Duke Energy Kentucky
Case No. 2014-00280
Staff's First Set Data Requests
Date Received: September 29, 2014

STAFF-DR-01-013

REQUEST:

Refer to the Application, Exhibit B, page 2. By program, in electronic format with formulas intact and cells unprotected, provide the support for the lost revenues and shared savings for both residential and commercial programs.

RESPONSE:

Refer to Attachment STAFF-DR-01-13.

PERSON RESPONSIBLE: Melissa Adams

	KWH Saving Impacts	Lost Revenue Factor	Lost Revenue
Residential Programs			
Appliance Recycling Program	2,106,140	$ 0.0497190	$ 104,715
Energy Efficiency Education Program for Schools	377,700	$ 0.0497190	$ 18,779
Low Income Neighborhood	889,938	$ 0.0497190	$ 44,247
Low Income Services	786,366	$ 0.0497190	$ 39,097
My Home Energy Report	9,417,000	$ 0.0497190	$ 468,204
Personalized Energy Report Program	59,324	$ 0.0497190	$ 2,950
Residential Energy Assessments	569,416	$ 0.0497190	$ 28,311
Residential Smart $aver®	31,691,278	$ 0.0497190	$ 1,575,659
Residential Smart Saver Products and Services	44,140	$ 0.0497190	$ 2,195
My Home Energy Report	354,872	$ 0.0497190	$ 17,644
	46,296,174		**$ 2,301,799**
Commercial Programs			
Smart $aver® Custom	5,621,072	$ 0.0230160	$ 129,375
Smart $aver® Prescriptive - Energy Star Food Service Products	339,545	$ 0.0230160	$ 7,815
Smart $aver® Prescriptive - HVAC	2,042,355	$ 0.0230160	$ 47,007
Smart $aver® Prescriptive - IT	64,749	$ 0.0230160	$ 1,490
Smart $aver® Prescriptive - Lighting	12,637,584	$ 0.0230160	$ 290,867
Smart $aver® Prescriptive - Motors/Pumps/VFD	1,455,939	$ 0.0230160	$ 33,510
Smart $aver® Prescriptive - Process Equipment	68,994	$ 0.0230160	$ 1,588
SBES	614,864	$ 0.0230160	$ 14,152
	22,845,101.49		**525,802.86**
Total	**$ 69,141,275.64**		**$ 2,827,602.34**

	Total NPV Avoided Cost of Capacity / Total	Total NPV Avoided Cost of Energy / Total	Total NPV Avoided Cost of T&D / Total	Total NPV Avoided Cost of Gas Production / Total	Total Avoided Costs	Non-M&V Costs	Shared Savings Pool	Shared Savings Tier, after-tax	Shared Savings Revenue
Residential Programs									
Appliance Recycling Program	$ 183,204	$ 654,471	$ 182,102	$ -	$ 1,019,776	$ 188,478	$ 831,298	10.00%	$ 83,130
Energy Efficiency Education Program for Schools	$ 5,295	$ 60,561	$ 5,139	$ 21,797	$ 92,792	$ 215,186	$ (122,394)	10.00%	$ (12,239)
Low Income Neighborhood	$ 70,335	$ 249,607	$ 69,897	$ -	$ 389,839	$ 316,099	$ 73,741	10.00%	$ 7,374
Low Income Services	$ 36,951	$ 197,515	$ 33,497	$ 96,008	$ 363,972	$ 675,691	$ (311,719)	10.00%	$ (31,172)
My Home Energy Report	$ 205,543	$ 603,878	$ 203,983	$ -	$ 1,013,405	$ 560,562	$ 452,843	10.00%	$ 45,284
Residential Energy Assessments	$ 75,618	$ 107,744	$ 68,475	$ 55,445	$ 307,282	$ 185,366	$ 121,916	10.00%	$ 12,192
Residential Smart $aver®	$ 469,893	$ 1,810,634	$ 498,069	$ 31,670	$ 2,810,266	$ 1,212,081	$ 1,598,184	10.00%	$ 159,818
Power Manager	$ 961,643	$ -	$ 869,430	$ -	$ 1,831,073	$ 530,183	$ 1,300,890	10.00%	$ 130,089
My Home Energy Report - New Measures	$ 2,872	$ 34,133	$ 7,176	$ -	$ 44,181	$ 9,496	$ 34,685	10.00%	$ 3,469
Residential Smart $aver® - New Measures	$ 8,879	$ 26,360	$ 8,814	$ -	$ 44,053	$ 16,285	$ 27,768	10.00%	$ 2,777
Total	**$ 2,020,234**	**$ 3,744,902**	**$ 1,946,582**	**$ 204,920**	**$ 7,916,638**	**$ 3,909,426**	**$ 4,007,212**		**$ 400,721**
Commercial Programs									
Smart $aver® Prescriptive - Energy Star Food Service Products	$ 9,150	$ 116,974	$ 11,947	$ -	$ 138,071	$ 17,941	$ 120,129	10.00%	$ 12,013
Smart $aver® Prescriptive - HVAC	$ 209,998	$ 511,941	$ 216,033	$ -	$ 937,971	$ 146,071	$ 791,900	10.00%	$ 79,190
Smart $aver® Prescriptive - Lighting	$ 520,007	$ 2,725,017	$ 471,203	$ -	$ 3,716,226	$ 612,515	$ 3,103,712	10.00%	$ 310,371
Smart $aver® Prescriptive - Motors/Pumps/VFD	$ 47,579	$ 309,752	$ 51,543	$ -	$ 408,874	$ 42,118	$ 366,757	10.00%	$ 36,676
Smart $aver® Prescriptive - Process Equipment	$ 2,004	$ 9,076	$ 1,817	$ -	$ 12,897	$ 1,583	$ 11,315	10.00%	$ 1,131
Smart $aver® Prescriptive - IT	$ 49	$ 37,601	$ 1,980	$ -	$ 39,630	$ 9,575	$ 30,055	10.00%	$ 3,005
Smart $aver® Custom	$ 148,776	$ 1,088,509	$ 134,779	$ -	$ 1,372,064	$ 357,573	$ 1,014,491	10.00%	$ 101,449
Power Share®	$ 2,242,992	$ -	$ 2,027,919	$ -	$ 4,270,910	$ 946,500	$ 3,324,411	10.00%	$ 332,441
SBES	$ 93,228	$ 429,387	$ 92,714	$ -	$ 615,330	$ 232,585	$ 382,745	10.00%	$ 38,275
Total	**$ 3,273,783**	**$ 5,228,257**	**$ 3,009,934**	**$ -**	**$ 11,511,975**	**$ 2,366,460**	**$ 9,145,515**		**$ 914,551**
Total									**$ 1,315,273**

Duke Energy Kentucky
Case No. 2014-00280
Staff's First Set Data Requests
Date Received: September 29, 2014

STAFF-DR-01-014

REQUEST:

Refer to Exhibit E of the Application, pages 57-58 and pages 65-66.

a. Identify those recommendations with which Duke Kentucky is in agreement. Include support for Duke Kentucky's agreement with each recommendation.

b. Explain when Duke Kentucky plans to implement any of the recommendations with which Duke Kentucky is in agreement.

c. Identify those recommendations with which Duke Kentucky is not in agreement and explain why.

RESPONSE:

Duke Energy Kentucky reviews and considers each recommendation provided via the evaluation process and will make program changes as appropriate. Responses to the recommendations identified throughout Exhibit E are contained in Attachment Staff DR-01-014.

PERSON RESPONSIBLE: John D Langston

#	Recommendation	Program Management Response
1	It seems logically sound that cancellation rates will diminish with a greater number of appointment time slots and with shorter time intervals between customer calls and pick up dates. However, that will remain an indirect effect until more customers begin making appointments. Therefore, Duke Energy and JACO should also take multiple actions to increase program enrollments and direct steps to reduce cancellations wherever possible.	Cancellation rates in August 2014 were 16% - Ohio and 19% - KY. DE and JACO will continue to work towards our goal of reducing cancellations that are in our control by having pick up dates available within an average of 14 days of initial contact as opposed to customer's cancelling because they decided to keep unit, gave or sold unit, or unit stopped working and no longer met elgibility requirements.
2	Raising incentive amounts from $30 to $40 or $50 per unit will likely increase participation and help the program to reach its targeted goals. This should be studied and compared with the effectiveness of increasing marketing spent per unit to make a wider audience aware of the program and its benefits. The Duke Energy and JACO conducted an incentive level effectiveness study in North Carolina and South Carolina with 240,000 Duke Energy customers during September and October 2013 to assess participation levels at higher inventive levels. The study found a 230% increase in customer enrollments when the incentive was raise to a $50 over the current $30. These findings should be considered for their cost effectiveness as means of increasing program participation compared with the costs of increasing marketing spend per unit to make more people aware of the program and its benefits at lower incentive levels.	DE agrees on positive impact of increasing incentive; however, increasing the incentive will negatively impact cost effectiveness of program.
3	Because landlords represent the largest group of appliance purchasers, consider developing an aspect of the program that targets property management companies to encourage their participation either with collections of individual refrigerators that require replacement or via large scale replacements at one time, linked to a replacement incentive for energy efficient units. Such a move could increase the energy savings of the program, while providing landlords with cash offsets to replace inefficient refrigerators, making their rental units more attractive to tenants. Because this would also encourage these market actors to acquire new units (rather than used), it could make the replacement process more convenient by avoiding multiple search, purchase, delivery and installation efforts.	Duke Energy's New Product Development Group (NPD) is currently reviewing a request from the Appliance Recycle Program (ARP) team to evaluate the feasibility of three potential ARP offers: • Expand offer to Multi- Family segment including apartment complexes, condominium complexes, and property management groups. • The initiative will address ways to structure an offer that reduces kWh consumption for tenant or condo owner. • Who receives the incentive and how is it used. • What are the impacts of free ridership?
4	To better reach its goals the program team may also consider expanding eligibility beyond residential customers to other types of buildings, including schools, offices, and industrial locations.	• Evaluate an ARP offer to Small Commercial market. • Schools with one or more old refrigerators. • Offices with old units for employees.
5	Duke Energy may be able to generate leads for the program by adding a question about secondary refrigerators and freezers to future customer surveys, such as the Home Energy House Call survey.	DE ARP Program Manager (PM) and HEHC PM are working together on finalizing a joint effort to have HEHC Auditors inform customers with a second qualifying refrigerator or freezer to consider ARP. • A single page ARP program description detailing how to enroll, process for pick up, estimated energy and $ savings, and ARP web site address has been created to train auditors on ARP. • A "Live Meeting" will be hosted and recorded with the ARP PM providing more details on the program as well as answering questions from the Audit Management team who will administer training to the field on an ongoing basis. • Auditors will be provided with pads of 3 ½" x 7" ARP tear off sheets" the size of a bill insert explaining the program with toll free # and ARP URL for additional questions or to enroll. • Program implementation is planned for Q4 2014.
6	Consider taking advantage of Duke Energy's internal customer satisfaction and net promoter scores to develop an initiative that encourages program participants to refer their families and friends.	DE ARP PM agrees with exploring a "family & friends" program in the future.
7	Arranging joint promotions with municipal and private recycling firms to promote environmentally appropriate recycling may be a way to increase awareness at fairly low cost.	• Our primary focus has been on working with our Supplier to expand enrollment while maintaining customer satisfaction in the DE service territory. This is an option that can be revisited in the future, but for the present we are focused on creating awareness and increasing participation in the current ARP construct.
8	Duke Energy may also be able to increase the used appliance collections by new appliance dealers with point-of-sale promotion materials to encourage them to mention the program to customers shopping for new units. Freeridership can be minimized by not implementing this practice with firms that are actively participating in the EPA's RAD program	• The third expansion opportunity that DE NPD will evaluate is to identify potential "Big Box" Retail (BBR) operations and explore developing retail partnerships with the objectives of: • Increasing participation in ARP. • Potentially operating reducing costs for DE (working with our Supplier partner) and the BBR operation. • DE is open to exploring opportunities in all jurisdictions with the appropriate partners.

9	As permitted under filing requirements, consider accepting units from and paying incentives to used appliance dealers who are willing to recycle working units via the program instead of reselling them. A method for determining the portion of units that would go into the secondary market would have to be explored prior to implementation.	This is an area which could be researched in the future, but our current ARP focus is Multi-Family, Small Commercial, and BBR
10	The market for used appliances is influenced by a wide number of factors and continues to change with time. Thus it may be helpful to plan a follow up study of the marketplace within a few years in order to understand and appreciate those changes are influencing customer expectations, willingness to participate, and satisfaction with the program.	• This is an excellent recommendation and would be valuable as we continue to evaluate ARP for areas of improvement in collection and customer satisfaction.

STAFF-DR-01-015

REQUEST:

Refer to the Application, Exhibit F, page 10, which states, "Consider setting up test groups that receive the same MyHER with the same tips in order to conduct a more thorough and meaningful analysis of which tips are recalled and acted upon."

a. Provide the criteria that might be used to set up a test group.

b. Explain whether Duke Kentucky has ever received customer complaints regarding the MyHER Program, and if so, provide the reasons for the customer's concerns.

RESPONSE:

a. The suggestion to consider setting up test groups was made after the analysis of customer survey data for the MyHER evaluations. If Duke Energy desires to know the degree to which specific tips and messages are being recalled and acted upon, it would be advisable to devise specific tests to allow for a more thorough analysis.

Sending the same MyHER with the same tips to a test group at the same time would allow Duke Energy and the evaluation team to reliably test for recall, to understand the associated response and test for propensity to take action. This would allow different groups to be compared, such as customers who are inexperienced or experienced with energy efficiency measures in question.

For recall testing, a simple random sampling of 100 customers would suffice. For propensity of action, test groups might be composed based upon demographics, house characteristics, and/or psychographics as derived from existing Duke Energy customer data, prior participation in other Duke Energy programs, Prizm clusters, and other secondary customer data.

Adding these test groups would add cost to the overall evaluation budget, and would require the program implementation team to revise how tips are currently incorporated into the MyHER reports.

b. Since September 2013 through August 2014, only 129 of over 55,000 customers have chosen to opt out of the program. Customers cite that 1) the report is a waste of Duke Energy's money; 2) they want the report online; or 3) they are doing all they can.

PERSON RESPONSIBLE: **a. Roshena Ham**
b. Kelly Griffin

STAFF-DR-01-016

REQUEST:

Refer to the Application, Exhibit F, page 10, which states, "Add specially coded CFL coupons to the MyHER mailing if it can be shown that the participants can use additional CFLs that they are not likely to purchase on their own."

a. If this recommendation is adopted, provide the number of compact florescent light ("CFL") bulbs and wattage that might appear on the specially coded CFL coupons.

b. Explain how Duke Kentucky is able to determine whether a participant can use additional CFLs that they are not likely to purchase on their own.

RESPONSE:

a. Duke has considered the recommendation to add CFL coupons to MyHER mailing, but prefers instead to add messaging to MyHER mailing of customers that are eligible for additional CFLs. This has been successfully done in other states for the free offer of 13W and 18W CFL bulbs, and in KY in 2014 to promote the specialty lighting offered through the online EE Savings Store.

b. The number of free CFLs a customer is eligible for is variable, depending on the number that brings the customers up to the cost-effective limit of CFLs as determined by the freerider analysis results. Duke Energy has a CFL tracker that tracks CFL adoption on a per-customer basis.

PERSON RESPONSIBLE: Kelly Griffin

STAFF-DR-01-017

REQUEST:

Refer to the Application, Exhibit F, page 16, which states, "By sending letter that compare one utility customer's energy use with that of similar customers, several utility companies have used this normative effect to generate between 1.5 to 2.5% savings." Explain whether Duke Kentucky has ever done a billing analysis comparing a customer's bill before receiving a MyHER Report and after receiving a MyHER Report.

RESPONSE:

A billing analysis of the MyHER program was conducted and the results are in Exhibit H: *KY – MyHER – Final Impact Evaluation Report – Feb 12 2014*. The billing analysis used energy consumption data for MyHER recipients in Kentucky (58,881 customers) that included a time period before participating in the program and a time period after participating in the program. Program participation occurred between August of 2012 and October of 2013. A linear panel model was used to determine program impacts, where the dependent variable was daily electricity consumption from January of 2010 to October of 2013, which covered both periods.

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-018

REQUEST:

Refer to the Application, Exhibit F, page 17, which states, "The program has energy saving's target of an average 219 kWh per participant per year." Provide the average annual kWh savings per participant for Duke Kentucky for this program.

RESPONSE:

A billing analysis of the MyHER program was conducted and the results are in Exhibit H: *KY – MyHER – Final Impact Evaluation Report – Feb 12 2014*. The evaluation resulted in an estimated 204 kWh annual savings per MyHER recipient.

	Annual Savings, 95% Confidence Interval		
	Lower Bound	**Estimate**	**Upper Bound**
Per Participant kWh Savings	168	204	240
Per Participant coincident kW savings	0.0496	0.0602	0.0708

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-019

REQUEST:

Refer to the Application, Exhibit F, page 18, which states, "Operational roles for the MyHER program are shared between Duke Energy, two primary vendors, and several subcontractors." Provide a list of the two primary vendors and subcontractors applicable to Duke Kentucky.

RESPONSE:

Tendril, Inc.	Direct Vendor	Produces Reports
RR Donnelly	Tendril Subcontractor	Prints Reports
Customer Link	Direct Vendor	Receives customer calls
Customer Prototype Lab	Internal Duke Resource	Responds to customer emails/letters

PERSON RESPONSIBLE: Kelly Griffin

Duke Energy Kentucky
Case No. 2014-00280
STAFF'S First Set of Data Requests
Date Received: September 29, 2014

STAFF-DR-01-020

REQUEST:

Refer to the Application, Exhibit F page 22. Explain the source of identifying household characteristics.

RESPONSE:

As noted on page 22 of Exhibit F, household characteristics, including home age, square footage, heating fuel type, location, state, and billing dates are compiled from a variety of data sources, including directly from customers, from professional auditors who visit customer homes, from Duke Energy account records and analysis, and from third party data such as Experian. The data are utilized with a specific order of precedence based upon their availability and deemed degree of accuracy. Those data sources are:

1. Customer specified information, such as corrected numbers for home square footage, age, and heat fuel type, as captured via telephone conversations with the call center vendor or email exchanges with the Customer Prototype Lab;
2. Household characteristics recorded during a visit by a professional auditor as part of Duke Energy's Home Energy House Call (HEHC) program;
3. Household characteristics provided directly by customers when they completed a data collection survey as part of Duke Energy's Personalized Energy Report (PER) program;

4. Duke Energy algorithms applied to confirm customer provided data, such as heating fuel type, since customers may erroneously think they have gas or electric heat, while an analysis of their annual electric load shape reveals otherwise;
5. Household characteristics acquired by the program vendor via publically available Experian third party data.

More specifically, household characteristics are obtained from the following sources.

• Age of home	Data provided directly by customers to Duke Energy or to professional auditors working on behalf of Duke Energy, plus data provided by Experian and other third party providers.
• Size (square footage)	Data provided directly by customers to Duke Energy or to professional auditors working on behalf of Duke Energy, plus data provided by Experian and other third party providers.
• Heating fuel type	Data provided directly by customers to Duke Energy or to professional auditors working on behalf of Duke Energy, plus data provided by Experian and other third party providers. Duke Energy also analyzes billing data based on customer load shapes (summer vs. winter peak shapes) to determine fuel types.
• State (ensures neighborhoods do not cross state lines during clustering)	Customer address supplied by Duke Energy.
• Location (multiple vectors based on latitude and longitude)	Vendor-supplied mapping software using addresses associated with customer accounts.
• Bill dates (ensures billing periods are of similar duration to produce accurate comparisons for consumption)	Billing data supplied by Duke Energy.

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-021

REQUEST:

Refer to the Application, Exhibit F, page 26, which states, "The rate factor for Kentucky is $0.088." Provide the current rate factor being used.

RESPONSE:

The rate factor cited was provided by the Duke Energy program manager which was accurate during the evaluation period, at the time of the management interviews conducted from February to July of 2013. The factor is still the same as of October 1, 2014.

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-022

REQUEST:

Refer to the Application, Exhibit F, page 30, which states, "Kentucky customers would not run out of original tips until September of 2013." Explain whether Duke Kentucky has run out of original tips.

RESPONSE:

We add new tips to the tips database on a regular basis. There were 45 Kentucky customers who did receive a repeated tip in 2013. This was due to some changes made in the Tendril system where some historical data was inadvertently not loaded in to the database therefore allowing a few duplicate tips to slip through.

PERSON RESPONSIBLE: Kelly Griffin

STAFF-DR-01-023

REQUEST:

Refer to the Application, Exhibit F, page 37, which states, "If the customer is calling to order free CFLs, this service is also taken care of during the phone call." Explain how many free CFLs and the wattage of the bulb a customer can receive.

RESPONSE:

The number of bulbs a customer receives depends on the past campaign participation (i.e. coupons, Business Reply Cards (BRCs) and other Company programs offering CFLs). Bulbs are available in 3, 6, 8, 12 and 15 pack kits that have a mixture of 13 watt and 20 watt bulbs. The maximum number of bulbs available for each household is 15, but customers may choose to order less.

PERSON RESPONSIBLE: Kelly Griffin and Lari Granger

STAFF-DR-01-024

REQUEST:

Refer to the Application, Exhibit F, page 105, which states, "Provide information about geothermal units," and "I'd like to see a report that has comparisons between me and my neighbors for electricity and gas dollars."

a. Explain whether Duke Kentucky has considered a DSM program that includes geothermal.

b. Explain whether Duke Kentucky has considered a MyHER report that includes natural gas customers.

RESPONSE:

a. Duke Kentucky currently offers incentives via the Residential Smart $aver® HVAC Program[1]. To qualify for this incentive the geothermal heat pump installed must achieve at least 10.5 EER and include an ECM fan on the indoor unit.

b. The Duke Kentucky MyHER report does include natural gas customers who also receive their electricity from Duke Kentucky.

PERSON RESPONSIBLE: a. Nathan Cranford
b. Kelly Griffin

[1] Tariff - Residential Smart $aver Energy Efficient Residences Program

STAFF-DR-01-025

REQUEST:

Refer to the various recommendations made by TecMarket in Exhibit F. Explain whether Duke Kentucky is considering any of the recommendation that would pertain to Kentucky, and if so, identify which ones and state when they would be implemented.

RESPONSE:

1. Dynamic Clustering: Duke has worked with Tendril to stabilize the comparison clusters. Duke did not remove cluster information from the report as Duke has received calls from customers inquiring why their cluster group changes. Rather than remove the cluster information, Duke worked with Tendril to stabilize the comparison clusters so that customers remained in a similar cluster for each report. The clusters are not static as new customers enter the program and customers drop out of the program as they move residences or opt out.
2. Duke did not perform a longitudinal study of cluster size savings of smaller clusters versus larger clusters as it is not a sizable issue to warrant such a study.
3. Duke has received one customer complaint about changing the comparison figures from dollars to kWh. This customer was not a resident of Kentucky.
4. Duke used static tips messaging June 2013-August 2013. Duke did resume dynamic tips messaging in October of 2013 and they have remained dynamic ever since.

5. The messaging provided under the house chart and 13 month trend line have all been revisited and rewritten in a positive tone to encourage customers to save more and/or continue their efforts.
6. Real estate on the MyHER paper report is very precious. Duke chose not to include the definition of the "average" and "efficient" home on the report as a standard message. In addition, customer calls regarding these definitions have diminished. In addition, MyHER Interactive will provide those definitions as a help feature where the "average" and "efficient" homes are mentioned.
7. Duke has not changed the software code to display more advanced tips to more advanced customers. However, the introduction of MyHER Interactive will provide these advanced customers to further engage with their energy use but providing the functionality to set goals, measure progress to goals and interactive with energy calculators.
8. Duke adds new tips on a regular basis. Duke also strives to present the tips in engaging language and content. Duke will also be adding visuals to the tips in 2015.
9. As a standard practice, all report data is now validated for accuracy before reports are generated.
10. Changes to the report are based on the volume of customer feedback on any given subject. If one or two customers out of 1.2 million customers suggest changes, those changes are evaluated for their merit and typically do not warrant changing the report. However, if several customers call about a subject, the answer to their question can be added to the FAQs so other customers can benefit from the information.

PERSON RESPONSIBLE: Kelly Griffin

STAFF-DR-01-026

REQUEST:

Refer to the Application, Exhibit G, page 7.

a. Refer to the Recommendations paragraph. State which, if any, of these recommendations are applicable to Duke Kentucky.

b. Explain whether Duke Kentucky has implemented or plans to implement any of the evaluation recommendations. If Duke has implemented any of the recommendations, provide an updated schedule showing kWh savings for each DSM program.

RESPONSE:

a. and b. Duke has implemented all of these recommendations when the impact evaluation results were applied effective December 1, 2013.

Please see Attachment STAFF-DR-01-026.xlsx

PERSON RESPONSIBLE: Roshena Ham

Measure Name	kWh Savings
High Performance Low Watt T8 4ft 2 lamp, replacing standard T8 (EMV 12.01.13)	85.98
High Performance Low Watt T8 4ft 3 lamp, replacing standard T8 (EMV 12.01.13)	146.16
High Performance Low Watt T8 4ft 4 lamp, replacing standard T8 (EMV 12.01.13)	154.76
High Performance T8 4ft 1 lamp, replacing standard T8 (EMV 12.01.13)	44.39
High Performance T8 4ft 1 lamp, replacing T12-HPT8 (EMV 12.01.13)	101.00
High Performance T8 4ft 2 lamp, replacing standard T8 (EMV 12.01.13)	72.43
High Performance T8 4ft 2 lamp, replacing T12 8ft 1 lamp (EMV 12.01.13)	129.93
High Performance T8 4ft 2 lamp, replacing T12 High Output 8ft 1 lamp (EMV 12.01.13)	285.59
High Performance T8 4ft 2 lamp, replacing T12-HPT8 (EMV 12.01.13)	135.80
High Performance T8 4ft 3 lamp, replacing standard T8 (EMV 12.01.13)	81.77
High Performance T8 4ft 3 lamp, replacing T12-HPT8 (EMV 12.01.13)	227.33
High Performance T8 4ft 4 lamp, replacing standard T8 (EMV 12.01.13)	121.49
High Performance T8 4ft 4 lamp, replacing T12 8ft 2 lamp (EMV 12.01.13)	53.71
High Performance T8 4ft 4 lamp, replacing T12 High Output 8ft 2 lamp (EMV 12.01.13)	523.89
High Performance T8 4ft 4 lamp, replacing T12-HPT8 (EMV 12.01.13)	258.73
Low Watt T8 lamps 2-4ft, replacing standard 32 Watt T8 (EMV 12.01.13)	35.05
LW HPT8 4ft 1 lamp, Replace T12 (EMV 12.01.13)	107.43
LW HPT8 4ft 2 lamp, Replace T12 (EMV 12.01.13)	141.85
LW HPT8 4ft 3 lamp, Replace T12 (EMV 12.01.13)	257.97
LW HPT8 4ft 4 lamp, Replace T12 (EMV 12.01.13)	292.40
Occupancy Sensors over 500 Watts (EMV 12.01.13)	684.80
Occupancy Sensors under 500 Watts (EMV 12.01.13)	273.50
T-5 4 ft 1 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	47.28
T-5 4 ft 2 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	4.35
T-5 4 ft 3 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	77.35
T-5 4 ft 4 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	17.21
T-5 High Output 1 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	30.07
T-5 High Output 2 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	51.59
T-5 High Output 3 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	30.07
T-5 High Output 4 Lamp with Electronic Ballast (replacing T-12 fixture) (EMV 12.01.13)	101.00
T-8 2ft 1 lamp (EMV 12.01.13)	85.98
T-8 2ft 2 lamp (EMV 12.01.13)	206.35
T-8 2ft 3 lamp (EMV 12.01.13)	103.17
T-8 2ft 4 lamp (EMV 12.01.13)	404.10
T-8 3ft 1 lamp (EMV 12.01.13)	120.29
T-8 3ft 2 lamp (EMV 12.01.13)	209.75
T-8 3ft 3 lamp (EMV 12.01.13)	330.98
T-8 3ft 4 lamp (EMV 12.01.13)	541.67
T-8 4ft 1 lamp (EMV 12.01.13)	55.79
T-8 4ft 2 lamp (EMV 12.01.13)	55.79
T-8 4ft 3 lamp (EMV 12.01.13)	111.78
T-8 4ft 4 lamp (EMV 12.01.13)	137.50
T-8 8ft 1 lamp (EMV 12.01.13)	119.15
T-8 8ft 2 lamp (EMV 12.01.13)	58.82
T-8 High Output 8 ft 1 Lamp (EMV 12.01.13)	197.83
T-8 High Output 8 ft 2 Lamp (EMV 12.01.13)	245.11
VFD HVAC Fan (EMV 12.01.13)	1011.70
VFD HVAC Pump (EMV 12.01.13)	1558.00
VFD Process Pump 1-50 HP (EMV 12.01.13)	270.60

STAFF-DR-01-027

REQUEST:

Refer to the Application, Exhibit G, page 7, which states, "[T]he program saved 31.8% less than the measures installed via the program incentive because free ridership was particularly high and the program did not induce participants to take many additional energy efficiency actions beyond those incented by the program." Explain whether Duke Kentucky believes this statement is applicable to its operation in Kentucky, since the evaluations only sampled measures installed by Duke Ohio.

RESPONSE:

As stated on page 3 of Exhibit G, "This evaluation was conducted for both Ohio and Kentucky. The M&V was conducted on Ohio projects, however, all findings are applicable to the Kentucky projects (where there was not enough projects for a representative sample)."

The low number of projects in Duke Kentucky (as shown below and on page 4 of Exhibit G) do not allow for a rigorous enough sample to be representative of the program's impact for Kentucky. Given this limitation and budget considerations, evaluation resources were concentrated on Ohio projects to reduce the evaluation costs for both Duke Energy Ohio and

Duke Energy Kentucky. The Smart $aver program has identical operational procedures and program incentives in Ohio and Kentucky, therefore Duke Energy and the evaluation team believe that there are no differences between Ohio and Kentucky customer behavior.

Number of Program Participants from 1-1-2009 to 2-29-2012	2439 Projects (OH) 228 Projects (KY)

PERSON RESPONSIBLE: Roshena Ham

STAFF-DR-01-028

REQUEST:

Refer to the Application, Exhibit I, page 12. Provide a copy of the Draft Ohio Technical Resource Manual.

RESPONSE:

See Attachment Staff-DR-01-028 for the most recent version of the Ohio Technical Resource Manual, which was not marked final.

PERSON RESPONSIBLE: Roshena Ham

VERMONT ENERGY
INVESTMENT CORPORATION

State of Ohio Energy Efficiency Technical Reference Manual

Including
Predetermined Savings Values
and Protocols for Determining Energy and Demand Savings

Prepared for the Public Utilities Commission of Ohio
by Vermont Energy Investment Corporation
August 6, 2010

The 2010 Ohio TRM was prepared for the Public Utilities Commission of Ohio by Vermont Energy Investment Corporation (VEIC), with contributions from the following:

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I. Introduction

VEIC was retained by the Public Utilities Commission of Ohio (PUCO) to prepare this Technical Reference Manual (TRM) for use by the electric and gas utilities in the state of Ohio (in response to the PUCO TRM Entry *In the Matter of Protocols for the Measurement and Verification of Energy Efficiency and Peak Demand Reduction Measures, Case No. 09-512-GE-UNC*, June 24, 2009). The information contained in this document outlines our recommendations for the content of the 2010 Ohio TRM and a process for its maintenance and update.

In developing these characterizations, we have reviewed the information in the TRM document filed jointly by the Ohio electric utilities (*Technical Reference Manual (TRM) for Ohio Senate Bill 221, Energy Efficiency and Conservation Program and 09-512-GE-UNC*, October 15, 2009). This review included an engineering assessment of formulas found therein and an analysis of how the utilities' proposals compare with those used in other jurisdictions (after adjusting for expected differences due to climate, codes, programs, etc.). Documents and reference materials supporting utility assumptions have been investigated, and we have been in contact with the utilities to collect information on program design and delivery as well as technical support information and evaluations. We specifically reviewed information from the electric and gas utilities' Portfolio Plans, including savings by measure for the programs the electric utilities have proposed in their plans, and preliminary information on the make-up of mercantile customer projects. We have pursued all significant questions arising out of our review, and findings and observations from these reviews have been shared with the PUCO staff and the utilities.

We have attempted to provide characterizations or protocols here to guide savings calculations for all planned program measures for which there is reliable information to support claims. Measures have been characterized using all available best practice information, taking into account:

- Guidance promulgated by the Commission regarding underlying policy considerations that will shape the protocols, assumptions, and values included in the TRM
- Comparative research of best practice and appropriate use of assumptions from other jurisdictions when needed
- Adjustments made to measure characterizations to reflect the Ohio-specific market environment (climate, codes, other baselines, market penetration, etc.)
- The context of the energy efficiency program designs through which measures are delivered
- Compliance with potential RTO market requirements, including IPMVP protocols where practical and necessary

The characterizations and protocols for the measures included here are the result of these activities. Our analysis of assumptions for these characterizations rests on our understanding of the best-supported information available. In each case, we reviewed all Ohio and mid-West specific information available, including evaluations and support material provided by the Ohio utilities and information from other more-mature efficiency programs in the Ohio region that have undertaken evaluations and research to support their savings assumptions (including programs in Wisconsin, Pennsylvania, and Michigan). Ohio-specific information on market penetrations, weather-dependent assumptions, and local codes and practices was used. When Ohio-specific evaluations of other types of information was not available, or if we felt that results were not well supported or not applicable to the measures in question, we turned to best practice research and data from other jurisdictions, often from west- and east-coast states that have long-standing programs and who have allocated large amounts of funding to evaluation work and refinement of measure characterization parameters. As a result, much of the most-defensible information originates from these regions. In every case we used the most-recent well-designed and supported studies and only if it was appropriate to generalize their conclusions to the Ohio utilities' programs.

Purpose of the TRM

The TRM has been developed officially to help determine compliance with the energy efficiency and conservation requirements of Senate Bill 221 (SB 221) and the requirements of Case 09-512-GE-UNC. More broadly than this, as envisioned by the PUCO the TRM will serve a wide range of important users and functions, including:

- Utilities – for cost-effectiveness screening and program planning, tracking, and reporting
- Mercantile customers – for assessing energy savings opportunities
- The PUCO, the Independent Program Evaluator, and other parties – for evaluating utilities performance relative to statutory goals, and facilitating planning and portfolio review
- Markets, such as PJM's Reliability Pricing Model (its wholesale capacity market) and carbon markets – for valuing efficiency resources

Thus, the TRM is intended to serve as an important tool to support efficiency investments, both for planning and assessment of success in meeting goals. In addition, the TRM is intended to support the bidding of efficiency resources into resource markets, such as PJM's wholesale capacity market, and in setting and tracking future environmental and climate change goals. It provides a common platform for Ohio utilities to characterize measures within their efficiency programs, analyze and meaningfully compare cost-effectiveness of measures and programs, communicate with policymakers and stakeholders about program details, and it can guide future evaluation and measurement activity and help identify priorities for investment in further study, needed either at a regional or individual organizational level.

Use of the TRM – General Format

For each prescriptive measure, the TRM includes either specific deemed values or algorithms for deemed calculations. These algorithms contain a number of deemed underlying assumptions that when combined with some measure-specific information (e.g., equipment capacity) produce deemed calculated savings values. Values or algorithms are included for calculating:

- Gross annual electric energy savings
- Gross electric peak demand savings – peak coincidence determinations are based on the PUCO established summer on-peak period (3:00-6:00 p.m. weekdays, June through August)
- Gross annual fossil fuel energy savings - for electric efficiency measures that also save fossil fuels, as well as gas measures
- Other resource savings where appropriate (e.g., water savings, O&M impacts); for use in cost-effectiveness screening
- Incremental costs
- Measure lives

For those measures that appear to be consistent with an implementation strategy involving in-store coupons, prescriptive rebates, or buydowns (for example, efficient appliances, pool pumps, etc.), we have provided prescriptive deemed savings values rather than deemed calculation algorithms that require input variables for each purchase. This was not always consistent with the format of measure characterization in the Joint Utility TRM, but we believe this approach will be more convenient for program design and be equally accurate when all the savings are aggregated.

Conversely, for other measures that lend themselves more appropriately to calculations using site- or project-specific data (for example air sealing, shell insulation, duct sealing, etc.), we have assumed that a member of implementation staff or an associated contractor will be onsite to record the necessary information and use it to calculate savings using the algorithms we have provided. These types of measures are often very variable and so providing simple deemed savings values is not appropriate.

We have also provided detailed protocols for the Residential New Construction and Whole House Retrofit programs that provide guidance on the custom approach recommended for these programs. Both require the collection of site-specific information to be used to assess savings on a house-by-house basis. Detailed protocols are also provided for custom commercial and industrial (C&I) projects and for transmission and distribution (T&D) projects.

The TRM is intended to be a living document. There will be measures that are not characterized here; new measures will be added to programs and new program designs will be implemented; new information will be gathered through evaluations or research; and savings for current measures will change as the activity of the programs changes their markets (i.e., savings for CFLs will decrease over time as successful programs result in lamps being installed mostly in lower-use locations). The TRM update and maintenance process described in Appendix D has been designed to allow for frequent review and update of the TRM as needs demand. Data from reliable impact evaluations would be necessary to support savings claims until the measure has been incorporated into the TRM or updated.

Use of the TRM – Common Definitions and Assumptions

The savings estimates are expected to serve as representative, recommended values, or ways to calculate savings based on program-specific information. All information is presented on a per measure basis. In using the measure-specific information in the TRM, it is helpful to keep the following notes in mind.

- The TRM clearly identifies whether the measure impacts pertain to "retrofit", "time of sale",[1] or "early retirement" program designs.
- Additional information about the program design is sometimes included in the measure description, because program design can affect savings and other parameters.
- Savings algorithms are provided for each measure. For a number of measures, prescriptive values for each of the variables in the algorithm are provided along with the output from the algorithm. That output is the deemed savings assumption. For other measures, prescriptive values are provided for only some of the variables in the algorithm, with the term "actual" or "actual installed" provided for the others. In those cases – which one might call "deemed calculations"– users of the TRM are expected to use actual efficiency program data (e.g., capacities or rated efficiencies of central air conditioners) in the formula to compute savings. Note that the TRM often provides example calculations for measures requiring "actual" values. These are for illustrative purposes only.
- All estimates of savings are for annual savings (not lifetime savings).
- Unless otherwise noted, measure life is defined to be the life of an energy consuming measure, including its equipment life and measure persistence.
- Where deemed values for savings are provided, these represent average savings that could be expected from the average measures that might be installed in the region in 2010.
- For measures that are not weather-sensitive, peak savings are estimated whenever possible as the average of savings between 3 pm and 6 pm across all summer weekdays (the PUCO summer on-peak period).
- Wherever possible, savings estimates and other assumptions are based on Ohio or regional data. However, a number of assumptions are based on sources from other regions of the country. While this information is not perfectly transferable, due to differences in definitions of peak periods as well as geography and climate and customer mix, it was used because it was the most transferable and usable source available at the time.
- Users will note that the TRM presents engineering equations for most measures. These were judged to be desirable because they convey information clearly and transparently, and they are widely accepted in the industry. Unlike simulation model results, they also provide flexibility and opportunity for users to substitute locally specific information and to update some or all parameters as they become available on an ad hoc basis. One limitation is that certain interaction effects between end uses, such as

[1] In some jurisdictions, this is called "replace on burn-out". We use the term "time of sale" because not all new equipment purchases take place when an older existing piece of equipment reaches the end of its life.

how reductions in waste heat from many efficiency measures impacts space conditioning, are not universally captured in this version of the TRM. Such interactive factors are included in calculations for lighting measures, and full protocols for their inclusion are given in the custom project protocols.

- Many C&I measures in the Joint Utility TRM were based on building energy simulations. This was typically done for complex, highly interactive measures, such as envelope improvements or chilled water resets. We agree that this is the best approach; it is prohibitively difficult to estimate energy savings from these types of measures with simplified algorithms. We conducted a review of the building prototype assumptions, which are primarily based on California's Database of Energy-Efficient Resources (DEER) prototypes with adjustments based on data published by the U.S. Energy Information Administration's (EIA) Commercial Building Energy Consumption Survey (CBECS) and a review by an engineering consulting company under contract to Duke Energy, and did not have any major concerns. The parameters used for the efficient case were also reviewed, and no issues significant enough to justify additional modeling work were identified. Two major changes were made in the presentation of the modeled measures in this TRM. First, we added the change in natural gas usage due to heating impacts for all relevant measures. Second, we disaggregated savings estimates by building type as well as climate zone. Many modeled measures show savings varying by up to a factor of four from one building type to another, and envelope measures often have significant heating impacts. These changes should increase the accuracy of the savings estimates and provide a more complete portrait of the measure's impacts. Finally, other values, such as incremental measures costs, that do not affect the modeling results were updated based on the latest available data.
- For early replacement measures across all sectors, we have provided two levels of savings:
  - An initial period during which the existing inefficient unit would have continued to be used had it not been replaced (and savings claimed between the existing unit and the efficient replacement),
  - The remainder of the measure life, where we assume that the existing unit would have been replaced with a standard baseline unit (and so savings are claimed between the standard baseline and the efficient replacement).

  We assume that accounting for this step-down adjustment in annual savings is possible in the utilities' tracking systems. We have also provided the impact of the deferred replacement payment that would have occurred at the end of the useful life of the existing equipment.
- For this and other net present value calculations, we have assumed a 5% discount factor for all calculations.
- In general, the baselines included in the TRM are intended to represent average conditions in Ohio. Some are based on data from the state, such as household consumption characteristics provided by the Energy Information Administration. Some are extrapolated from other areas, when Ohio data are not available. When weather adjustments were needed in extrapolations, weather conditions in all major Ohio cities were generally used as representative for their regions.
- The TRM anticipates the effects of changes in efficiency standards for some measures, specifically CFLs and motors. Specific reductions in savings have incorporated for CFL measures that relate to the shift in appropriate baseline due to changes in Federal Standards for lighting products. In 2012, Federal legislation (stemming from the Energy Independence and Security Act of 2007) will require all general-purpose light bulbs between 40 and 100W to be approximately 30% more energy efficient than current incandescent bulbs, in essence beginning the phase-out of the current style, or "standard", incandescent bulbs. In 2012, standard 100W incandescent bulbs will no longer be manufactured, followed by restrictions on standard 75W bulbs in 2013 and 60W bulbs in 2014. The baseline for the CFL measure in those years will therefore become bulbs (improved, or "efficient", incandescent, or halogen) that meet the new standard but are still less efficient than a CFL. The industry has indicated that new products that meet the federal standards but are less efficient than CFLs will be on the market. Those products can take several different forms we can envision now and perhaps others we do not yet know about; halogens are one of those possibilities and have been chosen to represent a baseline at that time. CFL fixtures will also have savings reduced by approximately 50% after the first year. Other lighting measures will also have baseline shifts that could result in significant impacts to estimated savings. While not reflected in the current proposed characterization, as of July 14, 2012, Federal

standards will require that all linear fluorescents meet strict performance requirements essentially requiring all T12 users to upgrade to high performance T8 lamps and ballasts.