BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke Energy Ohio, Inc., for Recovery of Program Costs, Lost Distribution Revenue and Performance Incentives Related to its Energy Efficiency and Demand Response Programs.	)))))	Case No.17-781-EL-RDR

APPLICATION OF DUKE ENERGY OHIO, INC.

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1. Duke Energy Ohio, Inc., (Duke Energy Ohio or the Company) is an Ohio corporation engaged in the business of supplying electric transmission, distribution, and generation service in Adams, Brown, Butler, Clinton, Clermont, Hamilton, Montgomery, and Warren Counties in Southwestern Ohio to approximately 690,000 electric customers and 420,000 gas customers.

2. Duke Energy Ohio is a "public utility" as defined by Sections 4905.02 and 4905.03, Revised Code, and an "electric distribution company," "electric light company," "electric supplier," and "electric utility" as defined by Section 4928.01, Revised Code.

3. As an Ohio electric distribution utility, Duke Energy Ohio is subject to the mandates set forth in Amended Substitute Senate Bill 221 and subsequently modified by Senate Bill 310, codified in Revised Code 4928.66, including, *inter alia*, the requirement to implement energy efficiency programs and peak demand reduction programs.

4. Subsequent to the enactment of the mandates contained in Revised Code 4928.66, the Public Utilities Commission of Ohio (Commission) promulgated rules to facilitate the Commission's oversight of compliance with this new energy law. These rules are set forth in Ohio Administrative Code 4901:1-39-01, *et seq.*

5. Pursuant to the Commission's rules, Duke Energy Ohio submitted an application for approval of an energy efficiency portfolio of programs in Case No. 13-0431-EL-POR. The Stipulation that was adopted and approved by the Commission, provided for implementation of Rider EE-PDR (shown in the Duke Energy Ohio electric tariff as Rider EE-PDR and Rider EE-PDRR) to be effective on January 1, 2014. With respect to cost recovery, the Stipulation provided the following:

- Rider EE-PDR true-up shall occur in the first quarter of the following year.
- Cost recovery shall be allocated between distribution and transmission customers based on the allocation of distribution revenues as approved in the Company's most recent electric distribution rate case.
- Duke Energy Ohio is eligible for an incentive for achieving energy efficiency above the statutory mandate. The incentive thresholds are set forth in the Stipulation. An updated stipulation was filed in Case No. 14-457-EL-RDR on January 6, 2016 stating that Duke Energy Ohio will recover a total of $19.75 million dollars in shared savings incentives for program years 2013 and 2014 and will not claim a shared savings incentive for program years 2015 or 2016.[1]

[1] Ordered on October 26, 2016

- Duke Energy Ohio shall perform measurement and verification as set forth in the Supplemental Testimony of Trisha Haemmerle. Duke Energy Ohio has hired an independent evaluator for measurement and verification. Costs for the independent measurement and verification shall be capped at five percent of program portfolio costs.

6. As stated above, the Commission enacted rules to facilitate oversight and compliance with the requirements for energy efficiency and peak demand reduction set forth in Revised Code 4928.66. Rule 4901:1-39-07, O.A.C., provides for the recovery of costs and specifies what may be included in a cost recovery mechanism. Rule 4901:1-39-07, O.A.C., states that cost recovery may include "costs due to electric utility peak-demand reduction, demand response, energy efficiency program costs, appropriate lost distribution revenues, and shared savings."

7. The Company submitted its portfolio of programs in compliance with Revised Code 4928.66 and the Commission's rules in Case No. 13-0431-EL-POR. In Case No. 11-5905-EL-RDR, the Public Utilities Commission of Ohio approved a distribution decoupling rider, (Rider DDR).

8. In July 2011, in Case No. 11-4393-EL-RDR, the Company requested that the Commission approve a new cost recovery mechanism. The application was approved in August of 2012. In compliance with the Opinion and Order, Duke Energy Ohio submitted an updated portfolio filing, Case No. 13-0431-EL-POR, to align the cost recovery mechanism with the portfolio of programs on April 15, 2013.

The portfolio was approved on December 4, 2013. The Company also filed and received approval for a new non-residential program, Small Business Energy Saver.[2]

9. Duke Energy Ohio has submitted status reports annually as required by 4901:1-39-05(C), in Case Nos. 10-317-EL-EEC, 11-1311-EL-EEC, 12-1477-EL-EEC, 13-1129-EL-EEC, 14-457-EL-EEC, 15-454-EL-EEC, 16-0513-EL-EEC and 17-689-EL-EEC[3].

10. In support of its request for approval to adjust Rider EE-PDR to recover costs related to compliance with energy efficiency mandates in this Application, Duke Energy Ohio is submitting testimony to provide greater detail about the supporting documentation that will allow the Commission to evaluate the delivery of efficient and measurable energy efficiency and peak demand reduction.

11. Duke Energy Ohio witness Trisha Haemmerle will provide a historical overview of the energy efficiency and demand response programs and Duke Energy Ohio's success with these programs, as well as, the methodology used for Evaluation, Measurement and Verification (EM&V) and the processes by which the Company evaluated its programs. The testimony will also provide the load impacts used in the true-up process for Rider EE-PDRR and the total impacts achieved based upon actual participation.

12. Duke Energy Ohio witness James E. Ziolkowski will provide information related to the financial and accounting support for Rider EE-PDR. Mr. Ziolkowski will describe the calculation of the Rider EE-PDRR revenue requirement for the period January 2016 through December 2016 and the procedure utilized for calculating

[2] Case No. 14-964-EL-POR approved on September 10, 2014.
[3] To be filed no later than May 15, 2017.

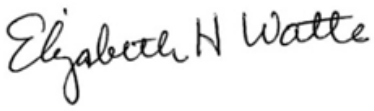
recovery rate. The calculation also includes the expected costs for 2017. Mr. Ziolkowski will sponsor Attachments JEZ-1, JEZ-2 and JEZ-3.

Conclusion

As supported by the testimony of the Duke Energy Ohio witnesses filed herewith, the Company respectfully requests that the Commission approve its Application, subject to the terms outlined herein.

Respectfully submitted,

Duke Energy Ohio



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DUKE ENERGY OHIO EXHIBIT_____

BEFORE THE

PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke Energy Ohio, Inc., for Recovery of Program Costs, Lost Distribution Revenue and Performance Incentives Related to its Energy Efficiency and Demand Response Programs.	))))))	Case No.17-781-EL-RDR

DIRECT TESTIMONY OF

TRISHA A. HAEMMERLE

ON BEHALF OF

DUKE ENERGY OHIO, INC.

March 31, 2017

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Trisha A. Haemmerle. My business address is 139 East Fourth Street, Cincinnati, Ohio 45230

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Duke Energy Business Services, LLC (DEBS), as Senior Manager, Strategy and Collaboration. DEBS provides various administrative and other services to Duke Energy Ohio, Inc., (Duke Energy Ohio or the Company) and other affiliated companies of Duke Energy Corporation (Duke Energy).

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.

A. I graduated from Ohio University with a Bachelor's Degree in Marketing. I started my career with Cinergy in 1997. I worked for Cinergy and Duke Energy from 1997 to 2010 developing, managing, and analyzing survey activities, as well as market research projects. Starting in 2009, I also managed the coordination of verification for the energy efficiency and demand response programs. I assumed my current position in 2010.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO?

A. Yes, I submitted testimony in support of Duke Energy Ohio's application for recovery of program costs, lost distribution revenue and performance incentives related to its Energy Efficiency (EE) and Demand Response (DR) programs, Case Nos. 14-457-EL-RDR, 15-534-EL-RDR and 16-0664-EL-RDR.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony in this proceeding is to discuss the history of Rider Energy Efficiency-Peak Demand Response (EE-PDR), Duke Energy Ohio's energy efficiency programs, and the successful achievement Duke Energy Ohio has had with its current portfolio of programs. My testimony will also discuss how the Company determines program cost-effectiveness and explain the Company's evaluation, measurement and verification process (EM&V) used to verify the results of its portfolio of programs, and the testimony of Duke Energy Ohio witness James E. Ziolkowski will explain Rider EE-PDR and how it is applied to the programs to determine cost recovery.

II. HISTORY OF RIDER EE-PDR

Q. PLEASE EXPLAIN THE HISTORY OF RIDER EE-PDR.

A. Duke Energy Ohio proposed the Rider EE-PDR energy efficiency and peak demand cost recovery mechanism in its application in Case No. 11-4393-EL-RDR that was filed on July 20, 2011. The Company's application requested approval to implement Rider EE-PDR to replace Rider DR-SAW, which was due to expire on December 31, 2011. The application also proposed a mechanism by which to recover the costs it incurs in achieving the energy efficiency and peak demand reduction targets set by SB 221, and to provide the Company with an incentive to exceed the targets. The Public Utilities Commission of Ohio (Commission) approved a Stipulation and Recommendation resolving intervening parties' concerns and establishing Rider EE-PDR on August 15, 2012. In compliance with

the Order, Duke Energy Ohio submitted an updated portfolio filing, Case No. 13-0431-EL-POR, to align the cost recovery mechanism with the portfolio of programs on April 15, 2013. The case was approved on December 4, 2013. The Company also filed and received approval for a new non-residential program, Small Business Energy Saver.[1]

Q. PLEASE SUMMARIZE THE COST RECOVERY AND INCENTIVE MECHANISM UNDERLYING RIDER EE-PDR THAT WAS APPROVED IN CASE NO. 13-0431-EL-POR.

A. Under the Commission-approved Rider EE-PDR, the Company is entitled to recover the costs prudently incurred to deliver energy efficiency and peak demand reduction programs. Additionally, under Rider EE-PDR, the Company is entitled to earn a shared savings incentive based upon its ability to *exceed* its annual efficiency savings benchmark targets that are mandated by Ohio law. In Case No. 13-0431-EL-POR, the Commission approved recovery of lost distribution margins from all customer classes not included in the Company's pilot distribution decoupling rider (i.e., those customers receiving service under Rates DS, DP, and TS).

Q. PLEASE DESCRIBE HOW THE COMPANY'S APPROVED SHARED SAVINGS MECHANISM WORKS.

A. The Company's shared savings incentive structure is designed to incentivize the Company for exceeding its annual energy efficiency targets in the most cost-effective manner possible. Under this incentive structure, the level of incentive, or the magnitude of the percentage of the net system benefits (avoided costs less

[1] Case No. 14-964-EL-POR approved on September 10, 2014.

the costs of delivering the efficiency) that the Company may earn, is tiered and can range from 5.0% up to 13.0%, depending on the degree by which the actual efficiency savings exceed the annual target. Please see Table 1 below.

Table 1	
Achievment of Annual Target	After-Tax Shared Savings
≤ 100	0.0%
≥ 100 - 105	5.0%
≥ 105 - 110	7.5%
≥ 110 - 115	10.0%
≥ 115	13.0%

This shared savings mechanism allows Duke Energy Ohio an opportunity to recover its costs and earn an incentive for exceeding the mandated benchmarks.

Q. DOES THE SHARED SAVINGS CALCULATION INCLUDE COST INCURRED FOR MEASUREMENT AND VERIFICATION?

A. Yes, consistent with the Commission's Order in Case No. 13-753-EL-RDR, the net benefit used in the calculation of shared savings includes cost incurred for EM&V.

Q. IS THE COMPANY'S SHARED SAVINGS MECHANISM APPROVED FOR 2016?

A. The Company's shared savings incentive mechanism for 2016 is currently pending before the Commission in Case No. 14-1580-EL-RDR. Consistent with the Commission's approval of the mechanism in Case No.13-431-EL-POR, the mechanism was to terminate at the end of 2015 and its effectiveness, particularly in light of not having a cap, was subject to review prior to going into effect in 2016. The Company was unable to reach consensus with the parties regarding the form in which the mechanism should continue, so it instead filed an application

justifying its continuation in 2016 for the final year of its portfolio plan. Case No. 14-1580-EL-RDR has been litigated and is currently pending with the Commission. While this case is still pending, consistent with the Stipulation approved by the Commission in Case No. 14-457-EL-RDR on October 26, 2016, at this time, the Company is forgoing its ability to claim a shared savings incentive for 2016.

Q. PLEASE DESCRIBE THE LOST DISTRIBUTION REVENUE RECOVERY ELEMENT CONTAINED IN THE CALCULATION OF RIDER EE-PDR.

A. The calculation of Rider EE-PDR includes the recovery of lost distribution revenue for customers billed under schedules Rate DP, Rate DS, and Rate TS. Unlike all other customers being billed under Rider EE-PDR, the customers under these three rate schedules were excluded from the distribution revenue decoupling pilot being recovered through Rider DDR. In order to eliminate the disincentive created by the under-recovery of fixed costs from the customers who are not served under the decoupling pilot, the Commission's order in Case No. 11-5905-EL-RDR authorized the Company to collect thirty-six months of lost distribution margins associated with the impacts of its energy efficiency programs for these customers.

Q. DID THE COMMISSION'S ORDER INCLUDE A PROVISION FOR RECEIVING CARRYING COSTS FOR OVER- OR UNDER-COLLECTION OF LOST MARGINS?

A. No. Any over- or under-collection of lost margins is to be determined without including carrying costs.

III. OVERVIEW OF PORTFOLIO PERFORMANCE

Q. WHAT ENERGY EFFICIENCY AND DEMAND RESPONSE PROGRAMS WERE ULTIMATELY OFFERED TO DUKE ENERGY OHIO CUSTOMERS UNDER RIDER EE-PDR IN 2016?

A. The portfolio of programs approved for inclusion in Rider EE-PDR included the following programs:

- Residential Energy Assessments
- Smart Saver® for Residential Customers
- Low Income Services
- Energy Efficiency Education Program for Schools
- Power Manager for Residential Customers
- Home Energy Comparison Report
- Nonresidential Energy Assessments
- Smart Saver® for Nonresidential Customers
- Power Share for Nonresidential Customers
- Low Income Neighborhood Program
- Low Income PWC Pilot
- Appliance Recycling Program

- Home Energy Solutions
- Small Business Energy Saver

Q. HAS DUKE ENERGY UPDATED ANY OF ITS PROGRAMS TO BE OFFERED TO CUSTOMERS IN 2017?

A. Yes. Duke Energy Ohio filed a new portfolio in 2016 for program years 2017 – 2019. A stipulation with the majority of intervening parties was submitted and is pending before the Commission in Case No. 16-576-EL-POR. While the Company is awaiting an order in the case, it continues to offer programs consistent with its 2014-2016, portfolio of programs until it can begin offering its new updated portfolio of programs.

Q. DID DUKE ENERGY OHIO OFFER ANY OTHER PROGRAMS DURING 2016 THAT WERE NOT INCLUDED IN CASE NO. 13-0431-EL-POR?

A. Yes. Consistent with Rule 4901:1-39-05(G) O.A.C., and the Commission's Opinion and Order in Case No. 10-834-EL-POR, Duke Energy Ohio has offered eligible customers the opportunity to participate in the Ohio Mercantile Self-Direct Rebate Program.

Duke Energy Ohio also has an electric pilot program offered to customers residing in the Duke Energy Ohio service territory. The program is offered through a partnership with People Working Cooperatively (PWC).[2] The program targets low income customers and focuses on energy efficiency. Customers receive whole-house weatherization services which include installation of energy efficiency measures and education. Duke Energy Ohio will purchase and

[2] Approved in Case No. 13-662-EL-UNC

recognize the energy and demand savings achieved through the whole-home weatherization in the Duke Energy Ohio service territory that are currently funded by leveraged funds, funding from sources other than the Company that are not explicitly tied to efficiency. The pilot is designed to allow the Company to recognize efficiency impacts that were previously unrecognized, and to achieve these impacts in a cost-effective manner. The pilot's three year term will expire in 2016; however, based on the positive results, the Company included the program in its portfolio plan for 2017-2019.

Q. DID DUKE ENERGY OHIO PARTICIPATE IN THE PJM INTERCONNECTION, INC. BASE RESIDUAL AUCTION?

A. As agreed to by the signatory parties in the Stipulation and Recommendation for Case No. 13-0431-EL-POR, Duke Energy Ohio created a PJM Interconnection, Inc. (PJM) Pilot program capturing all the costs and benefits of PJM Reliability Pricing Model (RPM) participation. Duke Energy Ohio agreed to bid at least 80% of eligible[3], projected cost effective[4], approved Program Portfolio resources[5] into the PJM Base Residual Auctions (BRA) occurring during the term of the 2014 – 2016 Program Portfolio.

All cost effective, PJM approved MW resources were bid into the 2019/2020 BRA. This resulted in 10.2 MWs from energy efficiency clearing in

[3] "Eligible" is defined for purposes for the Stipulation as existing and planned energy efficiency savings and demand response that comply with PJM Manuals 18 and 18b.

[4] "Cost effective" is defined for purposes of Duke Energy Ohio's PJM Pilot Program as the projected auction revenues are greater than the projected costs for existing and planned energy efficiency and demand response, where the phrase "projected auction revenues" is defined as the estimated kW multiplied by the previous BRA clearing price for the Duke zone and "projected costs" are defined as the costs necessary to fully qualify and bid the resources into the PJM capacity auctions.

[5] "Program Portfolio resources" is defined as the energy efficiency and demand response resources, both existing and planned, that are expected to be created under Duke's 2014 – 2016 Program Portfolio application in Case No. 13-0431-EL-POR. Program Portfolio resources specifically exclude mercantile self-direct resources, unless a self-direct mercantile customer affirmatively and explicitly chooses to grant its energy efficiency capacity resources to Duke Energy Ohio, by separate agreement.

the 2019/2020 auction. Due to uncertainty regarding the Company's portfolio of programs beyond 2016 and the relatively close clearing prices of the auctions, the Company believes it is more prudent to participate with the MWs from DR programs in the incremental auctions rather than the BRA.

When the clearing MW revenue is collected, it will be allocated back to programs after all administrative and EM&V costs are covered. Revenue offset is allocated back to program based on percentage of MWs clearing each auction and customer class and the net offset will be shared with the Company at its approved shared savings percentage as applicable. Duke Energy Ohio kept the Duke Energy Community Partnership (the Collaborative) updated throughout 2016 regarding the auction process.

Q. HAS DUKE ENERGY OHIO BEEN SUCCESSFUL IN MEETING ITS TARGETED MANDATES FOR ENERGY EFFICIENCY AND PEAK DEMAND REDUCTION?

A. Duke Energy Ohio successfully met the 2016 SB221 mandates for energy efficiency and peak demand of 1,336,878 MWh and its peak reduction mandate of 279.2 MW.

Q. WHAT PROGRAMS WERE THE PRIMARY CONTRIBUTORS TO THE COMPANY'S SUCCESS DURING 2016?

A. While the Company is pleased with the performance of its overall portfolio of programs that were deemed cost effective by the total resource cost test, four programs that continue to prove most successful are the three Smart Saver® Programs: Smart Saver® for Residential Customers and Smart Saver® Prescriptive

and Custom for Nonresidential Customers and the Small Business Energy Saver program. Together these four programs accounted for over 158,000 MWh, 88%, of the total impacts recognized in 2016. These programs continued to flourish in large part due to the attractiveness of lighting measures and the Duke Energy, Energy Efficiency Online Store.

Q. IS DUKE ENERGY OHIO'S ACHIEVEMENT LEVEL VERSUS ITS BENCHMARKS THE SAME ACHIEVEMENT THAT THE COMPANY IS USING TO CALCULATE ITS PERFORMANCE FOR THE PURPOSES OF CALCULATING ITS EARNED INCENTIVE LEVEL FOR 2016?

A. No, the Company's calculation of its annual energy efficiency achievement level versus its mandates for the purposes of determining its level of shared savings incentive is performed consistent with the methodology adopted and approved by the Commission in Case No. 11-4393-EL-RDR and in Case No. 13-0431-EL-POR. For the purposes of determining its 2016 earned incentive level, the Company excludes impacts achieved through its Mercantile Self-Direct Rebate Program (41,998 MWh) and base rate-funded low income weatherization programs (635 MWh). After making the agreed upon adjustments to the impacts, the Company has recognized an impact achievement of 179,463 MWh. Consistent with the Stipulation in Case No. 13-0431-EL-POR that was adopted and approved by the Commission, the Company also adjusted its mandate by reducing its three-year average sales baseline for the load of the customers participating in the Mercantile Self-Direct Rebate Program. This adjustment to the three-year average sales baseline reduces its mandate by 7,777 MWh to

establish a mandate for determining the incentive of 207,278 MWh. Consistent with the Commission's Order in Case Nos. 14-457-EL-RDR and 15-534-EL-RDR, the Company is not seeking a shared savings incentive for 2015 and 2016.

Q. PLEASE DESCRIBE HOW THE COMPANY'S MERCANTILE SELF-DIRECT REBATE PROGRAM HAS BEEN FACTORED INTO THE CALCULATION OF RIDER EE-PDR.

A. As previously mentioned, 41,998 MWh of energy savings and 5.0 MW of capacity savings achieved through the Company's Mercantile Self-Direct Rebate Program have been excluded from the 179,463 MWh energy savings recognized for determining the Company's performance versus its annual statutory benchmarks. Additionally, the avoided cost savings associated with the Mercantile Self-Direct Rebate Program have not been included in the calculation of its shared savings incentive. While the impacts and associated avoided cost from the Mercantile Self-Direct Rebate Program have been excluded from the calculation of the Company's shared savings incentive, the program costs associated with Mercantile Self-Direct Rebate Program are included for recovery in the calculation of Rider EE-PDR.

Q. HAS THE COMPANY INCLUDED ANY COSTS OR IMPACTS FROM TRANSMISSION AND DISTRIBUTION INVESTMENTS THAT REDUCE LINE LOSSES IN THE CALCULATION OF ITS SHARED SAVINGS INCENTIVE IN RIDER EE-PDR?

A. No, the Company has not counted any impacts from investments in transmission and distribution systems that reduce line losses in the determination and calculation of its shared savings incentive.

Q. HAS THE COMPANY COMPLIED WITH ALL OF THE DIRECTIVES FROM THE COMMISSION IN ITS OPINION AND ORDER IN THE 13-0431-EL-POR CASE?

A. Yes. Duke Energy Ohio believes that it has complied with the directives set forth in that Opinion and Order. For example, the Commission directed the Company to continue to work with its Collaborative and to file specific information in its status reports. The Company has held Collaborative meetings, with significant participation on 03/23/16, 06/09/16, 09/08/16, and 12/15/16.

Additionally, the Company has filed full and complete status reports in Case Nos. 10-0317-EL-EEC, 11-1311-EL-EEC, 12-1477-EL-EEC, 13-1129-EL-EEC and 14-456-EL-EEC, 15-454-EL-EEC, 16-0513-EL-EEC and 17-689-EL-EEC. Finally, the Company is filing this true-up in accordance with the Stipulation and Recommendation and the Commission's Order in Case No. 13-0431-EL-POR.

IV. OVERVIEW OF EVALUATION, MEASUREMENT, AND VERIFICATION

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY ON EVALUATION, MEASUREMENT AND VERIFICATION (EM&V)?

A. This section of my testimony (1) provides an overview of the programs on which Evaluation, Measurement and Verification (EM&V) activities were performed or

for which EM&V results were applied in 2016, (2) provides the current findings from the Company's EM&V work, and (3) demonstrates how the results from the EM&V process will be used in the true-up.

Q. WHAT PROGRAMS RECEIVED EVALUATION, MEASUREMENT & VERIFICATION THAT APPLY TO THIS TRUE-UP?

A. The table below provides the detailed, completed EM&V reports that apply to this true-up:

Attachment	Program	Evaluation Type	Report Date	Effective Date
1	Impact and Process Evaluation of the 2015 Power Manager Program	Process and Impact	March 23, 2016	Not Applicable
2	Impact and Process Evaluation of the 2015 PowerShare Program	Process and Impact	March 8, 2016	Not Applicable

Additionally, the Company will provide the reports presented here as Appendices D - E as appendices in its annual energy efficiency status report, Case No. 17-689-EL-EEC, to be filed later this year.

Q. HOW WERE THE EVALUATION, MEASUREMENT, AND VERIFICATION RESULTS UTILIZED IN DEVELOPING ESTIMATES OR TRUE-UPS FOR THE EE RIDER?

A. The original projection of program cost-effectiveness utilized projected numbers for participants in the programs and estimates of the load impacts per participant, derived either from initial estimates or previous EM&V results. The Company has measured actual participation and uses this actual participation information as the basis for annual true-ups of estimated incentives for the rider by multiplying the

actual participation by the current estimates of load impact per participant, which reflect all applied EM&V results.

For those programs on which EM&V has been conducted and finalized, the evaluated estimates of energy efficiency impacts and net-to-gross ratio are applied prospectively to adjust subsequent impact assumptions until superseded by new EM&V results, if any. The evaluated impacts identified in the EM&V report for a program are applied to the rider in the month following the completion of the EM&V report. These results will also be used to estimate future target achievement levels for development of estimated incentives and in future cost-effectiveness evaluations[6].

Q. WHAT DATA WERE USED IN THE CALCULATION OF THE REVENUE REQUIREMENT PROVIDED BY DUKE ENERGY OHIO WITNESS JAMES E. ZIOLKOWSKI?

A. The revenue requirement was calculated using both data inputs and outputs from the DSMore™ model, including initial estimates or estimated energy savings from EM&V, program costs and avoided costs. In addition, the costs of the independent measurement and verification activities, which are not used as an input to the DSMore™ model, are also included in the calculation of revenue requirements.

[6] For demand response programs, the contracted amounts of kW reduction capability from participants are considered to be components of actual participation.

Q. WERE ATTACHMENTS 1 – 2 PREPARED BY YOU OR AT YOUR DIRECTION?

A. The EM&V reports were prepared by Cadmus, one of Duke Energy Ohio's independent third party evaluators.

V. CONCLUSION

Q. PLEASE DESCRIBE THE COMPANY'S OVERALL ENERGY EFFICIENCY AND PEAK DEMAND REDUCTION PORTFOLIO PERFORMANCE IN 2016.

A. Duke Energy Ohio's portfolio of programs continued to perform exceptionally well in 2016 and exceeded the projected impacts included in Case No. 16-664-EL-RDR by over 26%, while only having to exceed its projected spending by 13%. The success has allowed customers that participated in its programs to take control of their energy usage and realize significant bill savings, as well as allowing all Duke Energy Ohio customers to realize the benefits of millions of dollars of avoided system costs. In fact, the net present value of the system avoided costs associated with the 2016 energy and capacity achievements from its portfolio of programs is over three times the program cost incurred to achieve the impacts.

Q. HAS DUKE ENERGY PROPOSED ANY NEW PROGRAMS TO ASSIST IN MEETING THE INCREASING ANNUAL BENCHMARK?

A. No, Duke Energy Ohio did not propose any new program additions in 2016. Due to the prohibitions included in SB310 related to modifications of portfolio plans that were cited in the Commission order denying the Company's application to

add the Smart Energy in Offices Program, the Company did not propose new programs in 2016.

Q. HAS THE COMPANY ADOPTED ANY OF THE NEW IMPACT COUNTING PROVISION ESTABLISHED IN SB310?

A. No, since the Company is operating under its existing portfolio through 2016, it will address the new impact counting provision established by SB310 after its new portfolio of programs is established for 2017-2019.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

Impact and Process Evaluation of the 2015 Power Manager Program®

Duke Energy Ohio

Final - March 23, 2016

Duke Energy Ohio
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Cincinnati, Ohio 45202

The Cadmus Group, Inc.

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Executive Summary

Duke Energy engaged Cadmus to perform a process evaluation and assess the results of Duke Energy Ohio's (DEO) impact evaluation of its Power Manager Program in Ohio. This report outlines the Program Year 2015 (PY2015) impact and process evaluation findings for the evaluation period of May 1, 2015, through April 30, 2016.

Cadmus' process evaluation included interviews with Duke Energy program managers and two sets of surveys with program participants. We fielded the event/non-event survey in the summer, immediately following curtailment events (event) and high temperature days without events (non-event), that was focused on customer response to events. We fielded a participant survey after the end of the cooling season that was focused on the overall participant experience, including topics such as awareness, enrollment, and household demographics.

For the PY2015 impact evaluation, DEO used a variety of commonly accepted, utility industry statistical practices and applications to measure and report program results. These included sample selection and validation, air conditioner duty cycle modeling, model simulations, switch device operability analysis, weather normalization, and monthly capability weighting of expected capacity. As an independent, third-party evaluator, Cadmus reviewed DEO's approaches as commensurate with standard evaluation, measurement, and verification (EM&V) industry practice.

A. Program Description

Power Manager is a voluntary residential load control program available to DEO homeowners with qualified central air conditioning. Each year, program customers receive a monthly bill credit for participating during the summer months of May through September. Participants agree to allow DEO to cycle their air conditioning units during peak periods of energy demand, when energy costs are high, or for emergency purposes when a program-induced full-shed period would aid in the reliability of delivering energy to the region. As shown in Table 1, 44,978 customers participated in PY2015.

Table 1. PY2015 Program Participation as of September 30st, 2015

Enrolled Customers	Enrolled Switches
44,978 total	47,527 total
1.5 kW option: 6,679	1.5 kW option: 7,015
1.0 kW option: 38,237	1.0 kW option: 40,446
0.5 kW option: 62	0.5 kW option[1]: 66

[1] 0.5 kW option is offered to customer who would otherwise cancel participation in the program. It is not an option available to all customers at enrollment. Due to such a small impact and low customer count, the impacts are not calculated for these customers or included in capacity numbers.

B. High-Level Process Findings

Awareness and Response to Curtailment Events

Only 40% (event/non-event survey n=172) of surveyed participants were aware that their Power Manager devices have been activated since they joined the program. Among event respondents, only 11% (n=66) of those who were at home during the event time period were aware that their device had been activated, which is statistically significantly higher than the 3% (n=36) of non-event survey respondents at home on high temperature days without events who believed there had been an event when there was not.

Similar numbers of respondents who were surveyed after events (13%, n=62) and after high temperature days without events (6%, n=36) reported that comfort levels in their home declined on the afternoon of the event or high temperature day, respectively. Among those that reported a decline in comfort (event/non-event survey n=10), the average comfort ratings declined from 8.3 before the event time period to 5.5 during the event time period, and most respondents blamed rising temperatures for their decline in comfort. Only 2% (n=102) of event survey respondents reported that the activation of their Power Manager device had caused a decline in their comfort; this finding is not significantly different from the 0% (n=70) of non-event survey respondents who reported that activation of their Power Manager device had caused a decline in their comfort during the equivalent afternoon time period.

There are no statistically significant differences in awareness of events, decline in comfort during event time periods, or associating Power Manager device activation with a decline in comfort between PY2015 and PY2013 event/non-event surveys.

More than a third of the respondents who we surveyed after the end of the cooling season (participant survey 38%, n=84) reported that they run electric fans in their home "always" or "most of the time" on weekday afternoons when the outdoor temperature is over 90°F. This is lower than the actual rate of electric fan use measured from responses to surveys conducted on hot days during the cooling season (event/non-event surveys 52%, n=104).

Only 6% (event/non-event survey n=101) of respondents adjusted their thermostats downward during the event time period, and 9% (event/non-event survey n=104) turned on electric fans during the event time period. There were no significant differences between those surveyed following events and those surveyed following high temperature days without events.

Air Conditioner Use and Maintenance

Three-quarters of respondents (participant survey 73%, n=84) reported that they use air conditioning on "most days" or "every day" during the cooling season, and 77% (n=82) reported that their home is typically occupied on weekday afternoons before 6:00 p.m. This is slightly higher than the actual summertime survey result that 61% (event/non-event survey n=172) of surveyed households were occupied during the event time period.

Only 42% (participant survey n=84) of respondents manually adjust their thermostat, while the majority either have programmed settings or leave the thermostat at the same setting all the time. Respondents' median thermostat set point for every time period during the week was 73°F to 75°F.

Two-thirds of respondents (participant survey 68%, n=80) have had maintenance performed on their air conditioning unit since joining Power Manager. Only 2% of these respondents (participant survey n=54) reported that their Power Manager device had been disconnected during maintenance and not re-connected afterwards, although 67% were not sure if their device had been disconnected or not.

Motivation for Enrollment and Understanding of the Program

The most common main reason given by participants for enrolling in Power Manager was the bill credits (participant survey 34%, n=74) followed by saving money through lower utility bills (30%).

Only 14% (participant survey n=83) indicated that something was unclear to them about how the program works, and 1% (participant survey n=83) contacted Duke Energy to find out more about the program. However, 76% (participant survey n=84) could not estimate how much they receive in bill credits from Power Manager, 69% did not know if they had received any bill credits during 2015, and 83% did not know how many events to expect per year.

Program and Utility Satisfaction

The PY2015 participant satisfaction ratings are similar to past years. In the participant survey, most respondents (58%, n=71) were "very satisfied" while only 3% were "somewhat dissatisfied" or "very dissatisfied." The result from the event/non-event survey was very similar, with 57% (n=158) of respondents giving the program a rating of "very satisfied" and only 3% giving "somewhat dissatisfied" or "very dissatisfied" ratings. Fifty-one percent (n=84) of participant survey respondents gave "very satisfied" ratings for Duke Energy overall, and only 6% were "somewhat dissatisfied" or "very dissatisfied."

The average rating for satisfaction with Power Manager using a 10-point scale was 8.5 in the participant survey (n=74) and 8.4 in the event/non-event survey (n=157). Participants' average rating for their likelihood of recommending the program were 8.4 in the participant survey (n=145) and 8.1 in the event/non-event survey (n=69). Participant survey respondents gave Duke Energy an overall satisfaction rating of 8.3 (n=84) and event/non-event respondents gave an overall rating of 8.4 (n=169).

There were no statistically significant differences in satisfaction or recommendation ratings between participants who were surveyed following curtailment events and those who were surveyed following high temperature days without events.

C. High-Level Impact Findings

DEO conducted the impact analysis of the Power Manager Program. Cadmus reviewed the results presented in this report as well as a spreadsheet with a sample of impact figures to ensure proper methodology.

The section summarizes DEO's key findings for the evaluation period.

- There were 47,527 active switches installed at the end of September 2015
- The DEO operability study conducted in 2013 revealed that Power Manager switch devices were operational at a 85.4% rate (see Table 2)
- For PY2015, the total summer Power Manager Program capacity at the plant, adjusted for peak normal weather and de-rated for operability, was 50.29 MW
- During PY2015, there were five (5) Power Manager events and two (2) test events in DEO.

Table 2. PY2015 Program Summary Table

Program Year	Active Switches as of September 30st, 2015	Summer Capacity	Operability Rate
PY2015	47,527	50.29 MW	85.4%

D. Conclusions and Recommendations

The Power Manager Program is successful as measured by multiple metrics. Participants report they are satisfied with the program, are generally not aware of curtailment events, and that events do not have a significant effect on their home comfort or on their satisfaction with the program. Additionally, participants who experience an event are not more likely to take counter-actions such as lowering thermostat temperatures, turning on secondary window or wall units, or turning on electric fans than they were on days of equivalent high temperature but no curtailment event.

While the program is functioning well overall, the evaluations revealed potential areas Duke Energy could explore to further refine program operations or expand program benefits. Following are the conclusions and recommendations resulting from Cadmus' process evaluation and DEO's impact evaluation activities.

Conclusion #1: **Participants' main motivations for enrolling in Power Manager are monetary, however few were aware of any details about these benefits.** Participant responses indicate that bill credits and lower bills motivated their participation in the program, however few participants know how much bill credit to expect, or whether they have been receiving any bill credit.

Recommendation #1: **Consider exploring payment options and marketing opportunities to raise awareness of Power Manager bill credits.**

Conclusion #2: **Monitoring customer experience through annual event/non-event surveys enhances understanding of program affects during specific summer conditions.** During PY2015, customers in the Midwest experienced moderate summer weather compared to other recent years (in general PY2012 was hotter and PY2014 was cooler). More extreme summer weather may affect participants differently, so results for a given year's surveys may not be predictive of other years. Since the scope of summer weather cannot be predicted in advance, event/non-event surveys should be fielded every year.

Recommendation #2: **Continue fielding event/non-event surveys to gauge customer response to curtailment events.**

Introduction

Power Manager is a voluntary residential load control program available to DEO homeowners with qualified central air conditioning. Each year, program customers receive bill credits for participating during the summer months of June through September. Participants agree to allow DEO to cycle their air conditioning units during peak periods of energy demand, when energy costs are high, or for emergency purposes when a program-induced full-shed period would aid in the reliability of delivering energy to the region.

Through the program, DEO allows customers to select a target load reduction of either 1.0 kW or 1.5 kW. During an event, DEO could cycle air conditioners on the 1.5 kW option off for a few minutes longer than the 30 minutes allowed for the 1.0 kW option units. Customers with more than one central air conditioner must have all units controlled in order to participate.

Two types of events may be called for a Power Manager event. First, economic events can be called on days where energy demand and/or energy costs are expected to be high, but there is not necessarily significant concern about system reliability. Second, emergency events can be called by the PJM Regional Transmission Organization when high energy usage on hot days or other conditions threaten the reliability of the transmission system. For such an event, participants' units would be cycled off and on for the duration of the Power Manager emergency event.

Power Manager participants are allowed to opt out of one event per calendar month, by notifying Duke Energy 24 hours in advance through a toll free number.

E. Methodology

The intent of our process evaluation was to document how well the program worked in practice, in order to identify and understand important influences on program operations and overall performance. Cadmus assessed the program strengths, weaknesses, areas for improvement, and use of best practices. As part of the process evaluation, we interviewed Duke Energy program staff and surveyed participants/customers (Table 4 lists the sample populations).

Program Manager Interviews

Cadmus interviewed Duke Energy staff that lead the Power Manager Program for Ohio and the larger Midwest region, to discuss the following research areas:

- Program design and implementation;
- Marketing;
- Enrollment processes;
- Event Calls;
- Quality control.

Participant and Event/Non-Event Surveys

Cadmus fielded two surveys to capture customer feedback; the first was an online participant survey (participant survey) about program participation fielded in the fall, at the end of the cooling season. For the second survey, we conducted telephone calls during the cooling season immediately following curtailment events and hot days without events (event/non-event surveys).

Participant Survey and Sample Design

Cadmus developed a customer survey for Power Manager Program participants, and lauched this via an online platform, Qualtrics, between November 12 and November 24, 2015. The survey timing was after participants had experienced control events during the summer of 2015. We randomly selected 2,000 program participants from the population of 41,895 contactable[2] participants in DEO territory, and

[2] A participant was considered contactable if all of the following were true: (1) the program record included a person's name (not a business or organization), (2) the program record included a telephone number, (3) the customer was not enrolled in the Power Manager Research Group, (4) the customer was not on Duke Energy's do-not-call list, and (5) the customer had not been contacted for any other evaluation surveys in the previous six months.

invited 854 of those customers with a valid email address to take the survey. Cadmus closed the online survey after two weeks, when we had a sample large enough to meet the targeted precision level.[3]

Event/Non-Event Survey and Sample Design

Cadmus conducted telephone surveys immediately after program control events to collect participant information. We maintained these surveys in a "ready-to-launch" status until being notified of a curtailment event affecting switches used by Duke Energy. Then we launched the surveys following the end of the control event, and continued them until the next evening, attempting all calls during regular surveying hours (10:00 a.m. to 8:00 p.m. Eastern Standard Time [EST], Monday through Saturday). For example, if a control event occurred on a Monday and ended at 5:00 p.m., survey calling hours for that particular event would be:

- Monday 5:00 p.m. – 8:00 p.m. and
- Tuesday 10:00 a.m. – 8:00 p.m.

Cadmus made event survey calls following curtailment events on July 17, July 28, July 29, and September 1, 2015 (the September 1 event was a one-hour PJM test event). We surveyed 102 participants in DEO territory (20 following the PJM test event and 82 following regular events), exceeding the target needed to meet a minimum ±10% precision with 90% confidence for the event survey respondents.

Cadmus also surveyed Power Manager participants on hot days without events. Since there was no activation period for these non-event surveys, we asked respondents about their activities and comfort level between 2:00 p.m. and 5:00 p.m. on the day of high temperature, a time period that is similar to the normal curtailment event time periods. We conducted the non-event surveys following non-event days when the outdoor high temperature was at least 90°F (September 2, September 3, and September 8, 2015). Cadmus surveyed 70 participants in DEO territory, exceeding the target needed to meet a minimum ±10% precision with 90% confidence for the non-event survey respondents.

The schedule of Power Manager event/non-event surveys for DEO are shown in Table 3, along with the high temperatures on those dates.[4]

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[3] Based on the size of the population being surveyed, a sample of at least 68 respondents was necessary to achieve a precision of ±10% or better with 90% confidence. Although the survey achieved the sampling goal of 90/10, precision estimates vary for individual survey questions depending on the number of respondents who answered the individual question and the distribution of their responses.

[4] These high temperatures were recorded at the Cincinnati/Northern Kentucky International airport (airport code CVG) for those dates, as reported in the historical temperature data archive at http://www.wunderground.com/.

Table 3. Schedule of PY2015 DEO Events and Non-Event High Temperature Days

Event ID	Type	2015 Event or Non-Event Date	Event Hours	2015 Survey Dates	Completed Surveys	High Temp-erature
OH-event1	Event	July 17	2:30 – 4:00 p.m.	July 17-18	34	89
OH-event2	Event	July 28	3:30 – 6:00 p.m.	July 28-29	27	92
OH-event3	Event	July 29	2:30 – 5:00 p.m.	July 30	21	91
OH-event4	Event (1 hour PJM test event)	September 1	3:30 – 5:00 p.m.	September 1-2	20	89
OH-nonevent1	Non-event	September 2	N/A	September 3	18	90
OH-nonevent2	Non-event	September 3	N/A	September 3-4	18	92
OH-nonevent3	Non-event	September 8	N/A	September 8-9	34	90

Survey Response Rates and Precision

Table 4 summarizes the response rates and achieved precision levels for the participant surveys and event/non-event surveys. Cadmus exceded the targeted number of completed surveys for all respondent groups.

Table 4. Process Evaluation Data Collection and Analysis

Evaluation Component	Population	Attempted Contacts	Achieved Completes	Response Rate	Precision at 90% Confidence
Program Managment Staff	N/A	1	1	1	N/A
Participating Customers - Participant Surveys	44,764	854	84	10%	±9.0%
Participating Customers - Event/Non-Event Surveys	44,764	2,771	172 (102 event, 70 non-event)	6%	±6.3% all surveys ±8.1% event ±9.8% non-event

F. *Program Manger Interviews*

Cadmus interviewed the program manager to gain an in-depth understanding of the program and to identify its successes and challenges. Results of these discussions follow below, presented by topic.

Program Design and Implementation

DEO calls Power Manager events in order to reduce load when there is peak demand. Although the program manager for the Midwest manages three territories, program operations are specific to each, based on different program goals, state regulations, and technology infrastructure.

The program manager reports that GoodCents is the contractor that installs, removes, and maintains switches for Power Manager in the Midwest. Duke Energy maintains the pager system which transmits control signals to switches, rather than using a contractor for this service.

The program manager reported that Duke Energy is seeking to maintain the load reduction capacity of the program in Ohio.

Marketing

The program manager reported that during PY2015, most outreach for the Power Manager Program was conducted through outbound calling using vendor CustomerLink. The program manager reported that telephone contact has increased the recruitment rate because customers are able to pose questions directly to a representative.

This point was further illustrated when a mail marketing effort to 10,000 customers in June 2015 in conjunction with the HōM Energy Manager Program resulted in only 24 new enrollments. The program manager said that since the Power Manager and HōM programs are both more complicated than most energy efficiency programs, customers are less likely to enroll without being able to ask a representative their program questions.

At this time, Duke Energy does not co-brand or co-market Power Manager with other energy efficiency programs. The program manager stated that a future goal for the utility is to leverage AMI data to target customers for demand response quality control inspections.

Historically, mailings from Duke Energy were the most important channel for recruiting customers to enroll in the program, and most of the current participants recalled learning about the program through the mail (see Figure 1 in the Program Awareness section below).

Enrollment Process

Customers may enroll in Power Manager over the phone, by mail, e-mail, or online. During PY2015, DEO focused on recruiting new participants using telephone and e-mail channels. Once the customer provides their enrollment information, installation vendor GoodCents is able to transmit the information automatically to their work management system.

The current participant dropout rate is around 1% per year according to the Duke Energy program manager, although the rate of recruiting new participants is similarly low. There were 43,928 Ohio customers enrolled in Power Manager according to the PY2013 evaluation, and there were 44,764 participating customers in PY2015, for a net increase of 1.9% over two years.

Duke Energy pays customers who enroll in Power Manager a one-time incentive of $35 for choosing the 1.5 kW option, or $25 for choosing the 1.0 kW option. Duke Energy also provides a minimum annual bill credit for participating in the program of $8.00 per device for the 1.5 kW option, $5 for the 1.0 kW

option, and $3.00 for the 0.5 kW option.[5] Monthly bill credits are calculated and paid throughout the cooling season as events occur, based on the customers' kW option, the length of events, and price of electricity. However, recent summers have had relatively few high temperature days, and therefore there have been fewer curtailment events. For several years, Ohio participants have been receiving the minimum annual credit, with the balance due after summer monthly payments are applied to their final bill of the season (usually received in October). Current marketing practices do not focus on energy or monetary savings since the program does not deliver significant savings in either of these areas.

Event Calls

Duke Energy program managers meet weekly with their Demand Response Team and company market price planners to determine whether to call an economic curtailment event. Key inputs for this decision include the wholesale price of generation capacity, local weather forecasts (including high temperatures, humidity, and storm activity), as well as Duke Energy's capacity needs and any extraneous considerations such as local outages or maintenance on transmission lines. The program manager reports that the customer experience is a key consideration, and close attention is paid to the length and frequency of events so as to minimize any inconvenience to participants. Events are timed to maximize their impact by activating switches during peak demand hours for the service territory, which is most often from 2:30 p.m. to 5:00 p.m. EST in the DEO territory.

For the PY2015 cooling season, Duke Energy called five curtailment events for the general population of participants: one event occurred on July 17, 2015, two occurred on the consecutive days July 28 and 29, 2015, a PJM test event occurred on September 1, 2015 and the last event occurred on September 4, 2015. Duke Energy also called three curtailment events for their logger research group, which did not affect most program participants.[6]

Quality Control

DEO assures quality for all aspects of the program through internal monitoring and study, and through implementer activities.

Duke Energy staff is able to monitor the load reduction impact of curtailment events in nearly real-time, by observing internal load shapes provided by the utility's system operating center.

Duke Energy performed switch operability and air conditioner duty cycle studies in the past, but operability studies will be performed by Nexant beginning in PY2016.

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[5] Customers may not enroll in the program at the 0.5 kW level, but if a participant asks to have their Power Manager device removed, the customer service representative will offer them the option of reducing their kW option instead of leaving the program. Thus, there is a monthly minimum annual payment for the 0.5 kW option, but no enrollment incentive (as these customers were already enrolled and had received an incentive at that time). For PY2015, only 61 Ohio customers were enrolled at the 0.5 kW level.

[6] Cadmus removed these research group participants from the survey sample.

The scope of work for program implementer GoodCents was revised effective January 1, 2016, to provide additional checks and balances to improve data entry, verification and reporting. These changes include a new work order management system.

In response to past disruptions in the supply chain affecting the availability of Eaton Cooper switches, Duke Energy maintains an inventory of switches sufficient to supply the program for at least three months. The program manager reports that this was done because they cannot control extraneous events that affect the global supply chain, and also that the switch availability has improved in PY2015.

G. Participant Surveys

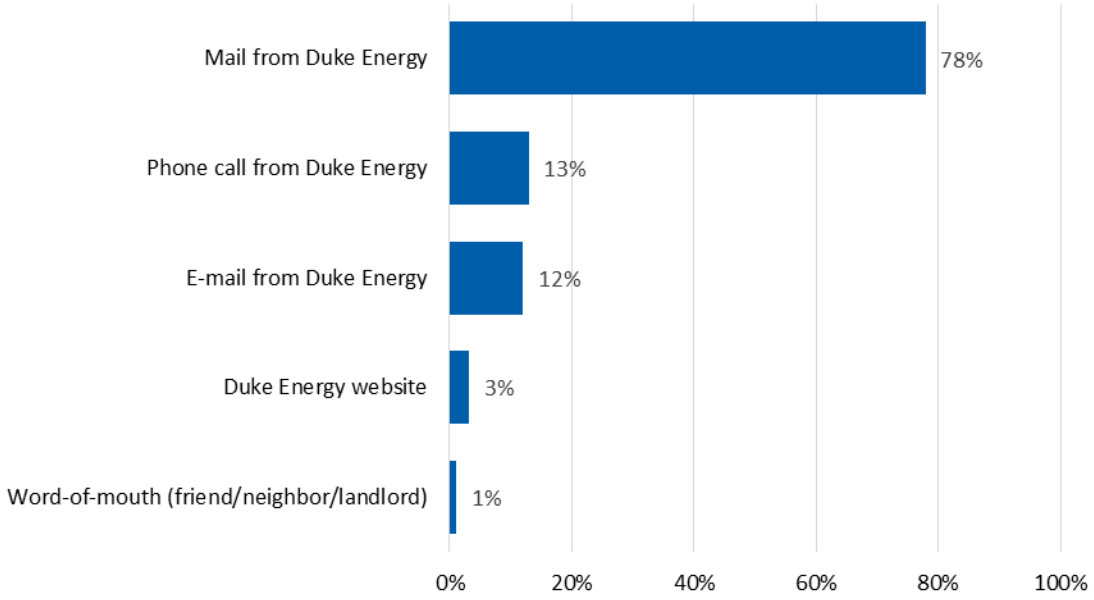
Cadmus analyzed feedback from online surveys completed by 84 Duke Energy customers who participated in the Power Manager Program in PY2015. These participant surveys were designed to cover program-level topics such as awareness, enrollment, and household demographics that are not related to specific curtailment events. Power Manager event/non-event surveys are summarized separately, in the Event/Non-Event Surveys section of this report.

This section presents the results of our analysis by topic. Except where noted, we excluded "don't know" and "refused" responses, which is reflected in accompanying n-values.

Program Awareness

In order to qualify for the survey, respondents had to confirm that they were aware of their household's participation in the Power Manager Program. Most survey respondents (94%; n=79) were involved in their household's decision to participate in the program, while 1% were not involved and 5% joined the program by moving into a home that already had a Power Manager device installed by a previous occupant. Figure 1 shows that most participants who were involved in the decision to join the program first learned about Power Manager through mailings from Duke Energy (78%), with the next most common channels being phone calls (13%) and emails (12%) from Duke Energy .

Figure 1. Source of Power Manager Program Awareness

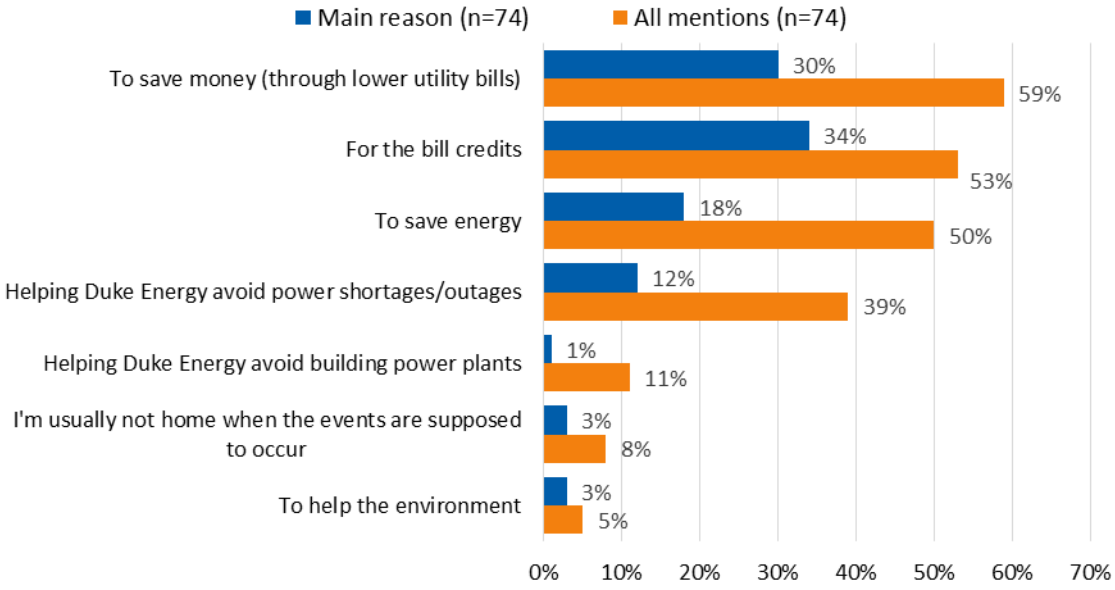


Source: Participant Survey Question B2. How did you hear about the Power Manager Program? Multiple responses permitted (n=69 respondents involved in household decision to join program).

Program Enrollment

Cadmus asked participants who were involved in the decision to join the program for the reasons they joined the program, first giving a single main reason, then any additional reasons (shown in Figure 2). About one-third (30%; n=74) of respondents mentioned saving money through lower utility bills as their main reason for joining the program, but the largest response was 34% who specifically mentioned the bill credits. Respondents also mentioned saving energy (18%) and avoiding power shortages (12%). When all reasons are combined, saving money, bill credits, and saving energy were each mentioned by 50% or more of survey respondents, followed by 39% who mentioned avoiding power shortages. Eleven percent mentioned building fewer power plants, and only 5% mentioned helping the environment as a reason for their participation.

Figure 2. Reasons for Joining the Power Manager Program



Source: Participant Survey Questions B3 and B4. What was the main reason why you chose to participate in the program? (single response) and Were there any other reasons why you chose to participate in this program? (multiple response permitted; n=74 respondents involved in household decision to join program).

Cadmus asked the four respondents who mentioned helping the environment as a reason for their participation what they meant by this response, and only one provided an explanation, saying: "we waste a lot of unnecessary energy."

We asked respondents who were involved in their household's enrollment to rate their satisfaction with the enrollment process on a 10-point scale, where 10 is very satisfied and 0 is very dissatisfied. Most (76%; n=71) gave a high rating of 9 or 10, and the overall mean rating was 9.0. Only two participants surveyed in Ohio rated their satisfaction with enrollment lower than 5. When we asked for the reason(s) for their dissatisfaction, one respondent, who gave a rating of 0, said, "They just informed us that they were doing it, and that was it; I don't remember it being a choice." The other respondent gave a rating of 4, but did not explain the reason for this rating.

Understanding of the Program

During the time of program enrollment, Duke Energy provides new participants with information about how the program works. When asked if they recalled this information, 81% (n=74) of respondents confirmed that they did. [7]

[7] We did not ask this question of participants who joined the program by moving into a home that already had a device installed by a previous occupant.

For respondents who recalled receiving information about the program, we asked them to rate their satisfaction with the information they received on a 10-point scale, where 10 is very satisfied and 0 is very dissatisfied. Seventy-two percent (n=58) gave a high rating of 9 or 10, and the overall mean rating was 8.9. Two respondents rated their satisfaction at 4 or less, both rating it as a 3, so we asked the reason for their low satisfaction. One of these respondents said, "I would like a report with my bill showing me the times that my air conditioner was turned off." The other respondent did not provide an explanation for their dissatisfaction.

When asked, 14% of respondents (n=83) indicated that something was unclear to them about how the program works. Four of these 12 respondents merely expressed a general lack of knowledge of "how the program works," while three specifically wanted to know when or how often their devices are activated, and three were concerned about a lack of notification or feedback from Duke Energy. Another respondent did not know where to look for program credits on their bill, and one recalled joining Power Manager but did not know if it was still ongoing. Some specific questions raised by respondents include:

- When are devices activated?
- How often are devices activated?
- How do participants know when devices are activated?
- Does Duke Energy notify participants when devices are activated?
- How does this program save energy?

Only one Ohio respondent (1%; n=83) reported having contacted Duke Energy to find out more about the Power Manager Program. This respondent used the telephone to reach a Duke Energy representative, but did not provide a rating for the ease of reaching a Duke Energy representative.

Bill Credits

Cadmus asked all survey respondents to estimate the total annual amount of bill credit they receive for participating in Power Manager, and 76% (n=84) did not know. Among the 24% who provided estimates,

responses ranged from zero to $500, with an average estimate of $50.32 and median of $12.50.[8] These responses tend to overestimate the amount of annual bill credits.[9]

Only 19% (n=84) of respondents said they received bill credits during PY2015, while 12% said they did not receive any credit for the program, and 69% did not know if they had received any credit. Among those who recalled receiving bill credits, 31% (n=16) could not recall how many times they noticed a credit for Power Manager on their bill, while 25% recalled a credit on one bill, 31% recalled a credit on two bills, and 13% recalled a credit on three or more bills.

Awareness of Device Activation

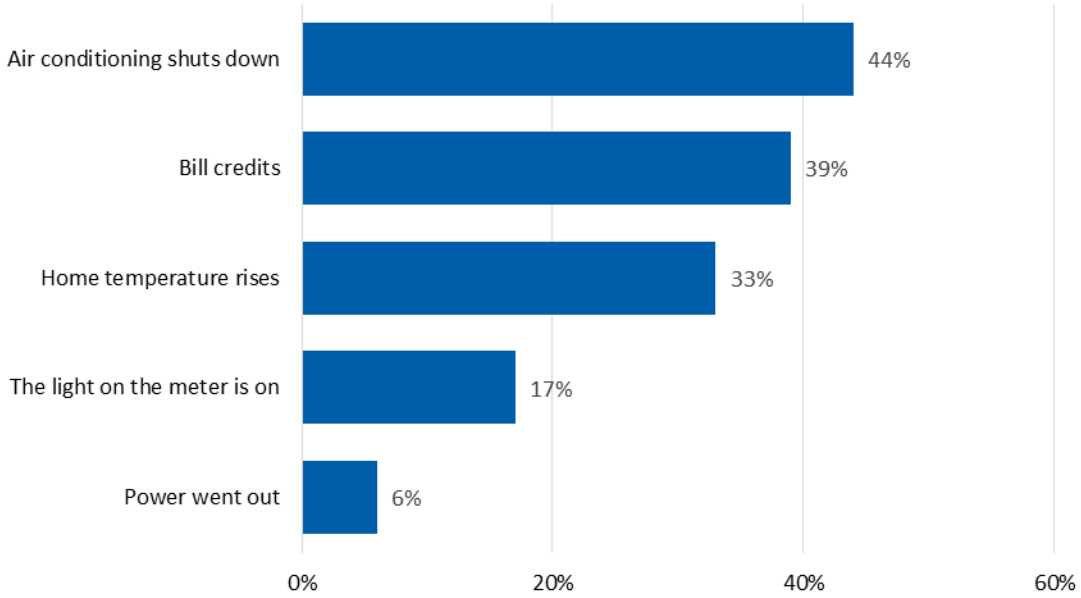
Cadmus asked respondents how many times per year Duke Energy said they would activate the Power Manager device (i.e., call an event). Only 17% (n=83) of respondents were able to answer this question, while the rest did not know. Among those who answered, the number of expected events ranged from zero to "every day," with zero being the most common response (38%; n=8). The mean number of expected events was three per year and the median was 2.5 per year.

Only 24% (n=80) of surveyed participants were aware of any times their devices have been activated since they joined the program. Figure 3 shows that 44% of these respondents (n=18) reported that they could tell an event occurred because their air conditioning "shut down" temporarily, while 39% noticed credits for events on their bills, and 33% mentioned rising temperatures in the home. One respondent became aware of an event due to a power outage, saying, "My electric clocks were wrong."

[8] When we remove the respondent who estimated $500 in annual bill credits as an outlier, the average estimate from the remaining participants is $26.65, and the median is $10.

[9] The minimum annual bill credits are $3.00 for the 0.5 kW target cycle option, $5.00 for the 1.0 kW option, and $8.00 for the 1.5 kW option. Monthly bill credits are calculated and paid throughout the cooling season as events occur, based on the customers' kW option, the length of events, and price of electricity. However, recent summers have had relatively few high temperature days, and therefore there have been fewer curtailment events. For several years, Ohio participants have only been receiving the minimum annual credit, with the balance due after summer monthly payments are applied to their final bill of the season (usually received in October). The one-time enrollment incentive is $25 for the 1.0 kW option and $35 for 1.5 kW (customers may not enroll at the 0.5 kW level).

Figure 3. Reasons for Awareness of Device Activation



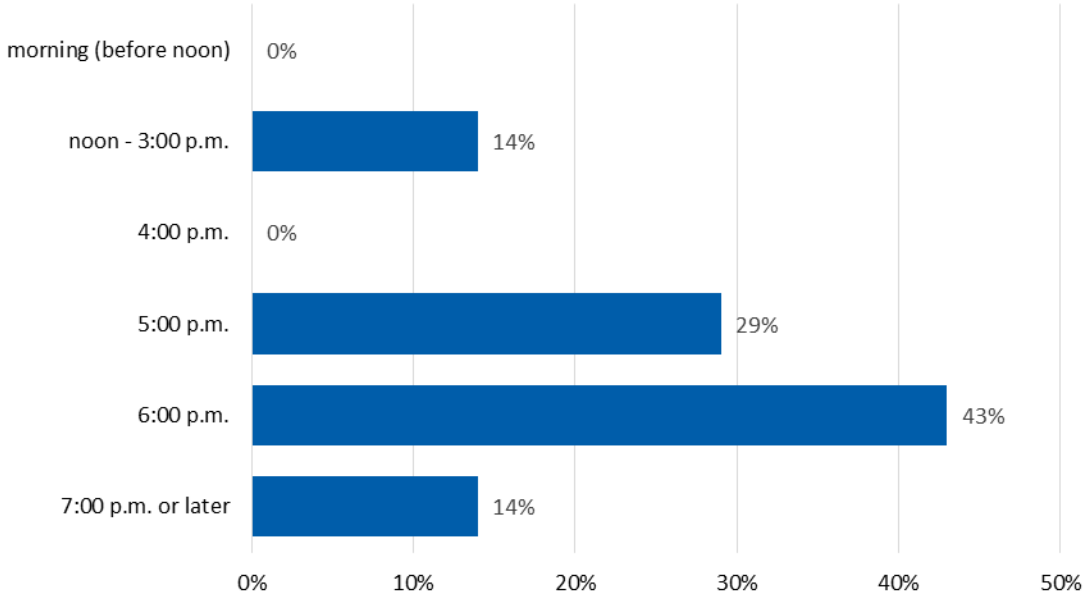
Source: Participant Survey Question D2. What happened that made you believe that the device had been activated? Multiple responses permitted (n=18 who were aware their device was activated).

Cadmus asked respondents who were aware of their devices being activated since joining the program how many times Duke Energy had activated their devices during the summer of 2015. Half of these respondents (47%; n=19) were able to provide a number, with estimates ranging from zero to 10 events, and an average estimate of 2.4 events with a median estimate of one event. Duke Energy called five curtailment events that affected the entire population of program participants in Ohio during PY2015.

We then asked these same respondents how long Duke Energy is controlling the air conditioning when devices are activated. A minority (37%; n=19) were able to answer the question, with responses ranging from 30 minutes to 4 hours. The mean estimate was that events last 1.9 hours and the median estimate was 2 hours, which closely matches the actual event lengths in PY2015 of 2.5 hours and 1.5 hours.

Cadmus also asked these same respondents who were aware of device activation what time of day events generally end. Only 37% (n=19) were able to answer the question, and their responses ranged from 2:00 p.m. to 10:00 p.m. Figure 4 shows the complete distribution of responses from those who were able to answer. The median response was 6:00 p.m., which corresponds to the latest PY2015 event end time that occurred in Ohio (other events ended earlier at 4:00 p.m. or 5:00 p.m.).

Figure 4. Respondents' Perception of When Events Typically End



Source: Participant Survey Question E7. On a day when Duke Energy activates your Power Manager device, at what time of day do you think that they usually de-activate the control devices and stop controlling your air conditioner? (n=7 who were aware of device activation).

Response to Device Activation

We asked respondents who were aware that their device has ever been activated if they were at home during any events that occurred during 2015, and nine said they were. These respondents rated the comfort level in their home before and during the period when they believe their devices were activated, using a scale of 0 to 10 where 0 means very uncomfortable and 10 means very comfortable. The average rating for comfort before the perceived event was 8.4, and the average comfort rating during the event was 7.9. Nearly half of these respondents (44%; n=9) reported that their comfort declined during the event, with the largest decline being 2 points on the 10-point rating scale.

Cadmus asked the four respondents who reported a decline in comfort during a PY2015 event what they thought had caused this decline, and all four cited rising indoor temperatures. We also asked these respondents how long it took for their comfort level to return to normal after they believe their device had been activated; two reported that it took less than one hour, and the other two said it took one to two hours.

We asked all nine respondents who believe they were at home during an event in 2015 how many times device activation may have affected their comfort during the summer. Responses ranged from zero up to five times, with a mean of being affected 1.9 times and a median of one time.

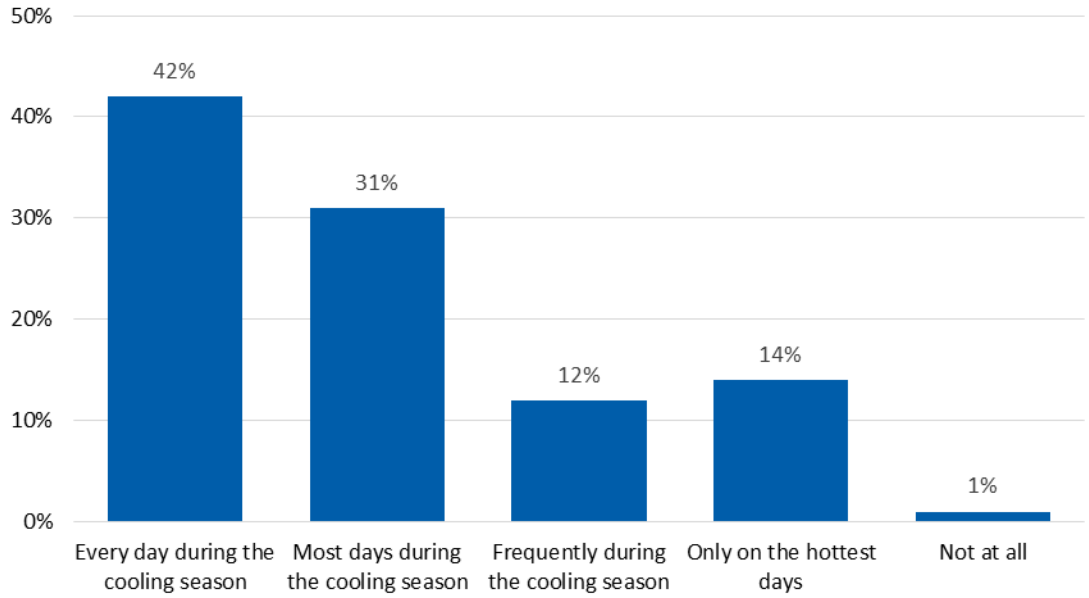
Seven of the nine respondents who believe they were at home during a 2015 event did not do anything in response to the perceived device activation. One respondent turned on fans and another drank a cool

beverage. None of the surveyed participants made thermostat adjustments during the event time period.

Air Conditioner Use

Survey respondents routinely use their air conditioners throughout the cooling season, and are therefore more likely to be affected by curtailment events. Figure 5 shows that 73% (n=84) of respondents use their air conditioning every day or most days during the cooling season, and only 1% said they do not use their air conditioning at all.

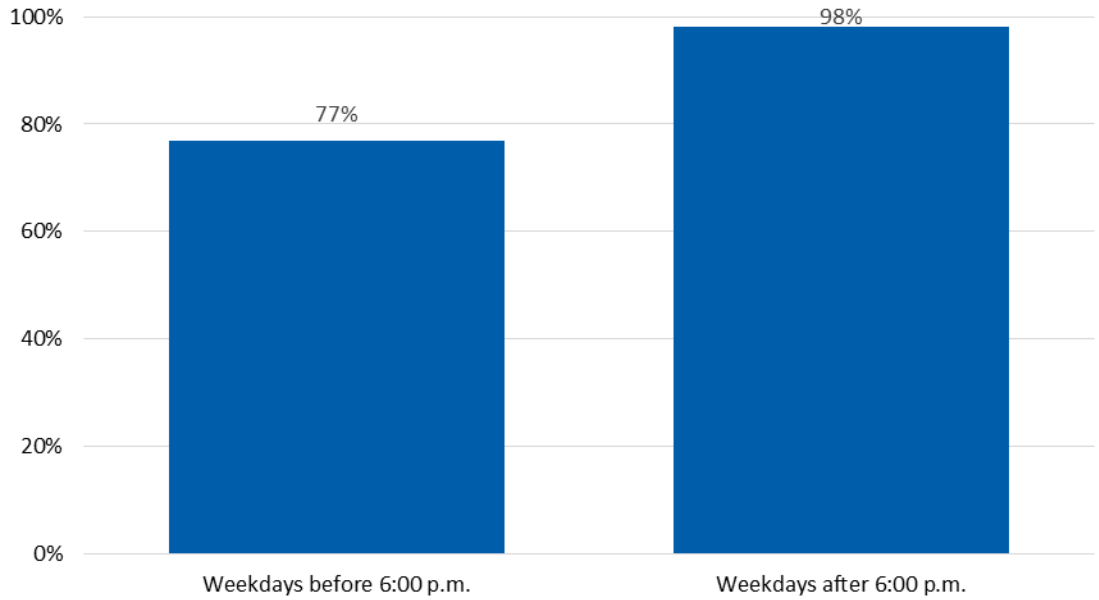
Figure 5. Respondents' Air Conditioner Use



Source: Participant Survey Question G1. How often do you use your central air conditioner? Would you say you use it ...? (n=84).

Figure 6 shows that 77% of surveyed participants (n=82) reported typically using their air conditioning to keep someone comfortable in the home on summer weekday afternoons before 6:00 p.m., and virtually all (98%; n=83) typically use air conditioning in the evenings after 6:00 p.m.

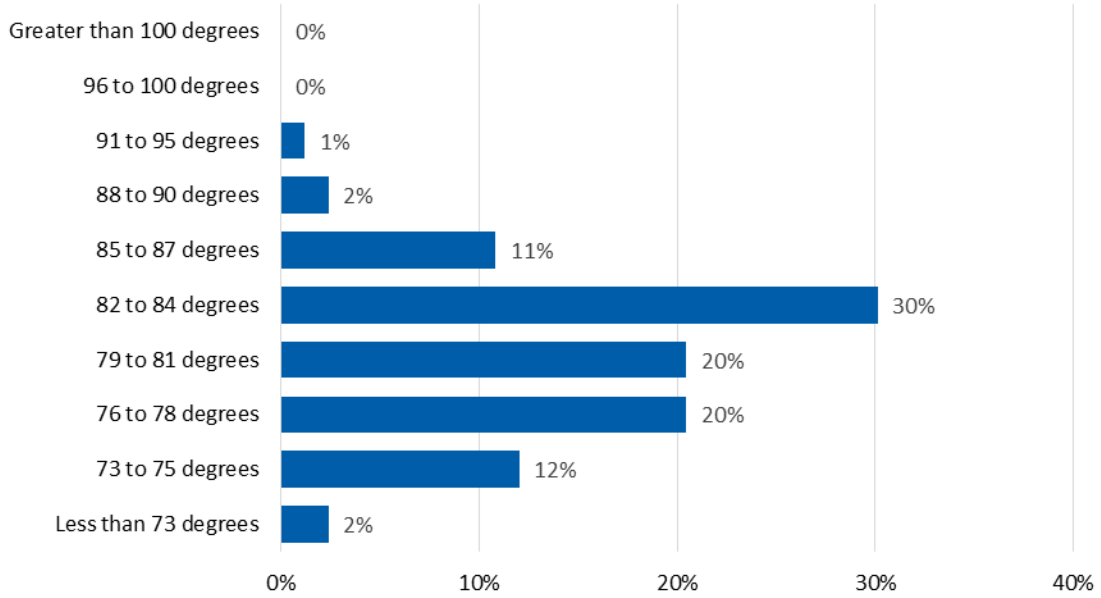
Figure 6. Air Conditioner Use by Time of Day



Source: Participant Survey Questions G6 and G7. Is the air conditioner typically used to keep someone at home comfortable during weekday summer afternoons before 6:00 p.m.? (n=82) and Is the air conditioner typically used to keep someone at home comfortable during weekday summer afternoons after 6:00 p.m.? (n=83).

Personal comfort levels vary, so Cadmus asked respondents at what outdoor temperature they start to feel uncomfortable in their home, and at what outdoor temperature they tend to turn on their air conditioner. Figure 7 indicates that the median outdoor temperature at which respondents start to become uncomfortable is around 80°F, and 99% (n=83) say they are uncomfortable when the outdoor temperatures reaches 88°F to 90°F.

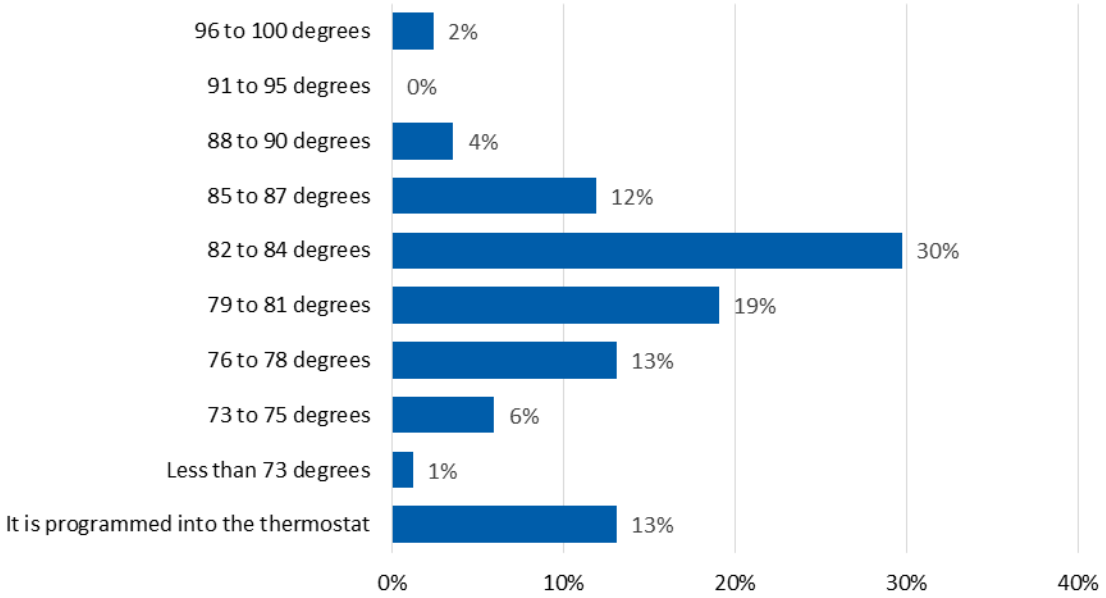
Figure 7. Outdoor Temperature at which Respondents Start to Feel Uncomfortable in their Home



Source: Participant Survey Question G8. When you think of a typical hot and humid summer day, at what outside temperature do you tend to feel uncomfortably warm in your home? (n=83).

Only one respondent (1%; n=84) turns on their air conditioner when the outdoor temperature is less than 73°F, while 98% tend to turn on their unit before the outdoor temperature has reached 96°F (Figure 8). Some respondents (13%; n=84) did not respond with a specific temperature, but said their air conditioner is programmed to turn itself on when the indoor temperature reaches a set point. Among those who answered with a specific temperature, the median response was 82°F to 84°F, one category higher than the median response for the outdoor temperature at which they tend to become uncomfortable in their home.

Figure 8. Outdoor Temperature at which Respondents Turn on Air Conditioners

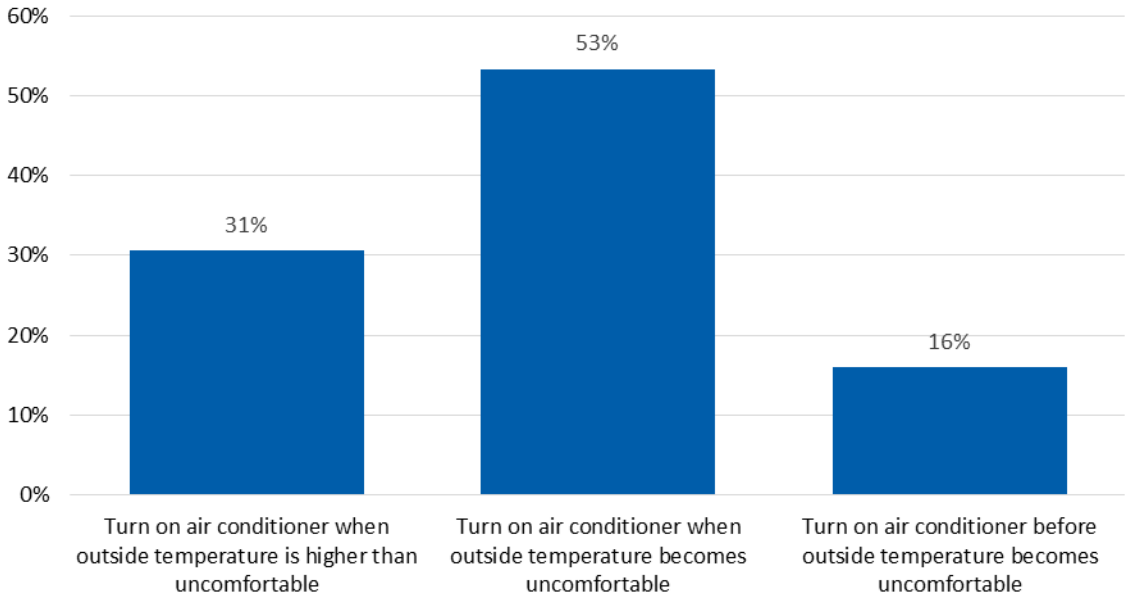


Source: Participant Survey Question G9. At what outside temperature do you tend to turn on the air conditioner? (n=84).

Respondents who said their thermostat is programmed, rather than providing a temperature at which they turn their unit on, were equally likely to report that they program their thermostat based on when the weather gets hot (55%; n=11) or on the season or time of year (45%).

Cadmus cross-tabulated the survey responses to questions about the outdoor temperature at which a respondent becomes uncomfortable with the temperature at which they turn on their air conditioning (Figure 9). The largest percentage of respondents tend to turn on their air conditioner at the same temperature they tend to become uncomfortable (53%; n=75), while 31% turn on their air conditioner when the outdoor temperature is higher than the temperature at which they become uncomfortable, and 16% turn on their air conditioning before the temperature becomes uncomfortable.

Figure 9. Uncomfortable Outdoor Temperature Compared to Temperature at which Air Conditioners are Turned on



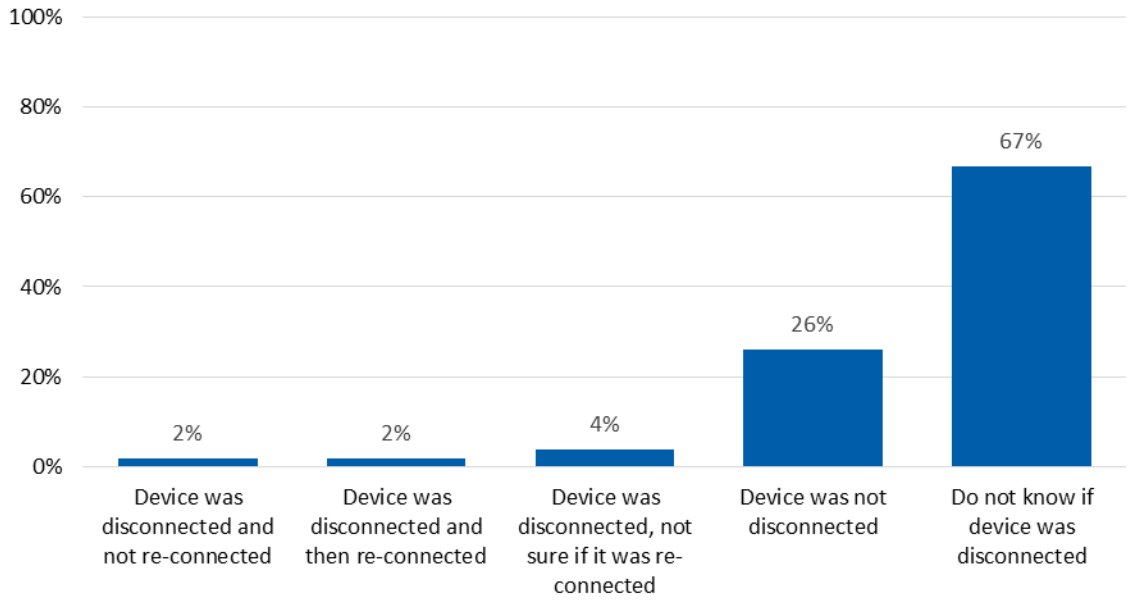
Source: Participant Survey Questions G8 and G9. When you think of a typical hot and humid summer day, at what outside temperature do you tend to feel uncomfortably warm in your home? and At what outside temperature do you tend to turn on the air conditioner? (n=75 who gave a numeric response to both questions).

Air Conditioner Maintenance

Two-thirds of respondents (68%; n=80) reported they have had maintenance performed on their central air conditioning since joining the Power Manager Program. As shown in Figure 10, most of the participants who had their units serviced (67%; n=54) did not know if their Power Manager device was disconnected during maintainence, while 7% reported that their devices were disconnected and 26% reported they were not.[10] Only one of these survey respondent (2%; n=54) said their Power Manager device was disconnected during maintenance then not reconnected afterwards. This respondent explained why the device was not reconnected: “The technician said they won't connect anything that is not theirs.”

[10] Eight percent shown in table due to rounding.

Figure 10. Disconnecting Power Manager Devices for Air Conditioner Maintenance

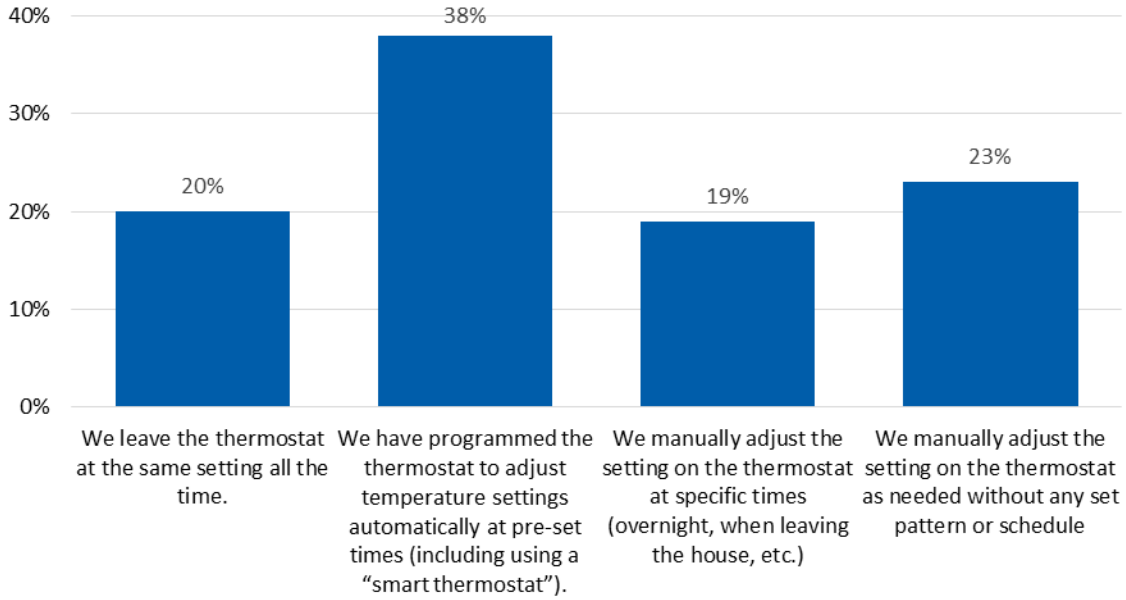


Source: Participant Survey Questions G3 and G4. Was the Power Manager device disconnected while your air conditioner was being serviced? (n=54) and Was the Power Manager device re-connected after completing service on the air conditioner? (n=4 who said yes to G3).

Thermostat Settings and Electric Fan Use

Cadmus asked respondents how they make adjustments to their thermostat, and 20% (n=84) said they leave their thermostat on the same temperature setting all the time (Figure 11). Another 38% programmed their thermostat to make adjustments automatically (including the use of smart thermostats), while the remaining 42% make manual adjustments. Participants who make manual adjustments are about equally split between those who make adjustments at specific times (19%) and those who make adjustments "as needed" without a pattern or schedule (23%).

Figure 11. How Respondents Adjust their Thermostat

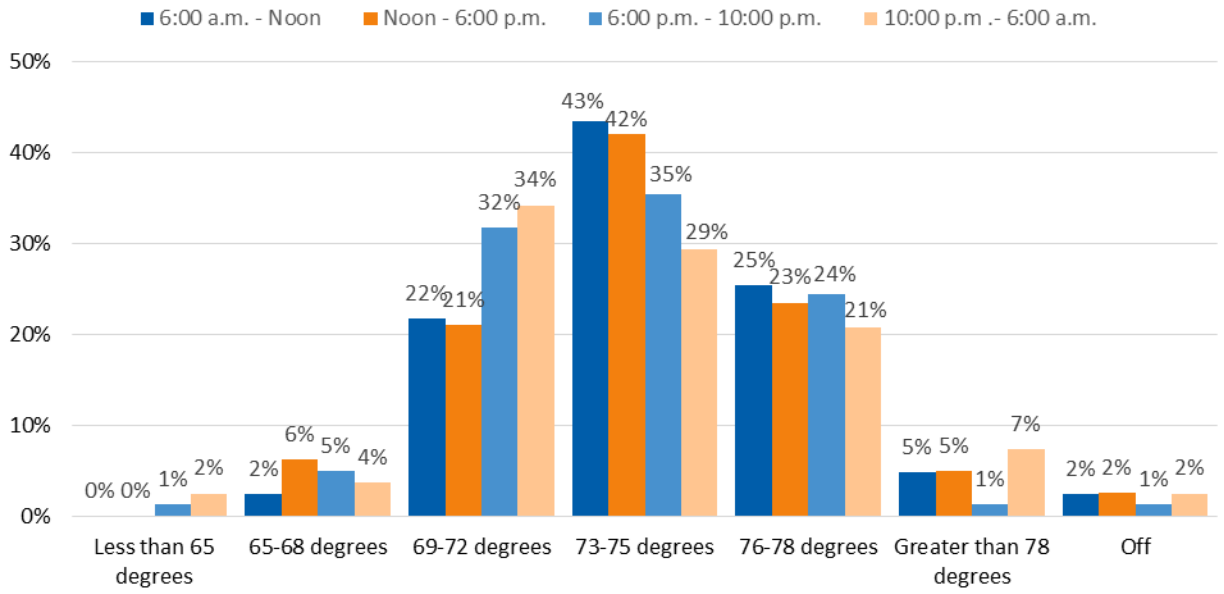


Source: Participant Survey Questions G11. Which of the following best describes how you control the temperature in your home during the summer? (n=84).

Cadmus asked respondents a series of follow-up questions to determine thermostat settings throughout the week. Figure 12 shows that only two respondents surveyed in Ohio set their thermostat lower than 65°F on summer weekdays (2%; n=82 for 10:00 p.m. to 6:00 a.m. time period), while no more than 10% normally have their thermostats set higher than 78°F or turned off. For most sets of times we asked about during the weekday, the largest share of respondents (35% to 43%) set their thermostat between 73°F and 75°F, and several respondents (35%) set their thermostat to 69°F to 72°F degrees overnight. Although many respondents keep consistent thermostat settings throughout the week, the overall pattern shows a clear shift toward lower thermostat set points during the 6:00 p.m. to 10:00 p.m. and 10:00 p.m. to 6:00 a.m. time periods, when participants are most likely to be at home using air conditioning (see Figure 6).

Cadmus also asked respondents about their weekend thermostat set points, and the distribution of responses was almost identical to their weekday set points.

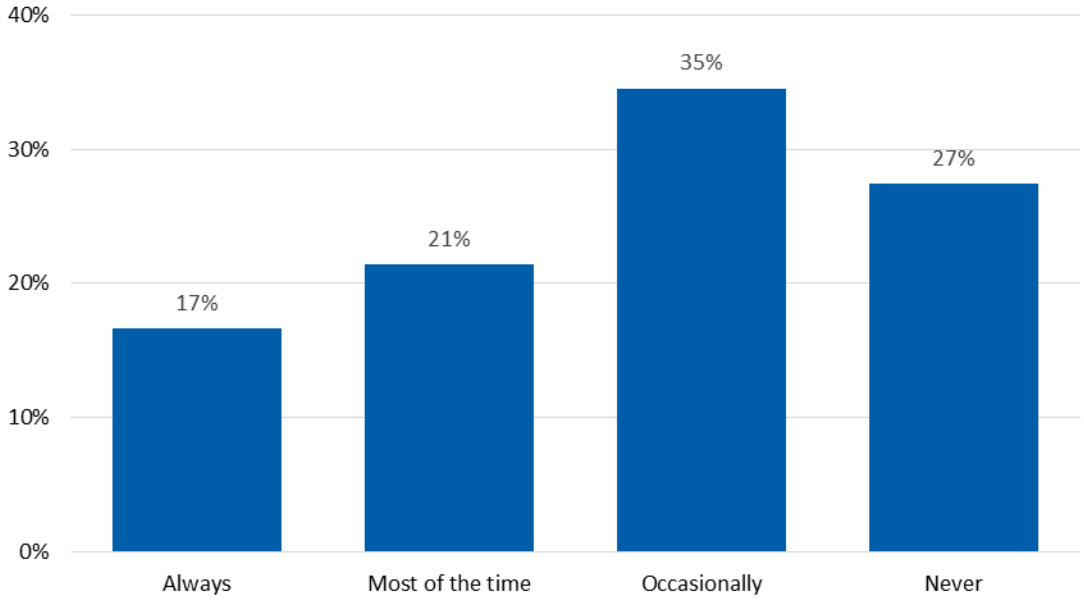
Figure 12. Respondent Thermostat Settings by Time of Day on Weekdays



Source: Participant Survey Questions G12-G16 combined (n=81 to 83 per question).

Figure 13 shows that respondents commonly use electric fans on hot weekday afternoons. More than one-third (38%; n=84) reported that they run electric fans running at least "most of the time" in the afternoon when the outdoor temperature is in the 90s, including 17% who "always" have fans running at such times. Only 27% said they "never" use electric fans in their home.

Figure 13. Electric Fan Use on High Temperature Weekday Afternoons

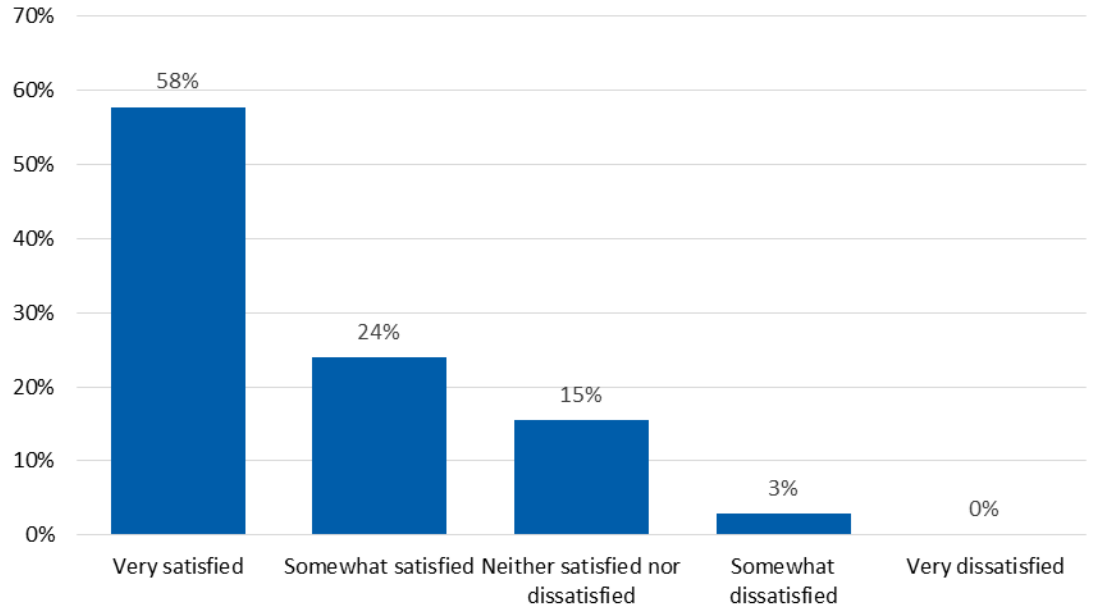


Source: Participant Survey Question G22. On a weekday afternoon when the outdoor temperature is in the 90s, how often do you use electric fans to keep cool in your home? Would you say that you have fans on... (n=84).

Satisfaction with the Program

Cadmus asked respondents to rate their overall satisfaction with the Power Manager Program on a five-point scale, where 5 indicates being "very satisfied." Figure 14 shows that 58% of respondents (n=71) were "very satisfied" with their participation in Power Manager. Only 3% were "somewhat dissatisfied," and no respondents were "very dissatisfied." Of those who were "somewhat dissatisfied," one said they never know when Duke Energy is activating their device and the other reported the bill credit was small.

Figure 14. Power Manager Program Satisfaction Ratings



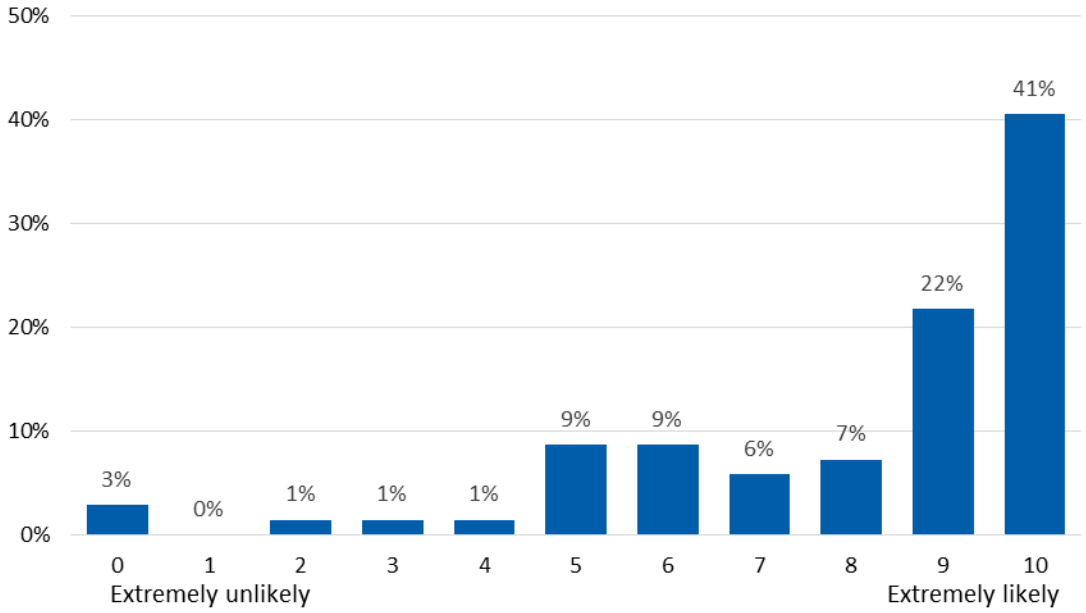
Source: Participant Survey Question F3. How would you rate your overall satisfaction with the Power Manager Program, would you say you were…? (n=71).

In order to have a comparable satisfaction rating to Duke Energy programs in other territories, Cadmus also asked respondents in Ohio to rate their satisfaction with the program on a scale from 0 to 10, where 10 is very satisfied. Respondents' mean rating on this 10-point scale was 8.5 (n=74) and the median rating was 9.

Cadmus also analyzed program satisfaction scores for different subgroups of respondents in order to identify contributing factors. Participant survey respondents did not give significantly different satisfaction ratings if they were aware of their devices being activated, aware of receiving bill credits in 2015, or if they reported a decline in comfort ratings during a perceived event. Some factors that were associated with lower satisfaction ratings include moving into a home where a Power Manager device was already installed (6.0; n=2) and being unclear about how the program works (7.0; n=8). Both of these groups of respondents gave average satisfaction ratings that were more than one point lower than the average rating given by all respondents.

Cadmus asked respondents how likely they are to recommend the Power Manager Program to others, also using a scale from 0 to 10 where 10 is most likely to recommend. As shown in Figure 15, 41% (n=69) gave the highest possible rating of 10. The average recommendation rating was 8.1, and the median rating was 9.

Figure 15. Likelihood of Recommending Power Manager

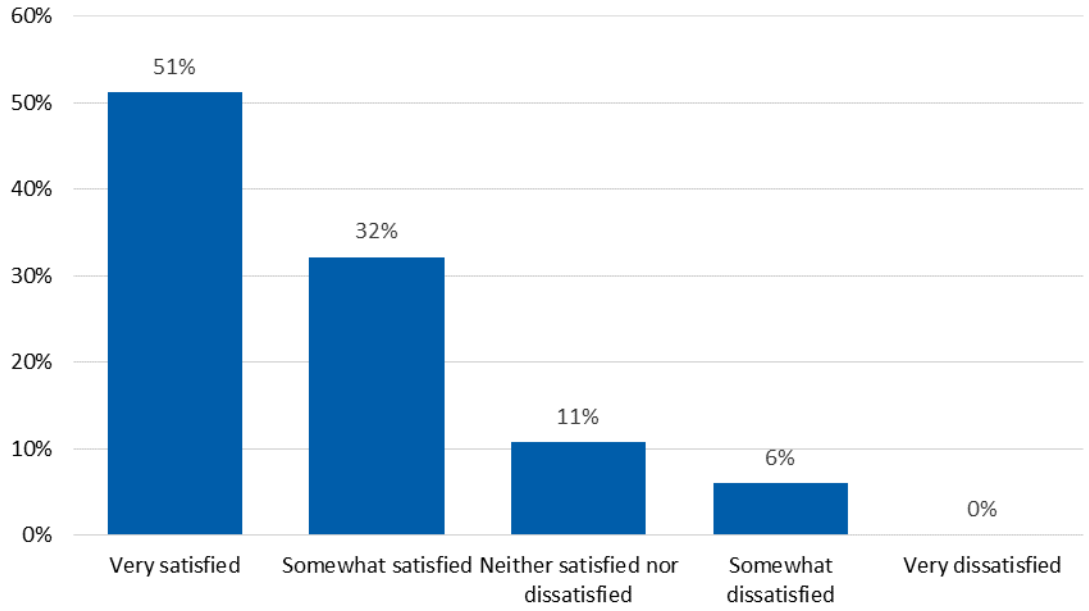


Source: Participant Survey Question F5. Using a scale of 0 to 10, where 0 means "extremely unlikely and 10 means "extremely likely," how likely is it that you would recommend this program to a friend, neighbor, or co-worker? (n=69).

Satisfaction with Duke Energy

Cadmus asked respondents to rate their overall satisfaction with Duke Energy on a five-point scale from "very satisfied" to "very dissatisfied." As shown in Figure 16, 51% (n=84) gave Duke Energy the highest possible rating of "very satisfied," while only 6% were "somewhat dissatisfied" and no survey respondents were "very dissatisfied." When we asked, the five respondents who were "somewhat dissatisfied" with Duke Energy gave the following reasons: three cited increases in electricity rates and their utility bills, one complained about frequent power outages, and one mentioned poor customer service. One of the three respondents who complained about increasing rates also mentioned that Duke Energy "has a monopoly," and another expressed "significant distrust of Duke Energy's meters."

Figure 16. Satisfaction with Duke Energy Overall



Source: Participant Survey Question I3. How would you rate your overall satisfaction with Duke Energy, would you say you were…? (n=84).

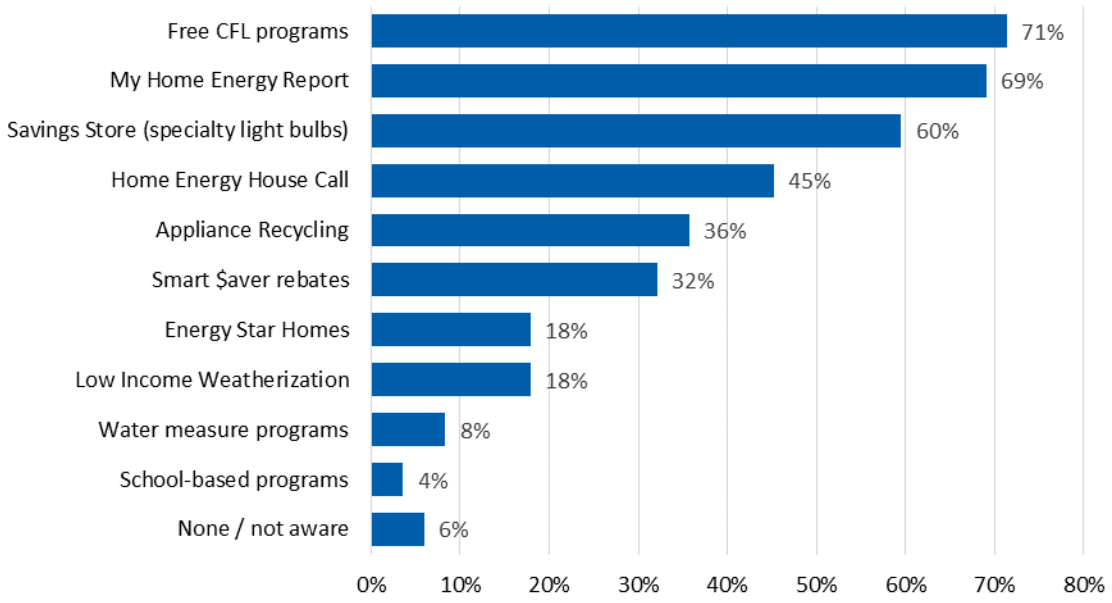
In order to have a comparable satisfaction rating to Duke Energy programs in other territories, Cadmus also asked respondents in Ohio to rate satisfaction with their utility on a scale from 0 to 10, where 10 is "very satisfied." Respondents' mean rating on this 10-point scale was 8.3 (n=84) and the median rating was 9.

Cadmus also analyzed program satisfaction scores for different subgroups of respondents in order to identify contributing factors. Participant survey respondents did not give significantly different satisfaction ratings if they were aware of their devices being activated, aware of receiving bill credits in 2015, or if they reported a decline in comfort ratings during a perceived event. Some factors that were associated with lower satisfaction ratings include moving into a home where a Power Manager device was already installed (5.3; n=3) and being unclear about how the program works (7.3; n=12). Both of these groups of respondents gave average satisfaction ratings that were more than one point lower than the average rating given by all respondents.

Awareness and Interest in Other Utility Programs

Cadmus asked respondents if they were aware of any other Duke Energy programs to help them save energy. Figure 17 shows that free CFL programs, My Home Energy Report (MyHER), and the Savings Store (specialty lighting) are the most well-known Duke Energy programs, each mentioned by between 60% and 71% of surveyed Power Manager participants (n=84). Only 6% of respondents were not aware of any other Duke Energy programs.

Figure 17. Awareness of Other Duke Energy Programs



Source: Participant Survey Question H1. What, if any, Duke Energy programs or services have you heard of that help customers save energy? Multiple response permitted (n=84).

Cadmus asked respondents if they would be interested in participating in programs to cycle other types of equipment, such as electric water heaters. A majority of 54% (n=84) expressed interest in such a program, while 20% said they would not participate in such a program, and 26% said they were not sure.

Participant Demographics and Household Characteristics

Cadmus asked respondents a number of questions about their household, including questions about demographics and cooling systems. These responses are summarized in Appendix B. Participant Household Characteristics and Demographics.

H. Event/Non-Event Surveys

Cadmus surveyed current Power Manager participants during the cooling season in order to better gauge their awareness of Power Manager events and their perception of discomfort caused by Power Manager curtailment events.

This section outlines the results of Cadmus' analysis of the difference in responses between participants who were surveyed immediately following curtailment events, and those who were surveyed immediately following equivalent high temperature days without events. This is a quasi-experimental study design, where the event surveys constitute the experimental group (those experiencing an event) and the non-event surveys constitute a control group (those not experiencing at event).

Although the study design controls for the presence of an event, there are many factors which cannot be controlled, such as the range and distribution of temperatures over the summer, other weather

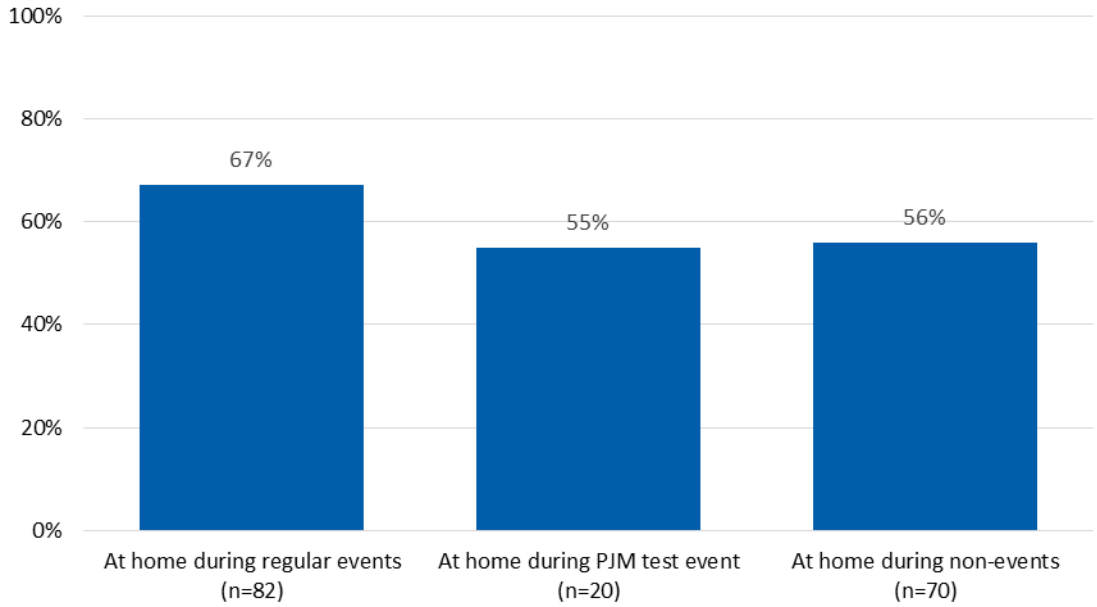
events (such as high humidity and storms), and extraneous events that could affect program operations (such as power outages or transmission issues). The opportunities to conduct these surveys were limited by program activities and the weather, thus the results of surveys during a particular summer may not be predictive of other years under different conditions. There were more Power Manager curtailment events and high temperature days in Ohio during the summer of 2015 than during the summer of 2014 (when there was one PJM test event and no regular events), and about as many as during the summers of 2012 and 2013 (five events each).

Except where noted, Cadmus excluded "don't know" and "refused" responses, which is reflected in accompanying n-values.

Home Occupancy During Events

Cadmus asked respondents if there was anybody at home during the actual time period when an event occurred, and during the equivalent hours of 2:00 p.m. to 5:00 p.m. for non-event surveys. Most surveyed households (61%; n=172 combined event and non-event) had someone at home during the afternoon in question (Figure 18).

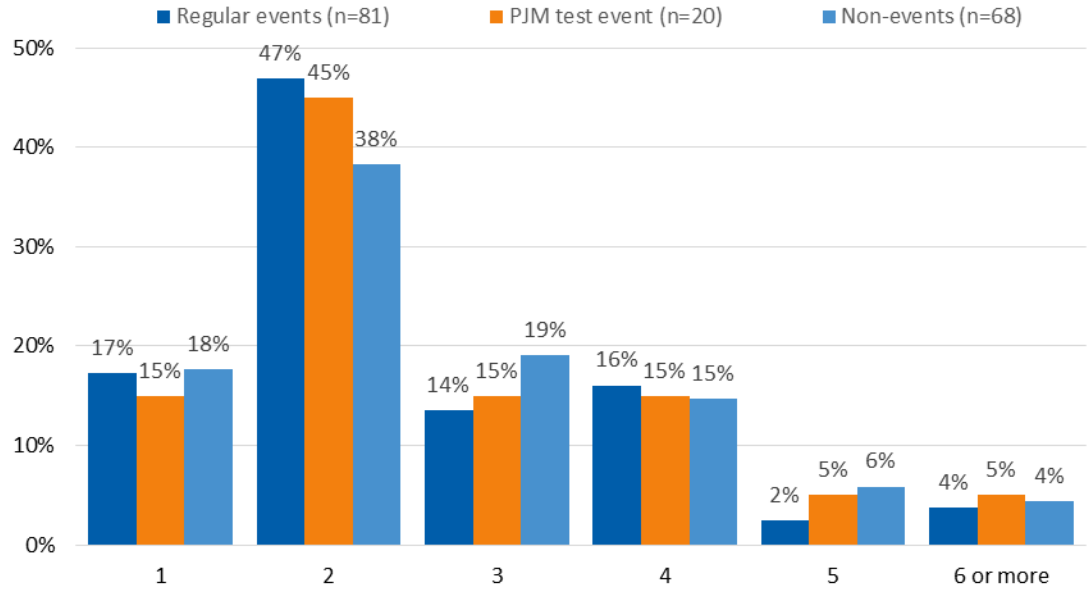
Figure 18. Home Occupancy During Event Time Period



Source: Event/Non-Event Survey Question B5. Were you or any members of your household home at that time?

Cadmus asked respondents how many people live in their home. Figure 19 shows that respondents surveyed for events and non-events had similar numbers of people living in their home. The overall average number of residents per household for event and non-event surveys was 2.6. In the participant survey, the average number of residents per surveyed household was similar, at 2.7 (see Appendix B. Participant Household Characteristics and Demographics).

Figure 19. Number of People Living in Respondent Households



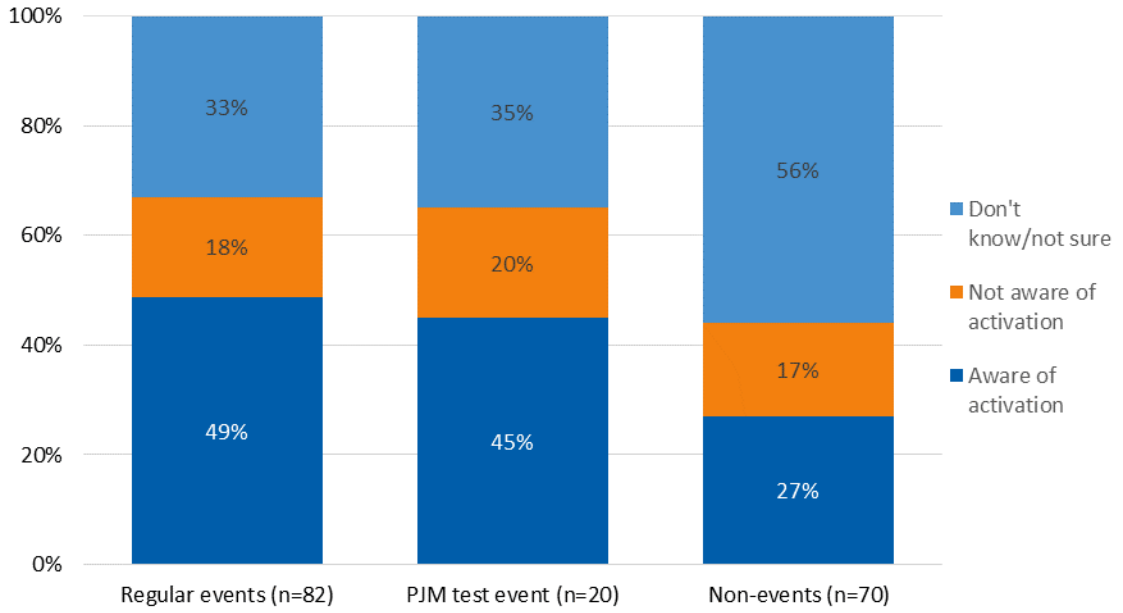
Source: Event/Non-Event Survey Question G1. Including you, how many people live in this home?

Awareness of Device Activation

In order to gauge awareness of the Power Manager device activation, Cadmus first asked event and non-event respondents if they were aware of any device activations occurring since they had joined the program. Nearly half of the event respondents said they were aware that their devices have been activated (48%; n=102), while this was true for just 27% (n=70) of the non-event respondents (Figure 20). This difference between event and non-event groups is statistically significant.[11]

[11] This difference is statistically significant at $p<0.05$ using a binomial t-test.

Figure 20. General Awareness of Device Activation

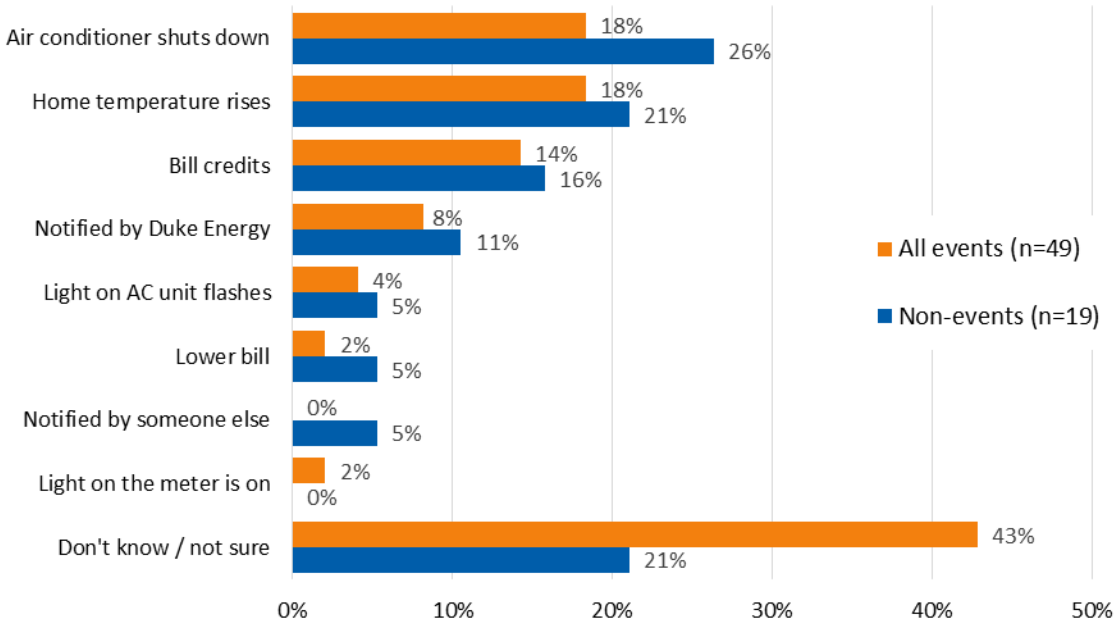


Source: Event Survey/Non-Event Question B1. Has Duke Energy activated the Power Manager device since you joined the program?

Cadmus asked all respondents how they know when their Power Manager device has been activated. Figure 21 shows the distribution of reasons given by respondents who were aware that their devices had been activated. Most event and non-event respondents (combined) were able to give reasons why they were aware of device activation (63%; n=68). The most frequently mentioned reasons for both groups of survey respondents are air conditioning shutting down and rising home temperature, followed by bill credits and notifications from Duke Energy (including e-mail, mail, and directly from Duke Energy employees). Although event respondents were significantly more likely to say they were aware of device activation compared to non-event respondents, event respondents were also significantly more likely to not be able to state a reason why they were aware (43%; n=49) compared to non-event respondents (21%; n=19).[12] This was the only statistically significant difference between groups of survey respondents.

[12] This difference is statistically significant at $p<0.10$ using a binomial t-test.

Figure 21. Reasons for Awareness of Device Activation



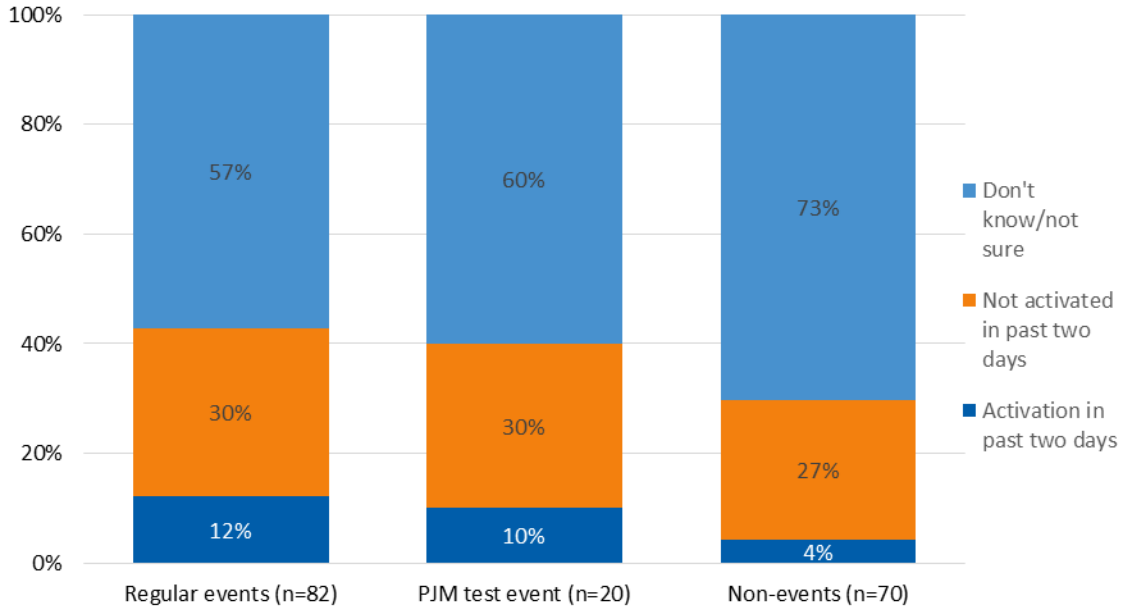
Source: Event/Non-Event Survey Question B2. How can you tell when the device has been activated?

Most respondents who were not aware that their devices have been activated were unable to state how they would know if the devices had been activated (68%; n=104 combined event and non-event group respondents who were not aware of their devices having been activated since joining the program). The most common reasons given by respondents who were able to answer this question is that the air conditioner shuts down (14%) and home temperature rises (13%).

Cadmus asked respondents if Duke Energy had activated their Power Manager device in the past two days (i.e., the day of the survey call or the day before). For event respondents, there had been device activation (a curtailment event) during this time period, while for non-event respondents there had been no device activation in the past two days. Only 12% (n=82) of regular event respondents and 10% (n=20) of PJM test event respondents answered correctly that their device had been activated, which is statistically significantly higher than 4% (n=70) of non-event respondents who incorrectly believed their device had been activated (Figure 22).[13] However, most respondents in all groups did not know if their devices had been activated or not.

[13] The differences between regular event respondents and non-event respondents, and between all event respondents combined and non-event respondents, are statistically significant at $p<0.10$ using binomial t-tests. However, the result for PJM test event respondents is based on a small sample (n=20) that does not have enough precision to be statistically significantly different from regular event or non-event respondents.

Figure 22. Awareness of Recent Device Activation

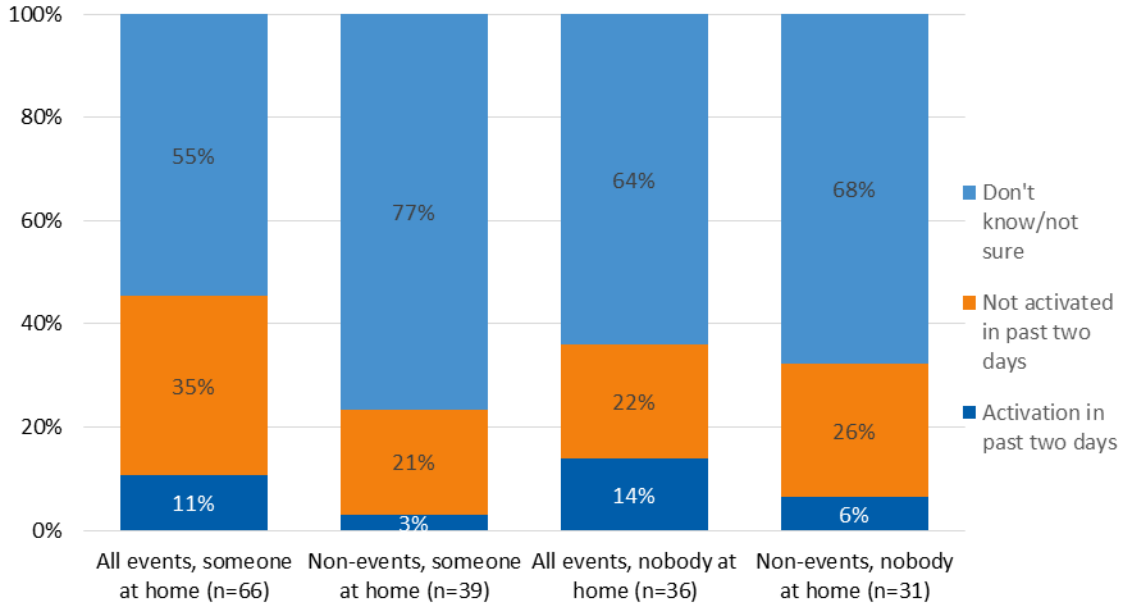


Source: Event/Non-Event Survey Question B3. Has your device been activated in the last two days? [IF NEEDED: Was your device activated yesterday or today?]

Figure 23 shows that whether or not anybody was at home during the event period, event respondents were more likely to believe their devices were activated than non-event respondents.[14] However, both event and non-event respondents, awareness of events was not statistically significantly different if respondents were at home during the event time period compared to not being at home.

[14] The difference between event respondents who were home during the event time period (11%; n=66) and non-event respondents who were at home (3%; n=39) is statistically significant at $p<0.10$ using a binomial t-test. This difference is not statistically significant for event and non-event respondents who were not at home during the event time period.

Figure 23. Awareness of Recent Device Activation for Occupied Homes and Unoccupied Homes



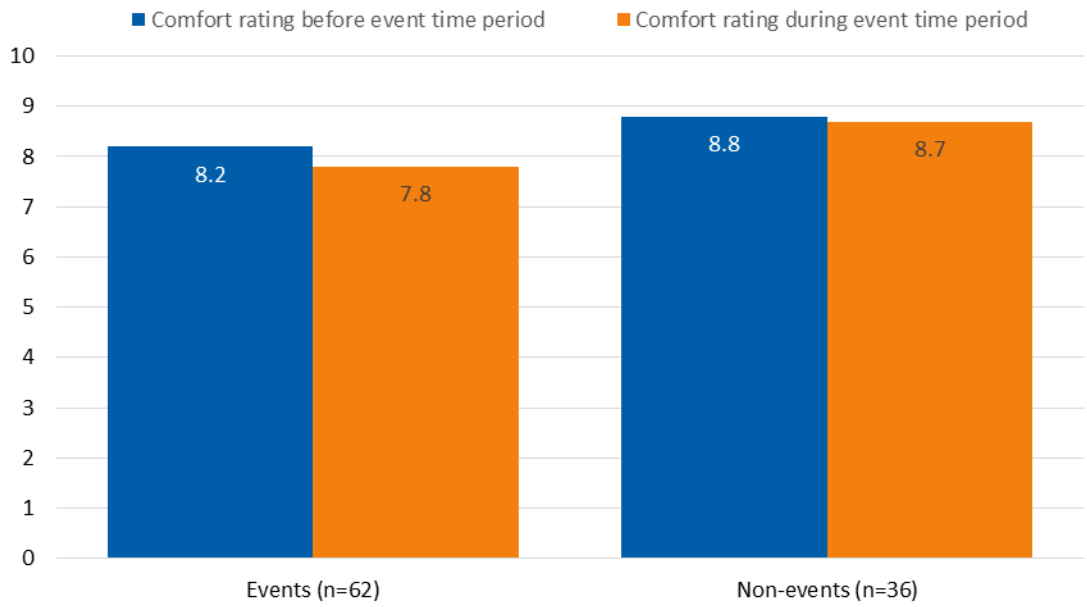
Source: Event/Non-Event Survey Question B3. Has your device been activated in the last two days? [IF NEEDED: Was your device activated yesterday or today?]

Response to Device Activation

Cadmus asked respondents who were at home during the event time period (when events would occur, whether they did or not) to rate the comfort level of their home before and during the time period on a scale from 0 to 10, where 0 means very uncomfortable and 10 means very comfortable. Cadmus defined the before time period using the actual start time of a curtailment event for event respondents, or 2:00 p.m. for non-event respondents. We defined the event time period as the actual start and end times of an event for event respondents, or from 2:00 p.m. to 5:00 p.m. for the non-event respondents. Figure 24 shows that there was a small, but not statistically significant, decline in comfort ratings from before the event time period to during the event time period for respondents in both survey groups. Event respondents gave significantly lower comfort ratings than non-event respondents.[15]

[15] The differences between event and non-event respondents are statistically significant at $p<0.10$ or better using ANOVA for both sets of ratings.

Figure 24. Comfort Ratings Before and During Event Time Period

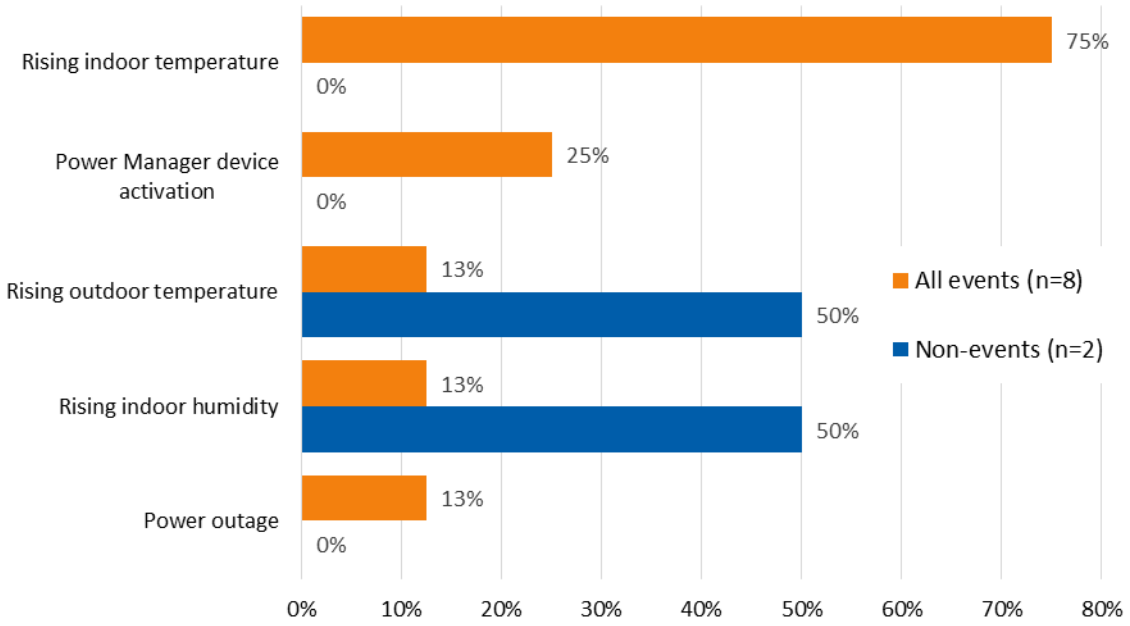


Source: Event/Non-Event Survey Questions C1 and C2. Using a scale of 0 to 10 where 0 means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort before [START TIME] on [DATE]? and Using the same scale of 0 to 10 where 0 means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort between [START TIME] and [END TIME] on [DATE]?

Slightly more event respondents (13%; n=62) than non-event respondents (6%; n=36) reported a decline in comfort ratings during the event time period, though this difference is not statistically significant. Event and non-event respondents who reported a decline in comfort provided very similar comfort ratings, overall averaging 8.3 before the event time period and 5.5 during the event time period (n=10 combined), with no statistically significant differences between event and non-event respondents.

Cadmus asked the 10 respondents who reported a decline in comfort during the event time period what had caused their decline in comfort. Figure 25 shows that rising indoor temperatures was the most frequent response for event respondents, and a minority of these respondents (25%; n=8) blamed the activation of their Power Manager device for their decline in comfort.

Figure 25. Reasons Given for Decline in Comfort



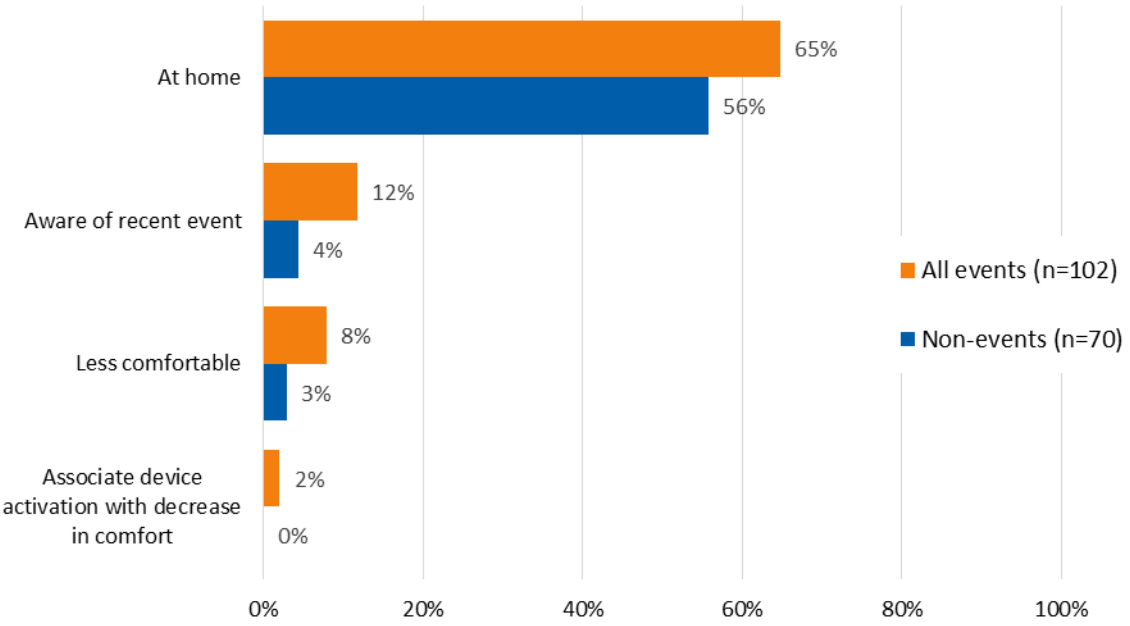
Source: Event/Non-Event Survey Questions C3. What do you feel caused your decrease in comfort? (Multiple response permitted).

Summary of Awareness and Response to Events

Figure 26 summarizes respondents' awareness and response to events using the total survey sample as a base. Although event respondents were more likely to be aware of events (12%; n=102), report a decline in comfort during events (8%), and associate Power Manager device activation with their decline in comfort (2%), the only difference from non-event respondents that is statistically significantly is awareness of a recent event.[16]

[16] This difference is statistically significant at $p<0.10$ using a binomial t-test.

Figure 26. Summary of Awareness and Response to Events



Source: Event/Non-Event Survey Questions B5, B3, C1, C2, and C3. (See Figure 18, Figure 22, Figure 24 and Figure 25 for question wording).

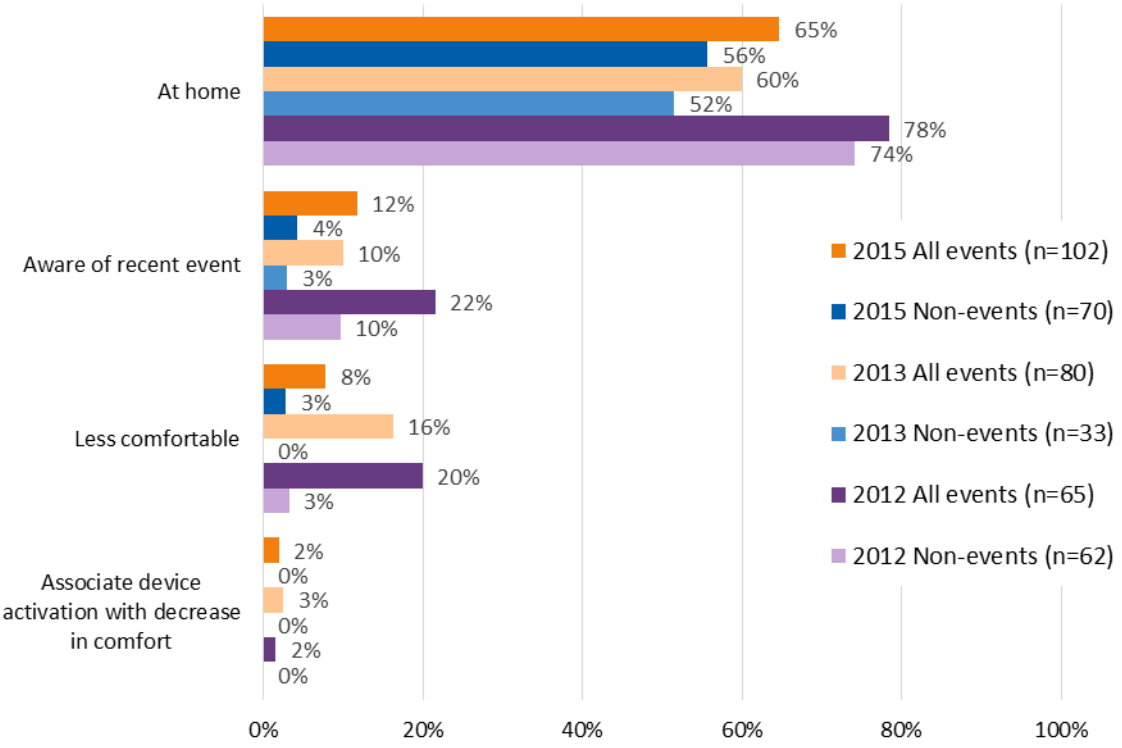
Figure 27 shows a comparison of PY2015 event/non-event survey results to previous evaluations of the Power Manager Program in Ohio.[17] Since there were no regular curtailment events in Ohio during the summer of 2014, there are no comparable survey results for that year.

There are no statistically significant differences in these key metrics between the PY2015 and PY2013 surveys for event or non-event respondents. Compared to the PY2015 survey results, event respondents in PY2012 were more likely to report a decline in comfort (20%; n=65), and both groups of respondents were more likely to be at home during the event time period (78% for event and 74%; n=62 for non-event).[18]

[17] TecMarket Works. *Process Evaluation of the 2012 Power Manager Program in Ohio*. April 24, 2013. TecMarket Works. *Process Evaluation of the 2013 Power Manager Program in Ohio*. June 16, 2014.

[18] These differences between PY2012 and PY2015 survey results are statistically significant at $p<0.05$ using binomial t-tests.

Figure 27. Summary of Awareness and Response to Events Compared to Previous Evaluations



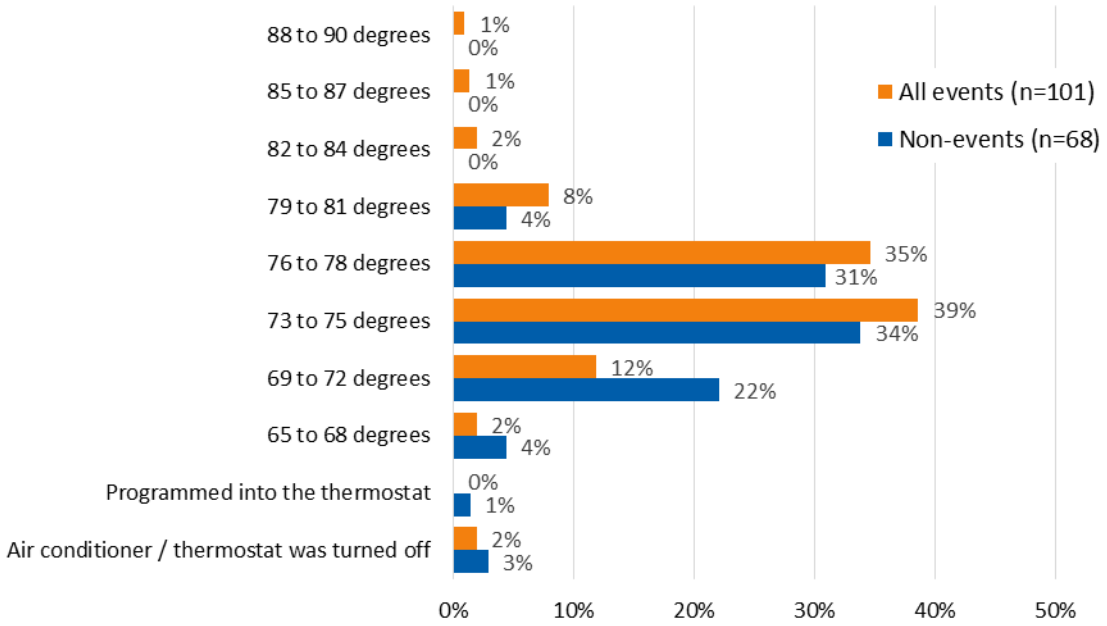
Source: PY2015 Event/Non-Event Survey Questions B5, B3, C1, C2, and C3. (See See Figure 18, Figure 22, Figure 24 and Figure 25 for question wording). PY2012 and PY2013 event group survey questions are included in the TecMarket Works reports cited above.

Behavior During Events

Cadmus asked respondents about their thermostat settings during the event time period. Figure 28 shows that 85% (n=101) of event respondents and 87% (n=68) of non-event respondents had their thermostats set between 69°F and 78°F.[19]

[19] Eighty-six percent shown in table due to rounding.

Figure 28. Thermostat Settings During Event Time Period

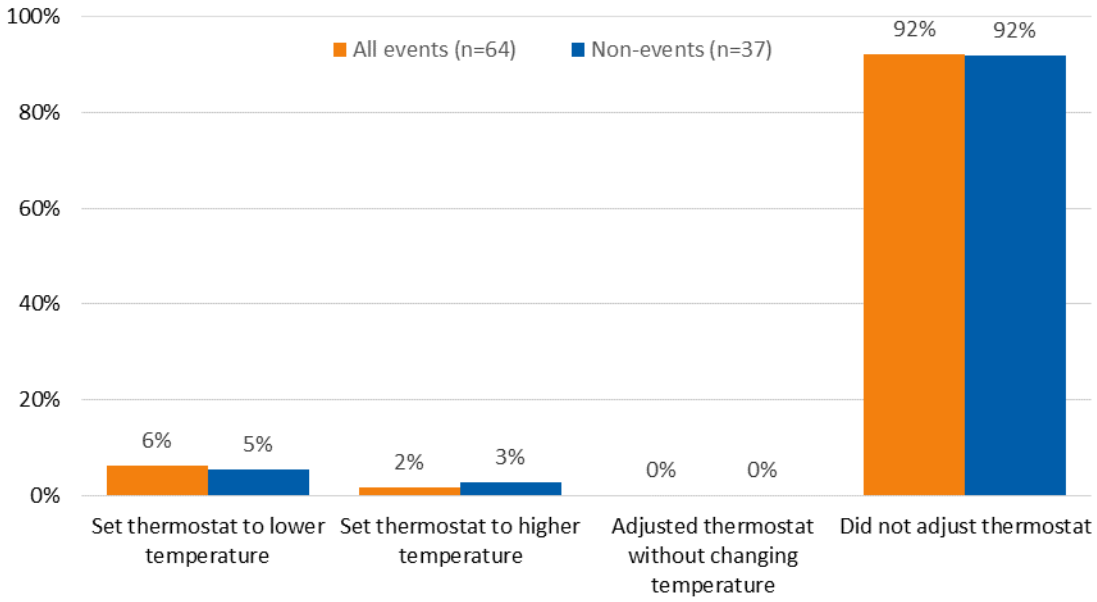


Source: Event/Non-Event Survey Questions B4. At what temperature was your thermostat set to between [START TIME] and [END TIME] on [DATE]?

Cadmus also asked respondents if they made any adjustments to their thermostat during the event time period, and about their use of electric fans during the event time period.

Figure 29 shows that nine in ten respondents did not adjust their thermostat during the time period. Respondents in the event group (6%; n=64) and non-event group (5%; n=37) were equally likely to set their thermostat to a lower temperature.

Figure 29. Thermostat Adjustments During Event Time Period

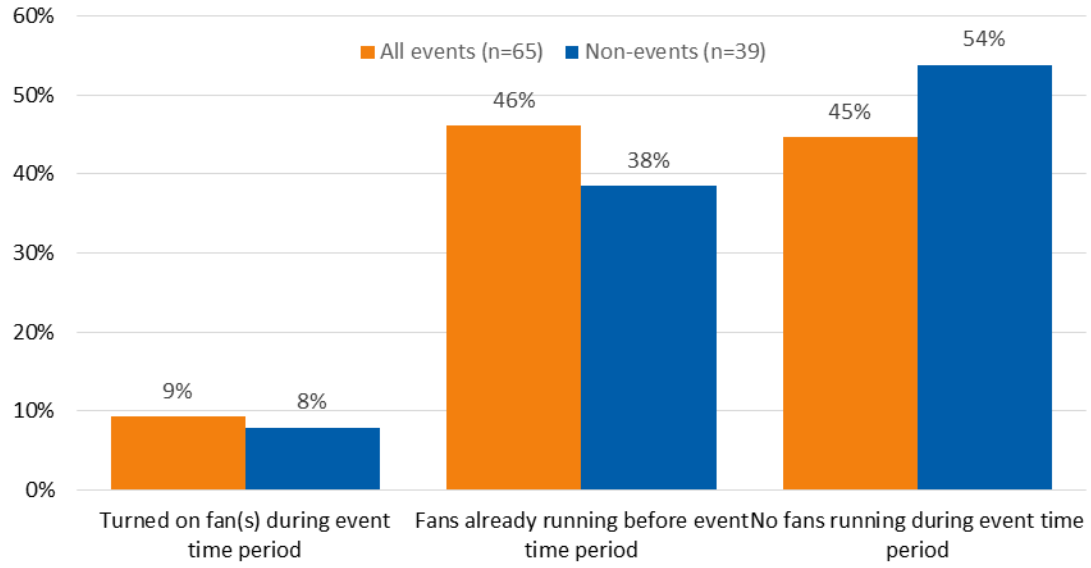


Source: Event/Non-Event Survey Questions C4. Between [START TIME] and [END TIME] on [DATE], did you or any other members of your household adjust the settings on your thermostat?

For event respondents who made thermostat adjustments, the average setting change was 2°F lower and the maximum change was 4°F lower. For the non-event respondents, the average setting change was 1°F lower, and the maximum change was 3°F lower.

About half of respondents (55%; n=65 for event and 46%; n=39 for non-event) had electric fans running in their home during the event time period, though most of these fans were already running before the event time period. Only 9% (n=65) of event respondents and 8% (n=38) of non-event respondents turned fans on during the event time period (Figure 30). There are no statistically significant differences between event and non-event respondents.

Figure 30. Electric Fan Use During Event Time Period

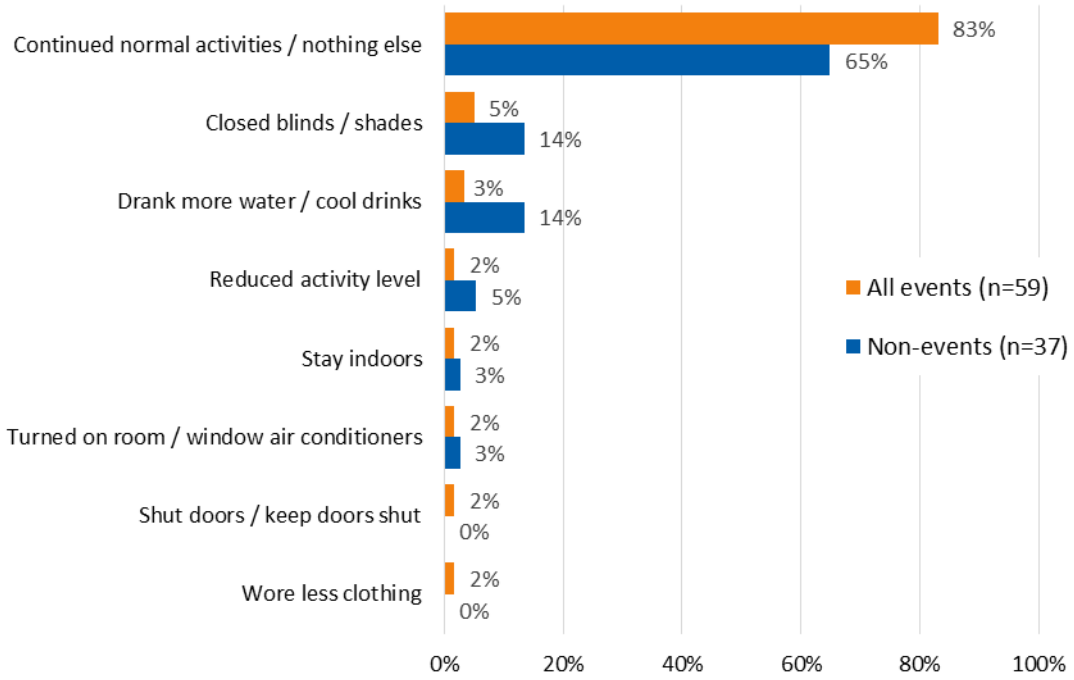


Source: Event/Non-Event Survey Questions C6 and C7. Between [START TIME] and [END TIME] on [DATE], were any electric fans being used in your home? and Did you or any other members of your household turn any electric fans on between [START TIME] and [END TIME], or were all of the fans already running before [START TIME]?

Cadmus asked respondents what else they or other members of their household did to stay cool during the event time period. Figure 31 indicates that most (83%; n=59 for event and 65%; n=37 for non-event) did not do anything in addition to using electric fans or making thermostat adjustments. Of those who took an action to stay cool, the most common activity was closing blinds and shades (5% for event and 14% for non-event), and only one respondent in each group turned on window or room air conditioners (2% for event and 3% for non-event). Compared to non-event respondents, those surveyed after events were significantly less likely to drink cool beverages and more likely to have continued normal activities.[20]

[20] These differences are statistically significant at p<0.10 or better using a binomial t-test.

Figure 31. Other Actions During Event Time Period



Source: Event/Non-Event Survey Question C8. What else (if anything) did you or other members of your household do to keep cool between [START TIME] and [END TIME] on [DATE]?

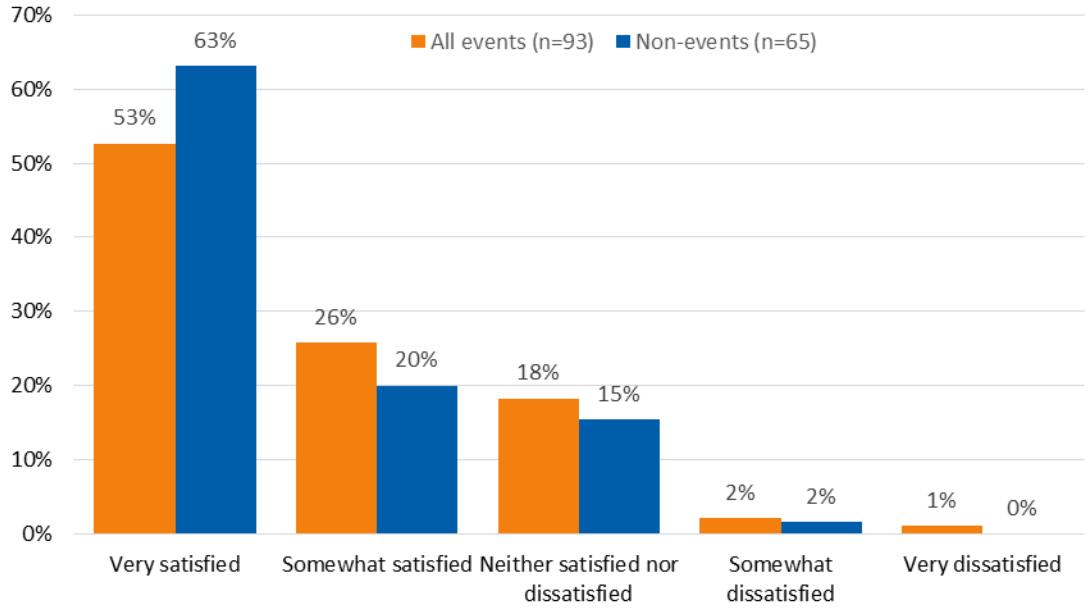
When it is controlling their air conditioner, respondents could mistake their Power Manager device for a power outage, so Cadmus asked respondents if there had been any power outages on the day of the event or high temperature. Four percent (n=99) of event respondents and 1% (n=70) of non-event respondents reported having a power outage on the day in question. This difference is not statistically significant, and indicates that participants are not associating device activation with power outages.

Participant Satisfaction and Recommending the Program

Cadmus asked respondents to rate their overall satisfaction with the Power Manager Program on a five-point scale from "very satisfied" to "very dissatisfied." Figure 32 shows that a majority (57%; n=158 combined event and non-event) said they were "very satisfied" with their participation in Power Manager. Only 2% were "somewhat dissatisfied" and 1% was "very dissatisfied." There are no statistically significant differences between survey groups.

We asked the dissatisfied respondents to explain their satisfaction rating. The event respondent who was very dissatisfied with Power Manager explained that "it cuts our power." Two of the three respondents who were somewhat dissatisfied said that their home gets too warm, one specifying this happened only "in certain areas" of their home, and the other stating that this only happens "sometimes." The third somewhat dissatisfied respondent did not provide a comment about their program rating.

Figure 32. Satisfaction with the Power Manager Program

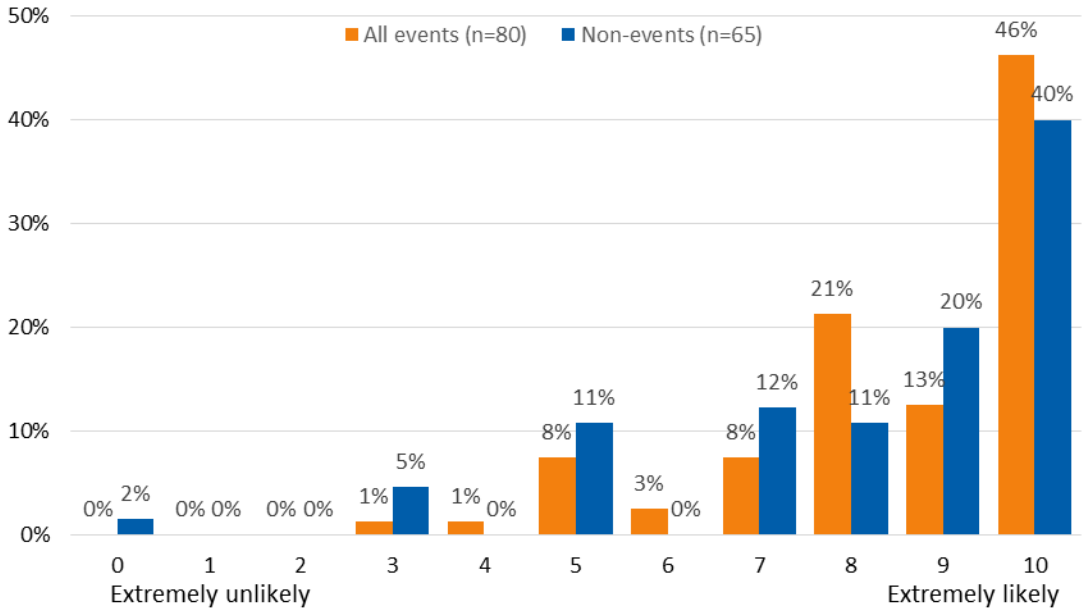


Source: Event/Non-Event Survey Questions E1. How would you rate your overall satisfaction with the Power Manager Program? Would you say you are…?

In order to have a comparable satisfaction rating to Duke Energy programs in other territories, Cadmus also asked respondents in Ohio to rate their satisfaction with the program on a scale from 0 to 10, where 10 is very satisfied. Respondents' mean ratings on this 10-point scale were 8.4 for both event (n=91) and non-event (n=66) respondents, and the median rating for both groups was 9. Respondents also did not give significantly different satisfaction ratings if they were aware of their devices being activated or not, or if they reported a decline in comfort ratings during an event or not.

Cadmus also asked respondents how likely they would be to recommend the Power Manager Program, also using a scale from 0 to 10 where 10 is most likely to recommend. As shown in Figure 33, 43% (n=145 combined event and non-event) gave the highest possible rating of 10. The average recommendation rating was 8.6 for event respondents and 8.2 for non-event respondents, and the median rating for both groups was 9.

Figure 33. Likelihood of Recommending Power Manager



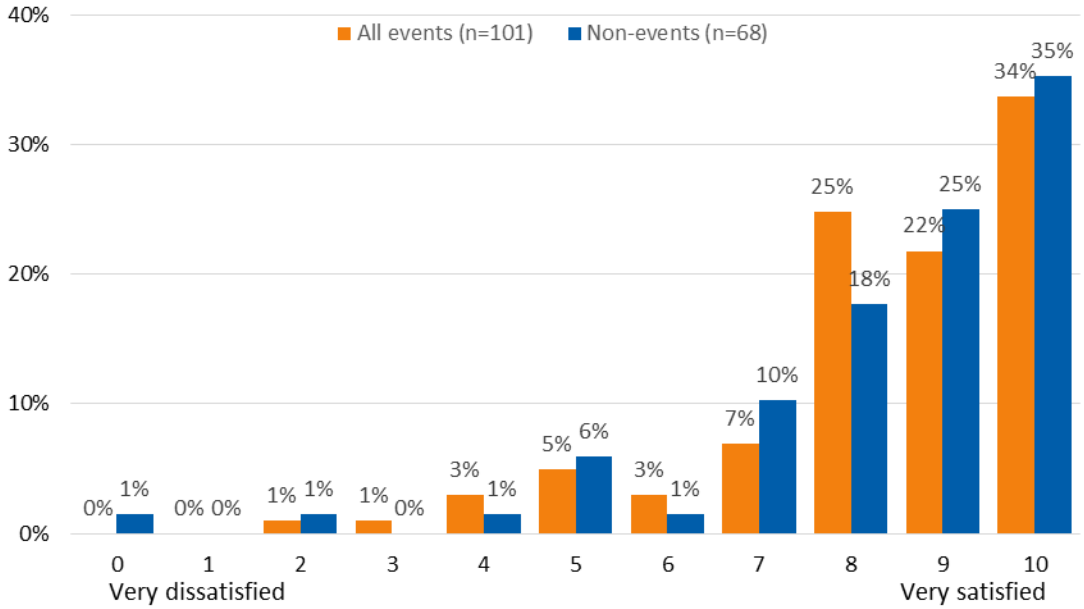
Source: Event/Non-event Survey Question F3. Using a scale of 0 to 10, where 0 means "extremely unlikely" and 10 means "extremely likely," how likely are you to recommend this program to a friend, neighbor, or co-worker?

Satisfaction with Duke Energy

Cadmus asked respondents to rate their overall satisfaction with Duke Energy using a scale from 0 to 10, where 10 indicates high satisfaction. As shown in Figure 34, 57% of respondents (n=169 combined) gave Duke Energy a high satisfaction rating of 9 or 10. The mean rating from both event and non-event respondents was 8.4, and both groups gave a median rating of 9. Respondents also did not give significantly different satisfaction ratings if they were aware of their devices being activated or not, or if they reported a decline in comfort ratings during an event or not. However, participants who reported that they experienced a power outage on the survey date gave lower satisfaction ratings (6.6; n=5) compared to those who did not report an outage (8.4; n=164).[21]

[21] This difference is statistically significant at $p<0.05$ using ANOVA.

Figure 34. Satisfaction with Duke Energy Overall



Source: Event/Non-Event Survey Question F1. Using a scale of 0 to 10 where 0 indicates "very dissatisfied" and 10 indicates "very satisfied," what what is your overall satisfaction with Duke Energy?

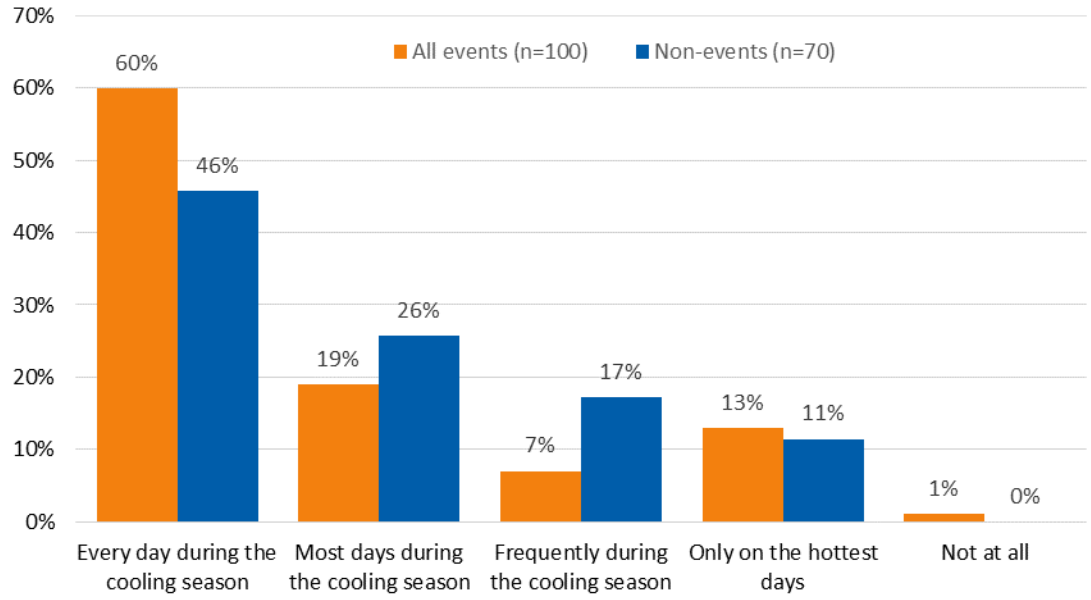
Eight survey respondents (5%; n=169) rated their satisfaction with Duke Energy at 4 or less on a 10-point scale. When we asked why they are dissatisfied, three mentioned frequent power outages, one stated that their utility bills are too expensive, one complained about poor customer service, one mentioned "indiscriminate" tree trimming, one mentioned a lack of utility options, and one complained about a third-party solar company.

Air Conditioner Use

Event/non-event respondents routinely use their air conditioners throughout the cooling season, and are therefore likely to be affected by Power Manager curtailment events, matching the results from the participant survey (see Figure 5). Figure 35 shows that most event (79%; n=100) and non-event (71%; n=70) respondents are using their air conditioning "every day" or "most days" during the cooling season.[22]

[22] Seventy-two percent shown in table due to rounding.

Figure 35. Respondents' Air Conditioner Use

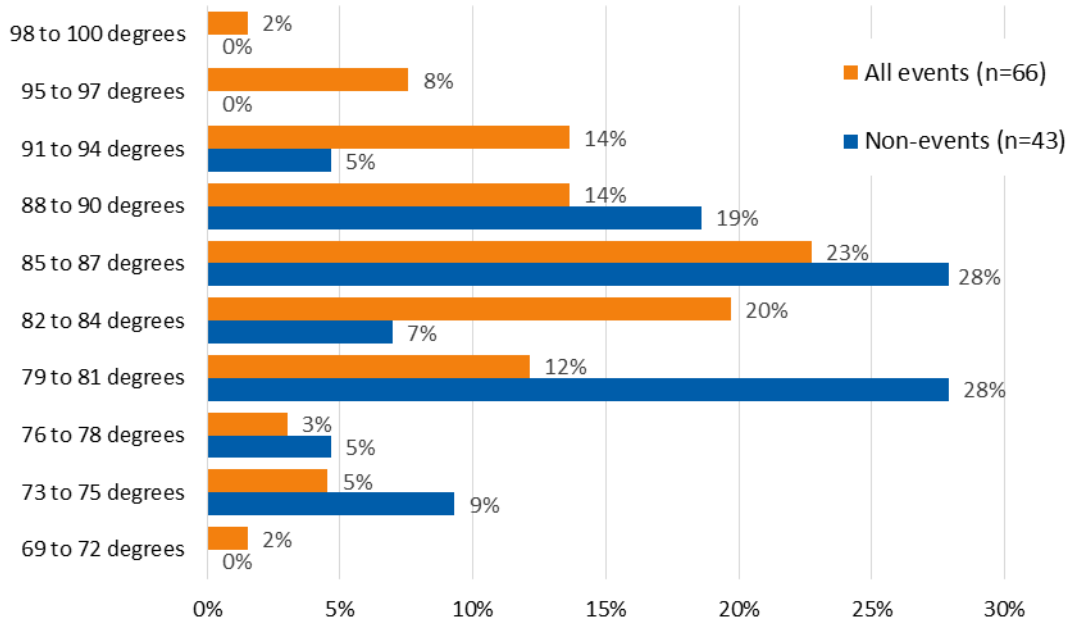


Source: Event/Non-Event Survey Question D1. How often do you use your central air conditioner? Would you say you use it...?

Cadmus asked respondents at what outdoor temperature they start to feel uncomfortable in their home, and at what outdoor temperature they tend to turn on their air conditioners. Figure 36 indicates that the median and modal outdoor temperature at which respondents start to become uncomfortable is 85°F to 87°F, and 91% of event (n=66) and 100% of non-event (n=43) respondents say they are uncomfortable when the outdoor temperatures reaches 91°F to 94°F. Event respondents were significantly more likely to give a temperature of discomfort of 91°F or higher (23%, compared to 5% for non-event respondents) and less likely to give a temperature of 81°F or lower (21%, compared to 42% for non-event respondents).[23]

[23] These differences are statistically significant at $p<0.05$ or better using a binomial t-test.

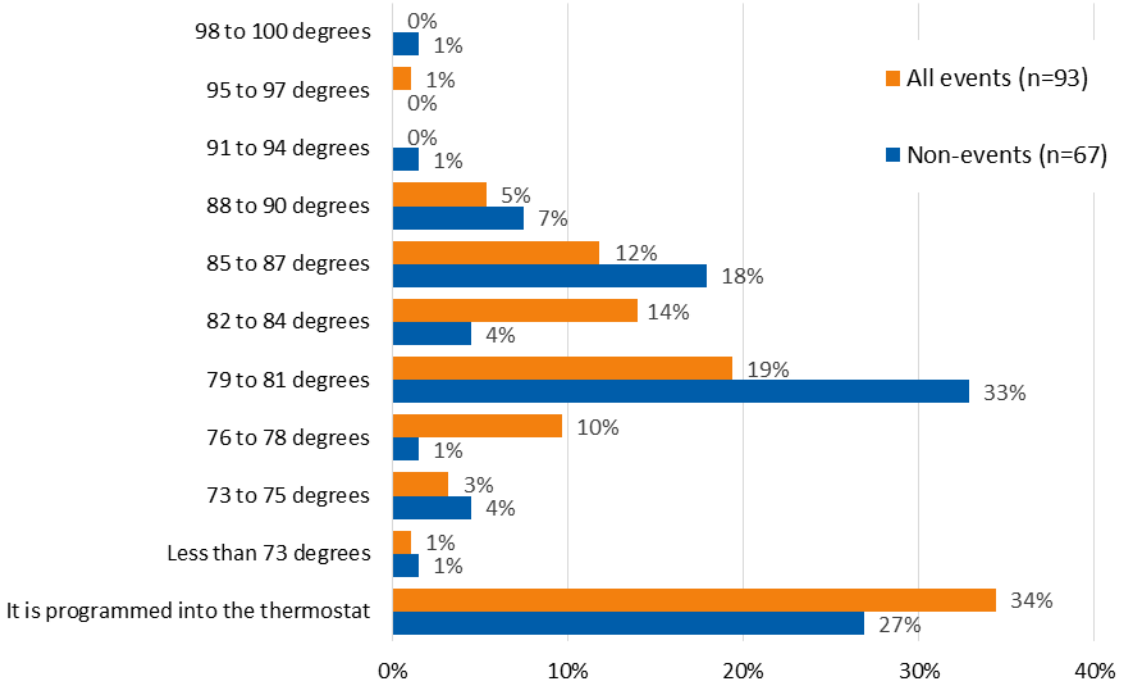
Figure 36. Outdoor Temperature at which Respondents Start to Feel Uncomfortable in their Home



Source: Event/Non-Event Survey Question D2. When you think of a typical hot and humid summer day, at what outside temperature do you tend to feel uncomfortably warm inside your home?

Only 1% of respondents (n=160 combined) said they typically turn on their air conditioner when the outdoor temperature is less than 73°F, while only 2% said they turn on their unit when the outdoor temperature is 91°F or higher (Figure 37). Around one-third of respondents (31%; n=160) did not respond with a specific temperature, saying that their air conditioner is programmed to turn itself on when the indoor temperature reaches a set point. Among those who answered with a specific temperature, there are no significant differences between event and non-event respondents. The median temperature at which respondents turn on air conditioning was around 80°F, which is approximately 5°F lower than the median response for the outdoor temperature at which they tend to become uncomfortable in their home.

Figure 37. Outdoor Temperature at which Respondents Turn on Air Conditioners

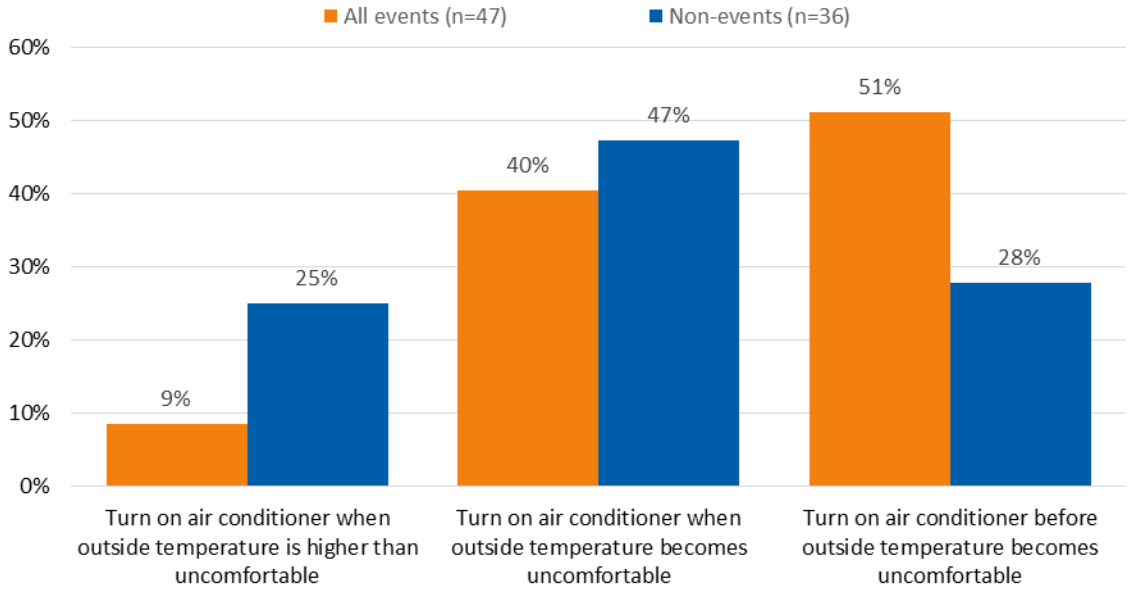


Source: Event/Non-Event Survey Question D3. At what outside temperature do you tend to turn on the central air conditioner?

Cadmus cross-tabulated the responses to outdoor temperature at which a respondent becomes uncomfortable with the temperature at which they turn on their air conditioning (Figure 38). A minority of respondents wait until the outdoor temperature is higher than the temperature at which they become uncomfortable to turn on their air conditioners (9%; n=47 for event and 25%; n=36 for non-event). Event respondents were significantly more likely then non-event respondents to turn on their air conditioning before the outdoor temperature becomes uncomfortable (51%), and less likely to wait until it is higher than uncomfortable. [24]

[24] These differences are statistically significant at p<0.10 or better using a binomial t-test. The participant survey was fielded in November, two months after the end of the cooling season, while the event and non-event surveys were fielded on the hottest days of the summer.

Figure 38. Uncomfortable Outdoor Temperature Compared to Temperature at which Air Conditioners are Turned on



Source: Event/Non-Event Survey Questions D2 and D3. When you think of a typical hot and humid summer day, at what outside temperature do you tend to feel uncomfortably warm in your home? and At what outside temperature do you tend to turn on the central air conditioner? (n=83 who gave numeric responses to both questions).

This result is statistically significantly different from the results of the participant survey (see Figure 9), where only 16% (n=75) said they would turn on their air conditioning before the outdoor temperature reached their level of discomfort, and 31% said they would not turn on air conditioning until the temperature was higher than their level of discomfort.[25]

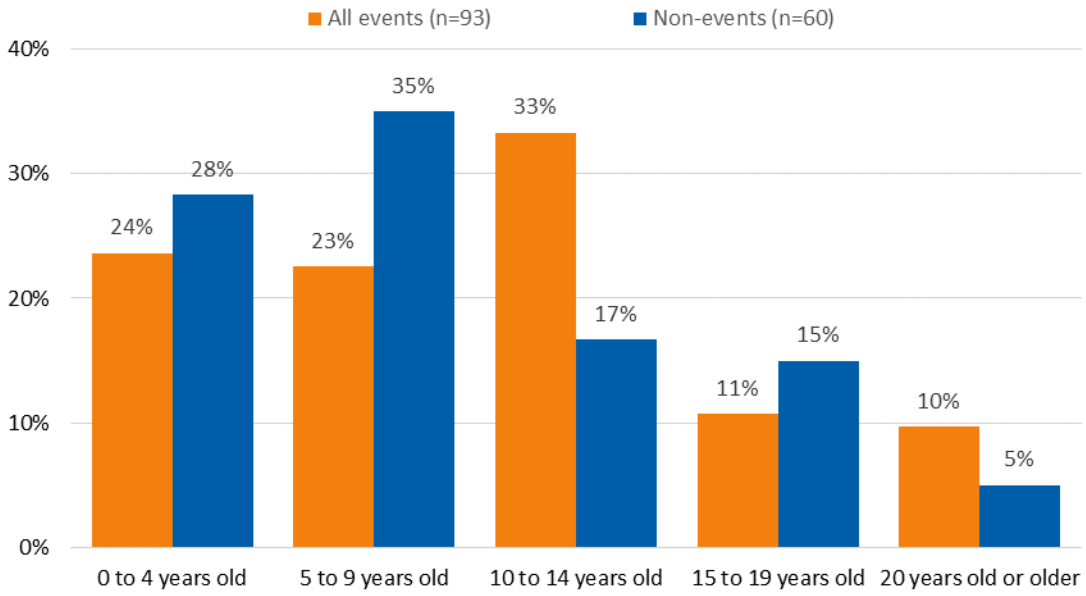
Age of Air Conditioner

The self-reported median age of participants' air conditioning unit is between 10 and 14 years for event respondents and five to nine years for non-event respondents (Figure 39). Significantly more non-event respondents have air conditioners that are less than 10 years old (63%; n=60) compared to event respondents (46%; n=93).[26]

[25] The differences between the participant survey (n=75) and combined event/non-event surveys (n=83) are statistically significant at p<0.10 or better using binomial t-tests. The participant survey was fielded in November, two months after the end of the cooling season, while the event and non-event surveys were fielded on the hottest days of the summer.

[26] This difference is statistically significant at p<0.05 using a binomial t-test.

Figure 39. Age of Air Conditioning Unit



Source: Event/Non-Event Survey Question D4. How old is your central air conditioner?

Impact Evaluation

I. Analytical Methodology

DEO conducted the impact evaluation of the Power Manager Program in a three step approach:

1. Tested the operability of the active switch devices installed at the customer premises.
2. Calculated the impact or demand reduction per switch during events as determined by a duty cycle analysis.
3. Provided documentation to Cadmus for review and approval as the independent EM&V contractor.

J. Operability Study

DEO determined the operability of the active switch devices installed at the customer premises using a representative sample group of customers. There are two components of device operability: the setup factor and the shed factor.

- ***Setup Factor*** - Quantifies the proper installation and configuration of switch devices in the sample group (including the physical installation, wiring, and programming).
- ***Shed Factor*** - Quantifies performance during actual load control events for switches with the correct setup, and measures the switch effectiveness at achieving the programmed load shed.

Combined, the setup and shed factors provide an overall operability rate, which is used to de-rate the program impacts and capacity.

Setup Factor

The setup factor used in this evaluation was established in the 2013 Operability Study, which occurs every four years. In March 2013, DEO selected a random sample of 150 households with 158 switch devices[27] from the population of Power Manager participants in Ohio and Kentcuky. The sample size was designed to target ±5% precision at the 90% confidence level. The combination of households selected from the DEO territory met the ±5% precision at the 90% confidence level.

In July 2013, DEO collected switch data from the sample group, downloading it directly from the switch devices. A total of five (5) households were dropped from the operability study (reflecting 5 participating switches) due to the following reasons:

- 3 households due to access problems (gates on households, large dogs)
- 2 households with no data due to the switches not being on

[27] Multiple switch devices are installed at a single household with more than one air conditioning unit enrolled in the program.

Table 5. PY2013 Operability Group Removals

	Households	Switches
Beginning Sample Group	150	158
Removals from Sample Group	(5)	(5)
Final Sample Group	145	153

The final operability sample group size was 145 households with 153 load control devices. Table 6 summarizes the Operability group observations pertaining to the setup factor.

Table 6. Operability Group Observations of Setup Factor

Reason for Removal from Operability Study	Switch Device Count	Qualifying Multiplier	Weighted Factor
Switch disconnected from air conditioner	14	0.00	0
No switch present at customer premise	3	0.00	0
1.5 kW switch configured as 1.0 kW switch	6	0.67 (2/3)	4
Switch set up correctly	130	1.00	130
Total	**153**		**134**
Set-Up Factor	**0.876**		

DEO calculated the setup factor to be 87.6%.

Setup Factor = Total Weighted Factor / Total Switch Device Count

Shed Factor

As defined in Appendix A: Excerpts from PY2013 Power Manager EM&V Report, DEO used the 97.5% shed factor from the last operability study findings in the PY2013 report.

Shed Factor = Total Weighted Factor / Total Switch Device Count

Operability Study Findings

The operability study performed in 2013 revealed that Power Manager switch devices were operational at a 85.4% rate. DEO applied this de-rate factor to all program switch devices to more accurately represent the available program capacity and kW reduction during events.

The following calculation determined switch operability:

87.6% [2013 sample group setup factor] * 97.5% [2013 sample group shed factor] = 85.4%

The historical operability study results are shown in Table 7.

Table 7. Historical Operability Study Performance

Program Year	Setup Factor	Shed Factor	De-Rating Factor
PY2013	87.6%	97.5%	85.4%
PY2010	N/A	N/A	93.1%

K. Impact Study

Power Manager load control was activated in DEO during seven days of the summer of 2015. There were two test events and five Power Manager events.

Measurement and Verification Sample

In the research group for DEO, there were 169 households with 180 switches. These households are equipped with Cannon switches and at the end of the season the switch run time data is collected along with interval meter data.

The historical profile is a component of calculating impacts. This information is obtained via downloads from the Cannon switches. The historical profile is a 24-hour run-time profile covering every switch and the percentage of run time for those hours. The run-time profile is made up of 'Saved Dates' which are high temperature dates that are not inclusive of event dates. Each 'Saved Date' goes into the run-time profile with one-eighth weighting.

Adjusters and gears are instructions telling the switch how long to shed. The adjusters are a part of Target Cycling which uses the historical profile to calculate shed time. The lower the adjuster, the greater impact achieved.

Test Events

For operational purposes DEO had two test events for Power Manager. The test event on April 21, 2015 was from 1:30-2:00PM, and the test event on 5/27/2015 was from 10:30-11:30AM. Impacts were not calculated on these test events due to their short duration.

Impact/Switch Realization Rate

Table 8 details the realization rate between the actual impact/switch and expected impact/switch on an event day. The programming of the switch, including gears and adjusters alter the impact/switch during an event.

The calculation for the realization rate is:

$$\text{Realization Rate (\%)} = \text{Actual Impact} / \text{Expected Impact}$$

Table 8. Impact Realization Rate

Date	Hour (EDT)	Expected Impact/Switch	Actual Impact/Switch	Realization Rate (%)
7/17/2015	16	1.5 kW	1.447 kW	96%
		1.0 kW	1.060 kW	106%
7/28/2015	17	1.5 kW	1.771 kW	118%
		1.0 kW	1.161 kW	116%
	18	1.5 kW	1.847 kW	123%
		1.0 kW	1.222 kW	122%
7/29/2015	16	1.5 kW	1.404 kW	94%
		1.0 kW	0.869 kW	87%
	17	1.5 kW	1.217 kW	81%
		1.0 kW	0.692 kW	69%
9/1/2015	17	1.5 kW	1.373 kW	92%
		1.0 kW	0.972 kW	97%
9/4/2015	16	1.5 kW	1.575 kW	105%
		1.0 kW	1.032 kW	103%

PY2015 Load Impact Results

Table 9 details the calculated demand reduction per switch device under peak normal weather and using the de-rated impact from the operability study.

Table 9. Demand Reduction per Switch Device

Switch Type	Control Strategy	Potential Impact (kW)	De-rating Factor	De-rated Impact (kW)
Cannon	Target Cycle 1.5	1.578	0.854	1.35
	Target Cycle 1.0	1.083	0.854	0.92

Table 10. Impact Results by Event Date

Date	Hour (EDT)	OH De-Rated Impact (MW)	OH Switch Count	Temperature (°F)
7/17/2015	16	48.68	47,766	88°
7/28/2015	17	54.53	47,766	90°
	18	57.27		91°
7/29/2015	16	41.31	47,745	75°
	17	33.52		77°
9/1/2015	17	44.73	47,528	87°
9/4/2015	16	48.24	47,528	91°

PY2015 Program Capacity

Table 11 details the PY2015 total DEO Power Manager Program capacity, adjusted for peak normal weather, de-rated, and calculated at the plant. The last column of Table 11 shows the average capacity of the Power Manager program across the summer months in 2015. The monthly capacity is based on the number of switches at the end of each month.

Table 11. PY2015 Program Capacity, DEO (MWs)

State	Control Strategy	May	June	July	August	September	Summer Capacity
Ohio	Cycling	50.48	50.34	50.34	50.20	50.06	50.29

Table 12 shows the summer monthly load reduction under peak normal weather conditions. Table 13 shows the peak normal weather conditions used to calculate the results in Table 12. The system peak is calculated to occur in the hour 4:00-5:00 pm EDT in DEO.

Table 12. Shed kW/switch with Peak Normal Weather

Switch Type	Control Strategy	Potential Impact	De-rated Impact
Cannon	1.0 kW	1.08	0.92
	1.5 kW	1.58	1.35

Table 13. Peak Normal Weather

Hour	Ohio	
	Temp	Dewpt
11	85.3	71.8
12	87.6	71.9
13	89.9	71.9
14	92.0	71.5
15	93.1	70.7
16	93.9	70.5
17	92.5	70.0
18	92.4	69.5

Cadmus Review of Analytical Approach

Cadmus, as the third-party evaluator, reviewed the files for participation and impacts for the Power Manager program year 2015 provided by Duke Energy. A conservative approach was taken by the Duke Energy measurement and verification team to ensure accurate load reduction. The data reported here align with the information provided in the spreadsheets received. The methods reviewed are comparable with Cadmus' experience in other jurisdictions and confirmed as reliable estimates.

Appendix A: Excerpts from PY2013 Power Manager EM&V Report

2013 Operability Study for Duke Energy Ohio Cannon Load Control Devices

Cannon devices were instructed to execute a Target Cycle. With Target Cycle, each device calculates a unique shed time for each hour of load control based on the Amps parameter for the attached AC unit (entered into the device at installation) and the expected hourly run-time of the attached AC unit stored in the historical profile registers. Expected run-time is accumulated in the historical profile by saving run-time of the attached AC unit on days with weather conditions similar to load control days.

Table 14 shows the list of events occurred during the summer of 2013 for Cannon switches. The data collection included both device scan data and device data logs. Device data logs contain hourly shed minutes and hourly run-time for the attached AC unit. We obtained shed minutes during each hour of load control from device data logs and this information was used to assess shed performance of devices.

Table 14. OH PM events for Cannon devices

Event Date	Event Duration (EDT)
7/15/2013	2:30 – 5:00 pm
7/16/2013	2:30 – 6:00 pm
7/17/2013	2:30 – 5:00 pm
7/18/2013	2:30 – 5:00 pm

The shed factor measures correct response by properly configured devices to paging signals sent immediately prior to and during a load control event. In the PY2013 study, 136 devices were properly configured to shed. The shed factor was calculated by dividing the total non-zero shed event hours by total event hours for each device. Table 15 summarizes the results pertaining to the shed factor. From this data, the shed factor estimate is 97.5%.

Table 15. Shed Factor

Factor	Count	Weighted Factor
0	1	0
0.17	1	0.17
0.26	1	0.26
0.63	1	0.63
0.83	1	0.83
0.9	2	1.8
0.93	1	0.93
1	128	128
Sum	**136**	**132.62**
Shed Factor	**0.975**	

Shed Factor = Sum of Weighted Factor / Total count

Appendix B. Participant Household Characteristics and Demographics

Table 16. Participant Household Characteristics and Demographics

Household Characteristics	Ohio
Home Ownership Status	**n=80**
Homeowner	99%
Renter	1%
Type of Home	**n=84**
Single-family home, detached construction	93%
Single-family home, manufactured or modular	2%
Single-family mobile home	0%
Row house	1%
Two- or three-family attached home	1%
Apartment home (4+ families)	0%
Condominium	2%
Home Age	**n=82**
Built before 1960	34%
1960 – 1969	6%
1970 – 1979	10%
1980 – 1989	16%
1990 – 1999	13%
2000 – 2005	17%
2006 – 2015	4%

Household Characteristics	Ohio
Years Living in Current Residence	**n=84**
Less than 1 year	0%
1 – 3 years	6%
3 – 5 years	7%
5 – 10 years	15%
10 – 15 years	26%
15 – 20 years	12%
20 – 25 years	8%
More than 25 years	25%
Home Size	**n=79**
500 – 999 square feet	1%
1,000 – 1,499 square feet	16%
1,500 – 1,999 square feet	33%
2,000 – 2,499 square feet	29%
2,500 – 2,999 square feet	4%
3,000 – 3,499 square feet	10%
3,500 – 3,999 square feet	1%
4,000 or more square feet	5%
Home Heating System	**n=83 (multiple responses permitted)**
Central forced air furnace	90%
Heat pump	10%
Electric baseboard heat	0%
Geothermal heat pump	0%
Other systems	2%
Primary Fuel Used for Heating	**n=82**
Electricity	18%
Natural gas	76%
Oil or kerosene	4%
Propane	2%
None	0%

Household Characteristics	Ohio
Age of Heating System	**n=83**
0 – 4 years	8%
5 – 9 years	30%
10 – 14 years	33%
15 – 19 years	20%
20 years or older	8%
Home Cooling System	**n=84 (multiple responses permitted)**
Central air conditioning	86%
Heat pump for cooling	13%
Wall or window air conditioning unit(s)	1%
None, do not cool the home	1%
Fuel Used for Cooling	**n=80 (multiple response permitted)**
Electricity	91%
Natural gas	9%
Propane	0%
Age of Cooling System	**n=78**
0 – 4 years	15%
5 – 9 years	32%
10 – 14 years	31%
15 – 19 years	18%
20 years or older	4%
Number of Wall or Window Air Conditioning Units	**n=84**
None	99%
1	1%
2	0%
Number of Thermostats	**n=83**
1	93%
2	7%
3 or more	0%
Have a Programmable Thermostat	**n=81**
Yes	72%
No	28%

Household Characteristics	Ohio
Primary Fuel Used for Water Heating	**n=82 (multiple responses permitted)**
Natural gas	70%
Electricity	30%
Propane	1%
Age of Water Heater	**n=83**
0 – 4 years	29%
5 – 9 years	39%
10 – 14 years	18%
15 – 19 years	8%
20 years or older	6%
Number of People Living in Home	**n=81**
1	15%
2	40%
3	20%
4	15%
5	7%
6 or more	4%
Number of Teenagers (Age 13 – 19) Living in Home	**n=62**
None	74%
1	13%
2	10%
3	2%
4 or more	2%
Age of Respondent	**n=81**
18 – 34	4%
35 – 49	27%
50 – 59	27%
60 – 64	11%
65 – 74	27%
75 or older	4%

Household Characteristics	Ohio
Annual Household Income	**n=59**
Under $15,000	2%
$15,000 – $29,999	5%
$30,000 – $49,999	15%
$50,000 – $74,999	19%
$75,000 – $99,999	31%
Over $100,000	29%

Appendix C: Process Instruments Used for the PY2015 Evaluation

Three survey instruments and the management interview guide are included on the following pages:

- Participant Survey Instrument
- Event Survey Instrument
- Non-Event Survey Instrument
- Program Manager Interview Guide

CADMUS

Duke Energy
Participant Survey 2015

Researchable Questions	Item
Introduction / screening	A1-3
Program participation and enrollment	B1-9
Program information	C1-6
Awareness of activation	D1-4
Response to activation	E1-10
Satisfaction with the program	F1-5
Air conditioner usage	G1-22
Participation and interest in other programs	H1-2
Satisfaction with Duke Energy	I1-4
Bill credits	J1-3
Household demographics and characteristics	K1-20
Closing (confirm incentive address)	L1-2

Target Quota = [80 completes for OH]

A. Introduction

Welcome! We are following up with participants of Duke Energy's Power Manager® Program to help Duke Energy understand opinions that will help improve this Program. This survey will take approximately 20 minutes to complete. Please complete the survey by November 30th. Thank you in advance.

As a token of our appreciation we will enter your name into a drawing for a $100 gift card once the survey is complete. Instructions for accepting the gift card are provided at the end of the survey. Winners will be notified in 4 to 6 weeks.

This survey is administered by The Cadmus Group, an independent consulting firm. The survey is designed for appearance on a computer screen rather than a mobile or tablet device. If you experience technical difficulties completing the survey, please email The Cadmus Group at David.Ladd@CadmusGroup.com.

If you have any questions or need to contact Duke Energy, you may reach out to Frankie.diersing@duke-energy.com.

Please click Next to enter the survey.

A1. Please identify the state in which you live.

1. North Carolina
2. South Carolina
3. Ohio
4. Indiana

A2. Are you aware of your participation in the Power Manager® program?

1. Yes
2. No
98. (Don't know)
99. (Refused)

[ASK IF A2 <>1]

A3. Just to confirm, in the Power Manager program, Duke Energy installs a device outside on your central air conditioner or heat pump which allows the utility to cycle your cooling on and off for a few minutes during periods of critical need for electricity. Are you aware of your participation in the Power Manager program (is there a device installed outside on your air conditioner or heat pump)?

1. Yes
2. No [TERMINATE]
98. (Don't know) [TERMINATE]

B. Program Participation and Enrollment

B1. Were you involved in the decision to participate in Duke Energy's Power Manager Program?

1. (Yes)
2. (No)
3. (It was already installed when I moved in)
98. (Don't know)
99. (Refused)

[ASK IF B1=1]

B2. How did you hear about the Power Manager Program? [DO NOT READ LIST; RECORD ALL THAT APPLY]

1. (Something in the mail from Duke Energy)
2. (Phone call from Duke Energy (telemarketing)
3. (Email from Duke Energy)
4. (Duke Energy website)
5. (Other website,) [SPECIFY]
6. (Word-of-mouth (friend/neighbor/landlord))
7. (Newspapers)
8. (Television)
9. (Radio)
10. (Social media network) [SPECIFY]
11. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

[ASK IF B1=1]

B3. What was the main reason why you chose to participate in the program? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (For the bill credits)
2. (Helping Duke avoid power shortages/outages)
3. (Helping Duke avoid building power plants)
4. (To save energy)
5. (To save money (through lower utility bills))
6. (To help the environment) [ASK: Please explain]
7. (I don't use the air conditioner much)
8. (I'm usually not home when the events are supposed to occur)
9. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

[ASK IF B1=1]

B4. Were there any other reasons why you chose to participate in this program? [DO NOT READ LIST; RECORD ALL THAT APPLY]

1. (No other reasons)
2. (For the bill credits)
3. (Helping Duke avoid power shortages/outages)
4. (Helping Duke avoid building power plants)
5. (To save energy)
6. (To save money (through lower utility bills))
7. (To help the environment) [ASK: Please explain]
8. (I don't use the air conditioner much)
9. (I'm usually not home when the events are supposed to occur)
10. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

B5. During the time you enrolled, Duke Energy provided you with information that described how the Power Manager program works. Do you recall this information?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

B6. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", how satisfied were you with this information in helping you to understand how the program works?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF B6 IS 4 OR BELOW]

B7. Why do you say you are dissatisfied with this information?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

B8. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", how satisfied were you with the process of enrolling in the program?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF B8 IS 4 OR BELOW]

B9. Why do you say you are dissatisfied with this enrollment process?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

C. Program Information

C1. How many times per year did Duke Energy tell you it would activate the Power Manager device on your air conditioner?

1. [RECORD NUMBER]
98. (Don't know)
99. (Refused)

C2. Is anything unclear to you about how the program works?

1. (Yes) [ASK C2a]
   C2a. What is unclear to you? [RECORD RESPONSE]
2. (No)
98. (Don't know)
99. (Refused)

C3. Did you ever contact Duke Energy to find out more about the Power Manager Program?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF C3=1]

C4. What method did you use to contact Duke Energy? [DO NOT READ LIST; RECORD ALL THAT APPLY]

1. (Phone)
2. (Email)
3. (In person)
4. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

[ASK IF C3=1]

C5. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", how satisfied were you with how the Duke Energy representative responded to your questions?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF C5 IS 4 OR BELOW]

C6. Why do you say you are dissatisfied? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (Didn't respond to my questions/ concerns)
2. (Unable to answer/address my questions/concerns)
3. (Not professional/not courteous)
4. (Other) [SPECIFY]

98. (Don't know)

99. (Refused)

D. Awareness of Device Activation

D1. Are you aware of any times when Duke Energy may have activated your Power Manager device since you joined the program? [IF ASKED WHAT THIS MEANS SAY, "Has your air conditioner been controlled so that it cycles off and on when energy demand is high?"]

1. (Yes)
2. (No) [SKIP TO F1]

98. (Don't know) [SKIP TO F1]

99. (Refused) [SKIP TO F1]

[ASK IF DD1=1]

D2. What happened that made you believe that the device had been activated? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (A/C shuts down)
2. (Home temperature rises)
3. (The light on the meter is on)
4. (Light on AC unit flashes)
5. (Bill credits)
6. (Lower bill)
7. (Contact or notification from Duke Energy (other than bill))
8. (Customer called the Power Manager 800 number)
9. (Other) [SPECIFY]

98. (Don't know)

99. (Refused)

[ASK IF D1=1]

D3. During the summer of 2015, about how many times do you believe Duke Energy activated your Power Manager device?

1. [RECORD NUMERIC RESPONSE >0]
2. (None) [SKIP TO E6]

98. (Don't know)

99. (Refused)

[ASK IF D1=1]

D4. Were you or any members of your household home when Duke Energy activated your Power Manager device this past summer?

1. (Yes)
2. (No) [SKIP TO E6]
98. (Don't know) [SKIP TO E6]
99. (Refused) [SKIP TO E6]

E. Response to Activation

[ASK IF D4=1]

E1. Using a scale of 0 to 10 where zero means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort before your device was activated?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF D4=1]

E2. Using the same scale of 0 to 10 where zero means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort during the period when the device was activated?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF E2 IS LESS THAN E1]

E3. What do you feel was the main reason for your decrease in comfort? [RECORD ALL THAT APPLY] [IF CUSTOMER SAYS "rising temperature" or "rising humidity" ASK WHERE THEY ARE REFERRING TO INDOOR OR OUTDOOR OR BOTH.]

1. (Power Manager device activation)
2. (Rising outdoor Temperature)
3. (Rising indoor temperature)
4. (Rising outdoor Humidity)
5. (Rising indoor humidity)
6. (Power Outage)
7. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

[ASK IF D4=1]

E4. After your comfort level decreased during the Power Manager device activation, how long did it take for the comfort level in your home to return to normal? Would you say…

1. Less than one hour
2. More than 1 but less than 2 hours
3. More than 2 but less than 3 hours
4. More than 3 but less than 4 hours
5. Or more than 4 hours

98. (Don't know)

99. (Refused)

E5. Thinking about this summer, how many times do you think the activation of the Power Manager program affected your level of comfort?

1. [RECORD RESPONSE]

98. (Don't know)

99. (Refused)

[ASK IF D1=1]

E6. On a day when Duke Energy activates your Power Manager device, for how many hours do you think they are typically controlling your air conditioner?

1. [RECORD NUMBER OF HOURS]

98. (Don't know)

99. (Refused)

[ASK IF D1=1]

E7. On a day when Duke Energy activates your Power Manager device, at what time of day do you think that they usually de-activate and stop controlling your air conditioner?

1. [RECORD TIME OF DAY]

98. (Don't know)

99. (Refused)

[ASK IF D4=1]

E8. When Duke Energy activated your Power Manager device, did you or any other members of your household adjust the settings on your thermostat?

1. (Yes)
2. (No)

98. (Don't know)

99. (Refused)

[ASK IF E8=1]

E9. At what temperature was it originally set, and what temperature did you set it to during the control event?

E9b. (ORIGINAL TEMPERATURE SETTING) [RECORD DEGREES F]

E9c. (ADJUSTED TEMPERATURE SETTING) [RECORD DEGREES F]

[ASK IF D4=1]

E10. Did you or other members of your household do anything else to keep cool? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (Continued normal activities/did not do anything else)
2. (Turned on room/window air conditioners)
3. (Turned on fan(s))
4. (Closed blinds/shades)
5. (Moved to a cooler part of the house)
6. (Left the house and went somewhere cool)
7. (Wore less clothing)
8. (Drank more water/cool drinks)
9. (Cooled off with water (shower, bath, sprinkler, hose, pool))
10. (Opened windows)
11. (Other) [SPECIFY]

98. (Don't know)

99. (Refused)

F. Satisfaction with the Program

[ASK EVERYONE]

F1. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", how satisfied are you with the Power Manager program in general?

1. [RECORD NUMBER] [RANGE 0 TO 10]

98. (Don't know)

99. (Refused)

[ASK IF F1 IS 4 OR BELOW AND STATE IS NC, SCOR IN; DO NOT ASK FOR OHIO]

F2. Why do you say you are dissatisfied with the Power Manager Program? [DO NOT READ LIST; RECORD ALL THAT APPLY]

1. [RECORD RESPONSE]

98. (Don't know)

99. (Refused)

[ASK IF STATE = OHIO]

F3. How would you rate your overall satisfaction with the Power Manager Program, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat satisfied
5. Very dissatisfied

98. (Don't know)

99. (Refused)

[ASK IF F3=1, 2, 3, 4 or 5]

F4. Why do you give it that rating?

1. [RECORD RESPONSE]

98. (Don't know)

99. (Refused)

F5. Using a scale of 0 to 10, where zero means "Extremely Unlikely" and 10 means "Extremely Likely", how likely is it that you would recommend this program to a friend, neighbor, or co-worker?

1. [RECORD NUMBER] [RANGE 0 TO 10]

98. (Don't know)

99. (Refused)

G. Air Conditioner Use

Next are a few questions about your air conditioning use.

G1. How often do you use your central air conditioner? Would you say you use it ... [READ LIST UNTIL THEY REPLY]

1. Not at all
2. Only on the hottest days
3. Frequently during the cooling season
4. Most days during the cooling season
5. Every day during the cooling season

98. (Don't know)

99. (Refused)

G2. Have you had your central air conditioner tuned-up or serviced since you enrolled in the Power Manager program?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF G2=1]

G3. Was the Power Manager device disconnected while your air conditioner was being serviced?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF G3=1]

G4. Was the Power Manager device re-connected after completing service on the air conditioner?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF G4=2]

G5. Why wasn't the Power Manager device re-connected?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

G6. Is the central air conditioner typically used to keep someone at home comfortable during summer weekdays before 6 P.M.? [IF NEEDED: SOMEONE INCLUDES PETS, IF APPLICABLE]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

G7. Is the air conditioner typically used to keep someone at home comfortable during summer weekdays after 6 P.M.? [IF NEEDED: SOMEONE INCLUDES PETS, IF APPLICABLE]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

G8. When you think of a typical hot and humid summer day, at what outside temperature would you start to feel uncomfortably warm in your home? [DO NOT READ LIST AND RECORD ONE RESPONSE]

1. (Less than 73 degrees)
2. (73 to 75 degrees)
3. (76 to 78 degrees)
4. (79 to 81 degrees)
5. (82 to 84 degrees)
6. (85 to 87 degrees)
7. (88 to 90 degrees)
8. (91 to 95 degrees)
9. (96 to 100 degrees)
10. (Greater than 100 degrees)
98. (Don't know)
99. (Refused)

G9. At what outside temperature do you tend to turn on the central air conditioner? [DO NOT READ LIST AND RECORD ONE RESPONSE]

1. (It is programmed into the thermostat)
2. (Less than 73 degrees)
3. (73 to 75 degrees)
4. (76 to 78 degrees)
5. (79 to 81 degrees)
6. (82 to 84 degrees)
7. (85 to 87 degrees)
8. (88 to 90 degrees)
9. (91 to 95 degrees)
10. (96 to 100 degrees)
11. (Greater than 100 degrees)
98. (Don't know)
99. (Refused)

[ASK IF G9=1]

G10. Do you set your thermostat based on the season or when the weather gets hot? [DO NOT READ LIST AND RECORD ONE RESPONSE]

1. (Based on the season)
2. (When the weather gets hot)
3. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

G11. Which of the following best describes how you control the temperature in your home during the summer? [CHECK ONE]

1. We leave the thermostat at the same setting all the time.
2. We have programmed the thermostat to adjust temperature settings automatically at pre-set times (including using a "smart thermostat").
3. We manually adjust the setting on the thermostat at specific times (overnight, when leaving the house, etc.)
4. We manually adjust the setting on the thermostat as needed without any set pattern or schedule.

98. (Don't know)

99. (Refused)

[ASK IF G11=1]

G12. What temperature is your thermostat usually set to during the summer? [DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)

98. (Don't know)

[ASK IF G11<>1]

G13. On a hot weekday morning from 6 am to noon, what temperature do you set your thermostat to? [DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)

98. (Don't know)

99. (Refused)

[ASK IF G11<>1]

G14. On a hot weekday afternoon from noon to 6 pm, what temperature do you set your thermostat to?

[DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)
98. (Don't know)
99. (Refused)

[ASK IF G11<>1]

G15. On a hot weekday evening from 6 pm to 10pm, what temperature do you set your thermostat to?

[DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)
98. (Don't know)
99. (Refused)

[ASK IF G11<>1]

G16. During a hot weekday night from 10pm to 6am, what temperature do you set your thermostat to?

[DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)
98. (Don't know)
99. (Refused)

[ASK IF G11<>1]

G17. Do you use the same thermostat settings on summer weekends that you use on weekdays, or are your settings different on the weekend? [CHECK ONE]

1. Same settings on weekdays and weekends.
2. Different settings on weekends.
98. (Don't know)
99. (Refused)

[ASK IF G17=2]

G18. On a hot weekend morning from 6 am to noon, what temperature do you set your thermostat to? [DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)
98. (Don't know)
99. (Refused)

[ASK IF G17=2]

G19. On a hot weekend afternoon from noon to 6 pm, what temperature do you set your thermostat to? [DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)
98. (Don't know)
99. (Refused)

[ASK IF G17=2]

G20. On a hot weekend evening from 6 pm to 10pm, what temperature do you set your thermostat to?

[DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)

98. (Don't know)

99. (Refused)

[ASK IF G17=2]

G21. During a hot weekend night from 10pm to 6am, what temperature do you set your thermostat to?

[DO NOT READ LIST AND SELECT ONE RESPONSE]

1. (less than 65 degrees)
2. (65-68 degrees)
3. (69-72 degrees)
4. (73-75 degrees)
5. (76-78 degrees)
6. (greater than 78 degrees)
7. (Off)

98. (Don't know)

99. (Refused)

G22. On a weekday afternoon when the outdoor temperature is in the 90's, how often do you use electric fans to keep cool in your home? Would you say that you have fans on . . .

1. Always
2. Most of the time
3. Occasionally
4. Or never?

98. (Don't know)

99. (Refused)

H. Participation and Interest in Other Programs

H1. What, if any, Duke Energy programs or services have you heard of that help customers save energy? [PROBE:] Any others? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (Smart Saver (other than CFL) – rebates for HVAC equipment and maintenance, including duct sealing and attic insulation)
2. (Free CFL Programs (Smart Saver CFLs / CFLs by mail))
3. (Savings Store (specialty light bulbs sold online))
4. (Water Measures (water and energy saving kit or rebates for heat pump water heaters, pool pumps))
5. (Home Energy House Call (auditor visits home to give advice and install measures)
6. (My Home Energy Report (mailed or online report about household energy usage)
7. (Energy Star Homes)
8. (Low Income, Weatherization, or Low Income Weatherization)
9. (School-based programs: school performances, kits by mail)
10. (Appliance Recycling (remove old refrigerators and freezers)
11. (Other) [SPECIFY]

98. (Don't know)

99. (Refused)

H2. Duke Energy is always looking for other ways to help their customers. If Duke were to offer a program that cycles on and off other equipment at your home such as an electric water heater, would you be interested in participating?

1. (Yes)
2. (No)

98. (Don't know)

99. (Refused)

I. Satisfaction with Duke Energy

I1. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", what is your overall satisfaction with Duke Energy?

1. [RECORD NUMBER] [RANGE 0 TO 10]

98. (Don't know)

99. (Refused)

[ASK IF I1 IS 4 OR BELOW AND STATE IS NC, SC OR IN (do not ask for OH)]

I2. Why do you say you are dissatisfied with Duke Energy?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

[ASK IF STATE = OHIO]

I3. How would you rate your overall satisfaction with Duke Energy, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat satisfied
5. Very dissatisfied
98. (Don't know)
99. (Refused)

[ASK IF I3=1, 2, 3, 4 or 5]

I4. Why do you give it that rating?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

J. Bill credits

J1. What's your best estimate of how many dollars you will receive in yearly bill credits from Duke Energy for participating in the Power Manager program?

1. [RECORD DOLLAR AMOUNT]
98. (Don't know)
99. (Refused)

J2. Have you received any bill credits this year from Duke Energy for participating in this program?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF J2=1]

J3. How many times have you noticed the Power Manager credits on your bill this summer? [DO NOT READ LIST AND RECORD ONE RESPONSE]

1. (Every bill this summer)
2. (Once)
3. (Twice)
4. (Three times)
5. (Four or more times)
6. (Other) [SPECIFY]
7. (Don't know)
8. (Refused)

K. Demographics

Finally, we have some questions about your household.

K1. In what type of building do you live? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (Single-family home, detached construction)
2. (Single-family home, factory manufactured/modular)
3. (Single family, mobile home)
4. (Row House)
5. (Two or Three family attached residence-traditional structure)
6. (Apartment (4 + families)---traditional structure)
7. (Condominium---traditional structure)
8. (Other) [SPECIFY]

98. (Don't know)

99. (Refused)

K2. Approximately when was your home constructed? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (Before 1960)
2. (1960-1969)
3. (1970-1979)
4. (1980-1989)
5. (1990-1999)
6. (2000-2005)
7. (2006-present)

98. (Don't know)

99. (Refused)

K3. How long have you been living in your current residence? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (less than 1 year)
2. (1 to 3 years)
3. (3 to 5 years)
4. (5 to 10 years)
5. (10 to 15 years)
6. (15 to 20 years)
7. (20 to 25 years)
8. (more than 25 years)

98. (Don't know)

99. (Refused)

K4. Which of the following best describes your home's heating system? [READ LIST; RECORD ALL THAT APPLY]

1. Central forced air furnace
2. Electric Baseboard
3. Heat Pump
4. Geothermal Heat Pump
5. Other [SPECIFY]
6. (None; home has no heating system)

98. (Don't know)

99. (Refused)

[ASK IF K4 <>6]

K5. How old is your heating system? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (0-4 years)
2. (5-9 years)
3. (10-14 years)
4. (15-19 years)
5. (20 years or older)
6. (Do not have)

98. (Don't know)

99. (Refused)

[ASK IF K4 <>6]

K6. What is the primary fuel used in your heating system? Is it…[READ LIST; RECORD ONE RESPONSE]

1. Electricity
2. Natural Gas
3. Oil
4. Propane
5. Other [SPECIFY]

98. (Don't know)
99. (Refused)

K7. Do you use one or more of the following to cool your home? [READ LIST; RECORD ALL THAT APPLY]

1. Heat pump for cooling
2. Central air conditioning
3. Through the wall or window air conditioning unit
4. Geothermal Heat pump
5. Other [SPECIFY]
6. (None; do not cool the home)

98. (Don't know)
99. (Refused)

[ASK IF K7=3]

K8. How many window-unit or "through the wall" air conditioner(s) do you use? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (None)
2. (1)
3. (2)
4. (3)
5. (4)
6. (5)
7. (6)
8. (7)
9. (8 or more)

98. (Don't know)
99. (Refused)

[ASK IF K7 <>6]

K9. What is the fuel used in your cooling system? Is it… [READ LIST; RECORD ONE RESPONSE]

1. Electricity
2. Natural Gas
3. Oil
4. Propane
5. (Other) [SPECIFY]
6. (None)
98. (Don't know)
99. (Refused)

[ASK IF K7 <>6]

K10. How old is your cooling system? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (0-4 years)
2. (5-9 years)
3. (10-14 years)
4. (15-19 years)
5. (20 years or older)
6. (Do not have)
98. (Don't know)
99. (Refused)

K11. What is the fuel used by your water heater? [DO NOT READ LIST; RECORD ALL THAT APPLY]

1. (Electricity)
2. (Natural Gas)
3. (Oil)
4. (Propane)
5. (Other) [SPECIFY]
6. (No water heater)
98. (Don't know)
99. (Refused)

[ASK IF K11 <>6]

K12. How old is your water heater? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (0-4 years)
2. (5-9 years)
3. (10-14 years)
4. (15-19 years)
5. (20 years or older)
98. (Don't know)
99. (Refused)

K13. About how many square feet of living space are in your home? [IF NEEDED: DO NOT INCLUDE GARAGES OR OTHER UNHEATED AREAS. A 10-FOOT BY 12-FOOT ROOM IS 120 SQUARE FEET.]

1. (Less than 500)
2. (500 to 999)
3. (1000 to 1499)
4. (1500 to 1999)
5. (2000 to 2499)
6. (2500 to 2999)
7. (3000 to 3499)
8. (3500 to 3999)
9. (4000 or more)
98. (Don't know)
99. (Refused)

K14. Do you own or rent your home?

1. (Own)
2. (Rent)
98. (Don't know)
99. (Refused)

K15. How many thermostats are there in your home?

1. (0)
2. (1)
3. (2)
4. (3)
5. (4 or more)
98. (Don't know)
99. (Refused)

K16. Do you have a programmable thermostat?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

K17. Including yourself, how many people live in this home?

1. (1)
2. (2)
3. (3)
4. (4)
5. (5)
6. (6)
7. (7)
8. (8 or more)
98. (Don't know)
99. (Prefer not to answer)

K18. How many of the people living in your home are teenagers between ages 13 and 19?

1. (none)
2. (1)
3. (2)
4. (3)
5. (4)
6. (5)
7. (6)
8. (7)
9. (8 or more)
98. (Don't know)
99. (Prefer not to answer)

The following questions are for classification purposes only and will not be used for any other purpose than to help Duke Energy continue to improve service.

K19. Please select your age group. [READ LIST; RECORD ONE RESPONSE]

1. 18 to 34
2. 35 to 49
3. 50 to 59
4. 60 to 64
5. 65 to 74
6. Over 74
99. (Prefer not to answer)

K20. Please select your annual household income. [RECORD ONE RESPONSE]

1. Under $15,000
2. $15,000-$29,999
3. $30,000-$49,999
4. $50,000-$74,999
5. $75,000-$100,000
6. Over $100,000

98. (Don't know)

99. (Prefer not to answer)

L. Closing

L1. Please let us know if the email used to send you this survey is the best way to contact you about future surveys.

1. The email this survey was sent to is correct.
2. Please contact me in the future at (enter new email): [SPECIFY]

L2. Those were all the questions we have for you. Before you go, we need to verify your address for the $100 drawing. Please enter the best address for use to use.

1. [SPECIFY NAME, STREET ADDRESS, CITY, STATE, ZIP CODE]

Thanks again for your time today! We will notify the winner of the Visa gift card in about 4-6 weeks.

CADMUS

Duke Energy
Power Manager Event Survey 2015

Researchable Questions	Item
Introduction / screening	A1-5
Device activation awareness	B1-5
Response to activation	C1-9
AC usage	D1-4
Satisfaction with program	E1-4
Satisfaction with Duke Energy	F1-3
Demographics (number of occupants)	G1

General Instructions

- Interviewer instructions are in green **[LIKE THIS]** (the style is "Survey: Interviewer Instructions").
- CATI programming instructions are in red **[LIKE THIS]** (the style is "Survey: Programming").
- Items that should not be read by the interviewer are in parentheses like this ( ).

Variables defined in survey programming (update for each event)

- [DATE OF EVENT]
- [EVENT START TIME]
- [EVENT END TIME]

Calling Instructions:

Only calls to homes, please. Businesses are not eligible for this survey.

Make one call attempt per contact within 28 hours of the end of the event. Callbacks are OK as long as the survey is completed within 28 hours of the end of the event. Call times are from 10:00 a.m. to 8:00 p.m. EST Monday through Saturday. No calls on Sunday. For example, if a control event occurs on a Monday ending at 5 p.m., calling hours for that particular event would be:

Monday 5 p.m.-8 p.m. Eastern

Tuesday 10 a.m.-8 p.m. Eastern

A. Introduction

A1. Hello, my name is _____, and I'm calling on behalf of Duke Energy with a short customer satisfaction survey. This survey will take about five minutes to complete; do you have five minutes to answer some questions for us today?

1. Yes
2. No or not a convenient time **[THANK AND TERMINATE]**

99. (Refused) **[THANK AND TERMINATE]**

A2. Thank you. The information you provide will be confidential and will help to improve service. This call may be monitored or recorded for quality assurance puposes. According to our information, you participate in the Power Manager® Program. This program allows Duke Energy to cycle your air conditioner on and off during periods of critical need for electricity. Are you aware of your participation in the Power Manager program?

1. Yes
2. No **[ASK IF THERE IS SOMEONE ELSE AVAILABLE WHO WOULD KNOW AND RESTART SURVEY WITH THAT PERSON; IF NO ONE ELSE IS AVAILABLE THANK AND TERMINATE]**

98. (Don't know) **[ASK IF THERE IS SOMEONE ELSE AVAILABLE WHO WOULD KNOW AND RESTART SURVEY WITH THAT PERSON; IF NO ONE ELSE IS AVAILABLE THANK AND TERMINATE]**

A3. Just to confirm, do you still live at **[ADDRESS FROM CALL SHEET]**?

1. Yes
2. No **[THANK AND TERMINATE]**

98. (Don't know) **[THANK AND TERMINATE]**

A4. **[CHECK STATE FROM CALL SHEET]**

1. North Carolina / South Carolina
2. Ohio
3. Indiana

A5. **[COPY RESPONDENT ID NUMBER FROM CALL SHEET]**

1. **[PASTE RESPONDENT ID NUMBER HERE]**

B. Device Activation Awareness

B1. Has Duke Energy activated the Power Manager® device since you joined the program? *[IF THEY ASK WHAT THIS MEANS, RESPOND WITH: "*Duke Energy has the ability to send a signal to activate the device to cycle your central air conditioner on and off when there is peak demand foir electricity.*" THEN REPEAT THE QUESTION.]*

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

B2. How can you tell (how would you be able to tell) when the device has been activated? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (A/C shuts down)
2. (Home temperature rises)
3. (The light on the meter is on)
4. (Light on AC unit flashes)
5. (Bill credits)
6. (Lower bill)
7. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

B3. Has your device been activated in the last two days? [IF NEEDED: Was your device activated yesterday or today?]

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

B4. At what temperature was your thermostat set to between [EVENT START TIME] and [EVENT END TIME] on [EVENT DATE]? [DO NOT READ LIST]

1. (Less than 65 degrees)
2. (65 to 68 degrees)
3. (69 to 72 degrees)
4. (73 to 75 degrees)
5. (76 to 78 degrees)
6. (79 to 81 degrees)
7. (82 to 84 degrees)
8. (85 to 87 degrees)
9. (88 to 90 degrees)
10. (91 to 94 degrees)
11. (95 to 97 degrees)
12. (98 to 100 degrees)
13. (Greater than 100 degrees)
14. (It's programmed into the thermostat)
15. (Thermostat was turned off)
16. (Air conditioner was turned off)
98. (Don't know)
99. (Refused)

B5. Were you or any members of your household home at that time?

1. (Yes)
2. (No) [SKIP TO D1]
98. (Don't know) [SKIP TO D1]
99. (Refused) [SKIP TO D1]

C. Response to Activation

[ASK IF B5=1]

C1. Using a scale of 0 to 10 where zero means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort before [EVENT START TIME] on [EVENT DATE]?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

C2. Using the same scale of 0 to 10 where zero means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort between [EVENT START TIME] and [EVENT END TIME] on [EVENT DATE]?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF C2<C1]

C3. What do you feel caused your decrease in comfort? [RECORD ALL THAT APPLY; DO NOT READ LIST] [IF CUSTOMER SAYS "rising temperature" or "rising humidity" ASK WHETHER THEY ARE REFERRING TO INDOOR OR OUTDOOR OR BOTH.]

1. (Power Manager device activation)
2. (Rising outdoor Temperature)
3. (Rising indoor temperature)
4. (Rising outdoor Humidity)
5. (Rising indoor humidity)
6. (Power Outage)
7. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

C4. Between [EVENT START TIME] and [EVENT END TIME] on [EVENT DATE], did you or any other members of your household adjust the settings on your thermostat?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF C4=1]

C5. At what temperature was it originally set, and what temperature did you set it to during the event?

C5a. (ORIGINAL TEMPERATURE SETTING) [RECORD DEGREES F]

C5b. (ADJUSTED TEMPERATURE SETTING) [RECORD DEGREES F]

[ASK IF B5=1]

C6. Between [EVENT START TIME] and [EVENT END TIME] on [EVENT DATE], were any electric fans being used in your home?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF C6=1]

C7. Did you or any other members of your household turn any electric fans on between [EVENT START TIME] and [EVENT END TIME], or were all of the fans already running before [EVENT START TIME]?

1. (Yes, turned fan(s) on during time period)
2. (No, all fans were already running before time period)
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

C8. What else, if anything, did you or other members of your household do to keep cool between [EVENT START TIME] and [EVENT END TIME] on [DAY OF HIGH TEMPERATURE]? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (Continued normal activities/did not do anything else)
2. (Turned on room/window air conditioners)
3. (Closed blinds/shades)
4. (Moved to a cooler part of the house)
5. (Left the house and went somewhere cool)
6. (Wore less clothing)
7. (Drank more water/cool drinks)
8. (Cooled off with water (shower, bath, sprinkler, hose, pool))
9. (Opened windows)
10. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

C9. Did you experience any power outage issues on [DATE OF EVENT]?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

D. AC Usage

Now I'm going to ask you some questions about your air conditioning use.

D1. How often do you use your central air conditioner? Would you say you use it ... [READ LIST]

1. Not at all
2. Only on the hottest days
3. Frequently during the cooling season
4. Most days during the cooling season
5. Every day during the cooling season
98. (Don't know)
99. (Refused)

D2. When you think of a typical hot and humid summer day, at what outside temperature do you tend to feel uncomfortably warm inside your home? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (Less than 65 degrees)
2. (65 to 68 degrees)
3. (69 to 72 degrees)
4. (73 to 75 degrees)
5. (76 to 78 degrees)
6. (79 to 81 degrees)
7. (82 to 84 degrees)
8. (85 to 87 degrees)
9. (88 to 90 degrees)
10. (91 to 94 degrees)
11. (95 to 97 degrees)
12. (98 to 100 degrees)
13. (Greater than 100 degrees)
98. (Don't know)
99. (Refused)

D3. At what outside temperature do you tend to turn on the central air conditioner? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (Less than 65 degrees)
2. (65 to 68 degrees)
3. (69 to 72 degrees)
4. (73 to 75 degrees)
5. (76 to 78 degrees)
6. (79 to 81 degrees)
7. (82 to 84 degrees)
8. (85 to 87 degrees)
9. (88 to 90 degrees)
10. (91 to 94 degrees)
11. (95 to 97 degrees)
12. (98 to 100 degrees)
13. (Greater than 100 degrees)
98. (Don't know)
99. (Refused)

D4. How old is your central air conditioner? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (0 to 4 years old)
2. (5 to 9 years old)
3. (10 to 14 years old)
4. (15 to 19 years old)
5. (20 years old or older)
98. (Don't know)
99. (Refused)

E. Satisfaction with Program

[ASK IF STATE=OHIO]

E1. How would you rate your overall satisfaction with the Power Manager Program, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied
98. (Don't know)
99. (Refused)

[ASK IF E1=1, 2, 3, 4 or 5]

E2. Why do you give it that rating?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

E3. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", what is your overall satisfaction with the Power Manager® program?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF E3=4 OR BELOW AND STATE=NC, SC or IN]

E4. Why do you say you are dissatisfied with Power Manager®?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

F. Satisfaction with Duke Energy

F1. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", what is your overall satisfaction with Duke Energy?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF F1 IS 4 OR BELOW]

F2. Why do you say you are dissatisfied with Duke Energy?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

F3. Using a scale of 0 to 10, where zero means "Extremely Unlikely" and 10 means "Extremely Likely", how likely is it that you would recommend this program to a friend or colleague?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

G. Demographics and Closing

G1. Including you, how many people live in this home?

1. (1)
2. (2)
3. (3)
4. (4)
5. (5)
6. (6)
7. (7)
8. (8 or more)

99. (Refused)

Thank you for your time and feedback today!

CADMUS

Duke Energy
Power Manager Non-Event Survey 2015

Researchable Questions	Item
Introduction / screening	A1-5
Device activation awareness	B1-5
Response to activation	C1-9
AC usage	D1-4
Satisfaction with program	E1-4
Satisfaction with Duke Energy	F1-3
Demographics (number of occupants)	G1

General Instructions

- Interviewer instructions are in green **[LIKE THIS]** (the style is "Survey: Interviewer Instructions").
- CATI programming instructions are in red **[LIKE THIS]** (the style is "Survey: Programming").
- Items that should not be read by the interviewer are in parentheses like this ( ).
- Differences from Event Survey question text are highlighted yellow.

Variables defined in survey programming (update for each non-event high temperature day)

- [DATE OF HIGH TEMPERATURE]

Calling Instructions:

Only calls to homes, please. Businesses are not eligible for this survey.

Make one call attempt per contact within 28 hours beginning at 5 p.m. on the non-event high date of high temperature. Callbacks are OK as long as the survey is completed within the 28 hour timeframe. Call times are from 10:00 a.m. to 8:00 p.m. EST Monday through Saturday. No calls on Sunday. For example, if there is a high temperature day without an event on a Monday, calling hours for that particular non-event would be:

Monday 5 p.m.-8 p.m. Eastern

Tuesday 10 a.m.-8 p.m. Eastern

A. Introduction

A1. Hello, my name is _____, and I'm calling on behalf of Duke Energy with a short customer satisfaction survey. This survey will take about five minutes to complete; do you have five minutes to answer some questions for us today?

1. Yes
2. No or not a convenient time **[THANK AND TERMINATE]**

99. (Refused) **[THANK AND TERMINATE]**

A2. Thank you. The information you provide will be confidential and will help to improve service. This call may be monitored or recorded for quality assurance puposes. According to our information, you participate in the Power Manager® Program. This program allows Duke Energy to cycle your air conditioner on and off during periods of critical need for electricity. Are you aware of your participation in the Power Manager program?

1. Yes
2. No **[ASK IF THERE IS SOMEONE ELSE AVAILABLE WHO WOULD KNOW AND RESTART SURVEY WITH THAT PERSON; IF NO ONE ELSE IS AVAILABLE THANK AND TERMINATE]**

98. (Don't know) **[ASK IF THERE IS SOMEONE ELSE AVAILABLE WHO WOULD KNOW AND RESTART SURVEY WITH THAT PERSON; IF NO ONE ELSE IS AVAILABLE THANK AND TERMINATE]**

A3. Just to confirm, do you still live at **[ADDRESS FROM CALL SHEET]**?

1. Yes
2. No **[THANK AND TERMINATE]**

98. (Don't know) **[THANK AND TERMINATE]**

A4. **[CHECK STATE FROM CALL SHEET]**

1. North Carolina / South Carolina
2. Ohio
3. Indiana

A5. **[COPY RESPONDENT ID NUMBER FROM CALL SHEET]**

1. **[PASTE RESPONDENT ID NUMBER HERE]**

B. Device Activation Awareness

B1. Has Duke Energy activated the Power Manager® device since you joined the program? *[IF THEY ASK WHAT THIS MEANS, RESPOND WITH: "*Duke Energy has the ability to send a signal to activate the device to cycle your central air conditioner on and off when there is high demand for electricity.*" THEN REPEAT THE QUESTION.]*

1. (Yes)
2. (No)

98. (Don't know)
99. (Refused)

B2. How can you tell (how would you be able to tell) when the device has been activated? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (A/C shuts down)
2. (Home temperature rises)
3. (The light on the meter is on)
4. (Light on AC unit flashes)
5. (Bill credits)
6. (Lower bill)
7. (Other) [SPECIFY]

98. (Don't know)
99. (Refused)

B3. Has your device been activated within the last two days? [IF NEEDED: Was your device activated yesterday or today?]

1. (Yes)
2. (No)

98. (Don't know)
99. (Refused)

B4. At what temperature was your thermostat set to between 2:00 and 5:00 p.m. on [DAY OF HIGH TEMPERATURE]? [DO NOT READ LIST]

1. (Less than 65 degrees)
2. (65 to 68 degrees)
3. (69 to 72 degrees)
4. (73 to 75 degrees)
5. (76 to 78 degrees)
6. (79 to 81 degrees)
7. (82 to 84 degrees)
8. (85 to 87 degrees)
9. (88 to 90 degrees)
10. (91 to 94 degrees)
11. (95 to 97 degrees)
12. (98 to 100 degrees)
13. (Greater than 100 degrees)
14. (It's programmed into the thermostat)
15. (Thermostat was turned off)
16. (Air conditioner was turned off)

98. (Don't know)
99. (Refused)

B5. Were you or any members of your household home at that time?

1. (Yes)
2. (No) [SKIP TO D1]
98. (Don't know) [SKIP TO D1]
99. (Refused) [SKIP TO D1]

C. Response to Activation

[ASK IF B5=1]

C1. Using a scale of 0 to 10 where zero means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort before 2:00 pm on [DAY OF HIGH TEMPERATURE]?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

C2. Using the same scale of 0 to 10 where zero means very uncomfortable and 10 means very comfortable, how would you describe your level of comfort between 2:00 pm and 5:00 pm on [DAY OF HIGH TEMPERATURE]?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF C2<C1]

C3. What do you feel caused your decrease in comfort? [DO NOT READ LIST; RECORD ALL THAT APPLY] [IF CUSTOMER SAYS "rising temperature" or "rising humidity" ASK WHETHER THEY ARE REFERRING TO INDOOR OR OUTDOOR OR BOTH.]

1. (Power Manager device activation)
2. (Rising outdoor Temperature)
3. (Rising indoor temperature)
4. (Rising outdoor Humidity)
5. (Rising indoor humidity)
6. (Power Outage)
7. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

C4. Between 2:00 pm and 5:00 pm on [DAY OF HIGH TEMPERATURE] did you or any other members of your household adjust the settings on your thermostat?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF C4=1]

C5. At what temperature was it originally set, and what temperature did you set it on [DAY OF HIGH TEMPERATURE]

C5c. (ORIGINAL TEMPERATURE SETTING) [RECORD DEGREES F]

C5d. [ADJUSTED TEMPERATURE SETTING) [RECORD DEGREES F]

[ASK IF B5=1]

C6. Between 2:00 pm and 5:00 pm on [DAY OF HIGH TEMPERATURE], were any electric fans being used in your home?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

[ASK IF C6=1]

C7. Did you or any other members of your household turn any electric fans on between 2:00 pm and 5:00 pm, or were all of the fans already running before 2:00 pm?

1. (Yes, turned fan(s) on during time period)
2. (No, all fans were already running before time period)
98. (Don't know)
99. (Refused)

[ASK IF B5=1]

C8. What else, if anything, did you or other members of your household do to keep cool between 2:00 and 5:00 on [DAY OF HIGH TEMPERATURE]? [RECORD ALL THAT APPLY; DO NOT READ LIST]

1. (Continued normal activities/did not do anything else)
2. (Turned on room/window air conditioners)
3. (Closed blinds/shades)
4. (Moved to a cooler part of the house)
5. (Left the house and went somewhere cool)
6. (Wore less clothing)
7. (Drank more water/cool drinks)
8. (Cooled off with water (shower, bath, sprinkler, hose, pool))
9. (Opened windows)
10. (Other) [SPECIFY]
98. (Don't know)
99. (Refused)

C9. Did you experience any power outage issues on [DAY OF HIGH TEMPERATURE]?

1. (Yes)
2. (No)
98. (Don't know)
99. (Refused)

D. AC Usage

Now I'm going to ask you some questions about your air conditioning use.

D1. How often do you use your central air conditioner? Would you say you use it ... [READ LIST]

1. Not at all
2. Only on the hottest days
3. Frequently during the cooling season
4. Most days during the cooling season
5. Every day during the cooling season
98. (Don't know)
99. (Refused)

D2. When you think of a typical hot and humid summer day, at what outside temperature do you tend to feel uncomfortably warm inside your home? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (Less than 65 degrees)
2. (65 to 68 degrees)
3. (69 to 72 degrees)
4. (73 to 75 degrees)
5. (76 to 78 degrees)
6. (79 to 81 degrees)
7. (82 to 84 degrees)
8. (85 to 87 degrees)
9. (88 to 90 degrees)
10. (91 to 94 degrees)
11. (95 to 97 degrees)
12. (98 to 100 degrees)
13. (Greater than 100 degrees)
98. (Don't know)
99. (Refused)

D3. At what outside temperature do you tend to turn on the central air conditioner? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (Less than 65 degrees)
2. (65 to 68 degrees)
3. (69 to 72 degrees)
4. (73 to 75 degrees)
5. (76 to 78 degrees)
6. (79 to 81 degrees)
7. (82 to 84 degrees)
8. (85 to 87 degrees)
9. (88 to 90 degrees)
10. (91 to 94 degrees)
11. (95 to 97 degrees)
12. (98 to 100 degrees)
13. (Greater than 100 degrees)
98. (Don't know)
99. (Refused)

D4. How old is your central air conditioner? [DO NOT READ LIST; RECORD ONE RESPONSE]

1. (0 to 4 years old)
2. (5 to 9 years old)
3. (10 to 14 years old)
4. (15 to 19 years old)
5. (20 years old or older)

98. (Don't know)
99. (Refused)

E. Satisfaction with Program

[ASK IF STATE=OHIO]

E1. How would you rate your overall satisfaction with the Power Manager Program, would you say you were Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied?

1. Very satisfied
2. Somewhat satisfied
3. Neither satisfied nor dissatisfied
4. Somewhat dissatisfied
5. Very dissatisfied

98. (Don't know)
99. (Refused)

[ASK IF E1=1, 2, 3, 4 or 5]

E2. Why do you give it that rating?

1. [RECORD RESPONSE]

98. (Don't know)
99. (Refused)

E3. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", what is your overall satisfaction with the Power Manager® program?

1. [RECORD NUMBER] [RANGE 0 TO 10]

98. (Don't know)
99. (Refused)

[ASK IF E3 IS 4 OR BELOW AND STATE IS NC, SC or IN]

E4. Why do you say you are dissatisfied with Power Manager®?

1. [RECORD RESPONSE]

98. (Don't know)
99. (Refused)

F. Satisfaction with Duke Energy

F1. Using a scale of 0 to 10 where zero indicates "Very Dissatisfied" and 10 indicates "Very Satisfied", what is your overall satisfaction with Duke Energy?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

[ASK IF F1 IS 4 OR BELOW]

F2. Why do you say you are dissatisfied with Duke Energy?

1. [RECORD RESPONSE]
98. (Don't know)
99. (Refused)

F3. Using a scale of 0 to 10, where zero means "Extremely Unlikely" and 10 means "Extremely Likely", how likely is it that you would recommend this program to a friend or colleague?

1. [RECORD NUMBER] [RANGE 0 TO 10]
98. (Don't know)
99. (Refused)

G. Demographics and Closing

G1. Including you, how many people live in this home?

1. (1)
2. (2)
3. (3)
4. (4)
5. (5)
6. (6)
7. (7)
8. (8 or more)
99. (Refused)

Thank you for your time and feedback today!

CADMUS

Duke Energy
Power Manager Management Interview Guide 2015

Interviewer: _____ Date of Interview: _____ Interview method: _____

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the Power Manager Program. We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates. As you may know, due to regulatory requirements Duke Energy needs to conduct periodic evaluations whether they are needed or not. Today's interview will take about an hour to complete. May we begin?

Program Overview

1. Please describe your role and scope of responsibility in detail. What is it that you are responsible for as it relates to this program? When did you take on this role?

2. In your own words, please briefly describe the Power Manager Program's objectives. Are there any objectives at the participant level? What are they?

   Are there any objectives at the state portfolio level?

   Are there any objectives at the company level, across all the Power Manager states? Or for reporting to balancing authorities such as MISO or PJM?

3. What are the options for enrolling, what is the process?

4. What is the current enrollment in Power Manager? What is the dropout rate?

5. In your own words please describe how the Power Manager Program works and go over its design, marketing and operational approaches. Walk us through the participatory steps starting with a customer who knows nothing about the program.

6. Please describe for me the roles and responsibilities of vendors that are supporting Duke Energy's Power Manager program?

7. Are there any changes you would like to see in the vendors' roles or responsibilities that would improve the Power Manager program's operations?

Objectives

8. Have the Power Manager's objectives changed in the last year or so, and if so how? Why?

9. In your opinion, which objectives do you think are being, or will be, met?

10. Since the program objectives were devised, have there been any changes in external influences (such as market conditions) or internal influences that have affected the Power Manager program's operations?

11. Should the current objectives be revised in any way because of these changes that developed since the program objectives were devised? What changes would you put into place, and how would it affect the objectives?

12. Are there any pre-existing conditions that are associated with the program or the market that are not being addressed or that you think should have more attention?

    If yes, which conditions are they? How should these conditions be addressed? What should be changed? How do you think these changes will increase program participation or impacts?

Incentives

13. Do you think the incentives offered through the Power Manager Program are adequate enough to entice customers to enroll in the program? Why or why not?

14. Do you think the customers understand the incentive levels?

Marketing

15. What kinds of marketing, outreach and customer contact approaches do you use to make your customers aware of the program? Are there any changes to the program marketing that you think would increase participation?

16. Do you use Duke Energy Energy Efficiency programs to generate leads for Power Manager?

17. What are the key market or operational barriers that impede a more efficient program operation or limit obtainable impacts?

Overall Power Manager Management

18. Describe the use of any internal or outside program advisors, technical groups or organizations that have in the past or are currently helping you think through the program's approach or methods. How often do you use these resources? What do you use them for?

19. Could you share with me when AC duty cycle and switch operability studies will be taking place?

20. Are there any other studies Duke Energy will be carrying out to better understand the response rate of the market?

21. Do you currently use any smart grid technologies in your DR programs? Do you have plans to do so?

Event calls

22. Under what conditions would you call an event? Who is involved in the call?

23. How do you coordinate events calls between your res and non-res DR programs?

24. Can residential customers opt out of an event?

25. How do you verify load shed? What is the quality control, tracking and accounting processes for determining how well control strategies worked?

26. Overall, what about the Power Manager Program works well and why?

27. What doesn't work well and why? Do you think this discourages participation?

28. In what ways can the Power Manager Program's operations be improved?

29. If you could change any part of the program what would you change and why?

30. Are there any other issues or topics you think we should know about and discuss for this evaluation?

Impact and Process Evaluation of the 2015 PowerShare Program®

Duke Energy Ohio

Final Report, March 8, 2016

Duke Energy
139 East 4th Street
Cincinnati, Ohio 45202

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CADMUS

Prepared by:

Cadmus and
Yinsight, Inc.

CADMUS

Table of Contents

Executive Summary

PowerShare® is a demand response program designed to reduce nonresidential customers' energy use (kW demand) during periods of high energy prices or when high energy usage would cause energy supplies across the transmission and distribution system be at, or near, critical levels. In both these situations, the PowerShare Program allows Duke Energy Ohio (DEO) to purchase capacity from their commercial and industrial (C&I) customers who reduce their energy demand, thus increasing the available energy supply.

DEO notifies customers that a demand response event is needed via a multi-approach communications system. Customers then reduce their electric usage to a level consistent with their program participation agreements. PowerShare emergency capacity reduction commitments are registered with PJM on a seasonal basis. Emergency events are dispatched by PJM to relieve capacity constraints.

DEO conducted the program year 2015 (PY2015) impact evaluation of PowerShare using a variety of commonly accepted, standard utility industry statistical practices and applications. These included calculating baseline proforma load calculations for each customer and monthly and hourly peak hour analysis. These approaches were then reviewed by an independent, third-party evaluator (Cadmus) commensurate with standard evaluation, measurement, and verification (EM&V) industry practice. Based on a critical review of the processes used for PowerShare, the findings for PY2015 are credible.

Program Year 2015 Highlights

An overview of the PY2015 PowerShare parameters and results include:

- The evaluation program year covers January 1, 2015 through December 31, 2015. To match the PJM Interconnection, LLC planning years, the period beginning January 1st through May 31st falls within the 2014 program year. Program year 2015 begins on June 1st. All customer participants in the 2014 program year had "summer only" agreements that expired on September 30, 2014. Therefore, this evaluation will be focused on customers who signed agreements that begin in June 2015.
- There were two PowerShare events during the 2015 calendar year. Both were 1 hour 'test' events scheduled for customers to demonstrate their ability to meet curtailment commitments as required by PJM:
    - September 1, 2015 (all participants)
    - September 23, 2015 (internal retest opportunity for select customers)
- During PY2015, the summer peak program capability[1] for the PowerShare program was calculated to be 63.3 MWs.

[1] Summer Peak Program Capability is defined as the Program Year, average load shed capability for active program participants, from June – September, between Hours Ending 15-18.

Introduction

PowerShare is a demand response program designed to reduce nonresidential customers' energy use (kW demand) during periods of high energy prices or when high energy usage would cause energy supplies across the transmission and distribution system be at, or near, critical levels. In both these situations, the PowerShare program allows Duke Energy Ohio (DEO) to purchase capacity from their commercial and industrial (C&I) customers who reduce their energy demand, thus increasing the available energy supply.

PowerShare is the brand name given to DEO Peak Load Management Program (Rider PLM, Peak Load Management Program P.U.C.O. Electric No. 19, Sheet No. 87.3). A revised version of this Rider was accepted in PUCO Case No. 12-1682-EL-AIR. All information in this report refers to the Rider PLM. The PLM Program is voluntary and offers customers the opportunity to reduce their electric costs by managing their electric usage during the Company's peak load periods. Customers and the Company will enter into a service agreement under this Rider, specifying the terms and conditions under which the customer agrees to reduce usage.

DEO notifies customers that a demand response event is needed via a multi-approach communications system. Customers then reduce their electric usage to a level consistent with their program participation agreements. PowerShare emergency capacity reduction commitments are registered with PJM on a seasonal basis. Emergency events are dispatched by PJM to relieve capacity constraints.

Program Year 2015 Options

In PY2015, DEO offered two product options within PowerShare, each of which is outlined below. For all program products the participant must be able to provide a minimum of 100 kW load reduction.

QuoteOption

Under the QuoteOption products, the DEO may notify the customer of a QuoteOption event and provide a Price Quote to the customer for each event hour.

The customer will decide whether to reduce demand during the event period. If they decide to do so, the customer will notify DEO and provide an estimate of the customer's projected load reduction.

Each time the DEO exercises this option the customer who reduces load will receive an energy credit. There is no option premium for the QuoteOption® product since customer load reductions are voluntary.

Call Option

A customer enrolled in the PowerShare CallOption® product agrees, upon notification by DEO, to reduce its demand. Each time the DEO exercises its option under the agreement the customer will receive a credit for the energy reduced.

Duke Energy offered only emergency CallOption events and enrollment choices beginning in program year 2015. The enrollment choices mimic the rules for PJM's "Limited Demand Response" and "Extended Summer Demand Response" programs.

1. "CallOption 0/10":
    a. Customer agreements cover the time period from June 1, 2015 to September 30, 2015.
    b. Maximum number of interruptions during the agreement is 10.
    c. Emergency Events may be between 1 hour and 6 hours in duration.
    d. Emergency Events may be called only on non-holiday weekdays between noon and 8 pm.

2. "Extended Summer":
    a. Customer agreements cover the time period from June 1, 2015 to October 31, 2015 plus May 2016.
    b. There is no maximum number of interruptions during the agreement.
    c. Emergency Events may be between 1 hour and 10 hours in duration.
    d. Emergency Events may be called on any day during the agreement period between 10 am and 10 pm.

Emergency events are implemented due to reliability concerns. Participants are required to curtail during emergency events. During PJM Interconnection, LLC (PJM)-declared emergency events, customers are not provided the option to buy through. Participating customers receive a monthly capacity premium based on their curtailment capability during the term of the agreement. In addition, customer receive an energy credit for actual energy reduced during a curtailment event.

For the 2014 PowerShare program, DEO customers were only eligible for the Emergency-only option (CallOption 0/10) and were required to reach their contracted level of load reduction within 90 minutes

For 2015, PJM changed the advanced notification requirement for their DR programs to 30 minutes. Certain customers with safety or physical limitations are allowed to request a "waiver" and respond in either 60 or 120 minutes—depending on the situation. Duke Energy Ohio adopted this 30 minute notice requirement, and the exception process, for the 2015 program year.

Program Year 2015 Participation

The PowerShare program has an annual enrollment for participation. This report covers the participation year of 2015. However, customers may enroll for one year periods from June through May the following year. Under normal circumstances, DEO is a summer peaking utility and therefore, the most relevant participation period is the summer months of June through September and the impact analysis concentrates on those months.

Table 1 below compares account participation levels for summer 2014 and summer 2015, as well as megawatts (MWs) enrolled in the program. The MW values are DEO's estimate of the load reduction

capability across the summer. Additional information is presented below on the different calculations performed for the program including summer load reduction capability (LRC), P&L revenue recovery values, Measurement & Verification (M&V) values, and day-ahead projected load reduction (PFLs).

Table 1. Program Participation and Capability[2]

PowerShare CallOption	2014	2015
Account Participation	44 (Average June-Sept)	38
MW Capability[3]	104.3	63.3

[2] Average participation customer count during the summer months of June – September.

[3] Values are reported at the point of generation grossed up using a line loss factor of 1.06842.

2015 PowerShare Program Evaluation Methodology

DEO calculates and reports a variety of internal and external values related to the PowerShare program, which are used for a variety of purposes. Three categories represent a large portion of the analytics effort and are relevant to this evaluation. This section outlines these categories and calculation areas, listed below then described in more detail.

Pro-Forma Load Estimates

Pro-forma load (PFL) are estimates of participants' hourly electric power consumption for the next day. These projections are used in the measurement and verification (M&V) analysis to determine the potential load reduction for a next day event. The baseline is the customers' load absent the event.

Measurement and Verification Load Reduction Estimates

In the M&V verification load reduction approach, the actual load reduction provided by individual program participants on a specific event day is calculated using the pro-forma, or baseline, as a proxy.

Peak Available Load Reduction Estimates

Also known as load reduction capability (LRC), these estimates of participant load reduction are calculated under peak normal weather conditions, if applicable, over a specified period of time (such as a month or the entire summer).

As the three calculation methodologies imply, analysis of the PowerShare program must meet a diverse set of goals. The specific methodology of how values are calculated for each approach are detailed below.

Pro-Forma Load Estimates

As the name implies, the process for PFL estimates is to create the day-ahead pro-forma (i.e., estimated assuming no control events) load shapes specific to each program participant in each PowerShare option.

Estimating the PFL involves using 12 weeks (84 days) of historical load and weather data (eliminating or accounting for North American Electric Reliability Corporation (NERC) holidays, event days, and any days identified as quiet periods from the analysis) to produce hourly predicted load shapes for the next 30 days based on the forecasted regional weather, if available. From that data, there are five ways to estimate the PFL, outlined below.

Hourly Regression Method

This method involves regression hourly energy on a set of Fourier, weather, and monthly dummy variables (if appropriate), and fitting an autoregressive process to the error terms. Then the same model is re-fit with weather variables excluded, and an F-test is performed to determine if weather is a significant explanatory factor. The appropriate model results are used for further calculations.

PJM Method

This method is based on the default method PJM uses to calculate a Customer Baseline CBL for settlement, using an average load shape based on the highest four of five days selected by the method from a 45-day window. Only NERC holiday weekdays are excluded as event days.

The initial set of days is the most recent five days in the 45-day window. If the average usage over the exposure hours on any of those days was less than 25% of the overall average usage over the exposure hours for all five days, that day is dropped and a replacement selected. This loop is repeated until there are five viable days, and the four days with the highest usage are selected from this group for calculating an average load shape.

MISO Method

The MISO method is similar to the PJM method, except it uses 10 days, there are no exclusions for low usage, and all 10 days are used to calculate the load shape.

Last Two Days Method

For this method, the load shape is calculated based on the most recent two non-NERC holiday and non-event day weekdays.

Hybrid Method

This method involves first performing a regression of the daily energy usage for a customer. The explanatory variables are binary variables for day of the week, a daily weather variable, monthly dummy variables (if appropriate), and interactions between the weather variables and binary variables.

As with the hourly regression, the model is re-fit without the weather variables and an F-test performed to determine the appropriate model. The predicted daily energy is spread over the hours of the day using the load shape from the PJM method, after normalizing that load shape by the total energy under the shape.

Measurement and Verification Load Reduction Estimates

The steps involved in calculating the monthly LRC, P&L, and M&V are similar. In addition, the LRC and P&L processes are not performed for PowerShare QuoteOption since they are not relevant to this program option. The M&V process for PowerShare requires collecting hourly load data from all enrolled customers for a particular month.

Data is treated similarly among the processes, with a few exceptions such as the modeling of quiet periods. In all the processes, event days are excluded. However, quiet periods, such as days when participants reduced load due to a maintenance period, are included and accounted for in the M&V process model. If an event occurs when the customer is on a maintenance shutdown, the information used in the analysis requires special handling to focus only during their shutdown period.

In this rare event, the typical procedure is to combine the data with actual weather data for that month. Then, the process is to develop regression models (with and without weather terms) using the combined

data, similar to the hourly regression model used in the day-ahead PFL calculations discussed above. Specifically, the regression equation relates the customers' hourly electricity load to:

- A Fourier transform of hour of the day
- A Fourier transform of hour of the week
- A Fourier transform of hour of the month
- The temperature humidity index
- Binary variables for holidays and quiet periods, if appropriate
- Interactions between the Fourier transforms and other variables

An F-test is calculated for each customer to determine if weather is a significant explanatory variable (unless weather is explicitly excluded for customers known to not be weather sensitive). If weather is significant, the estimated parameters are used to create predicted loads using actual weather conditions on the event days. Thus, the baselines from the M&V process represent the actual load absent an event. These event-day baselines are then combined with actual load data from the event hours to calculate the load reduction.

All regression results are reviewed by DSM Analytics. If the results are clearly not representative of a specific participant load absent the event, an adjustment to the baseline may be applied. In addition, small variances around the baseline expected from typical model variance, above and below, are set to zero and therefore not considered load reduction.

M&V results are shown above in the Introduction section. Note that the PFL event load reduction estimates are used for settlement with customers due to their quicker availability, and because the baselines are available for customers to review for load reduction decisions. However, M&V load reduction leads to DEO's best estimate of the load reduction impacts, which are used for regulatory reporting purposes.

Customer Settlement

After each event, the level of load reduction must be calculated for each participant. If the participant is on a firm service level reduction agreement, a determination is made about whether they reduced load during the event period from a baseline. Another determination is made about whether the customer's actual load was at or below the firm service level during the event hours, regardless of the amount of load reduction.

For customers who are on a fixed reduction agreement, the difference between the baseline and the actual load during the control period is calculated to determine if the agreed amount of reduction was achieved. Credits or penalties for event participants are calculated using PFL baselines, within the Energy Profiler Online system for PowerShare, and are recorded on the customers' utility bills.

Peak Available Load Reduction Estimates

Similar to the M&V regression process described above, LRC is calculated on a monthly basis for PowerShare.

The LRC process requires collecting hourly load data from all enrolled customers for a particular month, eliminating event day information from the analysis and including quiet periods, such as due to a maintenance shutdown. The regression methodology is the same as for the M&V regression described above, with a few differences:

- While event day information is eliminated in both types of analysis, quiet periods, which are eliminated in the M&V process, are included and modeled in the LRC analysis.
- Once the regression equation is specified as described above in the M&V section, the estimated parameters are used to create predicted loads using peak normal weather conditions for all days of the month, if weather is applicable. Thus, the baselines from the LRC process represent the peak normalized load the customer would have consumed throughout the month.
- The weekday, non-holiday baselines are then used with the customer's specified fixed reduction amount or firm load level to calculate the load reduction available each hour. By hour, these values are averaged across the month.

The monthly LRC by participant is typically not of interest for most reporting purposes, but the summer LRC is of primary interest since Duke Energy is a summer peaking utility. Therefore, an average of the summer monthly LRC values is calculated, by hour and by participant. Then, the hours ending Eastern Daylight Time (EDT) 15-18 are captured to determine the summer LRC of each participant. The sum across all participants provides the summer LRC for the program.

Specifically, the regression equation relates the customers' hourly electricity load to:

- A Fourier transform of hour of the day
- A Fourier transform of hour of the week
- A Fourier transform of hour of the month
- The temperature humidity index
- Binary variables for holidays
- Interactions between the Fourier transforms and the other variables

An F-test is calculated for each customer to determine if weather is a significant explanatory variable (unless weather is explicitly excluded for customers known to not be weather sensitive). If weather is significant, the estimated parameters are used to create predicted loads using peak normal weather conditions for all days of the month. Thus, the baselines from the P&L process represent the peak normalized load that would have consumed throughout the month for all customers, even those who were not actually participating in one or more of the summer months.

For this next step, the processes for LRC and P&L differ. In LRC, the monthly June value for a participant who joined the program in July would be 0. However, in P&L, the calculated value for the customer would be used for June.

Continuing, the weekday, non-holiday baselines are then used with the customer's specified fixed reduction amount or firm load level to calculate the load reduction available each hour, and these values are averaged across the month. Then an average of the four monthly values is calculated, by hour and by participant.

Next, the hourly values for the hours ending EDT 15-18 are captured to determine the summer P&L of each participant. The LRC process terminates after summing across all participants. However, in the P&L process, monthly values are now calculated by summing the summer values described above for each month, only for participants in that particular month. These monthly values are then delivered to DSM Analytics for final calculations of the P&L results. Accounting adjustments are made as needed, including the application of a line loss factor.

Best-of-Breed

For each customer, the best calculation method is chosen to produce the final day-ahead baseline estimates. This is accomplished by comparing the predicted load from each method to the actual load for the five days outlined by the PJM method at an hourly, daily, and total level:

- For the hourly value, the absolute value of each hourly difference between the predicted and actual load is summed across all five days
- For the daily value, the difference for each hour is summed for each day, then the absolute value is summed across the five days
- For the total value, the difference in each hour for all five days is calculated, then summed to determine the absolute value

The best method is chosen based on each methods' relative performance of these differences. If a method is best for at least two values, then the PFL results from that method are used. Otherwise, the PFL results from the method that produces the lowest hourly variance is used.

2015 PowerShare Program Events and Impacts

PowerShare Events

During the 2015 PowerShare contract year (June 1, 2015 – May 31, 2016),[4] program participants were registered with PJM as either a DEO 'Limited' Emergency Resource or as an 'Extended Summer' Emergency Resource. Under PJM rules and DEO's contract for the limited emergency resource, customers are only obligated to respond to events called by PJM from June 2015 – September 2015. However, any response outside of the June-September commitment is considered a voluntary reduction and settled with the customer and PJM accordingly. Under PJM rules and DEO's contract for the extended summer emergency resource , customers are obligated to respond to events called by PJM only during June-Sept, October and May of the delivery year.

PJM called no emergency events within the DEO territory during the 2015 calendar year.

It is important to note that customers were under no obligation to respond to wintertime events and the impacts that would have been achieved would be due to the voluntary response of customers. No winter 2015 appeals for curtailment occurred.

Table 2. PY2015-16 Event Summary

Event Date	Event Time (Eastern Prevailing Time)	PJM Event Duration	Event Reason
None called by PJM			
Test Events			
9/1/2015	Hour ending 17 EPT (4-5 pm DST/3-4 pm EST)	1 hour	Test to fulfill PJM requirement
9/23/2015	Hour ending 17 EPT (4-5 pm DST/3-4 pm EST)	1 hour	Alternate internal retest date for customers electing to retest to demonstrate ablity to meet contractual reduction value

[4] The numbers provided in this report are current through March, though it is possible additional events can be called through May.

Table 3 outlines details of the MW savings for each event, by program option.

Table 3. Event Impacts[5]

Date	Hour Ending	Call Option (kW)	Quote Option	Extended Summer (kW)	Total Event Impact (MW)
None called by PJM					
Test Events					
9/1/2015	17 (EPT)	61,388	n/a	10,119	71.5
9/23/2015	17 (EPT)	209	n/a	n/a	0.21

[5] Values are reported at the point of generation.

Process Evaluation Objectives

The process evaluation of the PY2015 PowerShare program has several purposes. First, this process evaluation is intended to help identify areas where the program may be improved, drawing upon the insights of Duke Energy staff members from multiple divisions and of a sample of participating customers. Second, this report will document program operations for future reference, including ways in which the program has addressed and overcome past program challenges. Because no emergency events were called in PY2015, this report will document some of the activities that Duke Energy staff members have undertaken to prepare for current challenges and future events calls.

Methodology

Overview of the Evaluation Approach

The process evaluation for the PowerShare program was conducted by Cadmus and Yinsight (hereafter the evaluation team). The results presented in this report include management interviews and participant surveys.

Management Interviews

The evaluation team conducted hour-long management interviews with a Duke Energy product and services manager for PowerShare in the Midwest and an account manager serving Duke Energy customers.

The evaluation team developed the interview protocol for the PowerShare program management interview that was implemented in January of 2016. The full interview guide is in Appendix A.

Participant Survey

The evaluation team developed a customer survey for PowerShare Program participants, and administered questionnaires via short telephone interviews with the contact person identified to receive PowerShare alerts on behalf of the company. The evaluation team conducted the surveys between November 30 and December 16, 2015. The survey is in Appendix B.

Data collection methods, sample sizes, and sampling methodology

The evaluation team attempted a census of the 53 contactable companies that participated in PowerShare in PY2015. [6] The team completed 18 total phone interviews. [7]

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[6] The evaluation team attempted to contact representatives from 53 businesses, which was the total number of unique contacts after removing records with duplicate or missing contact information.

[7] For the purposes of the process evaluation, these findings include data from five Duke Energy Kentucky (DEK) participants and 13 DEO participants because the program is implemented using the same process in both states. There were no statistically significant differences in participants' responses between the two states.

These 18 companies comprise six manufacturers and seven schools, with the rest being sole representatives of nonmanufacturing sectors. Seven of these respondents also managed more than one site that participates in PowerShare. On average, these companies have participated in PowerShare for over four years, individually ranging from one to 10 years.

Survey Response Rates and Precision

Table 4 summarizes the response rates and achieved precision levels for the participant survey.

Table 4. Process Evaluation Data Collection and Analysis

Evaluation Component	Population	Attempted Contacts	Achieved Completes	Response Rate	Precision at 90% Confidence
Program Managment Staff	N/A	2	2	2	N/A
Participant Surveys	60	53	18	34%	±16.2%

Conclusions and Recommendations

In the absence of an emergency event, and in light of participants' high satisfaction with the PowerShare program, the evaluation team sees no need to change program operations, and thus has no major process recommendations for the PowerShare program. The evaluation team has two minor recommendations.

Conclusion #1: **Respondents show some confusion about PY2015 PowerShare program features, and might not understand the requirements for the emergency-only offering.**

Recommendation #1: Duke Energy product and account managers should consider developing additional ways to reinforce customers' knowledge of current and upcoming PowerShare program features. If Duke Energy is not already doing so, staff members could develop additional marketing materials that can be distributed to customers, which clearly identify the program year, the current program options, and the programs' requirements. Alternatively, Duke Energy could schedule "talking points" for account managers to remind participants of upcoming program changes and test events. The evaluation team understands that account managers engage in regular communication about program changes, but believes that participants will have greater satisfaction with PowerShare if they do not have to rely on their memories when additional changes are made to PowerShare in the foreseeable future.

Recommendation #2: In addition, the evaluation team suggests that Duke Energy continue tracking participant satisfaction against the baseline data that have been gathered through PowerShare process evaluations since PY2011.

Process Evaluation

PowerShare Program Objectives

In PY2015, Duke Energy's PowerShare program was offered as an emergency-only program in the PJM energy market. The PowerShare DEO demand response program provides a capacity premium for commercial and industrial participants that are willing to decrease their loads during an emergency event. PowerShare allows Duke Energy customers to earn a premium for helping to increase the reliability of the electricity transmission and distribution system and to mitigate the risk of blackouts.

PowerShare Background

For 2015, PJM revised its requirements, and curtailment service providers were required to be able to perform load shedding with 30 minutes of advance notice, down from two hours of advance notice in previous years. As a result of PJM requirements for demand response programs, Duke Energy applied for and received regulatory approval to change the PowerShare program from a year-round curtailment period to a summer-only curtailment period. In PY2015, PJM did not call any emergency events in DEO territory, and participants were only asked to perform load shedding during the annual test event.

PowerShare Operations

PowerShare program options

For the PY2015 summer-only program year, Duke Energy offered two program options: CallOption Emergency, with a curtailment period of June through September, and QuoteOption, with a year-round voluntary curtailment period. Both options had a contract term of one year. Duke Energy is moving toward offering year-round options for PowerShare: For the upcoming PY2016 summer season, Duke Energy has begun offering an extended summer option, with a curtailment period of June through October 2016 and May 2017. Duke Energy also reintroduced PowerShare with a year-round curtailment period. The premium credit levels for these longer curtailment periods are higher to provide appropriate incentive for customers to supply capacity beyond the summer months. The Midwest product manager reported that most 2016 PowerShare participants are signed up only for summer events in DEO territory. At the time of the interviews in January 2016, the PowerShare product manager reported that one customer is on the extended summer offering and all others are still on the four-month offering.

Program requirements

Participants must have at least 100 kW of curtailable load and are required to commit to reducing load during PJM emergency events. These events could last up to six hours, and would be called between noon and 8 p.m. on weekdays from June through September (excluding Independence Day and Labor Day). There could be up to 10 emergency event calls in any year. Participant must also participate in an annual emergency curtailment test.

Incentives

Duke Energy pays an annual capacity premium depending on the curtailment capacity to which a customer commits. This capacity premium is paid once a month during the curtailment period and is a

line item labeled “PowerShare credit” on the customer’s monthly bill. If customers respond to an event call by curtailing, they are paid an additional event incentive credited to their monthly bill after settlement. For PY2015, DEO paid customers $42/kW/year incentive to participate. For each event in which customers participate, they were also given 85% of real-time LMP credit based on their achieved curtailment. The incentive can fluctuate from year to year because it is determined by the prices of energy on the PJM market. The product manager reported that PowerShare incentives are designed to be competitive with other curtailment service providers. Despite fluctuations in incentives, PowerShare has historically enjoyed a high contract renewal rate, suggesting that customers are not very sensitive to these changes.

Penalties

Customers that do not curtail their loads are assessed a penalty and lose the monthly premium credit. These companies might also be removed from the program. There are no “buy-through” provisions for emergency events, in which participants can pay higher energy prices to avoid penalties for not curtailing to the level in their contracts.

Targeted Load Commitment

Customers can choose to reduce energy to a firm load-level or by a fixed amount against their *pro forma* baseline. A firm level-reduction commitment is a commitment to reduce down to a specific kW usage (e.g., customers commit to reduce energy usage to a firm level of 600 kW or below). A fixed level-reduction commitment is a commitment to reduce to a certain kW relative to the customer’s load shape (e.g., customers commit to reducing energy usage by a fixed 400 kW against their *pro forma*). The *pro forma* baseline load shape is calculated based upon past energy usage.

Marketing

PowerShare is marketed mainly by Duke Energy account managers to their large commercial and industrial customers. Marketing collateral is available on the Duke Energy website. All but one respondent in the participant survey reported that they first became aware of PowerShare from a Duke Energy representative. The one exception learned about the program from the Duke Energy website and brochure.

Website and Brochure. Duke Energy has a website with a downloadable brochure about the PowerShare program. Interested customers are directed to contact their account representative or email Duke Energy’s customer account services at the provided email address.

Marketing to Large Business Customers. Duke Energy account managers take the lead role in PowerShare marketing efforts. In the Midwest states, marketing for PowerShare starts with training of account managers in October and enrollment by mid-January.

The account managers help the customers determine whether or not PowerShare is appropriate for their company. Account managers help customers decide how they can participate without disrupting their business operations. If needed, the account managers discuss with the customers the specifics of what they will do at their facility to reduce the requisite load. An account manager reported that she

regularly communicates with customers about the suitability of the program for their company's particular business. The account manager explained that this communication occurs year round because, "Things change from one year to the next, people change, they have different opinions and comfort levels with PowerShare, and finances change." The account manager also reported that prospective participants are interested in hearing about other customers that have had success with the PowerShare program.

In the participant surveys, respondents were asked to rate "how useful that source was in providing the information you needed to decide whether or not to participate," using a scale of 1 to 10, where 1 means "Almost nothing I needed" and 10 meaning "Everything I needed." The 16 respondents to this question gave a very high average rating of 9.6. Three respondents also reported that they asked other business colleagues about their PowerShare participation experiences before making their own decision. One respondent added, "They were pretty positive about the program."

Customer Motivation

Fourteen respondents reported that their primary reason for participating in PowerShare was financial; one other respondent reported that their primary reason was to "help the local community." When asked if there was a secondary reason, six said they wanted to help the community and help reduce their loads. Two others gave secondary reasons that were financial in nature, and one said it allowed the company to test its generation system control.

The Duke Energy account manager reported that many customers have corporate sustainability objectives that can influence their decision to participate in PowerShare to meet those objectives.

Enrollment and Renewal

DEO offered a bonus if customers signed their PY2015 PowerShare contracts by January 19.[8] By obtaining contracts early, Duke Energy can bid capacity resources into the PJM capacity market. Of the 18 respondents, 10 reported that their company signed early. The evaluation team asked the others why they didn't sign early. Of the four respondents, one said his company wasn't ready to make the decision and another respondent's company "had issues on target reduction quantities and the way [Duke Energy] was doing [calculations]." A third respondent said that they were initially told there was not going to be a PowerShare program. The last respondent was considering another curtailment service provider's offer. The product manager reported that in 2015, fewer than five participants have declined to renew their contracts; a couple of them have selected competing curtailment service providers.

Event Calls

Emergency events are determined entirely by PJM. After the emergency call, participating companies have 30 minutes to curtail loads. To achieve curtailment within this aggressive timeline, Duke Energy's system operator must relay the event notification to companies participating in PowerShare within five

[8] DEO paid a bonus or $4/kW.

minutes or less, and those customers then have 25 minutes to complete load curtailment to their targeted loads.

DEO sends the notification by entering information into an automated notification system. This system contacts customers through a series of escalation rules that dictate which method of communication to use. Notifications are sent via phone, text, email, and fax to everyone on a contact list provided by the company. Notifications cease as soon as the customer responds. The product manager reported that the short timeline means it is likely that he will hear about an emergency event at the same time as PowerShare participants. However, the product manager reported that although the system operators have the task of notifying customers, the product managers have a communication role after the initial notification. The product manager reported that he follows up with customers and provides more details about each event, including estimates of the event duration. The product managers are usually assigned to notify customers that an event has ended. During the event season, the product managers and the account managers are vigilant about the possibility of event calls, and they strive to provide customers with as much advance notification as possible.

The evaluation team asked whether respondents would like to be notified by another method in addition to the current methods of communicating events. Most respondents did not have other preferences. Only three mentioned other methods: Two would prefer to be notified by Duke Energy representatives, and one suggested that a web service-based notification system might be faster. All respondents believed that the earlier the event notice was, the better. Only one respondent had some feedback on Duke Energy's event communication efforts, which was a preference for notification of any trend toward an event. Two respondents added that it was difficult for them to curtail their loads, and they wanted Duke Energy to be doubly sure that their participation was necessary. One of these respondents stated, "Determining a definite need would help. Do you *really* need *us* to drop?"

Respondents reported that they engage in a variety of tactics to curtail their loads during an event. Four of the respondents reported that they only need to turn on their generators; six conduct a full shutdown of their operations, five report they shut down or reduce their HVAC or chiller in addition to their lighting and plug load, three report they shut down or reduce their lighting and plug load only, and one reported they shut down or reduce their HVAC and chiller load only. Some respondents volunteered some of the challenges they faced in reducing load: One participant's company needed to ramp down its equipment over the course of an hour. Several respondents explained that equipment needs to be shut down manually, and an assistant might be responsible for shutting down equipment. Another respondent needed time to run materials through a process before a shutdown. Because the annual curtailment test is scheduled at the beginning of the calendar year, all respondents reported that they were successful in reducing their loads.

When asked whether respondents could curtail more load than their contracts mandated, 14 respondents considered their targeted level of load reduction to be "about right." Three said they might be able to curtail more load, but they wanted to be conservative to avoid risking penalties for not reaching their targets.

Settlement

Settlement for each month's events are paid to the customer as a credit on their bill within one or two billing cycles, depending on the billing dates. There are separate line items for the capacity premium and the event credit. The Duke Energy product manager reported that a customer can review their usage the day after an event through Energy Profiler Online (EPO), a web-based application provided by a third party. In addition to displaying meter information, EPO is used to track PowerShare agreements. The product manager reported that customers do not have much interest in being able to see their real-time load. The evaluation team asked respondents about their awareness of EPO; 11 were aware of the product, although three had never used it. Only six respondents considered themselves able to rate EPO's ease of use. On a scale of 1 to 10, where 1 meant "very difficult" and 10 meant "very easy," respondents gave an average rating of 8.0. Only one respondent gave a rating below 8, and suggested that Duke Energy could improve EPO by making it more user friendly, with a larger and easier to read screen.

Participation Barriers

The Duke Energy account manager reported that one of the largest participation barriers for manufacturers is the need to shut down their plant during an event call. As more and more businesses move to a "just in time" model, the impact of interrupting plant processes could mean that the manufacturers are unable to meet their customers' needs. The Duke Energy product manager noted that most of the PowerShare participants in the PJM territory were urban and suburban customers and participation is robust.

Survey respondents did not show a strong trend toward any particular concern about participating in PowerShare. The most-frequently cited concern, from five respondents, was whether or not their company would be able to curtail the amount of load in their contract. The second most-frequent concern came from three schools concerned about being able to remain open when the buildings could not be cooled. Only two respondents cited concerns about the impact on business operations and production time. Another two respondents cited concerns about being able to reduce their loads within the 30-minute window required by PJM. Other individuals cited concerns over the frequency of alerts, the cost-to-benefit ratio of participating, and their need to verify the legitimacy of the offering because "it sounded too good to be true initially," considering the attractiveness of the premium credit.

The evaluation team asked respondents with concerns whether any experiences during the past event season allayed their concerns. Although there were no emergency event calls, five respondents said they became more efficient and experienced in their shutdown procedures. One respondent gained additional staff members to help with the shutdown, and another received a waiver from PJM to curtail within 60 minutes instead of 30. When asked whether Duke Energy could do anything to decrease their concerns with participating in PowerShare, two respondents requested more advance notice and one mentioned increasing the incentive.

Participant Satisfaction Ratings

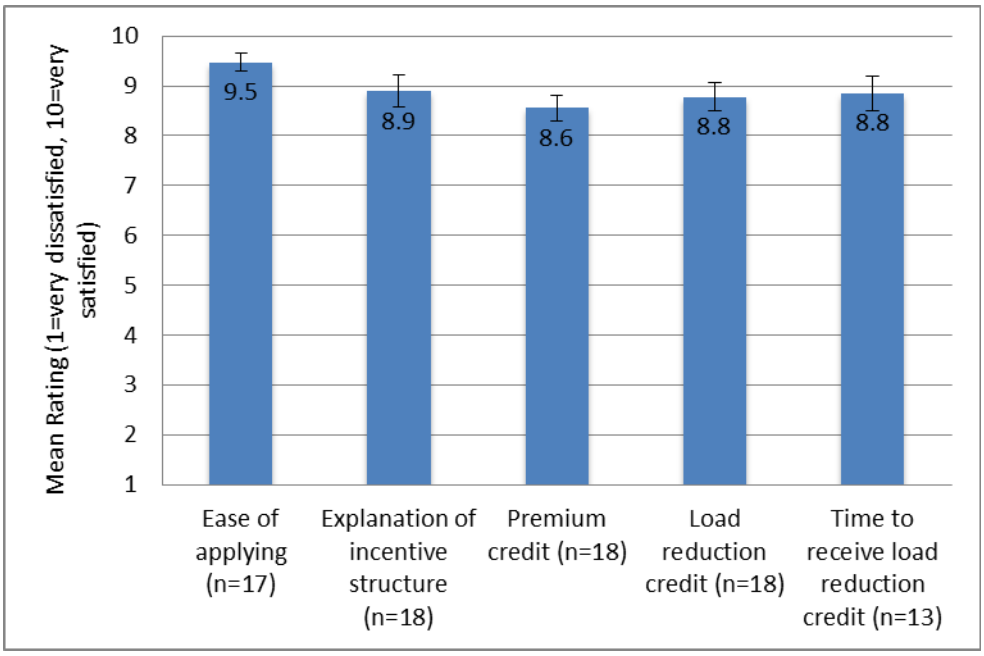
In general, respondents were highly satisfied with the PowerShare program. When asked about aspects of PowerShare that were working particularly well, six respondents stated that the program was working well in general. Five other respondents said that PowerShare communications were working exceptionally well, two cited the financial incentives, and two others were glad to help Duke Energy meet resource constraints. One respondent cited the timing of the test event as a program strength, another cited the EPO product, and another Duke Energy's representatives. When asked whether PowerShare could be improved in any areas, seven respondents could not identify any improvements. One respondent believed short events might not be worth curtailing, another said the 30-minute notification window was difficult to work with, and another said the test event should be scheduled when there was a larger load to reduce (rather than during "off-peak" days and hours). One respondent suggested that Duke Energy could allow aggregation of retailers with different owners, and another recommended that Duke Energy send periodic reminders of the annual test event.

Figure 1 shows that participant survey respondents have high satisfaction with PowerShare incentives and program enrollment operations. Respondents were highly satisfied with the enrollment process, rating it a 9.5 on a 10-point scale, where 1 indicates very dissatisfied and 10 indicates very satisfied. There were no ratings lower than 8 for the PowerShare enrollment process.

Respondents believed that they received a clear explanation of the incentive structure, rating it an 8. 9. One respondent explained that for PY2016, Duke Energy sent documentation that only stated the program would be the same as last year. However, this respondent did not remember the program details and suggested that Duke Energy could resend documentation on how the incentive was calculated.

Respondents were highly satisfied with the premium credit amount (mean rating of 8. 6), the load reduction credit amount (mean rating of 8. 8), and the time it took to receive the load reduction credit (mean rating of 8.8). One participant said it took almost two weeks to receive their test event results and suggested that Duke Energy could shorten this delay in the future.

Figure 1. Satisfaction with PowerShare Enrollment and Incentives



*Note: Error bars depict standard error of the mean.

Figure 2 shows respondents' moderately high satisfaction with PowerShare event calls. Respondents gave a mean satisfaction rating of 7. 9 for the amount of advance notice they received. Although there were no event calls in PY2015, respondents' comments indicate that they based their rating on their experience from previous years: three respondents wanted day-ahead notifications, one complained about a 4:00 a.m. winter event and suggested better forecasting, and another suggested that Duke Energy could provide periodic notifications for the mandatory test event.

Respondents gave a mean rating of 7.8 for the time they had to reduce their load, but again their responses reflected their experience from previous years: One respondent expressed frustration with receiving an event notification (for a winter event), only to learn that the event was cancelled after his company began shutdown procedures, and with another (winter) event that was cancelled after only one hour. Another suggested day-ahead notice, and a third wanted the response window increased from 30 minutes.

Respondents gave a mean rating of 7.8 for Duke Energy's method of confirming load reduction. Of the respondents who offered suggestions for improvement, four wanted to receive their test event results more quickly, and one complained that the test event occurred after his company had decreased its load, and he wanted Duke Energy to use the highest historical load as the baseline.

Figure 2. Satisfaction with PowerShare Event Calls

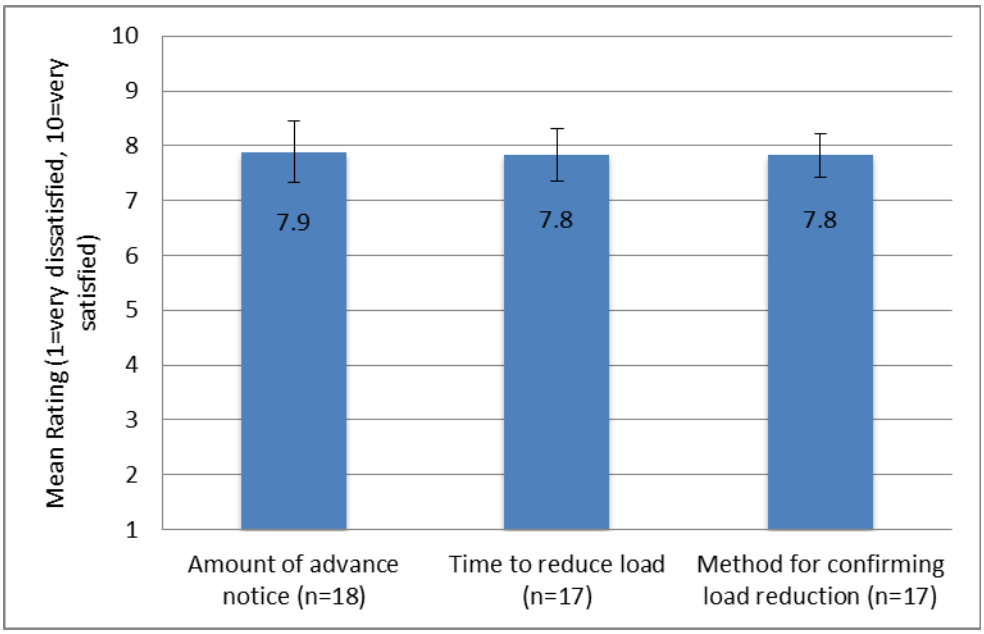
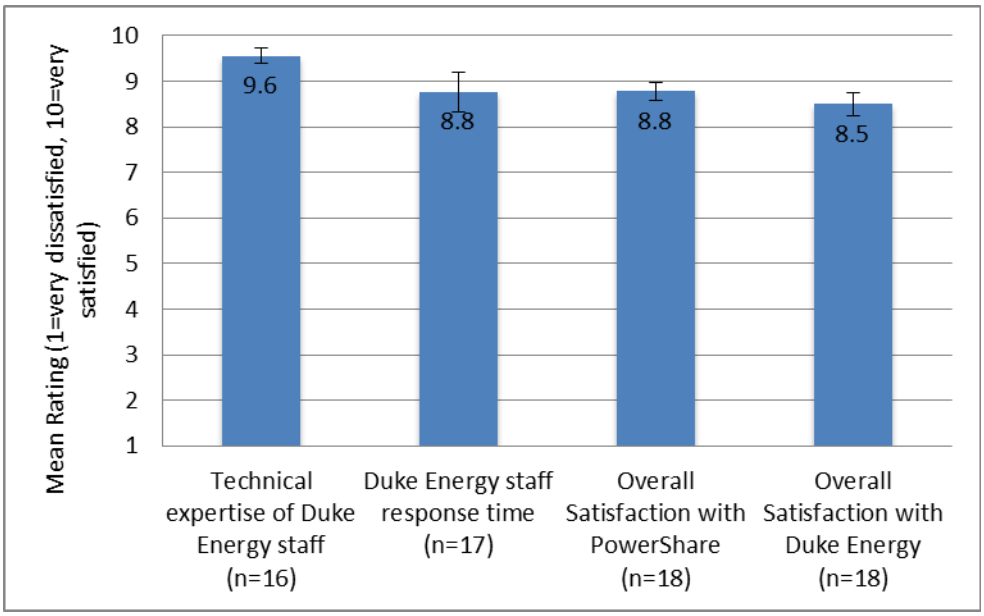


Figure **3** shows that respondents were very pleased with the technical expertise of Duke Energy staff, with a mean rating of 9.6, and they had no suggestions for improvement. Respondents gave moderately high satisfaction ratings for the time it took for Duke Energy staff to respond to issues or questions, with a mean rating of 8.8. One respondent said it was difficult to communicate with someone from Duke Energy during an emergency event, another wanted test event results within three to four days, and a third was currently waiting for someone from Duke Energy to return a call. There were no suggestions for improvement.

Overall, respondents have high satisfaction with the PowerShare program (mean rating of 8.8) and with Duke Energy (mean rating of 8.5). Only one respondent suggested an improvement for PowerShare, reiterating his suggestion of allowing small retailers to aggregate their accounts. Of the three comments from respondents who rated their overall satisfaction with Duke Energy an 8 or less, one repeated his earlier comment about a need to improve communication, and two others mentioned issues that were not related to Duke Energy's demand-side management programs.

Figure 3. Overall Satisfaction Ratings

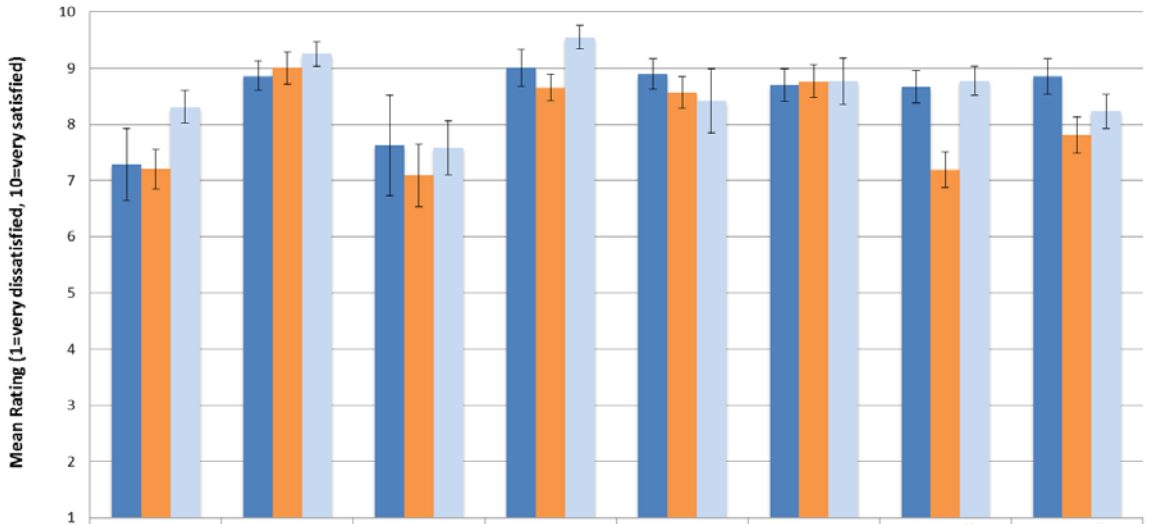


Change in Satisfaction Over Time

Figure 4 shows that participant satisfaction has remained high for many aspects of PowerShare since PY2011,[9] including satisfaction with the ease of applying to participate in PowerShare and the explanation of program rules and incentives. Since PY2011, participants have maintained moderate satisfaction with Duke Energy's method for confirming load reduction. In the areas where satisfaction ratings have fluctuated, there is an indication of lower satisfaction with the PY2013–PY2014 program, probably because of the unexpected winter events. These data form a baseline against which to track participant satisfaction.

[9] These data show current and historical data from PowerShare participants in Ohio.

Figure 4. Satisfaction with PowerShare over Time (DEO Respondents)



	Premium credit	Ease of applying	Method for confirming load reduction	Technical expertise of DE staff	DE staff response time	Explanation of incentive structure	Overall Satisfaction with PowerShare	Overall Satisfaction with Duke Energy
2011 Mean (N=10)	7.3	8.9	7.6	9.0	8.9	8.7	8.7	8.9
2013 Mean (N=26)	7.2	9.0	7.1	8.7	8.6	8.8	7.2	7.8
2015 Mean (N=13)	8.3	9.3	7.6	9.5	8.4	8.8	8.8	8.2

Future Program Challenges

Legislative Uncertainty

The PowerShare program in the Midwest has undergone several changes in recent years because of changing regulations. In Ohio, SB221 impelled DEO to ramp up their load curtailment programs to meet new capacity goals. Recent legislation put SB211 on hiatus to study whether the goals were appropriate. The product manager reported that the two-year hiatus will end in PY2016, but it is uncertain what the outcome of the study will be and how PowerShare will be affected in PY2017. In anticipation of multiple outcomes, the product manager has identified some markets within PowerShare that can provide additional capacity and continues to try to identify ways to decrease the impact of events on business operations.

PJM 30-Minute Notification Window

At the time of this evaluation, PowerShare's new procedures to curtail loads within PJM's new 30-minute notification window had not been implemented yet. Although PJM has granted exceptions to this window, the product manager was concerned that many current PowerShare participants would not be able to curtail their loads within 30 minutes. He said, "We were concerned that schools and commercial customers might need real help to respond within 30 minutes because they are not eligible for a waiver from PJM." The product manager reported that, in anticipation of these difficulties, he had explored ways to offer automated demand response offerings to PowerShare participants. Duke Energy recently concluded a two-year pilot of an automated demand response offering with a few large

customers[10] and was ready to apply lessons from the pilot with a larger pool of customers. To date, participants have not expressed much interest in automated demand response offerings, perhaps because PJM has not called any emergency events since instituting the 30-minute notification window. The product manager plans to continue to explore automated demand response offerings in anticipation of a changing energy market in which resources are managed through shorter, more frequent events, instead of longer and rare events.

Respondents have some awareness of and concerns about the 30-minute window. As one respondent explained about advance notice, "The earlier the better—the first year there was more time to respond. Last year I hesitated [to renew] because of the reduced 30-minute notification time. I have only 30 minutes to shut down [multiple] sites." The product manager and the account manager independently expressed surprise that PJM's change to a 30-minute notification window did not seem to deter participants from renewing their PowerShare contracts. One factor that makes the change more palatable may be the availability of exceptions to the 30-minute window. The product manager explained that manufacturers can apply for an exemption to curtail their loads within 60 or 120 minutes if there is risk that reducing loads within 30 minutes would cause damage to their equipment, raw materials, or finished products, or if it would take more than 30 minutes to safely evacuate a plant during shutdown. Likewise, customers with generators can receive an exemption if the transfer of loads to backup generators must be done manually and would take more than 30 minutes. The account manager reported that a customer must write a letter requesting an exemption, and Duke Energy sends the request to PJM. To date, PJM has generally granted all exemption requests.

Both the product manager and the account manager acknowledged that only a true emergency event call will allow them to find out how difficult it is to curtail loads with the 30-minute advance notification. To prepare for future events, the product manager reported that in spring 2016, Duke Energy will conduct another annual refresher of emergency event call procedures. This will allow Duke Energy to confirm the amount of time it takes for the system to notify customers of the start and end of an event.

The Duke Energy account manager said that despite the challenges posed by recent changes in the program, her longstanding relationship with customers means that they are willing to communicate their concerns to her. This allows her to explain the reasons and need for the program changes to her customers' satisfaction. The account manager believed that the high renewal rate from program participants speaks to the program's continued value to Duke Energy's customers despite the recent changes.

[10] Those customers have since chosen another curtailment service provider.

Cadmus Review of Analytical Approach

Cadmus, as the third-party evaluator, reviewed the files for participation and impacts for the PowerShare program year 2015 provided by Duke Energy. A conservative approach was taken by the Duke Energy measurement and verification team to ensure accurate load reduction. The data reported here align with the information provided in the spreadsheets received. The methods reviewed are comparable with Cadmus' experience in other jurisdictions and confirmed as reliable estimates.

Appendix A: Management Interview Protocol

Interviewer: _____ Date of Interview: _____ Interview method: _____

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the PowerShare Program for the state of OH as it was implemented between the dates of January 1, 2015 and December 31, 2015. We'll talk about the Program and its objectives, your thoughts on improving the program and its participation rates. Today's interview will take about an hour to complete. May we begin?

Program Overview

1. In your own words, please briefly describe the PowerShare Ohio Program's goals.

2. Please describe your role and scope of responsibility in detail. What is it that you are responsible for as it relates to this program? When did you take on this role?

3. Would you please tell me the history of the PowerShare program in Ohio?

4. In your own words please describe how the PowerShare Program works and go over its design, marketing and operational approaches. Walk us through the participatory steps starting with a customer who knows nothing about the program.

5. Please describe for me the roles and responsibilities of vendors that are supporting Duke Energy's PowerShare program in the state of Ohio?

6. Are there any changes you would like to see in the vendors' roles or responsibilities that would improve the PowerShare program's operations?

7. How does PowerShare fit into Duke Energy's demand response portfolio?

8. What other demand response programs does Duke offer to either residential or nonresidential customers?

9. How does Duke Energy prioritize use of the capacity provided by each of these demand response programs?

Objectives

10. Were there any quantitative targets in terms of participant enrollments? If yes, what were they?

11. Were there any quantitative targets in terms of demand response capacity? If yes, what were they?

12. Where there separate quantitative targets for each of the four participation options?

13. How do you set these objectives?

14. Please explain SB 221 and its influence on PowerShare program objectives.

15. How well has Duke Energy been meeting the capacity goals set by SB 221?

16. Did you meet those objectives? Exceed them?

17. Since the program objectives were devised, have there been any changes in external influences (such as market conditions or new regulations) or internal influences that have affected the PowerShare program's operations?

18. Should the current objectives be revised in any way because of these changes that developed since the program objectives were devised?

19. What is Duke Energy's need for having an economic demand response program in OH?

20. Please tell me about the Auto Demand Response program in OH?

21. Can you please provide me with a list of the campanies that are participating in the pilot?

22. What information do you need that would help you with program design in the future?

Incentives

23. What were the incentives for the PowerShare program in 2015? Do you expect that these will change in the future?

24. How do customers receive the monthly premium credit?

25. How do customers receive the load reduction credit for the events in which they participated?

26. Are these two credits reported separately on their invoice?

27. Do you think the incentives offered through the PowerShare Program are adequate enough to entice the C&I community to enroll in the program? Why or why not?

28. Do you think the customers understand the incentive levels and how they are calculated? Have there been any issues relating to the customers understanding the incentive approach or confusion over what they are paid? What can be done to minimize this confusion?

29. Do you think customers have additional ability to shed load that could be tapped if the incentives were increased?

Marketing

30. What kinds of marketing, outreach and customer contact approaches do you use to make your customers aware of the program? Are there any changes to the program marketing that you think would increase participation?

31. Do you think the materials and information presented to the C&I community about the PowerShare Program provides a complete enough picture for them to understand the participatory benefits of the program? How might they be improved?

32. Are there specific customer types (business types) or market segments that you think Duke Energy should focus more effort on enrolling? What are they? How should PowerShare approach them with this program?

33. What market information, research or market assessments are you using to determine the best target markets or market segments on which to focus?

34. What are the key barriers to more efficient program operation?

35. What are the key barriers to achieving greater load reduction?

36. Are there any steps of the enrollment process that is more difficult for the customer? How does PowerShare plan to address these issues.

37. How many customers have unenrolled from the program in 2015, for each of the options? How many MW does this represent?

38. What are most common reasons for unenrolling?

39. Describe the use of any internal or outside program advisors, technical groups or organizations that have in the past or are currently helping you think through the program's approach or methods. How often do you use these resources? What do you use them for?

40. Do you think there should be changes made to the structure of the participation options?

Event calls

41. How many and what types of events were called in 2015?

42. What are the steps customers must go through to participate in the voluntary and economic events?

43. How do you track, manage, and monitor or evaluate customer response to the event calls? How do you know if they reached their load shifting objectives?

44. For customers who do not shed as much load as anticipated, how do you find out why customers did not shed enough load?

45. Can you describe for me your understanding of how customers react to a call? How quickly do they learn of a call, what determines what they can do, how quickly can they react?

46. Given that PowerShare customers have different capabilities to react to an event depending upon their work volumes, production schedules, etc., how does PowerShare capture needed savings within the different customer conditions and capabilities in the market?

47. What is the quality control, tracking and accounting process for determining how well control and control strategies work at the customer level and at the program level?

48. Are there any market segments or customer types that the program is now serving that consistently are not able to provide the load shed within the timelines and notification systems used today? What would you suggest should be done about this customer segment?

49. Overall, what about the PowerShare Program works well and why?

50. What doesn't work well and why? Do you think this discourages participation?

51. In what ways can the PowerShare Program's operations be improved?

52. Are there any other issues or topics you think we should know about and discuss for this evaluation?

Thank you for your time!

Appendix B: Participant Survey Protocol

Survey ID _____
Surveyor Name _____

State

( ) Ohio

Participant Info

Name: _____
Company: _____
Title: _____

Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer satisfaction interview about the Power Share Program. May I speak with _____ please?

We need your help. Duke Energy has given us your name as someone who might be able to share some of your experiences with the Power Share Program. We are not selling anything. We would like to conduct a short interview that will take about 15 minutes and all your answers will be kept confidential. This information will enable Duke to make improvements to the program and the application process.

Message for voicemail
Hello, my name is _____ from Cadmus Works. I am calling on behalf of Duke Energy to conduct a customer satisfaction interview about the Power Share Program. Duke Energy has given us your name as someone who might be able to share some of your experiences with the Power Share Program. We are an independent evaluation firm and we are not selling anything. We would like to conduct a short interview that will take about 15 minutes. All your answers will be kept confidential. This information will enable Duke to make improvements to the program and the application process.
If you can help, please call me at _____. If there is someone at your company who would be more appropriate for us to speak to, we would appreciate if you could let us know that as well.

OPTIONAL - only If the customer wishes confirmation from Duke.
If you would like to verify this request, please contact your account manager. Or, you can contact Rose Stoeckle, Manager of Measurement and Verification Ops, at Duke Energy. She can be reached at (513) 287-2264 or rose.stoeckle@duke-energy.com.

IN-1. Would you be able to help us?

( ) Yes
( ) No

(If no)
IN-2. Can you please give me the name of someone else who might be the more appropriate person to tell us about your company's participation in Power Share?

ESTABLISHING QUESTIONS

ES-1. Would you please tell me what your company does and what your role is in your company? _____

ES-2a. Do you manage more than one site that participates in Power Share for your company?

( ) Yes
( ) No
( ) DK

If yes,
ES-2b. How many sites? _____

Most of the questions you will be answering today are about Power Share in general, but if you manage sites that participate in Power Share differently from one another, please answer for your company's facility that is listed as ...
[Please fill in facility name from info sheet].

_____

ES-5. How long has your company been participating in the Power Share Program?

_____

INFORMATION-GATHERING PHASE

INFO-1. How did you first become aware of the Power Share Program?

( ) Duke Energy sent me a brochure
( ) A Duke Energy representative told me about it
( ) Duke Energy website
( ) I saw an ad in: _____
( ) Other: _____
( ) Don't know

INFO-2. Please tell me how useful that source was in providing the information you needed to decide whether or not to participate. Please rate the usefulness of that source on a scale of 1 to 10, with 1 meaning "Almost nothing I needed", and 10 meaning "Everything I needed".

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

(If INFO-2 was less than 10, ask questions INFO-3a, 3b and 3c)

INFO-3a Where else did you go to get information? _____

INFO-3b. What additional information were you seeking? _____

INFO-3c. Were you able to get the information you needed about the program's participation requirements and benefits?

( ) Yes
( ) No
( ) DK/NS

OHIO: AUTO DR PILOT

CODR-1. Are you, or were you, a participant in the Automated Demand Response pilot, which is also known as Auto DR?

( ) Yes
( ) No
( ) DK/NS

(If yes, ask CODR-2, CODR-3 and CODR-4)

CODR-2. What do you like most about Auto DR?

_____

CODR-3. What do you like the least about Auto DR?

_____

CODR-4. Please rate your overall satisfaction with the Auto DR pilot, on a scale of 1 to 10, where 1 means that you are very dissatisfied and 10 means that you are very satisfied.

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating is less than 8:
CODR-5. What can be improved about the Auto DR program?

_____

DECISION MAKING

DM-1. What was the primary reason that you decided to participate in the Power Share Program?

_____

DM-2. Was there a secondary reason that your company decided to enroll?

_____

DM-3a. Duke Energy offered an early enrollment period with a bonus if your company renewed their contract in January. Did your company renew under this early enrollment period?

( ) Yes
( ) No
( ) DK/NS

If "No"
DM-3b. What were some of the reasons why your company did not renew under the early enrollment period?

_____

If "No"
DM-3c. Is there anything Duke Energy can do to help your company make a decision early?

_____

EVENT PARTICIPATION

EV-4a. In addition to phone calls, texts, fax and emails, is there another way in which you would like to be notified of events?

_____

EV-4b. For some events Duke Energy is able to send out a notice a day ahead of the event, to warn of the possibility that an event may occur. Can you please rate how useful it is for you to receive the "day ahead" notices, on a scale of 1 to 10, where 1 means "Not at all useful" and 10 means "Useful".

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA

EV-4c. Do you have any other feedback for Duke Energy on their event communication efforts?

_____

EV-5d What did you need to do at your facility to reduce load?

_____

EV-6a Was your company successful in reducing load?

( ) Yes
( ) No
( ) DK/NS

If No,
EV 6b. Were there any negative consequences of not reducing enough load?

_____

EV-8. Please rate how easy is it for you to use the Energy Profiler Online, or EPO, on a scale of 1 to 10, where 1 means very difficult and 10 means very easy.

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

(If rating was less than 8)

EV-9. What can be done to make using EPO easier for you?

_____

EV-10 Would you say the targeted level of load reduction you currently have with Duke Energy is ....

( ) **Much less than you can provide**
( ) Less than you can provide
( ) About right for your company
( ) More than you want to provide
( ) Much more than you want to provide
( ) DK/NS

EV-11. For winter events that were called recently, were there any differences in your company's ability to respond compared to summer events?

_____

IMPROVEMENTS

IMPR-1. While your company was deciding whether or not to enroll, what was the biggest concern about participating in Power Share?

_____

IMPR-2a. During the past season, did anything happen to decrease your concern?

( ) Yes
( ) No

If YES
IMPR-2b. What happened?

_____

If NO
IMPR-2c. What can Duke Energy do that would decrease your concern?

_____

IMPR-4. Is there anything about Power Share you would say was working exceptionally well? It's fine if there isn't.

_____

IMPR-5. What doesn't work well and why?

_____

SATISFACTION

We would like to ask you a few questions about your satisfaction with various aspects of the program. For these questions, we would like you to rate your satisfaction using a 1 to 10 scale where a 1 means that you are very dissatisfied with that aspect and a 10 means that you are very satisfied.

SAT-1. How would you rate your satisfaction with: The ease of applying for the program?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-1a. How can this be improved?

_____

SAT-2. How would you rate your satisfaction with: The amount of the monthly premium credit provided by the program?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-2a. How can this be improved?

_____

SAT-3. How would you rate your satisfaction with: The amount of the load reduction credit for the events in which you participated?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-3a. How can this be improved?

_____

SAT-4. How would you rate your satisfaction with: The time it took for you to receive your load reduction credit?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-4a. How can this be improved?

_____

SAT-5. How would you rate your satisfaction with: How clear the explanation of the Power Share incentive structure was?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-5a. How can this be improved?

_____

SAT-6. How would you rate your satisfaction with: The amount of advance notice you had about the events

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8
SAT-6a. How can this be improved?

_____

SAT-7. How would you rate your satisfaction with: The time window in which you were required to reduce your load once you had received notification about the start of the event?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8
SAT-7a. How can this be improved?

_____

SAT-8. How would you rate your satisfaction with: Duke Energy's method for confirming how much load you reduced?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8
SAT-8a. How can this be improved?

_____

SAT-9. How would you rate your satisfaction with: The technical expertise of Duke Energy staff

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8
SAT-9a. How can this be improved?

_____

SAT-10. How would you rate your satisfaction with: The time it took for Duke Energy staff to respond to any questions or address any issues.

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-10a. How can this be improved?

_____

Sat-11. Considering all aspects of the program, how would you rate your overall satisfaction with the Power Share Program?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-11a. How can this be improved?

_____

SAT-12 Does your company intend to stay in the Power Share program in the coming year?

( ) **Yes**
( ) No
( ) DK

SAT-13. How would you rate your overall satisfaction with Duke Energy?

( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 ( ) 7 ( ) 8 ( ) 9 ( ) 10 ( ) NA ( ) DK/NS

If rating was less than 8

SAT-12a. How can this be improved?

_____

SAT-13. Are there any other thoughts or comments you would like to share with Duke Energy management about the Power Share Program that we have not discussed already?

_____

Thank you for taking this time to share your thoughts! We appreciate it very much.

DUKE ENERGY OHIO EXHIBIT_____

BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Duke Energy Ohio, Inc., for Recovery of Program Costs, Lost Distribution Revenue and Performance Incentives Related to its Energy Efficiency and Demand Response Programs.	))))))	Case No. 17-781-EL-RDR

DIRECT TESTIMONY OF

JAMES E. ZIOLKOWSKI

ON BEHALF OF

DUKE ENERGY OHIO, INC.

March 31, 2017

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PAGE

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is James E. Ziolkowski, and my business address is 139 East Fourth Street, Cincinnati, Ohio 45202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by the Duke Energy Business Services LLC (DEBS) as Director, Rates and Regulatory Planning. DEBS provides various administrative and other services to Duke Energy Ohio, Inc., (Duke Energy Ohio or the Company) and other affiliated companies of Duke Energy Corporation (Duke Energy).

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL EXPERIENCE.

A. I received a Bachelor of Science degree in Mechanical Engineering from the U.S. Naval Academy in 1979 and a Master of Business Administration degree from Miami University in 1988. I am also a licensed Professional Engineer in the state of Ohio.

After graduating from the Naval Academy, I attended the Naval Nuclear Power School and other follow-on schools. I served as a nuclear-trained officer on various ships in the U.S. Navy through 1986. From 1988 through 1990, I worked for Mobil Oil Corporation as a Marine Marketing Representative in the New York City area.

I joined The Cincinnati Gas & Electric Company (CG&E) in 1990 as a Product Applications Engineer, in which capacity I designed and managed some of CG&E's demand side management programs, including Energy Audits and

Interruptible Rates. From 1996 until 1998, I was an Account Engineer and worked with large customers to resolve various service-related issues, particularly in the areas of billing, metering, and demand management. In 1998, I joined Cinergy Services, Inc.'s, Rate Department, where I focused on rate design and tariff administration. I was significantly involved with the initial unbundling and design of CG&E's retail electric rates. I was appointed to my current position in January 2014.

Q. PLEASE DESCRIBE YOUR DUTIES AS DIRECTOR, RATES AND REGULATORY PLANNING.

A. I am responsible for various rider filings, tariff administration, billing, and revenue reporting issues in Ohio and Kentucky. I also prepare filings to modify charges and terms in retail tariffs of Duke Energy Ohio and Duke Energy Kentucky, Inc., (Duke Energy Kentucky) and develop rates for new services. During rate cases, I prepare cost of service studies and help with the design of the new base rates. I assisted in the development of the retail electric tariffs in the Company's Case No. 03-93-EL-ATA, which established the Company's market-based standard service offer. Additionally, I frequently work with customer contact and billing personnel of Duke Energy Ohio and Duke Energy Kentucky to answer rate-related questions and to apply the retail tariffs to specific situations. Occasionally, I meet with customers and Company representatives to explain rates or provide rate training. I also prepare reports that are required by regulatory authorities.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO?

A. Yes. Recently, I provided testimony before the Public Utilities Commission of Ohio (Commission) in support of Duke Energy Ohio's electric distribution base rate case, filed under Case Number 17-0032-EL-AIR. I was also a witness in the Company's Electric Security Plan case, filed under Case Number 14-841-EL-SSO and the Energy Efficiency cases, filed under Case Number 16-576-EL-POR, 13-753-EL-RDR, Case No. 14-457-EL-RDR, Case No. 15-534-EL-RDR and Case No. 16-664-EL-RDR.

Q. WHAT ARE THE ATTACHMENTS AND SCHEDULES FOR WHICH YOU ARE RESPONSIBLE?

A. I am sponsoring the following items:

- Attachment JEZ-1 – Work papers showing the calculation of Rider EE-PDRR rates
- Attachment JEZ-2 – Proposed Rider EE-PDRR tariff sheet – redlined
- Attachment JEZ-3 – Proposed Rider EE-PDRR tariff sheet – clean

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony in this proceeding is to: (i) describe the calculation of the Rider EE-PDRR rate update, including the true-up for the year 2016 and (ii) discuss the distribution decoupling mechanism, Rider DDR, as approved in Case No. 11-5905-EL-RDR and its effect on lost margin recovery. The Company's electric tariff contains two shared savings-related sheets. Rider EE-PDR describes

the calculations of the shared savings recovery charges, and Rider EE-PDRR contains the results of the calculations, i.e., the retail recovery rates.

Q. WHAT IS THE PURPOSE OF RIDER EE-PDR AND EE-PDRR?

A. Rider EE-PDR is the mechanism through which the revenue requirement and its true-up is recovered from residential and non-residential customers. Rider EE-PDRR contains the results of the calculations, *i.e.*, the retail recovery rates.

Q. WHAT TIME PERIOD DOES THIS TRUE-UP COVER?

A. This true-up analysis addresses the calendar year 2016. The proposed Rider EE-PDRR rate also includes expected 2017 costs. The 2017 results will be trued-up in next year's filing. As part of the true-up calculation, the reconciliation balances (i.e., actual costs including lost revenues, and actual EE-PDRR revenues) from 2012, 2013, 2014 and 2015, as filed in Case No. 13-753-EL-RDR, Case No. 14-457-EL-RDR, Case No. 15-534-EL-RDR and the pending Case No. 16-664-EL-RDR, respectively, are carried forward and included in the revenue requirement.

II. CALCULATION OF EE-PDR REVENUE REQUIREMENT

Q. WHAT LEVEL OF ACHIEVEMENT IS THE COMPANY CLAIMING?

A. Duke Energy Ohio did not exceed its efficiency and peak demand mandates. Per the stipulation in Case No. 14-457-EL-RDR, the Company is claiming no Shared Savings incentive.

Q. IS THE COMPANY INCLUDING CARRYING COSTS ON LOST MARGINS IN THIS APPLICATION?

A. No.

Q. PLEASE EXPLAIN HOW DISTRIBUTION LOST MARGINS ARE CALCULATED.

A. The DSMore™ model calculates the kWh and kW reductions associated with each program measure. Based upon the units of participation and load reductions per program measure, the Company then applies lost margin rates to these reductions to calculate the lost margin dollars to be recovered.

Q. WHAT IS THE DIFFERENCE BETWEEN LOST REVENUES AND LOST MARGINS?

A. In general terms, lost margins equal lost revenues minus variable costs. For example, the lost margin associated with generation would be equal to the total generation revenue minus fuel costs (which are variable) minus any other variable O&M costs. Rider EE-PDR allows for the recovery of distribution lost margins, and the Company requests in this filing to recover distribution lost margins associated with Rider EE-PDR measures.

Q. WHAT TYPES OF LOST MARGINS ARE INCLUDED IN THIS TRUE-UP?

A. The calculated lost margins include only distribution margins associated with non-residential customers taking service under Rate DS, Rate DP, and Rate TS. The lost margins associated with these three non-residential rates are included under Rider EE-PDR since these non-residential customers are not subject to the Company's decoupling rider pilot, Rider DDR (Distribution Decoupling Rider), which was approved in Case No. 11-5905-EL-RDR.

Q. DOES THIS APPLICATION INCLUDE AVOIDED COSTS ASSOCIATED WITH THE MERCANTILE SELF-DIRECT PROGRAM?

A. No. The Company included the energy and capacity savings from the Mercantile Self-Direct program in determining its performance against the benchmarks set forth in Section 4928.66, Ohio Revised Code, but it did not include any avoided costs or lost revenues from the Mercantile Self-Direct program in its Rider EE-PDR true-up calculations.

Q. DID THE TRUE-UP CALCULATION INCLUDE ANY PRIOR-PERIOD TRUE-UP AMOUNTS?

A. Yes. To maintain continuity of the true-up mechanism from one year to the next, the filing includes the net reconciliation balances from the prior years – 2012, 2013, 2014, and 2015 in this case. The Company filed its 2012 reconciliation numbers in Case No. 13-753-EL-RDR. The Company filed its 2013 reconciliation numbers in Case No. 14-457-EL-RDR. The Company filed its 2014 reconciliation numbers in Case No. 15-534-EL-RDR. The Company filed its 2015 reconciliation numbers in pending Case No. 16-664-EL-RDR. Upon receipt of an order in Case No. 16-664-EL-RDR in these cases, the Company will make appropriate adjustments to this filing. This filing also includes an adjustment to the revenue requirement resulting from orders in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR.

Q. PLEASE DESCRIBE THE ADJUSTMENTS FROM CASE NO. 14-457-EL-RDR AND CASE NO. 15-534-EL-RDR.

A. In its Opinion and Order dated October 26, 2016 in Case No. 15-534-EL-RDR, the Commission disallowed the recovery of $409,096 of program costs. The calculation of the allocation of this amount appears on page 11 of Attachment JEZ-1. I allocated the reduction to the residential and non-residential rates based on the percentages of total program costs attributable to residential and non-residential customers as filed in Case No. 15-534-EL-RDR.

The approved stipulation in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR allows Duke Energy Ohio to recover a combined total of $19,750,000 in shared savings for those two cases. This number represents a reduction of $4,589,880 from the as-filed total amount of $24,339,880. The calculation of the allocation of this reduction appears on page 11 of Attachment JEZ-1. I allocated the reduction to the residential and non-residential rates based on the percentages of total shared savings dollars attributable to residential and non-residential customers as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR.

III. RIDER EE-PDR RECONCILATION RATE CALCULATION

Q. PLEASE EXPLAIN HOW THE COMPANY'S DISTRIBUTION DECOUPLING RIDER AFFECTS THE RIDER EE/PDR TRUE-UP CALCULATIONS.

A. Rider DDR was approved on May 30, 2012 in Case No. 11-5905-EL-RDR. On January 1, 2012, the Company began tracking the authorized distribution revenues

for each rate class covered by the rider against the actual revenues for the rate classes covered by the rider. On February 10, 2017, the Company filed an application to update Rider DDR rates for each rate class. The latest Rider DDR filing covers the period January 1, 2016 through December 31, 2016. The updated Rider DDR rates will be effective on July 1, 2017, absent any activity by the Commission. The lost margin dollars in this Rider EE-PDR true-up filing are based on lost kWh and kW for year 2016. Because Rider DDR does not apply to Rates DS, DP, and TS, only those three base rates are subject to lost margin recovery pursuant to Rider EE-PDRR.

Q. PLEASE DESCRIBE IN DETAIL THE RIDER EE-PDRR RATE CALCULATIONS CONTAINED IN ATTACHMENT JEZ-1.

A. Attachment JEZ-1 shows the calculation of the Rider EE-PDRR recovery rates. Page 1 shows the calculation of the Company's shared savings achievement tier. The Company claims an after-tax shared savings rate of 0%.

Page 2 summarizes the Rider EE-PDRR revenue requirement data from page 3. The total 2016 revenue requirement is $46,661,244. This figure includes $1,854,961 of Mercantile Self-Direct program cost recovery, however, no shared savings incentives are included for the self-direct program.

Page 3 of Attachment JEZ-1 shows the 2016 EE/PDR program details and results. The sheet shows the kWh and kW impacts, the shared savings calculations, the program cost recovery numbers, and the total revenue requirement associated with each of the residential and non-residential programs. The numbers are summarized on page 2.

Page 4 of Attachment JEZ-1 shows the lost distribution margins associated with program participants that take service under Rate DS, Rate DP, and Rate TS. As I previously mentioned, customers served under these three rates are not subject to Rider DDR. These customers are, however, subject to lost distribution margin recovery pursuant to Rider EE-PDRR.

Page 5 of Attachment JEZ-1 shows the expected 2017 program details and results. The sheet shows the kWh and kW impacts, the shared savings calculations, the program cost recovery numbers, and the total revenue requirement associated with each of the residential and non-residential programs.

Page 6 of Attachment JEZ-1 shows the expected 2017 prior-vintage lost margins associated with program participants that take service under Rate DS, Rate DP, and Rate TS. As stated earlier, customers served under these three rates are not subject to Rider DDR.

Page 7 of Attachment JEZ-1 shows the 2016 Rider EE-PDRR revenues by base rate class and month. Total revenue recovery during 2015 was $44,042,408.

Page 8 of Attachment JEZ-1 shows the actual 2016 kWh usage by month for Rate DS, Rate DP, and Rate TS accounts. The total 2016 kWh numbers for these rates are used on page 10 to calculate the lost revenue dollars included in Rider EE-PDRR associated with these three base rates.

Page 9 of Attachment JEZ-1 shows the forecasted kWh billing determinants for the period July 2017 through June 2018. These kWh figures are used in the denominators of of the final rate calculations that appear on page 10.

Page 10 shows the Rider EE-PDRR rate calculations that true-up 2016

costs and revenues and recover the 2017 expected costs. The total revenues to be recovered are grossed up by the Commercial Activity Tax factor of 1.0026068. As I previously discussed, the Company carries forward prior period reconcilation balances, including revenues. Upon receipt of a final order in Case No. 16-664-EL-RDR, the Company will adjust this filing if necessary to reflect any changes to the as-filed numbers in that case.

Page 11 shows the calculation and allocation of the reductions associated with the Opinion and Order in Case No. 15-534-EL-RDR and the stipulation from Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR. These reductions are included in the revenue requirement and resulting rate calculations on page 10.

IV. CONCLUSION

Q. HOW DOES THE COMPANY PROPOSE THAT ITS TARIFFS, INCLUDING THE PREVIOUSLY DISCUSSED RATES AND CHARGES, BE IMPLEMENTED?

A. Duke Energy Ohio proposes that the revised tariffs, including the rates and charges to be issued pursuant to the Commission's Order in this case, be effective for twelve months for all customers on a bills-rendered basis.

Q. WERE THE ATTACHMENTS DISCUSSED ABOVE PREPARED BY YOU OR UNDER YOUR SUPERVISION?

A. Yes.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

Duke Energy Ohio
2016 True Up
Shared Savings Achievement Tier

Achievement Level

	2016 Achievement from Shared Savings Portfolio	179,463
1	+ Use of Incentive Bank, if any	0
	= Total Claimed Impacts	179,463
	/ Mandate excluding Mercantile	207,278
	= Achievement	**87%**

Achievement Tiers

Achievement of Annual Target	After-Tax Shared Savings
<100	0.0%
>100-105	5.0%
>105-110	7.5%
>110-115	10.0%
>115	13.0%

Shared Savings Rate Earned and Tax Gross-up

2	After-Tax Achievement Rate Achieved	0.0%
	/ Tax Grossup Factor	63.9500%
	= Pre-Tax Achievement Rate	**0.00%** rounded to nearest basis point

Bank

	Starting Incentive Bank from Prior Year's True-up Filing	207,608
	- Use of Incentive Bank	0
	= Ending Incentive Bank	207,608

1 - Use of incentive bank to achieve incentive level is disallowed per pending settlement agreement in Case Nos. 14-0457-EL-RDR and 15-0534-EL-RDR.

2 - Shared savings rate for 2016 per pending settlement agreement in Case Nos. 14-0457-EL-RDR and 15-0534-EL-RDR.

Duke Energy Ohio
2016 True Up
Total Revenue Requirement

	Res	NonRes	Total
Program Costs and Shared Savings Revenue	12,949,286	29,719,246	42,668,533
Lost Revenues	0	2,137,750	2,137,750
Mercantile Self-Direct Cost Recovery		1,854,961	1,854,961
Total Revenue Requirement	**12,949,286**	**33,711,957**	**46,661,244**

Duke Energy Ohio
2016 True Up - Program Summary

Program	Unit Type	Impacts & Participants A: Annual KWH Gross FR @ Plant Total (*KWH data*)	B: Annual KW Gross FR @ Plant Total (*KW data*)	C: Participants (*# of Measure Units data*)	Shared Savings Calculation: (Avoided Cost minus Program Costs) x Sharing Rate + D: Total NPV Avoided Cost of Capacity / Total ($ *data*)	E: Total NPV Avoided Cost of Energy / Total ($ *data*)	G: Total NPV Avoided Cost of T&D / Total ($ *data*)	H: Total Avoided Costs ($ *D+E+G*)	I: Total Costs ($ *O*)	J: Shared Savings Pool ($ *H-I*)	K: Shared Savings Tier, pre-tax (% *data*)	L: Shared Savings Revenue ($ *J x K*)	Cost Recovery = M: Non-M&V Costs ($ *data*)	N: M&V Costs ($ *data*)	O: Total Costs ($ *M+N*)	P: Cost Recovery Revenue ($ *O*)	Revenue Requirement Q: Total Revenue ($ *L+P*)	R: Lost Revenue Make-Whole $ ($ *data*)	S: Total Revenue Requirement ($ *Q+R*)
Shared Savings Recovery																			
Res																			
Energy Efficiency																			
Appliance Recycling Program		51,640	6	93	$ 1,650	$ 13,753	$ 976	$ 16,380	$ (23,765)	$ 40,145	0.00%	$ -	$ (23,765)	$ -	$ (23,765)	$ (23,765)	$ (23,765)	$ -	$ (23,765)
Energy Efficiency Education Program for Schools		5,215,191	1,403	9,782	$ 722,315	$ 2,440,822	$ 424,956	$ 3,588,093	$ 744,626	$ 2,843,468	0.00%	$ -	$ 744,626	$ -	$ 744,626	$ 744,626	$ 744,626	$ -	$ 744,626
Home Energy Comparison Report	1	11,904,080	3,652	316,486	$ 2,277,133	$ 7,188,314	$ 1,361,339	$ 10,826,786	$ 2,936,903	$ 7,889,883	0.00%	$ -	$ 2,924,648	$ 12,256	$ 2,936,903	$ 2,936,903	$ 2,936,903	$ -	$ 2,936,903
Low Income Neighborhood Program		587,278	180	1,315	$ 101,585	$ 302,977	$ 63,667	$ 468,229	$ 551,779	$ (83,549)	0.00%	$ -	$ 514,139	$ 37,640	$ 551,779	$ 551,779	$ 551,779	$ -	$ 551,779
Low Income Services		0	0	0	$ -	$ -	$ -	$ -	$ (0)	$ 0	0.00%	$ -	$ (0)	$ -	$ (0)	$ (0)	$ (0)	$ -	$ (0)
Residential Energy Assessments		1,997,716	250	7,154	$ 215,519	$ 1,608,432	$ 129,998	$ 1,953,950	$ 743,896	$ 1,210,053	0.00%	$ -	$ 736,941	$ 6,956	$ 743,896	$ 743,896	$ 743,896	$ -	$ 743,896
Smart $aver Residential		19,872,536	3,764	469,336	$ 2,423,013	$ 11,191,242	$ 1,590,145	$ 15,204,400	$ 4,648,533	$ 10,555,867	0.00%	$ -	$ 4,722,359	$ (73,826)	$ 4,648,533	$ 4,648,533	$ 4,648,533	$ -	$ 4,648,533
Home Energy Solutions		599,546	378	1,024	$ 217,200	$ 328,855	$ 127,467	$ 673,522	$ 1,940,498	$ (1,266,976)	0.00%	$ -	$ 1,810,165	$ 130,333	$ 1,940,498	$ 1,940,498	$ 1,940,498	$ -	$ 1,940,498
Weatherization Pilot		1,042,598	132	27,307	$ 65,028	$ 417,391	$ 39,595	$ 522,013	$ 338,966	$ 183,048	0.00%	$ -	$ 338,966	$ -	$ 338,966	$ 338,966	$ 338,966	$ -	$ 338,966
Total		**41,270,584**	**9,765**	**832,497**	**$ 6,023,443**	**$ 23,491,786**	**$ 3,738,144**	**$ 33,253,373**	**$ 11,881,435**	**$ 21,371,937**		**$ -**	**$ 11,768,077**	**$ 113,359**	**$ 11,881,435**	**$ 11,881,435**	**$ 11,881,435**	**$ -**	**$ 11,881,435**
Demand Response																			
Power Manager®	1		18,585		$ 5,766,823	$ -	$ 3,467,540	$ 9,234,363	$ 1,067,851	$ 8,166,512	0.00%	$ -	$ 835,663	$ 232,188	$ 1,067,851	$ 1,067,851	$ 1,067,851	$ -	$ 1,067,851
Home Energy Solutions - Demand Response	1,2		1,291		$ 312,930	$ -	$ 188,162	$ 501,091	$ -	$ 501,091	0.00%	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total			**19,876**		**$ 6,079,753**	**$ -**	**$ 3,655,702**	**$ 9,735,454**	**$ 1,067,851**	**$ 8,667,603**		**$ -**	**$ 835,663**	**$ 232,188**	**$ 1,067,851**	**$ 1,067,851**	**$ 1,067,851**	**$ -**	**$ 1,067,851**
NonRes																			
Energy Efficiency																			
Smart $aver Non Residential Custom		24,254,302	3,072	12,221	$ 2,407,038	$ 16,193,902	$ 1,727,409	$ 20,328,349	$ 3,223,179	$ 17,105,170	0.00%	$ -	$ 3,055,100	$ 168,080	$ 3,223,179	$ 3,223,179	$ 3,223,179	$ 631,217	$ 3,854,396
Smart $aver Non Residential Prescriptive		91,985,961	16,215	805,683	$ 7,651,055	$ 38,487,045	$ 4,448,296	$ 50,586,396	$ 19,798,764	$ 30,787,632	0.00%	$ -	$ 19,798,764	$ -	$ 19,798,764	$ 19,798,764	$ 19,798,764	$ 1,146,874	$ 20,945,638
Small Business Energy Saver		21,952,355	4,501	20,709,861	$ 2,792,924	$ 12,802,984	$ 1,843,183	$ 17,439,092	$ 4,296,992	$ 13,142,100	0.00%	$ -	$ 4,223,947	$ 73,045	$ 4,296,992	$ 4,296,992	$ 4,296,992	$ 359,659	$ 4,656,652
Total		**138,192,618**	**23,788**	**21,527,765**	**$ 12,851,018**	**$ 67,483,931**	**$ 8,018,887**	**$ 88,353,836**	**$ 27,318,935**	**$ 61,034,901**		**$ -**	**$ 27,077,811**	**$ 241,125**	**$ 27,318,935**	**$ 27,318,935**	**$ 27,318,935**	**$ 2,137,750**	**$ 29,456,685**
Demand Response																			
PowerShare®	1		(485)		$ 5,112,991	$ -	$ 3,074,397	$ 8,187,388	$ 2,400,311	$ 5,787,077	0.00%	$ -	$ 2,376,190	$ 24,121	$ 2,400,311	$ 2,400,311	$ 2,400,311	$ -	$ 2,400,311
Total			**(485)**		**$ 5,112,991**	**$ -**	**$ 3,074,397**	**$ 8,187,388**	**$ 2,400,311**	**$ 5,787,077**		**$ -**	**$ 2,376,190**	**$ 24,121**	**$ 2,400,311**	**$ 2,400,311**	**$ 2,400,311**	**$ -**	**$ 2,400,311**
Total		**179,463,202**	**52,943**	**22,360,262**	**$ 30,067,204**	**$ 90,975,717**	**$ 18,487,129**	**$ 139,530,051**	**$ 42,668,533**	**$ 96,861,518**		**$ -**	**$ 42,057,740**	**$ 610,793**	**$ 42,668,533**	**$ 42,668,533**	**$ 42,668,533**	**$ 2,137,750**	**$ 44,806,282**
Cost Recovery Only																			
NonRes																			
Energy Efficiency																			
Mercantile Self-Direct		41,998,293	4,950	111									$ 1,854,961	$ -	$ 1,854,961	$ 1,854,961	$ 1,854,961	$ -	$ 1,854,961
Total		**41,998,293**	**4,950**	**111**									**$ 1,854,961**	**$ -**	**$ 1,854,961**	**$ 1,854,961**	**$ 1,854,961**	**$ -**	**$ 1,854,961**
Other EE Programs and Impacts		221,461,495	57,893	22,360,373															
Res																			
Energy Efficiency																			
Low Income Weatherization		635,882	171	603															
Total		**635,882**	**171**	**603**															
Total		**635,882**	**171**	**603**															
Total		**222,097,377**	**58,064**	**22,360,976**	**$ 30,067,204**	**$ 90,975,717**	**$ 18,487,129**	**$ 139,530,051**	**$ 42,668,533**	**$ 96,861,518**		**$ -**	**$ 43,912,701**	**$ 610,793**	**$ 44,523,494**	**$ 44,523,494**	**$ 44,523,494**	**$ 2,137,750**	**$ 46,661,244**
Energy Efficiency																			
Res Total		**41,906,466**	**9,936**	**833,100**	**$ 6,023,443**	**$ 23,491,786**	**$ 3,738,144**	**$ 33,253,373**	**$ 11,881,435**	**$ 21,371,937**		**$ -**	**$ 11,768,077**	**$ 113,359**	**$ 11,881,435**	**$ 11,881,435**	**$ 11,881,435**	**$ -**	**$ 11,881,435**
NonRes Total		**180,190,911**	**28,738**	**21,527,876**	**$ 12,851,018**	**$ 67,483,931**	**$ 8,018,887**	**$ 88,353,836**	**$ 27,318,935**	**$ 61,034,901**		**$ -**	**$ 28,932,772**	**$ 241,125**	**$ 29,173,897**	**$ 29,173,897**	**$ 29,173,897**	**$ 2,137,750**	**$ 31,311,646**

Notes:

1 **My Home Energy Report and Demand Response programs impacts represent incremental program participation from the prior filing period to be consistent with achievements.**
Total annual savings for the programs are as follows:

Home Energy Comparison Report	86,626,040	26,545
Power Manager		68,907
PowerShare®		62,813
Home Energy Solutions - Demand Response		3,739

2 **Program costs for Home Energy Solutions are listed on the Home Energy Solutions EE program row.**

Program	Product Code	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh
Appliance Recycling Program	FRCYCL	RS	2013		797.93	307,027.50
Appliance Recycling Program	FRCYCL	RS	2014		612.09	296,798.84
Appliance Recycling Program	FRCYCL	RS	2015		271.32	160,609.24
Appliance Recycling Program	FRCYCL	RS	2016		3.37	1,992.18
Appliance Recycling Program	FRCYCL	RS01	2013		1.43	549.90
Appliance Recycling Program	FRCYCL	RS01	2015		1.14	673.41
Appliance Recycling Program	RRCYCL	RS	2013		3,564.47	1,371,539.25
Appliance Recycling Program	RRCYCL	RS	2014		2,977.49	1,597,799.56
Appliance Recycling Program	RRCYCL	RS	2015		1,296.23	1,031,477.69
Appliance Recycling Program	RRCYCL	RS	2016		17.10	13,609.22
Appliance Recycling Program	RRCYCL	RS01	2013		17.34	6,670.35
Appliance Recycling Program	RRCYCL	RS01	2014		21.96	12,199.25
Appliance Recycling Program	RRCYCL	RS01	2015		12.67	10,080.90
Appliance Recycling Program	RRCYCL	RS3P	2014		0.51	403.24
Energy Efficiency Education Program for Schools	K12PRF	RS	2013		6,330.58	519,754.95
Energy Efficiency Education Program for Schools	K12PRF	RS	2014		22,128.62	1,794,090.00
Energy Efficiency Education Program for Schools	K12PRF	RS	2015		9,284.24	1,702,710.00
Energy Efficiency Education Program for Schools	K12PRF	RS	2016		4,692.73	1,805,673.08
Energy Efficiency Education Program for Schools	K12PRF	RS01	2013		11.42	937.27
Energy Efficiency Education Program for Schools	K12PRF	RS01	2014		23.39	1,896.00
Energy Efficiency Education Program for Schools	K12PRF	RS01	2015		5.19	1,996.00
Energy Efficiency Education Program for Schools	K12PRF	RS01	2016		4.65	1,788.08
Energy Efficiency Education Program for Schools	K12PRF	RS3P	2014		5.85	474.00
Home Energy Comparison Report	HECR	RS	2013		-	-
Home Energy Comparison Report	HECR	RS	2014		-	-
Home Energy Comparison Report	HECR	RS	2015		-	-
Home Energy Comparison Report	HECR	RS	2016		213,438.64	81,078,639.18
Home Energy Solutions	HES	RS	2014			686,096.00
Home Energy Solutions	HES	RS	2015			1,167,788.00
Home Energy Solutions	HES	RS	2016			470,960.33
Home Energy Solutions	HES	RS01	2014			1,644.00
Low Income Neighborhood Program	HWLI	RS	2013		440.30	169,417.50
Low Income Neighborhood Program	HWLI	RS	2014		3,268.70	1,257,732.00
Low Income Neighborhood Program	HWLI	RS	2015		2,514.79	710,928.97
Low Income Neighborhood Program	HWLI	RS	2016		641.32	161,878.51
Low Income Neighborhood Program	HWLI	RS01	2013		4.78	1,837.50
Low Income Neighborhood Program	HWLI	RS01	2014		18.34	7,056.00
Low Income Neighborhood Program	HWLI	RS01	2015		5.55	1,705.46
Low Income Neighborhood Program	HWLI	RS01	2016		15.50	3,911.44
Mercantile Self-Direct	NRCSSD	DM	2013		20.27	7,056.50
Mercantile Self-Direct	NRCSSD	DP	2013		269.57	118,721.90
Mercantile Self-Direct	NRCSSD	DP	2014		5,247.66	3,833,634.39
Mercantile Self-Direct	NRCSSD	DP	2016		153.22	36,689.16
Mercantile Self-Direct	NRCSSD	DS	2013		419.80	237,192.72
Mercantile Self-Direct	NRCSSD	DS	2014		340.13	248,477.34
Mercantile Self-Direct	NRCSSD	DS	2015		2,909.32	2,951,607.76
Mercantile Self-Direct	NRCSSD	DS	2016		666.98	404,457.96
Mercantile Self-Direct	NRCSSD	TS	2013		4,086.14	2,464,097.20
Mercantile Self-Direct	NRCSSD	TS	2015		2,819.82	2,052,332.04
Mercantile Self-Direct	NRCSSD	TS	2016		6,267.90	4,257,742.82
Mercantile Self-Direct	NRPRSD	DM	2013		42.59	14,073.13
Mercantile Self-Direct	NRPRSD	DP	2013		854.05	418,095.91
Mercantile Self-Direct	NRPRSD	DP	2014		4,394.15	1,687,633.75
Mercantile Self-Direct	NRPRSD	DP	2015		327.65	121,500.00
Mercantile Self-Direct	NRPRSD	DS	2013		386.89	162,616.11
Mercantile Self-Direct	NRPRSD	DS	2014		370.84	189,669.25
Mercantile Self-Direct	NRPRSD	DS	2015		39.13	14,511.47
Mercantile Self-Direct	NRPRSD	TS	2013		565.39	238,204.32
Residential Energy Assessments	HEHC	RS	2013		6,393.51	855,246.46
Residential Energy Assessments	HEHC	RS	2014		18,155.83	1,829,724.00
Residential Energy Assessments	HEHC	RS	2015		15,331.41	1,727,747.00
Residential Energy Assessments	HEHC	RS	2016		2,774.48	1,079,088.49
Residential Energy Assessments	HEHC	RS01	2013		10.40	1,317.79
Residential Energy Assessments	HEHC	RS01	2014		6.29	634.00
Residential Energy Assessments	HEHC	RS01	2015		6.29	634.00
Residential Energy Assessments	HEHC	RS01	2016		6.18	2,427.38
Residential Energy Assessments	HEHC	RS3P	2013		-	-
Residential Energy Assessments	HEHC	RS3P	2016		1.41	572.30
Smart $aver Non Residential Custom	NRPRSC	DM	2013		26.32	29,651.93
Smart $aver Non Residential Custom	NRPRSC	DM	2014		140.89	37,336.10
Smart $aver Non Residential Custom	NRPRSC	DM	2015		340.18	127,886.34
Smart $aver Non Residential Custom	NRPRSC	DM	2016		46.23	27,750.16
Smart $aver Non Residential Custom	NRPRSC	DP	2013	$ 30,764	4,023.77	3,183,698.98
Smart $aver Non Residential Custom	NRPRSC	DP	2014	$ 60,821	8,169.54	6,294,247.24
Smart $aver Non Residential Custom	NRPRSC	DP	2015	$ 69,919	4,751.52	7,235,756.98
Smart $aver Non Residential Custom	NRPRSC	DP	2016	$ 31,459	5,096.68	3,255,587.14
Smart $aver Non Residential Custom	NRPRSC	DS	2013	$ 80,539	6,681.70	5,022,702.01
Smart $aver Non Residential Custom	NRPRSC	DS	2014	$ 134,101	15,167.81	8,363,013.80

Program	Product Code	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh
Smart $aver Non Residential Custom	NRPRSC	DS	2015	$ 131,921	12,804.08	8,227,055.63
Smart $aver Non Residential Custom	NRPRSC	DS	2016	$ 91,693	14,549.00	5,718,285.52
Smart $aver Non Residential Custom	NRPRSC	EH	2013		4.68	1,273.49
Smart $aver Non Residential Custom	NRPRSC	EH	2015		47.48	15,690.31
Smart $aver Non Residential Custom	NRPRSC	TS	2014		6,167.64	3,366,788.85
Smart $aver Non Residential Custom	NRPRSC	TS	2015		20,583.12	13,885,322.46
Smart $aver Non Residential Custom	NRPRSC	TS	2016		2,292.42	1,674,661.19
Smart $aver Non Residential Prescriptive	NRFS	DM	2013		1.28	932.46
Smart $aver Non Residential Prescriptive	NRFS	DM	2014		8.87	5,193.15
Smart $aver Non Residential Prescriptive	NRFS	DM	2015		-	-
Smart $aver Non Residential Prescriptive	NRFS	DM	2016		8.16	5,958.80
Smart $aver Non Residential Prescriptive	NRFS	DP	2013	$ 84	13.28	8,650.80
Smart $aver Non Residential Prescriptive	NRFS	DP	2014	$ 1,159	183.26	119,891.52
Smart $aver Non Residential Prescriptive	NRFS	DP	2015	$ 9	1.27	925.03
Smart $aver Non Residential Prescriptive	NRFS	DP	2016	$ 170	41.80	17,549.29
Smart $aver Non Residential Prescriptive	NRFS	DS	2013	$ 7,008	947.89	437,059.66
Smart $aver Non Residential Prescriptive	NRFS	DS	2014	$ 1,296	152.33	80,825.51
Smart $aver Non Residential Prescriptive	NRFS	DS	2015	$ 2,612	266.97	162,901.25
Smart $aver Non Residential Prescriptive	NRFS	DS	2016	$ 1,424	158.17	88,811.41
Smart $aver Non Residential Prescriptive	NRFS	EH	2013		11.70	3,882.96
Smart $aver Non Residential Prescriptive	NRFS	EH	2014		12.39	6,389.43
Smart $aver Non Residential Prescriptive	NRFS	EH	2015		33.03	13,270.54
Smart $aver Non Residential Prescriptive	NRFS	EH	2016		0.21	156.17
Smart $aver Non Residential Prescriptive	NRHVAC	DM	2013		39.95	14,968.70
Smart $aver Non Residential Prescriptive	NRHVAC	DM	2014		200.03	76,278.32
Smart $aver Non Residential Prescriptive	NRHVAC	DM	2015		184.01	67,879.56
Smart $aver Non Residential Prescriptive	NRHVAC	DM	2016		42.24	17,240.17
Smart $aver Non Residential Prescriptive	NRHVAC	DP	2013	$ 1,849	447.00	191,399.73
Smart $aver Non Residential Prescriptive	NRHVAC	DP	2014	$ 4,889	1,351.46	505,919.24
Smart $aver Non Residential Prescriptive	NRHVAC	DP	2015	$ 616	154.54	63,699.30
Smart $aver Non Residential Prescriptive	NRHVAC	DP	2016	$ 145	39.40	14,961.36
Smart $aver Non Residential Prescriptive	NRHVAC	DS	2013	$ 7,264	3,088.36	453,016.23
Smart $aver Non Residential Prescriptive	NRHVAC	DS	2014	$ 9,579	1,583.40	597,359.85
Smart $aver Non Residential Prescriptive	NRHVAC	DS	2015	$ 14,976	2,438.34	933,943.09
Smart $aver Non Residential Prescriptive	NRHVAC	DS	2016	$ 3,625	597.86	226,058.83
Smart $aver Non Residential Prescriptive	NRHVAC	EH	2013		28.79	10,582.91
Smart $aver Non Residential Prescriptive	NRHVAC	EH	2014		55.60	83,748.92
Smart $aver Non Residential Prescriptive	NRHVAC	EH	2015		58.00	21,590.96
Smart $aver Non Residential Prescriptive	NRHVAC	EH	2016		4.86	1,792.51
Smart $aver Non Residential Prescriptive	NRHVAC	TS	2013		9.59	3,555.41
Smart $aver Non Residential Prescriptive	NRHVAC	TS	2014		1,524.81	565,440.00
Smart $aver Non Residential Prescriptive	NRHVAC	TS	2015		47.55	17,633.66
Smart $aver Non Residential Prescriptive	NRHVAC	TS	2016		10.27	3,817.82
Smart $aver Non Residential Prescriptive	NRIT	DM	2014		0.38	144.00
Smart $aver Non Residential Prescriptive	NRIT	DM	2015		0.38	144.00
Smart $aver Non Residential Prescriptive	NRIT	DM	2016		0.02	14.18
Smart $aver Non Residential Prescriptive	NRIT	DP	2015	$ 28	7.55	2,880.00
Smart $aver Non Residential Prescriptive	NRIT	DS	2014	$ 1	0.19	72.00
Smart $aver Non Residential Prescriptive	NRIT	DS	2015	$ 10	1.59	632.73
Smart $aver Non Residential Prescriptive	NRIT	DS	2016	$ 7	0.58	420.76
Smart $aver Non Residential Prescriptive	NRLTG	DM	2013		1,104.94	431,519.62
Smart $aver Non Residential Prescriptive	NRLTG	DM	2014		3,734.38	1,941,343.39
Smart $aver Non Residential Prescriptive	NRLTG	DM	2015		3,100.19	1,702,082.32
Smart $aver Non Residential Prescriptive	NRLTG	DM	2016		4,340.70	1,947,742.01
Smart $aver Non Residential Prescriptive	NRLTG	DP	2013	$ 9,990	2,320.78	1,033,813.34
Smart $aver Non Residential Prescriptive	NRLTG	DP	2014	$ 12,849	3,667.53	1,329,714.57
Smart $aver Non Residential Prescriptive	NRLTG	DP	2015	$ 30,350	7,099.73	3,140,816.07
Smart $aver Non Residential Prescriptive	NRLTG	DP	2016	$ 21,880	5,361.66	2,264,305.48
Smart $aver Non Residential Prescriptive	NRLTG	DS	2013	$ 145,363	24,797.23	9,065,345.91
Smart $aver Non Residential Prescriptive	NRLTG	DS	2014	$ 276,641	41,302.19	17,252,312.62
Smart $aver Non Residential Prescriptive	NRLTG	DS	2015	$ 258,098	33,430.59	16,095,940.53
Smart $aver Non Residential Prescriptive	NRLTG	DS	2016	$ 246,235	36,878.51	15,356,123.55
Smart $aver Non Residential Prescriptive	NRLTG	EH	2013		706.49	233,652.02
Smart $aver Non Residential Prescriptive	NRLTG	EH	2014		599.16	260,899.52
Smart $aver Non Residential Prescriptive	NRLTG	EH	2015		1,205.05	505,185.20
Smart $aver Non Residential Prescriptive	NRLTG	EH	2016		1,305.53	476,205.18
Smart $aver Non Residential Prescriptive	NRLTG	RS01	2013		6.78	2,181.53
Smart $aver Non Residential Prescriptive	NRLTG	TS	2013		8,117.63	2,877,413.06
Smart $aver Non Residential Prescriptive	NRLTG	TS	2014		1,431.64	612,976.39
Smart $aver Non Residential Prescriptive	NRLTG	TS	2015		3,059.00	1,385,198.21
Smart $aver Non Residential Prescriptive	NRLTG	TS	2016		2,981.15	1,239,750.19
Smart $aver Non Residential Prescriptive	NRP&M	DM	2013		51.49	26,204.50
Smart $aver Non Residential Prescriptive	NRP&M	DM	2014		211.15	107,774.41
Smart $aver Non Residential Prescriptive	NRP&M	DM	2015		139.21	72,447.84
Smart $aver Non Residential Prescriptive	NRP&M	DM	2016		50.79	26,430.66
Smart $aver Non Residential Prescriptive	NRP&M	DP	2013	$ 8,915	2,044.86	922,621.81
Smart $aver Non Residential Prescriptive	NRP&M	DP	2014	$ 10,301	2,048.37	1,066,018.17
Smart $aver Non Residential Prescriptive	NRP&M	DP	2015	$ 8,196	1,672.82	848,133.28

Program	Product Code	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh
Smart $aver Non Residential Prescriptive	NRP&M	DP	2016	$ 2	0.37	192.22
Smart $aver Non Residential Prescriptive	NRP&M	DS	2013	$ 23,938	3,354.53	1,492,889.79
Smart $aver Non Residential Prescriptive	NRP&M	DS	2014	$ 9,397	1,144.60	586,027.87
Smart $aver Non Residential Prescriptive	NRP&M	DS	2015	$ 13,458	1,682.99	839,297.30
Smart $aver Non Residential Prescriptive	NRP&M	DS	2016	$ 2,305	279.71	143,742.36
Smart $aver Non Residential Prescriptive	NRP&M	EH	2013		36.46	18,974.43
Smart $aver Non Residential Prescriptive	NRP&M	EH	2015		53.03	27,599.18
Smart $aver Non Residential Prescriptive	NRP&M	TS	2013		258.11	79,664.90
Smart $aver Non Residential Prescriptive	NRP&M	TS	2014		265.16	137,995.88
Smart $aver Non Residential Prescriptive	NRP&M	TS	2015		379.54	197,578.13
Smart $aver Non Residential Prescriptive	NRP&M	TS	2016		10.78	5,647.14
Smart $aver Non Residential Prescriptive	NRPROC	DP	2016	$ 190	55.91	19,634.64
Smart $aver Non Residential Prescriptive	NRPROC	DS	2013	$ 961	172.05	59,949.06
Smart $aver Non Residential Prescriptive	NRPROC	DS	2014	$ 7,656	1,370.30	477,478.44
Smart $aver Non Residential Prescriptive	NRPROC	DS	2015	$ 2,779	496.27	173,289.01
Smart $aver Non Residential Prescriptive	NRPROC	DS	2016	$ 621	96.26	38,711.39
Smart $aver Non Residential Prescriptive	NRPROC	TS	2013		91.66	31,937.60
Smart $aver Residential	HPWH	RS	2014		22.58	16,484.05
Smart $aver Residential	HPWH	RS	2015		80.06	58,443.45
Smart $aver Residential	HPWH	RS	2016		16.25	11,863.52
Smart $aver Residential	MFEEAR	RS	2014		332.49	242,336.00
Smart $aver Residential	MFEEAR	RS	2015		3,141.37	544,080.88
Smart $aver Residential	MFEEAR	RS	2016		2,007.24	61,053.50
Smart $aver Residential	MFEEPW	RS	2014		102.82	75,455.10
Smart $aver Residential	MFEEPW	RS	2015		373.58	239,776.15
Smart $aver Residential	MFEEPW	RS	2016		56.79	21,851.40
Smart $aver Residential	MFEESH	RS	2014		207.56	151,487.00
Smart $aver Residential	MFEESH	RS	2015		4,102.18	511,497.81
Smart $aver Residential	MFEESH	RS	2016		4,571.11	139,037.84
Smart $aver Residential	PEEPVS	RS	2014		9.18	6,724.35
Smart $aver Residential	PEEPVS	RS	2015		167.12	122,383.08
Smart $aver Residential	PEEPVS	RS	2016		69.79	51,105.02
Smart $aver Residential	RCFL	RS	2013		16,622.26	10,186,735.51
Smart $aver Residential	RCFL	RS	2014		58,428.55	35,807,175.06
Smart $aver Residential	RCFL	RS	2015		38,412.46	23,540,428.08
Smart $aver Residential	RCFL	RS	2016		(60.60)	(37,289.78)
Smart $aver Residential	RCFL	RS01	2013		190.56	116,785.21
Smart $aver Residential	RCFL	RS01	2014		454.63	278,614.21
Smart $aver Residential	RCFL	RS01	2015		359.77	220,482.06
Smart $aver Residential	RCFL	RS01	2016		(0.92)	(568.05)
Smart $aver Residential	RCFL	RS3P	2013		5.03	3,081.05
Smart $aver Residential	RCFL	RS3P	2014		12.35	7,568.52
Smart $aver Residential	RCFL	RS3P	2015		12.35	7,568.52
Smart $aver Residential	RCFLPM	RS	2013		796.99	489,245.05
Smart $aver Residential	RCFLPM	RS	2014		828.14	508,370.57
Smart $aver Residential	RCFLPM	RS	2015		1,075.37	660,125.92
Smart $aver Residential	RCFLPM	RS	2016		179.95	110,455.90
Smart $aver Residential	RCFLPM	RS01	2013		3.84	2,356.74
Smart $aver Residential	RCFLPM	RS01	2015		1.44	881.65
Smart $aver Residential	RCFLPM	RS01	2016		0.31	189.60
Smart $aver Residential	RCFLPM	RS3P	2014		0.21	128.55
Smart $aver Residential	RCFLSP	RS	2013		1,964.79	1,194,998.75
Smart $aver Residential	RCFLSP	RS	2014		9,293.48	5,625,532.47
Smart $aver Residential	RCFLSP	RS	2015		11,212.12	6,614,259.78
Smart $aver Residential	RCFLSP	RS	2016		4,233.17	2,427,884.30
Smart $aver Residential	RCFLSP	RS01	2013		10.53	6,410.89
Smart $aver Residential	RCFLSP	RS01	2014		53.15	32,342.44
Smart $aver Residential	RCFLSP	RS01	2015		61.21	36,226.31
Smart $aver Residential	RCFLSP	RS01	2016		23.76	13,655.70
Smart $aver Residential	RCFLSP	RS3P	2013		2.57	1,600.48
Smart $aver Residential	RCFLSP	RS3P	2014		5.70	3,360.56
Smart $aver Residential	RCFLSP	RS3P	2015		3.14	1,832.97
Smart $aver Residential	RCFLSP	RS3P	2016		0.65	381.14
Smart $aver Residential	RLED	RS	2016		5,862.81	3,610,119.63
Smart $aver Residential	RLED	RS01	2016		54.81	33,750.05
Smart $aver Residential	RLED	RS3P	2016		1.72	1,061.63
Smart $aver Residential	SFEEAR	RS	2014		475.08	351,085.60
Smart $aver Residential	SFEEAR	RS	2015		2,007.05	1,483,357.60
Smart $aver Residential	SFEEAR	RS	2016		760.00	561,653.93
Smart $aver Residential	SFEEAR	RS01	2015		1.00	740.80
Smart $aver Residential	SFEEAR	RS01	2016		1.78	1,317.47
Smart $aver Residential	SFEEPW	RS	2014		229.50	165,991.00
Smart $aver Residential	SFEEPW	RS	2015		932.03	674,107.00
Smart $aver Residential	SFEEPW	RS	2016		364.60	263,704.58
Smart $aver Residential	SFEEPW	RS01	2015		0.45	322.00
Smart $aver Residential	SFEEPW	RS01	2016		0.85	617.17
Smart $aver Residential	SFEESH	RS	2014		318.75	232,936.20
Smart $aver Residential	SFEESH	RS	2015		1,364.13	996,861.60

Program	Product Code	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh
Smart $aver Residential	SFEESH	RS	2016		497.49	363,548.85
Smart $aver Residential	SFEESH	RS01	2015		0.66	478.80
Smart $aver Residential	SFEESH	RS01	2016		1.15	837.90
Smart $aver Residential	SSAC	RS	2013		2,716.91	471,760.80
Smart $aver Residential	SSAC	RS	2014		4,891.63	849,378.08
Smart $aver Residential	SSAC	RS	2015		3,849.70	758,576.23
Smart $aver Residential	SSAC	RS	2016		1,365.58	506,518.70
Smart $aver Residential	SSAC	RS01	2013		1.82	316.13
Smart $aver Residential	SSAC	RS01	2014		4.37	758.71
Smart $aver Residential	SSAC	RS01	2015		2.18	379.36
Smart $aver Residential	SSAC	RS01	2016		0.33	122.07
Smart $aver Residential	SSAC	RS3P	2016		0.66	244.14
Smart $aver Residential	SSACTU	RS	2013		1.68	594.75
Smart $aver Residential	SSACTU	RS	2014		3.96	1,404.00
Smart $aver Residential	SSACTU	RS	2015		0.33	117.00
Smart $aver Residential	SSAIAS	RS	2013		74.07	28,401.22
Smart $aver Residential	SSAIAS	RS	2014		163.35	62,631.80
Smart $aver Residential	SSAIAS	RS	2015		171.83	65,885.40
Smart $aver Residential	SSAIAS	RS	2016		129.93	49,820.75
Smart $aver Residential	SSDINS	RS	2013		1.93	683.28
Smart $aver Residential	SSDINS	RS	2014		9.64	3,416.40
Smart $aver Residential	SSDINS	RS	2015		3.86	1,366.56
Smart $aver Residential	SSDSEA	RS	2013		16.54	5,863.00
Smart $aver Residential	SSDSEA	RS	2014		25.26	8,954.40
Smart $aver Residential	SSDSEA	RS	2015		18.04	6,396.00
Smart $aver Residential	SSDSEA	RS	2016		1.88	666.25
Smart $aver Residential	SSHP	RS	2013		1,777.88	1,006,955.43
Smart $aver Residential	SSHP	RS	2014		4,051.97	2,294,953.56
Smart $aver Residential	SSHP	RS	2015		3,242.64	1,784,220.76
Smart $aver Residential	SSHP	RS	2016		861.25	321,564.95
Smart $aver Residential	SSHP	RS01	2013		0.24	137.09
Smart $aver Residential	SSHP	RS3P	2015		2.90	1,645.13
Smart $aver Residential	SSHPTU	RS	2013		1.01	375.57
Smart $aver Residential	SSHPTU	RS	2014		5.39	2,003.04
Smart $aver Residential	SSHPTU	RS	2015		10.78	4,006.08
Weatherization Pilot	WTZKWH	RS	2014		1,183.11	690,972.57
Weatherization Pilot	WTZKWH	RS	2015		2,153.67	1,283,152.90
Weatherization Pilot	WTZKWH	RS	2016		675.25	475,039.08
Weatherization Pilot	WTZKWH	RS01	2016		0.73	536.32
Small Business Energy Saver	SSBDIR	DM	2015		8,646.52	3,357,121.71
Small Business Energy Saver	SSBDIR	DM	2016		4,940.37	1,929,186.54
Small Business Energy Saver	SSBDIR	DS	2015	$ 211,533	34,197.07	13,191,933.70
Small Business Energy Saver	SSBDIR	DS	2016	$ 148,127	22,250.18	9,237,718.39
Small Business Energy Saver	SSBDIR	EH	2016		358.89	113,461.49
Grand Total				$ 2,137,750	932,600.88	416,541,241.46

Duke Energy Ohio
2017 Projection
Program Summary

		Impacts			Shared Savings Calculation: (Avoided Cost - Program Costs) x Sharing Rate								+ Cost Recovery				= Revenue Requirement		
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Program		Annual KWH Gross FR, @ Plant Total (Annualized)	Annual KW Gross FR, @ Plant Total (Annualized)	Participants	Total NPV Avoided Cost of Capacity / Total	Total NPV Avoided Cost of Energy / Total	Total NPV Avoided Cost of T&D / Total	Total Avoided Costs	Total Costs	Shared Savings Pool	Shared Savings Tier, pre-tax	Shared Savings Revenue	Non-M&V Costs	M&V Costs	Total Costs	Cost Recovery Revenue	Total Revenue	Lost Revenue Make-Whole $	Total Revenue Requirement (3)
	Unit	*KWH*	*KW*	*# of Measure Units*	*$*	*$*	*$*	*$*	*$*	*$*	*%*	*$*	*$*	*$*	*$*	*$*	*$*	*$*	*$*
	Type	*data*	*data*	*data*	*data*	*data*	*data*	**D+E+F**	*data*	**G-H**	*data*	**IxJ**	*data*	*data*	**L+M**	**N**	**K+O**	*data*	**P+Q**
Shared Savings Revenue																			
Res																			
Energy Efficiency																			
Energy Efficiency Education Program for Schools		3,209,568	863	6,000	$ 518,604	$ 695,581	$ 490,098	$ 1,704,283	$ 533,192	$ 1,171,091	15.65%	$ 183,275	$ 503,192	$ 30,000	$ 533,192	$ 533,192	$ 716,467	$ -	$ 716,467
Home Energy Comparison Report		97,847,412	25,019	400,052	$ 2,451,588	$ 2,880,420	$ 2,352,637	$ 7,684,646	$ 4,632,106	$ 3,052,540	15.65%	$ 477,721	$ 4,622,106	$ 10,000	$ 4,632,106	$ 4,632,106	$ 5,109,826	$ -	$ 5,109,826
Low Income Neighborhood Program		600,001	184	1,339	$ 121,479	$ 144,739	$ 123,593	$ 389,812	$ 687,106	$ (297,295)	15.65%	$ (46,526)	$ 587,106	$ 100,000	$ 687,106	$ 687,106	$ 640,580	$ -	$ 640,580
Low Income Weatherization - Pay for Performance		5,679,331	1,209	15,685	$ 1,429,456	$ 2,408,946	$ 1,330,048	$ 5,168,450	$ 920,149	$ 4,248,301	15.65%	$ 664,857	$ 890,149	$ 30,000	$ 920,149	$ 920,149	$ 1,585,005	$ -	$ 1,585,005
Residential Energy Assessments		2,050,716	241	17,500	$ 253,648	$ 791,402	$ 460,780	$ 1,505,829	$ 1,083,319	$ 422,510	15.65%	$ 66,123	$ 1,033,319	$ 50,000	$ 1,083,319	$ 1,083,319	$ 1,149,442	$ -	$ 1,149,442
Smart Saver Residential		37,620,011	4,242	1,009,178	$ 3,220,649	$ 9,658,116	$ 4,343,047	$ 17,221,812	$ 8,486,154	$ 8,735,658	15.65%	$ 1,367,125	$ 7,879,154	$ 607,000	$ 8,486,154	$ 8,486,154	$ 9,853,279	$ -	$ 9,853,279
Total		**147,007,038**	**31,758**	**1,449,753**	**$ 7,995,423**	**$ 16,579,204**	**$ 9,100,203**	**$ 33,674,831**	**$ 16,342,026**	**$ 17,332,805**		**$ 2,712,574**	**$ 15,515,026**	**$ 827,000**	**$ 16,342,026**	**$ 16,342,026**	**$ 19,054,600**	**$ -**	**$ 19,054,600**
Demand Response																			
Power Manager®		0	48,589	45,447	$ 4,761,155	$ -	$ 4,512,228	$ 9,273,384	$ 2,308,344	$ 6,965,040	15.65%	$ 1,090,025	$ 2,058,344	$ 250,000	$ 2,308,344	$ 2,308,344	$ 3,398,368	$ -	$ 3,398,368
Power Manager® for Apartments		0	67	94	$ 6,529	$ -	$ 9,323	$ 15,852	$ 136,217	$ (120,365)	15.65%	$ (18,837)	$ 116,217	$ 20,000	$ 136,217	$ 136,217	$ 117,380	$ -	$ 117,380
Total		**0**	**48,656**	**45,541**	**$ 4,767,685**	**$ -**	**$ 4,521,551**	**$ 9,289,236**	**$ 2,444,561**	**$ 6,844,676**		**$ 1,071,188**	**$ 2,174,561**	**$ 270,000**	**$ 2,444,561**	**$ 2,444,561**	**$ 3,515,748**	**$ -**	**$ 3,515,748**
PJM																			
PJM Pilot Program - Residential	2	0	0	0	0	0	0	$ 632,494	$ 67,742	$ 564,752	15.65%	$ 88,383	$ -	$ 67,742	$ 67,742	$ 67,742	$ 156,126	$ -	$ 156,126
Total		**0**	**0**	**0**	**$ -**	**$ -**	**$ -**	**$ 632,494**	**$ 67,742**	**$ 564,752**		**$ 88,383**	**$ -**	**$ 67,742**	**$ 67,742**	**$ 67,742**	**$ 156,126**	**$ -**	**$ 156,126**
NonRes																			
Energy Efficiency																			
Power Manager® for Business - EE	1	62,631	23	67	$ 15,507	$ 14,711	$ 14,622	$ 44,841	$ 135,617	$ (90,776)	15.65%	$ (14,206)	$ 134,761	$ 856	$ 135,617	$ 135,617	$ 121,410	$ 367	$ 121,778
Small Business Energy Saver		26,257,838	5,907	24,713,200	$ 4,359,400	$ 7,096,805	$ 4,421,511	$ 15,877,716	$ 5,367,572	$ 10,510,144	15.65%	$ 1,644,832	$ 5,252,572	$ 115,000	$ 5,367,572	$ 5,367,572	$ 7,012,403	$ 138,502	$ 7,150,905
Smart Saver Non Residential Custom		23,557,184	2,689	15,702	$ 1,861,123	$ 5,439,191	$ 1,746,876	$ 9,047,190	$ 3,208,863	$ 5,838,327	15.65%	$ 913,695	$ 3,008,863	$ 200,000	$ 3,208,863	$ 3,208,863	$ 4,122,558	$ 118,734	$ 4,241,292
Smart Saver Non Residential Performance Incentive Program		631,258	72	588,871	$ 49,872	$ 145,753	$ 46,811	$ 242,436	$ 239,256	$ 3,180	15.65%	$ 498	$ 227,863	$ 11,393	$ 239,256	$ 239,256	$ 239,754	$ 3,182	$ 242,936
Smart Saver Non Residential Prescriptive		44,235,694	6,170	673,524	$ 3,479,940	$ 8,299,694	$ 3,256,665	$ 15,036,298	$ 6,732,057	$ 8,304,241	15.65%	$ 1,299,609	$ 6,661,057	$ 71,000	$ 6,732,057	$ 6,732,057	$ 8,031,666	$ 148,415	$ 8,180,081
Total		**94,744,605**	**14,861**	**25,991,364**	**$ 9,765,842**	**$ 20,996,154**	**$ 9,486,484**	**$ 40,248,480**	**$ 15,683,365**	**$ 24,565,116**		**$ 3,844,426**	**$ 15,285,116**	**$ 398,249**	**$ 15,683,365**	**$ 15,683,365**	**$ 19,527,791**	**$ 409,199**	**$ 19,936,991**
Demand Response																			
Power Manager® for Business - DR	1	0	247	71	$ 24,157	$ -	$ 22,833	$ 46,990	$ 405,655	$ (358,665)	15.65%	$ (56,131)	$ 396,511	$ 9,144	$ 405,655	$ 405,655	$ 349,524	$ -	
PowerShare®		0	46,203	43,100	$ 4,527,355	$ -	$ 4,279,196	$ 8,806,550	$ 3,079,934	$ 5,726,617	15.65%	$ 896,212	$ 3,029,934	$ 50,000	$ 3,079,934	$ 3,079,934	$ 3,976,146	$ -	$ 3,976,146
Total		**0**	**46,450**	**43,171**	**$ 4,551,511**	**$ -**	**$ 4,302,029**	**$ 8,853,540**	**$ 3,485,588**	**$ 5,367,952**		**$ 840,081**	**$ 3,426,444**	**$ 59,144**	**$ 3,485,588**	**$ 3,485,588**	**$ 4,325,670**	**$ -**	**$ 3,976,146**
PJM																			
PJM Pilot Program - NonResidential	2	0	0	0	$ -	$ -	$ -	$ 516,084	$ 32,258	$ 483,826	15.65%	$ 75,719	$ -	$ 32,258	$ 32,258	$ 32,258	$ 107,976	$ -	$ 107,976
Total		**0**	**0**	**0**	**$ -**	**$ -**	**$ -**	**$ 516,084**	**$ 32,258**	**$ 483,826**		**$ 75,719**	**$ -**	**$ 32,258**	**$ 32,258**	**$ 32,258**	**$ 107,976**	**$ -**	**$ 107,976**
Total		**241,751,643**	**141,725**	**27,529,830**	**$ 27,080,461**	**$ 37,575,359**	**$ 27,410,268**	**$ 93,214,666**	**$ 38,055,540**	**$ 55,159,126**		**$ 8,632,371**	**$ 36,401,147**	**$ 1,654,393**	**$ 38,055,540**	**$ 38,055,540**	**$ 46,687,911**	**$ 409,199**	**$ 46,747,587**
Cost Recovery Only																			
NonRes																			
Energy Efficiency																			
Mercantile Self-Direct		8,315,578	949	8									$ 1,068,533	$ 2,000	$ 1,070,533	$ 1,070,533	$ 1,070,533	$ -	$ 1,070,533
Total													**$ 1,068,533**	**$ 2,000**	**$ 1,070,533**	**$ 1,070,533**	**$ 1,070,533**	**$ -**	**$ 1,070,533**
Total		**0**	**0**	**0**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**		**$ -**	**$ 1,068,533**	**$ 2,000**	**$ 1,070,533**	**$ 1,070,533**	**$ 1,070,533**	**$ -**	**$ 1,070,533**
Total		**241,751,643**	**141,725**	**27,529,830**	**$ 27,080,461**	**$ 37,575,359**	**$ 27,410,268**	**$ 93,214,666**	**$ 38,055,540**	**$ 55,159,126**		**$ 8,632,371**	**$ 37,469,679**	**$ 1,656,393**	**$ 39,126,072**	**$ 39,126,072**	**$ 47,758,444**	**$ 409,199**	**$ 47,818,119**

1 Power Manager® for Business has both an energy efficiency and demand response component. Costs have been allocated to EE and DR based on forecasted KW.
2 Total costs for PJM EMV are as follows. Costs have been allocated to Residential and NonResidential based on forecasted KW.
Year 1 $100,000
Year 2 $100,000
Year 3 $100,000
3 Expected Revenue Requirement if mandates are met, includes shared savings incentive.

Program	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh	Grand Total
Appliance Recycling Program	RS	2012		-	-	-
		2013		-	-	-
		2014		1,312.56	839,085.00	840,397.55
		2015		1,567.55	1,192,086.93	1,193,654.48
		2016		47.93	36,636.07	36,684.00
	RS01	2012		-	-	-
		2013		-	-	-
		2014		8.61	5,622.10	5,630.71
		2015		13.81	10,754.31	10,768.12
	RS3P	2014		0.25	201.62	201.87
Energy Efficiency Education Program for Schools	RS	2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		13,287.65	1,077,303.25	1,090,590.90
		2015		9,284.24	1,702,710.00	1,711,994.24
		2016		12,668.84	4,874,731.00	4,887,399.84
	RS01	2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		9.74	790.00	799.74
		2015		5.19	1,996.00	2,001.19
		2016		16.86	6,487.00	6,503.86
	RS3P	2014		2.68	217.25	219.93
Home Energy Comparison Report	RS	2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		-	-	-
		2015		-	-	-
		2016		-	-	-
Home Energy Solutions	RS	2014			516,444.33	516,444.33
		2015			1,167,788.00	1,167,788.00
		2016			561,152.00	561,152.00
	RS01	2014			1,278.67	1,278.67
Low Income Neighborhood Program	RS	2013		-	-	-
		2014		1,344.57	517,366.50	518,711.07
		2015		2,514.79	710,928.97	713,443.76
		2016		2,091.15	527,837.86	529,929.01
	RS01	2013		-	-	-
		2014		8.98	3,454.50	3,463.48
		2015		5.55	1,705.46	1,711.01
		2016		53.83	13,587.09	13,640.92
Low Income Services	RS	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
	RS01	2011	$ -	-	-	-
Mercantile Self-Direct	DM	2012		-	-	-
		2013		-	-	-
	DP	2011		-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		2,688.63	1,950,540.53	1,953,229.16
		2015		81.91	30,375.00	30,456.91
		2016		229.82	55,033.75	55,263.57
	DS	2011		-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		339.22	215,199.42	215,538.65
		2015		2,948.45	2,966,119.22	2,969,067.68
		2016		854.73	460,581.30	461,436.03
	EH	2012		-	-	-
	TS	2012		-	-	-
		2013		-	-	-
		2015		2,819.82	2,052,332.04	2,055,151.86
		2016		54,524.25	38,793,171.03	38,847,695.28
Residential Energy Assessments	RS	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		7,662.44	772,212.00	779,874.44
		2015		15,331.41	1,727,747.00	1,743,078.41
		2016		4,767.77	1,864,409.58	1,869,177.36
	RS01	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2013		-	-	-
		2014		1.57	158.50	160.07
		2015		6.29	634.00	640.29
		2016		11.20	4,394.28	4,405.48
	RS3P	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2013		-	-	-
		2016		2.41	981.08	983.49
Small Business Energy Saver	DM	2015		8,646.52	3,357,121.71	3,365,768.23
		2016		7,880.87	3,071,550.10	3,079,430.97
	DS	2015	$ 211,532.66	34,197.07	13,191,933.70	13,437,663.43
		2016	$ 245,107.04	36,965.10	15,285,752.45	15,567,824.60
	EH	2016		424.93	134,601.06	135,025.99
Smart $aver Non Residential Custom	DM	2009	$ -	-	-	-
		2010	$ -	-	-	-

Program	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh	Grand Total
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		60.21	15,715.91	15,776.12
		2015		340.18	127,886.34	128,226.52
		2016		101.06	54,295.16	54,396.22
	DP	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012	$ -	-	-	-
		2013	$ -	-	-	-
		2014	$ 25,393.05	3,295.49	2,627,864.47	2,656,553.02
		2015	$ 69,919.12	4,751.52	7,235,756.98	7,310,427.61
		2016	$ 58,181.74	8,886.21	6,021,084.70	6,088,152.65
	DS	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012	$ -	-	-	-
		2013	$ -	-	-	-
		2014	$ 35,534.08	4,474.45	2,216,032.69	2,256,041.23
		2015	$ 131,920.84	12,804.08	8,227,055.63	8,371,780.55
		2016	$ 146,749.83	21,748.35	9,151,844.85	9,320,343.03
	EH	2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2015		47.48	15,690.31	15,737.79
	TS	2012		-	-	-
		2014		5,525.12	2,988,881.36	2,994,406.48
		2015		20,583.12	13,885,322.46	13,905,905.58
		2016		5,880.34	4,295,715.28	4,301,595.62
Smart $aver Non Residential Prescriptive	DM	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		1,659.52	984,040.38	985,699.91
		2015		3,324.08	1,810,466.25	1,813,790.33
		2016		9,725.25	4,374,833.57	4,384,558.82
	DP	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012	$ -	-	-	-
		2013	$ -	-	-	-
		2014	$ 12,395.24	3,183.16	1,282,753.15	1,298,331.55
		2015	$ 39,197.51	8,935.91	4,056,453.67	4,104,587.10
		2016	$ 53,312.79	14,407.83	5,517,208.47	5,584,929.09
	DS	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012	$ -	-	-	-
		2013	$ -	-	-	-
		2014	$ 129,016.02	19,543.24	8,045,900.61	8,194,459.87
		2015	$ 289,040.74	37,756.26	18,025,615.30	18,352,412.30
		2016	$ 589,552.28	91,086.46	36,766,590.53	37,447,229.28
	EH	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		369.59	206,494.32	206,863.91
		2015		1,318.09	557,663.62	558,981.71
		2016		3,060.74	1,136,418.28	1,139,479.03
	RS01	2010	$ -	-	-	-
		2011	$ -	-	-	-
		2013		-	-	-
	TS	2009	$ -	-	-	-
		2010		-	-	-
		2011		-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		699.82	303,406.74	304,106.56
		2015		2,956.77	1,430,020.13	1,432,976.90
		2016		7,111.90	2,848,558.36	2,855,670.26
Smart $aver Residential	RS	2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		6,872.33	4,317,432.78	4,324,305.12
		2015		24,465.78	11,908,899.35	11,933,365.14
		2016		30,471.34	12,764,327.81	12,794,799.15
	RS01	2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		32.88	20,135.66	20,168.54
		2015		64.75	38,649.56	38,714.31
		2016		133.17	81,233.92	81,367.09
	RS3P	2013		-	-	-
		2014		4.27	2,519.79	2,524.06
		2015		3.14	1,832.97	1,836.10
		2016		4.00	2,433.93	2,437.93
#N/A	RS	2009	$ -	-	-	-

Program	Rate Class	Transaction Year	Lost Revenue KWH Dollars	Monthly Lost Revenue kW	Monthly Lost Revenue kWh	Grand Total
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		35,055.31	20,333,902.21	20,368,957.52
		2015		45,698.87	26,156,990.03	26,202,688.90
		2016		5,367.51	1,983,749.06	1,989,116.57
	RS01	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		226.13	137,861.40	138,087.53
		2015		361.96	220,861.42	221,223.38
		2016		0.31	(131.40)	(131.09)
	RS3P	2009	$ -	-	-	-
		2010	$ -	-	-	-
		2011	$ -	-	-	-
		2012		-	-	-
		2013		-	-	-
		2014		7.46	4,574.46	4,581.92
		2015		15.25	9,213.64	9,228.90
		2016		1.32	488.29	489.61
Low Income Weatherization - Pay for Performance	RS	2014		83.44	52,254.80	52,338.23
		2015		2,153.67	1,283,152.90	1,285,306.57
		2016		1,369.91	975,218.17	976,588.08
	RS01	2016		0.84	613.10	613.94
Grand Total			$ 2,036,852.94	670,659.12	324,210,795.02	326,918,307.09

DUKE ENERGY OHIO
RIDER EE-PDRR REVENUES

Rider Revenue Rate 2016

Sum of RIDER EE	Column Labels												
Row Labels	**1/1/2015**	**2/1/2015**	**3/1/2015**	**4/1/2015**	**5/1/2015**	**6/1/2015**	**7/1/2015**	**8/1/2015**	**9/1/2015**	**10/1/2015**	**11/1/2015**	**12/1/2015**	**Grand Total**
DM	$70,197	$67,821	$61,458	$58,365	$52,156	$66,104	$75,627	$80,051	$79,382	$61,530	$55,110	$66,518	$794,319
DP	$288,114	$270,364	$277,849	$278,596	$286,582	$322,503	$341,450	$363,080	$349,586	$304,644	$286,742	$291,111	$3,660,621
DS	$899,566	$852,628	$822,465	$816,847	$817,873	$952,282	$1,029,922	$1,064,152	$1,058,087	$905,465	$822,100	$894,835	$10,936,223
EH	$14,268	$15,372	$11,204	$9,487	$7,861	$254	-$44	-$25	-$43	$8,660	$8,431	$13,109	$88,532
GF	$3,517	$3,520	$3,812	$3,533	$3,464	$3,554	$3,554	$3,553	$3,600	$3,578	$3,578	$3,578	$42,842
OR	$2,867	$2,866	$1,895	$1,480	$1,100	$1,333	$1,477	$1,572	$1,476	$1,121	$1,312	$2,438	$20,936
RS	$2,456,264	$2,322,620	$1,896,389	$1,612,210	$1,424,347	$1,996,507	$2,524,068	$2,788,339	$2,552,964	$1,793,310	$1,498,092	$2,178,878	$25,043,990
SF	$7	$7	$7	$7	$7	$7	$7	$7	$7	$7	$7	$7	$89
TD	$1,836	$1,637	$1,434	$1,256	$1,129	$71	$103	$103	$93	$68	$54	$87	$7,870
TS	$274,201	$280,278	$285,078	$286,551	$287,728	$287,189	$266,486	$323,971	$275,647	$311,266	$268,807	$299,784	$3,446,987
Grand Total	**$4,010,837**	**$3,817,114**	**$3,361,590**	**$3,068,333**	**$2,882,247**	**$3,629,806**	**$4,242,650**	**$4,624,803**	**$4,320,799**	**$3,389,650**	**$2,944,234**	**$3,750,345**	**$44,042,408**

DUKE ENERGY OHIO
KWH BY MONTH AND RATE FOR RATES DS, DP, AND TS
JANUARY 2016 - DECEMBER 2016

Sum of USAGE	Column Labels			
Row Labels	DP	DS	TS	Grand Total
1/1/2016	172,523,509	538,588,145	281,482,725	992,594,379
2/1/2016	161,894,709	510,237,425	291,740,567	963,872,701
3/1/2016	166,376,515	491,906,167	293,057,010	951,339,692
4/1/2016	166,812,878	488,689,311	282,682,263	938,184,452
5/1/2016	171,603,003	489,396,777	297,302,382	958,302,162
6/1/2016	193,114,640	569,674,511	282,110,240	1,044,899,391
7/1/2016	204,461,155	616,332,539	267,361,009	1,088,154,703
8/1/2016	217,412,883	636,911,368	320,120,565	1,174,444,816
9/1/2016	209,332,575	633,257,676	284,470,709	1,127,060,960
10/1/2016	182,421,429	541,892,280	302,083,811	1,026,397,520
11/1/2016	171,701,801	491,939,956	275,521,564	939,163,321
12/1/2016	174,317,882	535,603,043	296,630,073	1,006,550,998
Grand Total	2,191,972,979	6,544,429,198	3,474,562,918	12,210,965,095

Duke Energy Ohio
Energy Efficiency and Peak Demand Response Rider
Summary of Billing Determinants

Year	**July 2017 - June 2018**
Projected Annual Electric Sales KWH	
Residential Rates RS, ORH, TD, RS3P, RSLI, TD-13	7,253,699,377
Non-Residential Rates DS, DP, DM, GS-FL, EH, SP, SFL-ADPL, TS, RTP, & CUR	12,878,277,157
Non-Residential Rates DS, DP, & TS	12,134,950,580

Duke Energy Ohio
Energy Efficiency and Peak Demand Response Rider
Summary of Calculations

2017 Annual Filing

Rate Schedule	2012-2014 Actual Program Costs & Shared Savings	2012-2014 Actual Lost Revenues (DS, DP, TS)	2012-2014 Actual Riders EE-PDRR / SAWR Revenues	2016 Actual Program Costs & Shared Savings	2016 Actual Lost Revenues (DS, DP, TS)	2016 Actual Riders EE-PDRR Revenues	2017 Expected Program Costs & Shared Savings	2017 Expected Lost Revenues (DS, DP, TS)	Total Revenue Requirements	Total Revenue Requirements Plus CAT (b)	Estimated Billing Determinants	Effective July 2017 Energy Efficiency and Peak Demand Response Recovery Rider (EE-PDRR)
	Case No. 13-753, 14-457, 15-534 (c)			Case No. 17-xxx-EL-RDR								
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**A+B+C+D+E+F+G+ H+AA+BB+CC**			
Electric Rider DSM	(d)	(a)		(d)	(a)		(d)	(a)				
Residential Rates RS, ORH, TD, RS3P, RSLI, TD-13	$ 57,060,033	$ -	$ (48,028,991)	$ 12,949,286	$ -	$ (25,072,795)	$ 22,726,474	$ -	$ 11,167,633	$ 11,196,745	7,253,699,377 kWh	$ 0.001544 $/kWh
Distribution Level Rates - Program Cost Recovery (Part A) Applies to Rates DS, DP, DM, GS-FL, EH, SFL-ADPL, TS, RTP, & CUR	$ 52,456,573	$ -	$ (46,708,059)	$ 31,574,208	$ -	$ (15,733,707)	$ 25,031,970	$ -	$ 46,192,643	$ 46,313,058	12,878,277,157 kWh	$ 0.003596 $/kWh
Distribution Level Rates - Lost Revenue Recovery (Part B) Applies to Rates DS, DP, TS, & RTP		$ 5,653,696	$ (6,770,213)		$ 2,137,750	$ (3,235,906)	$ -	$ 2,446,052	$ (1,043,755)	$ (1,046,476)	12,134,950,580 kWh	$ (0.000086) $/kWh
Total Recovery	$ 109,516,606	$ 5,653,696	$ (101,507,263)	$ 44,523,494	$ 2,137,750	$ (44,042,408)	$ 47,758,444	$ 2,446,052	$ 56,316,521	$ 56,463,327		

	2015 Actual Program Costs & Shared Savings	2015 Actual Lost Revenues (DS, DP, TS)	2015 Actual Riders EE-PDRR Revenues	Adjustments From Page 11
	Case No. 16-664-EL-RDR (as-filed, pending)			Case No. 14-457, 15-534
	AA	**BB**	**CC**	**GG (Amounts Included in Column A)**
Electric Rider DSM	(d)	(a)		
Residential Rates RS, ORH, TD, RS3P, RSLI, TD-13	$ 16,413,356	$ -	$ (24,879,730)	$ (1,861,446)
Distribution Level Rates - Program Cost Recovery (Part A) Applies to Rates DS, DP, DM, GS-FL, EH, SFL-ADPL, TS, RTP, & CUR	$ 15,118,552	$ -	$ (15,546,893)	$ (3,137,530)
Distribution Level Rates - Lost Revenue Recovery (Part B) Applies to Rates DS, DP, TS, & RTP		$ 1,940,545	$ (3,215,679)	
Total Recovery	$ 31,531,908	$ 1,940,545	$ (43,642,302)	

Total Charge for Residential Rates RS, ORH, TD, RS3P, RSLI, TD-2013	**$**	**0.001544** $/kWh
Total Charge for Rates DM, GS-FL, EH, SFL-ADPL, & CUR (Part A Only)	**$**	**0.003596** $/kWh
Total Charge for Rates DS, DP, TS, & RTP (Part A plus Part B)	**$**	**0.003510** $/kWh

Note: (a) Rider DDR (Distribution Decoupling Rider) does not apply to Rates DS, DP, and TS. These rates are therefore subject to lost distribution revenue recovery under Rider EE-PDR.
(b) Commercial Activity Tax (CAT) factor is 1.0026068
(c) Includes adjustments ordered in Case No. 14-457-EL-RDR and 15-534-EL-RDR. Adjustments are shown in GG.
(d) M&V costs are included in the Shared Savings calculation per the order in Case No. 13-753-EL-RDR

Duke Energy Ohio
Energy Efficiency and Peak Demand Response Rider
Adjustments Per Orders In Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR

Case No. 15-534-EL-RDR Expenses		**Adjustment**
Residential Program Costs as filed in Case No. 15-534-EL-RDR (Work paper dated 3/30/2015, page 3 of 10, column O)	$19,053,630	
Non-Residential Program Costs as filed in Case No. 15-534-EL-RDR (Work paper dated 3/30/2015, page 3 of 10, column O)	$11,554,715	
Total Program Costs (excluding Mercantile Self-Direct) as filed in Case No. 15-534-EL-RDR	$30,608,345	
Residential Program Costs as filed in Case No. 15-534-EL-RDR (Work paper dated 3/30/2015, page 3 of 10, column M) (%)	62.25%	
Non-Residential Program Costs as filed in Case No. 15-534-EL-RDR (Work paper dated 3/30/2015, page 3 of 10, column M) (%)	37.75%	
Total Program Costs (excluding Mercantile Self-Direct) as filed in Case No. 15-534-EL-RDR (%)	100.00%	
Expense Reduction Per Opinion and Order dated October 26, 2016 in Case No. 15-534-EL-RDR	-$409,096	
Expense Reduction allocated to residential rate		-$254,661
Expense Reduction allocated to non-residential rate		-$154,435
		-$409,096

Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR Shared Savings		
Residential Shared Savings as filed in Case No. 14-457-EL-RDR (Revised work paper dated 4/17/2014, page 3 of 10, column L)	$3,794,952	
Adustment to Residential Shared Savings per Order in Case No. 13-753-EL-RDR (Revised work paper, page 10)	-$154,938	
Total Residential Shared Savings in Case No. 14-457-EL-RDR	$3,640,014	
Non-Residential Shared Savings as filed in Case No. 14-457-EL-RDR (Revised work paper dated 4/17/2014, page 3 of 10, column L)	$7,840,200	
Adustment to Non-Residential Shared Savings per Order in Case No. 13-753-EL-RDR (Revised work paper, page 10)	-$115,522	
Total Non-Residential Shared Savings in Case No. 14-457-EL-RDR	$7,724,678	
Residential Shared Savings as filed in Case No. 15-534-EL-RDR (Work paper dated 3/30/2015, page 3 of 10, column L)	$4,880,675	
Non-Residential Shared Savings as filed in Case No. 15-534-EL-RDR (Work paper dated 3/30/2015, page 3 of 10, column L)	$8,094,513	
Total Residential Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above	$8,520,689	
Total Non-Residential Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above	$15,819,191	
Total Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above	$24,339,880	
Total Residential Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above (%)	35.01%	
Total Non-Residential Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above (%)	64.99%	
Total Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above (%)	100.00%	
Shared Savings Allowed Per Stipulation	$19,750,000	
Total Shared Savings as filed in Case No. 14-457-EL-RDR and Case No. 15-534-EL-RDR from above	$24,339,880	
Reduction in Shared Savings from Stipulation	-$4,589,880	
Reduction in Shared Savings from Stipulation allocated to residential rate		-$1,606,784
Reduction in Shared Savings from Stipulation allocated to non-residential rate		-$2,983,096
		-$4,589,880

RIDER EE-PDRR
ENERGY EFFICIENCY AND PEAK DEMAND RESPONSE RECOVERY RATE

The EE-PDRR rate shall be determined in accordance with the provisions of Rider EE-PDR, Energy Efficiency and Peak Demand Response Recovery rider, Sheet No. 120 of this Tariff.

The EE-PDRR rate to be applied to residential service customer bills beginning with the ~~May 2014~~____ revenue month is $0.~~003443~~001544 per kilowatt-hour.

The EE-PDRR rate to be applied to non-residential service customer bills, other than service under Rates DS, DP, TS, and RTP, beginning with the ~~May 2014~~_____ revenue month for distribution service is $0.~~001405~~003596 per kilowatt-hour.

The EE-PDRR rate to be applied to non-residential service customer bills, for service under Rates DS, DP, TS, and RTP, beginning with the ~~May 2014~~_____ revenue month for distribution service is $0.~~001670~~003510 per kilowatt-hour.

Filed pursuant to an Order dated ~~April 2, 2014~~_____ in Case No. ~~13~~17-~~753~~781-EL-RDR before the Public Utilities Commission of Ohio.

Issued: ~~April 10, 2014~~ Effective: ~~May 1, 2014~~

Issued by James P. Henning, President

RIDER EE-PDRR
ENERGY EFFICIENCY AND PEAK DEMAND RESPONSE RECOVERY RATE

The EE-PDRR rate shall be determined in accordance with the provisions of Rider EE-PDR, Energy Efficiency and Peak Demand Response Recovery rider, Sheet No. 120 of this Tariff.

The EE-PDRR rate to be applied to residential service customer bills beginning with the ____ revenue month is $0.001544 per kilowatt-hour.

The EE-PDRR rate to be applied to non-residential service customer bills, other than service under Rates DS, DP, TS, and RTP, beginning with the _____ revenue month for distribution service is $0.003596 per kilowatt-hour.

The EE-PDRR rate to be applied to non-residential service customer bills, for service under Rates DS, DP, TS, and RTP, beginning with the _____ revenue month for distribution service is $0.003510 per kilowatt-hour.