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American Electric Power
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Noelle J. Coates
Senior Counsel - Regulatory Services
(804) 698-5541 (P)
(804) 698-5526 (F)
njcoates@aep.com

Hon. Joel H. Peck, Clerk
State Corporation Commission
Document Control Center
Tyler Building, First Floor
1300 E. Main Street
Richmond, VA 23219

In Re Commonwealth of Virginia,
State Corporation Commission
Ex Parte: In the matter of evaluating the establishment of protocols, a methodology, and a formula to measure the impact of energy efficiency measures
Case No. PUE-2016-00022

Dear Mr. Peck:

Pursuant to paragraph 5 of the Commission's March 30, 2016, Scheduling Order in this docket, please find attached for filing the Comments of Appalachian Power Company.

Very truly yours,

Noelle J. Coates

Enclosures

cc: Service List

COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

In Re Commonwealth of Virginia, State Corporation Commission Ex Parte: In the matter of evaluating the establishment of protocols, a methodology, and a formula to measure the impact of energy efficiency measures	))))))	**Case No. PUE-2016-00022**

COMMENTS OF APPALACHIAN POWER COMPANY

On March 31, 2016, the State Corporation Commission issued a Scheduling Order that sought the input from interested persons and entities prior to submitting its report of findings and recommendations to the Governor and General Assembly regarding "the establishment of uniform protocols for measuring, verifying, validating, and reporting the impacts of energy efficiency measures implemented by investor-owned electric utilities providing retail electric utility service in the Commonwealth and the establishment of a methodology for estimating annual kilowatt savings and a formula to calculate the levelized cost of saved energy for such energy efficiency measures," as required by legislation enacted during the 2016 General Assembly session.[1] Pursuant to Paragraph 5 Scheduling Order, please find attached for filing the Comments of Appalachian Power Company ("APCo" or the "Company").

A. Uniform protocols for measuring, verifying, validating and reporting the impacts of energy efficiency measures

The establishment of uniform protocols for Evaluation, Measurement and Verification ("EM&V"), as well as for reporting of program energy and demand impacts, would be an effective means to evaluate the overall effectiveness of energy efficiency and demand response programs. Uniform EM&V Protocols would provide a common framework and set of reference

[1] 2016 Va. Acts Ch. 255

points for conducting cost-effective impact and process evaluation of Demand Side Management ("DSM") Programs. Among other things, these protocols should describe the types of information that must be collected in order to conduct a comprehensive examination of a program's overall effectiveness, the recommended frequency for conducting these program evaluations, and the key metrics that must be reported during evaluation activities.

The ideal method to develop robust uniform protocols for EM&V and reporting is to develop a Virginia-specific Technical Reference Manual ("TRM"). With a TRM, the savings from many energy efficiency measures can be estimated reliably, within a level of confidence, through engineering algorithms. TRMs typically include "deemed savings" for these energy efficiency measures using two methods: deemed and partially deemed. Deemed measures are fairly straightforward calculations with stipulated savings values and/or inputs to engineering algorithms. Partially deemed measures require measurement or quantification of some key inputs to the engineering algorithms used to calculate energy and demand savings. The use of deemed and partially deemed savings calculations is a standard approach in the energy efficiency industry for non-custom measures. In addition, a robust TRM should also describe methodologies and formulae for the calculation of savings for "custom" measures where more rigorous calculations are necessary. In general, these more complex measures require site-specific information to determine energy and demand savings with the projects being confirmed with field verification.

Rather than developing a state-specific TRM, a more cost effective method might be to review TRMs already adopted by other states. The Commission could consider such TRMs for adoption, perhaps with some modification, for the utilities in Virginia. There are known prior

instances of this, including the adoption of the Arkansas TRM by the states of Louisiana and Mississippi.

Adopting a TRM would require periodic updates to capture any needed changes to savings calculations or processes and procedures. Nevertheless, having these established uniform EM&V protocols would provide needed guidance to utilities, the Commission and other stakeholders to provide a structured yet robust reporting of energy efficiency program effectiveness and potentially lowering the cost of EM&V activities. However, care should be taken to ensure such protocols are not overly burdensome and difficult to implement. Protocols should, to the extent possible, be streamlined, well defined and straightforward to reduce uncertainty with program savings calculations. Trying to capture marginal increased certainty of program savings / impacts (over acceptable levels of confidence), for example, would unnecessarily increase evaluation costs. Additional evaluation costs could push a program that would otherwise be cost-effective to a ratio that would not pass the cost-effectiveness standards.

B. A methodology for estimating annual kilowatt savings for such energy efficiency measures

The Company currently utilizes the Mid-Atlantic TRM for its Virginia programs as the basis for determining, whenever possible, energy and demand impacts resulting from DSM programs. All EM&V activities and results are coordinated by an independent third party evaluation contractor on behalf of the Company. Although the Mid-Atlantic TRM is a regional TRM, it provides a good proxy to determine baseline conditions and the impacts associated with the installation of a variety of basic energy efficiency measures in Virginia.

However, the depth of the Mid-Atlantic TRM, as it relates to the deemed savings estimates as well as formulae for more complex energy efficiency measures, is lacking. This is particularly true with measures for the commercial and industrial class customers. As an

example, there are no deemed savings estimates or formulae available for high efficiency motors, variable frequency drives (except for a limited purpose for Heating, Ventilation and Air Conditioning ("HVAC") applications), or any type of custom energy efficiency projects. The measure chapters included in the Mid-Atlantic TRM are comprised of deemed savings for simplistic measures, lacking custom measure protocols in entirety.

Thus, the development of a Virginia-specific TRM, or the adoption of a robust TRM currently in place in another state, would simplify the EM&V process, provide more certainty to the utilities and the Commission related to EM&V results, aid in the development of new programs, and could ultimately lower the overall cost of evaluation activities. This strategy would simplify, and in fact enhance, program evaluation efforts and quantify predictable, yet reliable (within a reasonable level of confidence), energy savings estimates for a wide variety of energy efficiency measures.

If such an alternative TRM were to be adopted, the following criteria should be examined when assessing best-fit for Virginia:

1) The adopted TRM should contain a broad measure list, inclusive of fully-deemed savings, partially-deemed protocols, and descriptions of custom protocols for non-standard measures.
2) The adopted TRM would ideally contain both electric and natural gas savings, so as to allow for all utilities in Virginia to use the same source for program savings (in accordance with the Commission's intent in the Scheduling Order to address both fuels through this process).
3) The adopted TRM should contain protocols pertaining to the timing, depth, and need of impact and process evaluations.
4) To the extent possible, the TRM should align with Virginia weather zones.

There are several protocols that can be utilized to inform and help guide the development of a TRM. Two of the more common and widely utilized protocols are described below.

i. Example Protocol #1 – IPMVP

The International Performance Measurement and Verification Protocol ("IPMVP") is an important and widely used guidance document for determining the level of effort required to conduct EM&V studies. These protocols are project-level, and are an internationally-recognized and accepted set of procedures for the calculation of energy and demand savings from custom projects. The IPMVP provides guidelines about the "level of effort" required to document energy efficiency savings. The IPMVP presents various EM&V options that help guide savings verification methods and levels of effort.

Additional information related to the IPMVP Protocol options can be found at http://evo-world.org/en/

ii. Example Protocol # 2 – Uniform Methods Project

Another protocol, which expands on the IPMVP protocol described above, is the Uniform Methods Project ("UMP") protocol. This protocol, which is being developed in conjunction with the U.S. Department of Energy, adds detail to the IPMVP protocol to describe specific procedures for application to program and portfolio level evaluations. The two sets of protocols are cohesive and complimentary insomuch as UMP chapters reference IPMVP guidelines for project-level analysis, while adding further detail on how the IPMVP is applied to program or portfolio evaluation.

The UMP is a work in progress with additional protocols being developed over time.

More information related to the Uniform Methods Project can be found at http://energy.gov/eere/about-us/ump-home

C. A formula to calculate the levelized cost of saved energy, as well as defining the inputs for such formula, for energy efficiency programs

The levelized cost of saved energy (LCOSE) can be calculated using the formula below. For the purpose of clarity, the inputs defined below assume calculations for the LCOSE for a hypothetical utility energy efficiency program implemented in the year 2016.

Levelized cost of saved energy algorithm

$$\text{Capital Recovery Factor} = \frac{A \times ((1 + A)^B)}{((1 + A)^B) - 1)}$$

$$\text{LCOSE} = \frac{(C \times \text{Capital Recovery Factor})}{D}$$

Where:

A = The Utility's Weighted Average Cost of Capital (WACC) for 2016

B = Estimated Program Measure Life in Years (the weighted average measure life for all measures included in the specific 2016 energy efficiency program)

C = Total Direct Program Costs incurred during 2016, excluding net lost revenues and margins

D = Annual kWh saved in 2016 for this specific energy efficiency program

The following provides a specific example of how LCOSE should be calculated:

Assumptions:

Total 2016 costs for a specific DSM Program = $1,500,000

- Includes program delivery, marketing, utility administration, customer incentives and evaluation costs

Total 2016 kWh savings from this program = 5,000,000 kWh

Discount rate (utility 2016 WACC) = 7%

Estimated program measure life = 10 years

- Weighted average measure life of measures installed for this program in 2016

$$\text{Capital Recovery Factor (CRF)} = \frac{0.07 \times ((1 + 0.07)^{10})}{((1 + 0.07)^{10}) - 1} = 0.1424$$

$$\text{LCOSE} = \frac{(\$1{,}500{,}000 \times 0.1424)}{5{,}000{,}000 \text{ kWh}} = \textit{\$0.0427/kWh}$$

The LCOSE, ostensibly a way to compare energy efficiency programs to each other or even to compare energy efficiency programs to other resource options, has limitations that, if not appreciated, could lead to incorrect conclusions. Primarily, this metric does not give credit to, or differentiate programs or generation resources on the capacity value they have. If two resources have the same levelized cost, but one is simultaneously meeting peak demand requirements (or reducing peak demand requirements) and one is not, which one is more economic? It is this omission of a primary component of value that diminishes the utility of this metric.

D. Whether the application of costs and benefits is consistent across utilities

It is reasonable and helpful to the Commission, as well as all interested stakeholders, that cost benefit tests are calculated consistently by all utilities. The Company applies the four cost benefits tests required by the Commission; the Total Resource Cost Test (non-Societal), Utility Cost Test, Ratepayer Impact Test, and Participant Test using the California Standard Practice Manual as its guide. The utilization of the California Standard Practice Manual, and its definitions of the four cost benefit tests, is industry standard. Although the Company does not have any specific examples of whether or not the application of costs and benefits are consistent across utilities, the lack of uniform EM&V protocols would suggest there could be differences in how utilities approach EM&V efforts.

E. Whether consistent application of costs and benefits across utilities is necessary or reasonable

The Company does not support the use of the same costs and benefits across utilities. For example, data specific to a particular utility such as avoided energy and capacity costs, weighted

average cost of capital, and revenues should be utilized to make resource decisions as significantly different circumstances among utilities will likely exist.

F. Whether the application of the cost/benefit tests can be improved by enhanced evaluation and verification protocols for estimating savings actually realized

With any evaluation, there is a level of risk that estimations of energy savings are inaccurate. However, there also are different levels of acceptable margin of error, sometimes referred to as level of confidence in statistical analyses. Well established and uniform protocols would help manage the risk of inaccuracy and reduce the margin of error by specifying the information and data required to properly document and calculate savings. Some of the primary benefits of EM&V activities are to determine whether a program is cost effective, whether existing program design can be modified to further improve cost effectiveness, or whether a program should continue at all. The EM&V process, in itself, doesn't impact the benefits that participants and other ratepayers realize as the result of the energy efficiency program's existence.

It should be noted that good EM&V practices relates to the level of effort required to obtain meaningful results while, at the same time, managing program evaluation costs. It is very important to consider the costs associated with obtaining additional, incremental information to develop more precise estimates of program impacts with the incremental benefits that may be realized, if any. This goal is best-served through the focusing of EM&V effort and expenditure of areas requiring additional monitoring but with higher impact. Having comprehensive deemed savings for low-risk, predictable measures would minimize program evaluators time and expense to allow more focused and enhanced efforts on areas that require more site specific data retrieval and after the fact analysis (such as custom measures for large commercial and industrial customers).

The Company would urge caution with defining any enhanced EM&V protocols that could provide additional uncertainty related to overall program impacts, increase costs, provide marginal increased certainty over acceptable levels of confidence, and/or be overly burdensome to implement.

Respectfully submitted,

APPALACHIAN POWER COMPANY

By _____
Counsel

May 25, 2015

James R. Bacha (VSB #74536)
Hector Garcia (VSB # 48304)
AMERICAN ELECTRIC POWER SERVICE CORPORATION
1 Riverside Plaza
Columbus, Ohio 43215
Tel: 614-716-3410; Fax: 614-716-1613
jrbacha@aep.com
hgarcia1@aep.com

Noelle J. Coates (VSB #73578)
AMERICAN ELECTRIC POWER SERVICE CORPORATION
3 James Center
1051 E Cary St., Suite 1100
Richmond, Virginia 23219
Tel: 804-698-5541
njcoates@aep.com

Counsel for Appalachian Power Company

CERTIFICATE OF SERVICE

I hereby certify that on this 25th day of May 2016 a true copy of the foregoing Comments of Appalachian Power Company as delivered by hand or mailed, first-class, postage prepaid, to the following:

Ashley B. Macko, Esq.
K. Beth Clowers, Esq.
State Corporation Commission
Tyler Building, 10th Floor
1300 E. Main Street
Richmond, Virginia 23219

C. Meade Browder, Jr., Esq.
Division of Consumer Counsel
Office of Attorney General
202 North Ninth Street
Richmond, Virginia 23219

Rodney Dickens
Allegheny Power
800 Cabin Hill Drive
Greensburg, Pennsylvania 15601

William K. Castle
Appalachian Power Company
1051 E Cary Street, Suite 1100
Richmond, Virginia 23219

John Ebert
Appalachian Natural Gas
P O Box 2543
Abingdon, Virginia 24212

Kevin Akers
Atmos Energy Corporation
801 Crescent Center Drive
Suite 600
Franklin, Tennessee 37067-6226

James S. Copenhaver
Columbia Gas of Virginia, Inc.
1809 Coyote Drive
Chester, Virginia 23836-2400

Paul Koonce
Dominion Virginia Power
120 Tredegar Street
Richmond, Virginia 23219

Department of Mines, Minerals
1100 Bank Street
Richmond, Virginia 23219

Rick Lovekamp
Kentucky Utilities
P O Box 32030
Louisville, Kentucky 40232

Lonnie Bellar
LG&E Energy Corporation
220 W Main Street
Louisville, Kentucky 40202

John S. D'Orazio
Roanoke Gas Company
P O Box 13007
Roanoke, Virginia 24011

Lance G. Heater
Southwestern Virginia Gas Company
208 Lester Street
Martinsville, Virginia 24112

Robert Duvall
Virginia Natural Gas, Inc.
544 South Independence Blvd
Virginia Beach, Virginia 23452-1104

Adrian Chapman
Washington Gas Light Company
6801 Industrial Rd
Springfield, Virginia 22151