explained by the Commission, in the *Tentative Order*, the SWE and Commission Staff reviewed all of the refrigeration measures in the 2012 TRM to ensure that the methods used to determine the EFLH values were consistent. *Tentative Order*, p. 49. Measure 3.26 – Evaporator Fan Controllers – uses a variable Hours_{CP} listed in the 2012 TRM, which represents the EFLH of compressor operation; however, there is no default value provided for this variable. Measure 3.33 – Special Doors with Low or No Anti-Sweat Heat for Low Temp Case – includes a variable EFLH whose default value is 5,700. The Commission proposes a default value of 5,700 for EFLH for Measure 3.26 to be consistent with Measure 3.33. *Id.*

PPL Electric agrees with the revision proposed by the Commission in this section of the *Tentative Order*, because it provides consistency with the other EFLH-dependent refrigeration measure in the TRM.

6. Refrigeration – Evaporator Fan Controllers

As explained by the Commission, in the *Tentative Order*, the existing Refrigeration – Evaporator Fan Controller protocol in the 2012 TRM was taken from the 2011 Massachusetts TRM. *Tentative Order*, p. 49. According to the Commission, this protocol does not clearly define how to determine the power demand for the evaporator fan (kW_{Fan}) or the compressor motor (kW_{CP}). *Id.* Therefore, as described in the *Tentative Order*, the Commission proposes the certain acceptable methods for determining the kW_{Fan} and kW_{CP} variables. *Id.* In addition, the Commission proposes to update the assumptions table and amend the definitions for this measure accordingly. *Id.*

PPL Electric appreciates the clarifications by the Commission for calculating power demand for compressors and fans. PPL Electric believes that the proposed calculation methods will provide additional flexibility for EDCs and evaluators.

7. Appendix C (Lighting Inventory Tool) and Appendix D (Motor and Variable Frequency Drive Inventory Tool)

In the *Tentative Order*, the Commission proposes that the expansion and improvements to the C&I Lighting protocols be captured in Appendix C – Lighting Inventory Tool. *Tentative Order*, p. 50. The Commission also explained that the major changes include updating the list of building types, HOU and CF values, control technologies, and savings factors. Furthermore, the Commission proposes minor edits to Appendix D – Motor and Variable Frequency Drive Inventory Tool – to be consistent with the protocol in the TRM.

Regarding Appendix C, PPL Electric recommends correcting the Appendix C lookup reference for lighting control adjustments. In rows 12 – 50 of Appendix C, a “#REF!” error appears in the columns for Controls Factor and Annual kWh Saved when controls are selected. PPL Electric recommends that the Commission update Appendix C to correct this error message. In addition, PPL Electric agrees with the Commission’s proposal to revise Appendix D to reflect the separate protocols for Motors and VFDs. This change adds transparency to the underlying calculations in the spreadsheet and will help to prevent customer confusion.

C. DEMAND RESPONSE

As explained by the Commission, in the *Tentative Order*, it previously determined in another proceeding not to propose additional peak demand reduction targets in Phase II of the Act 129 EE&C Program. Therefore, in the *Tentative Order*, the Commission explained that it does not deem it necessary to include a discussion of demand response in this update and removed said discussion from the 2013 TRM. *Tentative Order*, p. 51.

PPL Electric agrees with the Commission's determination to remove the discussion of demand response in this TRM update.

D. ADDITIONAL COMMENTS ON SPECIFIC SECTIONS OF THE PROPOSED 2013 TRM

PPL Electric has identified the following ministerial issues with the proposed 2013 TRM, which are not addressed by the Commission in the *Tentative Order*:

1. TRM Section 2.1 Electric HVAC

In the algorithm for Central A/C and Air Source Heat Pumps maintenance, the term "HSPFm" is used in the heating savings equation. PPL Electric recommends adding this term to the definition section and reference table as it is currently missing from both.

2. TRM Section 2.34.3 Energy Star Televisions Deemed Savings

The sentence preceding Table 2-76 contains the language "Energy Star Version 5.3," however, Table 2-76 contains "Energy Star Version 5.1." PPL Electric recommends adjusting the version numbers to be consistent.

3. TRM Section 2.37 Residential Occupancy Sensors

In Table 2-83, the value for RHold was updated to 2.8 to reflect the new HOU value for residential lighting. However, the value for RHnew did not change. PPL Electric believes this value should change as well, considering that it is defined as "70% of RHold."

4. TRM Section 5.1 Appendix A: Measure Lives

There are inconsistent measure lives provided in TRM protocols and Appendix A. For example, Appendix A defines the life of "Energy Star Refrigerator 2001" as 13 years, whereas the corresponding protocol, TRM section 2.24, states the life as 12 years. A similar discrepancy exists for Energy Star Room Air Conditioners. PPL Electric recommends aligning the measure lives in Appendix A with those provided in corresponding protocols, where appropriate.

Furthermore, PPL Electric suggests that the Commission consider revising the measure lives for those measures which have had their operating hours decreased in the proposed 2013 TRM. For instance, the life of a CFL would increase from 6.4 years if its operating hours per year decrease. PPL Electric notes that the Energy Star LED protocol (TRM section 2.36) does reflect a change of this nature. Similarly, the lives of residential HVAC equipment should increase, given that their EFLH have decreased significantly. To the extent that commercial lighting measure lives are tied to HOU, PPL Electric recommends that those measure lives are increased as well, given the proposed decrease in HOU.

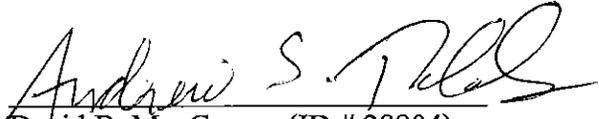
5. TRM Section 5.2 Appendix B: Relationship between Program Savings and Evaluation Savings

Section 5.2 of the proposed 2013 TRM defines three types of protocols used for measurement and verification. The third type listed is “Custom Measure Protocols reviewed and recommended by the SWE and approved for use by the Director of CEEP.” PPL Electric recommends removing this sentence. The formal Custom Measure Protocol process was eliminated near the end of Program Year 2. In its place, text could be added stating that there could occasionally be a need for EDCs to draft Custom Measure Protocols for measures that are not covered by TRM or Interim TRM protocols.

III. CONCLUSION

For all of the reasons stated above, PPL Electric Utilities Corporation recommends that the Public Utility Commission proceed with development of the 2013 TRM consistent with PPL Electric Utilities Corporation's comments.

Respectfully submitted,



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Post & Schell, P.C.

Date: October 31, 2012

Attorneys for PPL Electric Utilities Corporation

Attachment No. 1

THE
CADMUS
GROUP, INC.

Date: October 18, 2012

To: Peter Cleff, PPL Electric Utilities

From: Dakers Gowans and Anne West, Cadmus EM&V Team

Re: EM&V C&I Lighting Hours-of-Use Compared to Proposed 2013 TRM

The Cadmus EM&V team has conducted 179 site visits to date in order to verify savings from nonresidential lighting measures installed through the PPL Electric Utilities' Energy Efficient Incentive Program. We conducted these site visits during Program Years 2 and 3.

In addition to verifying fixture types and quantities, a primary objective of these visits was to obtain site-specific estimates of the annual lighting hours-of-use (HOU) for each building. The Cadmus EM&V team based these estimates on data obtained from interviews, posted schedules, and any additional evidence, such as energy management schedules.

The Cadmus EM&V team has also conducted metering studies for a subset of 27 buildings that have an estimated site-specific lighting HOU equal to $\pm 50\%$ of the Pennsylvania Technical Reference Manual (TRM) values.

The team analyzed the building lighting HOU estimates for all 179 site visits. The team then compared the results to TRM values and to the HOU derived from the metering studies. Key findings of this analysis are:

- The Cadmus EM&V team estimates of site-specific building annual lighting HOU average 105% of the 2011 TRM values by building type (for Program Year 3) and average 141% of the 2010 TRM values by building type (for Program Year 2). This discrepancy is likely due in large part to the number of industrial buildings in the evaluation sample that have three employee shifts; a building type that was not listed in the 2010 TRM. This building type was added to the 2011 TRM (and continues in the 2012 edition), resulting in the closer agreement between the team's site-specific HOU estimates and the TRM values in Program Year 3.
- On average, the Cadmus EM&V team estimates of lighting HOU are 101% of metered HOU.

Table 1 shows the results of the analysis by program year and reference TRM.

Table 1. Lighting Hours-of-Use Analysis Results

Program Year	Cadmus EM&V Sample		Hours-of-Use (% of TRM Value)		
	TRM Year	Site Visit	Metering	Inspector Estimate/TRM	Inspector Estimate/Metering
2	2010	59	18	141%	104%
3	2011	120	9	105%	94%
kWh Weighted Average	N/A	179	27	117%	101%

Proposed 2013 TRM Annual Lighting HOU by Building Type

The Cadmus EM&V team’s site-specific field estimates of annual lighting HOU in Program Year 3 for commercial and industrial (C&I) buildings are in near agreement to the 2011 TRM. The team also expects close agreement in Program Year 4 with the 2012 TRM, which expands the number of building types with HOU values.

The proposed 2013 TRM limits the number of building types from 36 in 2012 to 27. This reduction is mostly accomplished by combining similar types of building into a more general category; for example, the 2013 TRM has three retail building types being represented by one entry. These retail stores include small shops that are open from 2,000 to 2,500 hours/year, along with big-box stores that are open from 4,500 to 5,000 hours/year. Another example of combining related building types is that primary and secondary education HOU are 1,632 in the 2013 TRM compared to 1,440 to 2,305 in the 2012 TRM. By simplifying the categories of C&I building lighting schedules, electric distribution companies will be forced to use unrealistic annual HOU values for some building types.

The proposed 2013 TRM also reduces the annual HOU values for the remaining building types compared to the 2012 TRM. HOU for storage buildings is 3,420 in the 2013 TRM compared to 4,290 in the 2012 TRM. The impact of the reduced HOU is reduced project savings, which are based on deemed HOU for many C&I lighting projects. This effect is amplified for larger building types and for projects with larger kWh savings potential; the 2013 TRM retail annual HOU value of 2,829 applies to big-box stores, like Home Depot. The 2012 TRM HOU value for big-box stores is 4,368, so the 2013 TRM reduces the savings potential for this building type by 35%.

The Cadmus EM&V team’s site-specific annual lighting HOU estimates in Program Year 3 are in near agreement with 2011 TRM HOU values. The TRM estimates are in close agreement with the actual HOU the team metered. It appears that using the proposed 2013 TRM values, which are less than the 2012 TRM, will underestimate true lighting savings.