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December 18, 2013

Via Personal Delivery

Mr. Jeff Derouen, Executive Director
Case No. 2013-00259
Kentucky Public Service Commission
211 Sower Blvd.
Frankfort, KY 40601

Re: Case No. 2013-00259 Sonia McElroy and Sierra Club's Responses to Commission Staff's Request for Information to Sonia McElroy and Sierra Club

Dear Mr. Derouen,

Enclosed, please find one (1) original and ten (10) copies of Sonia McElroy and Sierra Club's Responses to Commission Staff's Request for Information, filed today in the above-referenced matter via personal delivery. By copy of this letter, all parties listed on the Certificate of Service have been served via USPS and e-mail. Please place this document of file.

Sincerely,

Kristin A. Henry

Kristin A. Henry
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COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:	)	
	)	
AN APPLICATION OF EAST KENTUCKY	)	
POWER COOPERATIVE, INC. FOR A	)	
CERTIFICATE OF PUBLIC CONVENIENCE	)	
AND NECESSITY FOR ALTERATION OF	)	**CASE NO. 2013-00259**
CERTAIN EQUIPMENT AT THE COOPER	)	
STATION AND APPROVAL OF A COMPLIANCE	)	
PLAN AMENDMENT FOR ENVIRONMENTAL	)	
SURCHARGE COST RECOVERY	)	

SONIA MCELROY AND SIERRA CLUB'S RESPONSES TO COMMISSION STAFF'S REQUEST FOR INFORMATION TO SONIA MCELROY AND SIERRA CLUB

Intervenors Sonia McElroy and Sierra Club (collectively "Environmental Intervenors") hereby submit their responses Commission Staff's Information Requests.

Request No. 1: Refer to page 12 of the Direct Testimony of Jeffrey Loiter ("Loiter Testimony"). Starting at line 6, Mr. Loiter states, "Rather than simply focus on air sealing measures, for example, the higher bills of electric heat customers may support more aggressive support of insulation upgrades and other investments such as switching from electric resistance heating to high-performance heat pumps." Is Mr. Loiter aware that East Kentucky Power Cooperative, Inc.'s ("EKPC") DSM-4 tariff, Button-Up Weatherization Program, includes insulation upgrades, and that its DSM-4b tariff, Heat Pump Retrofit Program, includes switching from electric resistance heating to high-performance heat pumps? If yes, state whether it is Mr. Loiter's opinion that these programs are inadequate and provide the basis to support such an opinion.

Response No. 1:

While I have not reviewed the referenced tariffs directly, I am aware that the measures referred to are included in the listed programs, as described in Exhibit DSM-6 to the IRP Technical Appendix – Demand Side Management, Volume 2. My testimony on page 12 referred to "more aggressive support" for these and other heat loss-reduction measures, in light of the percentage of customers that rely on electric heating and the potential for greater savings from such measures. I have not reviewed detailed information on these programs such that I can make an assessment of their adequacy. However, I will note that the cumulative penetration of the existing Button Up and Button Up with Air Sealing programs, as described in Exhibit DSM-6, amounts to just 4 percent of the eligible households in EKPC's service territory by 2021. This is well below any reasonable estimate of the maximum possible achievement in 10 years.

Request No. 2: Refer to pages 13-14 of the Loiter Testimony. Beginning at line 29 on page 13, Mr. Loiter states that "[u]sing the O&M spending for the environmental controls and fuel-based operating costs, more aggressive efficiency programs could acquire over 244,000 MWh of cumulative savings by 2017...." Provide the supporting calculation for the 244,000 MWh.

Response No. 2:

The Excel workbook ("loads and resources final.xlsx"), attached in response to EKPC Data Request 49, provides the supporting calculation for the referenced value. It appears in cell H68 on the "analysis" worksheet.

Request No. 3: Refer to page 14 of the Loiter Testimony. Beginning at line 25, Mr. Loiter states that "[i]f the $15 million capital cost of the Cooper unit 1 project was amortized over 15 years at 7.5%, the resulting $1.7 million per year cost could produce a sustained additional 22 MW of summer peak demand reduction...." Provide the supporting calculation for the 22 MW.

Response No. 3:

The Excel workbook ("loads and resources final.xlsx"), attached in response to EKPC Data Request 49, provides the supporting calculation for the referenced value. It appears in cell E77 on the "analysis" worksheet.

Request No. 4: Refer to the compact disc filed under seal with the Direct Testimony of Tyler Comings. Provide a description of each of the three files contained on the disc.

Response No. 4:

The following is a description of each of the files accompanying Mr. Comings' testimony:

- CONFIDENTIAL Synapse Cooper Generation Analysis: This file contains the historical generation of Cooper unit 1, the Company's assumptions of the projected generation of Cooper unit 1, the implied generation of Cooper unit 1 (comparing the retrofit scenario to the base case) and the differing assumptions of generation for the base case. This analysis is based on data for the historical generation of Cooper units 1 and 2 (provided by EPA), a breakdown of the costs and generation for the Company's base case (provided by the Company), and the projected capacity factor for Cooper unit 1 (provided by the Company).

- CONFIDENTIAL Synapse Price Analysis: This file contains the Company's energy, capacity, and natural gas price projections—and energy costs of the wind PPA—along with Mr. Comings' adjustments to the energy and capacity prices.

- PSC 5 - CONFIDENTIAL_Proposal Evaluation_Energy Production - Synapse alt: This file contains the calculations for the adjusted NPV presented in Mr. Comings' testimony, based on his energy and capacity price assumptions developed in the "Synapse Price Analysis" file.

Request No. 5: Refer to Item (V.) on page 12 of the Loiter Testimony wherein it states that "EKPC could support far greater levels of energy efficiency and demand response instead of retrofitting Cooper unit 1." It further states, in relevant part, that based on data from the recently published ACEEE State Energy Efficiency Scorecard, other states are accomplishing much greater energy efficiency results. Identify and explain the analysis that was performed, if any, to determine whether EKPC's service territory is comparable to the states identified in the response and thus could be expected to achieve similar energy-efficiency results.

Response No. 5:

While I did not perform a comprehensive analysis to quantify the extent to which EKPC's service territory is comparable to each of the states listed in my testimony on page 12, I referenced these states to illustrate that neighboring and nearby states – which have similar geographic and climatic characteristics as Kentucky and EKPC's service territory – are achieving significantly higher savings levels (as a percentage of sales) than the Company's planned savings.

In specific response to this question, I conducted a brief examination of conditions in these states to assess whether there were sufficient differences to refute my argument. The table below presents data on climate, one measure of customer characteristics, and two measures of demographic data relevant to efficiency potential. For the climate and economic data, I provide both the raw data and the % difference from EKPC or Kentucky, depending on data availability. As the data show, the variation with respect to these measures – which ranges from 0 to 19% – does not justify the substantial gap between EKPC's annual savings level (0.15%) and the annual savings levels achieved by the other states (ranging from 0.33-1.22%).

As an example, consider Indiana, which achieved efficiency savings that are *nearly four times* greater than EKPC's planned levels. Overall, EKPC's residential customers are responsible for a greater share of consumption than Indiana (58% vs 33%). Indiana's climate is slightly colder than Kentucky's. Annual heating degree days in Indiana are 17% greater than in Lexington (located near the center of EKPC's service area[1]), while annual cooling degree days are 11% fewer). While the warmer climate in Kentucky might suggest that the gross savings from a cooling-related efficiency measure would be higher (in terms of kWh), the PERCENTAGE savings usually varies less, because that is a function primarily of the equipment itself rather than operating conditions. Per capita income in Indiana is slightly higher (5%), $36,902 vs. $35,041 in Kentucky. Indiana's average monthly electric bill is approximately the same as Kentucky's. That is, a customer saving 10% of their consumption would generate nearly the same monetary savings in either state.
In contrast with these relatively minor differences, the Company's "reasonable" savings level is just 25% of Indiana's recent accomplishment. The data do not suggest to me that it is reasonable to assume that the efficiency potential in Kentucky is 75% less than it is in Indiana by virtue of much

[1] I understand that EKPC does not actually service Lexington, but I use it as a point of reference because it is close to the geographical middle of EKPC's service territory.

lower magnitude of differences in income, climate, or retail electric rates. The comparison indicates that EKPC could be expected to achieve far greater levels of energy-efficiency results.

	HDD[1]	CDD[1]	2012 per-capita income ($/yr)[2]	residential load fraction[3]	monthly electric bill ($)[4]
EKPC (Lexington)	4,783	1,140		58%	N/A
Kentucky			35,041		107
Indiana	5,615 (+17%)	1,014 (-11%)	36,902 (+5%)	33%	105 (-2%)
Ohio (Cincinnati)	5,248 (+10%)	966 (-15%)	39,289 (+12%)	51%	105 (-2%)
Tennessee (Knoxville)	3,937 (-18%)	1,266 (+11%)	37,678 (+8%)	43%	123 (+15%)
North Carolina (Greensboro)	3,865 (-19%)	1,253 (+10%)	37,049 (+6%)	59%	117 (+10%)

Sources:
1. www.climate-zone.com
2. http://bber.unm.edu/econ/us-pci.htm
3. EKPC load forecast and http://www.eia.gov/electricity/state/indiana/xls/sept08in.xls, .../ohio/xls/sept08oh.xls, .../ tennessee/xls/sept08tn.xls, & ... /northcarolina/xls/sept08nc.xls
4. http://www.eia.gov/electricity/sales_revenue_price/xls/table5_a.xls

I also wish to point out that the states I listed for comparison purposes, like all states, have far more in common with Kentucky with respect to many other factors that affect the available efficiency potential. They all contain customers across three major sectors and a range of consumption levels. These customers all use electricity for lighting, cooling, refrigeration, heating, consumer electronics, and other end-uses. The equipment that consumes electricity in providing these services is produced by national or international companies and purchased in retail establishments or provided by contractors hired to install equipment or construct buildings, and their rated operating efficiencies will be equal or similar across a wide range of conditions. Customers in all of these states face well-known barriers to efficiency investment, including those related to information availability, transaction costs, split incentives, and uncertainty. As a result, I am confident in asserting that while the exact magnitude of savings in Kentucky and EKPC's service territory would be influenced by a wide range of factors and therefore different to some degree from other jurisdictions, there is nothing to suggest that the potential should be drastically less by factors of 2, 4, or 8, as is currently the case. Differences in customer characteristics and market conditions (e.g., customer sector breakdowns, per-customer energy usage, distribution of energy consumption by end-use, etc.), should clearly inform the design and implementation strategy of efficiency programs. EKPC might use slightly different methods and approaches to addressing its customers' needs in terms of efficiency program design and delivery as compared to other parts of the state or to other states. Even so, best practice efficiency programs delivered to widely differing populations often share many of the same major features and strategies.

KPSC Case No. 2013-00259
SC Response to Staff Requests
Item No. 6
Respondent: Jeffrey Loiter

Request No. 6: Refer to the last sentence on page 12 of the Loiter Testimony wherein it states, "Second, it is only half of the cost-effective potential identified by a study completed in 2012, using data specific to Kentucky (Exhibit JML-2)." Identify and explain the analysis that was performed, if any, to determine whether EKPC's service territory is comparable to the entire state of Kentucky and thus could be expected to achieve similar energy-efficiency results.

Response No. 6:

With a customer base that equals one-quarter of the state's population, EKPC's service territory is accounted for in the state-wide assessment of potential in Exhibit JML-2, even if using state-average data. Furthermore, as noted in a document the Company filed on February 11, 2013 in response to Sierra Club's comments on the 2012 IRP, EKPC's population per-capita income is just 10% less than the state average. Therefore, it is appropriate to assume that the efficiency potential identified in the statewide assessment (as expressed in terms of savings as a percent of load) is a reasonable approximation of the potential in EKPC's territory.

Request No. 7: Refer to page 15 of the Loiter Testimony wherein it discusses the benefits to demand-side management ("DSM") beyond the cost savings as compared to supply- side resources. If EKPC were to opt for DSM expansion instead of retrofitting Cooper unit 1, what risks would it encounter if the projected DSM savings were not achieved?

Response No. 7:

As referenced in my testimony on page 4, Company witness Tucker has stated that there are no reliability impacts associated with the potential retirement of Cooper unit 1. The proposed project is not necessary for meeting the Company's loads. Therefore, the risks from projected DSM savings not being fully realized would primarily be financial. However, the economic risk of underachieving on DSM is likely to be very small. In the past, when EKPC was its own balancing authority, if EKPC's energy needs exceeded their supply, they would need to buy more power on the market than projected, but this would be a small fraction of total needs and purchases. Now that they are part of PJM, they must purchase all of their power on the market. My estimate of 244,000 MWH of cumulative efficiency by 2017 represents just 1.7% of EKPC's load. Therefore, if efficiency were only to achieve, say, 75% of planned results, the different would be just 0.4% of total energy requirements. This appears to be well within the annual variation of energy consumption due to weather and other exogenous impacts. Furthermore, DSM and efficiency carry significantly LESS risk than do supply side investments, largely because it is scalable and adjustable in the short term. If economic, environmental, or demographic conditions change, DSM efforts can be adjusted in a short amount of time to compensate. This is not true of investments in physical plant. Once construction of the Cooper unit 1 project begins, if not before, it would be more difficult to change the scope or size, as compared to DSM. Moreover, ratepayers would bear the risk of paying the costs of the project once complete even if it turns out it was not needed, is not operating as planned, or is subject to unknown other factors. Finally, DSM can mitigate the risk profile of supply-side resources in the portfolio because it does not require environmental compliance costs or hedges against fuel cost increases.

Request No. 8: Refer to page i of Exhibit JML-2 in the Loiter Testimony. The second paragraph of the Executive summary states, "This assessment is the first of three (3) documents that comprise ACEEE's energy efficiency potential study for Kentucky." If available, provide the other two documents.

Response No. 8:

Although I am not the author of Exhibit JML-2 and therefore cannot say with certainty, attached is a document titled "An Assessment of Utility Program Portfolios in the Commonwealth of Kentucky" dated June 14, 2012 and published by the same authors as the study provided as Exhibit JML-2. It may therefore be one of the two publications referenced in that document. I also note that the attached document references two additional future assessments on page ii: a program/policy analysis, which will focus on the degree to which programs and policies can capture the resource potential identified in the cost-effective resource assessment, and; a macroeconomic assessment, which will quantify the potential impacts of energy efficiency programs and policies on economic growth and employment in the Commonwealth. I have no information about either of these documents.

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U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Technical Assistance Program

An Assessment of Utility Program Portfolios in the Commonwealth of Kentucky

June 14, 2012

OAK RIDGE NATIONAL LABORATORY
Managed by UT-Battelle for the Department of Energy

This work has been performed by the American Council for an Energy-Efficient Economy under the Contract No. 4200000341 with Oak Ridge National Laboratory, which is managed by UT-Battelle, LLC, under Contract with the US Department of Energy No. DE-AC05-00OR22725.

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Contents

Abstract

Some utilities in the Commonwealth have been funding demand-side management programs for decades despite the absence of a statutory requirement for energy efficiency requiring them to do so. This highlights a few encouraging signs. First, there is a fundamental understanding from utilities that energy efficiency is a low-cost resource that helps meet growing demand for energy, helping to reduce strain on the Commonwealth's energy system and delaying, or even negating, the need for investments in supply-side resources, such as generation facilities and transmission infrastructure. Second, regulatory policy codified in KRS 278.285 and designed to encourage utility investment in energy efficiency appears to be having some impact, though it is difficult to quantify the contribution. Finally, recent utility DSM filings exhibit utilities' continuing commitment to energy efficiency: although utilities are ramping up program budgets and savings at varying rates, there does not appear to be any danger of utilities rolling back their commitments.

The success of energy efficiency programs in the Commonwealth requires the commitment of all stakeholders, from consumers to program administrators to the Commonwealth's Public Service Commission. Utilities have already laid a solid foundation for future growth of their energy efficiency programs, but there is more work to do in consistently documenting the existence and performance of these programs. And, as found by a previous ACEEE assessment of the cost-effective energy efficiency resource potential available in the Commonwealth, significant savings from energy efficiency are yet to be captured by utility energy-efficiency programs. Ultimately, as the process of approving and evaluating energy efficiency programs becomes more efficient and effective, the marginal additional effort and costs could end up saving ratepayers in the Commonwealth considerable sums on their energy bills.

Executive Summary

Background

This report is one of a series of assessments for the Commonwealth that is intended to provide stakeholders with a snapshot of existing state- and utility-financed energy efficiency efforts, and the potential energy efficiency resources available left to be captured by state and utility policies and programs. Prior to this report, ACEEE conducted an assessment of utility energy efficiency programs in other states to provide a benchmark with which to measure the effectiveness of utility programs in the Commonwealth (ACEEE 2011). ACEEE has also released an assessment of the cost-effective energy efficiency resource potential prior to this report (ACEEE 2012). These publications will be followed by two additional assessments: a program/policy analysis, which will focus on the degree to which programs and policies can capture the resource potential identified in the cost-effective resource assessment, and; a macroeconomic assessment, which will quantify the potential impacts of energy efficiency programs and policies on economic growth and employment in the Commonwealth.

Introduction

Assessing the performance of existing, utility-financed energy efficiency programs in the Commonwealth of Kentucky is critical to understanding lessons learned and how these programs

could be modified to perpetuate cost-effectiveness. By conducting a quantitative analysis of program savings, costs, and participation, we can evaluate program results reported by Kentucky's utilities and compare these results to similar program portfolios in other states to gauge the progress of energy efficiency programs in the Commonwealth. In addition, this report identifies important program design and regulatory issues that stakeholders in the Commonwealth should consider in order to raise the performance of utility energy efficiency programs.

This report assesses existing energy efficiency programs offered by Kentucky's three investor-owned utilities – Duke Energy Kentucky (Duke), Kentucky Power Company (KPC), and Louisville Gas and Electric Company/ Kentucky Utilities Company (LG&E/KU) – and one public power utility, the Tennessee Valley Authority (TVA), which together account for over 60% of retail electricity sales in the Commonwealth. We do not include municipal utilities because they are not regulated by the Kentucky Public Service Commission (KPSC). And though we include TVA, it is also not regulated by the KPSC. There are also no DSM program performance data available through the KPSC for jurisdictional cooperative corporations.

We review program metrics reported by these utilities for the 2008-2010 program years. Our analysis focuses on overall utility program portfolios as well as individual program performance, though we consider only electric energy efficiency programs. We use a number of metrics upon which to base our assessment, such as program electricity savings (as a percent of sales and absolute) and the levelized cost of saved energy (CSE). We gathered some data on program participation, but did not focus on program participation or savings per customer because of a lack of data for both total program participation and, to a much greater degree, the number of potentially eligible customers by customer class.

Discussion

In this section we review the overall results from our analysis on utility program performance in the Commonwealth, using the results from a previous ACEEE analysis on utility energy efficiency programs as benchmarks for performance (see Table ES-1) (ACEEE 2011). Following the results, we highlight some important program design and regulatory issues that stakeholders in the Commonwealth should consider in order to improve the performance of its utility energy efficiency programs.

Available Data

In this section we briefly discuss the metrics reported by utilities to the KPSC that we use to inform our analysis of utility program portfolios in the Commonwealth. These are the metrics that we were able to find in various utility filings with the KPSC, the sources of which we reference in the table as well. We take this opportunity to highlight a number of caveats prior to delving into the analyses of the various portfolios.

We were only able to procure actual performance results for Duke Energy, Kentucky Power, and TVA's program portfolios. The metrics that we use for our analysis of LG&E/KU's program portfolio

are projections from their 2007 DSM plan filing; actual performance data for LG&E/KU's programs were unavailable.[1]

- Duke reported energy savings (MWh), demand reductions (kW), program costs ($) and program participation for the 2008, 2009, and 2010 program years.
- KPC reported energy savings (MWh), demand reductions (kW), program costs ($) and program participation for the 2009, and 2010 program years.
- LG&E/KU reported *projections*, which included estimates of energy savings (MWh), demand reductions (kW), program costs ($) and program participation. In the 2007 filing we referenced, this information was reported for the 2008-2014 program years.
- TVA made energy savings (MWh), demand reductions (kW), and program costs ($) data available at the state level for the 2008, 2009, and 2010 program years. However, TVA did not include program participation. TVA does not report aggregate program data, by state, for its energy efficiency efforts to the KPSC because TVA and its distribution cooperatives are not under the KPSC's jurisdiction.
- Program performance data on jurisdictional cooperative corporations were not publically available for this analysis. .
- Municipal utilities are not under the jurisdiction of the KPSC and therefore are not required to report their energy efficiency efforts.

Assessment of Overall Results

In Table ES-1 and Figure ES-1 below we report the overall portfolio results for all utilities for the program years 2008-2010. The low savings percentages and high levelized CSE values are attributable to results from Kentucky Power Company's portfolio, which has not included programs for commercial or industrial customers since 2006. The percent savings take into account savings only from residential programs, which are compared to total sales across all sectors and, therefore, result in the relatively low percent savings. Nonetheless, utility energy efficiency programs in the Commonwealth have generally performed well compared to utilities in other states: performance results for Kentucky utilities fall within the ranges for non-Kentucky utilities that we report in Table ES-2.[2] This is despite the fact that, for decades, electric utilities in Kentucky have maintained some of the lowest electricity prices in the United States.[3] Energy prices are one important market incentive for utility investment in energy efficiency programs, which likely has had some influence on the commitment of utilities in the Commonwealth to pursuing energy efficiency aggressively.[4] Still, more

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[1] LG&E/KU reported actual savings for several of their program years in a June 13, 2011 filing in its joint integrated resource plan docket, Case No. 2011-00140. No costs or data on participation were reported in this filing.

[2] See Sciortino et. al (2011a and 2011b) for additional reviews of energy savings performance by states and utilities.

[3] Low energy prices do not guarantee low monthly energy bills for customers. The average residential energy bill in Kentucky ($107) hovers just below the national average ($110) (EIA 2011).

[4] There are many other market forces that drive investment in energy efficiency programs, such as fuel costs, the age of generation facilities, the ability of existing capacity to meet future demand, customer demand for energy efficiency services, etc.

can be done. For example, in ACEEE's comparison of utility program performance from other states, utilities aggressively pursuing energy efficiency achieved incremental annual savings in the tens-of-thousands to hundreds-of-thousands of megawatt-hours (MWh), achieving close to or above 1% annual savings. These utilities also spent tens-of-millions of dollars to achieve those savings. But while program expenditures and savings in the Commonwealth are an order-of-magnitude lower than leading states, the energy savings generated by these programs are still being achieved cost-effectively.

This analysis does not capture any of the industrial sector's voluntary energy efficiency efforts. In Kentucky, the industrial sector is allowed to opt-out of participation in regulated DSM programs. With forty-eight percent of the electricity usage going to the industrial sector, percent-of-sales is a more reasonable metric to use to estimate and report savings if all sectors were participating in regulatory DSM programs.

Utilities in the Commonwealth have already laid a solid foundation of energy efficiency programs without being statutorily required to do so.[5] They also have several decades of experience administering demand-side management (DSM) programs, so ramping up existing programs and adding new ones to their portfolios could be done by leveraging existing resources and infrastructure. This would require greater investment on behalf of utilities and consumers alike. But, as other states have shown, it is possible to generate much higher volumes of energy savings while maintaining the cost-effectiveness of energy efficiency programs. A previous ACEEE assessment of the cost-effective energy efficiency resource potential available in the Commonwealth shows that there are considerable savings from energy efficiency yet to be captured by utility energy-efficiency programs. With this available potential and the ability of utilities to leverage existing demand-side management infrastructure, utilities in the Commonwealth are in a position to augment their energy efficiency portfolios successfully and for the benefit of all customer classes.

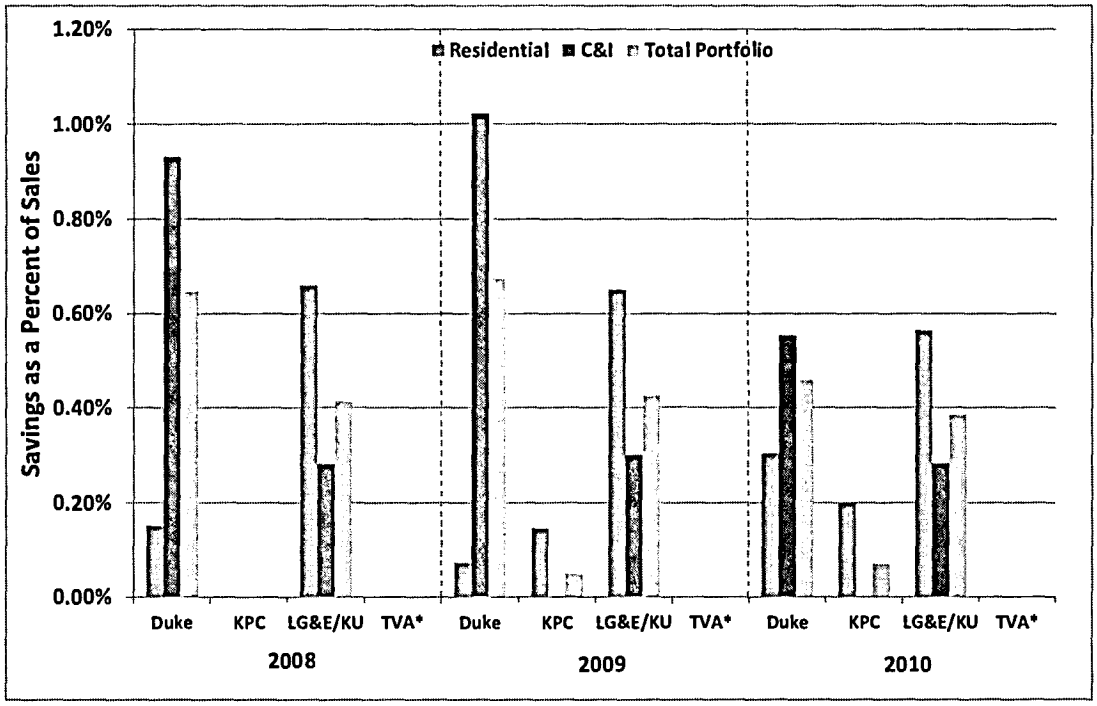
Table ES-1. Range of Portfolio Results from Non-Kentucky & Kentucky Utility Program Analysis

Portfolio Results				
Program Year	% Savings (of total sales)	Levelized CSE ($/kWh)	Average Cost of Saved Energy	Median Cost of Saved Energy
Non-Kentucky Portfolio Results				
2009	0.04% - 1.06%	$0.005 - $0.024	$0.015	$0.013
2010	0.16% - 1.48%	$0.006 - $0.018	$0.010	$0.009
Kentucky Portfolio Results				
2008	0.41% - 0.65%	$0.005 - $0.022	$0.013	$0.013
2009	0.05% - 0.67%	$0.007 - $0.039	$0.022	$0.020
2010	0.07% - 0.46%	$0.010 - $0.042	$0.022	$0.019

Source of Non-Kentucky Portfolio Results: ACEEE 2011

[5] While jurisdictional utilities are not required to offer energy efficiency programs, 807 KAR 5:058 requires utilities to summarize resource acquisitions in their integrated resource plans, including demand-side management programs.

Figure ES-1. Electricity Savings as % of Sales, by Sector (2008-2010)



* Retail electricity sales data for TVA's KY operations were unavailable, so we were unable to estimate percentage values for TVA.

INTERPRETING THE RESULTS

The utility program portfolios we have reviewed differ from one another as well as from those in other states on a number of factors: the types and number of programs that are offered; the volume of savings they achieve; and the cost of achieving those savings. There are countless reasons why this may be the case. In general, the degree to which energy efficiency is pursued is largely influenced by the utility regulatory environment in which utilities operate. Utility leaders in generating savings from energy efficiency generally are those operating in states with aggressive energy efficiency goals. Utilities are unlikely to make substantial investments pursuing demand-side resources if they are unable to benefit in a manner similar to making investments in supply-side resources.

The primary impetus for significant utility investment in energy efficiency is usually a mandate from the utility regulatory body or the state legislature requiring utilities to meet annual savings targets, usually referred to as an Energy Efficiency Resource Standard (EERS). So it is no coincidence that utility leaders in energy efficiency are those operating in states with aggressive energy efficiency goals (see Sciortino 2011b). The KPSC does not have the statutory authority to set savings targets; however, KRS 278.285 establishes regulatory policies that, in the absence of statutory requirements, provide some motivation for utilities to invest in energy efficiency programs, through "adders" in the DSM surcharge on customer energy bills.

The regulatory motivation for jurisdictional utilities in the Commonwealth to design and implement energy efficiency programs, such as program cost recovery and performance incentives, was codified by Kentucky Revised Statutes (KRS) 278.285 in 1994. Utilities differ in the extent to which they take

advantage of these motivational tools, however. Program costs incurred as a result of using these tools are incorporated, or "added," into the DSM surcharge that appears on the customer energy bill, allowing the utility to recover energy efficiency program costs in addition to some additional financial incentives. The amount of the DSM surcharge is determined by five elements: direct DSM program costs; projected lost sales revenues as a result of the programs; an incentive designed to provide positive financial rewards to a utility to encourage DSM implementation; capital recovery; and a true-up from the previous filing. While these "adders" serve to encourage greater investment in utility energy efficiency programs, ultimately they can also increase the total cost of delivering the programs to the customer. [6]

Using portfolio-level data reported by utilities in the Commonwealth to the U.S. Department of Energy's Energy Information Administration (EIA) through Form 861, it is evident that DSM expenditures have trended upwards for the all three major IOUs since 2001 (EIA 2010b).[7] While overall savings fell around the time of the recession, they have been steadily rising over the last several years. Clearly, then, existing regulatory policy encouraging investment in energy efficiency programs has had some impact on utility investments.

Regulatory Mechanisms to Facilitate Program Reporting, Data Accessibility and Transparency

From our review of utility program portfolios in the Commonwealth, we identified a few regulatory areas that, if addressed, would facilitate the growth and success of energy efficiency programs significantly.

First, neither the Kentucky Public Service Commission nor the State Legislature has established orders or laws outlining reporting requirements for utility DSM programs that apply to all utilities.[8] As a result, the structure of utility DSM status reports is inconsistent and the content disparate and inaccessible. Rigorously documenting the impacts of DSM programs is imperative if utilities, regulatory staff, and other stakeholders are to understand program performance and make justifiable decisions on how programs should be modified over time in order to perpetuate energy savings and ensure cost-effectiveness. Requiring greater consistency, clarity, and accessibility in the DSM status reports filed by utilities under their purview can provide value to all parties. By focusing on these

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[6] The effect of these adders on the overall cost-effectiveness to the customer is generally modest. The cost-effectiveness of a program is often measured over its life, which requires an avoided cost forecast in order to estimate its net present value of costs and benefits (avoided electricity costs for customers, for example) over that time period. Avoided costs generally increase over time due to a number of factors (such as capacity and infrastructure investments), but the relative effect of DSM program cost recovery on that overall increase is small. DSM surcharges are measured in mills, or 1/1000 of a dollar (per kWh), so any increase in retail prices – and, thus, energy bills – caused by the recovery of program costs will comprise a small percentage of a customer's total energy bill. Still, while rates may increase in the short-term because less electricity is sold, total customer bills will decline due to savings from efficiency.

[7] It is important to note that DSM program/portfolio performance data stretching back to 2001 is not readily available through the KPSC. Additionally, the EIA data do not disaggregate portfolio performance data to the program level.

[8] The KPSC has issued at least one order requiring one of the utilities under its purview to file DSM status reports. We are uncertain if other orders for individual utilities have been issued.

criteria and codifying the types of information that must be included in reports, it will be much easier to track program and portfolio performance over time, which will allow analysts and stakeholders to make more informed decisions on program design.

Second, some of the Commonwealth's electric cooperatives have been operating DSM programs for which tariffs (i.e., surcharges on a customer bill to help pay for DSM programs) do not exist (some for over 20 years). In other words, there are DSM programs that are not supported by a DSM tariff, which would set forth the eligibility, charges, payments, and terms and conditions of the programs. Since the paramount concern of any state utility commission is to ensure just and reasonable rates for consumers, it is necessary that a commission reviews and keeps records of all DSM programs operated by utilities under its purview. This discrepancy was identified in November 2011and has since been resolved. Regardless of the extent to which programs were undocumented, consumers in the Commonwealth have a statutory right to know where their money is being directed and, thus, utilities (regulated by the Commission) are statutorily required to "[...] submit tariffs that set forth the eligibility, charges, payments, and terms and conditions for each untariffed DSM program" and that, "Upon filing, the tariffs will be reviewed, solely to ensure that they comply with Commission statutes and regulations" (KPSC 2011).

Background

This report is one of a series of assessments for the Commonwealth that is intended to provide stakeholders with a snapshot of existing utility-financed energy efficiency efforts, and the potential energy efficiency resources available left to be captured by state and utility policies and programs. Prior to this report, ACEEE conducted an assessment of utility energy efficiency programs in other states to provide a benchmark with which to measure the effectiveness of utility programs in the Commonwealth (ACEEE 2011). ACEEE has also released an assessment of the cost-effective energy efficiency resource potential prior to this report (ACEEE 2012). These publications will be followed by two additional assessments:

- A program/policy analysis, which will focus on the degree to which programs and policies can capture the resource potential identified in the cost-effective resource assessment, and;
- A macroeconomic assessment, which will quantify the potential impacts of energy efficiency programs and policies on economic growth and employment in the Commonwealth.

Introduction

Assessing the performance of existing, utility-financed energy efficiency programs in the Commonwealth of Kentucky is critical to understanding lessons learned and how these programs could be modified to perpetuate cost-effectiveness. By conducting a quantitative analysis of program savings, costs, and participation, we can evaluate program results reported by Kentucky's utilities and compare these results to similar program portfolios in other states to gauge the progress of energy efficiency programs in the Commonwealth. We also discuss some important program design and regulatory issues that stakeholders in the Commonwealth should consider in order to raise the performance of utility energy efficiency programs.

This report assesses existing energy efficiency programs offered by Kentucky's three investor-owned utilities – Duke Energy Kentucky (Duke), Kentucky Power Company (KPC), and Louisville Gas and Electric Company/ Kentucky Utilities Company (LG&E/KU) – and one public power utility, the Tennessee Valley Authority (TVA), which together account for over 60% of retail electricity sales (EIA 2011). We do not include municipal utilities because they are not regulated by the Kentucky Public Service Commission (KPSC). And though we include TVA, it is also not regulated by the KPSC. There are also no DSM program performance data available through the KPSC for jurisdictional cooperative corporations. We review program metrics reported by these utilities for the 2008-2010 program years. Through this analysis we seek to answer the following questions, which will help guide Kentucky's utilities in their program design and delivery in the future:

- What are some of the most successful programs?
- Are the programs delivering savings cost-effectively?
- What are the total costs and savings of these programs and how do they compare to similar programs offered by utilities in other states?
- Are there additional programs and/or products that utilities should target in the future?

Our analysis focuses on electric energy efficiency programs only. While some portfolios we review in this document include programs for both electricity and natural gas, we concentrate on electric efficiency programs because: the number of these programs far exceed those for gas; utility regulatory commissions generally require more comprehensive suites of program offerings for electric utilities; and more robust evaluation data is available from electric programs than from natural gas programs.

Energy Efficiency Programs in Context

Utilities across the nation have been offering energy efficiency programs to their customers for varying periods of time – some for decades, others have begun only in the last several years. The impetus for program development and implementation across utilities and over time has also varied – economics, regulatory policies, system reliability concerns, market competition, and rate impacts are factors that typically influence utilities in the number and scope of programs that they offer. Understanding when and why utilities cultivate their program portfolios gives insight into how the various programs perform and grow, allowing utilities to make informed decisions that will help ensure greater success with their portfolios.

A defining moment in the era of utility efficiency programs was the wave of energy market deregulation that spread across many states during the 1990s. In order to foster competition between utilities, some states began deregulating energy markets in the hopes that greater competition between utilities would generate greater customer benefits, such as lower customer energy rates. In the race for market share, however, utilities in many states quit investing in energy efficiency programs altogether because the administration costs cut into their revenues – costs that utilities were previously able to recover through regulatory mechanisms.

The foray into market deregulation proved largely unsuccessful. As a result, regulators have been looking to other measures to control consumer costs, such as investments in energy efficiency. Thus we have seen the number and efficacy of energy efficiency programs grow significantly over the last several years. Much of this growth can be attributed to utility regulatory policy and, to a lesser degree, legislative mandates, particularly due to the introduction of Energy Efficiency Resource Standards (EERS) in over half of the states in the nation. It is no surprise that utilities with the most comprehensive and effective program portfolios, as well as the most detailed reporting of program performance, are utilities in markets with an EERS that, importantly, have also developed complementary utility regulatory policies to facilitate investment in energy efficiency programs.

Utility Program Portfolios

Our analysis focuses on utility program portfolios as a whole as well as individual program performance, though we report data on the latter only in Appendix A. We collected and analyzed data for many individual programs in order to determine their effectiveness and the effectiveness of utility program portfolios overall. However, data at the individual program level can be inconsistent or difficult to compare to other programs, while aggregate portfolio results are more consistently comparable. Programs vary considerably in the way they are designed and marketed, and to the extent to which customers are incented to participate. So it is important to understand that, when comparing programs across utilities within the Commonwealth, variations in performance of seemingly similar

programs are a result of a number of factors that are not necessarily quantifiable. Comparing utility achievements based on overall portfolio performance, then, is a high-level but more reasonable method.

Assessing individual program performance is important; however, its importance is greater for program administration than it is for making comparisons of similar programs across portfolios. This is because program portfolios differ significantly not only across states, but also between utilities within the same state as well as within one utility that operates in several states. Furthermore, programs that may appear similar can also differ significantly with regards to many economic and administrative factors that affect program performance: utility investment, program marketing, program incentives (rebates, tax breaks), availability of trained/qualified contractors, and energy prices and demand are just a few examples.

Analytic Approach

In evaluating utility energy efficiency programs, there are a number of metrics that are widely used to determine program and portfolio effectiveness. Below we discuss several of the most common metrics, which we use in our portfolio assessments later on. The key for any metric is providing some sort of normalization so that comparisons can be made across portfolios from utilities of various sizes and regions of the country. This list is not conclusive.

Savings (kWh) – This metric reports the volume of energy savings generated by a program/portfolio from its installed energy-efficient measures, such as lighting. Savings are reported either as "incremental", or the volume of savings generated in year X by measures installed in year X, or as "cumulative", or the volume of savings generated in years X, Y, and Z by measures installed in years X, Y, and Z. Often utilities report both incremental and cumulative energy savings in their DSM filings, as the latter is important in assessing progress over the life of a program/portfolio.

In addition to differentiating between incremental and cumulative savings, utilities also differentiate between "net" and "gross" savings. Gross savings include all the energy savings generated by measures installed through an efficiency program. Net energy savings subtract from gross savings the savings generated by "freeriders", or program participants that would have installed energy-efficient measures even in the absence of a utility program. Hence, "net" savings. The reason for the differentiation is to ascertain the influence of program design (marketing, education, incentives) on participants who are less savvy – or totally unfamiliar – about energy efficiency than others. These are the utility customers that are most important to reach because, without efforts on the part of a utility to incent and encourage investment in energy efficiency, these customers are unlikely to do so.

Savings as a Percent of Sales – This metric calculates the volume of energy savings generated by a program/portfolio relative to a utility's annual retail sales, reported as a percentage. Annual sales are taken from data reported by the Energy Information Administration (EIA 2009, 2010, and 2011). By normalizing the savings relative to a utility's annual sales, differences in utility market share are taken into account, allowing comparisons of programs between utilities of different sizes. As a result, this metric is an invaluable indicator to evaluate a utility's overall efforts in developing and implementing efficiency programs. Portfolios with higher percent savings can therefore be said to offer programs

that are well-funded, prudently marketed, and rigorously administered. It is important to note that the program savings considered in this metric are incremental, new savings; in other words, the savings are unique to that program year rather than the accumulation of savings from past program years.

It is important to understand, however, that this metric is not perfect, despite its usefulness in comparing program portfolios. Utilities use different methodologies for determining program savings and often report savings of different types (net versus gross savings). For utilities in Kentucky, it is not always clear which type of savings are being reported. Additionally, utilities use different methods for estimating savings of individual measures installed through a program. For example, some utilities rely on "deemed savings", which provides ex ante savings measurements for individual products and equipment (a massive document listing hundreds of measures with pre-verified savings and costs, filed with a state's regulatory commission). A program's savings are then calculated by taking the number of installed measures and multiplying by their individual per unit savings. A more rigorous approach would be to measure savings impacts ex post through evaluation, measurement, and verification (EM&V). EM&V can be costly and time consuming, however, so many utilities tend to rely on deemed savings, at least for a portion of their portfolio. The benefit of measuring savings ex post through EM&V is that it takes into account variations in the quality of installation. Equipment can often be installed poorly, thereby preventing that equipment from performing at peak levels and generating savings on par with its deemed savings.

Experience in other states provides a benchmark with which to ascertain the range of percent savings that is indicative of a strong program portfolio. ACEEE's 2011 State Efficiency Scorecard reported that the utilities in the top ten states are achieving annual incremental savings between 0.7% and 2.6% of annual retail sales. The next tier of ten states is achieving annual incremental savings between 0.4% and 0.7% (Scirotino et. al, 2011a). Utilities in states that are achieving the highest savings have had years of experience running energy efficiency programs. It generally takes several years of planning, development, and implementation for utilities to begin to generating savings on par with the leaders.

This analysis does not capture any of the industrial sector's voluntary energy efficiency efforts. In Kentucky, the industrial sector is allowed to opt-out of participation in regulated DSM programs. With forty-eight percent of the electricity usage going to the industrial sector, percent-of-sales is a more reasonable metric to use to estimate and report savings if all sectors were participating in regulatory DSM programs.

Costs ($) – When a utility reports program costs, it is reporting the total investment required on its part in order to bring a program to market. This includes costs incurred for program development and design, administration, marketing, education, training/payments to contractors (who perform the services), product purchases, incentives/rebates, and ex post program evaluation, measurement and verification. Program costs only capture the expense to deliver a program and do not include other elements that comprise the overall DSM surcharge. Additionally, participant costs are not included, i.e. the level of investment borne by the participant, which is the difference between the total cost of a measure, such as an efficient air conditioning unit, and the value of the utility rebate for that measure.

The absolute level of utility investment in a program/portfolio alone is not necessarily an illustrative metric to use in measuring a utility's commitment to energy efficiency, unless it is used as a reference to past or future utility portfolio investments to highlight trends. To facilitate comparisons across utilities, program costs must be indexed in some way in order to account for variations in the size of a utility. For instance, ACEEE reports utility energy efficiency spending as a percent of revenues in order to make comparisons across states in its annual State Energy Efficiency Scorecard.

Levelized Cost of Saved Energy ($/kWh) – The levelized cost of saved energy (CSE) is defined as the level of payment necessary each year to recover the total investment and interest payments (at a specified interest rate) over the life of an efficiency measure or in the case of energy efficiency programs, over the average life of all the measures installed through a program. The levelized CSE is essentially a measure of the "bang for the buck," or the volume of savings achieved with each dollar of program investment: the lower the CSE, the greater savings being generated per dollar. This methodology is an exercise in normalization that allows utilities to compare energy efficiency with other generation resources to evaluate the relative cost-effectiveness over their lifetimes and is usually reported in dollars per kilowatt-hour. For example, if the total cost of a pulverized coal plant is around $0.08 per kWh but a utility can generate energy savings through efficiency programs at a rate of $0.03 per kWh, then energy efficiency is the more cost-effective resource for meeting electricity demand

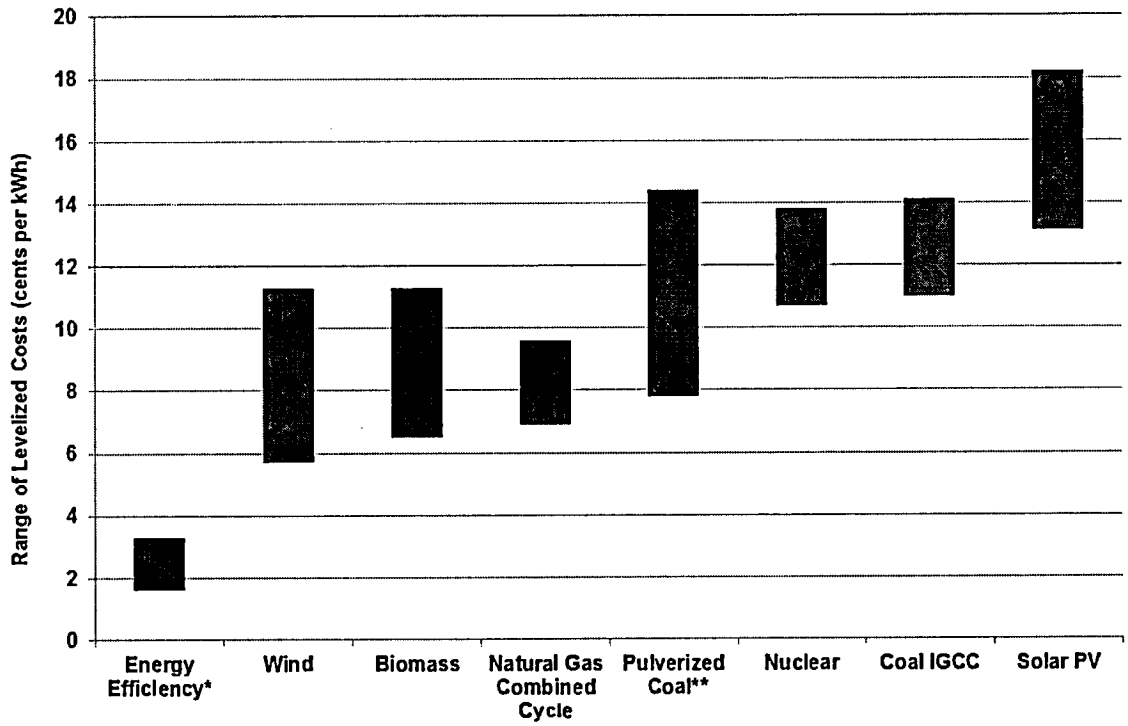
CSE values in this report are calculated by ACEEE using data reported by utilities. To estimate the levelized cost of saved energy we discount program investments at a rate of seven percent over the life of a measure, or, in the case of programs and portfolios, over the average life of all installed measures in a program. This gives us the present value (cost) of the investments. We then divide by the volume of savings achieved through a particular program, which gives us the cost of achieving each kilowatt-hour of saved energy, in $/kWh.

There are a number of ways to measure the costs (and benefits) of energy efficiency programs, which focus on either the customer or utility perspective, or both. Figure 1 represents costs from a program administrator (utility) perspective. This is known as the utility cost or program administrators cost (PAC) test. This is a cost/benefit test that measures the net costs of a program based on the costs incurred by the utility (including incentive costs) and excluding any net costs incurred by the participant (customer). The costs used to determine the portfolio results we report below are from the utility perspective, so they do not include customer costs. The benefits for this test are the avoided supply costs of energy and demand; the costs are the program costs incurred by the utility, incentives paid to the customer, and any increased supply costs. The other test frequently utilized is the total resource cost (TRC) test. Regulators sometimes implement TRC inconsistently, however, which makes comparisons between states difficult. The TRC benefit/cost test includes both the participants' and the utility's costs. The benefits are avoided energy supply costs; the costs are the program costs (including equipment costs) paid by the utility and the participants, plus the increase in supply costs for any period in which load has been increased.

In a 2009 analysis, ACEEE found that the energy efficiency programs for utilities across 14 states have portfolios performing at a levelized CSE ranging from $0.016 to $0.033 per kWh, with an average cost

of $0.025 per kWh (Friedrich et al, 2009). At these levels, energy efficiency is the least costly energy resource option available for utility resource portfolios: saving a kWh through energy efficiency is around one-third or less the cost of any new source of electricity supply (see Figure 1).

Figure 1. Levelized Utility Cost of New Electricity Resources



Notes: *Energy efficiency data from Friedrich et al. 2009 (ACEEE), which represents 5 years of average utility efficiency program cost data from 12 states. All other data from Lazard (2009).
**High-end range of advanced pulverized coal includes 90% carbon capture and storage.

The 2009 ACEEE study assumes an average measure lifespan of 10-15 years for electricity programs, with a median of 13 years, which were reported by utilities for their energy efficiency program portfolios in a given program year. Unfortunately, the program portfolios that we reviewed for the current study did not consistently report average measure lives. Therefore, we used the 10-15 year range from the 2009 study to estimate a range of levelized CSEs for each utility's portfolio in each program year. For each utility, tabular results are only reported assuming the median value of 13 years. Appendix A provides tables by utility that include the full range of levelized CSEs for each program in a utility's portfolio.

Program Participation (%) – Program participation is a measure of the market share reached by a program. Occasionally participation is expressed as a percentage relative to the number of potentially eligible customers. Few utilities report program participation as a percentage, however, if they report program participation at all. Instead, they focus only on the number of actual program participants. For some programs, one could assume that the total number of customers in a sector (residential, commercial, industrial) is equivalent to the total number of potential customers. But well-designed programs target particular market segments within a sector, such as low-income customers or small

commercial operations, so this assumption is not an accurate reflection of potential market participation. Additionally, many utilities measure program participation based on the number of installed efficiency measures, such as compact fluorescent lights or central air-conditioning tune-ups, as opposed to the number of households or firms.

Increasing overall program savings cannot be accomplished cost-effectively simply by expanding participation in existing programs. So while this metric is another useful tool in the program analysis kit, program performance should not be measured based on participation alone. Ultimately, good program design maximizes the volume of savings generated per customer. This generally means customers must install more energy efficiency measures with greater incremental efficiency gains to achieve deep savings. In states with more robust efficiency programs, program administrators are augmenting customer participation through better advertising (targeting social media), greater convenience (minimizing administrative costs), and higher incentives, the latter of which can potentially backfire if funding is not adequate enough to meet demand. Friedrich et al. (2009), for example, found that program incentives average around 75% of total program costs and range between 60 and 90% of total program costs.

We do not focus on program participation or report savings per customer in this assessment because of a lack of data for both total program participation and, to a much greater degree, the number of potentially eligible customers by customer class. As a measure of program performance, reporting customer participation either as a percentage of potential customers or in terms of savings per customer is a valuable indicator that utilities must strive to document in their program assessments. Comparing these numbers over time illustrates the progress of a program and gives administrators another metric with which to determine the tenets of a program that are in need of adjustment.

Utility Program Assessments

This section of the report reviews the program portfolios of Kentucky's three electric investor-owned utilities and TVA, which have varying degrees of experience administering energy efficiency programs. For each utility, we first give a brief discussion of its history with energy efficiency, followed by a description of existing programs and an assessment of program performance based on publicly available data acquired through the KPSC.

It is important to add some additional context for the evaluation of utility energy efficiency portfolios in the Commonwealth. Utility-funded energy efficiency programs are not mandatory in Kentucky; participation on the part of utilities is voluntary. The KPSC only retains the authority to "determine the reasonableness of demand-side management plans proposed by any utility under its jurisdiction", as codified in KRS 278.285. One such factor in making this determination is "the cost and benefit analysis" of the DSM programs. Furthermore, KRS 278.285 (3) states that industrial customers with energy intensive processes are exempt from paying for utility demand-side management programs through their rates and, instead, may implement cost-effective DSM measures on their own.

In Table 1 we report the range of portfolio results from a previous ACEEE assessment of utility programs in ten other states, such as Arkansas, Iowa, and Pennsylvania (ACEEE 2011). In addition, in Table 2 we report the range of levelized cost of saved energy estimated in that assessment. We use

these results as a benchmark through which to assess portfolio and program performance for Kentucky's utilities. The results cover program years between 2008 and 2010, though we only reported results for any two program years, either 2008-2009 or 2009-2010, in order to show how programs matured over the course of two years.

Table 1. Range of Portfolio Results from Non-Kentucky Utility Program Assessment

Portfolio Results				
Program Year	% Savings (of total sales)	Levelized CSE ($/kWh)	Average Cost of Saved Energy	Median Cost of Saved Energy
Year One	0.04% - 1.06%	$0.005 - $0.024	$0.015	$0.013
Year Two	0.16% - 1.48%	$0.006 - $0.018	$0.010	$0.009

Source: ACEEE 2011

Table 2. Range of Levelized CSE ($/kWh), Program Years One & Two

	Year 1	Year 2
10 Years	$0.006 - $0.029	$0.007 - $0.022
13 Years	$0.005 - $0.024	$0.006 - $0.018
15 Years	$0.004 - $0.021	$0.005 - $0.016

Source: ACEEE 2011

Again, the metrics we consider are savings as a percent of sales and the levelized cost of saved energy for program portfolios, not for individual programs (see Appendix A for results by program). Data on program participation was too scant to allow for consistent comparisons across utilities.

AVAILABLE DATA

In this section we briefly discuss the metrics reported by utilities to the KPSC that we use to inform our analysis of utility program portfolios in the Commonwealth. These are the metrics that we were able to find in various utility filings with the KPSC, the sources of which we reference in the table as well. We take this opportunity to highlight a number of caveats prior to delving into the analyses of the various portfolios.

We were only able to procure actual performance results for Duke Energy, Kentucky Power, and TVA's program portfolios. The metrics that we use for our analysis of LG&E/KU's program portfolio are projections from their 2007 DSM plan filing; actual performance data for LG&E/KU's programs were unavailable.[9]

- Duke reported energy savings (MWh), demand reductions (kW), program costs ($) and program participation for the 2008, 2009, and 2010 program years (Duke 2008, 2009, and 2010).

[9] LG&E/KU reported actual savings for several of their program years in a June 13, 2011 filing in its joint integrated resource plan docket, Case No. 2011-00140. No costs or data on participation were reported in this filing.

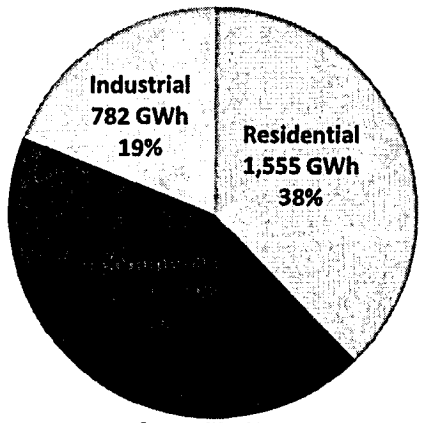
- KPC reported energy savings (MWh), demand reductions (kW), program costs ($) and program participation for the 2009, and 2010 program years (KPC 2011).
- LG&E/KU reported *projections*, which included estimates of energy savings (MWh), demand reductions (kW), program costs ($) and program participation. In the 2007 filing we referenced, this information was reported for the 2008-2014 program years (LG&E/KU 2007).
- TVA made energy savings (MWh), demand reductions (kW), and program costs ($) data available at the state level for the 2008, 2009, and 2010 program years. However, TVA did not include program participation. TVA does not report aggregate program data, by state, for its energy efficiency efforts to the KPSC because TVA and its distribution cooperatives are not under the KPSC's jurisdiction.
- Program performance data on jurisdictional cooperative corporations were not publically available for this analysis.
- Municipal utilities are not under the jurisdiction of the KPSC and therefore are not required to report their energy efficiency efforts.

Duke Energy Kentucky

Background

Duke Energy Kentucky has been offering DSM programs to its customers since 1996. Duke regularly convenes a multi-party collaborative, which includes representatives from the state government and various nonprofits, to review and approve its residential and commercial and industrial portfolios prior to filing the DSM application with the KPSC.

Figure 2. Duke 2010 Sales



Source: EIA 2011

Program Portfolio

Currently Duke's program portfolio consists of a dozen energy efficiency programs for its residential, commercial and industrial customers. This does not include load management programs such as its Power Manager of Power Share programs. Duke's portfolio is fairly diverse. Its residential portfolio includes programs such as low-income weatherization, refrigerator recycling and replacement, home energy audits and retrofits, and personalized energy reports. Its commercial and industrial portfolio includes programs that provide rebates for energy efficient lighting, HVAC equipment, and motors, plus an incentive program for public schools. With years of experience and a broad set of energy efficiency programs, Duke has established itself as a leader in energy efficiency in the Commonwealth. Despite a decrease in its portfolio savings by over 50% during the 2011 program year due to falling participation for some programs, Duke has led utilities in Kentucky in generating savings from energy efficiency since 2008. And it has done so while offering programs that are, for the most part, cost-effective.

Most of Duke's energy efficiency programs focus on equipment replacement – with the exception of its energy efficiency website and personalized energy report programs – which requires providing rebates to customers in order to buy-down the initial costs of efficient equipment. Duke does not

disaggregate its program costs by type in its status reports, so we have no data on incentives to reference, but incentive levels are likely relatively high for its two low-income programs, which are reflected in the relatively high levelized cost of saved energy for these programs (see Table A-1 in Appendix A for program results).

Assessment of Results

At the portfolio level, Duke has been generating significant savings with its programs since 2008, with the exception of its residential portfolio during the 2009 program year. The high CSE for its residential portfolio is largely driven by the high CSE of its two low-income programs. Residential low-income programs, in general, are rarely cost-effective because utilities tend to keep participant costs close to zero. In other words, utilities tend to provide rebates equivalent to 100% of the up-front costs of energy efficiency measures installed through the program because low-income customers often reside in very inefficient housing, yet do not have the income to invest in upgrades themselves.

Duke's commercial and industrial (C&I) program portfolio has been performing well since 2008. The services Duke offers to its C&I customers cover the major end-uses in commercial buildings (such as lighting, heating, and cooling) and motors. The levelized CSE of the portfolio falls within the range identified in Tables 1 and 2 above and, in fact, lies towards the lower end of that range. In addition, as a percent of total electricity sales, the savings generated by Duke's C&I programs in 2008 and 2009 are well towards the upper-end of the range of savings reported in Table 2.

While Duke's residential program portfolio has not been delivering savings to the degree of its C&I portfolio, it is important to understand that residential programs are often less cost-effective relative to C&I programs; however, residential programs are typically delivered cost-effectively. Low-income efficiency programs play a major role in this disparity, due to the relatively high incentive levels required to garner customer participation. In general residential customers are less inclined to pay the high up-front costs required for deep retrofits – i.e., whole-home retrofits as opposed to equipment replacement – and therefore require greater incentives to do so than commercial customers. Residential customers also do not benefit from the economies of scale that are more prevalent in the commercial sector.

Duke reported detailed data on program participation. With this data we were able to ascertain trends in participation over time. It is clear from this data that the number of participants in Duke's residential programs also played a major role in the performance of its programs. The number of participants dropped considerably in 2009, which had a noticeable impact on savings, although program costs were actually higher in the 2009 program year compared with 2008.

The majority of savings generated in both portfolios comes from residential and C&I lighting programs (see Table A-1 in Appendix A), although savings from lighting, largely residential, have dropped noticeably in recent years. Neither Duke's residential nor C&I portfolio offers programs targeting new construction. And while Duke's residential portfolio is diverse, its commercial portfolio would benefit greatly from targeting additional areas beyond equipment replacement, such as computer efficiency and systems and controls (building operations).

Table 3. Results for Duke Energy Kentucky's Energy Efficiency Portfolio

Program	Program Year	Partic.*	Retail Sales	Savings (of total sales)	Net Savings	Costs	Levelized CSE ($/kWh)
			GWh	%	MWh	Million $	13 yrs
Residential	2008	45,111	1,473	0.15%	2,224	$ 0.77	$ 0.04
C&I		27,465	2,569	0.93%	23,913	$ 0.44	$ 0.002
Total All Programs		**72,576**	**4,041**	**0.65%**	**26,137**	**$ 1.21**	**$ 0.005**
Residential	2009	11,794	1,404	0.07%	1,017	$ 0.89	$ 0.09
C&I		47,089	2,434	1.02%	24,867	$ 0.86	$ 0.004
Total All Programs		**58,883**	**3,838**	**0.67%**	**25,884**	**$ 1.74**	**$ 0.01**
Residential	2010	37,475	1,555	0.30%	4,723	$ 1.00	$ 0.02
C&I		29,715	2,562	0.55%	14,155	$ 0.72	$ 0.01
Total All Programs		**67,190**	**4,117**	**0.46%**	**18,877**	**$ 1.72**	**$ 0.01**
Residential	2011	18,236	-	-	2,357	$ 1.16	$ 0.05
C&I		25,537	-	-	5,423	$ 0.38	$ 0.01
Total All Programs		**43,773**	-	-	**7,779**	**$ 1.53**	**$ 0.02**

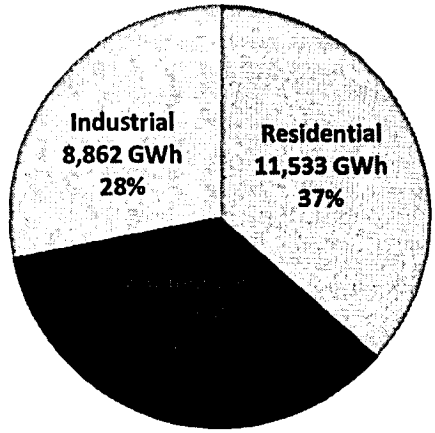
Sources: Duke 2008, 2009, 2010, and 2011; EIA 2011, 2010a, and 2009

* Values for the lighting programs, both residential and C&I, are given in terms of units, not participants. So these values include both number of participating households and number of installed lighting units.

Louisville Gas & Electric and Kentucky Utilities Company

Background

Figure 3. LG&E/KU 2010 Sales



Source: EIA 2011

Louisville Gas and Electric Company and Kentucky Utilities Company have been offering demand-side management programs to their customers since 1994. Since then, the two companies have worked with an Energy Efficiency Advisory Group (a group of customer/stakeholders, including low-income advocates, formerly called the "DSM Collaborative") to grow and improve their set of DSM program offerings. In their 2011 DSM filing, the two companies noted that there is "plenty of room for additional cost-effective energy and demand savings," which is evident given their recent filing for the addition of three new residential energy efficiency programs (LG&E/KU 2011a).

We were unable to determine how LG&E/KU's programs have evolved since 1994 because utilities in the Commonwealth are not required to report on program performance ex post and LG&E/KU does not do so voluntarily. However, using LG&E/KU DSM applications as a reference, their portfolios appear to be robust. Data on energy savings do appear sporadically in their DSM applications, though the savings data provided are cumulative (as opposed to new, incremental savings in a given year). Savings data are also reported within the text instead of in tables, and with no accompanying historical data with which make comparisons. Still, given the companies' experience with DSM and

the magnitude of their costs and savings projections reported in their DSM applications, LG&E/KU seem to be pursuing energy efficiency fairly aggressively.

Program Portfolio

LG&E/KU's program portfolio consists of thirteen demand-side management programs, of which seven focus on delivering energy savings through energy efficiency (the other focus on load management, education programs, etc.). Their residential portfolio includes programs focused on high efficiency lighting, new construction, HVAC tune-ups, low-income weatherization, and home retrofits (audits and rebates for equipment replacement). Their commercial portfolio includes programs focused on HVAC tune-ups and retrofits (audits and rebates for equipment replacement). There are currently no programs (or rates) that are offered to LG&E/KU's industrial customers because of the statutory provision allowing industrial customers to opt out of paying into energy efficiency programs.

In July 2007, LG&E/KU filed their joint application for the review, modification, and continuation of their energy efficiency programs and demand-side management cost recovery mechanisms, upon which the assessment below is based (LG&E/KU 2007). In each DSM plan filing, LG&E/KU reports seven-year projections of the budgets and savings for each program individually as well as for the overall portfolio. The most recent DSM plan was filed in April 2011, which sought approval for the continuation or modification of the thirteen DSM programs mentioned above and three new programs: Smart Energy Profile (home energy reports); Residential Incentives (equipment replacement); and Residential Refrigerator Removal (LG&E/KU 2011a).

LG&E/KU offer cash incentives to customers for three of their existing programs: residential new construction; residential high-efficiency lighting; and commercial retrofits. Incentives for the latter two constitute around 40% of total program costs (42% and 36%, respectively), while incentives for residential new construction are 77% of total program costs. Two of LG&E/KU's new programs will also offer incentives: 60% of the costs of the residential incentives program will be directed towards incentives while 15% of the costs of the refrigerator removal program will be directed towards incentives (customers are given a modest incentive for the removal).

Assessment of Results

The results reported in Table 4 below are from LG&E/KU's joint application for their DSM programs, filed in July of 2007 (LG&E/KU 2007). The filing reports seven-year projections, starting in 2008, of costs and savings for LG&E/KU's program portfolios. For the sake of comparison to other utilities covered in this analysis, we only report LG&E/KU's projections for the 2008-2010 program years. These results do not represent actual program performance in these program years; ex post results for existing programs in LG&E/KU's portfolio were unavailable.

LG&E/KU project minimal annual growth in their DSM programs for the first few years of the 2008-2014 planning period. Incremental annual savings actually decline from 2008-2010 and, although not

reported here, continue to decline through 2014.[10] Still, as a percent of sales, LG&E/KU project savings achievements on par with Duke Energy Kentucky above. However, without DSM status reports that show actual, measured savings from LG&E/KU's programs, it is impossible to determine to what degree the projections varied from actual program performance.

Assuming that LG&E/KU meet the projected savings with expenditures close to the allotted budget, they will be achieving those savings cost-effectively and, for the most part, within the range of CSE values reported above in Tables 1 and 2. Like Duke, LG&E/KU project that the vast majority of their portfolio savings will come from their residential lighting (averaging between 80%-85%) and commercial retrofit programs (see Table A-2 in Appendix A), the latter of which includes lighting along with other equipment (motors, refrigeration, etc.). While lighting retrofits will continue to generate significant savings in the future given new technologies such as light-emitting diodes (LEDs), LG&E/KU's commercial portfolio would benefit greatly from some program additions. Currently LG&E/KU rely more heavily on lighting to drive portfolio savings (as a percent) than any of the other utilities in this assessment. Like Duke, commercial programs targeting new construction, computer efficiency, and systems and controls would drive up portfolio savings considerably.

Table 4. Results for LG&E/KU Energy Efficiency Portfolio

Program	Program Year	Retail Sales	Savings (of total sales)	Savings*	Costs	Levelized CSE ($/kWh)
		GWh	%	MWh	Million $	13 yrs
Residential	2008	10,590	0.66%	69,892	$ 21.17	$ 0.03
C&I		19,795	0.28%	55,729	$ 4.69	$ 0.01
Total All Programs		**30,385**	**0.41%**	**125,621**	**$ 25.86**	**$ 0.02**
Residential	2009	10,261	0.65%	66,720	$ 20.77	$ 0.03
C&I		18,646	0.30%	56,125	$ 4.57	$ 0.01
Total All Programs		**28,907**	**0.42%**	**122,845**	**$ 25.34**	**$ 0.02**
Residential	2010	11,321	0.56%	63,831	$ 21.77	$ 0.04
C&I		19,992	0.28%	56,519	$ 4.73	$ 0.01
Total All Programs		**31,312**	**0.38%**	**120,350**	**$ 26.49**	**$ 0.02**

Sources: LG&E/KU 2007 and 2011a; EIA 2011, 2010a, and 2009

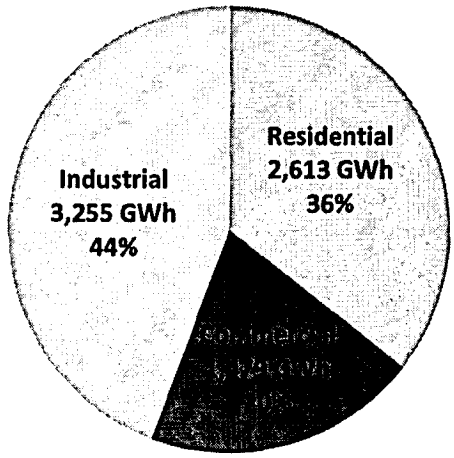
* Savings reported here are projections. It is unclear whether these represent net or gross savings. LG&E/KU reported actual savings in a June 13, 2011 filing in its joint integrated resource plan docket, Case No. 2011-00140. No costs were reported in this filing.

[10] LG&E/KU reported projected savings in their July 2007 filing in terms of cumulative annual, not incremental annual, the latter of which we report in Table 4. Annual sales reported from 2008 through 2010 are taken from the U.S. DOE's Energy Information Administration (EIA 2009, 2010, and 2011), while sales projections after 2010 are taken from LG&E/KU's integrated resource plan filings (LG&E/KU 2011b).

Kentucky Power Company

Background

Figure 4. KPC 2010 Sales



Source: EIA 2011

Kentucky Power Company has offered a variety of demand-side management programs "designed to encourage customers to use electricity efficiently, achieve energy conservation, and reduce the level of future peak demands for electricity since 1994" (KPC 2009). KPC is a subsidiary of American Electric Power and, as such, is subject to its parent company's strategic plans. In KPC's 2009 IRP, it notes that the AEP System – East Zone "anticipates significantly expanding the base of demand-side management programs within its footprint," acknowledging that legislation in Ohio and Michigan requires the implementation of significant programs beginning in 2009, though the level of activity will vary by jurisdiction (KPC 2009). Through 2008, KPC was the only AEP System – East Zone operating company that had "active traditional DSM programs."

Program Portfolio

Kentucky Power's program portfolio consists of seven energy efficiency programs and an additional five DSM programs (efficiency and load management) that are administered by an external vendor. The seven programs administered by KPC are all residential – KPC has not directly administered DSM programs for its commercial customers since 2006, citing a steady decline in participation within this customer class leading up to 2006.

KPC's residential portfolio offers several different types of programs such as: low-income weatherization; HVAC upgrades for mobile homes; improving the efficiency of new mobile homes; home retrofits for electrically-heated homes; high-efficiency heat-pump upgrades; lighting; and energy education for students. The five programs funded by KPC but administered by a third-party vendor include: residential efficient products; commercial HVAC upgrades; residential and commercial HVAC tune-ups; commercial building retrofits; and residential and commercial load management programs. Data on costs and savings for the programs administered by the external vendor were unavailable.

KPC offers incentives to participants of all seven of its residential energy efficiency programs, ranging from 30% to 86% of total program costs. In 2009 and 2010, incentives averaged around 60% of total portfolio costs (60% and 56%, respectively).

Assessment of Results

Although the levelized cost of saved energy for KPC's residential portfolio falls slightly outside the range of CSEs reported above in Tables 1 & 2, it is still delivering energy savings to its customers cost-effectively when these results are compared to the average retail price of electricity (see Table 5).

Portfolio expenditures have fluctuated since KPC began offering programs (averaging around $700K), though only in 2009 and 2010 did expenditures increase a significant amount (into the millions of dollars) relative to historical spending (KPC 2011).

While KPC has invested more in its residential DSM portfolio recently, the absence of a robust commercial portfolio limits its ability to achieve energy efficiency savings on par with more successful utilities in the Commonwealth and in other states. As a percent of sales, savings are modest, falling toward the lower end of the range of savings reported above in Tables 1 & 2, though savings have been steady historically. Savings reached a peak and then began to steadily decline in 2000, which was exacerbated by the discontinuation of commercial programs in 2006. Based on data reported in its 2011 DSM application, annual drops in customer participation are the likely culprit in the diminished savings, but whether the factors leading to lower participation were exogenous or endogenous to program design elements (such as marketing and incentives) is difficult to ascertain.

The programs included in KPC's residential portfolio have not changed much since it began offering programs in 1994. With almost 20 years of experience marketing and implementing these programs, it is likely that greater investment (in time and expenditures) would yield even greater savings. The addition of programs that target new construction and whole-house retrofits (beyond low-income customers), for example, would boost residential portfolio savings considerably. KPC could also consider the addition of an autonomous refrigerator recycling program and a home-energy reports / information feedback program, the latter of which would also serve as an educational tool for homeowners. And while industrial energy users are allowed to opt-out of paying for energy efficiency programs through their rates, given that 44% of KPC's sales were to the industrial sector, KPC could potentially generate considerable savings with some well-designed industrial energy efficiency programs.

Table 5. Results for Kentucky Power's Energy Efficiency Portfolio

Program	Program Year	Partic.*	Retail Sales	Savings (of total sales)	Savings**	Costs	Levelized CSE (kWh)
			GWh	%	MWh	Million $	13 yrs
Residential	2009	6,693	2,426	0.15%	3,535	$ 1.30	$ 0.04
C&I		-	4,643	-	-	$ -	$ -
Total All Programs		**6,693**	**7,068**	**0.05%**	**3,535**	**$ 1.30**	**$ 0.05**
Residential	2010	9,156	2,614	0.20%	5,189	$ 2.06	$ 0.04
C&I		-	4,735	-	-	$ -	$ -
Total All Programs		**9,156**	**7,349**	**0.07%**	**5,189**	**$ 2.06**	**$ 0.04**

Sources: KPC 2011, EIA 2011 and 2010a

* Values for the residential lighting program are given in terms of units, not participants. So these values include both number of participating households and number of installed lighting units.

** It is unclear if the savings reported by KPC are net or gross.

Tennessee Valley Authority

Background

Energy efficiency and demand-side management programs have been a part of TVA's energy supply resource mix since the late 1970s. Historically, TVA's programs were focused predominantly on reducing peak demand, though several of their programs also reduced end-use energy consumption. TVA had a substantial array of energy-efficiency programs around the late 1970s and early 1980s, including a major residential, energy efficiency loan program, as well as a variety of commercial programs. These programs were dismantled by the mid-1980s when TVA decided to focus instead on the construction of new power plants. Only recently, in 2007, did TVA adopt a strategic plan that incorporates greater investment in energy efficiency, as part of its goal to lead the Southeast region in increased energy efficiency. Its 2011 Integrated Resource Plan reflects an increased focus on energy efficiency and demand response, with a goal of achieving 3.5% of sales in energy efficiency savings by 2015, which would result in energy savings of around 6.000 GWh by the end of 2015 (TVA 2011).

TVA is a wholesale provider of electricity, so its operational structure is unique. TVA does not serve the majority of its end users directly, so it must work closely with the power distributor community to ensure proper program implementation. In fact, TVA only sells power directly to its industrial customers; residential and commercial customers are served through municipal and cooperative utilities, which purchase power from TVA. TVA is responsible for the designing and developing DSM programs for its direct customers and the customers of its distributors. Distributors then have the option of choosing which of TVA's programs they want to offer to their customers. Distributors also have the option of administering the program with their own resources or soliciting the services of a third-party administrator, Conservation Services Group, which is contracted by TVA to administer its DSM programs.

This unique structure requires its program design process to include not only consumer research, but also requires close involvement by the power distributor community. TVA and distributors coordinate DSM design activities through the Tennessee Valley Public Power Association's (TVPPA) Energy Services Committee. TVA offers programs under the EnergyRight® Solutions brand that includes residential, commercial, industrial, renewable, education/outreach and demand response initiatives (TVA 2011).

Program Portfolio

TVA's program portfolio consists of eight energy efficiency programs, not including demand response/load management programs. The programs in the residential portfolio include: new construction; new manufactured homes; heat pumps; water heaters; in-home energy valuations; and an online auditing tool. TVA's commercial portfolio includes programs focusing on: energy management; HVAC; lighting; and comprehensive building retrofits. TVA also offers two industrial programs: a general retrofit program and a motors/drives upgrade program. In addition, TVA has four (4) pilot programs on its books: a residential consumer electronics program; commercial water

heating upgrades; commercial kitchen retrofits, and; retrofits for data centers (information technology).[11]

In the data we received, TVA did not disaggregate its energy efficiency program costs by type for its 2010 program year – it only disaggregated them by sector – so we were unable to determine the level of incentives provided to the two customer classes (residential and C&I) as a percent of total program costs. Program costs in 2008 and 2009 were disaggregated by type, between direct and indirect costs, and incentives. Incentives in 2008 constituted almost 50% of total energy efficiency program costs. In 2009, incentive levels dropped, constituting only 17% of total energy efficiency program costs.

Assessment of Results

With the exception of its C&I portfolio in 2009, TVA's program portfolios have performed well (see Table 6). Portfolios have achieved energy savings cost-effectively, relative to the ranges reported in Tables 1 and 2. TVA's C&I programs were still in their nascent stage in 2009, characterized by the low energy savings and relatively high program costs; i.e., TVA was investing money upfront in program design, marketing, etc. before measures were actually being installed in commercial buildings and industrial facilities. This explains the high levelized CSE for TVA's C&I portfolio in 2009. TVA's residential portfolio in 2009, on the other hand, achieved its reported savings cost-effectively, well within the range of CSEs reported in Table 1.

Overall, TVA's portfolio improved in 2010. While savings decreased for the residential portfolio, spending on C&I programs in 2009 clearly generated meaningful results in 2010. The levelized cost of saved energy for the residential, C&I, and overall portfolio falls within the range reported in Table 1.

We were unable to report on the performance of TVA's programs individually because that data was unavailable. TVA is a federally owned utility, so it is not regulated by the KPSC and, therefore, is not required to report its activities to the state. Also, because TVA is a wholesale provider of electricity and does not directly sell power to end-users, with the exception of some of its industrial customers, we have no way of quantifying residential and commercial retail electricity sales because those customers are served through municipal and cooperative utilities. As a result, we were also unable to estimate savings as a percent of sales since no sales data is available for the residential and commercial customer classes.

[11] Program data received from TVA did not include program descriptions, so we were unable to determine program design elements that would provide additional detail for these programs.

Table 6. Results for TVA's Energy Efficiency Portfolio

Program	Program Year	Retail Sales	Savings (of total sales)	Savings*	Costs	Levelized CSE ($/kWh)
		GWh	%	MWh	Million $	13 yrs
Residential	2009	-	-	8,165	$ 0.88	$ 0.011
C&I		-	-	150	$ 0.57	$ 0.402
Total All Programs		-	-	**8,315**	**$ 1.45**	**$ 0.019**
Residential	2010	-	-	5,125	$ 0.68	$ 0.014
C&I		-	-	6,131	$ 0.77	$ 0.013
Total All Programs		-	-	**11,256**	**$ 1.45**	**$ 0.014**

Source: TVA 2012

*Savings reported in 2009 were reported as net savings. Savings reported in 2010 were reported as gross savings.

Discussion

In this section we review the overall results from our analysis on utility program performance in the Commonwealth, using the results in Tables 1 & 2 as benchmarks for performance. Following the results, we highlight some important program design and regulatory issues that stakeholders in the Commonwealth should consider in order to raise the performance of utility energy efficiency programs to a level commensurate with leaders in other states.

Assessment of Overall Portfolio Results

In Table 7 and Figure 2 we present the overall portfolio results for the four Kentucky utilities for the program years 2008-2010. Table 8 reports the same metrics but for utilities from other, comparable states to the Commonwealth (ACEEE 2011), in addition to summary results from Kentucky's utility program portfolios, in order to provide context for evaluating the portfolio results. These tables allow readers to gauge the overall success of the portfolios relative to the performance of utilities in other states.

The low savings percentages and high levelized CSE values are attributable to results from Kentucky Power Company's portfolio, which has not included programs for commercial or industrial customers since 2006. The percent savings take into account savings only from residential programs, which are compared to total sales across all sectors and, therefore, result in the relatively low percent savings. Nonetheless, utility energy efficiency programs in the Commonwealth have generally performed well compared to utilities in other states: results for the metrics in Table 7 fall well within the ranges we report above in Tables 1 and 2 on page 6 above.[12] This is despite the fact that, for decades, electric utilities in Kentucky have maintained some of the lowest electricity prices in the United States.[13] Energy prices are one important market incentive for utility investment in energy

[12] See Sciortino et. al (2011a and 2011b) for additional reviews of energy savings performance by states and utilities.

[13] Low energy prices do not guarantee low monthly energy bills for customers. The average residential energy bill in Kentucky ($107) hovers just below the national average ($110) (EIA 2011).

efficiency programs, which likely has had some influence on the commitment of utilities in the Commonwealth to pursuing energy efficiency aggressively.[14] Still, more can be done. While the volume of energy savings is fairly modest, savings are being achieved cost-effectively, within the range of CSEs reported in Table 1. In ACEEE's comparison of utility program performance from other states, utilities aggressively pursuing energy efficiency achieved incremental annual savings in the tens-of-thousands to hundreds-of-thousands of megawatt-hours (MWh), achieving close to or above 1% annual savings. These utilities also spent tens-of-millions of dollars to achieve those savings. Still, those savings were achieved cost-effectively.

Kentucky utilities have laid a solid foundation of energy efficiency programs without being statutorily required to do so.[15,16] However, as ACEEE's assessment of the economic potential for energy efficiency in the Commonwealth attests, a considerable amount of energy efficiency resources remains available in the state for utility programs to capture (ACEEE 2012). Utilities in the Commonwealth have years of experience administering DSM programs, so ramping up existing programs and adding new ones to their portfolios could be done by leveraging existing resources and infrastructure. This expansion would require greater investment on behalf of utilities and consumers alike, but, as other states have shown, it is possible to generate much higher volumes of energy savings while maintaining or improving the cost-effectiveness of energy efficiency programs. With this available potential and the ability of utilities to leverage existing demand-side management infrastructure, utilities in the Commonwealth are in a position to augment their energy efficiency portfolios successfully and for the benefit of all customer classes.

This analysis does not capture any of the industrial sector's voluntary energy efficiency efforts. In Kentucky, the industrial sector is allowed to opt-out of participation in regulated DSM programs. With forty-eight percent of the electricity usage going to the industrial sector, percent-of-sales is a more reasonable metric to use to estimate and report savings if all sectors were participating in regulatory DSM programs.

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[14] There are many other market forces that drive investment in energy efficiency programs, such as fuel costs, the age of generation facilities, the ability of existing capacity to meet future demand, , customer demand for energy efficiency services, etc.

[15] Kentucky does not require its utilities to offer DSM programs nor does it require them to file DSM plans. According to KRS 278.285, also known as the "DSM Statute," the Commission only has the authority to "determine the reasonableness of demand-side management plans proposed by any utility under its jurisdiction."

[16] While jurisdictional utilities are not required to offer energy efficiency programs, 807 KAR 5:058 requires utilities to summarize resource acquisitions in their integrated resource plans, including demand-side management programs.

Table 7. Energy Efficiency Program/Portfolio Performance in the Commonwealth, by Utility (2008-2010): Savings, Costs, and Levelized Costs

Utility and Program Year	Electricity Savings as %			Savings (MWh)*			Portfolio Costs (Million $)			Levelized CSE ($/kWh)[17]		
	Res	C&I	Total	Res	C&I	Total	Res	C&I	Total	Res	C&I	Total
2008												
Duke	0.15%	0.93%	0.65%	2,224	23,913	26,137	$ 0.77	$ 0.44	$ 1.21	$ 0.037	$ 0.002	$ 0.005
KPC	-	-	-	-	-	-	$ -	$ -	$ -	$ -	$ -	$ -
LG&E/KU	0.66%	0.28%	0.41%	69,892	55,729	125,621	$21.17	$ 4.69	$25.86	$ 0.032	$ 0.009	$ 0.022
TVA	-	-	-	-	-	-	$ -	$ -	$ -	$ -	$ -	$ -
2009												
Duke	0.07%	1.02%	0.67%	1,017	24,867	25,884	$ 0.89	$ 0.86	$ 1.74	$ 0.093	$ 0.004	$ 0.007
KPC	0.15%	0.00%	0.05%	3,535	-	3,535	$ 1.30	$ -	$ 1.30	$ 0.039	$ -	$ 0.039
LG&E/KU	0.65%	0.30%	0.42%	66,720	56,125	122,845	$20.77	$ 4.57	$25.34	$ 0.033	$ 0.009	$ 0.022
TVA	-	-	-	8,165	150	8,315	$ 0.88	$ 0.57	$ 1.45	$ 0.011	$ 0.402	$ 0.019
2010												
Duke	0.30%	0.55%	0.46%	4,723	14,155	18,877	$ 1.00	$ 0.72	$ 1.72	$ 0.023	$ 0.005	$ 0.010
KPC	0.20%	0.00%	0.07%	5,189	-	5,189	$ 2.06	$ -	$ 2.06	$ 0.042	$ -	$ 0.042
LG&E/KU	0.56%	0.28%	0.38%	63,831	56,519	120,350	$21.77	$ 4.73	$26.49	$ 0.036	$ 0.009	$ 0.023
TVA	-	-	-	5,125	6,131	11,256	$ 0.68	$ 0.77	$ 1.45	$ 0.014	$ 0.013	$ 0.014

Sources: Duke 2008, 2009, 2010, and 2011; KPC 2011; LG&E/KU 2007 and 2011a

*The savings reported here are not consistently reported as net or gross. For a few utilities, it is unclear what type of savings these values represent.

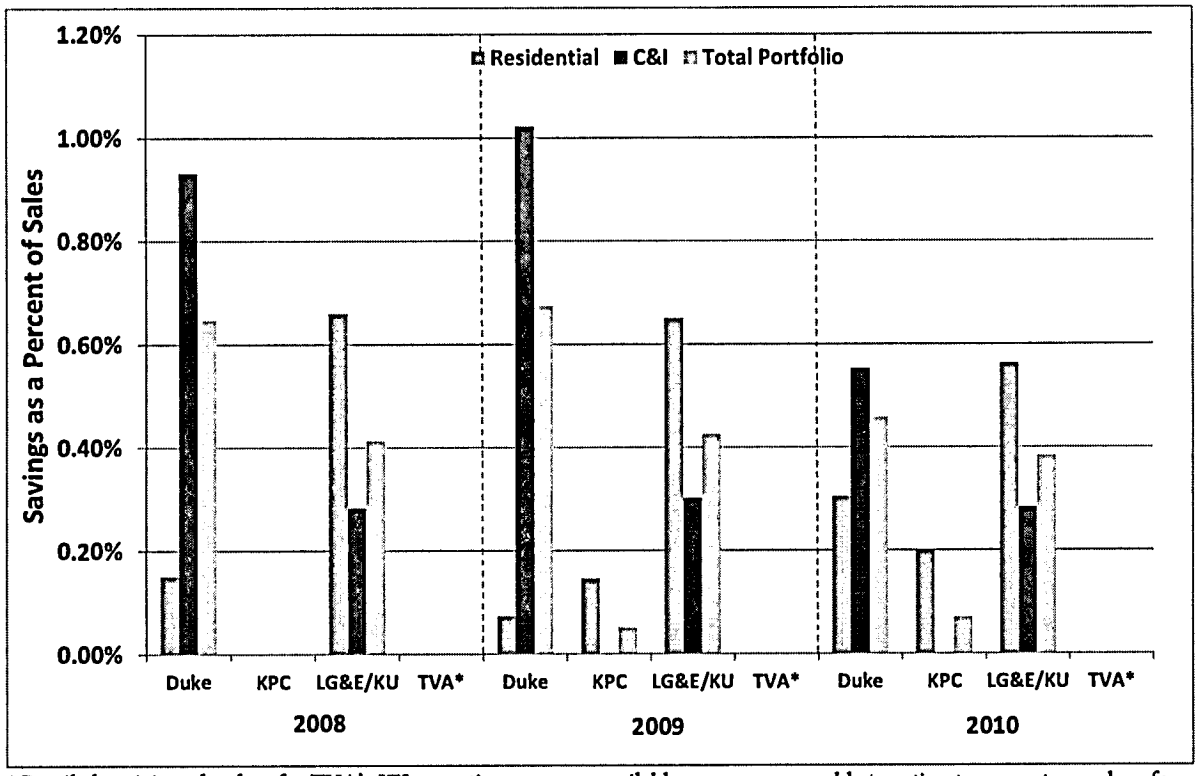
Table 8. Range of Portfolio Results from Non-Kentucky & Kentucky Utility Program Analysis

Portfolio Results				
Program Year	% Savings (of total sales)	Levelized CSE ($/kWh)	Average Cost of Saved Energy	Median Cost of Saved Energy
Non-Kentucky Portfolio Results				
2009	0.04% - 1.06%	$0.005 - $0.024	$0.015	$0.013
2010	0.16% - 1.48%	$0.006 - $0.018	$0.010	$0.009
Kentucky Portfolio Results				
2008	0.41% - 0.65%	$0.005 - $0.022	$0.013	$0.013
2009	0.05% - 0.67%	$0.007 - $0.039	$0.022	$0.020
2010	0.07% - 0.46%	$0.010 - $0.042	$0.022	$0.019

Source of Non-Kentucky Portfolio Results: ACEEE 2011

[17] CSE values assume a median average measure life of 13 years. These values were calculated by ACEEE using data from utility DSM status reports, when available, and DSM plans.

Figure 2. Electricity Savings as % of Sales, by Sector (2008-2010)



* Retail electricity sales data for TVA's KY operations were unavailable, so we were unable to estimate percentage values for TVA.

Interpreting the Results

The utility program portfolios we have reviewed in this report are disparate among each other as well as utilities outside of the Commonwealth not only with regards to the types and number of programs that are offered, but also with regards to the volume of savings they achieve and the cost of achieving those savings. There are countless reasons why this may be the case, but, generally, the degree to which energy efficiency is pursued is largely influenced by the utility regulatory environment in which utilities operate. A lack of experience administering energy efficiency programs likely does not play a large role in the disparity of portfolio achievements: utilities in the Commonwealth have been offering programs for decades and, thus, are seasoned program administrators. Generally, utilities are unlikely to incur considerable costs pursuing demand-side resources if they are unable to benefit financially from those ventures as they can with investments in supply-side resources.

The primary impetus for significant utility investment in energy efficiency is usually a mandate from the utility regulatory body or the state legislature requiring utilities to meet annual savings targets, usually referred to as an Energy Efficiency Resource Standard (EERS). So it is no coincidence that utility leaders in energy efficiency are those operating in states with aggressive energy efficiency goals (see Sciortino 2011b). The KPSC does not have the statutory authority to set savings targets; however, KRS 278.285 establishes regulatory policies that, in the absence of statutory requirements, provide some motivation for utilities to invest in energy efficiency programs, through "adders" in the DSM surcharge on customer energy bills.

The regulatory motivation for jurisdictional utilities in the Commonwealth to design and implement energy efficiency programs, such as program cost recovery and performance incentives, was codified by Kentucky Revised Statutes (KRS) 278.285 in 1994. Utilities differ in the extent to which they take advantage of these motivational tools, however. Program costs incurred as a result of using these tools are incorporated, or "added," into the DSM surcharge that appears on the customer energy bill, allowing the utility to recover energy efficiency program costs in addition to some additional financial incentives. The amount of the DSM surcharge is determined by five elements: direct DSM program costs; projected fixed-cost portion of lost sales revenues as a result of the programs; an incentive designed to provide positive financial rewards to a utility to encourage DSM implementation; capital recovery; and a true-up from the previous filing. While these "adders" serve to encourage greater investment in utility energy efficiency programs, ultimately they can also increase the total cost of delivering the programs to the customer.[18]

Using portfolio-level data reported by utilities in the Commonwealth to the U.S. Department of Energy's Energy Information Administration (EIA) through Form 861, it is evident that DSM expenditures have trended upwards for the all three major IOUs since 2001. While overall savings fell around the time of the recession, they have been steadily rising over the last several years. Clearly, then, existing regulatory policy encouraging investment in energy efficiency programs has had some impact on utility investments, though not to the degree that it could have if it was complemented by savings requirements akin to those introduced in other states.[19]

KEYS TO SUCCESSFUL PROGRAM PORTFOLIOS

From previous data and program information that we have collected and analyzed in other program assessments, including ACEEE's assessment of utility programs in other states (ACEEE 2011), we have identified several qualitative trends that are correlated with the success of utility program portfolios:

- ***Experience:*** Utilities that have been engaged with energy efficiency for longer periods of time tend to generate greater savings through their programs. And, as more utilities become involved, the more information we have on "best practices" through which program development can be informed. Of course other factors play an important role in the overall success of portfolios, such as funding and marketing. But ultimately the utilities that best balance these factors will reap the greatest benefit from their programs. Simply investing large

[18] The effect of these adders on the overall cost-effectiveness to the customer is generally modest. The cost-effectiveness of a program is often measured over its life, which requires an avoided cost forecast in order to estimate its net present value of costs and benefits (avoided electricity costs for customers, for example) over that time period. Avoided costs generally increase over time due to a number of factors (such as capacity and infrastructure investments), but the relative effect of DSM program cost recovery on that overall increase is small. DSM surcharges are measured in mills, or 1/1000 of a dollar (per kWh), so any increase in retail prices – and, thus, energy bills – caused by the recovery of program costs will comprise a small percentage of a customer's total energy bill. Still, while rates may increase in the short-term because less electricity is sold, total customer bills will decline due to savings from efficiency.

[19] It is important to note that DSM program/portfolio performance data stretching back to 2001 is not readily available through the KPSC, so it would be difficult to make this assertion based on publicly-available data in the state. Conversely, the EIA data does not disaggregate portfolio performance data to the program level, rendering it unusable for this program analysis.

sums of money into a program or running massive advertising campaigns will not guarantee success. How that money is spent – the division of funds between program administration, customer incentives, marketing, contractor training, etc. – is more important than the volume of funds invested. And utilities with greater experience tend to know how best to diversify their program investments. Still, the volume of funds invested is crucial, especially since providing customer incentives is a key driver of demand for energy efficiency services (see below).

- ***Scope of Portfolios:*** The greater the diversity of a program portfolio, the more likely the portfolio will satisfy the demand for services of a heterogeneous market. In other words, programs must reach all customer segments of a market (low- and moderate-income households, small and large commercial buildings, small and large industrial facilities) and target all major end-uses (lighting, HVAC, water heating) in order to maximize savings. In this report, the utility portfolios that we have assessed included at least a few the following programs:
    - **Residential**
        - Lighting (CFLs)
        - Home Energy Assessments (audits) with enhancements (rebates, list of qualified contractors)
        - Appliance Rebates (ENERGY STAR)
        - Appliance Recycling with ENERGY STAR replacements
        - New Home Construction (ENERGY STAR)
        - Low-Income Weatherization
    - **Commercial/Industrial**
        - Lighting
        - New Construction
        - Incentives for High Efficiency HVAC
        - Prescriptive Incentives
        - Custom Incentives (customer works with utilities/contractors to develop custom solutions)
        - Appliance/Equipment Rebates (ENERGY STAR)
- ***Marketing:*** We did not cover utility program marketing in this report because marketing campaigns are rarely discussed in portfolio status reports. However, understanding the attributes that characterize successful marketing campaigns is important for achieving greater customer participation. Of course, determining the impact of marketing on customer participation is difficult because the correlation between savings from efficiency programs and investment in marketing is not necessarily quantifiable. Nonetheless, here are some key marketing attributes that are widely recognized to augment program marketing campaigns :
    - **Understand Your Market** – Collecting information on market segmentation and demographics is critical for determining how to target programs that will meet the specific needs of customers in a utility service territory. Saturation of efficient products, age of housing/building stock, and customer demographics are examples of market characteristics that are key to understanding these needs.

  - **Use Captivating Information** – Marketing materials must capture a customer's attention. Making the information vivid, concrete, and personal ensures that a customer focuses their attention on the material initially and recalls the information later on in time.
  - **Message Framing** – Convincing customers to invest in energy efficiency can be a message delivered either positively (installing energy-efficient light bulbs will save you money) or negatively (if you don't install energy-efficient light bulbs you will end up spending more money). More often than not, presenting a message that emphasizes losses rather than gains will evoke customers to take action.
  - **Emphasize Personal Contact** – The most successful programs are those that develop a regular, personal relationship with the target audience, including post-installation follow-up contacts to verify that measures are working properly and to promote additional measure installation.
- *Incentives:* Providing financial incentives helps catch customer attention and can greatly reduce the upfront cost of measure implementation, depending on the measures being installed. Incentives are clearly a key driver of participation in energy efficiency programs because they lower the upfront costs that must be paid by a customer. Data on the effect of incentive levels on customer participation are limited, so while there is most definitely a correlation between incentive levels and participation, it is hard to determine an exact relationship, if one does exists, especially in light of other relevant factors, such as effectiveness of program marketing and the strength of the local economy.

Demand-Side Management Program Reporting and Data Accessibility

Rigorously documenting the impacts of DSM programs is imperative if utilities, regulatory staff, and other stakeholders are to understand program performance and how programs should be modified in order to perpetuate energy savings and ensure cost-effectiveness. Utility regulatory bodies should strive to require consistency, clarity, and accessibility in the DSM status reports filed by utilities under their purview. By focusing on these criteria and codifying the types of information that must be included in reports, it will be much easier to track program and portfolio performance over time, which will allow analysts and stakeholders to make more informed and justifiable decisions on program design.

Neither the Kentucky Public Service Commission nor the State Legislature has established orders or laws outlining reporting requirements for utility DSM programs, so utilities that report on portfolio performance are doing so of their own volition. The KPSC only has the statutory authority to approve utility DSM plans. As a result, the structure of utility DSM status reports is inconsistent and the content disparate and inaccessible. For example, it is not always clear if program savings are reported as net (of freeriders[20]) or gross savings. Program costs, if included, are often reported in tables in entirely different sections of a report, which can be troublesome to locate in documents that are often

[20] Freeriders are program participants who would have invested in an energy efficient measure even in the absence of utility rebates or incentives for that measure.

over 100 pages in length and include dozens of tables. Costs are also infrequently broken down between types, such as administration, marketing, and incentives, making it difficult to conduct cost/benefit tests from various perspectives (administrator versus participants). Additionally, none of this data is available at the measure or end-use level, making it impossible to evaluate measure performance and ascertain if they should continue to be included in the program.

Arizona is one model that the KPSC can reference when developing its DSM program reporting requirements. Arizona has codified reporting requirements for its utility DSM programs in Title 14 of its administrative code (R14-2-2409). Along with requiring reports to be filed annually on a specific date, R14-2-2409 also lists a dozen individual reporting requirements that must be included in each report. Arizona has also utilized orders issued by the Arizona Corporation Commission (AZCC) to establish additional rules or clarify and modify existing ones, some of which are specific to individual investor-owned utilities and most of which were introduced prior to the establishment of the energy efficiency rules codified in R14-2-2409.[21] The requirements established through R14-2-2409 and through the AZCC orders allow program data to be found quickly – portfolio summary tables reporting costs and savings are often upfront and bundled together instead of strewn throughout the reports – and the consistency and clarity of the reported data facilitates program analysis over time.

Program data in Arizona are also reported in individual program summaries, allowing data to be easily reconciled. This also gives utilities an opportunity to provide greater detail about the measures or end-uses rebated through each program, such as the relative allocation of program costs and savings, where appropriate.[22] Analysts can then evaluate the impact of individual measures or end-uses on overall program savings, which, coupled with data on costs, helps program administrators understand the relative performance of the measures or end-uses and if any design elements need to be modified.

Arizona's experience establishing its existing reporting requirements has not been without difficulty, however. One concern with using both administrative rules and Commission orders to establish requirements is that, over time, they can become hard to track as they increase in number, especially if this is done frequently through Commission orders. This can create needless work on behalf of the utility and Commission staff responsible for compliance. Still, it is hard to identify all reporting needs ahead of time – utility programs and portfolios change regularly and often provide rebates for dozens of individual measures – so it is important for commissions to adjust or introduce new requirements accordingly. But without a central repository for these requirements, compliance can become burdensome. Sorting out how the Commission and utilities will track reporting requirements efficiently over time is crucial.

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[21] A discussion of reporting requirements and previous, relevant AZCC orders can be found in an amended order filed December 29, 2011, Docket # E-01345A-11-0232. See http://edocket.azcc.gov/.

[22] An energy efficiency program can often provide rebates for dozens of measures, which may require more time than it is worth to report data on each measure individually. Lumping measures into end-uses (HVAC, shell, appliances, lighting) is a practical alternative when the number of qualified measures is large.

Developing reporting requirements is a dynamic process that takes time and careful thought. But without them, the maximum potential of energy efficiency programs will never be realized. Introducing some baseline requirements, such as the energy efficiency rules in Arizona, is a necessary first step. And tracking additional requirements introduced through Commission orders will necessitate rigorous tracking on behalf of Commission compliance staff. But DSM status reports are only as useful as the data they provide and their value cannot be understated, so it is critical for the KPSC to exercise its authority in this area. Any additional costs to utilities of complying are easily justifiable when considering the clarity and accessibility the requirements can create. Fortunately, precedents have been set that will assist Kentucky and ensure detailed documentation of program design and performance.

The Need for Transparency of Demand-Side Management Programs

In a letter written by the Executive Director of the KPSC, Jeff DeRouen, to the Blue Grass Energy Cooperative Corporation in November 2011, it came to light that the Jackson Energy Electric Cooperative was and had been operating DSM programs for which no DSM tariff had been filed (some for over 20 years). In other words, many of the DSM programs were unsupported by a tariff that would set forth the eligibility, charges, payments, and terms and conditions of the programs. Without a tariff there was no formal review by the KPSC, so that it was uncertain that the programs were complying with Commission statutes and regulations. Customers of the cooperatives were being charged and provided incentives for programs that were not reviewed by the KPSC and for which there was no record of the existence of these programs on file at the KPSC.

Since the paramount concern of any state utility commission is to ensure just and reasonable rates for consumers, it is necessary that a commission reviews and files records of all DSM programs operated by utilities under its purview. To address this need, in the letter the KPSC noted that "any program that includes a charge to the customer, provides for any rebate or incentive payment to the customer or a third party, or allows for reduced or discounted rates should be supported by a tariff that sets forth the eligibility, charges, payments, and terms and conditions." The KPSC noted further that "when the public or the Commission seeks information about the existence of DSM programs, the primary source for that information is the tariffs that each utility has on file [at the Commission]." The KPSC acknowledged the need to address this lack of oversight and laid out a three-step approach that it deemed was "the most practical and equitable approach to take regarding the untariffed DSM programs." As a result, the KPSC required each jurisdictional electric utility and major gas utility required to file a response by the end of March 2012 stating whether it does or does not currently offer any DSM programs that are not set out in its filed tariffs (KPSC 2011). All jurisdictional utiliies have since complied with the filing requirement.

Since DSM programs offered by the Commonwealth's electric investor-owned utilities are regularly reviewed and approved by the Commission, the redress is directed primarily at the state's cooperatives, all of which are regulated by the Commission, with the exception of those served by TVA.[23] Sales from cooperatives account for almost 30% of statewide electricity sales, compared to 46%

[23] There are two generation and transmission cooperatives regulated by the KPSC and nineteen distribution cooperatives.

for the investor-owned utilities, which is a significant percentage of the total market share and emphasizes the need to hold cooperatives accountable. Regardless of the extent to which programs were untariffed, consumers in the Commonwealth have a statutory right to know where their money is being directed and, thus, utilities (regulated by the Commission) are statutorily required to participate in a transparent review process that documents utility DSM efforts to ensure that consumers are being treated fairly.

Conclusion

Utilities in the Commonwealth have been funding demand-side management programs for decades despite the absence of a statutory requirement for energy efficiency requiring them to do so. This highlights a few encouraging signs. First, there is a fundamental understanding from utilities that energy efficiency is a low-cost resource that helps meet growing demand for energy, helping to reduce strain on the Commonwealth's energy system and delaying, or even negating, the need for investments in supply-side resources, such as generation facilities and transmission infrastructure. Second, regulatory policy codified in KRS 278.285 and designed to encourage utility investment in energy efficiency appears to be having some impact, though it is difficult to quantify the contribution. Furthermore, recent utility DSM filings exhibit utilities' continuing commitment to energy efficiency: although utilities are ramping up program budgets and savings at low rates, there does not appear to be any danger of utilities rolling back their commitments.

Utility energy efficiency programs in the Commonwealth have generated modest energy savings cost-effectively, which have likely played some role in the Commonwealth's relatively low energy prices. Existing utility program portfolios are robust and target a variety of end-uses, from "low-hanging fruit" such as lighting to deeper retrofits in residential and commercial buildings. These programs provide a solid foundation upon which utilities can build as they carry their portfolios into the future. As administrators contemplate program modifications and additions, there are numerous examples of best-practice energy efficiency programs from utilities in other states that Kentucky's utilities can reference and emulate moving forward.

However, the Commonwealth must prioritize fundamental changes to existing regulatory policy if it is intent on maximizing its energy savings and perpetuating progress well into the future, Kentucky's utilities are not statutorily required to offer DSM programs to their customers, which is not uncommon across the country. But any channeling of ratepayer dollars toward funding energy efficiency programs must initiate a transparent process through which programs are systematically reviewed and filed with the Commission. The issue of DSM programs having been in existence for years and never having undergone a formal tariff process, however, is a matter that was quickly addressed by the Commission and the jurisdictional utilities, with all utilities having filed their tariffs by March 2012.

Documenting DSM portfolio performance through the annual filing of utility DSM status reports is another regulatory issue that requires considerable discussion. Currently there is no statutory requirement for utilities to file reports on the performance of their DSM programs. While utilities are most certainly tracking program performance for their own purposes, the lack of publicly available information on the costs and savings of these programs must be addressed. Although the review of

DSM status reports by the KPSC will require greater resources that may not be readily available, annual filing of portfolio performance is crucial if the Commission and other stakeholders are to understand how programs should be modified to ensure that energy savings are being generated cost-effectively; additionally, there needs to be greater transparency for energy efficiency savings that result from industrial facilities that have opt-out of the utility DSM programs. Consumers also have a right to know how their money is being spent and if it is being spent in a manner that benefits them.

The success of energy efficiency programs in the Commonwealth requires the commitment of all stakeholders, from consumers to program administrators to Commission staff. Utilities have already laid a solid foundation for future growth of their energy efficiency programs, but the state has more work to do in consistently documenting the existence and performance of these programs. And, as found by a previous ACEEE assessment of the cost-effective energy efficiency resource potential available in the Commonwealth, there are considerable savings from energy efficiency yet to be captured by utility energy-efficiency programs (ACEEE 2012). Ultimately, as the process of approving and evaluating energy efficiency programs becomes more efficient and effective, the marginal additional effort and costs could end up saving ratepayers in the Commonwealth considerable sums on their energy bills.

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Appendix A – Full Results of Program Analysis

In this appendix we present the full results of our energy efficiency program analysis. The results are estimated using a range of average measure lifespans between 10-15 years, which is the range of measure lifespans identified in the 2009 ACEEE study, *Saving Energy Cost-Effectively: A National Review of the Cost of Energy Saved through Utility-Sector Energy Efficiency Programs.* This study assumes an average measure lifespan of 10-15 years for electricity programs, with a median of 13 years, which was reported by utilities for their energy efficiency program portfolios in a given program year.

CSE values in these tables are calculated by ACEEE using data reported by utilities. To estimate the levelized cost of saved energy we discount program investments at a rate of seven percent over the life of a measure, or, in the case of programs and portfolios, over the average life of all installed measures in a program. This gives us the present value (cost) of the investments. We then divide by the volume of savings achieved through a particular program, which gives us the cost of achieving each kilowatt-hour of saved energy, in $/kWh.

Estimates of savings as a percent of sales were made by dividing retail sales, by sector, reported by the Energy Information Administration (EIA 2009, 2010, and 2011) by program/portfolio savings reported by utilities in their DSM status reports and/or DSM plans.

Table A-1. Duke Energy Kentucky Program Portfolio Results

Program	Program Year	Participation	Retail Sales	% Savings (of total sales)	Net Savings	Costs	Levelized Cost of Saved Energy ($/kWh)		
			GWh	%	MWh	Million $	10 yrs	13 yrs	15 yrs
Residential	2008		**1,473**	**0.15%**	**2,224**	**$ 0.77**	**$ 0.045**	**$ 0.037**	**$ 0.033**
Low-Income		265			165	$ 0.33	$ 0.262	$ 0.216	$ 0.195
Refrigerator Replacement		85			92	$ 0.09	$ 0.121	$ 0.100	$ 0.090
Home Energy House call		568			150	$ 0.12	$ 0.104	$ 0.086	$ 0.078
NEED		625			73	$ 0.05	$ 0.086	$ 0.071	$ 0.064
ENERGY STAR Products		43,123			1,644	$ 0.17	$ 0.013	$ 0.011	$ 0.010
EE Website		445			100	$ 0.01	$ 0.014	$ 0.012	$ 0.011
Personalized Energy Report					-	$ -	$ -	$ -	$ -
C&I			**2,569**	**0.93%**	**23,913**	**$ 0.44**	**$ 0.002**	**$ 0.002**	**$ 0.002**
C&I High Efficiency Incentive					23,913	$ 0.44	$ 0.002	$ 0.002	$ 0.002
C&I lighting		24,777			*16,712*	*$ -*	*$ -*	*$ -*	*$ -*
C&I HVAC		2,683			*7,199*	*$ -*	*$ -*	*$ -*	*$ -*
C&I Motors		4			*2*	*$ -*	*$ -*	*$ -*	*$ -*
C&I Other		1			-	*$ -*	*$ -*	*$ -*	*$ -*
Custom Incentive – Schools					-	$ -	$ -	$ -	$ -
Total All Programs			**4,041**	**0.65%**	**26,137**	**$ 1.21**	**$ 0.006**	**$ 0.005**	**$ 0.004**
Residential	2009		**1,404**	**0.07%**	**1,017**	**$ 0.89**	**$ 0.113**	**$ 0.093**	**$ 0.084**
Low-Income		222			138	$ 0.52	$ 0.485	$ 0.399	$ 0.361
Refrigerator Replacement		66			72	$ 0.08	$ 0.135	$ 0.111	$ 0.101
Home Energy House call		405			153	$ 0.12	$ 0.100	$ 0.082	$ 0.074
NEED		390			45	$ 0.08	$ 0.230	$ 0.189	$ 0.171
Energy Star Products		10,685			603	$ 0.08	$ 0.017	$ 0.014	$ 0.013
EE Website		26			6	$ 0.01	$ 0.214	$ 0.176	$ 0.159
Personalized Energy Report					-	$ 0.01	$ -	$ -	$ -
C&I			**2,434**	**1.02%**	**24,867**	**$ 0.86**	**$ 0.004**	**$ 0.004**	**$ 0.003**

Program	Program Year	Participation	Retail Sales	% Savings (of total sales)	Net Savings	Costs	Levelized Cost of Saved Energy ($/kWh)		
C&I High Efficiency Incentive					24,867	$ 0.86	$ 0.004	$ 0.004	$ 0.003
C&I lighting		28,580			*16,670*	$ -	$ -	$ -	$ -
C&I HVAC		86			*1,931*	$ -	$ -	$ -	$ -
C&I Motors		11			*514*	$ -	$ -	$ -	$ -
C&I Other		18,410			*4,609*	$ -	$ -	$ -	$ -
Custom Incentive – Schools		2			1,142	$ -	$ -	$ -	$ -
Total All Programs			**3,838**	**0.67%**	**25,884**	**$ 1.74**	**$ 0.009**	**$ 0.007**	**$ 0.006**
Residential			**1,555**	**0.30%**	**4,723**	**$ 1.00**	**$ 0.028**	**$ 0.023**	**$ 0.020**
Low-Income		199			124	$ 0.39	$ 0.406	$ 0.334	$ 0.302
Refrigerator Replacement		92			100	$ 0.08	$ 0.108	$ 0.089	$ 0.080
Home Energy House call		482			182	$ 0.19	$ 0.137	$ 0.112	$ 0.102
NEED		488			57	$ 0.08	$ 0.177	$ 0.146	$ 0.132
Energy Star Products		28,890			1,630	$ 0.08	$ 0.006	$ 0.005	$ 0.005
EE Website		314			71	$ 0.01	$ 0.023	$ 0.019	$ 0.017
Personalized Energy Report	2010	7,010			2,559	$ 0.17	$ 0.009	$ 0.007	$ 0.006
C&I			**2,562**	**0.55%**	**14,155**	**$ 0.72**	**$ 0.007**	**$ 0.005**	**$ 0.005**
C&I High Efficiency Incentive					14,155	$ 0.72	$ 0.007	$ 0.005	$ 0.005
C&I lighting		24,801			*336*	*$ 0.45*	*$ 0.174*	*$ 0.143*	*$ 0.130*
C&I HVAC		89			*69*	*$ 0.06*	*$ 0.109*	*$ 0.089*	*$ 0.081*
C&I Motors		18			*502*	*$ 0.02*	*$ 0.005*	*$ 0.004*	*$ 0.004*
C&I Other		4,782			*59*	*$ 0.18*	*$ 0.405*	*$ 0.333*	*$ 0.301*
Custom Incentive – Schools		25			13,188	$ -	$ -	$ -	$ -
Total All Programs			**4,117**	**0.46%**	**18,877**	**$ 1.72**	**$ 0.012**	**$ 0.010**	**$ 0.009**
Residential					**2,357**	**$ 1.16**	**$ 0.064**	**$ 0.052**	**$ 0.047**
Low-Income	2011	234			146	$ 0.64	$ 0.569	$ 0.467	$ 0.423
Refrigerator Replacement		76			83	$ 0.07	$ 0.114	$ 0.094	$ 0.085
Home Energy House call		511			201	$ 0.14	$ 0.091	$ 0.074	$ 0.067
NEED		155			18	$ 0.08	$ 0.567	$ 0.466	$ 0.422

Program	Program Year	Participation	Retail Sales	% Savings (of total sales)	Net Savings	Costs	Levelized Cost of Saved Energy ($/kWh)		
Energy Star Products		13,712			615	$ 0.12	$ 0.026	$ 0.021	$ 0.019
EE Website		167			60	$ 0.01	$ 0.030	$ 0.024	$ 0.022
Personalized Energy Report		3,381			1,234	$ 0.09	$ 0.010	$ 0.008	$ 0.007
C&I					**5,423**	**$ 0.38**	**$ 0.009**	**$ 0.007**	**$ 0.007**
C&I High Efficiency Incentive					5,423	$ 0.38	$ 0.009	$ 0.007	$ 0.007
C&I lighting		19,656			*4,488*	*$ 0.23*	*$ 0.007*	*$ 0.006*	*$ 0.005*
C&I HVAC		5,738			*606*	*$ 0.11*	*$ 0.024*	*$ 0.020*	*$ 0.018*
C&I Motors		111			*276*	*$ 0.01*	*$ 0.005*	*$ 0.004*	*$ 0.003*
C&I Other		32			*53*	*$ 0.02*	*$ 0.047*	*$ 0.039*	*$ 0.035*
Custom Incentive – Schools					-	$ -	$ -	$ -	$ -
Total All Programs					**7,779**	**$ 1.53**	**$ 0.026**	**$ 0.021**	**$ 0.019**

Sources: Duke 2008, 2009, 2010, and 2011

Table A-2. LG&E/KU Program Portfolio Results

Program	Program Year	Retail Sales	% Savings (of total sales)	Net Savings	Costs	Levelized Cost of Saved Energy ($/kWh)		
		GWh	%	MWh	Million $	10 yrs	13 yrs	15 yrs
Residential	2008	**10,590**	**0.66%**	**69,892**	**$ 21.17**	**$ 0.04**	**$ 0.03**	**$ 0.03**
Residential Conservation				1,495	$ 0.64	$ 0.06	$ 0.05	$ 0.04
Res Demand Conservation				4,802	$ 9.99	$ 0.27	$ 0.22	$ 0.20
WeCare				2,297	$ 1.73	$ 0.10	$ 0.08	$ 0.07
Res High Efficiency Ltg				60,603	$ 3.43	$ 0.01	$ 0.01	$ 0.01
Res NC				409	$ 0.86	$ 0.27	$ 0.22	$ 0.20
Res HVAC Tune-Up				286	$ 0.20	$ 0.09	$ 0.08	$ 0.07
C&I		**19,795**	**0.28%**	**55,729**	**$ 4.69**	**$ 0.01**	**$ 0.01**	**$ 0.01**
Comm Demand Conservation				213	$ 0.44	$ 0.27	$ 0.22	$ 0.20
Prescriptive Rebates				54,988	$ 3.18	$ 0.01	$ 0.01	$ 0.01
Comm HVAC and Tune-Up				528	$ 0.19	$ 0.05	$ 0.04	$ 0.03
Total All Programs		**30,385**	**0.41%**	**125,621**	**$ 25.86**	**$ 0.03**	**$ 0.02**	**$ 0.02**
Residential	2009	**10,261**	**0.65%**	**66,720**	**$ 20.77**	**$ 0.04**	**$ 0.03**	**$ 0.03**
Residential Conservation				1,996	$ 0.70	$ 0.05	$ 0.04	$ 0.03
Res Demand Conservation				4,803	$10.25	$ 0.28	$ 0.23	$ 0.21
WeCare				2,296	$ 1.74	$ 0.10	$ 0.08	$ 0.07
Res High Efficiency Ltg				56,179	$ 3.39	$ 0.01	$ 0.01	$ 0.01
Res NC				793	$ 0.86	$ 0.17	$ 0.14	$ 0.13
Res HVAC Tune-Up				653	$ 0.34	$ 0.22	$ 0.18	$ 0.16
C&I		**18,646**	**0.30%**	**56,125**	**$ 4.57**	**$ 0.01**	**$ 0.01**	**$ 0.01**
Comm Demand Conservation				214	$ 0.40	$ 0.24	$ 0.20	$ 0.18
Prescriptive Rebates				54,988	$ 3.15	$ 0.01	$ 0.01	$ 0.01
Comm HVAC and Tune-Up				923	$ 0.27	$ 0.04	$ 0.03	$ 0.03
Total All Programs		**28,907**	**0.42%**	**122,845**	**$ 25.34**	**$ 0.03**	**$ 0.02**	**$ 0.02**
Residential	2010	**11,321**	**0.56%**	**63,831**	**$ 21.77**	**$ 0.04**	**$ 0.04**	**$ 0.03**

Program	Program Year	Retail Sales	% Savings (of total sales)	Net Savings	Costs	Levelized Cost of Saved Energy ($/kWh)		
Residential Conservation				2,247	$ 0.74	$ 0.04	$ 0.04	$ 0.03
Res Demand Conservation				4,802	$ 10.79	$ 0.29	$ 0.24	$ 0.22
WeCare				2,297	$ 1.79	$ 0.10	$ 0.08	$ 0.08
Res High Efficiency Ltg				52,078	$ 3.40	$ 0.01	$ 0.01	$ 0.01
Res NC				1,591	$ 1.06	$ 0.12	$ 0.10	$ 0.09
Res HVAC Tune-Up				816	$ 0.39	$ 0.06	$ 0.05	$ 0.05
C&I		**19,992**	**0.28%**	**56,519**	**$ 4.73**	**$ 0.01**	**$ 0.01**	**$ 0.01**
Comm Demand Conservation				213	$ 0.45	$ 0.27	$ 0.23	$ 0.20
Prescriptive Rebates				54,988	$ 3.17	$ 0.01	$ 0.01	$ 0.01
Comm HVAC and Tune-Up				1,318	$ 0.33	$ 0.03	$ 0.03	$ 0.02
Total All Programs		**31,312**	**0.38%**	**120,350**	**$ 26.49**	**$ 0.03**	**$ 0.02**	**$ 0.02**

Sources: LG&E/KU 2007 and 2011a

Table A-3. Kentucky Power Company Program Portfolio Results

Program	Program Year	Participants	Retail Sales	% Savings (of total sales)	Net Savings	Costs	Levelized Cost of Saved Energy ($/kWh)		
			GWh	%	MWh	Million $	10 yrs	13 yrs	15 yrs
Residential	2009		**2,426**	**0.15%**	**3,535**	**$ 1.30**	**$ 0.05**	**$ 0.04**	**$ 0.04**
Targeted EE Program		342			581	$ 0.55	$ 0.12	$ 0.10	$ 0.09
Mobile Home Heat Pump Prog		160			413	$ 0.09	$ 0.03	$ 0.02	$ 0.02
Mobile Home New Cons. Prog		208			350	$ 0.11	$ 0.04	$ 0.03	$ 0.03
Modified Energy Fitness Prog		801			522	$ 0.31	$ 0.08	$ 0.06	$ 0.06
High Efficiency HP		308			491	$ 0.17	$ 0.05	$ 0.04	$ 0.03
Community Outreach CFL		3,744			927	$ 0.04	$ 0.01	$ 0.00	$ 0.00
Energy Educ for Students		1,130			251	$ 0.02	$ 0.01	$ 0.01	$ 0.01
C&I			**4,643**		-	$ -	$ -	$ -	$ -
Total All Programs			**7,068**	**0.05%**	**3,535**	**$ 1.30**	**$ 0.05**	**$ 0.04**	**$ 0.04**
Residential	2010		**2,614**	**0.20%**	**5,189**	**$ 2.06**	**$ 0.05**	**$ 0.04**	**$ 0.04**
Targeted EE Program		400			726	$ 0.90	$ 0.16	$ 0.13	$ 0.12
Mobile Home Heat Pump Prog		233			602	$ 0.12	$ 0.03	$ 0.02	$ 0.02
Mobile Home New Cons. Prog		204			343	$ 0.13	$ 0.05	$ 0.04	$ 0.04
Modified Energy Fitness Prog		1,200			782	$ 0.43	$ 0.07	$ 0.06	$ 0.05
High Efficiency HP		761			1,202	$ 0.38	$ 0.04	$ 0.03	$ 0.03
Community Outreach CFL		4,811			1,191	$ 0.06	$ 0.01	$ 0.01	$ 0.01
Energy Educ for Students		1,547			343	$ 0.04	$ 0.01	$ 0.01	$ 0.01
C&I			**4,735**		-	$ -	$ -	$ -	$ -
Total All Programs			**7,349**	**0.07%**	**5,189**	**$ 2.06**	**$ 0.05**	**$ 0.04**	**$ 0.04**

Source: KPC 2011

Request No. 9: Refer to page 2 of Exhibit JML-2 in the Loiter Testimony. The last paragraph states that "[t]he baseline home was computed using a variety of housing characteristics gathered from a local utility as well as national datasets." Identify the local utility referenced in this statement.

Response No. 9:

Although I am not the author of Exhibit JML-2 and therefore cannot say with certainty, Table A-1 on page 21 of Exhibit JML-2 notes "Duke" as the source for some of the modeling assumptions.

Request No. 10: Refer to Exhibit JML-2 in the Loiter Testimony. Identify and explain any changes that have occurred since this document was issued in March 2012 that, in Mr. Loiter's opinion, would affect the conclusions contained therein.

Response No. 10

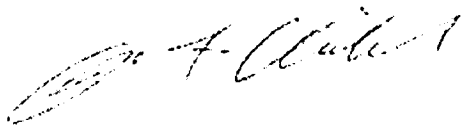
am not aware of any changes in market conditions, technology development, or policy constructs in Kentucky that would alter the qualitative conclusions of the report, that is, that substantial amounts of cost-effective energy efficiency potential exists in Kentucky. To address some of the most likely factors that could affect the quantitative results of the study, I will address market conditions and technology development briefly.

First, it is important to note that while the report was published in March of 2012, the data and assumptions that underlie the analysis necessarily date from a variety of points in time before that date. For example, the report notes that it relied on, among many other sources, economic data downloaded in September 2011, data on energy consumption in manufacturing facilities from 2009, and residential energy consumption data from 2005.

With respect to market conditions, the study uses retail electric rates to assess cost-effectiveness. From September 2012 to September 2013, average retail electric rates in Kentucky increased slightly, about 5% (http://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_06_a). All else equal, this would likely increase the cost-effective efficiency potential. In terms of economic factors, according to the Bureau of Economic Analysis, Kentucky's GDP grew by 2% in 2011 and 1.4% in 2012. (http://www.bea.gov/newsreleases/regional/gdp_state/2013/xls/gsp0613.xls). Economic growth, again all else equal, would tend to increase the achievable efficiency potential, as businesses and residential customers have increased income to invest in efficiency upgrades.

With respect to technology, the biggest change is likely to have been in prices for and availability of LED lighting measures. Consumer prices on basic A-lamps have fallen by nearly 50% over timeframes of less than a year (http://www.consumerreports.org/cro/news/2013/03/led-prices-drop-as-competition-heats-up/index.htm). This is expected to continue. According to the United States Department of Energy: "Recent industry roadmapping indicates prices for warm white LED packages have declined by about one-third, from approximately $18 to $12 per thousand lumens (kilolumens, or klm) from 2010 to 2011. Prices are expected to decline significantly, to approximately $2/klm by 2015." (http://www1.eere.energy.gov/buildings/ssl/sslbasics_ledbasics.html). I would also expect that prices for mini-split heat pumps have declined in the past couple of years as that technology matures and reaches increasing levels of market penetration. This would be expected to further increase the cost-effectiveness of energy efficiency investments.

Respectfully submitted,



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Dated: December 18, 2013

CERTIFICATE OF SERVICE

I certify that I had filed with the Commission and served via U.S. Mail and electronic mail the foregoing Intervenors' Responses to Commission Staff's Requests for Information on December 18, 2013 to the following:

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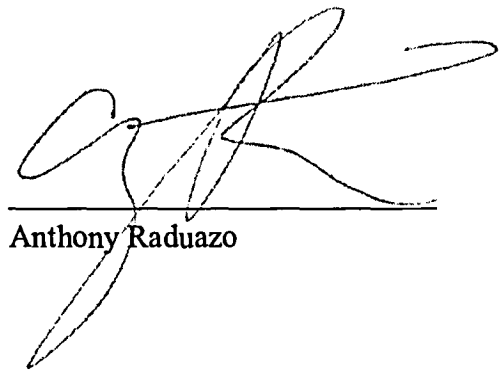

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