



Joel H. Peck, Clerk
State Corporation Commission
Document Control Center
P.O. Box 2118
Richmond, Virginia 23218

May 25, 2016

RE: PUE-2016-00022, Ex Parte: In the matter of receiving input for evaluating the establishment of protocols, a methodology, and a formula to measure the impact of energy efficiency measures

Dear Mr. Peck:

The Virginia Energy Efficiency Council (“VAEEC”) respectfully submits the following Comments in regards to the Commission’s March 30, 2016 Scheduling Order (Case No. PUE-2016-00022).

The VAEEC is a nonprofit organization composed of a broad coalition of businesses, academics, local governments, utilities, and advocates in the energy efficiency industry, working to assess and support programs, innovation, best practices, and policies that advance energy efficiency in Virginia while providing a forum for stakeholder interaction. We convened a broadly representative coalition of stakeholders interested in submitting comments and appreciate the opportunity the Commission has provided to engage on this important issue regarding EM+V protocols for utility programs in Virginia.

In preparation to submitting comments, the VAEEC also worked with DMME and other partners on a Department of Energy State Energy Program grant to commission a paper from the well-known and respected Synapse Energy, a consulting firm that provides data driven analysis of the electric power sector for public interest and governmental organizations. Their “*Evaluation, Measurement, and Verification in Virginia*” (Attachment A) informs aspects of our recommendations and response.

The VAEEC is especially sensitive to our stakeholders’ and members’ concerns about energy efficiency program cost and the impact that has on rates and regulatory approval. Accordingly, our recommendations identify ways to *lower* costs through a transparent and standard process; by leveraging both lessons learned and best practices from other states’ programs; and where applicable and cost effective, by incorporating EM&V methodologies enabled by new technology and innovation.

The Commission’s Scheduling Order included the following Objectives and Cost/Benefit Questions:

The Commission will conduct an evaluation to consider the establishment of: (i) uniform protocols for measuring, verifying, validating, and reporting the impacts of energy efficiency measures; (ii) a methodology for estimating annual kilowatt savings for such energy efficiency measures; and (iii) a formula to calculate the levelized cost of saved energy for such energy efficiency measures (collectively, “Objectives”).

The Commission also believes that the Evaluation also should encompass the methodologies by which utilities calculate the components of the cost/benefit tests in proceedings requesting approval to implement energy efficiency programs. In particular, the Evaluation should consider: (i) whether the application of costs and benefits is consistent across utilities; (ii) whether consistent application of costs and benefits across utilities is necessary or reasonable; and (iii) whether the application of the cost/benefit tests can be improved by enhanced evaluation and verification protocols for estimating savings actually realized (collectively, “Cost/Benefit Questions”).

The Commission also seeks specific input concerning:

- *Existing measurement and verification protocols and their applicability for Virginia; and*
- *Appropriate formulae for developing the cost of saved energy resulting from energy efficiency programs and appropriate inputs for such formulae*

VAEEC Comments/Recommendations

I. Establishment of uniform protocols for measuring, verifying, validating, and reporting the impacts of energy efficiency measures; including information existing protocols and their applicability for Virginia

Establishing a uniform EM&V protocol across utilities and their programs would contribute greatly to the quantification, validation, transparency, and level of confidence assignable to the quantitative impacts of EE measures and programs sponsored by regulated utilities in Virginia. First, these protocols would provide certainty that results derived from M&V measures included in the protocols would be accepted as accurate results by the SCC. Second, it would provide certainty for utilities about how lost revenue is calculated, to the extent that lost revenue is derived from efficiency programs with results measured using these M&V protocols. Also, the VAEEC supports the Synapse report recommendation for the SCC to adopt a transparent reporting framework, such as the new version of the NEEP reporting forms, and require EM&V contractors to use them.

The VAEEC has examined such protocols in “peer” states with comparable resources, legislative frameworks, EE histories and cultures, to determine what elements might be most applicable in Virginia. A summary of preliminary findings is given in Attachment B. After consulting with several stakeholders (full list of resources can be found in Attachment C), we have concluded that Arkansas is a useful “peer” state for the SCC to consider. Arkansas’ utilities are regulated, have a robust energy efficiency portfolio, and importantly have used a well-defined stakeholder forum to develop a state Technical Resource Manual (TRM), EM&V protocols, net-to-gross savings adjustments, and approaches for quantifying non-energy benefits.

The VAEEC supports the establishment of uniform protocols for measuring, verifying, validating, and reporting the impacts of energy efficiency measures *through a stakeholder process*, similar to the successful one developed by Arkansas (more details can be found in Synapse Attachment). One additional topic which should be explored is the creation or identification of a third party to review the EM&V process. This review should not be duplicative of the utilities’ own evaluations, nor a cost burden. The review by a third party EM&V consultant could concentrate on the utility’s EM&V practices and reports assuring consistent execution with the “approved EM&V” plan and the specific EE program requirements. Such a third party consultant would be part of an overall process improvement and

program feedback team. Best practices across the country have shown this can be an important step and requirement to lowering overall cost of the entire DSM program.

II. Establishment of a methodology for estimating annual kilowatt savings for such energy efficiency measures

In mass-market programs (residential and small business), one of the most common methodologies for EM&V relies on deemed savings, whose calculations are documented in a TRM. As billing analysis methods were time consuming and expensive, deemed savings were created to enable energy efficiency to scale. A deemed savings approach is relatively inexpensive, and the TRM provides the single, definitive source program administrators rely on for savings values. While deemed savings have been beneficial to the industry, they do not always represent the actual impact of energy efficiency measures and can vary significantly from the customer experience. As explained in the Synapse Attachment A, a deemed approach runs the risk of being more or less applicable to the jurisdiction based on a number of factors. Currently, Virginia utilities rely on the Mid-Atlantic TRM for deemed savings, but there is no common evaluation protocol or stakeholder input with respect to the EM&V process .

With respect to EM&V protocols, “enhanced EM&V” methods provide opportunities for utilities and regulators to gain program insights in near real-time, speeding up the evaluation process and reducing the associated costs. As was recently stated by Tom Eckman, the Power Division Director of the Northwest Power and Conservation Council, at a presentation on the evolution of evaluation, “Why deem it when you can measure it.”¹ Depending on the methodology, enhanced EM&V (also referred to as “automated EM&V” or “EM&V 2.0”) does not require a smart meter or in home energy monitoring device to be effective:

These technologies extract granular energy consumption data in different ways in a timely manner, and allow new data analytics software to store, track, and analyze the data in near real time using cloud-based software. This capability allows program administrators to implement automated M&V, which takes advantage of automated data processing to produce building energy profiles, estimate savings potential, or estimate whole-building energy savings in near real time.² The way automated M&V estimates savings is similar to traditional billing analysis. Billing analysis uses an adjusted baseline, modeled using actual metered consumption data in the pre-program period, to estimate what future building energy use would be absent the energy efficiency measure. The advantage of automated M&V over traditional methods such as billing analysis is that automated M&V estimates data in real time without needing a site visit. Thus, it can more easily develop baseline consumption and estimate savings in numerous buildings. (Synapse Attachment A, p.16)

The emergence of these new EM&V tools allows for a resurgence of billing analysis methods to be completed for utility programs inexpensively through cloud computing software with just monthly

¹ NEEA Efficiency Exchange, The Evolution of Evaluation: Revolution or Resolution? EM&V 2.0 New Approaches vs. Traditional Methods; Presentation by Tom Eckman; Impact Evaluation: A Very Short History; April 26, 2016, Coeur d'Alene, ID. <https://conduitnw.org/Pages/File.aspx?rid=3436>

² DNV GL. 2015c. The Changing EM&V Paradigm – A Review of Key Trends and New Industry Developments, and Their Implications on Current and Future EM&V Practices, p. 34.

energy use data and without a requirement for smart meters. Some EM&V 2.0 tools that employ a continuous, automated billing analysis can detect savings in buildings in the range of 2-3% and are no longer hindered by the costs associated with manual billing analysis. Standardizing these approaches will enable Virginia energy efficiency programs to develop a strong, data-driven footing from which to expand programs and offerings to customers. Enhanced EM&V that results in lower costs to ratepayers and shortens the program performance feedback cycle, will enable better long term program performance and greater customer satisfaction. A report issued by ACEEE last year on the topic of EM&V 2.0 noted these two important benefits. First, the ability for utilities to understand program performance continuously supports better outcomes for utilities and customers; "Automated program analysis provides timely key performance information to implementers and administrators on an ongoing basis." Second, the ability for automation to reduce costs associated with evaluation; "³

Many of the elements of EM&V 2.0 are already in use throughout the country, including in Virginia. For example, there are efficiency programs in use today in which the savings are measured with statistical analysis of meter data on a frequent basis. Residential behavioral energy efficiency (BEE) is one type of a program that includes these elements, and is measured with a process called a "randomized control trial." With residential BEE, a utility population is divided into treatment and control groups. These groups are statistically equivalent, based on previous energy usage, as well as characteristics like participation in other utility programs or parcel data (such as house size and age). Energy efficiency communications are sent to just the treatment group. The usage of each group is measured with meter data, and any difference in the usage of the two groups is credited to the behavioral energy efficiency program. These impacts are typically measured every month, but there's no reason they couldn't be measured over a shorter time frame, given sufficient metering technology. This randomized control trial approach has been endorsed as a best practice by the US Department of Energy, as part of the DOE's Uniform Methods Project (see Appendix D).

III. Establishment of a formula to calculate the levelized cost of saved energy for such energy efficiency measures

As succinctly explained in the Synapse Attachment: the levelized cost of energy (LCOE) is a metric used by utilities to make an apples-to-apples comparison of the cost of electric generating resources such as natural gas plants, nuclear plants, and renewables. The levelized cost of saved energy (LCOSE) refers to the cost of acquiring energy savings which result from economic lifetime of efficiency programs. The classic formula cited in HB 1053/ SB 395 is a useful means of computing and comparing program impacts.

The inputs to this formula—annual kWh saved, the year(s) in which such savings are claimed, the weighted average of measure lifetimes, total program costs, and applicable discount rate(s)—require careful definition and agreement on their sources and would benefit from a transparent, stakeholder-informed process. Best practices for these inputs are described in the Synapse Attachment, and the VAEEC supports standardizing key variables such as the discount rate and energy savings types (e.g., net vs. gross). The VAEEC also recommends the SCC be specific about how the LCOSE estimates will be used.

³ Rogers, Ethan, et al. 2015. *How Information and Communications Technologies Will Change the Evaluation, Measurement, and Verification of Energy Efficiency Programs*. ACEEE. <http://aceee.org/research-report/ie1503>, pg 21

In a vacuum, it's difficult to conclude anything about the value of an efficiency program with LCOSE alone, and LCOSE is not the appropriate metric for determining if an efficiency investment should be pursued. For this purpose, the SCC should continue to use cost-effectiveness tests.

IV. Consistency of application of cost/benefits tests across utilities

Cost/benefit (cost-effectiveness) tests vary widely from state to state and from utility to utility; even states and utilities that use what is nominally the same California Standard Practice Manual test each typically use their own assumptions and inputs, with the result that there is wide variation in the way that each test is implemented. Because the California Standard Practice Manual does not provide explicit guidance on many issues related to cost/benefit test implementation, tests such as the Utility Cost Test, the Total Resource Cost Test, and the Societal test are widely misinterpreted and/or misapplied. Frequent problems include failure to account for the full range of utility system costs and benefits, and asymmetrical approaches that incorporate all costs without adequately accounting for corresponding benefits. To ensure that regulators and policy-makers receive the best information possible as the basis for decisions about demand-side programs, a statewide cost/benefit test framework should be designed with reference to best practices, such as those developed by SEE Action, the Regulatory Assistance Project, and the National Efficiency Screening Project. We note that a standardized approach to developing accurate tests that address a state's specific policy needs and goals has been developed by the National Efficiency Screening Project, and would be the ideal basis for the development of a consistent statewide cost/benefit test framework.

One of the best practice principles that should be adopted in a statewide cost/benefit test framework is transparency. It is important that all stakeholders have a clear understanding of the inputs that go into the tests, and how the inputs are derived or calculated. A consistent statewide cost/benefit test has the following benefits:

- The cost/benefit test framework could incorporate best practices to ensure the most accurate results;
- Firms offering demand-side programs and services would have a broadly consistent market across the state.

While the Ratepayer Impact Measure (RIM) test is one test used to evaluate cost/benefit of a program, a statewide cost/benefit test framework should not rely solely on the RIM test, as it provides only limited information about a demand-side program: specifically, it looks only at rate impacts, rather than total costs, and does not provide an indication of the magnitude of the rate impacts (which, for small programs, are likely to be negligible). Also, the Total Resource Cost test should be constructed symmetrically, so that the full range of corresponding costs and benefits are accounted for. This is particularly an issue with participant costs, because participants incur costs to obtain a range of benefits, including comfort and improved health, with energy savings typically being a secondary consideration at best. Other costs, including avoided water and other fuel costs, should also be incorporated into these tests to ensure that they provide an accurate comparison of "total" costs and benefits.

The VAEEC respectfully requests that the Commission initiate a stakeholder process to develop guidance for the purpose of adopting a consistent, transparent state-wide framework for cost/benefit testing.

V. Enhanced EM&V impact on cost/benefit testing

A statewide Cost/Benefit Test framework (or any cost/benefit test) would benefit from enhanced EM&V (often referred to as EM&V 2.0). Enhanced EM&V increases the accuracy of the cost/benefit tests by quantifying more accurately one of the crucial test inputs: energy saved. Enhanced EM&V has particular potential for determining when energy is saved, therefore providing a much more accurate quantification of reduction in peak demand, as well as reduction in total energy consumption. Finally, enhanced EM&V can reduce the time necessary to quantify energy savings, thus allowing the cost/benefit tests to be based on more recent and relevant data.

Enhanced EM&V or EM&V 2.0 can be especially useful in establishing deemed savings for creating or updating a state TRM. This area of study is quickly emerging, and other states are taking advantage of it: Missouri is in the process of creating its first statewide Technical Resource Manual. As part of the project, the state will be studying the use of EM&V 2.0 technologies for this process.⁴ A recent case study completed by Ameren, Missouri demonstrated that an EM&V 2.0 tool using an automated billing analysis could locate deemed saving values that were both under and over-estimated.⁵

While automated EM&V tools measure savings at the meter, they also provide robust, local primary data sources for parties studying, creating and calibrating deemed savings. Ideally, Virginia deemed savings referenced in cost/benefit tests and subsequent EM&V should be standardized to a single TRM: the state could adopt one which has already been written; it could adopt *and* amend a TRM with “trued-up” Virginia data; or it could create its own. Certainly data drawn from a state TRM would provide more accurate projections for cost/benefit testing, as well as future EM&V. ***The Virginia Energy Efficiency Council recommends a stakeholder process for the adoption and/or potential development of a state TRM, overseen by an independent party and informed by results from past and current Virginia utility programs.***

Thank you for your thoughtful consideration of our comments. We look forward to continuing to engage with the commission on this important issue as you decide next steps in the process. Please do not hesitate to contact me at 804.457.8619 or chelsea@vaeec.org if VAEEC can further assist with this process.

Sincerely,

Chelsea Harnish, VAEEC Executive Director

Board of Directors vote

Approved:

Cynthia Adams, Pearl Certification, VAEEC Chair

David Steiner, D+R International, VAEEC Vice Chair

Bill Greenleaf, VAEEC Treasurer

Andrew Grigsby, Local Energy Alliance Program, VAEEC Secretary

⁴ <https://energy.mo.gov/energy/about/missouri-technical-reference-manual-work-plan>

⁵ ACEEE Intelligent Efficiency Conference; Presentation by Greg Lovett of Ameren of Missouri; Unique Insights from Usage Data: Leveraging Savings Measurement Software; December 7, 2015, Boston MA. <http://aceee.org/sites/default/files/pdf/conferences/ie/2015/Session3C-Lovett-IE15-12.7.15.pdf>

Bill Beachy, Community Housing Partners
Larry Cummins, Trane
John Morrill, Arlington County
Saifur Rahman
Marisa Uchin, Opower

Abstained:
David Koogler, Rappahannock Electric Cooperative
Tom Jewell, Dominion Virginia Power

Attachment A
Synapse report, "EVALUATION, MEASUREMENT, AND VERIFICATION IN VIRGINIA"
separate attachment

Attachment B

Peer State EM&V Protocols

EM&V Overview: Arkansas and Georgia

Completed by the Southeast Energy Efficiency Alliance

Arkansas

Framework

Many key issues in Arkansas' efficiency decision-making are developed through a longstanding utility stakeholder collaborative, known as the Parties Working Collaboratively (PWC). Among the issues that have been resolved through this process are the development and usage of a state technical reference manual, specific EM&V protocols, net-to-gross savings adjustments, approaches for quantifying non-energy benefits and carbon cost assumptions. The PWC operates based on a set of procedural guidelines, which chart a path toward, in many cases, a consensus recommendation.

Evaluation Approaches

Each year, the PWC updates the Arkansas Technical Reference Manual (TRM), which describes EM&V protocols for the EERS programs. The TRM includes deemed savings and the associated underlying assumptions.

Utilities subject to Arkansas' energy efficiency resource standard (EERS) have a two-tiered EM&V process, where each utility program is evaluated individually by a third-party contractor through both process and impact evaluations. These results, in turn, are evaluated at an aggregate level by a Commission-hired independent evaluation monitor (IEM). While we are concerned that having multiple evaluators can be costly, we do see value in the role a commission-hired IEM could provide.

The IEM ensures a level of consistency among the electric and gas utilities delivering programming under the EERS. The IEM's duties are as follows:

- "Assures compliance with national Evaluation, Measurement, and Verification ('EM&V') best practices, and Commission approved protocols and the Arkansas TRM.
- Manages timely updates and/or expansion of deemed savings and the TRM are pursued.
- Oversees and coordinates the activities of the TRM Technical Manager.
- Gives feedback on draft measure characterizations from other parties.
- Coordinates with Staff on recommendation for TRM revision to the Commission.
- Manages and updates TRM manuals (after Commission approval of changes).
- Ensures proper use of TRM in annual savings verification process."⁶

The standardization and oversight provided by the IEM allows for leverage of resources throughout the evaluation process, as well as the ability to distill key improvements and lessons learned from across the programs. The IEM submits an annual summary report to the Commission evaluating the work of the utilities' EM&V contractors over the program year.

Collaborative Forums

Arkansas utilities report net savings. In Program Year 2015, Arkansas' three investor-owned electric utilities currently covered by the EERS spent an average of 3.13 percent of their budgets on EM&V activities.

⁶ <http://www.johnsonconsults.com/presentations/IEPPEC%202014%20All%20Together%20Now%20AR.pdf>

Reporting

Each covered IOU files process and impact reports annually on May 1st. Utilities file a narrative report, as well as a standardized Excel workbook articulating key cost, participation and savings metrics.

References

Arkansas PSC Docket No. 10-100-R Evaluation, Measurement & Verification Protocol Rules for EM&V.

Arkansas PSC Docket No. 10-010-U Notice of Inquiry into Energy Efficiency

(http://www.apscservices.info/pdf/10/10-010-u_150_1.pdf).

Arkansas PSC Docket No. 06-004-R Rules for Conservation and EE Programs Order

(http://www.apscservices.info/Rules/energy_conservation_rules_06-004-R.pdf).

Arkansas Technical Reference Manual, Version 5 (<http://www.apscservices.info/EEInfo/TRM5.pdf>).

PWC procedural guidelines (http://www.apscservices.info/pdf/13/13-002-u_153_1.pdf).

Georgia

Framework

The Georgia Public Service regulates Georgia Power – the only electric, investor-owned utility in the state of Georgia. Georgia Power evaluations of its programs via a third-party evaluator. Georgia Power conducts both process and impact evaluations.

Collaborative Forums

Since 2004, the Georgia Public Service Commission has regularly convened a Demand Side Management Working Group (DSM Working Group). The DSM Working Group is a stakeholder collaborative charged with implementing a DSM Program Planning Approach to develop and manage Georgia Power's energy efficiency programs.

Evaluation Approaches

According to the terms of Georgia's IRP rules, evaluators may calculate savings through a variety of approaches, including a "comparison of demand patterns of similar participant and nonparticipant groups, and/or use of customer bill analysis, engineering estimates, end-use meter data, or other methods to identify the gross and net impacts of program participation on customers' usage and demand patterns."⁷

Georgia Power typically reports gross savings, and in the past, has allocated 5 percent of their program budget to EM&V activities.

Reporting

Georgia Power files quarterly and semi-annual progress reports, including key metrics like participation, program costs and marketing information. Semi-annual reports provide more detailed information. As a general rule, program impact evaluations are conducted on a two-year cycle.

Resources

Georgia PSC Docket No. 31082 final order

(<http://facts.psc.state.ga.us/Public/GetDocument.aspx?ID=129660>).

Georgia IRP Rules (http://rules.sos.state.ga.us/cgi-bin/page.cgi?g=GEORGIA_PUBLIC_SERVICE_COMMISSION%2FGENERAL_RULES%2FINTEG).

⁷ Georgia IRP Rules.

Attachment C

List of EM&V Resources

Compiled by the American Council for an Energy Efficient Economy

Program and Portfolio-Level EM&V

[ACEEE] American Council for an Energy-Efficient Economy. *State and Local Policy Database*.

<http://database.aceee.org/state/evaluation-measurement-verification>

[EIA] US Energy Information Administration. 2013. *State Energy Efficiency Program Evaluation Inventory*. <https://www.eia.gov/efficiency/programs/inventory/>

[EPA] US Environmental Protection Agency. 2015. *Evaluation Measurement and Verification (EM&V) Guidance for Demand-Side Energy Efficiency (EE) - Public Input Draft*.

<https://www.epa.gov/cleanpowerplanttoolbox/evaluation-measurement-and-verification-emv-guidance-demand-side-energy>

[DOE] Department of Energy. Uniform Methods Project. <http://energy.gov/eere/about-us/ump-protocols>

Joint Comments on Energy Efficiency in the Environmental Protection Agency's Proposed Rate-Based Federal Plan. 2016. <http://aceee.org/regulatory-filing/joint-comments-rate-based-012116>

State and Local Energy Efficiency Action Network. 2012. *Energy Efficiency Program Impact Evaluation Guide*. Prepared by Steve R. Schiller, Schiller Consulting, Inc.

<http://www4.eere.energy.gov/seeaction/publication/energy-efficiency-program-impact-evaluation-guide>

Kushler, M. et al. 2012. *A National Survey of State Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs*. Washington, DC: ACEEE. <http://aceee.org/research-report/u122>

Kushler, M. et al. 2014. *Examining the Net Savings Issue: A National Survey of State Policies and Practices in the Evaluation of Ratepayer-Funded Energy Efficiency Programs*. Washington, DC: ACEEE.

<http://aceee.org/research-report/u1401>

[NEEP] Northeast Energy Efficiency Partnerships. *The Changing EM&V Paradigm*. Lexington, Mass.: NEEP. <http://www.neep.org/changing-emv-paradigm>

[NREL] National Renewable Energy Laboratory. 2014. *Chapter 17: Estimating Net Savings: Common Practices. The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. Golden, CO.: NREL. <http://energy.gov/sites/prod/files/2015/01/f19/UMPChapter17-Estimating-Net-Savings.pdf>

[NREL] National Renewable Energy Laboratory. 2013. *The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. Golden, CO.: NREL.

<http://www.nrel.gov/docs/fy13osti/53827.pdf>

[RAP] Regulatory Assistance Project. 2014. *Energy Efficiency Evaluation, Measurement, and Verification: A Regional Review of Practices in China, the European Union, India, and the United States*.

<http://www.raonline.org/document/download/id/7064>

Rogers, E. et al. 2015. *How Information and Communications Technologies Will Change the Evaluation, Measurement, and Verification of Energy Efficiency Programs*. Washington, DC: ACEEE.

aceee.org/research-report/ie1503

Cost-Effectiveness Screening

Baatz, B. 2015. *Everyone Benefits: Practices and Recommendations for Utility System Benefits of Energy Efficiency*. Washington, DC: ACEEE. <http://aceee.org/everyone-benefits-practices-and-recommendations>

[NEEP] Northeast Energy Efficiency Partnerships. 2014. *Cost Effectiveness Screening Guidelines*. Lexington, Mass.: NEEP. <http://www.neep.org/cost-effectiveness-screening-guidelines-2014-0>

[NESP] National Efficiency Screening Project. 2014. *Resource Value Framework*. http://www.homeperformance.org/sites/default/files/nhpc_nesp-recommendations_20140816.pdf

[RAP] Regulatory Assistance Project. 2012. *Energy Efficiency Cost-Effectiveness Screening: How to Properly Account for “Other Program Impacts” and Environmental Compliance Costs*. <http://www.raonline.org/document/download/id/6149>

Project-Level M&V

[ASHRAE] American Society of Heating, Refrigerating, and Air-conditioning Engineers. 2002. *Guideline 14-2014: Measurement of Energy, Demand, and Water Savings*. Atlanta, GA: American Society of Heating, Refrigerating, and Air-conditioning Engineers. <http://www.ashrae.org>.

[DOE] Department of Energy. Uniform Methods Project. <http://energy.gov/eere/about-us/ump-protocols>

[EVO] Efficiency Valuation Organization. 2009. *International Performance Measurement and Verification Protocol (IPMVP): Concepts and Options for Determining Energy and Water Savings, Volume 1*. <http://www.evo-world.org>.

[FEMP] Federal Energy Management Program. 2015. *M&V Guidelines: Measurement & Verification for Performance-Based Contracts, Version 4.0*. Washington, DC: Department of Energy, Federal Energy Management Program. http://energy.gov/sites/prod/files/2016/01/f28/mv_guide_4_0.pdf

Additional Resources Consulted by the Virginia Energy Efficiency Council

<https://energy.mo.gov/energy/about/missouri-technical-reference-manual-work-plan>

ACEEE Intelligent Efficiency Conference; Presentation by Greg Lovett of Ameren of Missouri; Unique Insights from Usage Data: Leveraging Savings Measurement Software; December 7, 2015, Boston MA. <http://aceee.org/sites/default/files/pdf/conferences/ie/2015/Session3C-Lovett-IE15-12.7.15.pdf>