

26 Oct 2018

Judith Judson
Chair, Energy Efficiency Advisory Council (“EEAC”)
Commissioner, Massachusetts Department of Energy Resources
100 Cambridge St., Suite 1020
Boston, MA 02114-2533

Re: TrickleStar, Inc. comments for Oct. 30 EEAC meeting

Dear Chairperson Judson and EEAC members,

TrickleStar, Inc., a manufacturer of energy monitoring devices and Advanced Power Strips suitable for both residential and commercial applications, thanks you for the opportunity to submit comments to the public record for the October 30, 2018 meeting of the EEAC. We respect and appreciate the role of EEAC members to guide the development of state- and nation-leading energy efficiency plans by the Commonwealth’s investor-owned gas and electric utilities and energy providers. With respect to the EEAC’s responsibility to recommend and oversee specific studies and research, our comments pertain to a recently-completed evaluation, which will be submitted along with Eversource Electric’s contribution to the 3-year Plan on 31 Oct 2018.

RLPNC 17-3: Advanced Power Strip Metering Study (“RLPNC 17-3”) presents the field research findings of NMR Group, Inc. and Navigant Consulting on behalf of the Massachusetts Program Administrators¹. This report fails to maximize the economic and environmental benefits of energy efficiency and creates a monopolistic sourcing scheme for Advanced Power Strips (“APS”) in the Commonwealth likely to cause commercial harm to one or more suppliers of such products.

TrickleStar commissioned an independent 3rd-party review of this study by industry experts in evaluation, measurement and verification; specifically, Johnson Consulting Group and Mesa Point Energy created a response to the August 2 version of RLPNC 17-3 titled “Comments Regarding: RLPNC 17-3: Advanced Power Strip Metering Study.”² NMR Group and the Program Administrators have since updated the RLPNC 17-3 study with an October 5 final version posted to the EEAC website. While NMR Group did address our concerns about persistence and improper source citations, they did not address significant concerns of sample size, improper method of calculation, and sample outlier effect. It is these concerns of RLPNC 17-3 (Oct 5) that fail to maximize the economic and environmental benefits of energy efficiency.

¹ NMR Group, Inc., RLPNC 17-3: Advanced Power Strip Metering Study, October 5, 2018 http://ma-eeac.org/wordpress/wp-content/uploads/RLPNC_173_APSMeteringReport_5OCT2018_Finalv2.pdf

² Johnson Consulting Group and Mesa Point Energy, “Comments Regarding: RLPNC 17-3: Advanced Power Strips Metering Study,” September 10, 2018 http://www.johnsonconsults.com/Solicited%20Comments%20on%20RLPNC%2017-3_09-10-2018.pdf

Improper Method of Calculation

By the study's own author's admission, "... thus eliminating customers who removed their APS and experienced reduced or no savings. Therefore, it is possible that savings estimates are upwardly biased (p. 14)." When a utility sends 100 units of an energy-savings measure out into the world, some of those measures will be sold or discarded before entered into service. Therefore, removing test sites that discarded their device from the sample pool was inappropriate. Rather, assigning these units a zero savings value is appropriate. The authors state they took an "in-service rate" metric from another study – RLPNC 17-4/5³. However, the savings and in-service rate should be taken from the same quantitative study rather than relying on a qualitative, self-reported survey instrument such as RLPNC 17-4/5. Bias from such a self-reported survey is well-understood. For example: a utility provides a widget to a residential customer as a part of a program. The customer sells the widget on eBay shortly after receiving it. The utility then calls the customer three months later to ask about the customer's experience using the widget. The customer declines to participate in the survey (voluntary response bias⁴). Therefore, the bias in this type of study (RLPNC 17-4/5) favors individuals that kept the widget thus driving inflated in-service rate and persistence metrics.

"It is important to note that the log-linear, difference in differences model that we employed yielded substantially higher ERP estimates than simple pre- versus post-comparisons between treatment and non-treatment sites (p. 33)." The difference-in-differences model was inappropriately used in this project for two reason. First, EEAC consultant Dr. Lori Lewis told TrickleStar over the phone on 11 Sep 2018, "... the methodology drove the experiment." In all other similar field studies or evaluations, learning objectives drive the experiment. Second, the difference-in-differences model will not likely be used in any post-program evaluation due to cost and complexity. Therefore, the ex-ante savings established in RLPNC 17-3 will not likely be corroborated in a later evaluation effort.

Sample Size

The field test from which RLPNC 17-3 is based started with 35 units from the IR supplier and 35 units from the IR-OS supplier. These small numbers of ordered products would be appropriate for one N=70 sample consisting of both IR and IR-OS products, but they are inappropriate for two N=35 samples considering of separate groups of IR and IR-OS due to expected attrition. Ultimately, the sample sizes were N=13 for the IR device and N=19 for the IR-OS device. Such sample sizes are too small to make a reasonable representation of the general population. Typically, a sample size ~ 69 units is needed for a 90% confidence level with a 10% confidence

³ NMR Group, Inc., RLPNC 17-4 and 17-4: products Impact Evaluation of In-service and Short-Term Retention Rates Study, 05 Oct 2018, http://ma-eeac.org/wordpress/wp-content/uploads/RLPNC_1745_APSPRODUCTSURVEYS_5OCT2018_Final.pdf

⁴ Stat Trek, "Statistics Dictionary," <https://stattrek.com/statistics/dictionary.aspx?definition=voluntary%20response%20bias>

interval⁵. The authors state on page 33 of the report, “...there are several limitations to the approach that create some threats to validity. The small sample sizes for each technology diminish the reliability of the estimates.”

Small sample sizes also introduce other types of bias into the results. On page 21 of the report, the authors state, “Of the customers who received Tier 2 APS units, the two highest energy users in the pre-period each received Tier 2 IR devices as a result of the random assignments of Tier 2 APS technologies to study participants.” This bias favors the IR device results. The authors go on to state in the same paragraph on page 21, “... it is possible that the lack of high users in the metered Tier 2 IR-OS pool created a somewhat limited opportunity to generate energy reduction from the highest energy users, who we expected to be the greatest candidates for Tier 2 APS savings.” The authors recognize sample-size bias that works against the IR-OS device.

Sample Outlier Effect

With sample sizes of N=13 and N=19, one can understand why the study authors chose to not remove outliers from the sample. Doing so could drop the sample size even lower further decreasing the confidence level and increasing the confidence interval. However, failing to remove samples that are three or greater standard deviations from the mean serves to introduce bias into the results. Table 6 on page 21 of the report shows the effect of removing outliers from the sample. The Energy Reduction Percentage (“ERP”) of the IR device moves from 48% to 32%, and the ERP of the IR-OS device moves from 28% to 27%.

The sample sizes are already too small; knowing this, the Program Administrators decided to accept the results. We suggest that the ERP results in Table 6 on page 21 for “two highest and two lowest users excluded” are used in the final ERP calculations in the introduction of the report where Combined ISR & Retention and Realization Rate are applied to get a Gross kWh Savings value.

Commercial Harm to One or More Suppliers

Light bulbs, refrigerators, clothes washers, and windows all have a single savings value for their category. Differences in build materials and technology exist in each of these categories. Why then does Tier 2 Advanced Power Strips get separate savings by technology? Tier 1 Advanced Power Strips have different threshold settings, different build materials, and different operating energy use. Why then does Tier 1 APS get a common savings value for the category while Tier 2 APS gets separate savings values by technology? The Mass Save Program Administrators have sold Bits Limited, TrickleStar, and Globe Electric Tier 1 Advanced Power Strips over the past several years (retail programs administered by Lockheed Martin). We believe that one savings value for the category of Tier 2 Advanced Power Strips is appropriate and would promote cost

⁵ Calculator.net, Sample Size Calculator, <https://www.calculator.net/sample-size-calculator.html?type=1&cl=90&ci=10&pp=50&ps=&x=69&y=23>

effectiveness and increase innovation. Operating under one savings value for the category, manufacturers would need to compete for utility business with both price and performance. Assigning separate savings by technology will pick a single winner in the market and inhibit both cost effectiveness and product innovation.

Proposed Solution

The sample sizes of N=13 and N=19 are too small to make an accurate representation of the general population. Separating savings values by technology will pick a single winner in the market, inhibit innovation, and increase costs to the Program Administrators. We therefore recommend reevaluating the savings with a single, N=32 sample to create one savings value for the Tier 2 Advanced Power Strip category.

The difference-in-differences model creates exaggerated savings values as compared to a simple pre/post comparison. We suggest the data be reanalyzed using a standard pre/post linear regression model and these values used to move forward to inform the Technical Reference Manual and Benefit Cost Models.

Alternatively, if the Department of Public Utility has confidence in the difference-in-differences model and no concerns for the small sample sizes, we suggest the ERP savings values from Table 6 on Page 21 be used to apply against adjustments for Combined ISR and Retention and Realization Rate to arrive at a new Gross kWh Savings value. When this is done, savings by technology will be close, and one savings value for the category of Tier 1 Advanced Power Strips will be appropriate.

Thank you for your time and consideration. We will submit similar comments, substantiated by independent 3rd-party review, to the Department of Public Utilities by way of e-filing comments to docket 18-119.

Sincerely,

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