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File #: 140056

June 25, 2024

VIA ELECTRONIC FILING

Rosemary Chiavetta
Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
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**Re: Implementation of the Alternative Energy Portfolio Standards of 2004: Standards
for the Participation of Demand Side Management Resources – Technical Reference
Manual 2026 Update
Docket No. M-2023-3044491**

Dear Secretary Chiavetta:

Enclosed for filing are the Comments of PPL Electric Utilities Corporation on the 2026 TRM Update Tentative Order in the above-captioned proceeding. On June 24, 2024, PPL Electric electronically filed the same Comments at this docket, but the filing was rejected due to the unintended presence of a “CONFIDENTIAL” footer on one of the pages. The enclosed version of the Comments has the unintentional “CONFIDENTIAL” footer removed. No part of the Company’s Comments is confidential.

Copies are being provided as indicated on the Certificate of Service to the same individuals who were served the Company’s Comments yesterday.

Respectfully submitted,



Devin Ryan

DTR/dmc
Enclosures

Rosemary Chiavetta

June 25, 2024

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cc: Certificate of Service

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of this filing has been served upon the following persons, in the manner indicated, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a participant).

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Date: June 25, 2024



Devin T. Ryan

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

Implementation of the Alternative Energy :
Portfolio Standards of 2004: Standards for :
the Participation of Demand Side : Docket No. M-2023-3044491
Management Resources – Technical :
Reference Manual 2026 Update :

**COMMENTS OF
PPL ELECTRIC UTILITIES CORPORATION**

TO THE PENNSYLVANIA PUBLIC UTILITY COMMISSION:

I. INTRODUCTION

By Tentative Order entered May 9, 2024, the Pennsylvania Public Utility Commission (“Commission”) requested comments on the proposed 2026 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 2026 revisions to the TRM (“2026 TRM”).

PPL Electric generally agrees with many of the changes proposed in the 2026 TRM. However, the Company has identified some areas that it believes warrant further consideration, modification, or clarification.

¹ *Implementation of the Alternative Energy Portfolio Standards Act of 2004: Standards for the Participation of Demand Side Management Resources – Technical Reference Manual 2026 Update*, Docket No. M-2023-3044491 (Order entered May 9, 2024) (“*Tentative Order*”).

II. PPL ELECTRIC’S COMMENTS ON 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 by TRM Section. PPL Electric does not provide technical comments on every Commission proposal. The Company’s failure to address a specific section or proposal should not be considered PPL Electric’s agreement therewith.

A. VOLUME 1 – GENERAL INFORMATION

1. TRM Section 1.13- Adjustments to Energy and Resource Savings

PPL Electric notes that Act 129 of 2008’s (“Act 129”) definition of Total Resource Cost (“TRC”) and 15-year cap on measure life create inaccurate measure life values for many measures and artificially reduce the years of energy and demand savings generation. Although the Commission cannot adopt a TRC definition or cap on measure life that is different from Act 129, the Company believes that the Commission, General Assembly, and interested stakeholders should consider potential changes to Act 129 to address these concerns.

2. TRM Section 1.19 – Measure Applicability Based on Sector

Section 1.19 provides “[s]ome general guidelines for EE&C measures in multifamily buildings.” One of those guidelines states that “[i]n-unit measures should rely on residential sector protocols.” However, this guideline does not consider that for many multifamily lighting applications, commercial-style lighting is used. Similarly, the guideline that “[c]ommon-area measures should rely on commercial sector protocols” does not consider how common areas typically have residential end-use products like residential refrigerators, computers that can use advanced power strips, etc. Furthermore, there is a lack of guidance for block and/or masonry multifamily construction for air sealing.

B. VOLUME 2 – RESIDENTIAL MEASURES

As an initial matter, PPL Electric observes how there are several areas within Volume 2 where formatting issues exist, especially within the Tables. The Company recommends that these errors be corrected. In addition, Volume 2 contains various typographical errors, incomplete Table references, missing definitions for key terms, and incorrect terminology. The Company recommends that all Sources be reviewed for proper utilization including application to terms and obsolete Sources.

Moreover, the document is inconsistent with the use of SEER versus SEER2, EER and EER2 and HSPF and HSPF2. For example, measure 2.2.2 utilizes SEER instead of SEER2 for in the kWh algorithm. The Company recommends reviewing and correcting every measure and/or protocol that utilizes SEER(2), HSPF(2), and/or EER(2).

1. TRM Section 2.1.1 – Residential LED Lighting

Differentiation for replacement type and lower measure life for Direct Install (Early Replacement) will reduce cost-effectiveness, thereby creating a negative impact on cost-effectiveness for in-person programs, especially for income-eligible customers where direct install applications are most likely. Income-eligible customers may continue to store and have access to inefficient lighting, which would indicate that a higher measure life is required.

2. TRM Section 2.1.2 – Residential Occupancy Sensors

Source 6 for this measure's in-service rate ("ISR") relies on an outlet gasket ISR from one electric distribution company ("EDC") across two program years. The Company does not understand the use of an unrelated air sealing measure as a proxy for the occupancy sensor kit's ISR. Therefore, PPL Electric recommends the removal and recalculation of the measure's ISR utilizing more appropriate sources.

3. TRM Section 2.2.1 – High Efficiency Equipment: ASHP, CAC, GSHP, PTAC, PTHP

Table 2-10 contains multiple errors, including unsourced values and discrepancies when using the formula in footnote b to calculate EER2 and utilizing the formula in footnote c to calculate HSPF. A full review, recalculation and/or revisiting the sourcing is highly recommended.

4. TRM Section 2.2.2 – High Efficiency Equipment for Midstream Delivery: ASHP, CAC, PTAC, PTHP

The algorithm for ASHP and CAC, PTAC, and PTHP kW winter peak contains errors where OFcool should be replaced with OFheat:

$$= CAPY_{heat} \times \left(\frac{OF_{cool}}{COP_{base}} - \frac{1}{COP_{ee}} \right) \times \frac{1}{3.412 \frac{BTU}{W \cdot h}} \times CF_{winter}$$

Also, Table 2-15 has multiple minor variations when compared to manually calculated values, when accounting for rounding.

5. TRM Section 2.2.9 – Window Heat Pump

Per the 2026 TRM, a window heat pump is designed to “provide an energy-and-cost saving alternative to built-in or portable electric resistance heating in the residential market.” The Company recommends that kWpeak winter algorithms be added for this measure, as they are not currently present.

Additionally, natural gas is not included as a potential failed heating system in the Eligibility section. The Company recommends allowing this fossil fuel type due to the large number of customers with this heat type.

Also, the heading “Baseline: Spaceheater(s), Electric Baseboards” is missing “Electric Furnace,” which is listed in the Eligibility section.

6. TRM Section 2.2.12 – ENERGY STAR Certified Connected Thermostats

Measure life reduction for this measure is based solely on a single alternate state’s TRM reference, while other TRMs have measure lives of 11 years, including Illinois. Volume 3 in the 2026 TRM for measure 3.2.18 and 3.2.19 also maintain an 11-year measure life. In addition, the Company expects that customers will replace their thermostats at the time they replace their heating systems, for which the measure life is 15 years. The Company recommends maintaining the prior measure life for cost-effectiveness considerations of a key Phase V measure.

Furthermore, the summary includes the following language, “Electric resistance baseboard heating as the primary heating system is not eligible for savings to be claimed through this measure protocol because CTs are low voltage thermostats, which use 24 volts. Electric baseboard heating requires line-voltage thermostats, which can be either 120 or 240 volts.” However, the current draft version of the ENERGY STAR Connected Thermostats version 2.0 includes line voltage thermostats.

7. TRM Section 2.3.1 – Heat Pump Water Heaters

New ENERGY STAR version 5.0 became effective in April 2023. This is the version in Source 2 and should be updated in the Eligibility section, which references ENERGY STAR version 3.2.

8. TRM Section 2.3.9 – Drain Water Heat Recovery Units

Source 1 indicates that the measure life is “Limited to PA Act 129 maximum of 15 years.” This comment is made in at least six other sources and limits key measures, such as High Efficiency Equipment, thereby reducing EDCs ability to provide customers with comprehensive measures. This is an issue that needs to be addressed to ensure successful implementation.

9. TRM Section 2.4.1 – ENERGY STAR Refrigerators

The term “I” is defined as “I = 1 for a product with an automatic icemaker and 0 for a product without an automatic icemaker. See Table 2-82 for door coefficients.” The term “I” and its use in the formulas in Tables 2-81 and 2-82 are not clear and, therefore, should be clarified.

10. TRM Section 2.4.6 – Cooler Recycling with and without Replacement

Table 2-100 incorrectly references “Refrigerators and Freezers” in the Table description and references “refrigerators” in the terms. The term “coolers” should be used instead.

11. TRM Section 2.4.11 – ENERGY STAR Dehumidifiers

In Table 2-116, the kW summer peak values do not match with the results of the summer peak formula. This issue is present for all values in that column. In addition, according to the algorithm, the winter peak values would calculate to zero.

12. TRM Section 2.4.12 – Dehumidifier Retirement

Regarding Source 5, other measures in the 2026 TRM use National Oceanic and Atmospheric Administration’s (“NOAA”) 15-year annual climate Normals (2006–2020). If the data is available using this resource, PPL Electric recommends that the Commission consider updating this measure for consistency across weather impacted measures.

13. TRM Section 2.4.13 – ENERGY STAR Ceiling Fans

Table 2-122 displays the value “SF Only: 0.0001114” for ETDFs.” The term “SF” is undefined and should be clarified.

14. TRM Section 2.6.2 – Weather Stripping, Caulking and Outlet Gaskets

The formula for kWhcool incorrectly utilizes the term %elec, which should be %cool:

$$\frac{1.08 \times \Delta CFM_{50} \times CDD \times 24 \times ISR}{N \times SEER2 \times 1,000} \times LM \times DUA \times F_{RAC} \times \%_{elec}$$

15. TRM Section 2.6.4 – Basement or Crawl Space Wall Insulation

The opening paragraph should include language stating that this protocol is only applicable to “residential buildings with a primary electric heating and/or cooling source.”

16. TRM Section 2.6.5 – ENERGY STAR Windows

Measure life is incorrectly shown as “(15 max, but 20 for TRC) years” and should likely read: “(20 max, but 15 for TRC) years” or just state 15 years.

17. TRM Section 2.7.2 – ENERGY STAR Manufactured Homes

The paragraph in the Algorithms section starting “Additional demand savings may be claimed under this measure...” is unnecessary due to the inclusion of the following sentence earlier in the section: “Modeled energy and peak demand savings shall be produced by a RESNET accredited software program.” A similar adjustment was made for Residential New Construction.

18. TRM Section 2.8.3 – Photovoltaic (PV) Solar Generation

The algorithm yields higher than expected kW from an apparent major error. The Company recommends that ETDF ordinal and incremental values be reviewed to determine where the error exists.

Also, the Company recommends that hourly outputs from PV Watts be used to determine peak demand via calculator.

Additionally, the Company recommends that EDC gathering is provided as an option for the Module, Inverter Efficiency, Ground Coverage Ratio, Bifacial, Monthly Irradiance Loss, and DC to AC Size Ratio values in Table 2-176.

C. VOLUME 3 – COMMERCIAL & INDUSTRIAL MEASURES

Like with Volume 2, Volume 3 has a number of formatting issues, especially in the Tables. The Company recommends that these errors be corrected. In addition, there are typographical

errors in the document, such as incomplete or incorrect Table references, broken source links, incorrectly labeled Table headings, and incorrect terminology. There are also differences in some values between the redline and clean versions. In these cases, the Company utilized the clean version for reference. While some critical examples are noted in the section-specific comments, PPL Electric recommends that Volume 3 be reviewed in totality and that errors be corrected before the final version is accepted.

1. TRM Section 3.1.1 – Lighting Retrofits

The referenced Design Lights Consortium (“DLC”) Study that shows 49% savings includes Networked Lighting Control (“NLC”) with and without Luminaire Level Lighting Control (“LLLC”). As such, the Company recommends that the definition should be refined to reflect an NLC with LLLC and an NLC without LLLC savings factor.

2. TRM Section 3.1.6 – Midstream Lighting Incentives

The Algorithm for kWh shows $(1 - SVG_{base})$ and $(1 - SV_{Bee})$; the prior TRM indicated $(1 + SVG)$ for both. The Commission should clarify if this is a calculation error or an actual change.

3. TRM Section 3.1.7 – Indoor Horticultural Lighting

The interactive energy factors found in Table 3-22 are lower than what is found in other TRMs that offer horticultural lighting measures. Fully indoor cannabis facilities do not economize and utilize mechanical cooling/dehumidification year-round. A winter IF of 0 is not realistic, and the Company recommends that this variable be reevaluated.

4. TRM Section 3.2.1 – HVAC Systems

The algorithms do not show a coincidence factor (“CF”), only Energy to Demand Factor (“ETDF”) values. Can Table 3-26 be omitted, or is the CF missing in the noted algorithm? The

Company assumes that CF was removed from the protocol and that the Table is not required. The Table appears to only apply to Section 3.2.9.

The algorithm for kWsummerpeak and kWwinterpeak, should use kWhcool and kWhheat, respectively. This applies to systems in Sections 3.2.1 and 3.2.2.

5. TRM Section 3.2.5 – Ductless Mini-Split Heat Pumps – Commercial < 5.4 Ton

Table 3-43 includes a statement below that only applies to the Cold Climate version and should be noted in such a way so that it is not associated with the standard unit. This applies to Section 3.2.6 as well.

6. TRM Section 3.2.10 – Controls: Guest Room Occupancy Sensor

In Table 3-55, “Energy to Demand Factor Summer” is displayed twice; the second instance should read “Energy to Demand Factor Winter” instead. This comment also applies to Tables 3-74 and 3-77.

7. TRM Section 3.2.15 – Circulation Fan: High-Volume Low Speed

The algorithm for kWh appears to be incorrect, as it reverses the denominators of Effee and Effbase. It should read (1/Effbase - 1/Effee).

$$= \left(\frac{1}{\text{Eff}_{ee}} - \frac{1}{\text{Eff}_{base}} \right) \times CFM \times \frac{1}{1,000} \times HOU$$

8. TRM Section 3.2.18 – C&I ENERGY STAR Certified Connected Thermostats

The summary includes the sentence, “CT or line voltage thermostats controlling radiant floor heating or window type air conditioning units are not eligible.” However, the current draft version of the ENERGY STAR Connected Thermostats version 2.0 includes line voltage thermostats.

9. TRM Section 3.2.19 – Adjustment of Programmable Thermostats

In Table 3-76, “Rated cooling capacity of the energy efficient unit” is displayed twice; the second instance should read “Rated heating capacity of the energy efficient unit” instead. This comment also applies to Table 3-74. In addition, the Unit displayed for “Percent of Cooling Savings” and “Percent of Heating Savings” is kWh. This should be “%.”

10. TRM Section 3.3.2 – Variable Frequency Drive (VFD) Improvements

The value for Two-Speed Control Type with Flow Fraction Percentage of 60 is listed as 1.0, but it is 0.5 in Appendix D. The Company notes the value of 1.0 appears to be the correct value.

In Table 3-93, the value for kWh 0.746 is a kW conversion; the term should be updated to reflect this value.

11. TRM Section 3.3.3 – ECM Circulating Fan

The Watts conversion algorithm as written is incorrect and shows 0.746, which is the conversion factor for kW. The correct value is 746.

$$= \frac{0.746 \times HP}{\eta_{motor}}$$

12. TRM Section 3.4.2 – Low Flow Pre-Rinse Sprayers for Retrofit Programs and Time of Sale Programs

The U factors in the kWh algorithm indicate Ubase and Uee, though only one U factor is defined in the Table 3-112. The Company recommends that these terms be added to the Table and defined.

13. TRM Section 3.5.1 – ENERGY STAR Refrigeration/Freezer Cases

The Eligibility section notes vertical-closed doors only, while the Phase IV SWE Guidance Memo included horizontal doors. PPL Electric requests that the Commission clarify whether this omission was intentional or not.

14. TRM Section 3.5.12 – Special Doors with Low or No Anti-sweat Heat for Reach-in Freezers and Coolers

The values in Table 3-143 for Wattsbase and Wattsee Cooler and Freezer defaults appear to be rounded, and the algorithm values do not match the deemed values when manually calculated. The Company recommends updating the values for clarity.

15. TRM Section 3.7.3 – ENERGY STAR Electric Steam Cooker

The value of CAPYbase in Table 3-172 is 16.7 though the source referenced uses a baseline of 23.3. The Company recommends a correction to the discrepancy.

16. TRM Section 3.10.5 – Variable-Speed Drive Air Compressor

The Eligibility section limits the retrofit to 40 HP or less. This is significantly lower than several other TRMs that allow up to 200 HP. The Company recommends allowing a minimum of 100 HP.

17. TRM Section 3.11.6 – Photovoltaic (PV) Solar Generation

The algorithm for kWpeaksummer yields higher than expected kW from an apparent major error. The Company recommends that the ETDF ordinal and incremental values be reviewed to determine where the error exists.

The Company also recommends that hourly outputs from PV Watts be used to determine peak demand via calculator.

Further, the Company recommends that EDC gathering be provided as an option for Module, Inverter Efficiency, Ground Coverage Ratio, Bifacial, Monthly Irradiance Loss, and DC to AC Size Ratio values in Table 3-244.

In addition, the “In-situ” losses factors in Table 3-244 are from a source that cannot be reviewed. The Company recommends that the source of these loss factors be shared with the EDCs. It should be noted that PV Watts already assumes losses from a number of factors.

18. TRM Section 4.1 – Agricultural

Regarding Section 4.1 generally, the Company recommends that Animal Agriculture hours of operation be added. See ASABE Standard 344.4 Animal Lighting for guidance.

19. TRM Section 4.1.2 – Dairy Scroll Compressors

The Company recommends that New Construction be added to Measure Vintage as an option.

20. TRM Section 4.1.3 – High-Efficiency Ventilation Fans with and without Thermostats

The Company recommends that the addition of circulation fans, which are required in poultry facilities and operate nearly 24/7 (except when animals are cooled via misting). These are rated differently than ventilation fans and can be controlled easily for additional energy savings. The Illinois TRM Section 4.1.3 High Speed Fans can be utilized for guidance.

The Company also recommends that poultry hours of operation be added to Table 4-5. Poultry operates similar to hog nursery due to heat gain. See ASABE EP270.5 for guidance.

21. TRM Section 4.1.5 – High Volume Low Speed Fans

The algorithm for kWh appears to be incorrect, as it reverses the denominators of Effhvl_n and Effbaseline. It should read $(1/\text{Effbaseline} - 1/hvln)$.

$$= \left(\frac{1}{\text{Eff}_{\text{HVLS}}} - \frac{1}{\text{Eff}_{\text{baseline}}} \right) \times \frac{\text{CFM}}{1,000} \times \text{HOU}$$

III. CONCLUSION

For all of the reasons stated above, PPL Electric Utilities Corporation recommends that the Pennsylvania Public Utility Commission proceed with development of the 2026 TRM update consistent with PPL Electric Utilities Corporation's Comments.

Respectfully submitted,



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