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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. GT-2011-0410

DIRECT TESTIMONY

OF

KYLE SHOFF

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a Ameren Missouri

Ameren Exhibit No. 3
Date 10/6/11 Reporter JL
File No. GT-2011-0410

St. Louis, Missouri
August, 2011

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I. INTRODUCTION

Q. Please state your name and business address.

A. Kyle Shoff, Ameren Services Company ("Ameren Services"), One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri, 63103.

Q. What is your position with Ameren Services?

A. I am a DSM Planning Consultant in the Corporate Planning Department.

Q. Please describe your educational background and employment experience.

A. My educational background consists of a Bachelor's of Science degree in Business Administration from Saint Louis University in 2008. I am currently pursuing a Master's in Business Administration at Washington University in St. Louis, Missouri. Beginning in May of 2008, I worked as Planning Consultant – DSM in Ameren's Energy Efficiency/Demand Response team, supporting DSM efforts for the utilities in both Illinois and Missouri. My duties included the following: energy efficiency/demand response policy and planning, mass market implementation planning, commercial and industrial market implementation planning, cost-effectiveness analysis and modeling, and tracking of new technologies and DSM industry developments. I have been the lead energy efficiency analyst for Union Electric Company d/b/a Ameren Missouri's ("Ameren Missouri" or "Company") natural gas energy efficiency programs and have also supported the natural gas energy efficiency programs in Ameren Illinois.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony is to explain the Total Resource Cost test ("TRC"), to explain how and why the TRC was used by Ameren Missouri in developing the proposed tariff filed on June 8, 2011, and to demonstrate that Ameren Missouri utilized best-practice approaches in conducting its cost-effectiveness screening.

II. TRC RESULTS

Q. Please start by describing your role in reviewing Ameren Missouri's current natural gas energy efficiency tariffs.

A. Ameren Missouri currently has a portfolio which includes a business program with 28 measures and a residential program with 19 measures. I was asked to evaluate the cost-effectiveness of Ameren Missouri's natural gas energy efficiency portfolio. To do this, I calculated a TRC for each measure and program.

Q. Please define the Total Resource Cost Test.

A. The ratio of annualized benefits to annualized costs associated with energy efficiency measures is the basis for the TRC. As defined in the natural proposed gas energy efficiency tariff, the program level TRC is *a test of the cost-effectiveness of demand side programs that compares the sum of the Company's avoided costs plus avoided probable environmental costs to the sum of all incremental costs of end-use measures that are implemented due to the program (including both Company and participant contributions), plus Company's costs to administer, deliver and evaluate each demand-side program to quantify the net savings obtained by substituting the demand-side program for supply resources.* A TRC ratio greater than 1.0 indicates that a measure is cost-effective.

Q. Can the TRC be calculated at the measure level? If so, what components are included in the measure level TRC?

A. Yes. The TRC benefit/cost ratio numerator contains the present value of the energy savings benefits. The avoided cost per unit of energy (the fuel cost of the commodity purchased by Ameren Missouri at Henry Hub) is multiplied by the annual energy reductions produced by the measure. The dollar value of the annual energy is calculated for each year of the effective useful life of the measure and then discounted back to the year of installation. The denominator incorporates the costs of installing the efficient measure which includes the incremental equipment, labor, and maintenance costs above those of the baseline measure, where baseline indicates a minimum Federal or State appliance standard or building code.

Q. How did Ameren Missouri use the TRC to evaluate its energy efficiency measures?

A. Ameren Missouri calculated the TRC for each measure within the program year 2011 natural gas portfolio. The measure level data was developed using best-practice databases and, if available, actual field data based on load reduction impact assessments from independent evaluation, measurement, and verification contractors. Missouri specific weather, Ameren Missouri specific building and heating/cooling system types, and Ameren Missouri specific building vintages (age of home) were applied as appropriate. These *ex-ante* savings and cost estimates were then run through the DSMore™ analytic model to calculate the measure level TRC.

Q. Did any measures have a TRC below one?

A. Yes. The tables below summarize the measures that have TRC values less than one. The Company believes these measures should be removed from the natural gas programs.

TRC	Residential Measures
0.06	Average Wall Insulation R-11 to R-13
0.09	Energy Star Door
0.11	New Ceiling Insulation R-38 to R-50
0.13	New Wall Insulation R-19 + R-5 Sheathing
0.14	Wall Insulation
0.29	Tankless Water Heater - 0.82
0.32	Door Weather Stripping
0.41	Window Replacement
0.52	Old Ceiling Insulation R-11 to R-30
0.53	Old Wall Insulation R-0 to R-11
0.56	Ceiling Insulation
0.64	Average Ceiling Insulation R-19 to R-30
0.86	Tank Storage Water Heater - Tier II 0.67 EF

TRC	General Service Measures
0.03	Window Replacement
0.10	Energy Star Door
0.11	Boiler Tune-up
0.15	Griddles – Gas
0.49	Modulating Burner
0.82	Food Service Oven
0.82	Ceiling Insulation

Q. Does Ameren Missouri conduct cost-effectiveness analyses at the program level?

A. Yes. Once the measure screen is complete, all measures with TRC values of less than one are removed from the next phase of the analysis, the program level TRC screen. The program level screen bundles the cost-effective measures into logical groups (in this case Residential and General Service) and these measures are assigned a participation level, typically based off previous program data or DSM Potential study results. In this case, since no potential study had been completed for natural gas, previous program performance was utilized. Next, program implementation, portfolio administration, and evaluation costs are added to the denominator of the TRC equation. A Net-to-Gross factor ("NTG") is applied to both the savings and the measure costs in

order to account for free riders (customers who would have participated in the programs in absence of Ameren Missouri's incentives) and spillover (energy savings caused by Ameren Missouri's programs, but are not directly financially incentivized by Ameren Missouri). After the program screen, only those programs that have a program level TRC exceeding one are included in the portfolio.[1] The proposed portfolio of Ameren Missouri's residential and general service natural gas programs have the *ex ante* TRCs shown in the following table:

Program	TRC
Residential	1.27
General Service	5.10

Q. You use the terms energy efficiency "measures," "programs," and "portfolios." Please explain the difference between those terms.

A. A measure is a specific action taken to reduce a specific type of load. For example, replacing an 80% efficient natural gas furnace with a 95% efficient natural gas furnace is a space heating efficiency measure. A program is a bundle of measures delivered to customers usually through a common delivery mechanism. A portfolio is the aggregate of all programs.

III. METHOD FOR DETERMINING COST-EFFECTIVENESS OF ENERGY EFFICIENCY PROGRAMS

Q. What methods are considered best practices for estimating the cost-effectiveness of energy efficiency measure, programs, and portfolios?

[1] Some programs, such as those targeted at Low Income customers, are given exception and allowed to continue with TRC < 1.0 based on mutual agreement of the Administrators, Regulators, and Stakeholders.

A. Best practices for estimating the cost-effectiveness of energy efficiency measures, on either an *ex ante* (before implementation) or *ex post* (after implementation) basis, are summarized most succinctly and completely in the National Action Plan For Energy Efficiency ("NAPEE") Guides. NAPEE was formed in 2006 to create a sustainable, aggressive national commitment to energy efficiency through gas and electric utilities, utility regulators, and partner organizations. The U.S. Department of Energy and the U.S. Environmental Protection Agency facilitated the work of the NAPEE Leadership Group to develop a series of best practice guides to use in the development of energy efficiency programs. Ameren has been an active member of the NAPEE Leadership Group since 2006.

The TRC test is the most common primary measurement of energy efficiency cost-effectiveness in the nation. A positive TRC result indicates that an energy efficiency measure will, over its lifetime, produce a net reduction in energy costs in the utility service territory. There is a plethora of evidence to support the fact that the TRC is the de facto standard in the NAPEE guide *"Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues For Policy-Makers"* dated November 2008.

There are resources in both the public and private domains in the form of databases that are informed by actual field measurements and engineering simulation that capture the essence of measure level savings energy savings on an *ex ante* basis. A lengthy, but partial, list of those resources can be found in the NAPEE guide *"Guide To Resource Planning With Energy Efficiency"* dated November 2007.

Q. Is there a Missouri specific reference that also supports that the TRC test is the primary measurement of cost-effectiveness of energy efficiency measures, programs, and portfolios?

A. While the Commission does not have specific rules for natural gas energy efficiency programs, Chapter 22.050(7) of the Electric Utility Resource Planning rules identify the TRC as the major metric to evaluate demand-side programs. "The utility shall evaluate the cost-effectiveness of each potential demand-side program developed pursuant to section (6) using the total resource cost test." Ameren Missouri does not believe cost-effectiveness should be measured differently for natural gas and electric energy efficiency programs.

Q. Is it common to use *ex ante* measure level savings values to estimate the cost-effectiveness of programs?

A. Yes. I previously cited reference in the *EPRI Energy Efficiency Planning Guidebook* as to the best practice of assessing ex ante measure level economic screening. In addition, NAPEE guides state that estimating measure impacts is the first step in developing energy efficiency portfolios. Furthermore, NAPEE identifies three methodologies to estimate measure savings: engineering calculations and building simulations, utilizing existing best-practice databases, and evaluation ("EM&V") results. NAPEE states, "...it is common for utilities to begin with engineering estimates and then refine the estimates as they gain experience and data on both measure performance."[2] Since no Ameren Missouri specific EM&V has been completed for natural gas energy efficiency programs, Ameren Missouri utilized engineering models and databases, some

[2] NAPEE. "Guide to Resource Planning with Energy Efficiency." November 2007. Pg 7-2.

of which are based on actual field measurements, to estimate measure level savings with the intention of updating the data as the programs are evaluated.

In a recent report for the State & Local Energy Efficiency Action Network, *ex ante savings values* are defined as, "forecasted savings used for program and portfolio planning purposes."[3] These reports indicate that using *ex ante* savings values is the correct approach to estimating program energy savings impacts as well as for calculating cost-effectiveness.

Q. Do any other jurisdictions use the TRC as the primary evaluation tool for energy efficiency programs?

A. Yes. In addition to the NAPEE references cited earlier in my testimony, the Consortium for Energy Efficiency ("CEE") and the American Gas Association ("AGA") summarized natural gas efficiency programs in their 2009 Annual Report. In the report, a survey of member utilities indicated that, "76% of all respondents used Total Resource Cost testing to determine cost-effectiveness."[4] These results speak to the validity of the TRC as a metric for calculating cost-effectiveness and also shows that this is a common methodology accepted by Commissions and utilities across the nation.

Q. Please explain in the simplest possible terms why the TRC test is the best method to evaluate the cost-effectiveness of natural gas energy efficiency measures and programs.

A. The TRC test indicates whether over time an energy efficiency measure is expected to produce a net reduction in energy costs to both the utility and its customers. There are other tests that consider the cost-effectiveness from a single perspective such as

[3] Cadmus. "Scoping Study to Evaluate Feasibility of National Databases for EM&V Documents and Measure Savings." 2011. Pg iv.
[4] AGA. "Natural Gas Programs Report: 2009 Program Year." Pg. 24.

only from the participant or only from the utility or only from the customer base in general. But, the TRC is the most comprehensive of all the tests and best represents the interests of all stakeholders.

Q. Does this conclude your direct testimony?

A. Yes, it does.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's Gas Service Tariffs Removing Certain Provisions for Rebates from Its Missouri Energy Efficient Natural Gas Equipment and Building Shell Measure Rebate Program.	))))))	Case No. GT-2011-0410

AFFIDAVIT OF KYLE SHOFF

STATE OF MISSOURI)
) **ss**
CITY OF ST. LOUIS)

Kyle Shoff, being first duly sworn on his oath, states:

1. My name is Kyle Shoff. I work in the City of St. Louis, Missouri, and I am employed by Ameren Services Company as a DSM Planning Consultant in the Corporate Planning Department.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of Union Electric Company d/b/a Ameren Missouri consisting of 9 pages, all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Kyle Shoff

Subscribed and sworn to before me this 10th day of August, 2011.

Mary Hoyt
Notary Public

My commission expires: 4-11-2014

Mary Hoyt - Notary Public
Notary Seal, State of
Missouri - Jefferson County
Commission #10397820
My Commission Expires 4/11/2014