

STATE CORPORATION COMMISSION  
RECEIVED

MAY 19 2021

Case No. PUR-2020-00251

Sponsor: ("APCO")

Exhibit No. 13

Witness: DAVID DIEBEL

Bailiff: JABARI T. ROBINSON

210550010  
210550011  
210550012  
210550013  
210550014  
210550015  
210550016  
210550017  
210550018  
210550019  
210550020  
210550021  
210550022  
210550023  
210550024  
210550025  
210550026  
210550027  
210550028  
210550029  
210550030  
210550031  
210550032  
210550033  
210550034  
210550035  
210550036  
210550037  
210550038  
210550039  
210550040  
210550041  
210550042  
210550043  
210550044  
210550045  
210550046  
210550047  
210550048  
210550049  
210550050  
210550051  
210550052  
210550053  
210550054  
210550055  
210550056  
210550057  
210550058  
210550059  
210550060  
210550061  
210550062  
210550063  
210550064  
210550065  
210550066  
210550067  
210550068  
210550069  
210550070  
210550071  
210550072  
210550073  
210550074  
210550075  
210550076  
210550077  
210550078  
210550079  
210550080  
210550081  
210550082  
210550083  
210550084  
210550085  
210550086  
210550087  
210550088  
210550089  
210550090  
210550091  
210550092  
210550093  
210550094  
210550095  
210550096  
210550097  
210550098  
210550099  
210550100

**SUMMARY OF REBUTTAL TESTIMONY OF DAVID DIEBEL**

My rebuttal testimony addresses the following:

1. A non-survey method to assess potential impacts of VVO on power quality.
2. Recommend implementation of an “on”/“off” schedule for all circuits for which VVO is enabled, regardless of the performance of a supplementary analysis to compare energy usage on VVO circuits and non-VVO circuits.
3. Sampling approaches employed in support of EM&V of 2019 program year programs.
4. Considerations relating to the application of International Performance Measurement and Verification Protocol (IPMVP) Option C whole-building billing analysis and the application of estimates of Effective Useful Life (EUL) for the purpose of developing estimates of lifetime savings.



21  
20  
19  
18  
17  
16  
15  
14  
13  
12  
11  
10  
9  
8  
7  
6  
5  
4  
3  
2  
1

1           While larger sample sizes provide higher levels of precision and confidence of the  
2 sample estimates, attainment of larger sample sizes incurs greater cost. Further, the  
3 achievable sample size is constrained both by the size of the population and by  
4 customers' willingness to complete the survey. In many cases, evaluation efforts have  
5 included attempts to complete surveys with a census of program participants, and the  
6 customers' willingness to complete the survey has limited the achieved sample size. The  
7 cost to increase the number of customers that complete the survey can be increased by  
8 employing more aggressive recruitment strategies, including providing incentives,  
9 increasing already planned incentives, and adding data collection modes (e.g., telephone  
10 dialing, and mail contact), any or all of which are necessary to increase the survey  
11 response rate. In other words, doubling the sample size may more than double the cost of  
12 the data collection effort.

13           With a finite amount of evaluation resources, increasing the sample sizes would  
14 utilize resources that might otherwise allow for the performance of more valuable  
15 evaluation activities.

16 **Q. PLEASE ADDRESS STAFF WITNESS BLEVINS'S RECOMMENDATION**  
17 **RELATING TO THE VVO PILOT THAT THE COMPANY INCLUDE**  
18 **CUSTOMER SURVEY SAMPLING IN ITS EM&V PLAN.**

19 A. To enable identification of any difference in perceived power quality that may be  
20 attributable to VVO and is not due to other factors, a study to detect the effect of VVO on  
21 perceived power quality would necessarily involve administering a survey to a sample of  
22 customers on a VVO circuit as well as a sample of customers on a non-VVO circuit.

1           Additionally, identification of a small difference between groups requires a large  
2 sample size.<sup>2</sup> For example, if 15% of VVO customers have observed a form of service  
3 degradation and 10% of non-VVO customers also observed a form of service  
4 degradation, a sample of 685 customers from each group is needed to have an 80%  
5 chance of detecting that difference.

6           As an alternative to customer surveying, it is possible to compare meter-level  
7 variation in voltage magnitude for a VVO circuit and a non-VVO circuit prior to and  
8 after VVO enablement as a means to assess potential impacts of VVO on power quality.  
9 This alternative approach would incur significantly less cost than an expansive customer  
10 survey effort.

11 **Q. PLEASE ADDRESS STAFF WITNESS BLEVINS'S RECOMMENDATION**  
12 **RELATING TO THE VVO PILOT THAT THE COMPANY LEAVE TWO OF**  
13 **THE FOUR CIRCUITS SELECTED FOR VVO "ON" FOR AN EXTENDED**  
14 **PERIOD OF TIME.**

15 **A.** While supplementary analysis can be performed to evaluate energy usage on a VVO  
16 circuit and on a non-VVO circuit prior to and subsequent to VVO enablement, it is  
17 preferable to concurrently implement an "on"/"off" schedule for all circuits for which  
18 VVO is enabled. The "on"/"off" schedule facilitates statistical analysis to identify the  
19 incremental impact of VVO operation on energy usage. It is possible to perform  
20 supplementary analysis to compare energy usage on a VVO circuit and non-VVO circuit  
21 even with employment of an "on"/"off" schedule on the VVO circuit - in this case, the

---

<sup>2</sup> Sample sizes required to detect a difference between two or more groups may be different from the sample size requirements for estimating a single parameter in a population such as a realization rate.

210153042  
3044512

1 time period of comparison during the post-enablement period would be during VVO "on"  
2 times only.

3 At this time, the Company has not conducted a study to identify potential  
4 candidate comparison circuits. Such a study would entail assessment of the mix of  
5 customers and load characteristics of VVO circuits and candidate non-VVO comparison  
6 circuits.

7 **Q. WERE THE SAMPLE SIZES USED TO SUPPORT ESTIMATION OF 2019**  
8 **PROGRAM GROSS SAVINGS CONSISTENT WITH COMMONLY ACCEPTED**  
9 **REQUIREMENTS FOR THE CONFIDENCE AND PRECISION OF SAMPLE**  
10 **BASED GROSS SAVINGS ESTIMATES?**

11 **A.** Yes. The sample sizes were developed in order to meet the commonly accepted standard  
12 of +/- 10% precision at the 90% level of confidence. The practices used to develop the  
13 stratified samples for the 2019 evaluation are consistent with the guidance outlined in  
14 The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for  
15 Specific Measures, Chapter 11: Sample Design Cross-Cutting Protocol. The statistical  
16 precision afforded by the sample design for the 2019 C&I Lighting, C&I Standard, and  
17 SBDI programs was +/- 8.5%, +/- 6.1%, and +/- 9.0% at the 90% level of confidence,  
18 respectively.

19 **Q. PLEASE COMMENT ON STAFF WITNESS BLEVINS'S SKEPTICISM**  
20 **RELATING TO THE SUFFICIENCY OF THE NUMBER OF SAMPLE POINTS**  
21 **FOR INDIVIDUAL SAMPLING STRATA FOR EM&V OF THE 2019 C&I**  
22 **LIGHTING, C&I STANDARD, AND SBDI PROGRAMS.**

23 **A.** Stratified sampling is performed to group the population into subgroups that have less  
24 variance than the overall population. By minimizing variance within strata, a smaller

2120550103  
991030430103

1 sample size is needed to achieve given confidence and precision levels than would be  
2 needed if a simple random sample had been performed on the entire population. The  
3 stratified sampling approaches are designed to facilitate estimation of program-level  
4 gross savings with statistical precision of +/- 10% at the 90% level of confidence – they  
5 are not designed to facilitate estimation of stratum-level gross savings with statistical  
6 precision of +/- 10% at the 90% level of confidence.

7 The sampling approach employed for EM&V of the 2019 C&I Lighting, C&I  
8 Standard, and SBDI Programs is consistent with the guidance outlined in The Uniform  
9 Methods Project: Methods for Determining Energy Efficiency Savings for Specific  
10 Measures, Chapter 11: Sample Design Cross-Cutting Protocol.

11 While additional requirements may be applicable to the performance of future  
12 EM&V, the stratified sampling approach employed for EM&V of the 2019 C&I Lighting,  
13 C&I Standard, and SBDI Programs meets the requirements set forth in 20VAC5-318.

14 **Q. PLEASE DESCRIBE HOW TRM-BASED ENERGY SAVING ESTIMATES**  
15 **WILL BE VERIFIED UNDER EVALUATIONS PERFORMED IN**  
16 **ACCORDANCE WITH THE EM&V PLAN.**

17 **A.** Use of assumptions and engineering equations included in a technical reference manual  
18 (TRM) is common practice in the evaluation of program energy saving impacts. The  
19 advantage of this approach is that it can support development of reliable estimates of  
20 energy savings at a cost that is lower than the cost of performing custom evaluations of  
21 each instance of measure installation.

22 Both the 2019 EM&V effort and the EM&V Plan in this case incorporate  
23 International Performance Measurement and Verification Protocol (IPMVP) Option C  
24 analyses. The EM&V Plan identifies the specific conditions that must be met for Option

210550010  
210430103

1 C analyses to produce reasonably reliable estimates of energy impacts. Namely, the  
2 expected energy savings of the measure must be likely to exceed 10% of the building  
3 consumption, and ideally with sufficient pre- and post-implementation data, in full-year  
4 increments (e.g., 12 months pre-implementation and post-implementation).<sup>3</sup> The EM&V  
5 Plan describes how these conditions relate to the proposed programs and the cases for  
6 which we have determined an Option C analysis to be feasible. In general, the measures  
7 included in the Efficient Products, Energy Efficiency Kits, and SBDI Programs are not  
8 anticipated to effectuate energy savings equal to or greater than 10% of building  
9 consumption and are thus not suitable for IPMVP Option C whole-building billing  
10 analysis. The methods outlined in section 1.2.2.2 of the EM&V Plan will be applied to  
11 SBDI Program and Efficient Products Program projects, where appropriate, in cases in  
12 which ex ante savings meet or exceed 10% of prior year annual usage.

13 Staff noted that while Option C supplementary analysis was performed as part of  
14 EM&V of the 2019 eScore Program, Staff prefers annual data and asserts that this  
15 analysis should be validated by Staff after a full year of post implementation period data  
16 has been observed and measured. Notably, due to the timing of 2019 EM&V report  
17 production, it was not possible for the analyses reflected in the report to meet this  
18 criterion. Availability of post-implementation data is a function of the timing of EM&V  
19 analysis activities, which in turn is a function of the timing of EM&V report submission.

---

<sup>3</sup> International Performance Measurement & Verification Protocol. Concepts and Options for Determining Energy and Water Savings. Volume I. Revised March 2002.



21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32

1 **Q. WHAT ESTIMATES OF MEASURE EFFECTIVE USEFUL LIFE (EUL)**  
2 **SHOULD BE REFERENCED FOR THE PURPOSE OF DEVELOPING**  
3 **ESTIMATES OF LIFETIME SAVINGS?**

4 A. It is common practice to apply deemed EULs from technical reference manuals and other  
5 sources when estimating measure lifetime savings. There are multiple sources that could  
6 be referenced, preferably ones that have been vetted through a stakeholder review  
7 process. For instance, both the Mid-Atlantic TRM and the Pennsylvania TRM have been  
8 vetted through such a process. Multiple jurisdictions may come to different conclusions  
9 about what the EUL for a measure should be and both conclusions may be reasonable. In  
10 general, the Company's approach has been to apply EULs from the Mid-Atlantic TRM  
11 and cite other sources if a EUL is not provided in the Mid-Atlantic TRM. The Company  
12 also recognizes that, in the future, the stakeholder process may provide input and  
13 feedback on best practices of EM&V including those that relate to the estimation of  
14 lifetime savings.

15 **Q. IS THE APPROACH TO ASSESSING RESIDENTIAL MIDSTREAM LIGHTING**  
16 **FREE RIDERSHIP DESCRIBED IN THE EVALUATION PLAN AN**  
17 **ACCEPTABLE APPROACH?**

18 A. The price response model approach characterized in the EM&V Plan is commonly used  
19 to evaluate midstream lighting free ridership.<sup>4</sup> While this approach has limitations, I  
20 believe that Staff's preferred approach of performing a general population survey also has  
21 limitations and would incur greater cost. The primary limitation of the general population  
22 survey approach is that it is not possible to identify with certainty which purchases

---

<sup>4</sup> For example, see: Ameren Missouri Lighting Impact and Process Evaluation: Program Year 2015. PPL Electric Utilities. Annual Report to the Pennsylvania Public Utility Commission. Program Year 8.

21  
05  
04  
10  
03

1 described by respondents are program purchases. Instead, the approach largely depends  
2 on respondents' hypothetical assessments of their purchasing behavior under alternative  
3 pricing scenarios. The price response model has the advantage of using actual sales data  
4 to estimate free ridership.

5 Staff cited the 2018 EM&V report that presented estimates of free ridership  
6 developed using general population survey responses and the price response model  
7 estimates. The estimated free ridership under the two methods was 45% and 38%,  
8 respectively. Given that there is sampling error for the survey-based estimate, these two  
9 values are very similar.

10 Staff also stated that the Company and program implementation contractors  
11 should attempt to obtain sales of all retail lamps from retailers. While availability of such  
12 data would be ideal, I am not aware of a jurisdiction in which data on sales of all lamps  
13 by participating retailers has been made available.

14 **Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?**

15 **A.** Yes, it does.