RHOADS & SINON LLP

**Scott H. DeBroff, Esq.**

*Phone: (717) 237-6716*
*Fax: (717) 237-6790*
sdebroff@rhoads-sinon.com

FILE NO: 11307/3

March 30, 2009

Mr. James J. McNulty
Secretary
Pennsylvania Public Utility Commission
P.O. Box 3265
Harrisburg, PA 17105-3265

**Re: Docket No. M-00051865 – Reply Comments on Behalf of Positive Energy In Response to the Proposed Update to the Technical Reference Manual (TRM)**

Dear Mr. McNulty:

Enclosed herewith please find an original copy of the "Reply Comments on Behalf of Positive Energy in Response to the Proposed Update to the Technical Reference Manual (TRM)." This document has been electronically filed through the PUC's e-filing system. Please enter this into the docket. An electronic copy of the Comments will be sent to the Commission's Act 129 e-mail account.

Should you have any questions, please do not hesitate to contact me at (717) 233-5731.

Best regards,

RHOADS & SINON LLP

By: [signature]
**Scott H. DeBroff, Esq.**

Enclosures

cc: ra-Act129@state.pa.us

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# COMMONWEALTH OF PENNSYLVANIA
# PENNSYLVANIA PUBLIC UTILITY COMMISSION

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| **IMPLEMENTATION OF THE ALTERNATIVE ENERGY PORTFOLIO STANDARDS ACT OF 2004: STANDARDS FOR THE PARTICIPATION OF DEMAND SIDE MANAGEMENT RESOURCES – TECHNICAL REFERENCE MANUAL** | Docket No. M-00051865 |

## REPLY COMMENTS ON BEHALF OF POSITIVE ENERGY, INC. IN RESPONSE TO THE PROPOSED UPDATE TO THE TECHNICAL REFERENCE MANUAL (TRM)


**SCOTT H. DEBROFF, ESQUIRE**
**ALICIA R. PETERSEN, ESQUIRE**
RHOADS & SINON LLP
ONE SOUTH MARKET SQUARE
P.O. BOX 1146
HARRISBURG, PA 17108-1146

TEL: (717) 233-5731
FAX: (717) 231-6626
EMAIL: SDEBROFF@RHOADS-SINON.COM
APETERSEN@RHOADS-SINON.COM


**DATED: MARCH 30, 2009**


**COUNSEL FOR POSITIVE ENERGY, INC.**

## COMMONWEALTH OF PENNSYLVANIA
## PENNSYLVANIA PUBLIC UTILITY COMMISSION

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## REPLY COMMENTS ON BEHALF OF POSITIVE ENERGY, INC. IN RESPONSE TO THE PROPOSED UPDATE TO THE TECHNICAL REFERENCE MANUAL (TRM)

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AND NOW COMES, **Positive Energy, Inc.** ("Positive Energy"), by and through its counsel, **Scott H. DeBroff, Esquire** and **Alicia R. Petersen, Esquire** of Rhoads & Sinon LLP, for the purpose of filing these "Reply Comments" before the Pennsylvania Public Utilities Commission ("Commission") and avers as follows:

1. Positive Energy is a privately-held technology company which has developed the utility industry's first behavioral science driven, customer-centric, data analysis and communications software platform, the Home Energy Reporting System. This platform is becoming a core element of energy efficiency portfolios around North America. It is helping forward-thinking utilities better engage their residential customers to become more energy efficient, target specific

and relevant efficiency recommendations to each of their residential customers, and make it easier for each customer to take action on these recommendations.

2. Following are Positive Energy's Reply Comments to the Proposed Update to the Technical Reference Manual (TRM).

**POSITIVE ENERGY'S REPLY COMMENTS IN RESPONSE TO THE PROPOSED UPDATE TO THE TECHNICAL REFERENCE MANUAL (TRM)**

Positive Energy thanks the Commission for the opportunity to respond to concerns surrounding its application to have Large-Scale Data Analysis (LSDA) included in the Technical Requirements Manual (TRM) as an appropriate Measurement and Verification (M&V) technique.

In its submission, Positive Energy asked the Commission to accept LSDA as an appropriate measure for efficiency gains. LSDA is an old, uncontroversial, widely known, and widely accepted M&V technique. Here is how it works: one establishes a "control group" and an "experimental group" to test the impact of a stimulus. The stimulus could be a drug, nutritional advice, or new information about energy consumption. The control and experimental groups are carefully designed so that the only difference between the two is the stimulus. Consequently, any difference between the two groups may be properly attributed to the stimulus. To be clear, LSDA is not part of any company's specific software; it is a scientific measurement technique.

Until recently, LSDA has not been used by utilities because there were few appropriate applications for this measurement technique. (A utility could not, for example, offer a refrigerator rebate to one "experimental" group and not to a "control group.") Increasingly, however, utilities are turning to LSDA to evaluate the impact of behavioral change programs on residential customers. Indeed, utilities in California, Washington, Minnesota, Massachusetts, New York, and Illinois are starting to use LSDA to evaluate behavioral change programs.

LSDA plays a role in the M&V for many businesses, including Positive Energy's. Positive Energy partners with utilities ("EDCs") to achieve efficiency goals by providing information to residential customers that motivates behavioral change. Positive Energy does this by (1) using innovative software that allows us to create a neighbor-to-neighbor energy comparison ("neighborhood benchmarking") and (2) using established direct marketing techniques to offer individualize recommendations that are easy to understand and act upon. LSDA is the most accurate way to document our impact – and enable our utility partners to get proper credit for the energy savings created.

Positive Energy only asks that the Commission accept LSDA as *one acceptable technique among many* with which evaluators may measure efficiency gains.

Positive Energy is NOT asking the Commission to describe or recommend Positive Energy's software or individualized products in the TRM. We simply request that the TRM acknowledge use of a technique, LDSA, that is widely accepted, employed, and trusted in numerous other fields for M & V. Positive Energy understands that the Commission may choose to add LSDA to the TRM either as a stand-alone M&V technique, or as a custom measure.

Positive Energy respectfully requests that the Commission accept LSDA as an appropriate M & V technique. This technique is specifically recommended in the Model Energy Efficiency Program Impact Evaluation Guide of the National Action Plan for Energy Efficiency (attached as Exhibit A). We stand ready to testify before the Commission at any time, should the Commission have further questions about this request.

WHEREFORE, Positive Energy respectfully requests that the Commission enter its Reply Comments in the above-captioned proceeding. We look forward to participating in the process going forward and contributing our experience and expertise. Thank you again for the opportunity to comment on this important matter.

Respectfully submitted,

By: ______________________

**SCOTT H. DEBROFF, ESQUIRE**
**ALICIA R. PETERSEN, ESQUIRE**
RHOADS & SINON LLP
ONE SOUTH MARKET SQUARE
P.O. BOX 1146
HARRISBURG, PA 17108-1146

TEL: (717) 233-5731
FAX: (717) 231-6626
EMAIL: SDEBROFF@RHOADS-SINON.COM
EMAIL: APETERSEN@RHOADS-SINON.COM

**DATED: MARCH 30, 2009**

**COUNSEL FOR POSITIVE ENERGY, INC.**

## COMMONWEALTH OF PENNSYLVANIA
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## CERTIFICATE OF SERVICE

I hereby certify that I served the foregoing "**REPLY COMMENTS ON BEHALF OF POSITIVE ENERGY, INC. IN RESPONSE TO THE PROPOSED UPDATE TO THE TECHNICAL REFERENCE MANUAL (TRM)**" electronically through the e-filing system with the PUC and in hand to the Commission, and electronically to the service list at the following Email address: ra-Act129@state.pa.us

Dated: **March 30, 2009**

By: ______________________


**SCOTT H. DEBROFF, ESQUIRE**
**ALICIA R. PETERSEN, ESQUIRE**
RHOADS & SINON LLP
ONE SOUTH MARKET SQUARE
P.O. BOX 1146
HARRISBURG, PA 17108-1146

TEL: (717) 233-5731
FAX: (717) 231-6626
EMAIL: SDEBROFF@RHOADS-SINON.COM
EMAIL: APETERSEN@RHOADS-SINON.COM

**COUNSEL FOR POSITIVE ENERGY, INC.**

# APPENDIX A

savings are totally dependent on its operating hours. Such a lamp installed in a closet will save much less energy than one installed in a kitchen.

The example of the residential lamp raises the issue of "granularity" of the deemed savings values. In that example, if an average household's annual operating hours were used, the result would be underestimated savings if lamps were only installed in high-use areas and overestimated savings if lamps were only installed in low-use areas. Thus, the value of deemed savings depends not only on the validity of the value used, but on whether the value is applied correctly—that is, it must be based on the use conditions as well as the technology.

Sources of stipulated values must be documented in the evaluation plan. Even when stipulated values are used in place of measurements, equipment installation and proper operation are still verified. Properly used, stipulations can reduce M&V costs and simplify procedures. Improperly used, they can give evaluation results an inappropriate aura of authority. Deciding whether parameters could be stipulated requires understanding how they will affect savings, judging their effect on the uncertainty of results, and balancing the costs, risks, and goals of the program being evaluated.

Assessing a few key aspects of the project could drive decisions about whether to use stipulations and how to use them effectively in an evaluation plan:

- Availability of reliable information.
- The project's likelihood of success in achieving savings.
- Uncertainty of the stipulated parameter and its contribution to overall project uncertainty.
- The cost of measurement.

Uncertainty in predicted savings, and the degree to which individual parameters contribute to overall uncertainty, should be carefully considered in deciding whether to use stipulations. Savings uncertainty can be assessed by identifying the factors that affect savings and estimating the potential influence of each factor. Factors having the greatest influence should be measured if at all practical. Several "rules of thumb" are:

- The most certain, predictable parameters can be estimated and stipulated without significantly reducing the quality of the evaluation results.
- Stipulating parameters that represent a small degree of uncertainty in the predicted result and a small amount of savings will not produce significant uncertainty concerns.
- Parameters could be measured when savings and prediction uncertainty are both large.
- Even if savings are high, but uncertainty of predicted savings is low, full measurement may not be necessary for M&V purposes.

## 4.4 Large-Scale Data Analysis Approach

Large-scale data analysis applies a variety of statistical methods to measured facility energy consumption meter data (almost always whole-facility utility meter billing data) and independent variable data to estimate gross energy and demand impacts.[5] Unlike the M&V whole-facility analysis option (IPMVP Option C) described in Section 4.2, the meter analysis approach usually (a) involves analysis of a census of project sites, versus a sample, and (b) does not involve onsite data collection for model calibration—although inspections of a sample of projects to confirm proper operation of installed measures are still performed.

Most analyses of meter data involve the use of comparison groups (which can be hard to find in areas with a long history of program offerings). In assessing the impacts of programs, evaluators have traditionally used "quasi-experimental design." They compare the behavior of the participants to that of a similar group of nonparticipants—the comparison group—to estimate what would have happened in the absence of the program. The two groups need to be similar on average. The only difference should be the fact that one participated in an energy efficiency program and one did not. The observed change in consumption in the comparison group can be assumed to resemble the change in consumption that would have been observed in the participant group had it not been through a program.

There are three basic large-scale meter data analysis methods employed for energy efficiency programs:

- **Time series comparison**—compares the program participants' energy use before and after their projects are installed. With this method the "comparison group" is the participants' pre-project consumption. Thus, this method has the advantage of not requiring a comparison group of non-participants. The disadvantages are that it cannot be easily applied to new construction programs and even with well-established regression techniques, this approach cannot fully account for all changes in all the independent variables that might impact energy savings. The basic evaluation equation is:

  $$savings = Q_{pre\text{-}installation} - Q_{post\text{-}installation}$$

  where: $Q_{pre\text{-}installation}$ = quantity of energy used before the projects were implemented, corrected for independent variables, such as weather, to match reporting period independent variable values

  $Q_{post\text{-}installation}$ = quantity of energy used after the projects were implemented

- **Use of comparison group**—compares the program participants' energy use after projects are installed with the energy use of non-participants. This method is used primarily for new construction programs, where there are no baseline data. The difficulty with this approach is usually related to the cost of analyzing two groups and finding a comparison group with sufficiently similar characteristics to the group of participants. The basic evaluation equation is:

  $$savings = Q_{non\text{-}participants} - Q_{participants}$$

  where: $Q_{participants}$ = quantity of energy used by the participants after their projects are installed

  $Q_{non\text{-}participants}$ = quantity of energy used by the control group of non-participants, after the participants installed their projects

- **Comparison group/time-series**—this approach combines the two above approaches and thus has the advantages of comparing similar if not identical groups to each other while accounting for efficiency savings that would have occurred irrespective of the program. If the participant and comparison group are available, it is a preferred approach. The basic evaluation equation is:

  $$savings = (Q_{pre\text{-}installation} - Q_{post\text{-}installation})_{participants} - (Q_{pre\text{-}installation} - Q_{post\text{-}installation})_{non\text{-}participants}$$

  where: $Q_{pre\text{-}installation}$ = quantity of energy used before the projects were implemented

  $Q_{post\text{-}installation}$ = quantity of energy used after the projects were implemented

Statistical models apply one of a number of regression analysis techniques to measured energy use data to control for variations in independent variables. With regression analyses, a relationship is defined (in the form of an equation or group of equations) between the dependent variable and one or more important independent variables. Dependent variables are the output of an analysis. Independent variables are the variables which are presumed to affect or determine the dependent variables and are thus inputs to an analysis. In the case of energy efficiency analyses, the output is energy or demand consumption and savings. The analysis itself is done with a computer model, which can be anything from a spreadsheet tool to sophisticated proprietary statistical modeling software.

The primary consideration for any evaluation is that the analysis must be designed to obtain reliable energy savings. Uncertainty of savings estimates can decrease as the evaluators attempt to incorporate the major independent variables that may have affected the observed change in consumption. This can be accomplished in several ways. One common method is to include participant and non-participant analyses (the second and third bullets above). If one of these approaches is selected, particular care and justification must be made for the non-participant group selected and its appropriateness for the program and participant population being analyzed. Secondly, evaluation design and analysis needs to consider whether the analysis is providing gross impact, net impact, or something in between that must then be adjusted or analyzed.

It is very important to note that simple comparison of meter data—say subtracting this year's utility bills from the utility bills from before the measure installations—is not a valid evaluation approach (equation 4.1 above shows that the baseline data are corrected for the changes in independent variables). Simple comparison of reporting period energy use with baseline energy use does not differentiate between the effects of a program and the effects of other factors, such as weather. For example, a more efficient air conditioner may consume more electricity after its installation if the weather is warmer during the reporting period than it was before installation. To isolate the effects of the evaluated program (i.e., to establish attribution), the influence of these complicating factors must be addressed through the use of regression analyses.

In regression analysis, the following questions need to be answered:

- What independent variables are relevant to calculating energy savings? Often this is decided by common sense, experience, or budget considerations (with respect to how many variables can be measured and tracked) but it can also be determined through field experiments and statistical tests. For weather data (the most common independent variable), there is a wide range of public and private data sources.
- Will a comparison group be used in the analysis? While often a more accurate approach, the use of comparison groups assumes that a comparable group of participants and non-participants can be found and analyzed. This, of course, adds to evaluation costs.
- How will the analysis be tested for statistical errors, and what level of uncertainty is acceptable? The first concern requires qualified analysts and a quality control system. The second requires specification of statistical parameters that define the uncertainty of the calculated savings. The field of statistical analysis can be quite complex and untrained analysts often misinterpret analyses and miss key considerations or errors in statistical analyses.
- Are gross or net savings values desired? The latter two methods described above, which include comparison groups, can actually produce net savings values.

In addition, the appropriate type of statistical model needs to be decided. The following are brief descriptions of some typical generic model types:

- **Normalized annual consumption (NAC) analysis.** This is a regression-based method that analyzes monthly energy consumption data. The NAC analysis can be conducted using statistical software, such as the Princeton Scorekeeping Method (PRISM), and other statistically based approaches using SAS or SPSS.[6] The NAC method, often using PRISM, has been most often used to estimate energy impacts produced by whole-house retrofit programs.
- **Conditional savings analysis (CSA).** CSA is a type of analysis in which change in consumption is modeled using regression analysis against the presence or absence of energy efficiency measures. These are usually entered in the form of binary variables (1 if measures are installed and 0 if not).
- **Statistically adjusted engineering (SAE) models.** A category of statistical analysis models that incorporate the engineering estimate of savings as a dependent variable. For example, a SAE model can use change in energy as the dependant variable

in a regression model against estimated savings for installed efficiency measures. Often these estimates are provided in the design phase or through secondary sources (e.g., DEER). When the measures are installed, the estimated savings is entered as the explanatory variable value. When the measures are not installed, 0 is entered as the explanatory variable value in the regression model.

- **Analysis of covariance (ANCOVA) models.** These are also called fixed effects models. Any of the above can be run as an ANCOVA model. The advantage of this approach is that it allows each participant or non-participant to have a separate estimate of the "intercept" term. Regression models estimate an intercept (in the case of energy modeling, this often represents the base component, i.e., non-weather sensitive component of energy use) and a slope coefficient (this often represents the change in energy consumption for one unit change in the explanatory variable). By permitting each participant and non-participant to have its own intercept, analysts allow for some differences among the analysis subjects.

While this Guide does not delve into statistical modeling details, an excellent source of information on the techniques described below is *The 2004 California Evaluation Framework* (CPUC, 2004).

## 4.5 Selecting a Gross Savings Evaluation Approach

Selecting an evaluation approach is tied to objectives of the program being evaluated, the scale of the program, evaluation budget and resources, and specific aspects of the measures and participants in the program. The following subsections describe situations in which each of the three gross impact approaches is or is not applicable.

One criterion that works across all of the approaches is evaluator experience and expertise. Thus, a common requirement is that the evaluator has experience with the approach selected.

### 4.5.1 M&V Approach

The M&V approach is used for almost any type of program that involves retrofits or new construction projects. While a census of projects can be used with the M&V approach, it is generally applied to only a sample of projects in a program. This is because the M&V approach tends to be more expensive on a per-project basis than the other two approaches. In general, the M&V approach is applied when the other approaches are not applicable or when per-project results are needed. An example is a performance-contracting program with multiple contractors.

Because the selection of the M&V approach is contingent on which of the four M&V Options is selected, Table 4-2 summarizes some selection criteria for each M&V Option. Cost is one of these considerations and is influenced by the following factors:

#### Option A

- Number of measurement points
- Complexity of deriving the stipulation
- Frequency of post-retrofit inspections

#### Option B

- Number of points and independent variables measured
- Complexity of measurement systems
- Length of time measurement system maintained
- Frequency of post-retrofit inspections

#### Option C

- Number of meters to be analyzed
- Number of independent variables used in models

#### Option D

- Number and complexity of systems simulated
- Number of field measurements required for model input data