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BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-7, SUB 1031

In the Matter of Application of Duke Energy Carolinas, LLC for Approval of Demand-Side Management and Energy Efficiency Cost Recovery Rider Pursuant to N.C. Gen. Stat. § 62-133.9 and Commission Rule R8-69	))))))	DIRECT TESTIMONY OF ASHLIE J. OSSEGE FOR DUKE ENERGY CAROLINAS, LLC

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Ashlie J. Ossege 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 as Manager, Energy Efficiency Analytics for Duke Energy Business Services LLC ("Duke Energy Business Services"), a wholly-owned service company subsidiary of Duke Energy Corporation ("Duke Energy").

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.

A. I have a Bachelor's degree from the University of Cincinnati in Marketing and Real Estate. I have completed additional coursework at the graduate level in Quantitative Analysis. I am an Instructor in the Graduate Economics department at the University of Cincinnati, teaching Applied Statistical Programming Methods for Economists.

From 1997 to 2006, I worked for Cinergy and Duke Energy as a Lead Market Analyst developing and managing product/program design activities as well as market research projects. Since 2006, I have been employed by Duke Energy Business Services (formerly Duke Energy Shared Services, Inc.), currently in the role of Manager, Energy Efficiency Analytics.

Q. PLEASE DESCRIBE YOUR DUTIES AS MANAGER, ENERGY EFFICIENCY ANALYTICS.

A. As Manager, Energy Efficiency Analytics, I have responsibilities for a variety

of analytical functions in support of product development and operations, including managing impact and process evaluation studies, market research data collection and analysis, marketing design testing, energy load analysis, cost-effectiveness analysis, and product design research. In this role, I provide Evaluation, Measurement and Verification ("EM&V") services for Duke Energy affiliates, including Duke Energy Carolinas, LLC ("Duke Energy Carolinas" or the "Company"), and have represented the Company on various national EM&V and energy consortiums.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THIS COMMISSION OR ANY OTHER REGULATORY BODIES?

A. Yes. I have presented testimony before the North Carolina Utilities Commission (the "Commission") in support of Duke Energy Carolinas' 2011 and 2012 Applications to update its demand-side management ("DSM") and energy efficiency ("EE") cost recovery rider, Rider EE, in Docket No. E-7, Sub 979 ("Rider 3 Filing") and Docket No. E-7, Sub 1001 ("Rider 4 Filing"); before the Indiana Utility Regulatory Commission in Cause No. 43955 and Cause No. 42693; and before the Ohio Public Utilities Commission in Case No. 11-4393-EL-RDR.

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

A. My testimony supports Duke Energy Carolinas' Application to update Rider EE for 2014 ("Rider 5"). In particular, my testimony: (1) provides an

overview of the EM&V process and activities; and (2) details the current findings from the Company's EM&V work.

Q. PLEASE DESCRIBE THE EXHIBITS ATTACHED TO YOUR TESTIMONY.

A. Ossege Exhibit 1 provides a summary of the estimated activities and timeframe for completion of EM&V by program. Ossege Exhibit 2 provides the actual and expected dates when the EM&V for each program or measure will become effective.[1] Ossege Exhibits A through H provide the detailed completed EM&V reports or updates for the following programs:

Ossege Exhibit	EM&V Reports	Report Finalization Date	Evaluation Type
A	2011 Power Share Process Report	March 30, 2012	Process
B	Smart $aver HVAC Process Evaluation	November 20, 2012	Process
C	Energy Efficiency for Schools Process Evaluation	November 27, 2012	Process
D	PowerShare 2011 Impacts	September 7, 2012	Impact
E	Power Manager 2011 Impacts	September 7, 2012	Impact
F	Residential Smart $aver CFLs Process and Impacts	September 28, 2012	Impact
G	Revised Residential Energy Assessments: PER/OHEC	May 25, 2012	Impact
H	Memo: Smart Energy Now Update to Evaluation Schedule	January 18, 2013	Memo

Q. WERE OSSEGE EXHIBITS 1, 2, AND A THROUGH H, PREPARED BY YOU OR AT YOUR DIRECTION AND SUPERVISION?

A. Yes, they were. However, the EM&V reports were prepared by the Company's independent third party evaluator.

[1] For DSM programs, the contracted amounts of kW reduction capability from participants are considered to be components of actual participation. As a result, the Vintage 3 true-up reflects the actual quantity of demand reduction capability for Vintage 3.

II. RESULTS FROM EM&V

Q. HOW WERE EM&V RESULTS UTILIZED IN DEVELOPING THE PROPOSED RIDER 5?

A. The EM&V process produces two important data sets used in the development of the rider: actual customer participation and evaluated load impacts. As described in Company Witness Kimberly McGee's testimony, the Vintage 3 Experience Modification Factor ("EMF"), or true-up, component of Rider 5 incorporates actual customer participation and evaluated load impacts from the EM&V process as agreed upon by the Company, Southern Alliance for Clean Energy and the Public Staff and approved by the Commission in its *Order Approving DSM/EE Rider and Requiring Filing of Proposed Customer Notice* issued November 8, 2011 in Docket No. E-7, Sub 979 ("EM&V Agreement"). In addition, actual participation and evaluated load impacts are used prospectively to update net lost revenues estimated for 2014.

The EM&V Agreement provides that initial EM&V results shall be applied retrospectively to program impacts that were based upon estimated impact assumptions derived from industry standards (rather than EM&V results for the program in the Carolinas), specifically the DSM and EE programs initially approved by the Commission in Docket No. E-7, Sub 831 ("Sub 831 Programs"), with the exception of the Non-Residential Smart $aver Custom Rebate Program and the Low Income Energy Efficiency and Weatherization Assistance Program.

For purposes of the vintage true-ups, initial EM&V results are considered actual results for a program and continue to apply until superseded by new EM&V results, if any. For all new programs and pilots approved after the Sub 831 Programs, the initial estimates of impacts will be used until Duke Energy Carolinas has EM&V results, which will then be applied back retrospectively to the beginning of the offering and will be considered actual results until a second EM&V is performed.

All program impacts from EM&V apply only to the programs for which the analysis was directly performed, though Duke Energy Carolinas' new product development may utilize actual impacts and research about EE and behavior conservation directly attributed to existing Duke Energy Carolinas program offerings not already accounted for.

Since program impacts from EM&V in this application apply only to the programs for which the analysis was directly performed, there are no costs associated with performing additional EM&V for other measures, other than the original cost for EM&V for these programs. As indicated in previous proceedings, Duke Energy Carolinas estimates that 5% of total portfolio program costs will be required to adequately and efficiently perform EM&V on the portfolio. The level of EM&V required varies by program and depends on that program's contribution to total portfolio, the duration the program has been in the portfolio without material change, and whether the program and administration is new and different in the energy industry. However, Duke Energy Carolinas estimates no additional costs above 5% of total program

costs will be associated with performing EM&V for all measures in the portfolio.

Q. WHICH PROGRAMS OR MEASURES HAVE COMPLETED THEIR EM&V?

A. The completed Process Evaluation studies for Carolinas-based Power Share, Smart $aver HVAC, and the Energy Efficiency for Schools programs are included as Ossege Exhibits A through C, respectively.

The completed Impact Evaluation studies for the 2011 Power Share Program, the 2011 Power Manager program, and the Carolinas-based Residential Smart $aver CFLs (including Process Evaluation) are included as Ossege Exhibits D through F, respectively.

Q. WHAT WERE THE LOAD IMPACTS FROM THE EM&V AND HOW DO THEY COMPARE TO THE COMPANY'S CURRENT IMPACT ESTIMATES?

A. Gross energy savings[2] from the Residential Smart $aver CFL Program were originally estimated to be 41.23 kWh based on the EM&V for this program provided in the 2010 Smart $aver CFL report (revised April 26, 2011), which was included as Exhibit F to my Direct Testimony in the Rider 4 Filing. Based on the most recent EM&V, the gross savings are 33.6 kWh (net[3] energy savings were modified from 47.65 kWh to 33.05 kWh). The coincident kW had a minor adjustment from 0.0044 kW to 0.0036 kW. These results became

[2] These savings are system annual kWh, gross without losses.
[3] Net adjustments include free-ridership, spillover, and line losses.

effective March 1, 2012, and apply to participants in the Residential Smart $aver CFL Program. This report has been provided as Exhibit F of this proceeding.

In addition, as indicated in Witness McGee's testimony, a true-up adjustment was made for the Residential Energy Assessments: Personal Energy Report ("PER") program based on the revised evaluation report dated May 25, 2012 and actual participation. This revised report has been provided as Exhibit G of this proceeding.

Q. WHAT IS THE PROJECTED ACTIVITIES SCHEDULE FOR EM&V AND ESTIMATED EFFECTIVE DATES OF IMPACTS?

A. The projected activities schedules for EM&V can be found in Ossege Exhibit 1. The effective dates can be found in Ossege Exhibit 2.

Q. PLEASE EXPLAIN ANY ADDITIONS OR CHANGES TO THESE SCHEDULES FROM THE PRIOR PROCEEDING?

A. There were a few additions and changes made from the previous EM&V Schedule filed as Ossege Exhibit 2 in the Rider 4 Filing. In addition, the format of Ossege Exhibit 2 has been changed to reflect the graph and color-coded format that was well received in the EM&V Agreement.

In the Rider 4 Filing Ossege Exhibit 2, the sample analysis end date for Home Energy House Call did not adequately align with the evaluation requirement of including summer post-installation consumption data in the analysis. Therefore, the sample analysis data will be collected through, and the effective date of impacts will be, Q3 of 2012. In regards to the Non-

Residential Custom Incentive program, Duke Energy Carolinas believes that the Custom Incentive EM&V report should incorporate case studies from the entire term of the save-a-watt pilot for the most accurate depiction of the program. Therefore, the EM&V Impact report delivery was moved from Q4 of 2012 to Q2 of 2013 and will be applied in accordance with the EM&V Agreement. The evaluation report delivery for Smart Energy Now has been moved from the end of 2012 to the end of 2013 to allow for the evaluation to capture the full three years of the pilot program. This does not impact the effective date of impacts, which will be applied in accordance with the EM&V Agreement.

Additions to the EM&V schedule include the Non-Residential Prescriptive (Other) Lighting, the Low Income Neighborhood Program, the Residential Appliance Recycling Program and the My Home Energy Comparison Report Program ("MyHER"). Duke Energy Carolinas customers in North Carolina began receiving MyHER reports in October 2012. The analysis and report dates reflect enough time for customers to become acclimated to the reports as well as the evaluation to obtain adequate post-consumption billing data (typically 12 months after customer receives first MyHER report).

As a follow up to the previous Non-Residential Prescriptive Lighting evaluation, participants were examined further on their use of Linear Fluorescents and Occupancy Sensors. The schedule of this subsequent evaluation has been added to the EM&V schedule. The Low Income

Neighborhood Program and the Residential Appliance Recycling program were approved in Q2 of 2012, and thus added to the EM&V activities and effective date schedule. The effective date of impacts, once the first EM&V is received for these two programs, will be applied back to the date of approval.

Q. WHAT IS "SNAPBACK?"

A. Snapback can be thought of as the additional energy and capacity used by customers who feel they can consume more because they have implemented an energy-efficient product. For example, snapback occurs when a customer decides not to turn off a newly-installed CFL when he leaves the room, because he figures that his energy consumption does not matter as the CFL is more efficient than his previously-installed incandescent light bulb.

Q. WHAT IS "PERSISTENCE?"

A. Generally speaking, persistence is the measurement of how long an energy-efficient product remains installed and utilized after its initial acquisition. For example, persistence measures if a customer decides to remove a CFL after it has been installed because they do not like the quality of light produced.

Q. DO THE COMPANY'S CURRENT AND FUTURE EM&V REPORTS EVALUATE SNAPBACK AND PERSISTENCE?

A. Yes. Both snapback and short-term persistence are measured and included (though not explicitly) in the EM&V reports, as they apply to EE programs. Billing analysis and on-site metering capture the short-term effects of snapback and persistence, because they capture the impacts that occur soon after an EE action is taken. Because metering and utility bill analyses often examine electric consumption records before and after an action is taken, the effects of snapback and persistence are embedded in the analysis results.

The long-term effects of persistence, however, cannot be directly measured during the current 12- to 18-month cycle for each EM&V report.

Long-term analysis of persistence requires regular, cyclical studies with the same respondents over the life of each measure. Such long-term evaluations would increase the cost of EM&V reporting significantly but would provide little, if any, increased accuracy in the analysis. Furthermore, the results from such a long-term study would only be available well after the end of the four-year modified save-a-watt pilot.

Future EM&V reports will include an explicit paragraph explaining the evaluation of snapback and persistence, as described above.

IV. LOST REVENUES

Q. PLEASE EXPLAIN HOW THE ENERGY AND CAPACITY REDUCTIONS FOR THE NET LOST REVENUE CALCULATIONS FOR THE PROSPECTIVE COMPONENTS OF RIDER 5 WERE CALCULATED.

A. Based on the available EM&V analysis, the Company ran the DSMore model in order to calculate the kWh and kW reductions associated with net lost revenues. These results were then provided to Witness McGee in order for her to determine the Company's net lost revenues. Energy and capacity associated with net lost revenues for year three of Vintage 3 and year two of Vintage 4 were calculated beginning January 1, 2014 and ending December 31, 2014 using rates in effect as of the beginning of 2013.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

Activities for the following programs were outlined in Rider 4, Ossege Exhibit 1 These reports will be finalized during 2013 and trued up in 2014.

Non-Residential Smart$aver Prescriptive Other Lighting
Residential Energy Assessments: Personalized Energy Report
Energy Efficiency Education (K12 Curriculum)
Residential SmartSaver AC and HP
Residential Home Energy House Call
Non-Residential Smart$aver Custom Rebate
Smart Energy Now (Final report 2014)

NORTH CAROLINA

EM&V Activities for Appliance Recycling

	Months after EMV Plan Kick Off-->	4	6	8	10	12	14	16
Process	Interview Program Managers and Implementers	Instrument Development	Conduct Interviews	Analysis				
	Participant Surveys		Instrument Development	Conduct Surveys	Analysis			
	Non-Participant Surveys (as needed)		Instrument Development	Conduct Surveys	Analysis			
	Interview Program Vendors		Instrument Development	Conduct Surveys	Analysis			
	Analysis and Early Feedback				Analysis			
	Process Evaluation Report						Final Report	
	Approximate Completion Date-->	1/1/2013	3/1/2013	5/1/2013	7/1/2013	9/1/2013	11/1/2013	1/1/2014
Impact	Selective monitoring (may not be performed if valid data collected through Process Eval)			Pre/post monitoring of whole HVAC systems. These data will be used to inform the DOE-2 simulation models				
	In Situ Site Visits			In situ metering assessment to determine the energy consumption of 140 appliances collected from the home (70 refrigerators and 70 freezers)	Duke staff will conduct site visits at a sample of sites to verify unit installation and gather building characteristics data.			
	Data Cleaning				Data from process evaluations and On site will be analyzed and prepared for the engineering analysis.			
	Engineering Estimates					Building characteristics data from the verification surveys, and the data from the monitoring sample will be used to develop and calibrate a series of prototypical DOE-2 models.		
	Billing Analysis						A statistical billing analysis of program participants will be conducted and compared to the engineering estimates.	
	Impact Evaluation Report							Final Report
	Effective Date of Impacts	9/1/2012						

* Equipment installed, and enough participation for statistically significant results

NORTH CAROLINA

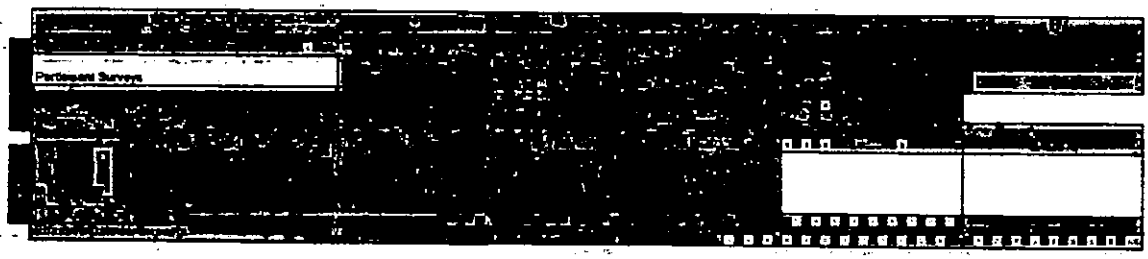
EM&V Activities for Income-Qualified Energy Efficiency Low Income Neighborhoods

	Months after EMV Plan Kick Off	4	8	8	10	12
Process	Interview Program Managers and Implementers	Instrument Development	Conduct Interviews	Analyses		
	Participant Surveys		Instrument Development	Conduct Surveys	Analyses	
	Non-Participant Surveys (as needed)		Instrument Development	Conduct Surveys	Analyses	
	Interview Program Vendors and CAP agencies	Instrument Development	Conduct Surveys	Analyses		
	Analyses and Early Feedback			Memo		
	Process Evaluation Report					Final Report
	Approximate Completion Date-->	11/1/2013	1/1/2014	3/1/2014	5/1/2014	7/1/2014
Impact	Engineering Estimates					Engineering estimates of savings will be developed for efficiency actions identified through the participant surveys. Average savings per participant based on self-reported efficiency actions will be calculated
	Billing Analyses					
	Impact Evaluation Report					
	Effective Date of Impacts	7/1/2013				

* Equipment installed and enough participation for statistically significant results

14	15
9/1/2014	11/1/2014
A statistical billing analysis of program participants will be conducted and compared to the engineering estimates.	
	Final Report

NORTH CAROLINA
EM&V Activities for My Home Energy Report



* Equipment installed, and enough participation for statistically significant results

14	15
10/1/2013	12/1/2013
A statistical billing analysis of program participants will be conducted and compared to the engineering estimates.	
	Final Report
10/1/2013	

NORTH CAROLINA
EM&V Activities for Energy Efficient Appliances and Devices: Specialty Bulbs

	Months after EM&V Plan Kick Off-->	4	8	8	10	12
Process	Interview Program Managers and Implementers	Instrument Development		Conduct Interviews	Analyses	
	Participant Surveys		Instrument Development	Conduct Surveys	Analyses	
	Non-Participant Surveys (as needed)		Instrument Development	Conduct Surveys	Analyses	
	Interview Program Vendors		Instrument Development	Conduct Surveys	Analyses	
	Process Evaluation Report					Draft Report
	Approximate Completion Date-->	10/1/2013	12/1/2013	2/1/2014	4/1/2014	6/1/2014
Impact	Engineering Estimates Lighting Specialty Bulbs					Engineering estimates of savings will be developed for efficiency actions identified through the participant surveys. Average savings per participant based on self-reported efficiency actions will be calculated.
	Impact Evaluation Report					
	Effective Date of Impacts	6/1/2013				

* Equipment installed, and enough participation for statistically significant results

14	15
Final Report	Duke reviews and addresses report recommendations
8/1/2014	10/1/2014
Final Report	Duke reviews and addresses report recommendations

NORTH CAROLINA

EM&V Activities for HVAC Energy Efficiency: Duct Insulation and Sealing, Tune Up, and Attic Sealing and Insulation

	Months after EM&V Plan Kick Off	4	6	8	10	12
Process	Interview Program Managers and Implementers			Instrument Development	Conduct Interviews	Analyses
	Participant Surveys				Instrument Development – Will consider expanding evaluation to get robust data on pre and post	Conduct Surveys
	Non-Participant Surveys (as needed)				Instrument Development	Conduct Surveys
	Interview Program Vendors				Instrument Development	Conduct Surveys
	Process Evaluation Report					
	Approximate Completion Date-->	10/1/2013	12/1/2013	3/1/2014	6/1/2014	8/1/2014
Impact	Selective monitoring					Pre/post monitoring of whole HVAC systems. These data will be used to inform the DOE 2 simulation models
	Site visits					Duke staff will conduct site visits at a sample of sites to verify unit installation and gather building characteristics data
	Data Cleaning					
	Engineering Estimates					
	Building Simulation Modeling					
	Billing Analysis					
	Impact Evaluation Report					
	Effective Date of Impacts	Q3 2012				

* Equipment installed, and enough participation for statistically significant results

14	16	18
Analysis		
Analysis		
Analysis		
	Final Report	
8/1/2014	10/1/2014	12/1/2014
Monitored data from whole HVAC systems will be analyzed and prepared for the engineering analysis		
Building characteristics data from the verification surveys, and the data from the monitoring sample will be used to develop and calibrate a series of prototypical DOE-2 models representing a range of building ages and operating modes.		
The calibrated DOE-2 simulation models will be run using long term average weather data for Charlotte, NC		
	A statistical billing analysis of program participants will be conducted and compared to the engineering estimates	
		Final Report

NORTH CAROLINA

EM&V Activities for Non-Residential Smart Saver Energy Efficiency (Additional Measures)

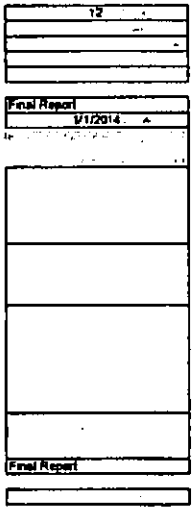
Months After Program Implementation-->	4	8	8	10
Interview Program Managers and Implementers	Instrument Development	Conduct Interviews	Analyses	
Participant Surveys		Instrument Development	Conduct Surveys	Analyses
Non-Participant Surveys (as needed)		Instrument Development	Conduct Surveys	Analyses
Interview Program Vendors		Instrument Development	Conduct Surveys	Analyses
Process Evaluation Report				
Approximate Completion Date-->	5/1/2013	7/1/2013	9/1/2013	11/1/2013

Impact Analysis will depend on participation of additional Non-Residential Smart Saver Measures **

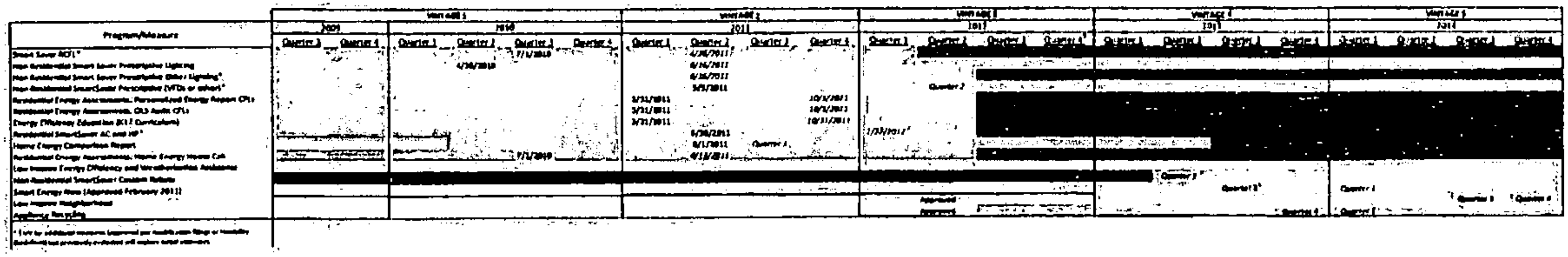
Impact					
	Selective monitoring (may not be pertinent if valid data collected through Process Eval)			Pre/post monitoring of whole HVAC systems (need HVAC and VFDs). These data will be used to inform the DOE-2 simulation models	
	Data Cleaning			Data from process evaluations and On site will be analyzed and prepared for the engineering analysis	
	Engineering Estimates			WECC database review	Building characteristics data from the verification surveys and the data from the monitoring sample will be used to develop and calibrate a series of prototypical DOE-2 models.
	Desk Review				Review of participation and deemed engineering estimates
	Impact Evaluation Report				
	Effective Date of Impacts	Q3 2012			

* Equipment installed, and enough participation for statistically significant results

** may not include selective monitoring and onsite visits


12
Final Report
1/1/2014
Final Report

Ossege Exhibit 2 - March 2013



* Evaluation for additional measures approved per modification filings or feasibility studies not previously evaluated will replace initial estimates.

Original Estimate
1st EM&V
2nd EM&V

Italic: Sample Date
Bold: Report Date

[1] Reports received end of Q4 2012 through beginning Q1 2013 will be applied to next EDM Reconciliation
[2] In addition, as stated in Ossege testimony March 19, 2012 page 23 "The Schools program had a program administrator third party vendor change, and Duke Energy Carolinas' independent evaluation consultant recommended delaying the process and impact evaluation until the new vendor began implementing the program." Participation began in the end of December and January, so in order to collect participants through February (or March) and with 6 months of post data (through August 31st) adjusts the effective date to Quarter 3, and report in Quarter 4
[3] No change in effective date.
[4] Not approved in NC for recovery until September 2012. Evaluation required time for new vendor to stabilize before monitoring.
[5] Evaluation should represent a minimum of two full years of SAW
[6] No change in effective date. Evaluation should represent full life of pilot.

Process Evaluation of the 2010 and 2011 PowerShare® Program in North and South Carolina

Final Report

Prepared for
Duke Energy
139 East Fourth Street
Cincinnati, OH 45201

March 30, 2012

Submitted by:

Subcontractor:

Carol Yin
Yinsight, Inc.

Nick Hall
TecMarket Works
165 West Netherwood Road
Oregon, Wisconsin 53575
(608) 835-8855

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Summary of Findings

The 2010-2011 PowerShare® Carolinas program is a complex program whose delivery requires fast decision-making and tight coordination across Duke Energy's different divisions. Although there have been a number of staff changes in recent years, the program is running smoothly and has successfully made a number of improvements to streamline its processes. Duke Energy's success in offering CallOption economic events in the Midwest suggests that they have the capability to manage economic event calls to similar standards in the Carolinas. The introduction of economic events is relatively new in the Carolinas System and the number of customers that participated in economic events in 2010-2011 were few. Nevertheless, the two emergency events called in 2011 confirmed Duke Energy's ability to reduce load when needed; an impact evaluation of the amount of load that was curtailed is pending, but not included in this evaluation. The Duke Energy program management and staff appear to have all the logistical challenges in hand, and at this point TecMarket Works sees no basis for recommending any tactical changes to the delivery of PowerShare in the Carolinas System.

PowerShare Carolinas' major challenges come from helping customers make the transition from the legacy of an environment where load curtailment was only warranted for emergency events, to a more flexible new environment where load may be curtailed for mutual economic benefits. This requires a shift in the customers' mindset regarding the value of a load curtailment program. In general, PowerShare Carolinas participants regard the program favorably and have high regard in particular for their Duke Energy account managers. The account managers play a key role in helping customers understand the program's benefits and its required commitments. The PowerShare program relies on accurate communication of information and the customers report that Duke Energy is doing a good job in explaining the program requirements and relaying the call for events. TecMarket Works sees that there may be opportunities to better remind customers of the full value of the PowerShare program. TecMarket Works' recommendations all fall into the area of helping Duke Energy to better understand customers' needs and concerns with participating in PowerShare, and for managing expectations more accurately.

Recommendations

RECOMMENDATION: Duke Energy should consider conducting a conjoint analysis to obtain data on what value customers place upon the different PowerShare program offerings. Such a study would provide Duke Energy management with more information on which to base any reviews of the PowerShare incentive structure in the Carolinas System. TecMarket Works further recommends that any conjoint analysis use a choice-based approach, such as discrete choice analysis. This would allow Duke Energy to mimic a real-life decision-making scenario and increase the predictive validity of the study. If Duke Energy does decide to conduct conjoint studies, TecMarket Works recommends that two conjoint studies with different participant samples be considered: One presenting the features of PowerShare Mandatory/Generator versus PowerShare CallOption (i.e., higher premium versus more lead time for events), and another that

presents CallOption versus non-participation scenarios in which customers consider the costs of blackouts and of paying higher energy prices due to not curtailing energy use. The second study with non-participation scenarios would allow Duke Energy to compare the relative attractiveness of receiving lower CallOption premium credits versus not participating at all, removed from the context of PowerShare Mandatory/Generator's higher premium credits.

RECOMMENDATION: Because economic curtailment programs are new to customers in the Carolinas System, Duke Energy may wish to provide a one-page reference to remind customers of the requirements for participating in Voluntary and CallOption economic events. This would allow new Voluntary participants to make more accurate decisions about whether or not they could participate in a Voluntary event, and when they could end their curtailment. This may also help remove any customer barriers to curtailment based upon a misunderstanding of program logistics and thus allow Duke Energy to focus on promoting the Voluntary program based upon its benefits.

RECOMMENDATION: It is not unexpected that PowerShare participants might forget details about the program in between the summer peak event seasons. To help remind customers, Duke Energy should consider providing customers with a summary sheet that highlights the program's key components, and their company's specific commitment in their agreement. If not already done, Duke Energy should also consider developing a process flow chart that illustrates the sequence of events during an event day, starting with the identification of event conditions, notification of customers, and the different paths to settlement should the customer choose to reduce load, generate, or buy through. This summary sheet could end with a reminder of where customers may find confirmation of their load reduction.

RECOMMENDATION: If the account managers are not already doing so, Duke Energy should consider following-up with first year PowerShare participants to review their load reduction commitments, whether or not those participants were compliant with the previous season's events. Duke Energy should also consider providing first year participants with the ability to adjust their commitments for the next event season, while their experience of the most recent event season is still fresh in their minds. This will allow these customers to provide feedback to Duke Energy on whether their load reduction commitments were easily achieved, just right, or too onerous. If a new participant has overcommitted and simply cannot deliver on that commitment, Duke Energy should identify them sooner rather than later, and stop paying on premiums on capacity that does not exist.

RECOMMENDATION: Duke Energy is already aware that the calculation of capacity and incentives may be difficult for customers to understand, and results from these participant surveys confirm that there still is some confusion. If Duke Energy has not already done so, they should consider easily-accessible tools for helping customers understand these calculations. For example, Duke Energy may develop short tutorials on how customers could calculate their capacity, specifying how baselines are calculated and used, and how proformas are calculated and used. While Duke Energy currently does have marketing collateral explaining these processes, they may be difficult for customers

to locate if they are embedded in a large document. Short tutorials that are available on the PowerShare website may be more convenient for customers who are trying to access specific information. Alternatively, if Duke Energy account managers are not already doing so, they could consider "showing their work" and leaving customers with documentation showing their company's specific incentive and baseline calculations. There are many other methods Duke Energy may be considering to improve the understanding of these technical issues.

RECOMMENDATION: Duke Energy should consider ways to reduce customer uncertainty about whether they can actually provide the amount of curtailment they have contracted (for both Mandatory and Voluntary events). Customers may have less uncertainty if they had a plan for curtailment and entered each event with an expectation that they will fulfill their curtailment commitment if they followed the entire plan. Such a plan may include a schedule specifying which pieces of equipment to turn off and which generators to turn on, and how much load would be curtailed with each of these actions if taken in the order specified. This schedule of curtailment would allow Voluntary participants to gauge how long they need to curtail and when they could return to normal operations. While developing such a plan would be the responsibility of the customer, Duke Energy might offer them some technical assistance. Duke Energy should obtain more data from customers on whether technical assistance with developing a curtailment plan and schedule would encourage more customers to participate in PowerShare. This may be accomplished informally by the Duke Energy account managers, or more formally with a telephone survey of customers whose main strategy is curtailment.

Introduction

This document presents the evaluation report for Duke Energy's PowerShare® Program as it was administered in the Carolinas System.

The evaluation was conducted by the TecMarket Works evaluation team. The survey instruments were developed by TecMarket Works. Yinsight (a TecMarket Works subcontractor) conducted the in-depth interviews with program management and program participants.

Methodology: Management Interviews

TecMarket Works developed the interview protocol for the PowerShare® Program management which was implemented in August and September of 2011. The full interview guide can be found in Appendix A: Program Manager Interview Instrument.

Methodology: Participant Interviews

TecMarket Works developed a customer survey for the PowerShare® Program participants, which was implemented in August and September of 2011 after they experienced control events over the summer of 2011.

The evaluation team attempted interviews with a census of PowerShare participants and were able to complete surveys with a sample of 20 participants in the Carolinas. These participants were surveyed by Yinsight. The survey can be found in Appendix B: Participant Survey Instrument.

Section 1: Program Operations

This process evaluation of the 2010-2011 PowerShare® Carolinas 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 across different divisions and upon the insights 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.

Interviewees

For this process evaluation, the evaluation team conducted in-depth interviews with six Duke Energy managers and program staff members at different levels of responsibility for the program. The evaluation team also conducted short interviews (20 minutes) with 20 commercial and industrial customers who participated in the 2010 and 2011 PowerShare Carolinas program. The findings from each of these sets of interviews will be discussed in turn.

Program Background

PowerShare is a demand response program designed to reduce non-residential customers' energy use during periods of high energy prices or during periods when high energy usage would cause energy supplies across the transmission and distribution system to drop to near-critical levels. In both these situations, the PowerShare program allows Duke Energy to purchase capacity from their customers by paying their commercial and industrial customers to reduce their energy demand, thus increasing the available energy supply. There are four offerings within the PowerShare program: Mandatory, Voluntary, Generator, and CallOption. Participants in the Mandatory program are typically enrolled in the Voluntary program. The fourth offering, CallOption, is newly approved for South Carolina in early 2010, but was not approved for North Carolina until March of 2011. Due to a desire to coordinate offerings across the Carolinas System, Duke Energy made the decision not to market CallOption in South Carolina while they awaited approval from the North Carolina regulators. With CallOption approved in both states, Duke Energy plans to market CallOption in the Carolinas System starting in 2012.

In the Carolinas System, Duke Energy still has customers participating in legacy demand response programs that were in place prior to Duke Energy's merger with Cinergy in 2006. A program manager reports that across PowerShare and the legacy C&I programs, Duke Energy currently manages over 500 MW of capacity in the Carolinas System.

PowerShare Program Objectives

The PowerShare Carolinas program has two components, an emergency component and an economic component. Both components of the PowerShare Carolinas program are load curtailment programs that allows commercial and industrial customers an opportunity to lower their energy cost by receiving premium payments for providing Duke Energy with additional energy capacity.

In the Carolinas System, Duke Energy acts as its own balancing authority. Duke Energy relies on PowerShare primarily as an emergency demand response program that increases the reliability of the electricity transmission and distribution system, and mitigates the risk of blackouts. PowerShare Voluntary and CallOption, the economic components, constitute a small portion of the PowerShare offering in the Carolinas System.

The economic components also allow participants to have advance notice of periods of high energy prices and thus be able to make the best financial decision for their company. During periods of high energy prices, an economic event may be called. During these events, economic participants have the option to reduce load and receive an event incentive for each kW reduced, to generate their own electricity and control their energy costs, or to "buy through" and pay for electricity they use during the event at a higher price.

PowerShare benefits all of Duke Energy's customers by avoiding the costs of building new power plants, reducing the need to run expensive generation plants during peak usage periods, and allowing Duke Energy customers to reduce their carbon footprint through curtailing energy use.

For 2011, Duke Energy has a portfolio-level goal of attaining 300 MW of cumulative load capacity from commercial and industrial customers participating in PowerShare. Duke Energy reports that this goal has been met and exceeded.

PowerShare Carolinas History

PowerShare was first offered in the Carolinas System in 2009 and began earning revenue when the Save-a-Watt model was approved in 2010. There are two legacy load curtailment programs still being implemented in North and South Carolina: Interruptible Service (IS) and Standby Generation (SG). When PowerShare was first offered in the Carolinas System, the South Carolina regulators allowed Duke Energy to end the legacy load curtailment program as of May of 2010. Duke Energy was able to offer PowerShare to those customers. A Duke Energy program manager reports that over 90% of participants in South Carolina's legacy programs enrolled in PowerShare. However, in North Carolina, the regulators did not allow Duke Energy to end the legacy load curtailment program and some participants of those programs remain grandfathered in. As a consequence, Duke Energy has had to maintain the legacy programs in North Carolina until existing participants leave the programs by attrition. A Duke Energy manager reports that there has been a steady attrition rate as a result of the natural business cycle of companies going out of business or changing hands, companies deciding to participate in Save-a-Watt's suite of EE and DR programs, and companies discontinuing participation for other reasons. As another consequence of the legacy programs, the premium credits for PowerShare Mandatory and Generator programs were kept comparable to legacy program incentives.

Duke Energy proposed PowerShare CallOption in the Carolinas System in 2010. Duke Energy's PowerShare CallOption program had been under implementation in the Midwest and Duke Energy proposed to offer the same program in the Carolinas System. CallOption would give customers the additional flexibility to contract for either a fixed-level reduction or to establish a firm load level. However, the incentives for CallOption are less than what is offered for Mandatory and Generator.

PowerShare CallOption was approved by the South Carolina regulators in the first quarter of 2010 and Duke Energy first offered PowerShare CallOption in 2010 in South Carolina. However, Duke Energy had not placed a priority on enrolling customers in CallOption in 2011 for several reasons. Duke Energy reports that at that time, account managers and program staff were focused on ending the legacy curtailment programs, which were withdrawn in May of 2010, and on re-enrolling those participants in the new PowerShare program before the 2011 summer event season. The account managers had not yet had time to become conversant in the CallOption offering.

Although some South Carolina customers enrolled in PowerShare in 2010, Duke Energy decided not to actively market CallOption to South Carolina ahead of North Carolina (where CallOption approval was in question) was the fact that a number of customers had facilities in both states. Having different PowerShare offerings in each state would have caused confusion for those customers. When CallOption was finally approved in North Carolina in March of 2011, it was too late to ramp up in time for the 2011 summer event season. A Duke Energy program manager reported that as a result, there were only two customers enrolled in the CallOption program, both of whom did so because they could not meet the higher capacity requirement for the Mandatory program.

PowerShare Programs and Incentives

PowerShare has four different offerings in the Carolinas System: Mandatory, Generator, Voluntary and CallOption. Table 1 shows the incentives and requirements of PowerShare Mandatory, Generator and Voluntary programs. CallOption will be discussed separately.

Table 1. Features of PowerShare Mandatory, Generator, and Voluntary in the Carolinas System

	Mandatory (Firm Reduction)	Generator (Fixed Reduction)	Voluntary (Firm Reduction)
Premium Credit $/kW/year	$42	$42	$0
Load Reduction Credit $/kWh/event	$0.10	$0.10	specified prior to event
Fees	$40 / month	$155 / generator meter	$40 / month
Maximum No. of Calls	Restricted to 100 hours per year	Restricted to 100 hours per year, but must participate in 1-hour test each month to receive Capacity Credits	No restriction
Advance Notice	30 minutes	15 minutes	Day-Ahead
Interruption Window (year-round)	up to 10 hours, anytime	up to 10 hours, anytime	specified prior to event
Weekends / Selected Holidays	Included	Included	No restriction
Maximum No. of Calls / Week	No restriction	No restriction	No restriction
Maximum No. of Consecutive Calls	No restriction	No restriction	No restriction
Non-compliance	Penalty $2.00 / kWh	Penalty $2.00 / kWh	Participation is voluntary, but must curtail 50% of Nominated Energy to receive any credit

Participants in Mandatory and Generator receive an annual premium of $42 for their kW of capacity they commit, paid out as a monthly credit to their bill. In case of an emergency event, customers are paid an additional $0.10 per kWh of load reduction for each event. Participants in the Voluntary program are not paid any premium but neither do they incur any penalties if they do not respond to an event call. Prior to each Voluntary event, Duke Energy agrees to provide participants with a price per kWh, using the EPO website to accept bids. Because there is no energy market in the Carolinas System, Duke Energy determines the Voluntary incentive based on prices used in Duke Energy' Hourly Pricing program for large commercial customers. One Duke Energy staff member reports that the energy market is soft and prices are lower than what customers may be anticipating. Duke Energy is reviewing this incentive because the hourly price is often well below what would be considered to be prevailing market rates.

PowerShare CallOption offers a number of features that may make participation more attractive for Duke Energy customers who are not able to participate in PowerShare Mandatory or Generator. CallOption participants are only required to reduce a minimum of 100 kW, compared with 200 kW for Mandatory and Generator. CallOption also provides customer with six hours of advance notice for an emergency event instead of 30 minutes. Based on Duke Energy's experiences with PowerShare in other states, and the results of focus groups conducted in all Duke Energy jurisdictions during 2009, this longer advance notice may also enable customers to commit greater capacity to the program.

Under CallOption, customers can select from several options, the number of events their company is capable of meeting, as well as whether their reduction is determined by a firm load level or a fixed reduction amount. If customers respond to an event call by curtailing, they are paid an additional event incentive credited to their monthly bill after settlement. Customer's capacity for demand response is determined against their baseline load shape, calculated based upon past energy usage.

All of these combinations are offered under the PowerShare CallOption umbrella, and all include an exposure to 5 emergency-only events. Customers can choose to commit to 0, 5, or 10 economic events in addition to the 5 emergency events. For these call options, Duke Energy pays an annual premium depending on the number of events a customer chooses. This capacity premium is paid over 12 months and shows up as a line item labeled "PowerShare credit" on the customer's monthly bill. The incentive levels match those offered in the Midwest in 2010—when the program was filed for approval in the Carolinas. Once a customer decides to participate in CallOption, their account manager helps them to sign up online.

Table 2. PowerShare CallOption Incentives

PowerShare Carolinas System	CallOption 0/5	CallOption 5/5	CallOption 10/5	CallOption 15/5
ECONOMIC EVENTS				
Maximum # of Calls	0	5	10	15
Premium Credit $/kW/year	$10	$15	$25	$30
Load Reduction Credit $/kWh/event	0.045			
Advance Notice	Day-Ahead			
Interruption Window (year-round)	Summer: 12 p.m. to 8 p.m. June through Sept. Winter: 7 a.m. to 1 p.m. Oct. through May			
Weekends / Selected Holidays	Excluded			
Maximum No. of Calls / Week	3			
Maximum No. of Consecutive Calls	2			
Non-compliance	Participation is expected, but Buy-through Energy is available & is based on rates used in the Hourly Pricing program			
EMERGENCY EVENTS				
Maximum # of Calls	5			
Load Reduction Credit $/kWh/event	0.045			
Advance Notice	6 hours			
Interruption Window (year-round)	Up to 8 hours, anytime			
Weekends / Selected Holidays	Included			
Maximum No. of Calls / Week	7			
Maximum No. of Consecutive Calls	7			

Non-compliance	Curtailment is expected, Penalty price is based on rates used in the Hourly Pricing program

PowerShare Operations

Marketing. The PowerShare program is promoted mainly by Duke Energy account managers. Account managers speak to their assigned large business customers on a one-to-one basis to determine whether they are suitable candidates for PowerShare. All Duke Energy staff members who were interviewed unanimously agreed that PowerShare was not a program that could be effectively promoted with marketing collateral alone. Account managers need to have an in-depth conversation with the customer, strategizing on what that customer might be able to do to reduce load. For some customers this may entail reducing lighting or HVAC usage, for others this may entail turning off a production line, or turning on a generator. The program is targeted to manufacturers with that sector making up two-thirds of the participants. PowerShare is also targeted to hospitals and universities with generation capabilities. A Duke Energy account manager reports that customers who agree to sign up for PowerShare "*like the fact that they're helping and that they're getting money for it.*"

Enrollment. Nonresidential customers must be able to curtail a minimum of 200 kW to qualify for the Mandatory and Generator programs. However, nonresidential customers only need to be able to curtail 100 kW of load to qualify for the CallOption program. Once a customer has decided to participate, a Duke Energy account manager assists the customer with the online enrollment process. If the customer does not have an interval consumption meter that can be interrogated over a phone line, Duke Energy will arrange for the meter to be installed. Generator customers require a meter be installed to meter the energy that they generate during an event.

Customers in North Carolina enroll in PowerShare with a three-year contract, while customers in South Carolina enroll with a one-year contract. The program is marketed most heavily during November and December. PowerShare participants in South Carolina can opt in or out of EE and DR programs, including PowerShare during the first quarter of the year, and participants in North Carolina can opt in or out during the last quarter of the year.

Duke Energy staff reports that every state in their service territory has seen increased participation in 2011, from both the perspective of number of companies and total capacity. At the time of these interviews in September 2011, PowerShare Carolinas was exceeding its capacity goal of 300 MW.

A Duke Energy program manager reports that most of the PowerShare participants are on the Mandatory program. Less than 5% of participants are in the PowerShare Generator program.

Transition between PowerShare Mandatory/Generator and CallOption. Several Duke Energy staff members mentioned that they are anticipating some difficulty in converting PowerShare Mandatory and Generator customers to incentive levels that are aligned with the ones being offered in the rest of Duke Energy service territory. One manager says, "*I would like to see something like a conjoint study that would give us a tradeoff on [the value] customers place on incentives vs advance notification, vs number of events.*"

RECOMMENDATION: Duke Energy should consider conducting a conjoint analysis to obtain data on what value customers place upon the different PowerShare program offerings. Such a study would provide Duke Energy management with more information on which to base any reviews of the PowerShare incentive structure in the Carolinas System. TecMarket Works further recommends that any conjoint analysis use a choice-based approach, such as discrete choice analysis. This would allow Duke Energy to mimic a real-life decision-making scenario and increase the predictive validity of the study. If Duke Energy does decide to conduct conjoint studies, TecMarket Works recommends that two conjoint studies with different participant samples be considered: One presenting the features of PowerShare Mandatory/Generator versus PowerShare CallOption (i.e., higher premium versus more lead time for events), and another that presents CallOption versus non-participation scenarios in which customers consider the costs of blackouts and of paying higher energy prices due to not curtailing energy use. The second study with non-participation scenarios would allow Duke Energy to compare the relative attractiveness of receiving lower CallOption premium credits versus not participating at all, removed from the context of PowerShare Mandatory/Generator's higher premium credits.

Event Calls

Emergency events are determined by Duke Energy's Systems Operations Center (SOC). In the event of a system emergency, the SOC must decide which resources to call. PowerShare may be called when all of Duke Energy's available generation plants are on line but energy usage is still depleting Duke Energy's reserve margins. If there is a possibility that an emergency event may be called, Duke Energy communicates that possibility to participants a day in advance to give them as much warning as possible. If the event is called, Duke Energy notifies Mandatory participants 30 minutes in advance. (PowerShare Generator participants receive 15-minute advance notification).

Economic events for PowerShare Voluntary, PowerShare CallOption 5/5, 10/5 and 15/5 are determined by Duke Energy's RED. RED monitors several indicators to determine whether conditions may warrant an event. These indicators include a heat index (factoring in temperature and humidity) during the summer months, a load forecast, and a peak forecast. If the load forecast is within 7% of the peak forecast, and energy prices reach a certain threshold, then conditions may be ideal for considering an economic event.

To make the final determination of whether an economic event is called or not, Duke Energy's Retail Energy Desk (RED) convenes a meeting of stakeholders. This group may include up to 20 different people, including account managers, account manager executives, production managers, production managers' supervisors, technical support staff and Duke Energy upper management. Customer needs and satisfaction are a concern, and account managers are sometimes reluctant to agree to a disruption of their customer's production capabilities. Other factors include how likely it would be for another event to be called before the end of the event season, given the maximum number of calls allowed each year by the program (please see Table 1 and Table 2).

For economic events, Duke Energy provides advance notice to participants prior to 4:30 pm the day before. At that time, Duke Energy also provides customers with a pro forma load shape

based upon their previous energy usage. That pro forma load shape is used as the baseline energy use for calculating settlements. The customer's energy use during the event call is reflected in the daily meter reading. Settlements for event incentives are done on a monthly basis.

Initiating the event. Once the decision has been made to call an event, the Business Service Center enters information in a notification system developed by Varolii. Varolii contacts customers through a series of escalation rules for which method of communication to use. Notifications cease as soon as the customer responds. One improvement planned for the future is the addition of SMS texting as a notification method. Another improvement being planned is the capability to choose a preferred method of communication. In 2011, the Business Service Center has had to update customer contact information in Varolii manually. An enhancement being made for future event seasons is the development of a method to automatically update all Varolii records when Duke Energy account managers update their customers' contact information in Salesforce, a customer relationship management tool. All interviewees agreed that aside from the constant challenge of maintaining updated contact information, they are satisfied with Varolii's notification process and results.

EPO Curtailment module. For PowerShare, Duke Energy uses Schneider Electric's proprietary Energy Profiler Online (EPO) software system. Customer meter data and proformas are routinely imported in the system. Through EPO, the RED can update energy prices for events and the system also displays the customers' load compared to their proforma the day after the event. Settlement information is calculated in EPO after the energy prices calculated based on hourly pricing and imported into the system. Detailed settlement information is displayed in EPO for the customer after the buy-through price components are imported. The event credits/charges are exported to the Duke Energy billing system and appear on the customer's bill in the month following the PowerShare event(s).

Duke Energy has been working with Schneider Electric to improve the reporting capabilities of EPO. One Duke Energy manager reports that a new version has been developed and it will be launched and tested after the 2011 event season is over. The new version contains the ability to report event-specific information. The existing version of EPO allows Duke Energy to pull up reports on individual customers' load shed during events, but the new version allows aggregation across customers by event.

Past evaluation studies have reported that Duke Energy staff had been unable to retrieve reports from EPO easily. This year, Duke Energy reports that several improvements have been made to EPO's reporting capabilities. PowerShare staff now has the ability to pull reports on load reduction by event, as well as by customer.

Reducing Load

Customers can choose to reduce load in one of two ways: If customers do not have generation capability, they can curtail load by shifting production schedules or turning off equipment.

If customers have generation capability, they could choose to generate their own electricity instead of using electricity purchased from Duke Energy. Duke Energy program managers report

that recent EPA requirements[1] for use of diesel generators will also impact the ability of customers to use generation to reduce load, but that requirement is still being clarified.

Non-Compliance

Voluntary events. There are no penalties for not responding to a Voluntary event.

CallOption economic events. For CallOption events, customers may choose not to comply and to buy through for many reasons, including a need to operate equipment to meet production goals. Duke Energy's Buy Through prices for CallOption economic events are based upon the rates used in Duke Energy's Hourly Pricing program.

Mandatory events. Customers who do not reduce load in response to an emergency event face removal from the program. These removals are determined on a case-by-case basis, but a Duke Energy program manager reports that there is an informal "three strikes" rule, a legacy from past demand response programs. For non-compliance with an emergency event call, participants pay $2.00/kWh for the energy used that does not comply with their PowerShare contract during the event. In addition, the customer forfeits the monthly premium for non-compliance during an emergency event.

CallOption emergency events. Participants who do not comply with CallOption emergency events are charged penalty rates and forfeit their premium incentive for the month. These rates are the same as the CallOption economic buy-through rates, based upon the rates used in Duke Energy's Hourly Pricing program.

[1] EPA made the RICE NESHAP (Reciprocating Internal Combustion Engines National Emission Standards for Hazardous Air Pollutants) ruling in February of 2010, with a compliance deadline of May 3rd, 2013.

2011 Events

Table 3. Events called in 2010 and 2011 in the Carolinas System

Mandatory	Generator	Voluntary	CallOption
		6/15/10	
		6/23/10	
		7/7/10	7/7/10
		7/8/10	7/8/10
		7/23/10	
		7/29/10	
		8/4/10	
		8/5/10	8/5/10
6/1/11	6/1/11	6/1/11	
7/12/11	7/12/11	6/2/11	
		7/20/11	
		7/21/11	
		7/22/11	
		8/3/11	

At the time of these interviews in September of 2011, PowerShare Carolinas called eight Voluntary events in 2010, six Voluntary events in 2011 and two emergency events in 2011. Duke Energy reports that prior to 2011, they had not called an emergency event since 2007. These two events also enabled Duke Energy to confirm that the capacity resource provided by PowerShare is indeed what they had expected. At the time of these interviews, Duke Energy had not yet finalized their analysis of PowerShare's realized reduction from the two emergency events. But a Duke Energy manager reports based on preliminary results, PowerShare seems to be capable of reducing the amount of load that was needed. Duke Energy plans to hire an independent third party to conduct an impact evaluation to verify the exact load reduction.

Load Management

Duke Energy currently manages approximately 500 MW of non-residential load capacity in the Carolinas System, as supplied by both PowerShare and the legacy non-residential demand response systems. A Duke Energy program manager reports that in the near future they hope to be able to call for part of that capacity (e.g. from PowerShare but not the legacy curtailment programs) for events when the full load is not needed. TecMarket Works recognizes this as a wise decision, given that the advance notice time window of these events require immediate action by the participants, and any confusion about which facilities were participating or not would lead to delays. A Duke Energy program manager reports that Duke Energy is moving toward balancing capacity between blocks of customers (e.g., by region) so that they could call for part or all of the capacity, depending on need. As a Duke Energy program manager says, "*We are trying to treat it as a smart resource...trying to match resource to need.*"

Program Management

In an improvement from past evaluations of this program, all Duke Energy staff now report that Duke Energy is providing them with enough time and resources to adequately manage the program. One manager reported that although monitoring conditions and running events took up

the majority of time during the summer event season, management took advantage of the off season to plan for future program needs. While program operations during events is still time-constrained, Duke Energy managers now report that the reallocation of staffing by DR program has been made since the last evaluation study. One Duke Energy staff member says while they could all use more hours in the day on event days, "*Duke Energy has streamlined the process as much as anyone could*".

Future Program Changes

Duke Energy is proactively identifying and anticipating future changes to the program. Duke Energy staff members play an active role in the demand response community, such as participating in the National Town Meeting that is held by the Association for Demand Response and Smart Grid. This allows them to share program innovations that Duke Energy has developed and to continually monitor ongoing discussions at peer utilities to identify new market sectors and program participation requirements.

Because PowerShare has a successful history of implementation in Duke Energy's Midwest service territory, Duke Energy is able to apply best practices they developed in the Midwest. Duke Energy is currently exploring whether customers in the Carolinas System would be more likely to participate if they could aggregate accounts. Account aggregation is an option that is already available to Duke Energy customers in the Midwest, and has a proven track record of increasing participation. For example, a customer might own a chain of stores, each too small to qualify for the PowerShare program. Account aggregation would enable customers who own a chain of stores to enroll a group of stores as an aggregate, and meet each event call with load reduction across any or all of the aggregated facilities. A Duke Energy manager reports that they are currently in the process of determining whether account aggregation is a feasible offering in the Carolinas System.

Duke Energy is also pilot-testing an automated demand response option that would be targeted to customers in commercial office building spaces. The pilot is currently being conducted in Ohio with 20 customers, implemented by two different vendors. Program staff are evaluating whether it would be appropriate for the other states in which Duke Energy offers a PowerShare program.

Another challenge that Duke Energy will be addressing is a new EPA's new NESHAP-RICE regulation (National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines) that affects how frequently diesel generators can be used. This new regulation would impact Duke Energy's ability to provide capacity through customer generation.

Section 2: Participant Interview Results

Interviews were conducted with 20 Duke Energy PowerShare Carolinas customers who participated in PowerShare (Mandatory and Voluntary) in 2010 and 2011, with ten each from North and South Carolina. These customers come from a variety of sectors, including medical, educational, and manufacturing. Customers were asked to describe their experiences during the application process, during events, and with post-event settlement. These customers include those who enrolled for less than a year to some who had been participating since the legacy load curtailment systems were offered.

These 20 companies do not constitute a statistically significant sample. The size of the sample does not support any conclusions that would generalize to the rest of the PowerShare participants. These interviews are intended as an opportunity to capture a few qualitative observations from PowerShare customers in the Carolinas System.

Enrollment

All but two of the interviewees credited Duke Energy account managers as being the one who first made them aware of the program and its benefits. This is to be expected, given that Duke Energy is marketing the program primarily through account managers. The other two customers both reported that they had recently purchased a generator and were told about the PowerShare program by the installation contractors.

Very few customers reported that they had any questions during the enrollment process. The three who did remember had asked how many events were called in the past, and one had asked peers to share whether the PowerShare program incentives offset the cost of fuel for their generators. When asked about their primary motivation for enrolling in PowerShare, all respondents cited financial motives.

Obtaining information about PowerShare

Customers lauded the excellent work of their account representatives in providing information about PowerShare, and for taking their time to walk them through the program if necessary.

Two customers also added that the PowerShare program was so new when they entered discussions with their account managers, they needed to wait until PowerShare's requirements and incentives were determined before they could make their decision. A few customers did comment that the terminology used to explain the program's requirements and operations were very technical, and they would have preferred an explanation using lay terms: "*When talking about federal regulations and surcharges... the jargon is too confusing*".

Customers in South Carolina were also asked if they were presented with information about PowerShare CallOption at the time they learned about PowerShare. The intent of this question was to gather information from customers about any concerns with participating in CallOption. However, all but one customer reported that they did not remember. The remaining customer

reported that they decided against CallOption and were only participating in Mandatory because they thought they "*had to*."

Understanding the incentive structure. Customers were asked to rate how easy it was for them to understand the PowerShare incentive structure. A 10-point rating scale was used, with 1 indicating "extremely difficult" and 10 indicating "extremely easy". Customers gave an average rating of 7.75 (N=18, st. dev. = 1.8). In their comments, one customer said he was confused by the transition from the legacy Standby Generation program and had trouble calculating what his maximum curtailment could be without risking penalties. Another customer had trouble understanding the incentive structure for the Voluntary program and did not know whether it made financial sense to participate.

One customer (whose company was late in responding to a Mandatory event) reported that he understood the incentive structure, but his company's accounting group had a hard time understanding and thus had difficulty justifying the penalty costs of the program because they "[*There was] no real visibility about the incentive that goes on the rest of the time; not easily identifiable on a bill.*"

Event Notification

Customers generally confirmed that notifications were effective, and that they were notified of events through phone calls, emails and faxes. Almost all customers stated that they would keep the existing notification system. One customer reported that he was responsible for several facilities, and that he would prefer to receive just one call for all his facilities: currently, he has to listen to the entire message for each facility in order to stop the escalation of notices. Another customer said he preferred emails or text messages because he often received event notifications while he was in the field, and that it was very difficult to remember the 14-digit that allowed him to log in to receive the notice from Duke Energy.

Several customers also mentioned that their account managers would try to give them warnings when events may be called: *"Communications have been extremely well handled. My account manager spoils me from that aspect. He gives information as quickly as he can so we can make plans accordingly."*

Reviewing the Forecasted Load

Only half of the respondents reported that they reviewed the forecasted load prior to an event, with four of the seven companies who curtailed during a Voluntary event doing so. Because so few customers had experience responding to economic events, very little feedback is available at the time of these interviews about the usefulness and presentation of the forecasted load. TecMarket Works recommends that Duke Energy revisit this research issue in future evaluation studies, after more PowerShare Carolinas customers have responded to Voluntary and CallOption economic events.

Event compliance

PowerShare Carolinas customers were asked to share their experience with event call compliance. Their responses to the questions were varied, but the sample size is too small to reveal any consistent patterns if any existed.

Mandatory event calls. All respondents reported that they reduced load in response to the Mandatory event calls. Customers were asked whether the load they had agreed to curtail was achievable. Of the 10 customers who responded, only three reported the load was less than they could currently achieve. The other customers reported their load was "about right" or was their maximum achievable load.

When asked whether they could offer more capacity than their current commitment level, only four respondents indicated they could. Of these, two said they were planning to offer more capacity to Duke Energy in future event seasons, and two others said while they were capable of doing so, they would not offer more capacity because "*the incentive is not worth the hassle*".

Voluntary event calls. Seven respondents reported that they participated in at least one Voluntary event. Of these, two said their company participated in the Voluntary event as a trial, but both companies decided that the incentives were not high enough for further Voluntary curtailment. One of these companies complained that they were not given clear instructions on when they could resume production; instead they were given a range of times. As a result, they waited and lost two hours of production time. One customer said he declined the Voluntary event but would have curtailed had he known he could participate for just a few hours instead of the entire time period. The same customer seemed to also have a misunderstanding of PowerShare Voluntary's requirement to curtail at least 50% of a customer's nominated load in order to receive energy credits, and incorrectly stated: "*In order to participate, if you get 10 calls in Voluntary, you have to participate in 5 of them, you have to participate in at least half of them.*"

> RECOMMENDATION: Because economic curtailment programs are new to customers in the Carolinas System, Duke Energy may wish to provide a one-page reference to remind customers of the requirements for participating in Voluntary and CallOption economic events. This would allow new Voluntary participants to make more accurate decisions about whether or not they could participate in a Voluntary event, and when they could end their curtailment. This may also help remove any customer barriers to curtailment based upon a misunderstanding of program logistics and thus allow Duke Energy to focus on promoting the Voluntary program based upon its benefits.

Automated Demand Response Interest

Customers were asked if they were interested in an automated demand response program. Duke Energy is currently pilot-testing an automated demand response program in Ohio, targeted to office buildings. Of the 19 customers who responded, 12 said they were not interested, and four said they might be interested. Only three said they were interested. These responses are not intended to be representative, but they provide some anecdotal evidence that there is a market for which Auto DR would be well suited.

Account aggregation

Duke Energy is considering whether to offer customers the ability to aggregate accounts in order to provide enough capacity to participate in PowerShare. Participants in this survey were asked whether they might be interested in account aggregation. Ten of the 18 respondents had more than one facility. Of these, one was definitely interested, four said there were not interested, and five more said the might be interested.

Perception of program successes and needs

Customers were also asked what aspects of PowerShare were working well. Twelve of the 17 respondents said that the event notification system was working well. Six customers said the whole program was working well, including one who said, "*I can't find a negative. As far as I'm concerned about how things are functioning, I think they are doing a great job, I'd pat them on the back.*" Another one of these customers said they had no complaints and were in fact getting ready to sign up another facility in a different city."

Customers were then asked what Duke Energy should do to improve the program, if Duke Energy were to make just one change. Customers gave varying responses, some of which they mentioned earlier.

Suggestions for improving the program included:

- *"Reduce rates more."*
- *"Include companies with smaller generators."*
- *"[Tell us] how much was saved, how much the incentive was."*
- *"Allow an adjustment to contracted demand."*
- *"Duke should at least have the cost of running generator offset by incentives."*
- *"Pursue auto DR."*
- *"Need more than 30 minutes to reduce."*
- *"Would prefer to only be asked to curtail due to natural events, not due to Duke's generators being down."*
- *"Real time monitoring"*

Satisfaction Ratings

Customers were asked to rate their satisfaction on different aspects of the PowerShare program. Ratings were on a scale of 1 to 10, with 1 indicating "extremely dissatisfied" and 10 indicating "extremely satisfied." Table 4 shows ratings of satisfaction with PowerShare incentives. Customers were only slightly satisfied with the level of premiums offered by the program (7.08 rating), and even less satisfied with the incentives received after curtailing for an event (6.63). One customer whose company was a corporation with facilities across the U.S. said, *"[It is] hard to sell energy conservation to corporate because [PowerShare's] incentive is much lower compared to other utilities*".

Table 4. Satisfaction with PowerShare Incentives (1 to 10 satisfaction scale)

Carolinas	Incentive Levels	Method of Confirming Load Reduced	Time to Receive Incentive	Amount of Incentive Received
Mean	7.08	7.50	8.59	6.63
st. dev.	1.37	1.02	0.71	1.69
N	19	14	17	19

Some of the customers who provided the lower ratings provided comments on the curtailment credits gives some insight into what they base their incentive expectations on.

- *"[They should] raise incentive if they are raising their rates."*
- *"Needs to offset penalty."*
- *"There should be a fuel adjustment when fuel costs increase."*
- *"Fuel costs were not offset."*

They were, however, highly satisfied with the time it took to receive those incentives (8.59). Customers were also moderately satisfied with the method Duke Energy used to confirm the amount of the load reduced (7.50). Two customers volunteered that they had a kW meter at their facility. One customer gave a "7" rating and said he didn't understand how the confirmation was delivered. Two others said they did not receive any confirmation, "*Never gotten one, they don't send it to you.*" Another customer said he checked the EPO website but the information was not updated and he had to wait until he received his next bill to confirm the amount reduced.

RECOMMENDATION: It is not unexpected that PowerShare participants might forget details about the program in between the summer peak event seasons. To help remind customers, Duke Energy should consider providing customers with a summary sheet that highlights the program's key components, and their company's specific commitment in their agreement. If not already done, Duke Energy should also consider developing a process flow chart that illustrates the sequence of events during an event day, starting with the identification of event conditions, notification of customers, and the different paths to settlement should the customer choose to reduce load, generate, or buy through. This summary sheet could end with a reminder of where customers may find confirmation of their load reduction.

Table 5. Satisfaction with PowerShare Program Information (1 to 10 satisfaction scale)

Carolinas	Ease of Application	Info Explaining Program	Technical Expertise of Duke Staff	Time for Duke Energy to Respond	Overall Satisfaction with Power Share	Overall Satisfaction with Duke Energy
Mean	8.56	8.35	8.63	8.78	7.93	8.13
st. dev.	0.88	1.28	0.85	0.65	1.52	1.25
N	16	17	20	20	20	19

Table 5 shows customers' satisfaction ratings with other aspects of the program. Customers generally agreed that Duke Energy's account managers did a good job answering technical questions. These are reflected in the moderately high satisfaction ratings of the technical expertise of Duke Energy staff (8.63) and in their high satisfaction with the time it took for Duke Energy staff to respond to their concerns (8.78). Customers also had moderate satisfaction with the ease of applying for the program (8.56) and with the information they were provided explaining the program (8.35). Satisfaction with this information varied a bit; in their comments, customers mentioned that the program should be described using layman's terms.

Overall, Duke Energy Carolinas customers varied in their satisfaction with the PowerShare program, with a mean rating of 7.93. Two customers gave PowerShare a "5" satisfaction rating. Of these, one cited his company's dissatisfaction (not his own) with a penalty for not curtailing, saying his management was not used to the transition from the legacy Standby Generator program and thought PowerShare offered only incentives with no penalties. The other cited dissatisfaction with several aspects of the PowerShare program, including confusion with requirements from Standby Generator, difficulty determining his company's maximum curtailment, and the low incentives offered for Voluntary. While the findings from this survey cannot be considered representative of the PowerShare participant population, Duke Energy may wish to consider following up with more research on whether a significant proportion of legacy curtailment program customers are also experiencing confusions with PowerShare requirements. If yes, then Duke Energy may wish to develop collateral to directly address the difference between PowerShare and legacy curtailment programs, perhaps targeted to an audience of company executives.

These customers rated their satisfaction with Duke Energy overall at 8.13; the few who provided comments were dissatisfied with the current energy rates and recent power outages and power surges ("*a lot of energy blinks*").

Participant Suggestions

Customers were asked to share thoughts on how Duke Energy might increase participation from companies such as theirs. Eleven out of the 19 respondents said to increase incentives, with three specifically mentioning the Voluntary incentive. One customer said, about incentives in general, "*It was nothing. It was almost funny they were going to give you that [little] money.*" Another customer who was an advocate of PowerShare made a suggestion about reminding customers of

the value of the full program: "*The incentive for participating was only $500. Corporate didn't see the value. [Duke needs] to communicate the avoided costs of operating during that peak period. The monthly incentive needs to be advertised more.*" These suggestions should be taken in the context of the PowerShare program's continued success in increasing PowerShare participant enrollments: while participants might desire a larger incentive, the existing incentive seems to be sufficient to meet Duke Energy's current enrollment objectives.

Four customers had no suggestions to make for improving the program: "*None: the set up is really good.*" One customer suggested that PowerShare provide more flexibility with the contracted demand. This customer had a new building and was struggling to meet the contracted demand. He suggested that PowerShare provides participants an opportunity to make an adjustment after the first event. "*They're overpaying us at this point because we can't get down to that level. Instead of running it until we fail three times, let us make the adjustment.*" This customer said his company is still coming out ahead on the premium incentives, after penalty pricing, "*but it would be nice to make the readjustment*".

> RECOMMENDATION: If the account managers are not already doing so, Duke Energy should consider following-up with first year PowerShare participants to review their load reduction commitments, whether or not those participants were compliant with the previous season's events. Duke Energy should also consider providing first year participants with the ability to adjust their commitments for the next event season, while their experience of the most recent event season is still fresh in their minds. This will allow these customers to provide feedback to Duke Energy on whether their load reduction commitments were easily achieved, just right, or too onerous. If a new participant has overcommitted and simply cannot deliver on that commitment, Duke Energy should identify them sooner rather than later, and stop paying on premiums on capacity that does not exist.

Two customers mentioned the fact that new clean air standards will be a problem and suggested that Duke Energy needed to help them address that: "*The clean air rules affect ability to run the generators. This has a potential impact on our ability to participate in the program.*"Another customer suggested that Duke Energy provide a tutorial or PowerPoint on how to calculate capacity.

> RECOMMENDATION: Duke Energy is already aware that the calculation of capacity and incentives may be difficult for customers to understand, and results from these participant surveys confirm that there still is some confusion. If Duke Energy has not already done so, they should consider easily-accessible tools for helping customers understand these calculations. For example, Duke Energy may develop short tutorials on how customers could calculate their capacity, specifying how baselines are calculated and used, and how proformas are calculated and used. While Duke Energy currently does have marketing collateral explaining these processes, but they may be difficult for customers to locate if they are embedded in a large document. Short tutorials that are available on the PowerShare website may be more convenient for customers who are trying to access specific information. Alternatively, if Duke Energy account managers are not already doing so, they could consider "showing their work" and leaving customers with documentation showing their company's specific incentive and baseline

calculations. There are many other methods Duke Energy may be considering to help reduce the confusion on these technical issues.

Two customer suggested that Duke Energy could improve the program by letting customers know when the curtailment could end. One of these customers wanted real time confirmation of when they had reached their contracted curtailment, saying right now his company did not know "*when to stop turning off equipment*". The other customer wanted to know the exact length of the (voluntary) curtailment period instead of leaving it "*open ended.*"

RECOMMENDATION: Duke Energy should consider ways to reduce customer uncertainty about whether they can actually provide the amount of curtailment they have contracted (for both Mandatory and Voluntary events). Customers may have less uncertainty if they had a plan for curtailment and entered each event with an expectation that they will fulfill their curtailment commitment if they followed the entire plan. Such a plan may include a schedule specifying which pieces of equipment to turn off and which generators to turn on, and how much load would be curtailed with each of these actions if taken in the order specified. This schedule of curtailment would allow Voluntary participants to gauge how long they need to curtail and when they could return to normal operations. While developing such a plan would be the responsibility of the customer, Duke Energy might offer them some technical assistance. Duke Energy should obtain more data from customers on whether technical assistance with developing a curtailment plan and schedule would encourage more customers to participate in PowerShare. This may be accomplished informally by the Duke Energy account managers, or more formally with a telephone survey of customers whose main strategy is curtailment.

Appendix A: Program Manager Interview Instrument

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 [insert state] **as it was implemented between the dates of** [insert start date of program period under evaluation] **and** [insert end date of program period]**. 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. In your own words, please briefly describe the PowerShare **[State]** 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 PowerShare states?

2. 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.

3. Please explain the different PowerShare options that are available to Duke Energy customers in the state of [insert state] along with their incentives.

4. 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?

5. Do you feel that Duke Energy has provided you with enough time and resources to adequately manage this program? Did you receive the support that you need to manage this program? What else is needed?

6. Please describe for me the roles and responsibilities of vendors that are supporting Duke Energy's PowerShare program in the state of [insert state]?

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

Objectives

8. Have the PowerShare'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 PowerShare 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 in the state of [insert state] 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 PowerShare Program are adequate enough to entice the C&I community to enroll in the program? Why or why not?

14. 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?

15. If Duke were able to change the incentive level for each event, how do you think this would impact PowerShare's ability to acquire power reductions? In other words, do you think customers have additional ability to shed load that could be tapped if the incentives were increased?

Marketing

16. 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?

17. 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 potential importance of the program to them and their operations and the incentive or participatory benefits of the program?

18. In the state of [insert state], 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?

19. What market information, research or market assessments are you using to determine the best target markets or market segments to focus on?

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

21. What market information, research or market assessments are you using to identify market or segment-level barriers, and develop more effective or targeted operational mechanisms?

Overall PowerShare Management

22. 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?

23. Do you think there should be changes made to the structure of the participation options? *For instance, in Kentucky's 2007 evaluation of the program, a company can opt for "quote" or "call" participation. Being "call" involves mandatory interruption, but only 2 companies enrolled. 20 companies enrolled in the optional "quote" group – but only 1 participated in the single event in 2007.*

24. *(Midwest only: Duke OH and KY will be with PJM instead of MISO.)* Given the RTO changes for 2012, how will the PowerShare program need to adapt? What operational or administrative changes will be necessary due to the change in RTOs from MISO to PJM?

Event calls

25. How do you track, manage, and monitor or evaluate customer response to the event calls?

26. For customers who do not shed as much load as anticipated, do you know why customers did not shed enough load?

27. Can you describe for me a picture of how customers react to a call? How fast do they learn of a call, what determines what they can do, how fast can they react?

28. 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?

29. How do you know if they reached their load shifting objectives?

30. 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?

31. Are there any market segments or customer types that the program is now serving that 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?

32. Overall, what about the PowerShare Program works well and why?

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

34. In what ways can the PowerShare Program's operations be improved?

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

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

Appendix B: Participant Survey Instrument

Name: _____
Company: _____
Title: _____

Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer satisfaction interview about the PowerShare 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 PowerShare Program. We are not selling anything. We would like to conduct a short interview that will take about 15-20 minutes and all your answers will be kept confidential. This information will enable Duke to make improvements to the program and the application process. Would you be able to help us?

Establishing Questions:

ES-0. Would you please tell me what your company does, and what your role is in your company?

_____

Were you the one who signed up for the PowerShare program?

How long has your company been participating in the PowerShare program?

Which option did you enroll in?

Southeast:

a) ❑ Mandatory Curtailment Option
b) ❑ Voluntary Curtailment Option
c) ❑ Generator Option
d) ❑ CallOption

Information-Gathering Phase

INFO-1. How did you become aware of the Power Share Program?

a) ❑ Duke Energy sent me a brochure
b) ❑ A Duke Energy representative told me about it
c) ❑ Duke Energy website.
d) ❑ I saw an ad in _____
e) ❑ Other _____
f) ❑ DK/NS

INFO-2. At the time you became aware of the program and were considering whether or not to participate, did you do any additional investigation to confirm the program's participation requirements and program benefits, or was the information you had enough for you to make a participation decision?

a) ❑ The information received was adequate
b) ❑ Didn't need to confirm/ already knew about it
c) ❑ Went to the program or Duke Energy web site
d) ❑ Called or emailed a Duke Energy contact
e) ❑ Other: _____
f) ❑ DK/NS

INFO-4b. What were you asking about?

g) _____
h) _____

INFO-3. Were you able to get the information you needed about the program's participation requirements and benefits?

1. ☐ Yes 2. ☐ No 99. ☐ DK/NS

INFO- 5: Would you please rate for me how easy it was for you to understand the PowerShare incentive structure on a scale of 1 to 10, with one being extremely difficult and 10 being extremely easy?

1 2 3 4 5 6 7 8 9 10

[If rating was less than 8:] What could Duke Energy do to make the incentive structure easier for customers to understand?

CAROLINAS ONLY: CALL OPTION

CO-1. I have some questions specifically about the PowerShare CallOption program. When you were learning about the PowerShare program, were you also presented with information about the PowerShare CallOption program?

If needed, explain: CallOption is a combination of emergency and economic events, with

CO-2. Can you please tell me why you decided that the CallOption program was not right for your company?

Decision Making

DM-1. What was the primary reason that you decided to participate? [If the customer participated in more than one option:] Why did your company choose to participate in each of these options?

Participation in a Mandatory or Voluntary Event

EV-1. Can you tell me, how many Power Share events has your business been asked to respond to this year?

EV-2a. How were you notified of the event?

EV-2b. How do you prefer to be notified about future events?

EV-3. Did you decide to reduce energy use for every event, or did you decide to decline one or more events?

EV-3a. [If customer did reduce] On the occasions you chose to reduce, why did you choose to?

EV-3b. [If customer did reduce] Do you think you would have been able to reduce more? Why or why not?

EV-3c. [If customer declined to reduce] Why did you decline to reduce energy usage?

_____

_____

Forecasted Loads:

EV-4 As you know, Duke Energy provides a forecasted load pattern to you the day before an event to help in your decision making process for voluntary. Do you review that load shape....

1. Before participating in a Curtailment Event? Never, Rarely, Sometimes, Always
2. During or immediately after a Curtailment Event? Never, Rarely, Sometimes, Always
3. Sometime after a Curtailment Event but before the bill comes? Never, Rarely, Sometimes Always
4. After the monthly bill comes? Never, Rarely, Sometimes, Always

EV-5 I'd like to ask how achievable your targeted level of load reduction is. Would you say the targeted level of load reduction you currently have with Duke Energy is ....

1. Much less than you can provide
2. Less than you can provide
3. About right for your company
4. More than you want to provide
5. Much more than you want to provide
6. Don't know.

Automated Demand Response:

EV-6. How interested would you be in using an automated method to curtail load that would respond to a signal from Duke Energy about a curtailment event? In this type of structure Duke Energy would send a signal to a piece of control equipment installed at your site, such as on an HVAC compressor, fan, temperature set-point unit or equipment control system that would automatically make an adjustment that would reduce energy use for that piece of equipment at that time. The incentive would then be based on the energy that would be saved from the equipment being automatically controlled by the Duke Energy signal. The customer would not have to make any adjustments themselves because it would have automatically occurred at the time the signal was sent. Would you be:

1. Not at all interested in this approach,
2. Slightly interested
3. Somewhat interested
4. Very interested

EV-6a. If not at all interested: What are your concerns about this type of an approach?

_____

EV-6b. If interested (2-4 above) What are the primary reasons that you would be interested in this type of a control approach?

_____

Improvements

Impr-1. One of the objectives that the Power Share program would like to see over the next year is increased participation of businesses like yours. Can you think of things that the program can do to help increase participation or help increase interest from people like yourself?

a. ❑ Increase general advertising
b. ❑ Increase advertising in trade media
c. ❑ Present the program in trade or associated meetings
d. ❑ Offer larger incentives
e. ❑ Offer incentives on other items/include other items

f. ❑ Have program staff call small C&I customers
g. ❑ Make the process more streamlined for customers
h. ❑ Make the process more streamlined for contractors
i. ❑ Increase number of events
j. ❑ Decrease number of events
k. ❑ Offer participation with events during certain months
l. ❑ Other: _____

Aggregation of Accounts (Carolinas Only)

Impr-3. How interested would you be in aggregating your accounts together, for PowerShare purposes only, in order to optimize load curtailment strategies across several Duke Energy accounts? This would allow you to reduce a certain kW across several sites, so that you could decide to curtail for one site and not for another, and still provide the agreed-upon load reduction. Would you be:

a. Not at all interested
b. Slightly interested
c. Somewhat interested
d. Very interested

Impr-4. Overall, what about the PowerShare Program works well and why?

_____

_____

Impr-5. What doesn't work well and why?

_____

_____

Satisfaction

We would like to ask you a few questions about your satisfaction with 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 the program and a 10 means that you are very satisfied.

How would you rate your satisfaction with:

Sat-1. The incentive levels provided by the program

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-2. The ease of applying for the program

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-3. The time window in which you were required to reduce your load

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-4. Duke Energy's method for confirming how much load you reduced?

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-5. The time it took for you to receive your incentive

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-6. The amount of your incentive

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-7. The technical expertise of Duke Energy staff

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat-8. 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

If score is 8 or less ask: What could have been done to make this better?

_____

Sat 9. The information you were provided explaining the program

1 2 3 4 5 6 7 8 9 10

If score is 8 or less ask: What could have been done to make this better?

_____

Sat 10. Considering all aspects of the program, how would you rate your overall satisfaction with the PowerShare Program?

1 2 3 4 5 6 7 8 9 10

Sat-10a. If score is 8 or less ask: What could have been done to make your experience better, or have we already covered it?

_____

_____

Sat 11. How would you rate your overall satisfaction with Duke Energy?

1 2 3 4 5 6 7 8 9 10

Sat-11a.If score is 8 or less ask: Why are you less than satisfied with Duke Energy?

_____

_____

Sat-12. Are there any other thoughts or comments you would like to share with Duke management about the Power Share program, that we have not discussed already?

_____

_____

Process Evaluation of the Residential Smart $aver® HVAC Program in the Carolina System

Final Report

Prepared for
Duke Energy
139 East Fourth Street
Cincinnati, OH 45201

November 20, 2012

Submitted by

Nick Hall and Dave Ladd

TecMarket Works
165 West Netherwood Road
Oregon, WI 53575
(608) 835-8855

Subcontractor:

Carol Yin
Yinsight, Inc.

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Executive Summary

Significant Process Evaluation Findings

Key Findings from the Management Interviews

- The Residential Smart $aver program in the Carolina System has benefitted from the experience that Duke Energy has gained from implementing Smart $aver in the Midwest.

- The total processing time from application to approval to the time the incentive checks were sent out was 8 business days. From an industry standpoint this performance constituted best in class.

Key Findings from the Trade Ally Interviews

- A majority (13 out of 21, 62%) of the trade allies mentioned that they thought ductless air conditioning units and handlers should be considered for the program – eight trade allies in North Carolina and five in South Carolina mentioned the technology.
- Trade allies mentioned inverter heat pumps and ductless mini-split systems should also be considered for the program.

Key Findings from the Participant Surveys

- Customers who participated are generally very satisfied with the HVAC Smart $aver program.
    - 88.2% rated their satisfaction with the program an "8 or higher" on a 10-point scale, while 40.9% rated their satisfaction a "10 out of 10".
    - For most customers, their favorite part was saving money through an immediate rebate (66.3%), while saving energy was secondary (mentioned by about 30%, including those who hope to save money from increased efficiency[1]). A large majority (81.8%) could not name a "least favorite" aspect of participating in Smart $aver.
- About one quarter of participants intend to do more than just HVAC Smart $aver to improve energy efficiency:
    - 28.9% of participants said they have taken other energy efficiency actions influenced by HVAC Smart $aver.
    - 22.5% of participants intend to make other major purchases to improve energy efficiency in the next three years.
- Trade allies are very important to spreading awareness (87.7% of customers heard about Smart $aver from a trade ally), and getting customers to participate (trade allies filled out Smart $aver paperwork for 80.7% of customers).

[1] This percentage also includes those that responded with "like saving energy and being more efficient in general" and "like learning about how to be more energy efficient in the future", and "like saving resources/ conservation/benefiting future generations/going green".

- Trade allies are especially important for larger installations (multiple rebate households).
- Not that many customers heard about Smart $aver directly from Duke Energy via brochures (2.7%), or the web site (2.1%), or even advertising (6.4%).

- Customers are also generally very satisfied with Duke Energy
  - 87.2% rated their satisfaction with Duke Energy an "8 or higher" on a 10-point scale, while 41.2% rated their satisfaction a "10 out of 10".
  - Dissatisfied customers most often complained of rate increases and the price of energy in general. Some also mentioned problems with loss of power.

Recommendations

Based upon the management interviews, the evaluation team has no recommendations for improving the program at this time. However, because Duke Energy has selected a new vendor to manage the trade ally network and to process the applications, we recommend that Duke Energy monitor the performance of the new vendor to see if they are able to maintain the high participation rates that the Smart $aver historically enjoys. If participation drops, whether from trade allies or customers, Duke Energy may wish to consider another process evaluation to determine the cause of the decrease. Otherwise, the evaluation team recommends that the new vendor be given one year to two years to implement Smart $aver before another process evaluation is conducted.

Introduction and Purpose of Study

Overview and Objective

This document presents the process evaluation report for Duke Energy's Residential Smart HVAC Program as it was administered in the Carolina System. The evaluation was conducted by TecMarket Works and Yinsight, Inc. The objective of this process evaluation is to document program operations and identify if there are any areas of improvement for future program implementation.

Summary of the Evaluation Data

The findings presented in this report were analyzed using survey data from participants and stakeholders in the HVAC program as presented in Table 1 below.

Table 1. Evaluation Date Ranges

Evaluation Component	Start Date of Participation	End Date of Participation[2]	Dates of Survey	Dates of Analysis
Participant Surveys	July 5th 2011	February 15th 2012	Surveys were conducted from 4/4/12 through 4/23/12	May 2012- July 2012
Trade Ally Surveys	July 5th 2011	February 15th 2012	Surveys conducted June 2012	July 2012 – August 2012
Program Managers and Vendors	July 5th 2011	February 15th 2012	Surveys conducted April 2012	May 2012 – June 2012

TecMarket Works conducted a phone survey with a random sample of 187 participants from the Carolinas between April 4th and April 23rd, 2012.

Three management interviews were conducted with program implementation staff and management in April 2012.

Twenty-one Residential Smart $aver® trade allies were interviewed in June of 2012.

[2] Cut-off date for when customer became a participant in Smart $aver, and last date of pre consumption data before post EE measure install data can be used in the EMV analysis.

Description of Program

The Duke Energy Residential Smart $aver® program in the Carolinas system provides rebates for installations of higher efficiency heating and cooling measures in new or existing homes. Qualified purchases by residential customers are eligible for rebates of $200 to the homeowner, and $100 to the HVAC contractor/dealer. Home builders who install qualified equipment are eligible for rebates of $300 that they may choose to pass on to the home buyers.

The Residential Smart $aver program launched in 2009 in the Carolinas system, when it received regulatory approval from both states. In late 2010, the long-time product manager for the residential Smart $aver program left his position and a new product manager came on board.

The measures that are eligible for a Smart $aver rebate in the Carolinas are[3]:

- Air conditioners that are 14 SEER[4] with an electronically commutative (ECM) fan
- Heat pumps that are 14 SEER with a HSPF[5] of at least 8.2, with an ECM fan
- Geothermal heat pumps that are 11.5 EER with an ECM fan

The efficiency level of these measures has remained the same since the Smart $aver program in the Carolina system was approved by regulators in 2009. The product manager reports that this level of efficiency is comparable to that of the HVAC programs in neighboring states. However, at this time the USDOE is assessing the potential to raise the energy efficiency standards for these types of equipment. When (or if) this occurs, the evaluation baseline for assessing impacts may be equal to the minimum efficiency level rebated via this program, requiring Duke Energy to increase the minimum level of efficiency rebated. At this time, the baseline for assessing this program does not need to be adjusted because the net to gross analysis adjusts for what participants would do on their own. However, if the federal standards are changed, the choice customers have in the market will be reduced to the more efficient lines, requiring a change in the baseline approach and in the program offering.

During the evaluation time period, Duke Energy used two third party vendors to help implement the program[6].

[3] Since the time these interviews were conducted in April of 2012, the Carolina System Smart $aver program has begun offering some incentives for HVAC maintenance and building envelope retrofits.
[4] Seasonal Energy Efficiency Ratio (SEER)
[5] Heating Seasonal Performance Factor (HSPF)
[6] The vendor currently implementing the Smart $aver program is GoodCents. The new vendor is not included in this evaluation because the Smart $aver program period covered for this evaluation is from July 1, 2011 through February 15, 2012.

Methodology

Overview of the Evaluation Approach

This process evaluation had three components: management interviews, trade ally interviews, and participant surveys.

Study Methodology

Management Interviews

Three management interviews were conducted with program implementation staff and management in order to capture their insights about the programs operations and challenges. We interviewed Duke Energy's Residential Smart $aver product manager, two staff members from the Wisconsin Energy Conservation Corporation, and two staff members from Customer Link. This study evaluates the Duke Energy Smart $aver program as implemented in the Carolinas system during the period from July 1, 2011 through February 15, 2012.

Trade Ally Interviews

Twenty-one Residential Smart $aver® trade allies were interviewed in June of 2012. All of the interviews were conducted with a sales manager within the firm or an equivalent representative. Each of the respondents indicated that they are the individual within their company who has the most experience and is the most acquainted with the program. The interview protocol used during these interviews can be found in Appendix B: Trade Ally Interview Instrument.

The interviews were written to cover various aspects of the program, such as program operations, aspects of trade allies' involvement, incentive levels applied, covered technologies, and program effects from the trade allies' perspectives.

Participant Surveys

This survey focused on customers who, according to program tracking records, received a rebate from Duke Energy for the purchase of a new, more efficient air conditioner or heat pump between the dates of July 1, 2011 and February 15, 2012.

Data collection methods, sample sizes, and sampling methodology

Management Interviews

Three management interviews were conducted with program implementation staff and management in order to capture their insights about the programs operations and challenges. We interviewed Duke Energy's Residential Smart $aver product manager, two staff members from the Wisconsin Energy Conservation Corporation, and two staff members from Customer Link.

Trade Ally Interviews

Twenty-one Residential Smart $aver® trade allies were interviewed in June of 2012 from a random selection of 196 trade allies with contact information.

Participant Surveys

A sample list of 800 customer records was randomly pulled by TecMarket Works from a list of 4,602 participants (between the dates of July 1, 2011 and February 15, 2012) provided by Duke

Energy, which included 400 records from North Carolina and 400 records from South Carolina. Surveys were conducted by telephone.

Number of completes and sample disposition for each data collection effort

Trade Ally Interviews

From the list of 196 records, 21 trade allies were contacted for interviews in June of 2012.

Participant Surveys

From the sample list of 800 records, 792 participants were called between April 4 and April 23, 2012, and a total of 187 usable telephone surveys were completed yielding a response rate of 23.6% (187 out of 792). Of the 187 completed interviews, 93 were conducted for homes in North Carolina and 94 were conducted for South Carolina homes. Furthermore, 9.6% of these households surveyed (8 from North Carolina and 10 from South Carolina) claimed more than one rebate from the Smart $aver HVAC program, and were asked additional questions about their secondary units.

Expected and achieved precision

Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 6.4% and an achieved precision of 90% +/- 5.9%.

Description of measures and selection of methods by measure(s) or market(s)

The process evaluation focused on measures that were eligible for a Smart $aver rebate in the Carolinas during the dates of July 1, 2011 and February 15, 2012[7]:

- Air conditioners that are 14 SEER[8] with an electronically commutative (ECM) fan
- Heat pumps that are 14 SEER with a HSPF[9] of at least 8.2, with an ECM fan
- Geothermal heat pumps that are 11.5 EER with an ECM fan

[7] Since the time these interviews were conducted in April of 2012, South Carolina's Smart $aver program has begun offering some incentives for HVAC maintenance and building envelope retrofits.
[8] Seasonal Energy Efficiency Ratio (SEER)
[9] Heating Seasonal Performance Factor (HSPF)

Management Interviews

Marketing

The Residential Smart $aver program is marketed by a network of trade allies. The trade ally network plays a critical role in the success of the Smart $aver program. The trade allies are the HVAC dealers and contractors who are usually the first point of contact for customers who are interested in purchasing an HVAC system. The trade allies are able to educate customers about energy efficient equipment and inform customers about the Duke Energy rebate. If the customer chooses to participate, the trade ally also completes the rebate applications on behalf of the customer and sends it to Duke Energy. This condition affects the assessment of freeridership because in most cases the customer does not know that they were able to acquire the more efficient unit using the Duke Energy rebate. The trade ally provides the customer with a set of product choice decisions in which they are able to acquire the energy efficient models at a much reduced cost, making that the attractive financial choice, even though the customer does not know why that unit has become the attractive financial choice. As a result, freerider analysis will primarily focus on the actions of the trade ally and what they report their customers would likely elect to buy without the rebate.

Duke Energy also provides information about the Residential Smart $aver program on its web site, but otherwise, the Residential Smart $aver program is not marketed directly to customers. Customers who would like more information about the program can also call a number listed on the website to get answers.

Customer Link is a third party vendor who handled both customer and trade ally calls during the program period being evaluated. For both customers and trade allies, Customer Link answered questions about the eligible measures and the incentives that were offered through the program. Customer Link representatives also directed callers to the web site for information, and if the caller requested it, Customer Link also mailed information about Smart $aver to the caller. Customer Link tracked Smart $aver calls and reported to Duke Energy periodically on 1) the number of calls, 2) how many seconds it took on average to answer the call, and 3) average time to handle the call. Customer Link's staff used a script to guide the call, and entered a results code to categorize the call as 1) general information, 2) new dealer, 3) application question, 4) status of application, and 5) technical question.

The Customer Link staff member reported that this process seemed to be working well.

Trade Ally Network

During the program period under evaluation, the trade ally network was cultivated and managed through a vendor, the Wisconsin Energy Conservation Corporation (WECC). WECC provided a group of trade ally service representatives (TASRs), whose job was to "make contact with every heating and cooling contractor in the marketplace in the Carolinas to personally inform them of the program." On behalf of Duke Energy, WECC reached out to HVAC contractors, distributors and manufacturers and signed them up as a "trade ally" for the Smart $aver program. WECC's duties included training the trade allies on program requirements and application procedures,

conducting follow up visits with the trade allies, and identifying program barriers that arise in the field. WECC also helped the trade allies with filling out the application, walking them through the application either in person or on the telephone. WECC also reports that the TASRs would talk with the contractors and educate them on why selling efficiency helps their business, and how energy efficiency would differentiate them from their competitors. WECC says that this is not formal sales training, "*but it helps them understand why energy efficiency was in the customers' best interest, and their checks go up when the customers' checks go up.*"

The trade ally installs the HVAC unit and also completes the rebate application on behalf of the customer, providing the necessary AHRI certificate and other technical information that customers may not be able to easily provide. For every approved application, the trade ally receives $100. The Duke Energy product manager reports, "*That* [trade ally] *incentive has been very effective.*"

WECC reports that their strategy for recruiting trade allies was to target the larger contractors first. WECC would obtain lists of HVAC vendors and contractors from Dun and Bradstreet, and report that in 2011 "*we contacted every contractor that we were aware of.*" WECC primarily conducts this outreach through face to face meetings. They also attended and presented at professional meetings and sent out email "blasts" to prospective trade allies about the Smart $aver program. According to WECC, during the program period, approximately 1,000 trade allies signed up for the Smart $aver program in North Carolina, and almost 400 in South Carolina. Altogether, 994 these trade allies in the Carolinas system submitted applications in 2011.

Duke Energy is also offering the HVAC trade ally community the opportunity to be trained and certified according to the standards of the Building Performance Institute (BPI), a trade association for building science professionals. The product manager reports that they have offered this training once in the fall of 2011 and although initial interest was not high, Duke Energy will offer it again in the spring of 2012. Through this program, Duke Energy provides a limited subsidy of approximately 50% - 75% of the BPI course costs. This training is not required for participation in Smart $aver but could be considered an additional service that Duke Energy provides to the trade allies.

In addition to direct training by WECC TASRs, a vendor could also call Customer Link for answers to their questions, including questions about filling out the rebate applications. Customer Link reports on the types of calls they receive on a daily basis and posts this data on Duke Energy's Sharepoint data system. According to a Customer Link staff member, approximately 60% of the calls were from residential customers, and 40% of the calls are from trade allies.

Customer Link also played a role in promoting Smart $aver participation to trade allies. Customer Link maintained a list of participating trade allies that is posted on the Smart $aver web site, and was able to offer trade allies a form to fill out so they could also be listed on the Smart $aver web site. Once received, trade ally information is posted on the web site in three business days.

Applications & Rebates

Through the program period, WECC processed the rebate applications for the residential Smart $aver program for Duke Energy's service territory across five states. The applications were submitted through postal mail, email, and fax[10].

The application processing time line was aggressive: Every application that is submitted must be entered into the WECC system within 3 days and categorized as 1) complete and qualified, 2) missing information, or 3) does not qualify. For every application, the processors must verify that AHRI certificate matches the serial number and model number on the invoice, and that the system qualifies for the program. WECC's service level agreement with Duke Energy required that there be 100% accuracy in data entry. To maintain this level of accuracy, WECC dedicated a staff member whose sole job was to check the applications that were completed each day. That staff member would print out a hard copy of all the data in each application and compare that data record "*side by side*" with the paper application.

Once approved, the information is sent to WECC's accounting department where check fulfillment is tracked. The information is then sent to a third party vendor who prints and mails the incentive checks. These incentive check runs occur twice a week. The total processing time from application to approval to the time the incentive checks are sent out is 8 business days, with $200 to the customer and $100 to the trade ally. Both Duke Energy and WECC have heard that this turnaround time has resulted in high customer satisfaction with the rebate process. From an industry standpoint this performance constituted best in class[11].

WECC reports that their contract with Duke Energy was based upon number of completed applications, and that they also had goals for each state. The specific goals depending on the different regulatory requirements in each state, and the WECC staff members who were interviewed said they had an opportunity to provide some feedback on the feasibility of those goals. A WECC staff member reports, "*We are proud of the quality of service we provided throughout the contract and especially satisfied with our performance on the application goals.*"

Quality Control

If an application is incorrectly filled out or contains incorrect information, WECC contacts the trade ally and asks them to obtain the necessary information. In this situation, and in situations where the measure did not qualify for a rebate, WECC would send out a notification to the trade ally, and it was the trade ally's responsibility to communicate with the customers about the results of the application.

WECC's trade ally service representatives also conducted site verifications on a random sample of the applications as part of their quality assurance process. If any trade ally has demonstrated a pattern of sending in questionable applications, WECC had the discretion to target that trade ally's installations for additional inspection until concerns are resolved. A total of 5% of the

[10] Duke Energy reports that the Smart $aver program is currently working on a method for electronic submission of the applications.
[11] The service level agreement with the new vendor is for 3 days to process the application and 10 days to send out the check.

applications had to undergo site verification[12]. The site verifications took place within 30 days of application approval. Three attempts were made to contact each customer. During the site verification, the inspector would verify that the unit was installed and operational, and that its model matched the application. During July 2011 – Feb 15, 2012, WECC conducted site inspections for 348 applications in NC and 93 applications in SC.

In the case that a site failed verification, WECC informed Duke Energy and the product manager decided the next action on a case by case basis. In the past, Duke Energy's corrective action has included suspending the trade ally from the program until the situation was remedied to Duke Energy's satisfaction[13]. However, in most cases a site inspection failed because the model number did not match the application but still qualified for the program, so an updated application was needed. Other times, the verifications found that equipment was not yet installed, or new equipment had to be ordered due to previously unidentified space constraints. For these situations, the correction was made and the trade ally was allowed to continue participating in the program. However, WECC reports that they do not have any records of trade allies being removed from the program for this reason.

Communication

WECC reports that they initially had weekly meetings with Duke Energy about the Smart $aver program, and that was later changed to biweekly meetings. During those meetings, WECC reported on any issues that were identified by their service representatives in the field. WECC also reported on issues that required Duke Energy management's input such as if a site verification failed. WECC and Duke Energy also held quarterly meeting at which WECC formally presented the quarterly results and the team discussed goal attainment for the coming period.

WECC states that the new Duke Energy program manager was "*very good to work with*" and that both the new and previous product managers were "*consistent in the direction [they] gave us... This was very important to the success of the program. All trade allies were treated fairly, and all applications were processed consistently.*"

Customer Link also attended the biweekly management calls between WECC and Duke Energy, and reported that they had been in continuous communication on a daily basis with WECC on questions about rebate applications. Most calls were about the status of an application, or why an application was rejected. When Customer Link was asked to offer ideas for improvement, the staff member said "*I usually do have something to say about that, but I like the way everything was set out. Everything was clear. There's not one thing I could think of that would need improving. The communication was great, as was the program itself.*"

Program Achievements

At the time of these interviews in April of 2012, the product manager believes the program is performing well against expectations. The Residential Smart $aver program has exceeded its

[12] With the new vendor, the quality assurance process has changed: For the randomly selected sample of the approved applications, the site verification must be completed before the incentive checks are sent out.
[13] To date, no trade ally has ever been permanently removed from the program.

participation in past years.[14] The product manager reports that the Smart $aver program is meeting its goals and anticipates that the program will remain equally successful in the future. The product manager also acknowledges that the high participation in 2010 was partly fueled by the availability of federal stimulus funds, but the program still was able to exceed its goals in 2011. He reports, "*There was an effect of the stimulus funds, but the program sustained its momentum from the early years.*"

The product manager reports that feedback through the trade ally network is that "*the program is easy to use and valuable.*" Furthermore, the product manager believes that there are lasting effects on the market due to the influence of the Duke Energy program and the federal stimulus funds, "*I think that energy efficiency is becoming greater in the awareness of the market, ranging from the manufacturer to the customer...encouraging manufacturers to produce more units.*"

Program Improvements

At the time of these interviews in April of 2012, Duke Energy is in the process of developing additional tools and marketing materials for the trade allies through their new vendor. They are also developing an online web portal so that trade allies can view their past performance, with parts of the portal already operational.

The Duke Energy product manager says that Duke Energy reviews the efficiency levels and incentives levels for Smart $aver on a regular basis. Currently, they are looking at efficiency levels of the measures and tiered incentives as opposed to flat incentives, with input from the trade allies.

The product manager reports that Duke Energy is continually evaluating the possibility of offering an early retirement program, in which customers are offered an incentive to upgrade to a higher efficiency measure before their existing system has reached its end of life. In addition, Duke Energy is considering ways to help customers in all their programs with financing of energy efficient retrofits.

At the time of these interviews, Duke Energy has submitted a regulatory filing to request the addition of new measures to the Smart $aver program in the Carolinas system, including AC and heat pump tune ups, duct sealing, duct insulation, and attic insulation and air sealing, each with their own program goals. Duke Energy also continually considers emerging technologies such as ductless mini-split HVAC systems, and has internally developed a prioritized list of new technologies that will undergo internal assessment for potential future inclusion in Smart $aver.

Summary

Duke Energy's Smart $aver program is a solid, well-run legacy program with a strong trade ally network to support Duke Energy's program goals. Although this program has only been offered

[14] See "Evaluation of the 2009 Residential Smart $aver® Program in North and South Carolina: Results of a Process Evaluation". (TecMarket Works, 2011)

since 2009 in the Carolinas, Duke Energy has successfully leveraged their experience from implementing the Smart $aver program in the Midwest, where the program has been offered for almost 15 years.

At this point, since the vendor contract has been awarded to a new vendor, the evaluation team does not have any new recommendations to offer. The past evaluation of the 2009 Smart $aver program included recommendations to consider early retirement marketing, tiered incentives, and to consider pilot testing new HVAC technologies. All of these recommendations are being considered through Duke Energy's existing program planning process, and Duke Energy is working with the regulators in both states to offer more measures to their customers.

The Duke Energy product manager has proactively suggested that Duke Energy is interested in conducting an evaluation of the Smart $aver with the new implementation vendor so that they can see whether any process recommendations are warranted with the new vendor. We recommend that unless program performance deviates significantly from the historical pattern, the new vendor be allowed at least one year of experience before launching a formal evaluation. The new implementation vendor has inherited a solid program with a strong trade ally network, high customer interest and a continued need for the program, and should be expected to maintain historical levels of performance.

Trade Ally Interviews

Twenty-one Residential Smart $aver® trade allies were interviewed in June of 2012. All of the interviews were conducted with a sales manager within the firm or an equivalent representative. Each of the respondents indicated that they are the individual within their company who has the most experience and is the most acquainted with the program. The interview protocol used during these interviews can be found in Appendix B: Trade Ally Interview Instrument.

The interviews were written to cover various aspects of the program, such as program operations, aspects of trade allies' involvement, incentive levels applied, covered technologies, and program effects from the trade allies' perspectives. The results of the process interviews are reported by the response categories presented below.

Program Materials

We asked the trade allies if they had enough program materials such as brochures, applications, and program documentation to effectively sell the program to their customers. All twenty-one allies indicated that they had enough program forms and applications. Six trade allies (29%), four in South Carolina and two in North Carolina, said that they had never seen any consumer marketing material from Duke Energy, but they weren't sure if it was needed. All trade allies said that the majority of customers learn about the Smart $aver program from the trade allies.

Problems That Have Come Up

The majority of trade allies interviewed (16 out of 21, or 76%) said that their experiences with the program were free of any problems and that they were pleased with the program.

Five of the trade allies mentioned that the wait time for some incentives seemed longer in the last few months. Four of the five trade allies also reported that they had been informed by Duke Energy of a change in program vendor to GoodCents, and they believed this wait for incentives occurred during the transition.

When we asked about customer complaints from the trade allies' perspective; in response to our question, trade allies reported that there have been very few customer complaints.

Wait Time for Incentive

The length of time that passes from when the application forms are submitted, to the arrival of the rebate check are described as reasonable by all 21 trade allies. The stated average length of time to wait for a rebate check varied very little from 2 to 3 weeks[15]. While this evaluation did not confirm the wait times by reviewing the application dates and the date of the rebate distributions, past experience in these types of studies indicate that contractors and customers expect rebates to be promptly processed and paid and that wait times of a couple of weeks are acceptable, however wait times of longer than a couple of weeks begins to impact satisfaction scores.

[15] Earlier in the report, it was indicated that the total processing time from application to approval to the time the incentive checks were sent out was 8 business days. This 2-3 week wait time is reasonable given that it includes sending in the application, application processing, and receiving the rebate check in the mail.

What About Residential Smart $aver Works Well

Each interviewed trade ally was asked what they think works well about the program. This question was then followed with a question about what changes should be made to the progam.

Twelve out of twenty-one trade allies mentioned ease of use and ease of filling out the rebate forms as an aspect of Residential Smart $aver that works well. Further, five trade allies noted that the ease of forms allowed them to maximize their time selling equipment rather than filling out forms.

Seven of the trade allies mentioned the relatively quick turnaround in rebate checks as a very positive aspect of the program.

All trade allies interviewed see the program as a way to encourage customers to upgrade their air conditioning or heat pump to a higher efficiency level.

What Should Change about Residential Smart $aver

The responses to the question of what should be changed varied among the trade allies, with some trade allies providing multiple responses. One of the common responses received is that trade allies would like to submit online applications, although it was noted that the form process currently works well. It should also be noted that Duke Energy recently posted an online application form that trade allies may not have been aware of at the time of the interviews for this report.

Communications with Duke Energy Staff

All of the trade allies interviewed said that communication with Duke Energy staff was fine, though limited. All trade allies said that they were very satisfied with Duke Energy's responses to their questions.

Customer Awareness of Residential Smart $aver

Trade allies were asked how they made customers aware of the Residential Smart $aver® program and then to describe the customers' initial reaction to the program.

All of the trade allies said they tell their customers about the program during normal sales communications and present it as a way to achieve savings on their utility bills as well as their upfront costs. All trade allies said that customers respond positively to the idea of the incentive.

All twenty-one trade allies said that the majority of their customers were not aware of the Residential Smart $aver® program before it was presented to them by the trade ally.

Why Trade Allies Participate

Why trade allies participate varies from the basic (increased sales/profit) to the altruistic (doing the right thing for their customers). Trade allies' individual responses include:

- "Our salespeople love it."

- "Everything helps in this economy."
- "We want to make sure people's houses and the planet stay comfortable. This helps us achieve both goals."
- "I'm not sure about return business, yet, but our customers seem really happy with the products."
- "It's more feel-good than a profit maker, but it certainly doesn't hurt."

Program Technologies and Incentives

We also talked to the trade allies about the technologies offered in the program, and the incentives that are provided.

Technologies and Equipment Covered

Three out of the 21 interviewed trade allies mentioned that they thought ground source heat pumps should no longer be incentivized through the Residential Smart $aver program. Two of these trade allies stated that they had researched selling ground source heat pumps but had decided against it because of the difficulty in determining the feasibility of the system for a particular property, and the need for subcontracting services for the installation of the ground coil. One trade ally had installed ground source heat pumps and found that because of the complexity of the installation process, customer satisfaction varied greatly and it was impossible to guarantee energy savings. All three trade allies also indicated that they believed current technologies such as inverter heat pumps and ductless mini-split systems to be superior to ground source systems in terms of customer satisfaction and reliable energy savings estimates.

Incentive Levels

Eighteen of the trade allies interviewed indicated that they were satisfied with the current incentive levels and distribution. Of the three that indicated they weren't satisfied, one trade ally indicated that he thought the dealer incentive should equal the current customer incentive, and two trade allies said that they used the dealer incentive to cut the customer costs even further, so they would prefer the entire incentive be sent to the customer.

Other Technologies That Should Be Included

A majority (13 out of 21) of the trade allies mentioned that they thought ductless air conditioning units and handlers should be considered for the program – eight trade allies in North Carolina and five in South Carolina mentioned the technology. One trade ally in South Carolina also mentioned that on-demand water heaters should be considered for the program, though this would provide gas savings, not electric savings. In addition, this measure does not fit into this program, which is designed for HVAC measures.

Program Results

We asked the trade allies about the benefits of their participation in the program to them and to their customers, and how the program has altered their business by changing what equipment they offer. None of the contractors have made significant changes to their marketing strategies because of the program. Their goal is to obtain the best price and quality for their customers. The incentives mean that they can push the energy efficient units at a reduced price allowing

more customers to obtain immediate and lasting savings. These findings are consistent with the program theory to increase market penetration via rebates and incentives.

Residential Smart $aver's Influence to Carry Other Energy Efficient Options

Four of the twenty-one trade allies, two in each state, said that the influence of the program has resulted in their businesses carrying other energy efficient equipment not covered by the program. One trade ally mentioned that high customer satisfaction and reports of energy savings with Smart $aver energy efficient qualified products led him and his staff to explore even newer, more efficient technologies to offer.

The remaining seventeen trade allies did note that they do carry more energy efficient products now than before the program started, but that the increase has more to do with a general move of their firm toward offering energy efficiency rather than the specific program's influence.

Five trade allies also noted that their sales staff has become more knowledgeable about the energy efficient models and items that they carry because of increased interest attributable to the program, which in turn may increase the sales staff's ability to sell more efficient products to all customers, both participants and non-participants.

Market Impacts and Effects

Trade allies were asked what percentage of Residential Smart $aver buyers are replacing older equipment that is still functional and what percentage of buyers are replacing failed units. On average, the 21 allies indicated that that 24 percent of participants were replacing functional but less efficient equipment, while 76 percent were replacing failed equipment. This average is in line with previous estimates from trade allies[16].

All 21 trade allies also indicated that they have fewer calls to correct problems with Residential Smart $aver appliances, but several allies noted that this may be because of the relatively young age of the rebated equipment.

Program's Influence on Business Practices

We asked the contractors if their business would change if the Residential Smart $aver program were no longer offered. We posed the question: *"If the program were to be discontinued, what would happen to the volume of sales of the high efficiency models?"* All 21 trade allies indicated that sales would decline. Specific responses include:

- "We'd see a drop for sure. We'd feel it."
- "A lot of people that come in with failed units are moving up in efficiency regardless, so it's important to get that final push to get to the most efficient."

[16] As reported in "Evaluation of the 2009-2010 Residential Smart $aver® HVAC Program in North and South Carolina", dated January 27, 2012.

- "I can tell you right now I'd order 20 percent less 14 SEER units."
- "We're committed to energy efficiency, so we'd find a way, but the bottom line is our sales would decline."

Fifteen of the trade allies, nine in North Carolina and six in South Carolina, said they would change their high efficiency model pricing structure if the program were no longer available.

Continuing Need for the Program

We asked the trade allies if they thought that the program was still needed. All of the interviewed trade allies said yes. All trade allies considered the Residential Smart $aver program an essential sales tool for energy efficient equipment.

Participant Surveys

Participation in Duke Energy's HVAC Smart $aver Program

As indicated in Table 2, 68.4% (128 out of 187) of survey respondents received a Smart $aver rebate for installing at least one new heat pump, while 32.1% (60 out of 187) received a rebate for installing at least one new central air conditioning system.

A notable minority of respondents (9.6% or 18 out of 187) received multiple rebates, usually for two heat pumps (7.5% or 14 out of 187), though there were also respondents who received two central air conditioner rebates (1.6% or 3 out of 187) and one case where a respondent received one of each type of rebate (0.5% or 1 out of 187). The distribution of the two types of rebates was consistent across states.

Table 2. Type of rebates received, by state

Measure	NC N=93	SC N=94	Total N=187
One Heat Pump	62.4%	58.5%	60.4%
One Central Air Conditioning	29.0%	30.9%	29.9%
Two Heat Pumps	6.5%	8.5%	7.5%
Two Central Air Conditioning	1.1%	2.1%	1.6%
One Heat Pump and One Central Air Conditioning	1.1%	0.0%	0.5%
At least one Heat Pump	69.9%	67.0%	68.4%
At least one Central Air Conditioning	31.2%	33.0%	32.1%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

In order to keep the groups distinct, differences between types of rebate redeemers are reported for those who received rebates exclusively for heat pumps, and those who received rebates exclusively for central air conditioners. This results in a single case of a respondent receiving both types of rebates being dropped from these tables.

As seen in Table 3, respondents claiming both of these types of rebates are evenly distributed across states (50.4% or 64 out of 127 heat pump redeemers in this study live in North Carolina, while 47.5% or 28 out of 59 central air conditioning redeemers live in North Carolina, and the total sample is 49.5% or 92 out of 186 North Carolinians).

Table 3. Distribution of rebates across states

State	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
North Carolina	50.4%	47.5%	49.5%
South Carolina	49.6%	52.5%	50.5%

Note: One respondent who received both types of rebate was not included in this table.

Awareness of the Smart $aver Program

As seen in Table 4, nearly all of the survey respondents recall participating in the rebate program on an unaided basis (95.7% or 89 out of 93 in North Carolina, and 100% or 94 out of 94 in South Carolina).

Table 4. Awareness of Smart $aver

State	Unaided recall of Smart $aver Program		Aided recall of Smart $aver Program	
	Yes	No/ Don't Know	Yes	No/ Don't Know
NC (N=93)	95.7%	4.3%	100.0%	0.0%
SC (N=94)	100.0%	0.0%	100.0%	0.0%
Total (N=187)	97.9%	2.1%	100.0%	0.0%

Table 5 shows that most participants became aware of the Smart $aver program from a trade ally (87.7% overall, or 164 out of 187). Advertising (6.4% or 12 out of 187), brochures from Duke Energy (2.7% or 5 out of 187), and the Duke Energy website (2.1% or 4 out of 187) were more marginal sources of awareness. None of the differences in this table are significant (at $p<.10$ level).

Table 5. Source of Awareness of the Program by State

Response	NC N=93	SC N=94	Total N=187
From a trade ally	87.1%	88.3%	87.7%
Other source	9.7%	8.5%	9.1%
Advertising	8.6%	4.3%	6.4%
Brochure from Duke Energy	2.2%	3.2%	2.7%
Duke Energy Web site	2.2%	2.1%	2.1%
Don't Know/Can't Recall	1.1%	2.1%	1.6%

Note: Multiple responses were accepted for this question; rows total more than 100%.

As indicated in Table 6, there were only marginal differences in source of awareness of the program when analyzed by the type of rebate received; trade allies are consistently the most frequently mentioned sources of awareness. None of the differences in this table are significant (at $p<.10$ level).

Table 6. Source of Awareness of the Program by Rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
From a trade ally	89.0%	84.7%	87.6%

Other source	10.2%	6.8%	9.1%
Advertising	7.1%	5.1%	6.5%
Brochure from Duke Energy	3.9%	0.0%	2.7%
Duke Energy Web site	2.4%	1.7%	2.2%
Don't Know/Can't Recall	0.8%	3.4%	1.6%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

The third most frequently mentioned specific source of awareness of Smart $aver was advertising, with only 6.4% (12 out of 187). The specific types of advertising respondents recalled by participants are characterized below.

- 6 respondents (3.2% of 187) mentioned newspapers and/or magazines
- 4 respondents (2.1% of 187) mentioned TV
- 3 respondents (1.6% of 187) mentioned in-store promotions
- 1 respondents (0.5% of 187) mentioned a mailing
- 1 respondents (0.5% of 187) recalled advertising, but could not recall the source

Note: The number of responses adds up to more than 12 because respondents could offer multiple sources of advertising.

There were also several uncategorized mentions of "other" sources of information about Smart $aver, mentioned by 9.1% (17 out of 187) of survey respondents, which are characterized below.

- 8 respondents (4.3% of 187) mentioned a friend or family member
- 3 respondents (1.6% of 187) mentioned state or federal government web sites
- 1 respondent (0.5% of 187) mentioned an energy assessment from Duke Energy
- 1 respondent (0.5% of 187) mentioned calling Duke Energy
- 1 respondent (0.5% of 187) mentioned having seen something with their monthly bill
- 1 respondent (0.5% of 187) mentioned having participated in a similar program in the past
- 1 respondent (0.5% of 187) mentioned an E-mail (source unspecified)
- 1 respondent (0.5% of 187) mentioned "hearing something on TV"

Gathering Information about Duke Energy's Smart $aver Program

Once aware of Smart $aver, program participants generally did not seek additional information. Overall, 87.2% (163 out of 187) felt they had enough information about the program, and only 14.4% (27 out of 187) sought out more information.

Three out of 187 survey respondents (1.6%) said that the information provided was adequate to make a participation decision, however they sought additional information anyway, while another 3 respondents (1.6% out of 187) could not recall whether or not they sought more information.

Table 7. Did you do any additional investigation to confirm the program's offering? (by state)

	NC N=93	SC N=94	Total N=187
Total not needing additional info	82.8%	91.5%	87.2%
The information provided was adequate	81.7%	84.0%	82.9%
Didn't need to confirm anything	1.1%	10.6%	5.9%
Total seeking additional info	18.3%	10.6%	14.4%
Other	6.5%	4.3%	5.3%
Called or emailed Duke Energy	3.2%	5.3%	4.3%
Went to the Duke Energy web site	5.4%	2.1%	3.7%
Called or emailed a trade ally	6.5%	1.1%	3.7%
Don't Know/Can't Recall	1.1%	2.1%	1.6%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Ten out of 187 survey respondents (5.3%) volunteered "other" forms of investigation into Smart $aver, which are characterized below.

- 4 respondents (2.1% of 187) mentioned talking to another person (friend, family member, accountant)
- 3 respondents (1.6% of 187) mentioned doing Internet research (other than on Duke Energy's web site)
- 2 respondents (1.1% of 187) said they should have done more investigation, but really didn't
- 1 respondent (0.5% of 187) was not aware of the program until after the unit was installed

Of those who did seek out more information, 85.2% (23 out of 27) felt they were able to acquire a more complete understanding of the program. Overall, after seeking additional information if needed, only 2.1% (4 out of 187) of all survey respondents felt they still had unanswered questions about Smart $aver.

Table 8. Acquiring a more complete understanding of the program by seeking additional information, and unanswered questions about the program, by state

Base: survey respondents who sought additional information	**NC** N=17	**SC** N=10	**Total** N=27
Was able to acquire a more complete understanding of the program	88.2%	80.0%	85.2%
Was NOT able to acquire a more complete understanding	11.8%	20.0%	14.8%
Base: all survey respondents	**NC** N=93	**SC** N=94	**Total** N=187
Had additional questions that were not answered	1.1%	3.2%	2.1%

These are the verbatim responses of the four Smart $aver participants in this survey who said their questions were not answered:

- *"I had questions on how many tax credits we would be eligible for. I had added a third heat pump when we moved in to the two that were already there. We replaced the two old ones when they died; soon thereafter the pump we added failed. The contractor had not properly evaluated how much the third heat pump would need to operate, and as such it burned out in a couple of years."*
- *"In many cases, I didn't even have questions, much less answers. Now I have most of the things answered. I just went with what the contractor told me about the programs for rebates on both heat pumps (Duke Energy) and gas furnaces (other utility). Not all the answers from the contractor were accurate, but we were both learning as we went along."*
- *"In the installation process, I had a load control unit (Power Manager) removed. There was disagreement between Duke and the contractor over who would reinstall it. Duke subsequently removed it 2-3 months ago and has not said if/when it will be reinstalled."*
- *"I had questions about rates and the geothermal units."*

Overall, 88.2% (165 out of 187) of participants did not contact Duke Energy with questions during their participation in the Residential Smart $aver program as indicated in Table 9. Only 1.6% (3 out of 187) reported that they contacted Duke Energy and did not have their questions handled effectively, while 10.2% (19 out of 187) reported contacting Duke Energy and having their questions handled effectively. (Of the 22 participants in this survey who contacted Duke Energy, overall 19 (86.4%) reported that Duke Energy handled their questions effectively.)

Table 9. Contacting Duke Energy while participating in Smart $aver, by state

	NC N=93	SC N=94	Total N=187
Contacted Duke Energy during participation in Smart $aver and questions were handled effectively	9.7%	10.6%	10.2%
Contacted Duke Energy during participation in Smart $aver and questions were NOT handled effectively	1.1%	2.1%	1.6%
Did not contact Duke Energy during participation in Smart $aver (including "don't know")	89.2%	87.2%	88.2%

Table 10 indicates similar results for both heat pump and central air conditioning rebate redeemers (no statistically significant differences at $p<.10$ level), although all three respondents in this survey whose questions were not handled effectively by Duke Energy received heat pump rebates (2.4% or 3 out of 127 heat pump rebate recipients, versus 0.0% or 0 out of 59 for central air conditioning rebate recipients).

Table 10. Contacting Duke Energy while participating in Smart Saver, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Contacted Duke Energy during participation in Smart $aver and questions were handled effectively	11.0%	8.5%	10.2%
Contacted Duke Energy during participation in Smart $aver and questions were NOT handled effectively	2.4%	0.0%	1.6%
Did not contact Duke Energy during participation in Smart $aver (including "don't know")	86.6%	91.5%	88.2%

Note: One respondent who received both types of rebate was not included in this table.

Of the three participants who reported that Duke Energy did not effectively answer their questions about Smart $aver, two blamed the web site while one mentioned customer service agents. The verbatim responses of these three participants are listed below:

- *"Make sure Duke's customer service agents are better-versed on types of heating/AC units."*
- *"Some of the explanations on the web site were too technical."*
- *"Web site didn't answer my questions - needed contractor to do more follow-up on what to do with the receipts."*

Receiving Rebates for Participation in Smart $aver

When it came to filling out the incentive forms for Smart $aver, the pattern is very similar to where respondents indicated they first became aware of the program: most mentioned trade allies (80.7% or 151 out of 187).

Only 12.3% (23 out of 187) of program participants filled out the forms themselves. Among those who did fill out the form, 95.7% (22 out of 23) found the form easy to understand.

Two respondents in South Carolina (2.1% of 94) mentioned someone from Duke Energy filling out the forms, and none (0.0% out of 93) mentioned Duke Energy employees in North Carolina.

Table 11. Who filled out the incentive forms, by state

	NC N=93	SC N=94	Total N=187
Trade allies	79.6%	81.9%	80.7%
Survey respondent ("I did")	14.0%	10.6%	12.3%
A family member	6.5%	4.3%	5.3%
Someone from Duke Energy	0.0%	2.1%	1.1%
Don't know	0.0%	1.1%	0.5%
Of those who filled out the incentive form themselves:	N=13	N=10	N=23
Incentive form was easy to understand	100%	90.0%	95.7%

As seen in Table 12, there were no significant differences (at $p<.10$ level) between heat pump and central air conditioning rebate redeemers when it came to who filled out the forms.

Table 12. Who filled out the incentive forms, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Trade allies	80.3%	81.4%	80.6%
Survey respondent ("I did")	11.8%	13.6%	12.4%
A family member	5.5%	5.1%	5.4%
Someone from Duke Energy	1.6%	0.0%	1.1%
Don't Know/Can't Recall	0.8%	0.0%	0.5%
Of those who filled out the incentive form themselves:	N=15	N=8	N=23
Incentive form was easy to understand	100%	87.5%	95.7%

Note: One respondent who received both types of rebate was not included in this table.

Table 13 shows that trade allies were also the most likely to submit the incentive forms for Smart $aver participants in this study (67.9% or 127 out of 187). However, the program participants themselves were more likely to submit the forms themselves (24.6% or 46 out of 187) than to fill them out themselves (12.3% or 23 out of 187, as seen in Table 11). None of the Smart $aver survey respondents indicated that someone from Duke Energy submitted their forms for them (0% out of 187).

Table 13. Who submitted the incentive forms by state

	NC N=93	SC N=94	Total N=187
Trade allies	64.5%	71.3%	67.9%
Survey respondent ("I did")	29.0%	20.2%	24.6%
A family member	5.4%	6.4%	5.9%
Don't know	1.1%	2.1%	1.6%
Someone from Duke Energy	0.0%	0.0%	0.0%

Overall, 90.9% (170 out of 187) of program participants reported no problems receiving their rebates and nearly half (47.1% or 88 out of 187) were certain they received additional federal or state tax credits as well. However, a significantly larger proportion of South Carolina residents were not sure if they received additional tax credits (23.4% or 22 out of 94 South Carolinians, versus 9.7% or 9 out of 93 North Carolinians).

Table 14. Receiving rebates and tax credits, by state

	NC N=93	SC N=94	Total N=187
Did NOT have problems receiving the rebate	92.5%	89.4%	90.9%

Had problems receiving the rebate	7.5%	8.5%	8.0%
Don't know	0.0%	2.1%	1.1%
Received state or federal rebate as well	51.6%	42.6%	47.1%
Did NOT receive state or federal rebate as well	38.7%	34.0%	36.4%
Don't know	9.7%	23.4%	16.6%

Similarly, Table 15 shows no problems receiving the rebate for the overwhelming majority of heat pump (91.3% or 116 out of 127) and central air conditioning (89.8% or 53 out of 59) rebate recipients. Similar percentages are certain they received state or federal tax rebates as well (46.5% or 59 out of 127 for heat pumps and 47.5% or 28 out of 59 for central air conditioning), however more central air conditioning rebate recipients were unsure if they received a government rebate (23.7% or 14 out of 59 for central air, versus 13.4% or 17 out of 127 for heat pumps).

Table 15. Receiving rebates and tax credits, by rebate

	Redeemed HP rebate N=127	**Redeemed CAC rebate** N=59	**Total** N=186
Did NOT have problems receiving the rebate	91.3%	89.8%	90.9%
Had problems receiving the rebate	7.1%	10.2%	8.1%
Don't know	1.6%	0.0%	1.1%
Received state or federal rebate as well	46.5%	47.5%	46.8%
Did NOT receive state or federal rebate as well	40.2%	28.8%	36.6%
Don't know	13.4%	23.7%	16.7%

Note: One respondent who received both types of rebate was not included in this table.

Fifteen respondents (8.0% of 187) reported that they had a problem receiving their Smart $aver HVAC rebate. Their verbatim descriptions of these problems are categorized and listed as follows:

- 9 out of 15 respondents (60.0%) mentioned having to submit paperwork more than once, or having to follow-up on paperwork submissions:
  - *"I had to fill out the paperwork a second time."*
  - *"I submitted it and after almost 6 months of not hearing anything, I contacted Duke and they said they had no record of an application having been received. I called my contractor and asked them to investigate. One month later, the rebate check arrived."*
  - *"My contractor had to call Duke back to follow up. There was a bit of a mix-up in the information that the contractor gave to Duke, so it took a little longer than expected."*
  - *"The A/C sales company sat on the paperwork, so I had to remind them to submit it."*
  - *"The process took two submissions. Duke returned one application, saying the form wasn't completely filled out because it was missing the registration date, but the date was on the next page and they didn't see it."*
  - *"The salesperson filled out the form incorrectly and had to do it over, but it was straightened out eventually."*
  - *"There was a little bit of a delay. The information said the rebate would come within 6 to 8 weeks. The unit was installed in late June. The forms were submitted by mid-July. I e-mailed Duke and received no response. I called and received a call back a few days later."*
  - *The salesperson or equipment supplier didn't turn it in on time, so I had to follow up with them."*
  - *"The forms were easy to fill out, but the web site information about the process was as vague as you could get. I had to contact my contractor and get an additional receipt and form. The contractor couldn't send it in; they didn't have my Duke customer number or forms, so I downloaded those from the Duke web site."*

- 5 out of 15 respondents (33.3%) mentioned problems with addresses or names on rebates mailings:
  - *"Duke at first sent the rebate to the wrong name, and had to reissue the check."*
  - *"I still had my deceased husband's name as the billing contact. Once I updated that information, everything was resolved satisfactorily."*
  - *"Our lot number was mistaken for an apartment number, which held up the rebate."*
  - *"The check initially arrived in my late husband's name. I asked for and received a check in my name."*
  - *"We first sent it to Duke under my name, but then had to change it to my wife's name."*

- 1 out of 15 respondents (6.7%) said they were misled about the amount of the rebate:
  - *"The salesperson said we could get $500, but we only got $200."*

Overall Customer Satisfaction with the Residential Smart $aver Program

As summarized in Table 16, considering all aspects of the Smart $aver program, 88.2% (165 out of 187) of participants in our survey rated their satisfaction with the program at "8" or higher on a 10-point scale, while only 0.5% (1 out of 187) participants rated their satisfaction at "4" or lower.

Table 16. Summary of satisfaction with Smart $aver, by state

	NC N=93	SC N=94	Total N=187
Very satisfied with Smart $aver ("8" or higher on 10-point scale)	87.1%	89.4%	88.2%
Not completely satisfied with Smart Saver ("5" to "7" on 10-point scale)	12.9%	9.6%	11.2%
Dissatisfied with Smart Saver ("4" or lower on 10-point scale)	0.0%	1.1%	0.5%

As Figure 1 indicates, a strong plurality of the Smart $aver participants in this survey rated their overall satisfaction with the program as a "10 out of 10" (overall 47.6% or 89 out of 187). There was a significant difference in the percentage of respondents giving the program a "10" rating by state; only 40.9% (38 out of 93) of North Carolinians rated Smart $aver a "10", versus 54.3% (51 out of 94) in South Carolina (statistically significant at $p<.05$ level using student's t-test). However, there were no significant differences between heat pump and central air conditioning rebate redeemers.

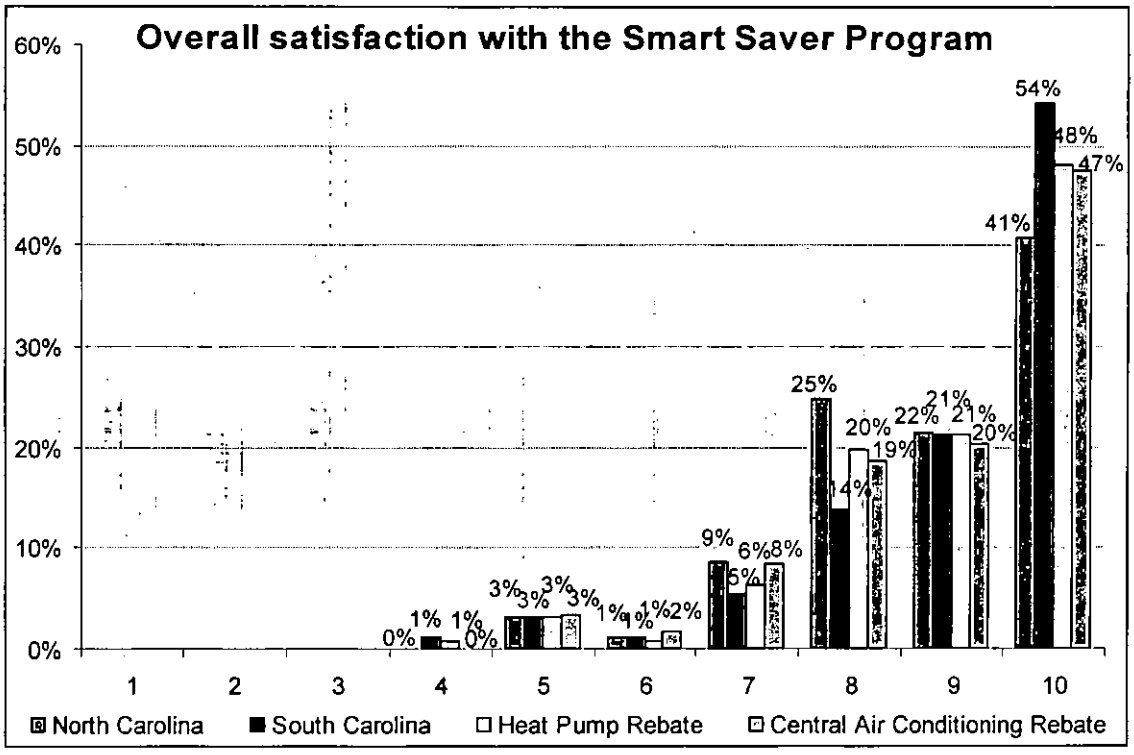

Figure 1. Respondent's overall satisfaction ratings for the Smart $aver program
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Twenty-two respondents (11.8% of 187) gave a rating of "7" or lower for their overall experience participating in the Smart $aver program. Their suggestions for what could be done to make the experience better are characterized below.

- 18 respondents (9.6% of 187, or 81.8% of the 22 respondents who rated this aspect of the program a "7" or lower) had nothing to add to their previous suggestions about specific aspects of the program (see next section).
- These were the verbatim responses of the four respondents who had something to add:
  - *"I would like to see ongoing bill credits for energy decisions."*
  - *"The form is targeted to the contractor. I needed help from the contractor to fill it out."*
  - *"The rebate wasn't large enough."*
  - *"There could have been more information about the program."*

Customer Satisfaction with Specific Aspects of Smart $aver

Most Smart $aver participants were very satisfied with this program, as measured by rating their satisfaction with different elements of the program on a 1 to 10 scale. As Table 17 summarizes, satisfaction was rated at "8" or higher on a 10-point scale by 85.6% (160 out of 187) for the time it took to receive the rebate, and at "8" or higher by 80.2% (150 out of 187) for the information they were provided explaining the program.

Satisfaction was slightly lower for the amount of the rebate (70.1% or 131 out of 187 rating an "8" or higher), and the number and kind of technologies included in the program (69.5% or 130 out of 187 rating an "8" or higher).

Among the minority of participants who were involved in filling out the forms, satisfaction with the ease of filling out the forms was also very high (94.4% or 51 out of 54 giving a rating of "8" or higher).

Table 17. Summary of participant satisfaction with Smart $aver, by state

Percent of participants rating satisfaction as "8" or higher on 1-10 scale	NC N=93	SC N=94	Total N=187
The time it took to receive your rebate check	83.9%	87.2%	85.6%
The information you were provided explaining the program	78.5%	81.9%	80.2%
The amount of rebate provided by the program	63.4%	76.6%	70.1%
The number and kind of technologies covered in the program	76.3%	62.8%	69.5%
Percent of participants WHO WERE INVOLVED IN COMPLETING THE FORM rating satisfaction as "8" or higher on 1-10 scale	**NC** N=30	**SC** N=24	**Total** N=54
The ease of filling out the form to receive the rebate	93.3%	95.8%	94.4%

As Figure 2 indicates, although a "10 out of 10" was the most common response for all groups when asked to rate their satisfaction with the amount of rebate provided by their participation in Smart $aver, there were many respondents who rated their satisfaction at "7" or lower.

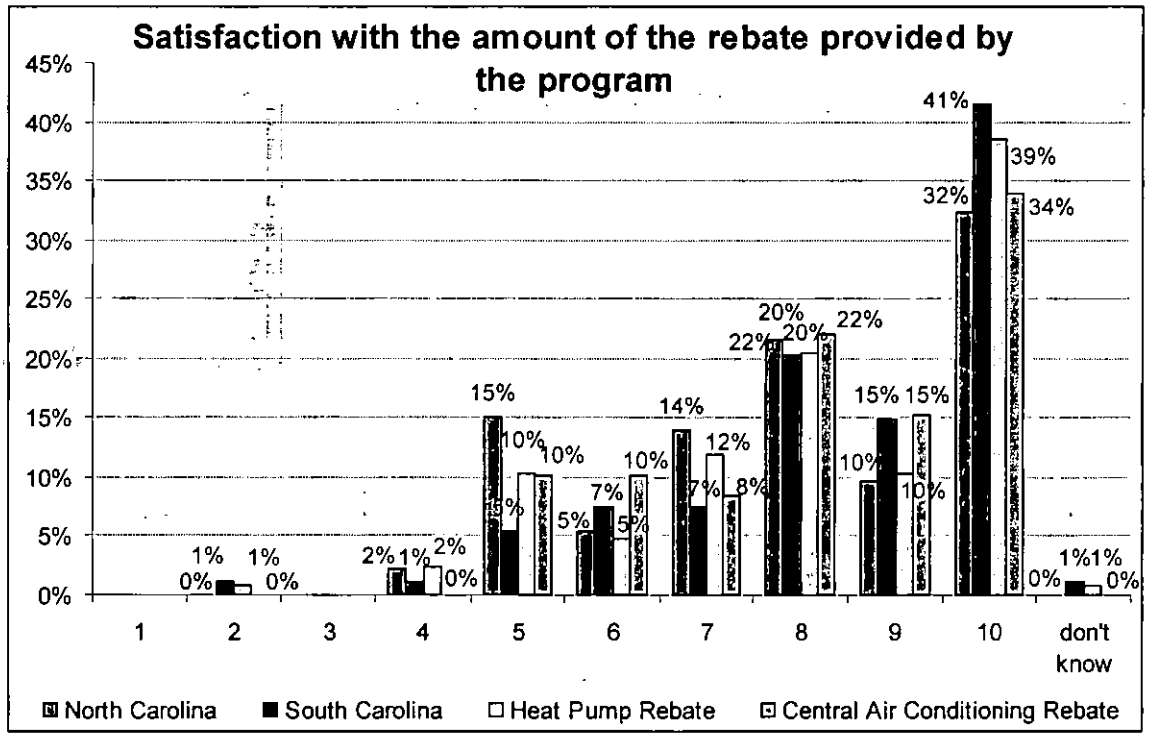

Figure 2. Respondent's satisfaction ratings for the amount of the rebate
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Respondents who rated their satisfaction with the amount of the Smart $aver rebate at "7" or lower on a 10-point scale were asked what could be done to make this aspect of the program better. Fifty-five (29.4% of 187) respondents rated this aspect of the program at "7" or lower, and their responses are characterized below. The most common reason for a lower rating was that respondents wanted bigger rebates (overall 23.5% or 44 out of 187 respondents in this survey said they felt the amount was not enough).

- 44 respondents (23.5% of 187) suggested the rebate should be larger (more money)
- 5 respondents (2.7% of 187) suggested the rebate amount should be scaled to a percentage of the cost of the new unit (bigger rebates for more expensive units)
- 2 respondents (1.1% of 187) claimed the current rebates are less than what was offered in the past
- 2 respondents (1.1% of 187) complained that the tax incentives weren't enough either
- 1 respondent (0.5% of 187) suggested older citizens should get larger rebates
- 1 respondent (0.5% of 187) complained that they had purchased two units but only received one rebate

- 3 respondents (1.6% of 187) did not have any suggestions or "accepted it for what it was"

Note: The number of responses adds up to more than 55 because respondents could offer multiple suggestions.

Figure 3 shows that among the 54 respondents in this survey who were involved in filling out forms (28.9% of 187), the majority of every subgroup rated the ease of filling out the forms at a "10" on a 10-point scale.

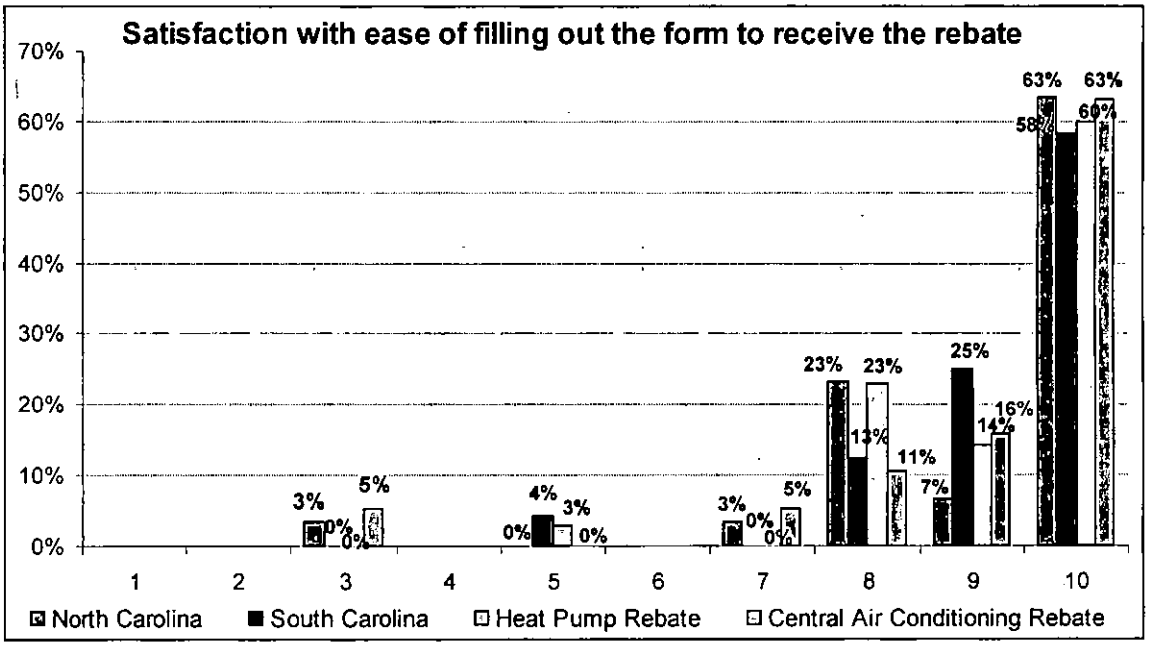

Figure 3. Respondent's satisfaction ratings for the ease of filling out rebate forms
(N=54 respondents who were involved in filling out Smart $aver forms)

Only three respondents (1.6% of 187, or 5.6% of the 54 respondents giving a rating for this aspect of the program) rated the ease of filling out the forms at a "7" or lower. Their suggestions for what could be done to improve this aspect of the program are listed below.

- 1 respondent (0.5% of 187) suggested that the verification process could be streamlined
- 2 respondents (1.1% of 187) did not have any suggestions

In Figure 4, once again the majority of respondents (overall 57.2% or 107 out of 187) rated the time it took to receive their rebate at a "10" on a 10-point scale.

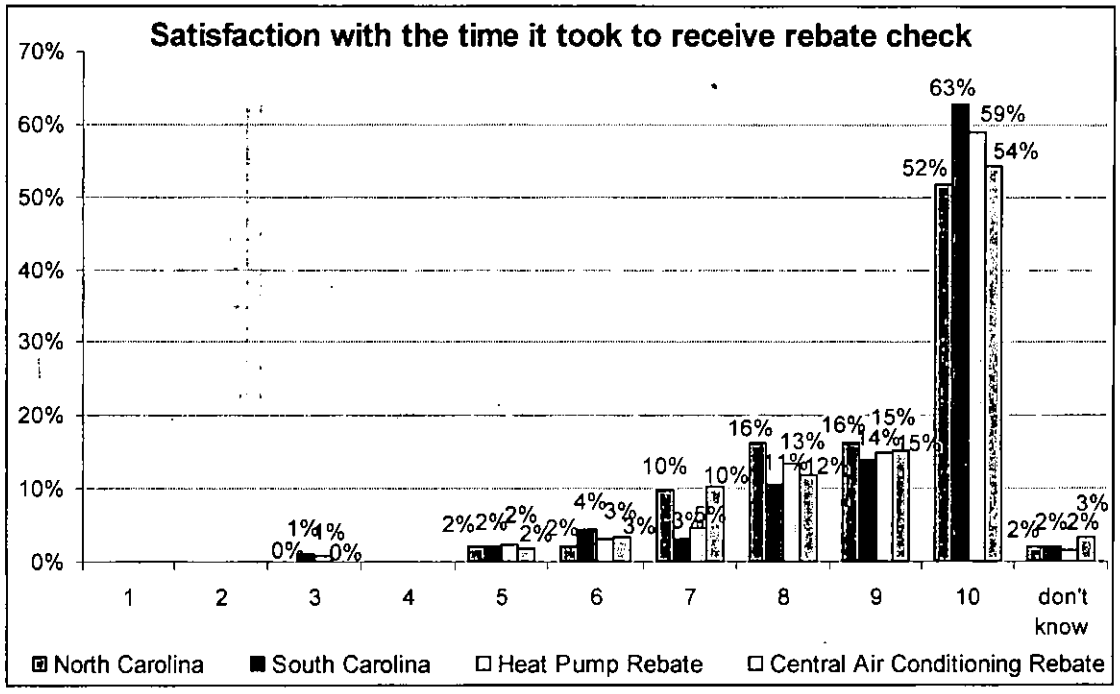

Figure 4. Respondent's satisfaction ratings for time it took to receive check
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Twenty-three respondents (12.3% of 187) gave a rating of "7" or lower for the time it took to receive their Smart $aver rebate. Their suggestions for what could be done to improve this aspect of the program are characterized below.

- 9 respondents (4.8% of 187) suggested that their rebates should have arrived more quickly
- 3 respondents (1.6% of 187) complained of problems with the contractor or installer
- 3 respondents (1.6% of 187) complained of inaccuracies with addresses or names on checks
- 2 respondents (1.1% of 187) wanted more immediate feedback after filing for the rebate
- 1 respondent (0.5% of 187) suggested that credit towards energy bills could be offered as an alternative to a rebate check
- 1 respondent (0.5% of 187) suggested the contractor or equipment supplier could pay participants their rebates right away, then get reimbursed by Duke Energy later
- 1 respondent (0.5% of 187) suggested using a tracking or reference number
- 1 respondent (0.5% of 187) suggested streamlining the paperwork process
- 5 respondents (2.7% of 187) did not have any suggestions

Note: The number of responses adds up to more than 23 because respondents could offer multiple suggestions.

Satisfaction with the number and kind of technologies covered by the Residential Smart $aver HVAC program is more mixed (this program only covered heat pumps and central air conditioning). Although a satisfaction rating of "10" on a 10-point scale was the most frequent response for all subgroups presented in Figure 5, only a third of the participants in this study gave a "10" for this aspect of the study (overall 33.7% or 63 out of 187). Respondents who claimed a heat pump rebate were more likely to give a "10" rating (37.0% or 47 out of 127) than those who claimed a central air conditioning rebate (27.1% or 16 out of 59; statistically significant at $p<.10$ level student's t-test).

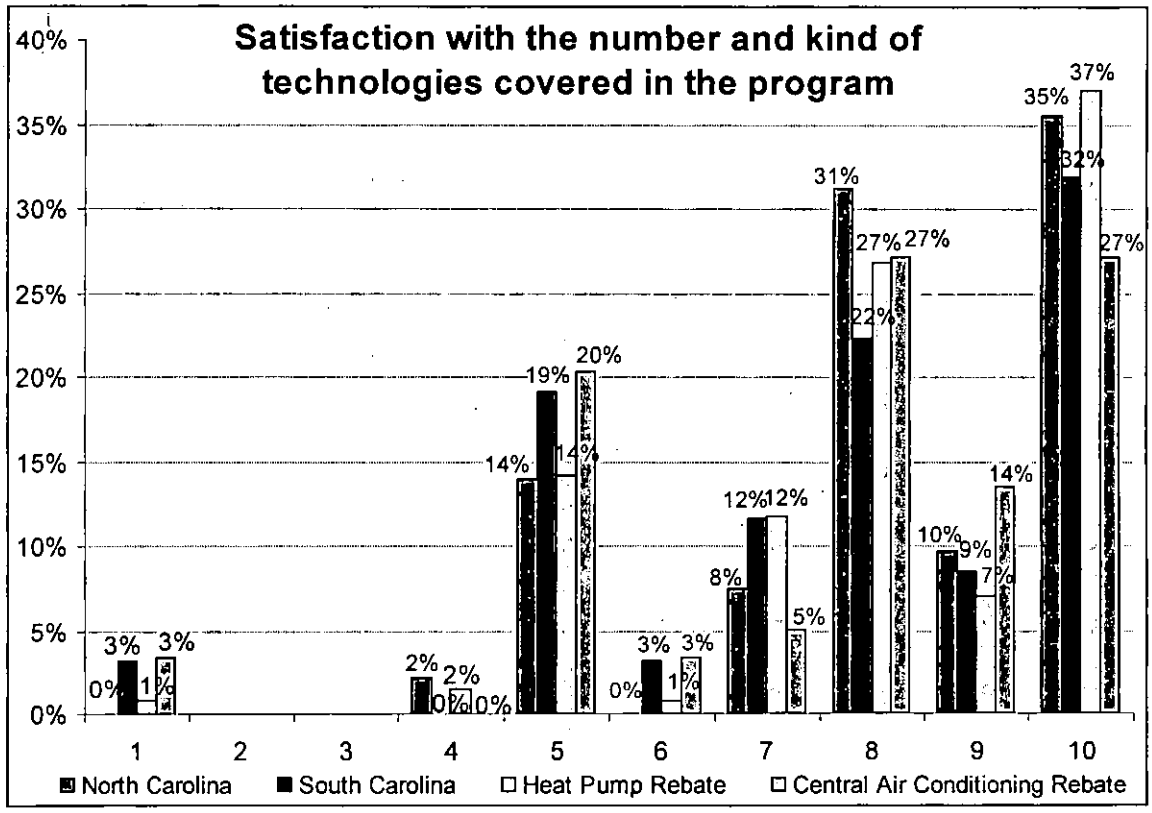

Figure 5. Respondent's satisfaction ratings for technologies included in program
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Fifty-seven respondents (30.5% of 187) gave a rating of "7" or lower for the number and kind of technologies covered in the Smart $aver program. Their suggestions for what could be done to improve this aspect of the program are characterized below, though most (59.6% or 34 out of 57) could not come up with any suggestions, and the next most frequent category of response was requests to receive more information about the program (14.0% or 8 out of 57).

- 8 respondents (4.3% of 187) said they wanted more information about what was included in the Smart $aver program
- 6 respondents (3.2% of 187) said more items and technologies should be covered in general (no specific item mentioned)
- 3 respondents (1.6% of 187) said they had made their purchase decision before learning that they qualified for Smart $aver (thus it was not a factor in their decision)
- 2 respondents (1.1% of 187) mentioned water heaters
- 2 respondents (1.1% of 187) mentioned stoves / ovens
- 1 respondent (0.5% of 187) mentioned washers / dryers
- 1 respondent (0.5% of 187) mentioned "items other than appliances"
- 1 respondent (0.5% of 187) complained that only "top-of-the-line" items were covered
- 1 respondent (0.5% of 187) reiterated that the amount of the rebate was insufficient
- 34 respondents (18.2% of 187) did not have any specific suggestions

Note: The number of responses adds up to more than 57 because respondents could offer multiple suggestions.

As Figure 6 indicates, nearly half of the respondents in this study rated their satisfaction with the information they received explaining the program at a "10" on a 10-point scale (overall 49.2% or 92 out of 187). There were significant differences between states and the between types of rebates received ($p<.05$ using student's t-test): 56.4% (53 out of 94) South Carolina respondents rated the program a "10" for information provided, versus 41.9% (39 out of 93) of North Carolinians; heat pump rebate recipients were also more likely to give a "10" rating (53.5% or 68 out of 127) compared to respondents who installed central air conditioning (40.7% or 24 out of 59).

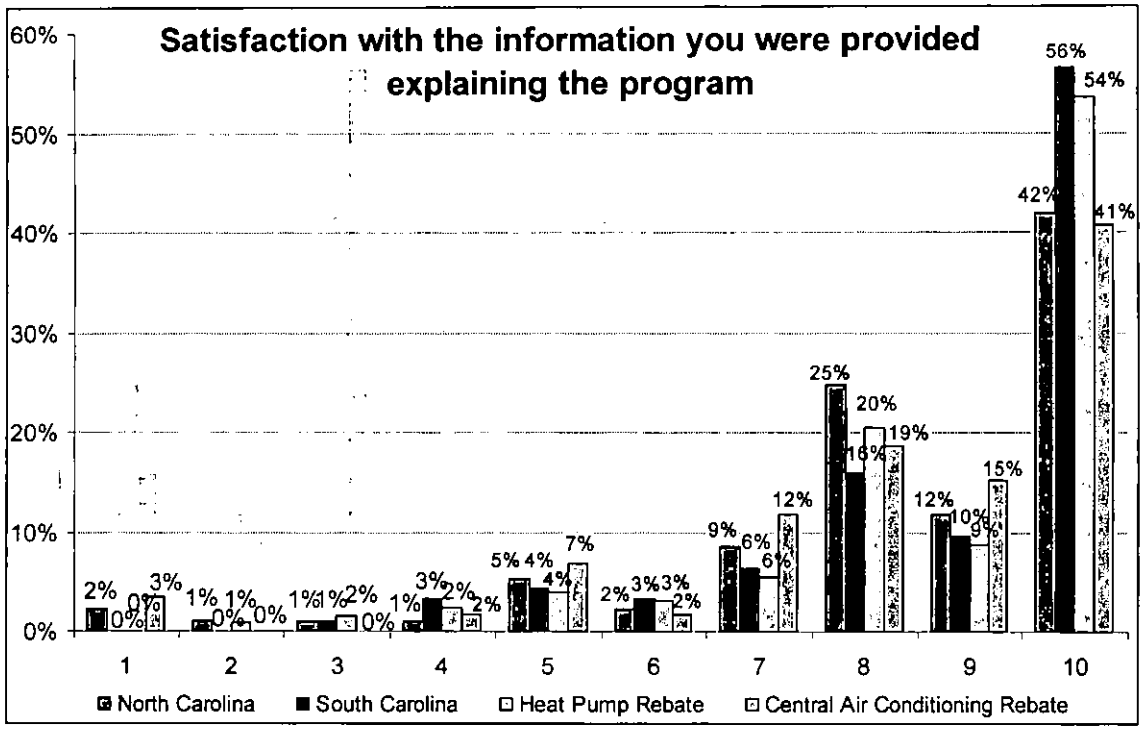

Figure 6. Respondent's satisfaction ratings for information explaining the program
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Thirty-seven respondents (19.8% of 187) gave a rating of "7" or lower for the information they were provided about the Smart $aver program. Their suggestions for what could be done to improve this aspect of the program are characterized below.

- 13 respondents (7.0% of 187) mentioned wanting more information about the program from Duke Energy
- 5 respondents (2.7% of 187) said they only heard about the program from the installer, not Duke Energy
- 5 respondents (2.7% of 187) said no one ever explained the program to them
- 4 respondents (2.1% of 187) mentioned wanting more information from trade allies
- 4 respondents (2.1% of 187) mentioned wanting more documentation / brochures / forms
- 3 respondents (1.6% of 187) complained that communications were too complex/technical
- 3 respondents (1.6% of 187) complained that communications were unclear/misleading
- 2 respondents (1.1% of 187) suggested that Duke Energy should use trade allies to inform customers
- 4 respondents (2.1% of 187) had no suggestions
- *The number of responses adds up to more than 37 because respondents could offer multiple suggestions.*

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Nothing / No Complaints / Don't Know	81.1%	83.1%	81.7%
Not enough money / rebate too small	4.7%	1.7%	3.8%
Too much involvement / reliance on trade allies	1.6%	5.1%	2.7%
Could have been better informed / more publicity	2.4%	1.7%	2.2%
Confusion / conflicting info about amount of rebate	1.6%	1.7%	1.6%
Rebate took too long to arrive	0.8%	3.4%	1.6%
Grace period for claiming rebate is too short	0.8%	1.7%	1.1%
Having to verify / clarify details for Duke Energy	0.0%	3.4%	1.1%
Duke Energy mishandled my paperwork / payment	1.6%	0.0%	1.1%
Did not receive federal tax credit	1.6%	0.0%	1.1%
Wasn't aware of program until talked to trade ally	1.6%	0.0%	1.1%
Confusion / conflicting information about eligibility for a rebate	0.0%	3.4%	1.1%
Disliked paperwork / too confusing	1.6%	0.0%	1.1%
Telephone survey follow up	1.6%	0.0%	1.1%
No ongoing discount for the investment in a more efficient unit	0.8%	0.0%	0.5%
Newly installed unit is not as good as expected	0.8%	0.0%	0.5%
Did not get receipt acknowledging Duke Energy had received my application	0.8%	0.0%	0.5%
Don't like government interfering in our choices	0.8%	0.0%	0.5%
No incentive from local gas utility	0.0%	1.7%	0.5%

Note: One respondent who received both types of rebate was not included in this table.
Multiple responses were accepted for this question; rows can total more than 100%.

[18] The responses presented here are verbatim statements from surveyed participants, and therefore may or may not be applicable to the Smart $aver program.

Customer's Overall Satisfaction with Duke Energy

Satisfaction with Duke Energy is generally high, with 87.2% (163 out of 187) of respondents in this survey giving Duke Energy an "8" or better on a 10-point scale, and only 2.1% (4 out of 187) rating their satisfaction with Duke Energy at "4" or less.

Table 22. Summary of overall satisfaction with Duke Energy, by state

	NC N=93	SC N=94	Total N=187
Very satisfied with Duke Energy ("8" or higher on 10-point scale)	88.2%	86.2%	87.2%
Not completely satisfied with Smart Saver ("5" to "7" on 10-point scale)	9.7%	11.7%	10.7%
Dissatisfied with Smart Saver ("4" or lower on 10-point scale)	2.2%	2.1%	2.1%

As seen in Figure 7, taken by subgroups or as a whole, a plurality of respondents in this survey rated their overall satisfaction with Duke Energy at a "10" on a 10-point scale (41.2% or 77 out of 187). There were no significant differences between subgroups.

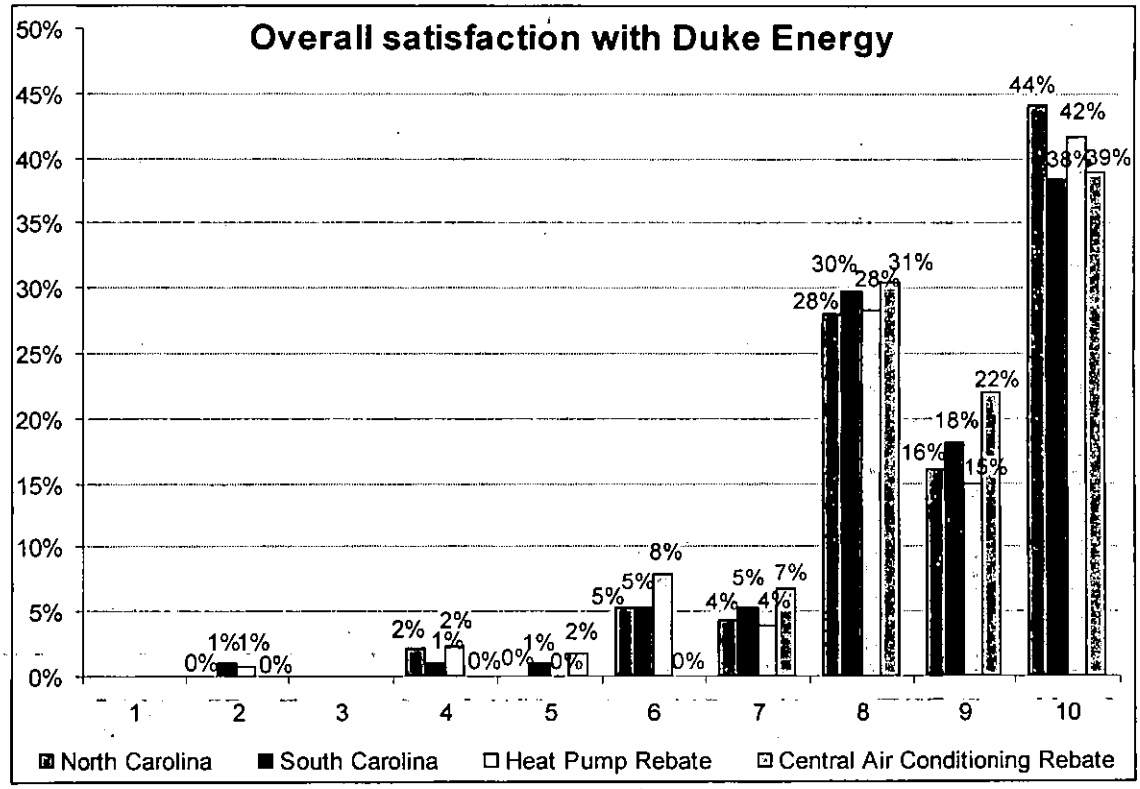

Figure 7. Respondent's overall satisfaction with Duke Energy
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Twenty-four respondents (12.8% of 187) gave a rating of "7" or lower for their overall satisfaction with Duke Energy. Their reasons for being less than satisfied are summarized, and then listed, below.

- 15 respondents (8.0% of 187) mentioned rate increases and/or energy from Duke Energy being too expensive.
- 4 respondents (2.1% of 187) mentioned issues with load control, power surges or blackouts
- 2 respondents (1.1% of 187) mentioned a lack of communication from Duke Energy
- 1 respondent (0.5% of 187) mentioned the need for renewable energy
- 1 respondent (0.5% of 187) mentioned the need for more competition
- 2 respondents (1.1% of 187) did not give a reason (nothing / don't know)

Note: The number of responses adds up to more than 24 because respondents could offer multiple issues.

These were the verbatim responses of all 22 respondents who rated their satisfaction with Duke Energy at a "7" or less, and who gave a reason for their dissatisfaction:

- The seven respondents who rated their overall satisfaction with Duke Energy as "7 out of 10" said:
  - *"Firstly, communication issues on load control unit. Secondly, once a customer goes on email payments, there is very little additional information from Duke. I suggest having a program that sends e-mail updates from Duke with an opt-out for those that don't want more e-mail. Send as an attachment or a separate file."*
  - *"I had an incident with wires on fire eight years ago. A huge power surge took out many pieces of home equipment in the neighborhood. Duke did not cover it at the time. I sold stock as a result."*
  - *"My neighborhood has experienced a lot of power outages."*
  - *"We're on an equal payment program. The rate increase really jacked up costs even though our use of electricity is steady."*
  - *"The rates keep going up but other than that we're very satisfied."*
  - *"It is expensive."*
  - *"I don't think there is enough competition."*

- The ten respondents who rated their overall satisfaction with Duke Energy as "6 out of 10" said:
  - *"The 17% energy rate increase was a big shock. I have witnessed roadside Duke Energy employees slacking on the job."*
  - *"The cost of energy is going up. Ask for a 17% with intent of getting 9%. The PSC is predictable."*
  - *"I am pretty mad at Duke Energy over the rate increase. I think it is an inappropriate time with the economy stumbling and people struggling."*
  - *"Duke raises its rates too often and by too big a percentage."*
  - *"It's just expensive."*

- *"Lower rates would make me happier."*
- *"Overall communication."*
- *"The rates are going up."*
- *"The rates are too high. They keep going up."*
- *"Duke needs to transition more towards renewable sources of energy and away from coal."*

- The lone respondent who rated their overall satisfaction with Duke Energy as "5 out of 10" said:
  - *"Duke Energy has been fair, but needs to lower power rates."*

- The three respondents who rated their overall satisfaction with Duke Energy as "4 out of 10" said:
  - *"I experience unexplained blackouts. We're the last house on the Duke Energy line so we can tell when others' air conditioners turn on and we get the least amount of power."*
  - *"There are jumps in rate increases: 10% last year; proposal for 17% this year – now pared back, but still high."*
  - *"Duke keeps increasing its rates."*

- The lone respondent who rated their overall satisfaction with Duke Energy as "2 out of 10" said:
  - *"It costs too much. The rates keep increasing. I am on the monthly program, in which I pay the same every month. The cost was calculated in Duke's favor by $500."*

Improving Participation in Residential Smart $aver

About a third of participants (31.0% or 58 out of 187) said that more general advertising would increase participation in Smart $aver, though only 8.0% (15 out of 187) said larger incentives were necessary. Another 8.6% (16 out of 187) suggested including more information with monthly bills. In North Carolina, 8.6% (8 out of 93) thought the program should be made more streamlined for customers, compared to 0.0% (0 out of 94) in South Carolina making this suggestion. Overall, 34.8% (65 out of 187) of participants did not have any suggestions for improving participation in the Smart $aver program, and 23.0% (43 out of 187) offered their own "other" suggestions on how to improve participation.

Table 23. What could help increase interest and participation in Smart $aver, by state

	NC N=93	SC N=94	Total N=187
Increase general advertising	28.0%	34.0%	31.0%
Include more information with monthly bills	4.3%	12.8%	8.6%
Offer larger incentives	6.5%	9.6%	8.0%
Use Internet more: Duke Energy site, email, Facebook, etc.	3.2%	8.5%	5.9%
Have program staff call residential customers	4.3%	7.4%	5.9%
Offer incentives on other items/include other items	3.2%	8.5%	5.9%
Make the process more streamlined for customers	8.6%	0.0%	4.3%
Increase advertising in trade media	1.1%	4.3%	2.7%
Present the program in trade or associated meetings	1.1%	0.0%	0.5%
Make the process more streamlined for trade allies	1.1%	0.0%	0.5%
Other suggestions	20.4%	25.5%	23.0%
Don't Know / Nothing	40.9%	28.7%	34.8%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

The suggestions for improving the program that were made by heat pump and central air conditioning rebate redeemers were generally consistent (none of the differences in Table 24 are statistically significant at the $p<.10$ level using student's t-test).

Table 24. What could help increase interest and participation in Smart $aver, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Increase general advertising	32.3%	28.8%	31.2%
Include more information with monthly bills	10.2%	5.1%	8.6%
Offer larger incentives	8.7%	6.8%	8.1%
Use Internet more: Duke Energy site, email, Facebook, etc.	5.5%	6.8%	5.9%
Have program staff call residential customers	5.5%	6.8%	5.9%
Offer incentives on other items/include other items	6.3%	5.1%	5.9%
Make the process more streamlined for customers	3.9%	5.1%	4.3%
Increase advertising in trade media	3.1%	1.7%	2.7%
Present the program in trade or associated meetings	0.8%	0.0%	0.5%
Make the process more streamlined for trade allies	0.0%	1.7%	0.5%
Other suggestions	24.4%	20.3%	23.1%
Don't Know / Nothing	34.6%	33.9%	34.4%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

Forty-three respondents (23.0% of 187) offered "other" suggestions on how to improve participation in the Smart $aver program. Their suggestions are characterized below.

- 8 respondents (4.3% of 187) mentioned more involvement with trade allies
- 5 respondents (2.7% of 187) mentioned educating the public through media: news / PSA's / TV / Radio
- 5 respondents (2.7% of 187) mentioned educating the public through community outreach: school programs, town hall meetings, etc.
- 5 respondents (2.7% of 187) mentioned more / better communication from Duke Energy (in general)
- 3 respondents (1.6% of 187) mentioned that promotions should highlight savings and value for customers
- 3 respondents (1.6% of 187) mentioned informing customers about government rebates / legislative updates
- 3 respondents (1.6% of 187) mentioned word of mouth promotion
- 2 respondents (1.1% of 187) mentioned Duke Energy offering financing for big upgrades
- 2 respondents (1.1% of 187) mentioned programs for energy efficient windows / home insulation

- 2 respondents (1.1% of 187) mentioned a direct mail promotion / newsletter
- 2 respondents (1.1% of 187) mentioned offering more programs for senior citizens
- 2 respondents (1.1% of 187) mentioned more discounts and credits for energy efficient decisions / more new programs (in general)
- 2 respondents (1.1% of 187) mentioned needing a better energy supply / more efficient units (better technology in general)
- 1 respondent (0.5% of 187) mentioned a giveaway promotion
- 1 respondent (0.5% of 187) mentioned Duke Energy selling heat pumps directly to customers
- 1 respondent (0.5% of 187) mentioned Duke Energy offering Energy Star certification for existing houses
- 1 respondent (0.5% of 187) mentioned doing more customer surveys
- 1 respondent (0.5% of 187) mentioned communicating the participation process to the customer better

Note: The number of responses adds up to more than 43 because respondents could offer multiple suggestions.

Seven respondents in this survey (3.7% of 187) suggested that Duke Energy should offer incentives for other items besides heat pumps and central air conditioning. Their specific recommendations for other items to cover are characterized below.

- 4 respondents (2.1% of 187) mentioned clothes washers and dryers
- 1 respondent (0.5% of 187) mentioned stoves
- 1 respondent (0.5% of 187) mentioned dishwashers
- 1 respondent (0.5% of 187) mentioned refrigerators
- 1 respondent (0.5% of 187) mentioned aluminum siding
- 1 respondent (0.5% of 187) mentioned tankless water heaters
- 1 respondent (0.5% of 187) mentioned wind turbines
- 2 respondents (1.1% of 187) mentioned strategies rather than specific items. These respondents' verbatim recommendations are as follows:
  - "*I need the process to be more than just a rebate for HVAC. It needs to be part of a comprehensive package with an auditing process. Offer a reduced power rate package for remodels that are Energy Star certified. Give customers a chance to see savings on a line-by-line payback cycle. If programmable thermostats and new heat pumps work, Duke should have more programs for customers to use them, as part of a concerted effort to reduce overall power need. How long will it take to get payback? Select the fastest payback upgrades--keep adding changes until the Energy Star threshold is reached.*"
  - "*Add small credits on bills.*"
- *The number of responses adds up to more than 7 because respondents could offer multiple suggestions.*

Energy Efficiency Actions and Intentions

As Table 25 shows, less than a third of respondents (28.9% or 54 out of 187) think Smart $aver has influenced them to become more energy efficient in other areas.

Table 25. Taken other energy efficiency actions influenced by Smart $aver, by state

	NC N=93	SC N=94	Total N=187
Yes	26.9%	30.9%	28.9%
No	73.1%	68.1%	70.6%
Don't know	0.0%	1.1%	0.5%

There was no significant difference between participants who received rebates for heat pumps (29.1% or 37 out of 127) versus central air conditioning (28.8% or 17 out of 59) in reporting that Smart $aver has influenced further energy efficiency actions.

Table 26. Taken other energy efficiency actions influenced by Smart $aver, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Yes	29.1%	28.8%	29.0%
No	70.1%	71.2%	70.4%
Don't know	0.8%	0.0%	0.5%

Note: One respondent who received both types of rebate was not included in this table.

The specific energy efficiency measures reported by the 54 respondents (28.9% of 187) who said they were influenced to do more by Smart $aver are shown in Table 27 and Table 28. The most common measures mentioned were installing more efficient CFL or LED light bulbs (by 17.1% overall or 32 out of 187 respondents in the study, or 59.3% or 32 out of 54 respondents who say they were influenced by Smart $aver), and improving insulation (by 8.6% overall or 16 out of 187 respondents in the study, or 29.6% or 16 out of 54 respondents influenced by Smart $aver).

Table 27. Energy efficiency actions taken that were influenced by Smart $aver, by state

	NC N=93	SC N=94	Total N=187
installed more efficient light bulbs	15.1%	19.1%	17.1%
insulation, caulking or weather-stripping	9.7%	7.4%	8.6%
installed a more efficient water heater	5.4%	1.1%	3.2%
installed new windows or doors	1.1%	4.3%	2.7%
bought Energy Star / more efficient appliances (not specific)	1.1%	4.3%	2.7%
installed more efficient washers / dryers	2.2%	2.1%	2.1%
using a timer and/or turning off lights and appliances	2.2%	2.1%	2.1%
installed programmable thermostats	1.1%	2.1%	1.6%
have always been energy conscious / were already trying to be more energy efficient before participating in the Smart $aver program	2.2%	1.1%	1.6%
had an energy audit of their home	1.1%	1.1%	1.1%
installed more efficient dishwashers	0.0%	2.1%	1.1%
installed more efficient refrigerators	1.1%	1.1%	1.1%
installed a new roof	1.1%	1.1%	1.1%

Seven respondents mentioned actions that were unique in this survey (i.e., one mention apiece). These seven respondents' actions are listed below.

- 1 respondent (0.5% of 187) mentioned installing solar panels
- 1 respondent (0.5% of 187) mentioned installing a more efficient stove and oven
- 1 respondent (0.5% of 187) mentioned installing a more efficient pool pump
- 1 respondent (0.5% of 187) mentioned installing a gas backup furnace
- 1 respondent (0.5% of 187) mentioned installing new ductwork
- 1 respondent (0.5% of 187) mentioned enrolling in the Power Manager program
- 1 respondent (0.5% of 187) mentioned attending a seminar about energy efficiency

There was one statistically significant difference by type of system installed – as seen in Table 28, central air conditioning rebate recipients were more likely to report they have installed new windows or doors (6.8% or 4 out of 59) compared to heat pump rebate redeemers (0.8% or 1 out of 127; this difference is significant at $p<.05$ using student's t-test).

Table 28. Energy efficiency actions taken that were influenced by Smart $aver, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
installed more efficient light bulbs	18.9%	13.6%	17.2%
insulation, caulking or weather-stripping	8.7%	8.5%	8.6%
installed a more efficient water heater	3.1%	3.4%	3.2%
installed new windows or doors	0.8%	6.8%	2.7%
bought Energy Star / more efficient appliances (not specific)	2.4%	3.4%	2.7%
installed more efficient washers / dryers.	3.1%	0.0%	2.2%
using a timer and/or turning off lights and appliances	2.4%	1.7%	2.2%
installed programmable thermostats	0.8%	3.4%	1.6%
have always been energy conscious / were already trying to be more energy efficient before participating in the Smart $aver program	2.4%	0.0%	1.6%
had an energy audit of their home	1.6%	0.0%	1.1%
installed more efficient dishwashers	0.8%	1.7%	1.1%
installed more efficient refrigerators	1.6%	0.0%	1.1%
installed a new roof	1.6%	0.0%	1.1%

Note: One respondent who received both types of rebate was not included in this table.

The 54 respondents (28.9% of 187) who said they were influenced to do more by the Smart $aver program were also asked how much money they think they have saved from these additional energy efficiency activities. Of these respondents, a little over half (53.7% or 29 out of 54) claimed the energy efficiency measures they had taken were saving them money, while two (3.7% of 54) said they were "breaking even" and one (1.9% of 54) said their energy bills had actually gone up. However, 42.6% (23 out of 54) of these respondents were not able to estimate any dollar amount of savings. Complete responses to this question are characterized as follows:

- 23 of 54 respondents (42.6%) were unable to make a guess (don't know, not sure yet, etc.)
- 14 of 54 respondents (25.9%) mentioned monthly or annual savings, as follows:
  - $1500 per year (equivalent to $125 per month)
  - $100-$150 per month
  - $80-$100 per month
  - $50-$75 per month
  - $30-$50 per month
  - $35 per month
  - $30 per month
  - $20 per month
  - $16 per month

  - $15 per month
  - $10-$15 per month (two respondents gave this range)
  - $8 per month
  - $7 per month
- 7 of 54 respondents (13.0%) mentioned total dollar amounts or ranges, as follows:
  - $3000-$4000
  - $3500
  - $400-$500
  - $300
  - $276
  - $150-$250
  - $100
- 4 of 54 respondents (7.4%) mentioned savings in percentage terms, as follows:
  - "Probably cut my bills by a third"
  - 10%-15%
  - "At least 10%"
  - 6-8%
- 4 of 54 respondents (7.4%) were unable to estimate their savings, but are sure that their energy bills are lower than they were before
- 2 of 54 respondents (3.7%) said they haven't saved anything, or only expect to "break even eventually"
- 1 of 54 (1.9%) respondents said their energy bills actually went up rather than down

Note: The number of responses adds up to more than 54 because respondents could give multiple responses.

Nearly one in four Smart $aver participants plans on making further large purchases to improve energy efficiency in the next 3 years (22.5% or 42 out of 187), but most do not (69.5% or 130 out of 187).

Table 29. Plan on making large purchase(s) to improve efficiency in next 3 years, by state

	NC N=93	SC N=94	Total N=187
Yes	22.6%	22.3%	22.5%
No	71.0%	68.1%	69.5%
Don't know	6.5%	9.6%	8.0%

Table 30 indicates that respondents who got their Smart $aver rebate for central air conditioning may be slightly more likely to plan on making further large purchases to improve energy efficiency in the next three years (27.1% or 16 out of 59) than those who received a rebate for a heat pump (20.5% or 26 out of 127), though the difference is not statistically significant.

Table 30. Plan on making large purchase(s) to improve efficiency in next 3 years, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Yes	20.5%	27.1%	22.6%
No	70.9%	66.1%	69.4%
Don't know	8.7%	6.8%	8.1%

Note: One respondent who received both types of rebate was not included in this table.

Overall, 31.0% (58 out of 187) of Smart $aver participants added other major new electrical appliances in the past year.

Table 31. Added other major electrical appliances to home in past year, by state

	NC N=93	SC N=94	Total N=187
Yes	30.1%	31.9%	31.0%
No	69.9%	68.1%	69.0%
Don't know	0.0%	0.0%	0.0%

As seen in Table 32, central air conditioning rebate redeemers in this survey were slightly more likely to have made other major electrical appliance purchases in the past year (37.3% or 22 out of 59) than heat pump rebate redeemers (27.6% or 35 out of 127), though this difference is not statistically significant.

Table 32. Added other major electrical appliances to home in past year, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Yes	27.6%	37.3%	30.6%
No	72.4%	62.7%	69.4%
Don't know	0.0%	0.0%	0.0%

Note: One respondent who received both types of rebate was not included in this table.

Figure 8 shows that the most common outdoor temperatures at which Smart $aver participants turn on their primary air conditioners are in the 76-84 degree range in North Carolina (44.1% or 41 out of 93) and a slightly cooler range of 73-81 degrees in South Carolina (56.4% or 53 out of 94). Overall, only 13.4% (25 out of 187) wait until the temperature reaches 85 or above to turn on the AC, and only 9.1% (17 out of 187) turn it on at 72 degrees or below.

Additionally, 9.1% (17 out of 187) could not give a specific temperature, saying instead "it's

programmed into the thermostat", while another 9.6% (18 out of 187) were not able to answer the question at all.

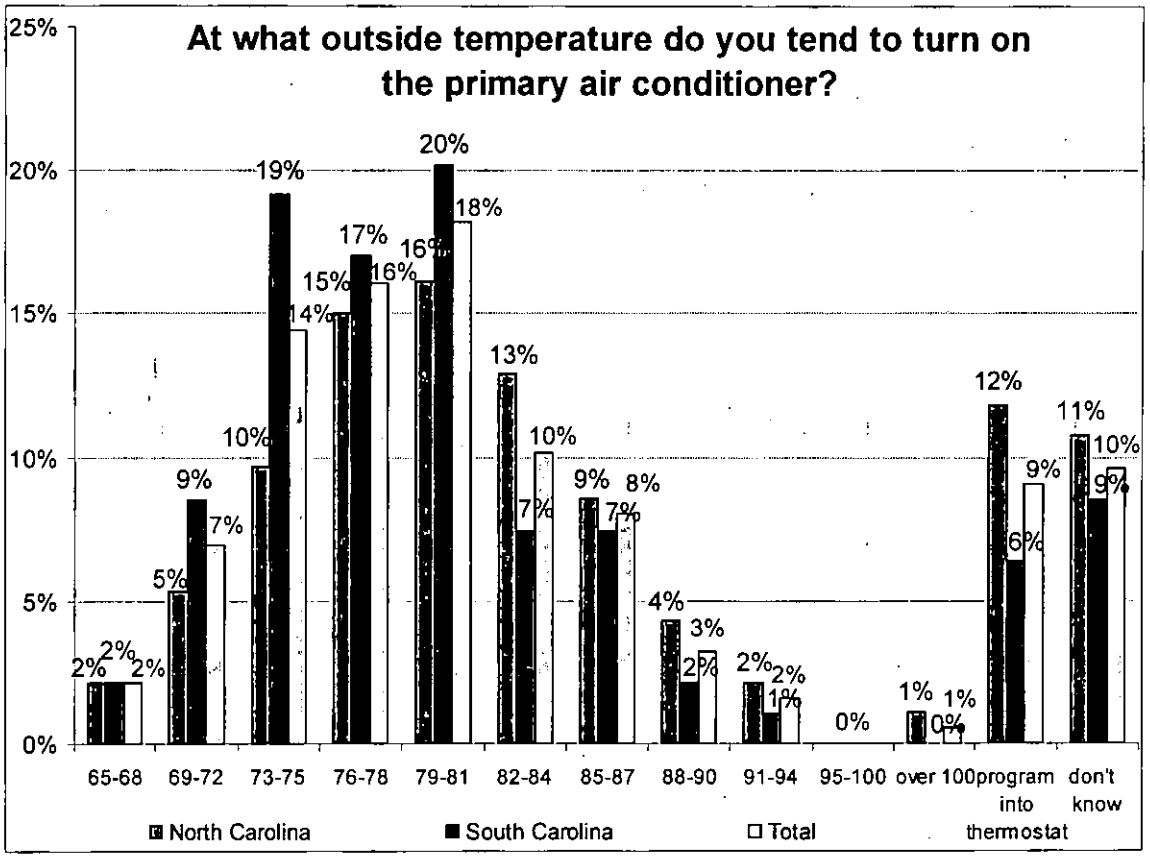

Figure 8. Temperature at which primary air conditioning unit is turned on, by state (N=187)

As Figure 9 shows, respondents who claimed their rebate for central air conditioning tend to turn on their units at higher temperatures than heat pump redeemers: only 18.6% (11 out of 59) of air conditioner rebate redeemers turn their unit on when the outdoor temperature is 75 degrees or below, compared to 26.0% (33 out of 127) of heat pump rebate redeemers turning their units on at 75 degrees or below. Conversely, 30.5% (18 out of 59) of respondents with new central air conditioning wait until the temperature outside reaches 82 or higher before turning on their units, compared to only 20.5% (26 out of 127) of those with new heat pumps. About a third of respondents of each rebate type turn on their cooling system between 76 and 81 degrees (33.9% or 43 out of 127 with heat pumps, compared to 33.9% or 20 out of 59 with central air).

Respondents with heat pumps were also twice as likely to say that it is programmed into their thermostat and they don't go by outside temperature (11.0% or 14 out of 127 heat pump rebate redeemers, versus 5.1% or 3 out of 59 for central air). Overall, another 9.7% (18 out of 186) did not know what temperature it was outside when they turned their units on.

The difference in distribution between the two types of rebate redeemer shown in Figure 9 is statistically significant (Pearson chi-square p<.10).

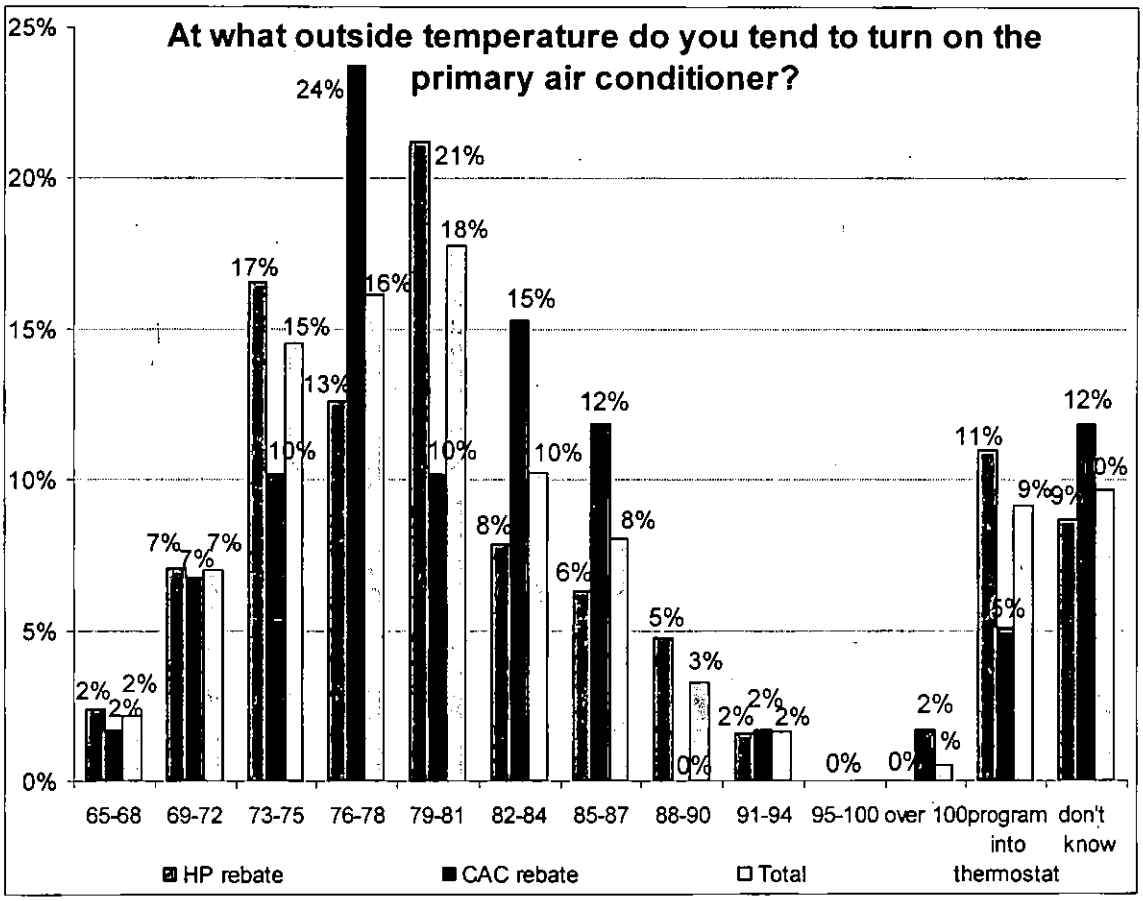

Figure 9. Temperature at which primary air conditioning unit is turned on, by rebate
(N=186; one respondent who received both types of rebate was dropped from this analysis)

Most respondents in this survey who were able to give specific temperature settings for their thermostats "before" and "after" installation of their new Smart $aver rebated unit said that they still set their thermostats to about the same temperature (overall 69.1% or 85 of the 123 respondents who gave "before" and "after" temperatures). As seen in Table 33, another 17.9% (22 out of 123) report that they are now setting their thermostats at a higher temperature than before installing their new unit, while 13.0% (16 out of 123) report that they set their thermostats at lower temperatures since installing their new units.

Table 33. Change in thermostat settings before and after installation of new unit, by state

	NC N=55	SC N=68	Total N=123

Set thermostat at same level "before" and "after"	72.7%	66.2%	69.1%
Set thermostat higher "after" than "before"	16.4%	19.1%	17.9%
Set thermostat lower "after" than "before"	10.9%	14.7%	13.0%

Note: This table only includes the 123 out of 187 respondents who were able to give specific "before" and "after" thermostat settings; sixty-four respondents either were not asked both questions, did not answer both questions, or said it was "programmed into the thermostat" without stating the setting.

Table 34 indicates that central air conditioning rebate recipients were a bit more likely to say they are setting their thermostats at about the same setting as before (77.3% or 34 out of 44 central air rebate recipients who could give specific "before" and "after" settings, versus 65.4% or 51 out of 78 heat pump rebate recipients; significant at $p<.10$ using student's t-test). However, there were no significant differences between rebate types regarding whether they set their thermostats higher or lower after installing their new units.

Table 34. Change in thermostat settings before and after installation of new unit, by rebate

	Redeemed HP rebate N=78	Redeemed CAC rebate N=44	Total N=122
Set thermostat at same level "before" and "after"	65.4%	77.3%	69.7%
Set thermostat higher "after" than "before"	19.2%	13.6%	17.2%
Set thermostat lower "after" than "before"	15.4%	9.1%	13.1%

Note: One respondent who received both types of rebate was not included in this table.
This table only includes 122 out of the remaining 186 respondents who were able to give specific "before" and "after" thermostat settings; sixty-four respondents either were not asked both questions, did not answer both questions, or said it was "programmed into the thermostat" without stating the setting.

The complete distribution of specific responses to both "before" and "after" questions about thermostat settings is shown in Table 23. Overall, there were very few respondents who changed their thermostat settings after installing a new unit by more than one response category (equal to about 3 or 4 degrees Fahrenheit) – just 2 respondents (1.6% of 123 who were able to give specific "before" and "after" settings) turned down their thermostats by two response categories (equal to 6 to 8 degrees), while one respondent (0.8% of 123) turned up their thermostat by two response categories (equal to 6 or 7 degrees) and one respondent (0.8% of 123) turned their thermostat up by three response categories (equal to 10 or 11 degrees).

In Table 35, the black numbers on the diagonal indicate respondents who set their thermostats to the same settings "before" and "after" installing their new units, while green numbers indicate those who are setting their thermostats higher "after", and red numbers indicate those who are setting their thermostats lower "after" installing their new units.

Table 35. Thermostat settings before and after installation of new unit

% out of 123 # of responses	After: 65-68	After: 69-72	After: 73-75	After: 76-78	After: 79-81	After: 82-84	After: 85-87
Before: 65-68	0.8% 1	3.3% 4	-	0.8% 1	-	-	-
Before: 69-72	-	17.9% 22	4.9% 6	0.8% 1	-	-	-
Before: 73-75	0.8% 1	4.1% 5	23.6% 29	6.5% 8	-	-	-
Before: 76-78	-	-	4.1% 5	23.6% 29	0.8% 1	-	-
Before: 79-81	-	-	-	3.3% 4	3.3% 4	-	-
Before: 82-84	-	-	-	0.8% 1	-	-	0.8% 1
Before: 85-87	-	-	-	-	-	-	-

Note: This table only includes the 123 out of 187 respondents who were able to give specific "before" and "after" thermostat settings; sixty-four respondents either were not asked both questions, did not answer both questions, or said it was "programmed into the thermostat" without stating the setting.

Half of Smart $aver participants are using their air conditioners and/or heat pumps "every day" during cooling season (50.3% or 94 out of 187), while only 11.2% (21 out of 187) do so "only the hottest days" or "not at all".

Table 36. Usage of primary cooling unit, by state

	NC N=93	SC N=94	Total N=187
Not at all	0.0%	1.1%	0.5%
Only on the hottest days	11.8%	9.6%	10.7%
Frequently during cooling season	8.6%	4.3%	6.4%
Most days during cooling season	25.8%	28.7%	27.3%
Every day during cooling season	47.3%	53.2%	50.3%
Don't know	6.5%	3.2%	4.8%

As seen in Table 37, reported cooling unit usage is generally comparable between central air and heat pump rebate recipients, though more heat pump rebate recipients turn their cooling on "not at all" or "only on the hottest days (combined 13.4% or 17 out of 127) compared to central air rebate redeemers (combined 6.8% or 4 out of 59; this difference is significant at $p<.10$ using student's t-test).

Table 37. Usage of primary cooling unit, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186

Not at all	0.0%	1.7%	0.5%
Only on the hottest days	13.4%	5.1%	10.8%
Frequently during cooling season	6.3%	6.8%	6.5%
Most days during cooling season	26.0%	30.5%	27.4%
Every day during cooling season	48.8%	52.5%	50.0%
Don't know	5.5%	3.4%	4.8%

Note: One respondent who received both types of rebate was not included in this table.

Table 38 shows that of the 18 respondents in this survey who claimed two rebates, half (50.0% or 9 out of 18) also said they turn on their secondary cooling units "every day during the cooling season."

Table 38. Usage of secondary cooling unit, by number of rebates

	Redeemed two HP rebates N=14	Redeemed two CAC rebates N=3	Total redeeming two rebates N=18 *
Not at all	7.1%	0.0%	5.6%
Only on the hottest days	0.0%	0.0%	5.6%
Frequently during cooling season	14.3%	33.3%	16.7%
Most days during cooling season	21.4%	33.3%	22.2%
Every day during cooling season	57.1%	33.3%	50.0%
Don't know	0.0%	0.0%	0.0%

** Note: Total column includes one additional respondent who received one rebate of each type.*

Figure 10 indicates that the majority of respondents in every subgroup had their cooling units turned on more than 13 hours a day before installing their new, more efficient HVAC system through the Smart $aver program. Overall, 58.8% (110 out of 187) had their units on more than 13 hours a day, and the next most common response to this question was "don't know" (19.3% or 36 out of 187).

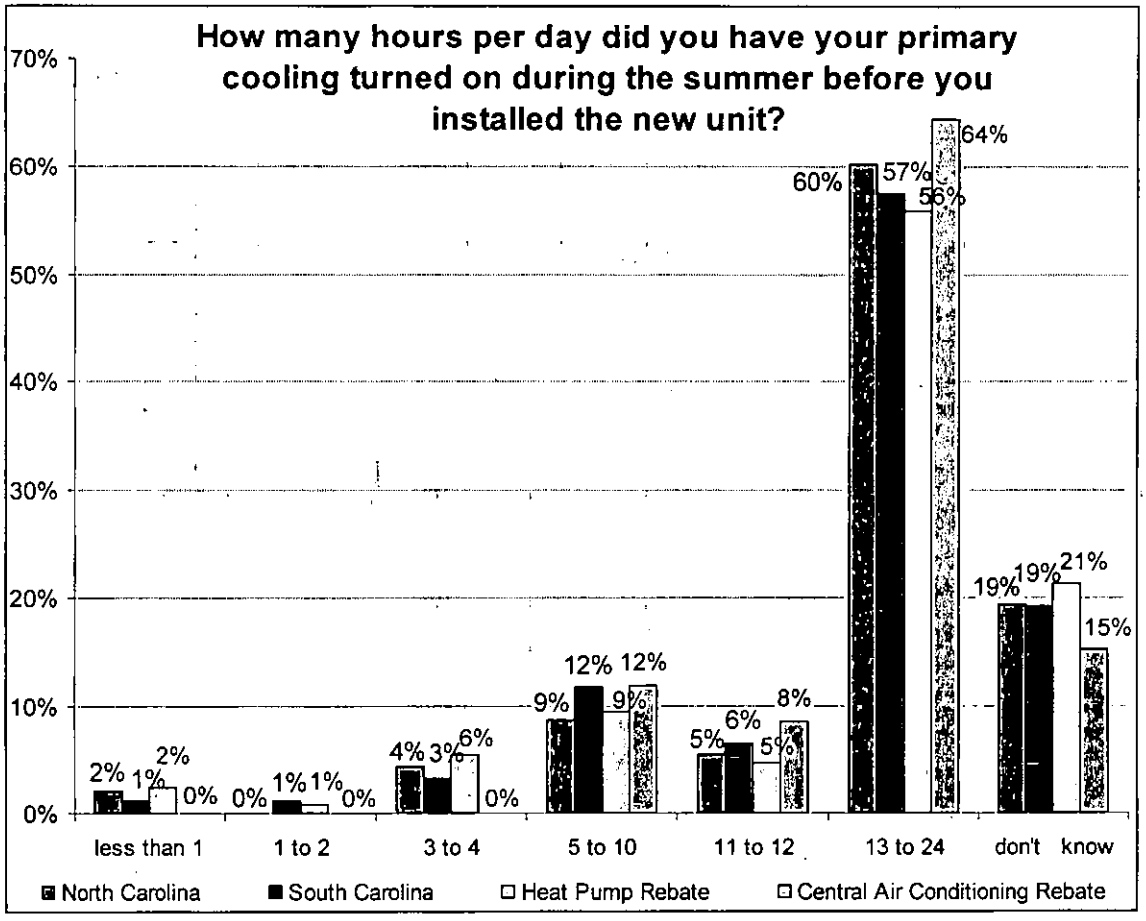

Figure 10. Hours per day of cooling with primary unit before installing new unit
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Hours of cooling with a secondary unit (prior to installing new Smart $aver-rebated systems) are shown in Figure 11. Eighteen respondents in this survey (9.6% of 187) had two cooling systems, and received two rebates for installing either two heat pumps (14 or 7.5% out of 187), or two central air conditioning systems (1.6% or 3 out of 187), or one of each type of system (0.5% or 1 out of 187). Though the sample size is too small to draw strong conclusions, it appears these secondary systems do not get used as often as the primary systems, with only a plurality (overall 38.9% or 7 out of 18) saying they used their secondary units at least 13 hours a day (compared to 58.8% of primary units being used that often).

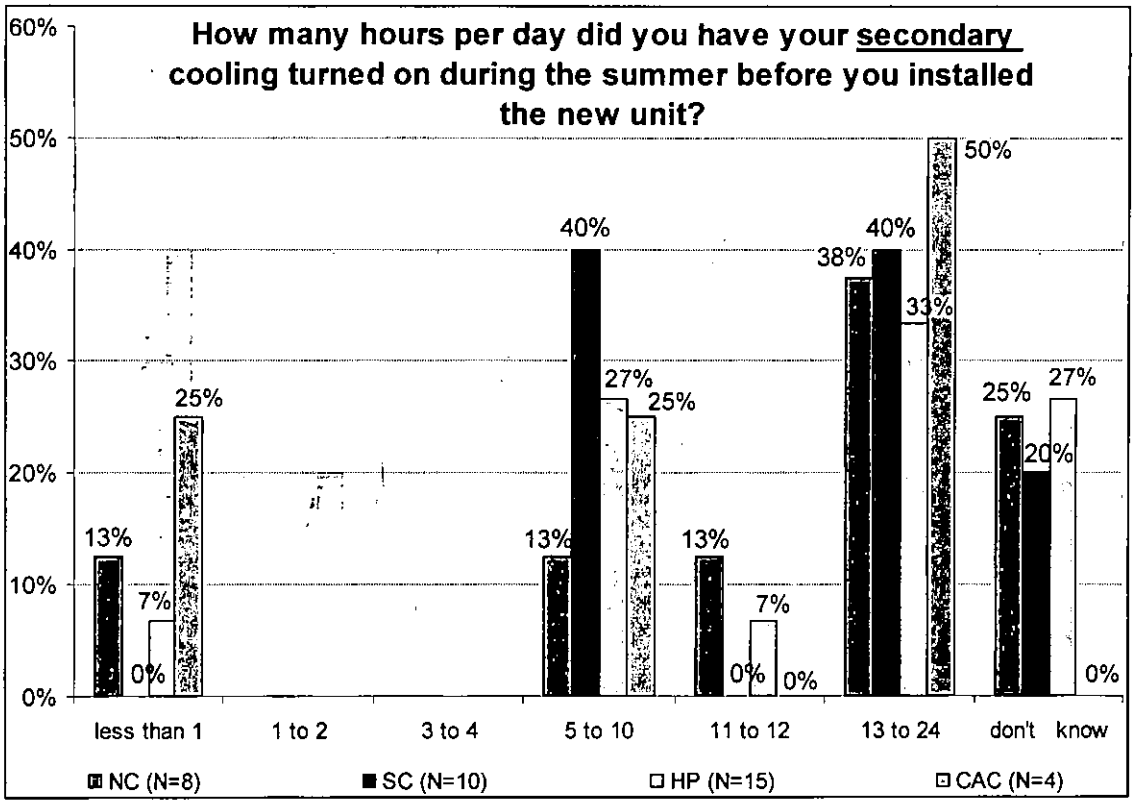

Figure 11. Hours per day of cooling with secondary unit before installing new unit
(N=18 respondents who received two rebates from Smart $aver program; one respondent who received both HP and CAC rebates was included in both categories for this chart.)

Overall 36.4% (68 out of 187) of Smart $aver participants reported they use their cooling units for fewer hours per day since installing a more efficient unit, compared to only 2.7% (5 out of 187) who say they use their units more hours per day now.

The differences between North and South Carolina were highly significant (Pearson chi-square $p<.01$), with twice as many South Carolinians reporting fewer hours of cooling per day (48.9% or 46 out of 94 in SC, versus 23.7% or 22 out of 93 in NC). However, a much higher percentage of North Carolinians were unable to answer this question (43.0% or 40 out of 93 in NC, versus 20.2% or 19 out of 94 in SC).

Table 39. Change in average daily use since replacing cooling unit, by state

	NC N=93	SC N=94	Total N=187
Decreased usage	23.7%	48.9%	36.4%
Stayed The Same	32.3%	26.6%	29.4%
Increased usage	1.1%	4.3%	2.7%
Don't Know/Not Sure	43.0%	20.2%	31.6%

As Table 40 shows, the difference between heat pump and central air conditioning was mostly that fewer air conditioner redeemers were able to answer the question (40.7% or 24 out of 59 central air conditioning redeemers "did not know", compared to only 27.6% or 35 out of 127 heat pump redeemers).

Table 40. Change in average daily use since replacing cooling unit, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
Decreased usage	37.8%	32.2%	36.0%
Stayed The Same	32.3%	23.7%	29.6%
Increased usage	2.4%	3.4%	2.7%
Don't Know/Not Sure	27.6%	40.7%	31.7%

Note: One respondent who received both types of rebate was not included in this table.

Five respondents (2.7% of 187) say that their daily cooling has increased since their new Smart $aver-rebated unit was installed. They were asked how many hours per day their cooling usage has increased, and their responses are listed below:

- *"2 hours"*
- *"4 hours"*
- *"Up to 4 hours"*
- *"12 hours"*
- *"24 hours"*

Sixty-eight respondents (36.4% of 187) say that their daily cooling has decreased since their new Smart $aver-rebated unit was installed. They were asked how many hours per day their cooling usage has decreased, and their responses are characterized below:

- 49 of 68 respondents (72.1%) responded with specific numbers or ranges of hours, which are listed below (the median response for this distribution is "4 hours"):
  - "1 hour" (2 respondents)
  - "1 to 2 hours"
  - "2 hours" (8 respondents)
  - "2 to 3 hours (3 respondents)
  - "2 to 4 hours"
  - "2.5 hours"
  - "3 hours" (2 respondents)
  - "3 to 4 hours" (5 respondents)
  - "4 hours" (5 respondents)
  - "4 to 5 hours"
  - "4 to 6 hours"
  - "5 hours"

- "6 hours" (2 respondents)
- "7 hours" (2 respondents)
- "7 to 9 hours"
- "8 hours"
- "8 to 9 hours"
- "8 to 10 hours" (2 respondents)
- "9 to 13 hours"
- "10 hours" (4 respondents)
- "10 to 12 hours"
- "12 hours"
- "12 to 14 hours"
- "15 hours"

- 6 of 68 respondents (8.8%) gave percentages or ratios for their decrease in cooling:
  - 16.7% ("from 6 to 5")
  - 30% ("at least 30% on power bill")
  - 50% ("about half as often") – 4 respondents

- 2 of 68 respondents (2.9%) say they are not sure yet, because they haven't had a full cooling season since the new installation.

- 13 of 68 respondents (19.1%) could not answer the question ("don't know")

Note: The number of responses adds up to more than 68 because respondents could give multiple responses.

Participation in Other Duke Energy Efficiency Programs

Most Smart $aver participants (67.4% or 126 out of 187) have not participated in the three other Duke Energy programs which this survey asked about, with only 20.9% (39 out of 187) having been involved with Power Manager, 8.6% (16 out of 187) with Home Energy House Call, and 11.8% (22 out of 187) with My Home Energy Report.

Table 41. Have you participated in any of these Duke Energy programs, by state

	NC N=93	SC N=94	Total N=187
Power Manager	19.4%	22.3%	20.9%
My Home Energy Report	11.8%	11.7%	11.8%
Home Energy House Call	8.6%	8.5%	8.6%
Did not participate in any of the three programs listed above	68.8%	66.0%	67.4%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

As Table 42 demonstrates, respondents in this survey who received rebates for heat pumps were much more likely to have had a Home Energy House Call (11.8% or 15 out of 127) than those who got a rebate for central air (1.7% or 1 out of 59), a difference which is statistically significant (student's t-test $p<.05$).

Table 42. Have you participated in any of these Duke Energy programs, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Power Manager	18.9%	25.4%	21.0%
My Home Energy Report	11.0%	13.6%	11.8%
Home Energy House Call	11.8%	1.7%	8.6%
Did not participate in any of the three programs listed above	67.7%	66.1%	67.2%

Note: One respondent who received both types of rebate was not included in this table. Multiple responses were accepted for this question; rows can total more than 100%.

Among Smart $aver participants who have not participated in Power Manager, Home Energy House Call and My Home Energy Report, interest is lowest in the Power Manager program (only 13.5% or 21 out of 155 of non-participants rated their interest in this program at "8" or higher on a 10-point scale), but higher for Home Energy House Call (37.0% or 64 out of 173 non-participants rating their interest at "8" or higher on a 10-point scale) and My Home Energy Report (29.9% or 50 out of 167 non-participants rating their interest at "8" or higher).

Table 43. Rating of interest in other energy efficiency programs by non-participants, by state

Percent of non-participants rating interest in program "8" or higher on 1-10 scale	NC	SC	Total
Home Energy House Call	N=86 38.4%	N=87 35.6%	N=173 37.0%
My Home Energy Report	N=84 33.3%	N=83 26.5%	N=167 29.9%
Power Manager	N=78 14.1%	N=77 13.0%	N=155 13.5%

Figure 12 shows the complete breakdown of interest ratings in Power Manager, Home Energy House Call and My Home Energy Report among non-participants in those programs. The most frequently mentioned level of interest in all three programs was a "1" on a 10-point scale (the lowest possible rating), given by 45.2% (70 out of 155) of non-participants in Power Manager, 34.7% (58 out of 167) of non-participants in Home Energy Report, and 29.5% (51 out of 173) of non-participants in Home Energy House Call.

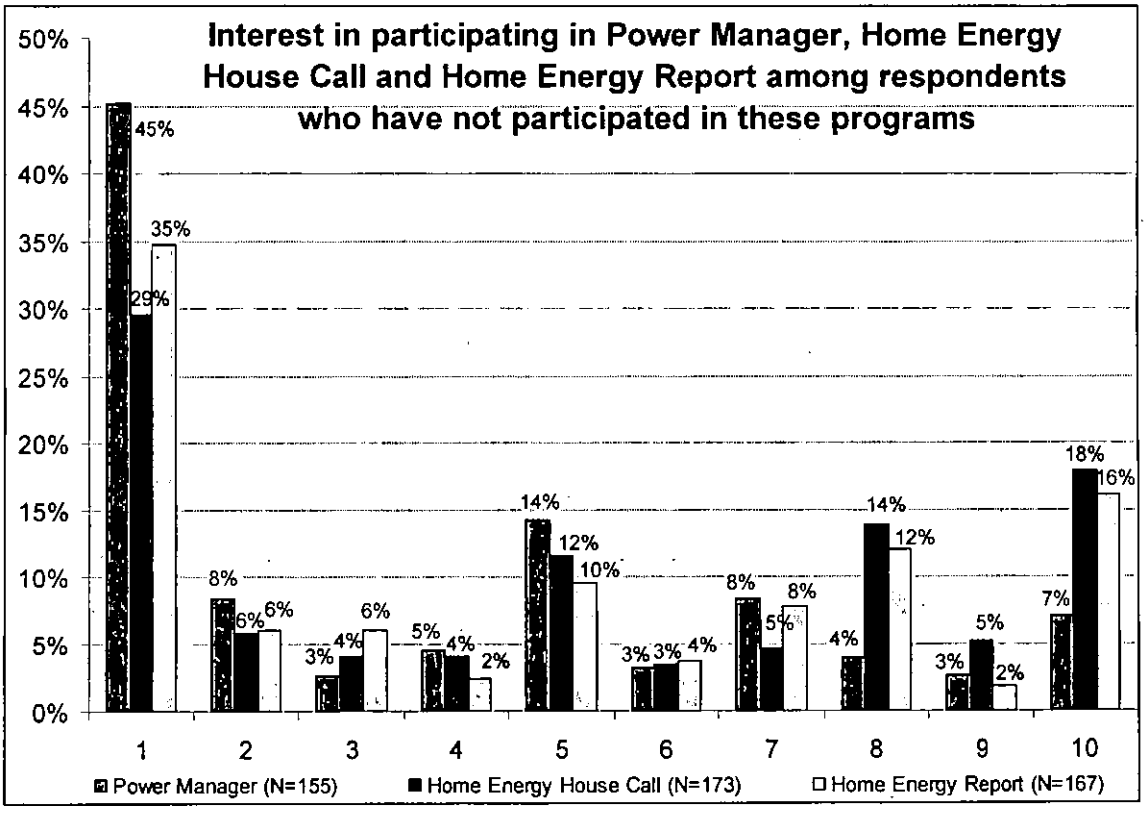

Figure 12. Interest in participating in Power Manager, Home Energy House Call and Home Energy Report among respondents who have not participated in these programs

Respondents in this survey were asked, "What other services could Duke Energy provide to help improve home energy efficiency?" Three-quarters of respondents (77.0% or 144 out of 187) had no suggestions and/or were satisfied with what Duke Energy is already doing. All suggestions mentioned by at least two respondents in this study are listed in Table 44 and Table 45.

The most common suggestions for services Duke Energy could offer had to do with lighting: encouraging more CFL usage (overall 5.3% or 10 out of 187), more LED usage (2.1% or 4 out of 187), and more efficient outdoor lighting (1.1% or 2 out of 187). Encouraging home solar (2.7% or 5 out of 187), more efficient windows (2.1% or 4 out of 187) and doing a better job of informing customers about efficiency programs (2.7% or 5 out of 187) also received multiple mentions.

Table 44. Suggestions for other programs Duke Energy should offer, by state

	NC N=93	SC N=94	Total N=187
Encourage lighting efficiency: CFL	1.1%	9.6%	5.3%
Encourage home solar / better power buy back program	4.3%	1.1%	2.7%
More contact/information for customers about efficiency	2.2%	3.2%	2.7%
Encourage lighting efficiency: LED	2.2%	2.1%	2.1%
Encourage new windows	2.2%	2.1%	2.1%
Encourage tankless / instant water heaters	0.0%	3.2%	1.6%
Notify homeowners of high meter readings / improve metering	1.1%	2.1%	1.6%
Encourage lighting efficiency: outdoor lighting	1.1%	1.1%	1.1%
Encourage new siding / insulation	1.1%	1.1%	1.1%
Credits for cycling water heater / installing switches	1.1%	1.1%	1.1%
Incentives for more Energy Star / efficient appliances	0.0%	2.1%	1.1%
Discounts for "green" homes / green remodeling	1.1%	1.1%	1.1%
Nothing / no suggestions / don't know	76.3%	69.1%	72.7%
Duke Energy is already doing a good job / "I am satisfied"	4.3%	4.3%	4.3%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Table 45. Suggestions for other programs Duke Energy should offer, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Encourage lighting efficiency: CFL	5.5%	5.1%	5.4%
Encourage home solar / better power buy back program	3.1%	1.7%	2.7%
Encourage lighting efficiency: LED	3.1%	0.0%	2.2%
Encourage new windows	1.6%	3.4%	2.2%
More contact/information for customers about efficiency	1.6%	3.4%	2.2%
Encourage tankless / instant water heaters	2.4%	0.0%	1.6%
Notify homeowners of high meter readings / improve metering	2.4%	0.0%	1.6%
Encourage lighting efficiency: outdoor lighting	1.6%	0.0%	1.1%
Encourage new siding / insulation	0.8%	1.7%	1.1%
Credits for cycling water heater / installing switches	0.8%	1.7%	1.1%
Incentives for more Energy Star / efficient appliances	0.8%	1.7%	1.1%
Discounts for "green" homes / green remodeling	1.6%	0.0%	1.1%
Nothing / no suggestions / don't know	70.9%	78.0%	73.1%
Duke Energy is already doing a good job / "I am satisfied"	4.7%	3.4%	4.3%

Note: One respondent who received both types of rebate was not included in this table.
Multiple responses were accepted for this question; rows can total more than 100%.

There were also 8 responses to this question which included unique suggestions. Their verbatim comments are listed below:

- "*Duke should offer more programs like the Power Manager program, where you provide bill credits for turning the heater or air conditioner down in the evening or overnight.*"
- "*If programmable thermostats and new heat pumps work, Duke should have more programs for customers to use them, as part of a concerted effort to reduce overall power need.*"
- "*Solar panels and wind turbines.*"
- "*The CFL program worked well, so Duke should keep offering it. I would like to see replacement of energy-efficient windows through certified contractors, with Duke offering financing. Make the public more aware that Duke has programs that can save their customers energy. Duke doesn't come to mind for energy efficiency.*"
- "*This isn't really energy efficiency but I'd like it if there were more information on when and where you can recycle difficult items like CFLs*

or microwaves."

- *"I would like it if Home Energy House Call could also include the use of infrared or thermal-gun technology to spot the biggest leaks at doors and windows, and for insulation in general. The infrared/thermal technology has come down in price."*
- *"Duke could improve its grid and improve its distribution network. I think there is a lot of waste in the distribution."*
- *"Duke could cut the rate that we have to pay, or use nuclear power."*

Attitudes toward Energy and the Environment

Energy and environmental issues are important to Smart $aver participants, as shown in Figure 13 through Figure 16. Fully 84.5% (158 out of 187) view "environmental issues" as either "important" or "very important", while the corresponding number for "reducing air pollution" is 88.2% (165 out of 187). A clear majority of 67.4% (126 out of 187) also view "climate change" as "important" or "very important".

However "reducing the rate of building new power plants" is deemed "important" or "very important" by only 42.8% (80 out of 187) of Smart $aver participants, though this percentage is higher in North Carolina (50.5% or 47 out of 93) than in South Carolina (35.1% or 33 out of 94).

Compared to heat pump rebate redeemers, respondents who claimed Smart $aver rebates for new central air conditioners were even more concerned about reducing air pollution (59.3% or 35 out of 59 say it is "very important", versus 47.2% or 60 out of 127 for heat pumps) and reducing the need for new power plants (25.4% or 15 out of 59 say it is "very important", versus only 9.4% or 12 out of 127 for heat pump rebate redeemers).

Figure 13 through Figure 16 show the complete distributions for these questions about the importance of environmental issues by state and type of rebate received.

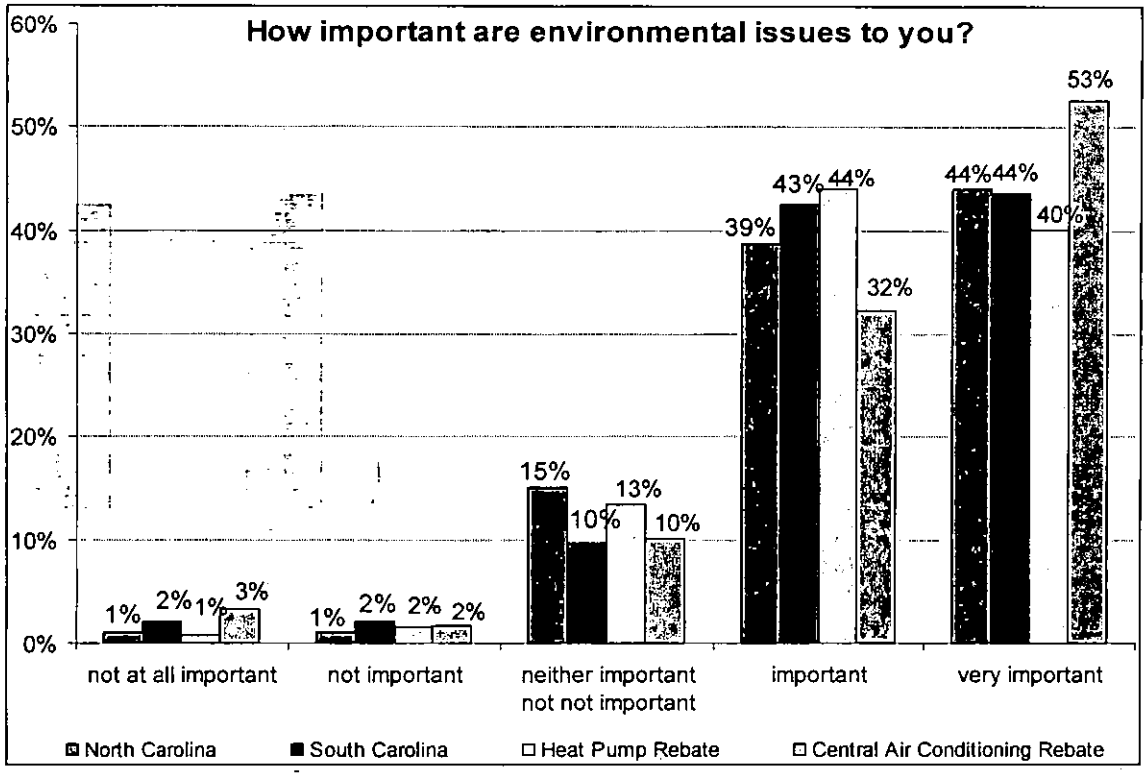

Figure 13. Importance of environmental issues to respondents
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

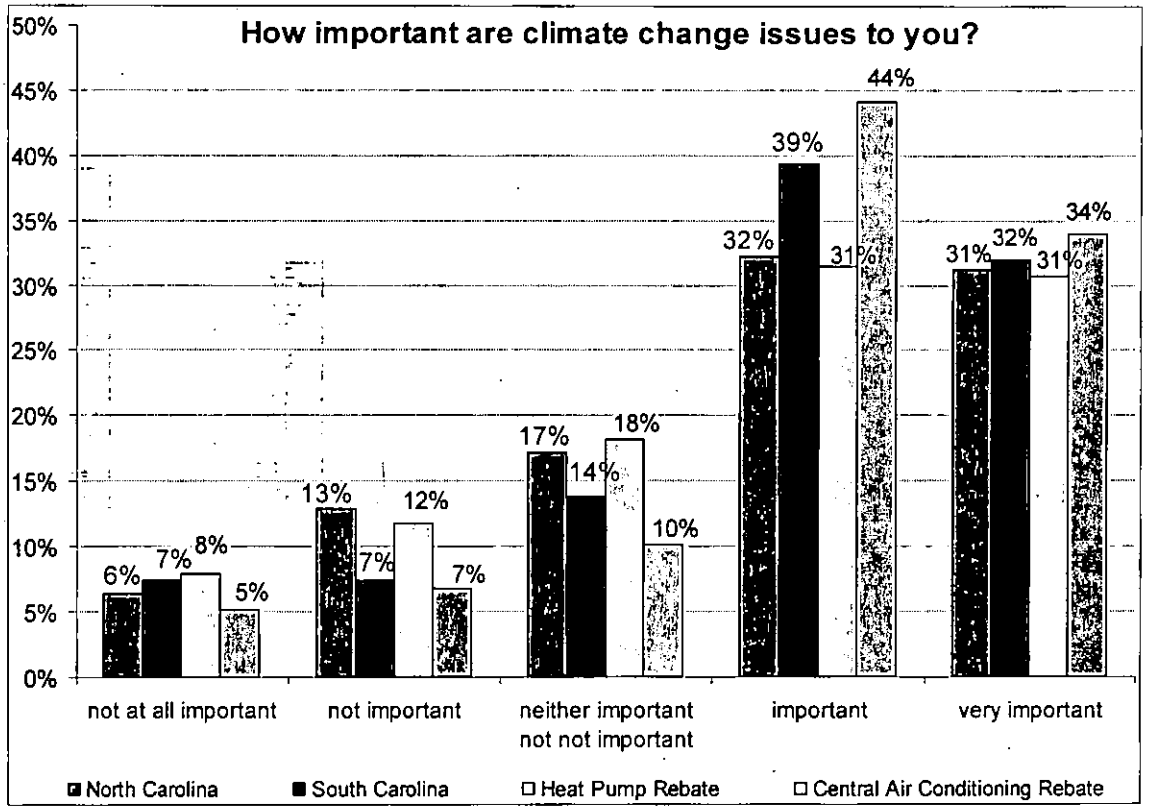

Figure 14. Importance of climate change issues to respondents
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

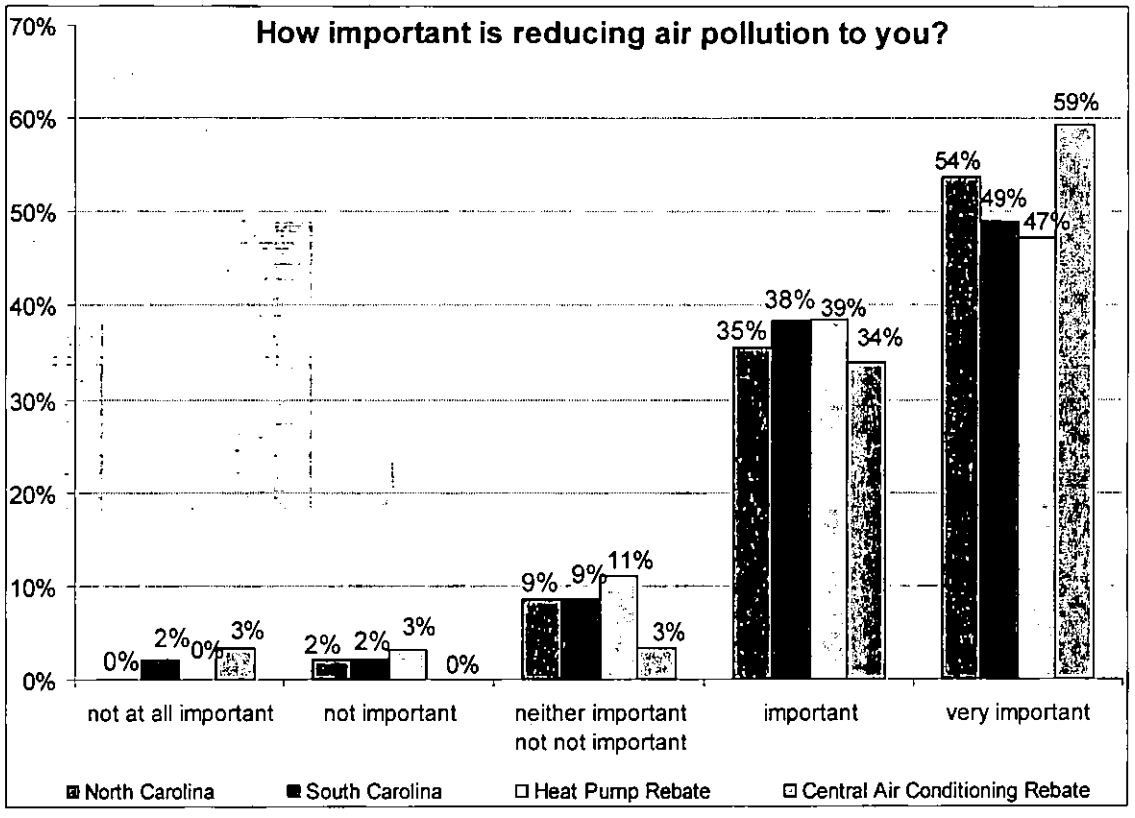

Figure 15. Importance of reducing air pollution to respondents
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

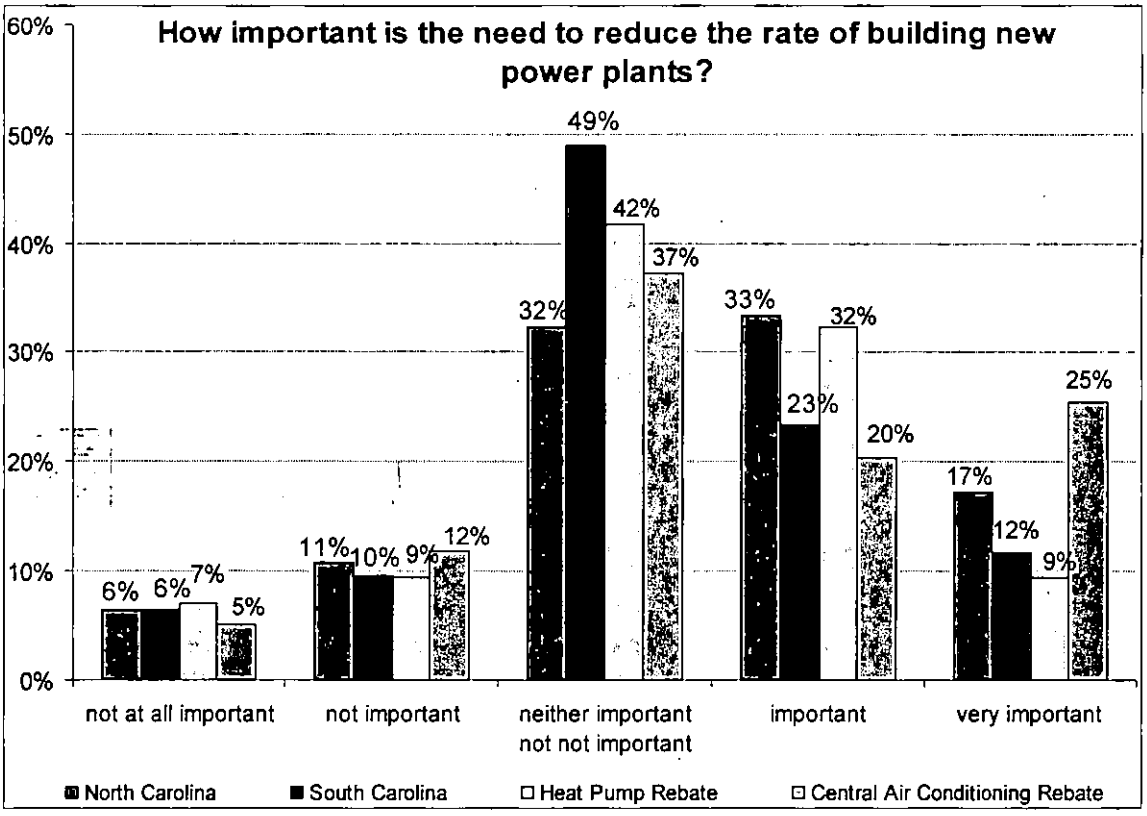

Figure 16. Importance of reducing rate of building new power plants to respondents
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

However, only 9.1% (17 out of 187) of Residential Smart $aver survey participants actually belong to groups or clubs with environmental missions.

Table 46. Membership in groups with environmental missions, by state

	NC N=93	SC N=94	Total N=187
Member of a group or club with an environmental mission	7.5%	10.6%	9.1%
Not a member of an environmental group (including "don't know")	92.5%	89.4%	90.9%

The groups and clubs these 17 respondents belong to are characterized below:

- 4 respondents (2.1% of 187) mentioned Sierra Club
- 2 respondents (1.1% of 187) mentioned World Wildlife Foundation
- 2 respondents (1.1% of 187) mentioned Trout Unlimited
- 2 respondents (1.1% of 187) mentioned church-affiliated groups
- 2 respondents (1.1% of 187) mentioned canoeing/paddling groups
- Other groups or causes receiving one mention (0.5% of 187) apiece are:
  - Advocate For Quality Development
  - American Arboreal Society
  - American Meteorological Society
  - Birmingham Zoo
  - Boy Scouts
  - Chapel Hill WISE
  - Ellerbe Creek Watershed Association
  - Friends of Lake Healy
  - Greenville Neighborhood Clean-Up
  - Habitat For Humanity
  - Mountain Lakes Community Association
  - The Nature Conservancy
  - Triangle Land Conservancy
  - Upstate Forever
  - "Habitat Conservation"
  - "Species Conservation Program"
  - "Sustainability group at work"

Note: The number of groups mentioned adds up to more than 17 because several of these respondents claimed membership in more than one group.

Households that Claimed Multiple Residential Smart $aver Rebates

Eighteen out of 187 (9.6%) respondents in this survey claimed more than one rebate from the Residential Smart $aver program. In most of these cases, the respondent claimed two heat pump rebates (7.5% or 14 out of 187), while respondents claiming two central air rebates numbered only 1.6% (3 out of 187) and there was one respondent who claimed one heat pump rebate and one central air conditioning rebate (0.5% or 1 out of 187).

Table 47. Type of Rebates Received, by state

	NC N=93	SC N=94	Total N=187
One Heat Pump	62.4%	58.5%	60.4%
Two Heat Pumps	6.5%	8.5%	7.5%
One Central Air Conditioning	29.0%	30.9%	29.9%
Two Central Air Conditioning	1.1%	2.1%	1.6%
One Heat Pump and One Central Air Conditioning	1.1%	0.0%	0.5%

Table 48 indicates that most multiple rebate households (83.3% or 15 out of 18) and single rebate households (88.2% or 149 out of 169), heard about Smart $aver through a trade ally.

Table 48. Source of Awareness of the Program by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
From a trade ally	83.3%	88.2%	87.7%
Other source	11.1%	8.9%	9.1%
Advertising	5.6%	6.5%	6.4%
Brochure from Duke Energy	5.6%	2.4%	2.7%
Duke Energy Web site	0.0%	2.4%	2.1%
Don't Know/Can't Recall	5.6%	1.2%	1.6%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

As seen in Table 49 and Table 50, in most cases trade allies also filled in the forms and submitted them. However single rebate households were significantly more likely to fill out incentive forms themselves or have a family member do it (combined 18.9% or 32 out of 169, compared to a combined 5.6% or 1 out of 18 for multiple rebate households; significant at $p<.10$ using student's t-test), as well as submit the forms themselves or have a family member do it (combined 32.5% or 55 out of 187, verses a combined 11.1% or 2 out of 18 for multiple rebate households; significant at $p<.05$ using student's t-test).

Table 49. Who filled out the incentive forms by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Trade ally	88.9%	79.9%	80.7%
Survey respondent ("I did")	5.6%	13.0%	12.3%
A family member	0.0%	5.9%	5.3%
Someone from Duke Energy	0.0%	1.2%	1.1%
Don't know	5.6%	0.0%	0.5%
Of those who filled out the incentive form themselves:	N=1	N=22	N=23
Incentive form was easy to understand	100.0%	95.5%	95.7%

Table 50. Who submitted the incentive forms by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Trade ally	83.3%	66.3%	67.9%
Survey respondent ("I did")	11.1%	26.0%	24.6%
A family member	0.0%	6.5%	5.9%
Don't know	5.6%	1.2%	1.6%
Someone from Duke Energy	0.0%	0.0%	0.0%

About three-quarters of multiple rebate households (77.8% or 14 out of 18) are certain that they received state or federal tax credits for their Smart $aver upgrade, compared to fewer than half of single rebate households (43.8% or 74 out of 169).

Table 51. Receiving rebates and tax credits by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Had problems receiving the rebate	5.6%	8.3%	8.0%
Did NOT have problems receiving the rebate	88.9%	91.1%	90.9%
Don't know	5.6%	0.6%	1.1%
Received state or federal rebate as well	77.8%	43.8%	47.1%
Did NOT receive state or federal rebate as well	16.7%	38.5%	36.4%

Don't know	5.6%	17.8%	16.6%

Table 52 and Table 53 show that multiple rebate households were also twice as likely to have made other major appliance purchases in the past year (61.1% or 11 out of 18, compared to just 27.8% or 47 out of 169 for single rebate households), and twice as likely to be planning to make more energy efficiency purchases in the next three years (44.4% or 8 out of 18, versus 20.1% or 34 out of 169 for single rebate households).

Table 52. Added other major electrical appliances to home in past year by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Yes	61.1%	27.8%	31.0%
No	38.9%	72.2%	69.0%
Don't know	0.0%	0.0%	0.0%

Table 53. Plan on making large purchase(s) to improve efficiency in next 3 years by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Yes	44.4%	20.1%	22.5%
No	50.0%	71.6%	69.5%
Don't know	5.6%	8.3%	8.0%

Table 54 shows that multiple rebate households are more likely to have participated in other Duke Energy programs, in particular My Home Energy Report (27.8% or 5 out of 18, versus 10.1% or 17 out of 169 for single rebate households).

There is more overlap among multiple rebate households, with about one in four having participated in two or more of these programs (27.8% or 5 out of 18), compared to only one in twenty single rebate households having participated in more than one program (5.3% or 9 out of 169). So although their participation rates are higher for all three of these programs, most multiple rebate households (61.1% or 11 out of 18) still have not participated in any of them, comparable to the 68.0% (115 out of 169) of single rebate households that have not participated in any of the three programs this survey asked about.

Table 54. Have you participated in any of these Duke Energy programs by number of rebates

	Multiple	Single	Total

	rebates N=18	rebate N=169	N=187
Power Manager	33.3%	19.5%	20.9%
My Home Energy Report	27.8%	10.1%	11.8%
Home Energy House Call	16.7%	7.7%	8.6%
Did not participate in any of the three programs listed above	61.1%	68.0%	67.4%
Participated in only one of the programs listed above	11.1%	26.6%	25.1%
Participated in two or three of the programs listed above	27.8%	5.3%	7.5%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Figure 17 shows that while a strong plurality of single rebate respondents who have not participated in My Home Energy Report rate their interest in the program a "1" (the lowest possible score) on a 10-point scale (37.5% or 57 out of 152), for multiple rebate households who have not yet participated in this program the most common rating of interest is actually a "10" (the highest possible score, given by 26.7% or 4 out of 15).

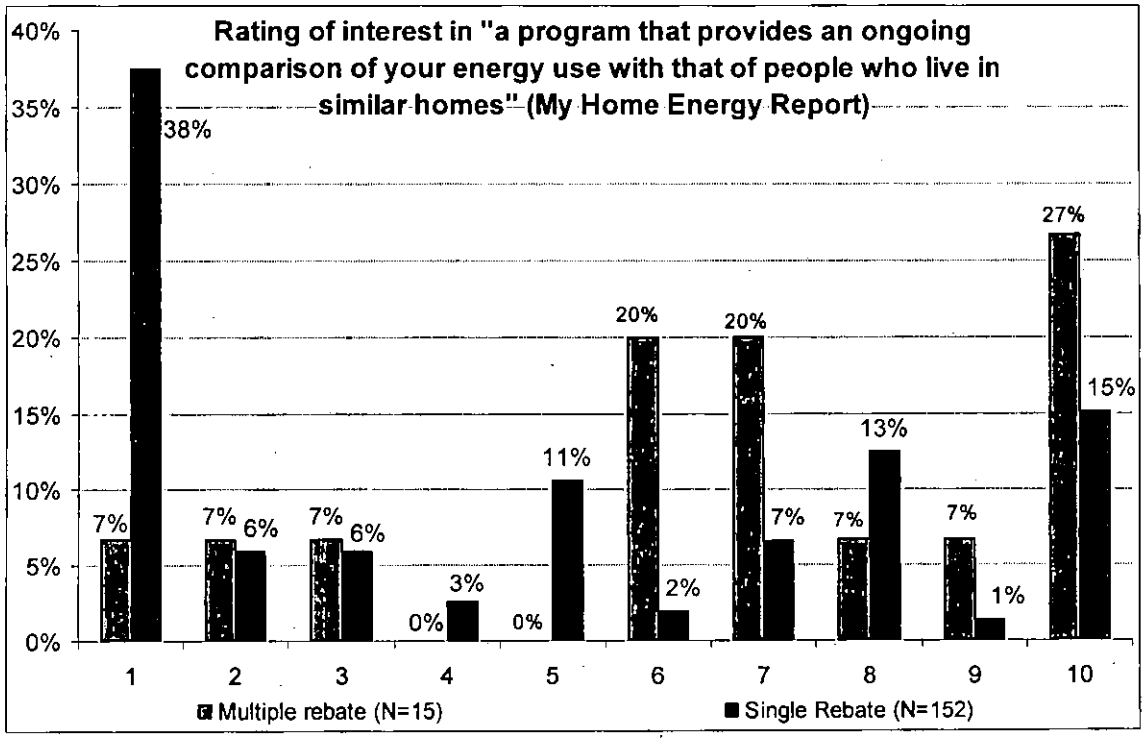

Figure 17. Interest rating in My Home Energy Report by number of rebates
(N=167 respondents who have not already participated in My Home Energy Report)

Overall, respondents who received multiple rebates were less satisfied with Smart $aver than single rebate recipients. Figure 18 shows that half of single rebate recipients (49.7% or 84 out of

169) rated their overall satisfaction with the program a "10 out of 10", compared to only 27.8% (5 out of 18) multiple rebate recipients.

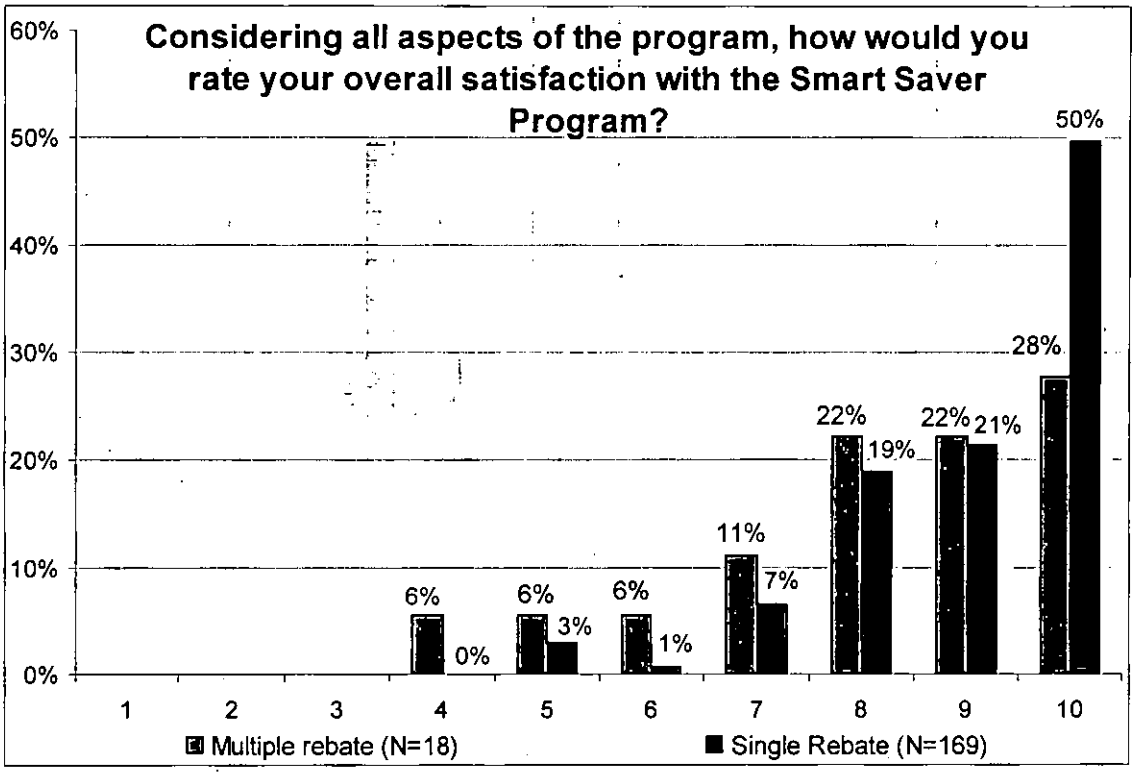

Figure 18. Overall satisfaction rating with the Smart $aver program by number of rebates (N=187)

Figure 19 through Figure 21 illustrate the aspects of the Smart $aver program that were rated significantly lower by multiple rebate respondents.

Respondents who received multiple rebates were less satisfied with the amount of the rebate, with more than half (61.1% or 11 out of 18) rating their satisfaction with this aspect of Smart Saver a "7" or lower on a 10-point scale, compared to just 26.6% (45 out of 169) of single rebate recipients rating their satisfaction that low (this difference is significant at $p<.01$ using student's t-test).

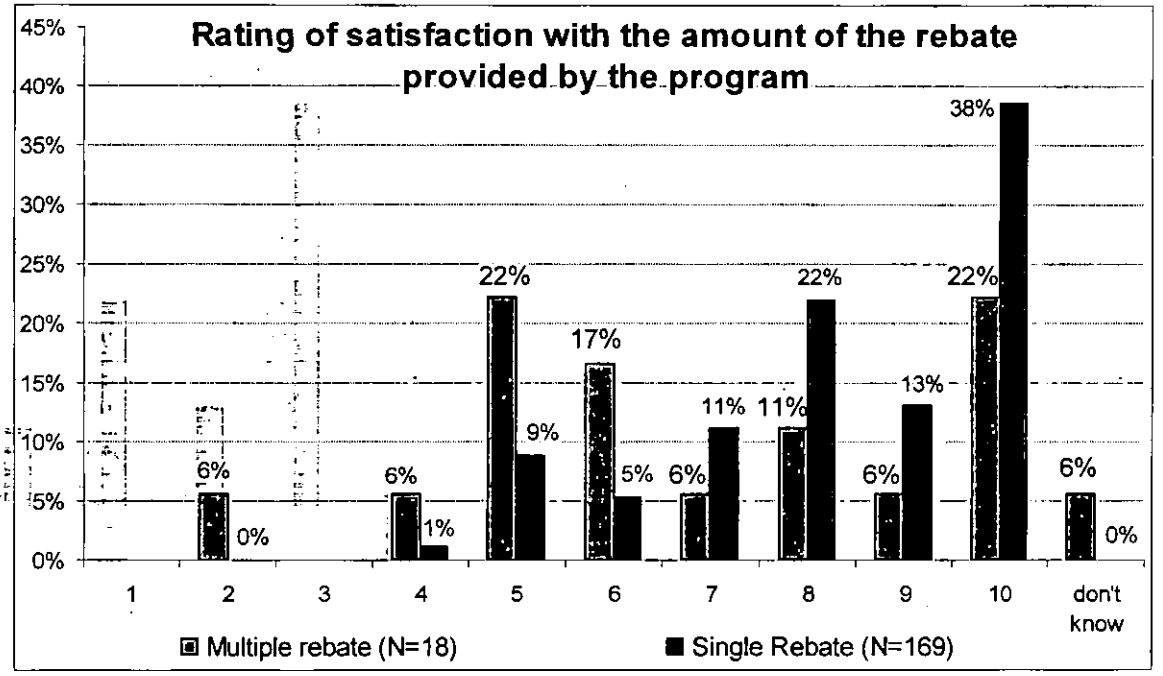

Figure 19. Satisfaction rating with the amount of rebate provided by Smart Saver by number of rebates (N=187)

Respondents who received multiple rebates were also less satisfied with the number and kind of technologies covered by the Smart Saver program, with more than half (55.6% or 10 out of 18) rating their satisfaction with this aspect of Smart Saver a "7" or lower on a 10-point scale, compared to just 27.8% (47 out of 169) of single rebate recipients rating their satisfaction a "7" or lower (this difference is statistically significant at $p<.05$ using student's t-test).

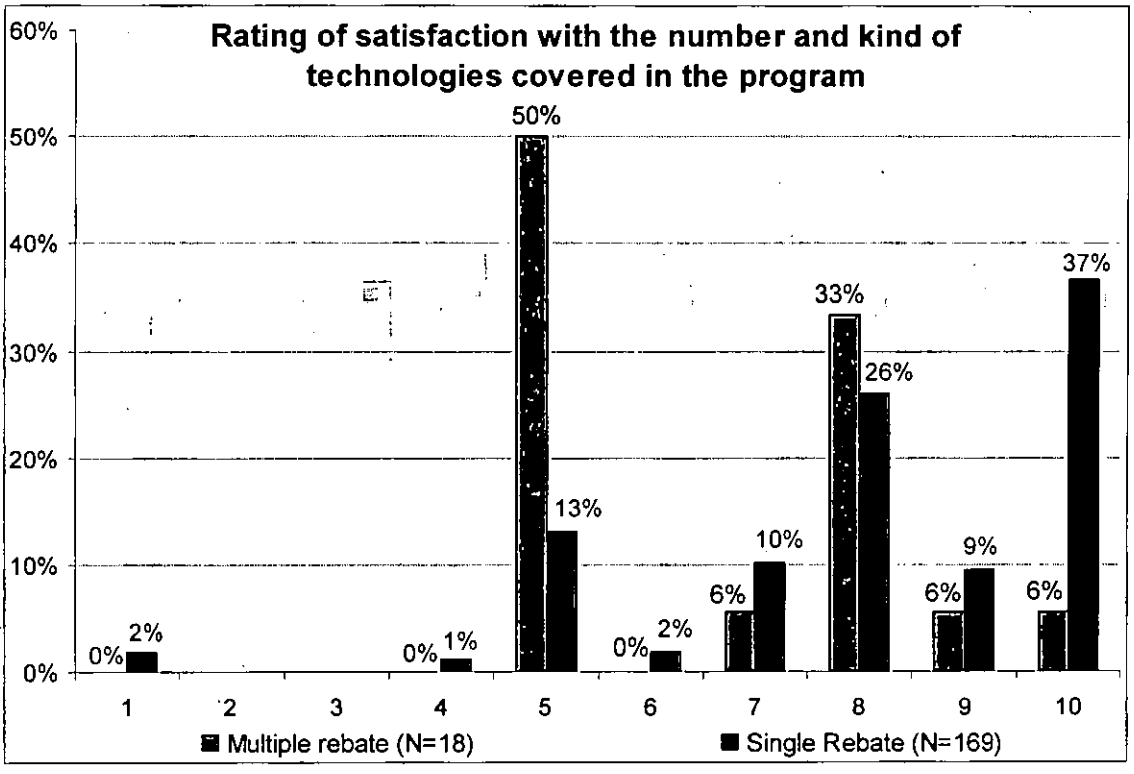

Figure 20. Satisfaction rating with the number and kind of technologies covered by Smart $aver by number of rebates (N=187)

Respondents who received multiple rebates were less satisfied with the information they were provided explaining the Smart Saver program, with half (50.0% or 9 out of 18) rating their satisfaction with this aspect of Smart Saver a "7" or lower on a 10-point scale, compared to just 16.6% (28 out of 169) of single rebate recipients rating their satisfaction a "7" or lower (this difference is significant at $p<.01$ using student's t-test).

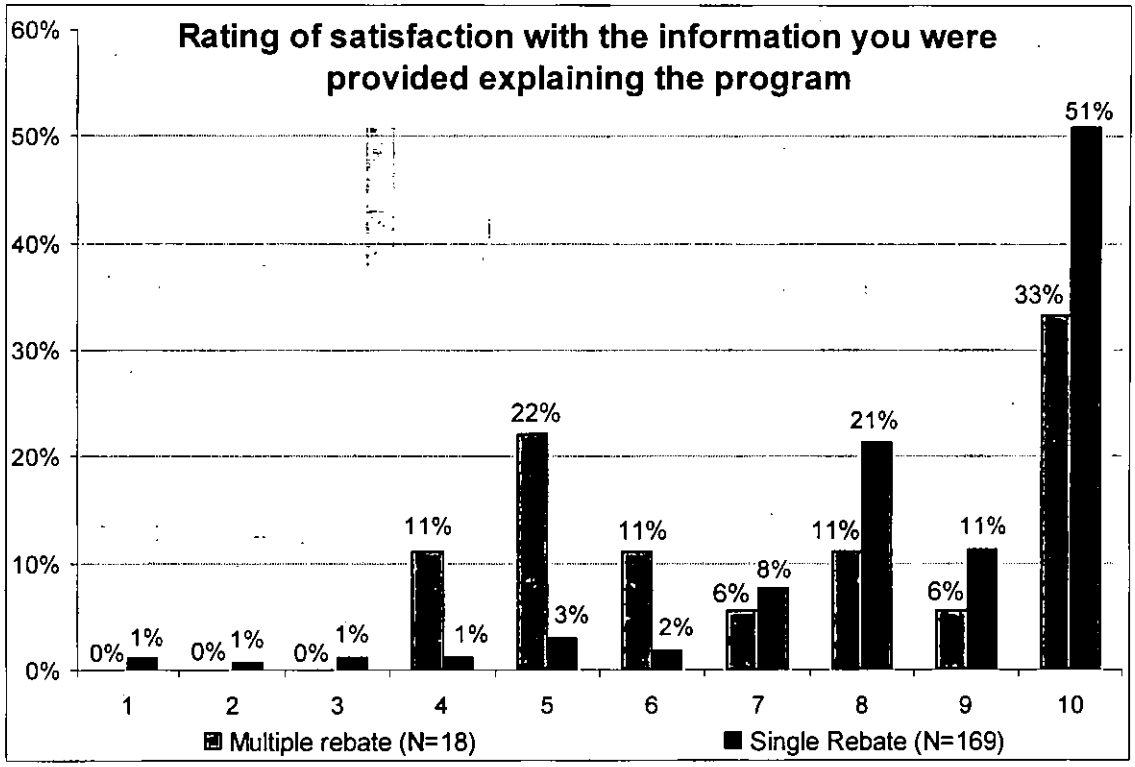

Figure 21. Satisfaction rating with the number and kind of technologies covered by Smart Saver by number of rebates (N=187)

Multiple Residential Smart $aver rebate households' multiple cooling units

The eighteen respondents who received multiple Smart $aver rebates were asked additional questions about their "secondary" cooling system.

Figure 8 and Figure 9 in a previous section of this report display the summer outdoor temperatures at which all respondents in this survey turn on their primary air conditioning unit. Figure 22 shows these temperatures for both primary and secondary air conditioning units of the households that claimed two Smart $aver rebates.

The most common response for all of these respondents was "it is programmed into the thermostat" (rather than naming an outdoor temperature), mentioned regarding 33.3% (6 out of 18) of primary air conditioning units and 38.9% (7 out of 18) of secondary units. Otherwise, most multiple-rebate households usually turn on both their primary and secondary units between 76 and 87 degrees (61.1% or 11 out of 18 primary units and 38.9% or 7 out of 18 secondary units).

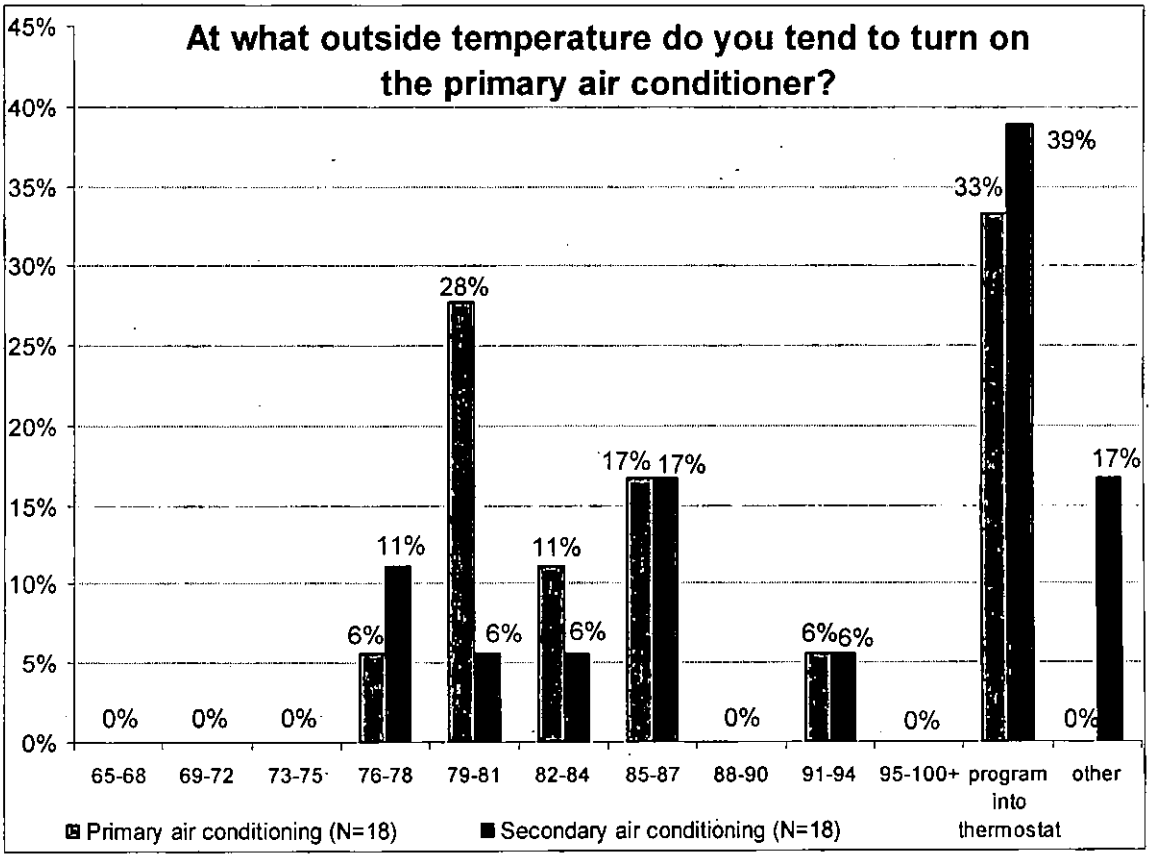

Figure 22. Outside summer temperature at which multiple-rebate households turn on their primary and secondary air conditioning units (N=18 multiple rebate households)

Three respondents in this survey who claimed multiple Smart $aver rebates (16.7% of 18) volunteered different responses to this question. These responses are characterized below:

- *"When I have guests"* (2 respondents)
- *"When the night temperature is 80 or above"*

Respondents who claimed more than one Residential Smart $aver HVAC rebate (and therefore have at least two systems that can be used for cooling) were also asked how many thermostats they have, and whether they set them to the same temperature, as seen in Table 55. The vast majority have two thermostats (88.9% or 16 out of 18), and most of them are not set at the same temperature (70.6% or 12 out of 17 respondents with at least two thermostats).

Table 55. Multiple thermostats in multiple rebate households

	Multiple rebate households N=18
Have one Thermostat	5.6%
Have two Thermostats	88.9%
Have three Thermostats	5.6%
	Households with multiple thermostats N=17
Additional Thermostats are set at the same temperature	29.4%
Additional Thermostats are NOT set at the same temperature	70.6%

Net to Gross Methodology

The net to gross ratio for the Residential Smart $aver HVAC program will be calculated and presented in the impact report. This section presents the methodology for determining the net to gross results.

The process evaluation included participant surveys and in-depth trade ally interviews, as presented in this report. However, the program's incentives are typically unknown to the participant. Many trade allies typically complete the application to receive the program's rebate and pass the savings on to the participating customer. In this common scenario, the participating customer is not a reliable source for freeridership information. With this program's operational structure, TecMarket Works determined that the best source for freeridership information is the trade allies. In the course of the 21 in-depth interviews conducted with trade allies, there were questions that addressed freeridership. However, not all of the trade allies were able to respond to the questions, and the resulting sample was too small to use in calculating the net to gross ratio. In September and October, 2012, TecMarket Works expanded the freerider analysis by conducted a short survey (see below) on an attempted census of participating trade allies in order to get as much information about freeridership as possible. When this survey is complete, the results will be compared to participant survey results to freeridership questions for those participants that were aware of the incentive. The resulting methodology will be based on the reliability of the data collected, and will be presented in full detail in the impact report.

Net to Gross Battery

The following short survey was fielded with an attempted census of partnering trade allies. The results of the calculations will be presented in the impact report for the Residential Smart $aver HVAC program.

I am calling on behalf of Duke Energy about their Smart Saver HVAC program. We have five brief questions that we're asking of the HVAC vendors in your area that will take just a couple minutes of your time. Do you have a couple of minutes?

If no, **I understand you're busy, but if you don't mind may I ask you two quick questions?** (#3 and 4)

1. **What percent of Smart $aver buyers do you think are replacing older equipment that are still functioning, but less efficient?**

2. **What percent of Smart $aver buyers do you think are replacing failed units?**

3. **Of the Energy Efficient equipment that was rebated through the program, what percent of those customers do you think would have still gone with an energy efficient model if the Duke Energy rebate were not available?**

4. **What percent of these customers do you think were in some way influenced by the rebate Duke Energy offered?**

5. **What percent of your total high efficiency equipment sales were rebated through the Smart Saver program last year?**

Appendix A: Management Interview Instrument

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the Smart $aver® program. We'll talk about the Smart $aver® Program and its objectives, your thoughts on improving the program, and the technologies the program covers. The purpose of this study is to capture the program's current operations as well as help identify areas where the program might be improved. Your responses will feed into a report that will be shared with Duke Energy and the state regulatory agency. I want to assure you that the information you share with me will be kept confidential; we will not identify you by name. However, you may provide some information or opinions that could be attributed to you by virtue of your position and role in this program. If there is sensitive information you wish to share, please warn me and we can discuss how best to include that information in the report.

The interview will take about an hour to complete. Do you have any questions for me before we begin?

Program Background and Objectives (15 min)

1. Please describe your role and scope of responsibility in detail.
2. How long have you been involved with the Smart $aver program?
3. (PM only) Describe the evolution of the Smart $aver® Program. Why was the program created, and has the program changed since it was it first started?
4. Have there been any recent changes been made to your duties since you started?
    a. If YES, please tell us what changes were made and why they were made. What are the results of the change?
5. In your own words, please describe the Smart $aver® Program's objectives. (e.g. enrollment, energy savings, non-energy benefits)

6. (PM only) Can you please walk me through the program's implementation, starting with how the program is marketed and how you target your customers, through how the customer participates and finishing with how savings are verified?

    a. Marketing/Targeting: How & Who

    b. Enrollment/Participation

    c. Rebate processing

    d. Savings verification: How & Who

7. Of the program objectives you mentioned earlier, do you feel any of them will be particularly easy to meet, and why?

8. Which program objectives, if any, do you feel will be relatively difficult to meet, and why?

9. Are there any objectives you feel should be revised prior to the end of this program cycle? If yes, why?

Vendors (10 min)

10. (PM only) Do you use any vendors or contractors to help implement the program?

    a. What responsibilities do they have?

    b. Are there any areas in which think they can improve their services?

11. *(If not captured earlier)* Please explain how activities of the program's vendors, customers and Duke Energy are coordinated.

    a. Do you think methods for coordination should be changed in any way? If so, how and why?

Rebates (15 min)

12. (PM only) How do you determine which pieces of equipment are included in the program? For example, how do you determine what level of efficiency the rebated equipment should have?

    a. Do you use any outside vendors or experts to help with this process?

    b. What should be changed about this selection process?

13. Describe your quality control and process for tracking participants, rebates, and other program data.

14. Do you believe that the program currently offers rebates on enough energy efficient products to meet your customers' needs?

    a. If not, what products would you like to add? Are these currently being considered?

15. Is the program offering enough of a rebate to motivate your customers to participate?

    a. If not, which rebates do you think should be changed, and why?

Contractor Training (5 min)

16. Describe Smart $aver's contractor program orientation training and development approach.

    a. (PM and WECC only) How do you ensure that contractors are getting adequate program training and updated program information?

    b. Can we obtain training materials that are being used?

    c. Are there any new areas where you think contractors could be trained?

17. Do you have any suggestions for improving contractor effectiveness?

Improvements (10 min)

18. Are you currently considering any changes to the program's design or implementation?

    a. What are the changes?

    b. What is the process for deciding whether or not to make these changes?

19. Do you have suggestions for improvements to the program that would increase participation rates, or is Duke Energy happy with the current level of participation?

20. Do you have suggestions for increasing energy impacts *per participant*, given the same participation rates, or is Duke Energy happy with the current per participant impact?

21. Overall, what would you say about the Smart $aver® program is working really well?

    a. Is there anything in this program you could highlight as a best practice that other utilities might like to adopt?

22. What area needs the most improvement, if any?

    a. (If not mentioned before) What would you suggest can be done to improve this?

23. Are there any other issues or topics we haven't discussed that you feel should be included in this report?

24. Do you have any further questions for me about this study or anything else?

25. Thank you!

Appendix B: Trade Ally Interview Instrument

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with Duke Energy's Residential Smart $aver program. We'll talk about your understanding of the Residential Smart $aver Program and its objectives, your thoughts on improving the program, and the technologies the program covers. The interview will take about 45 minutes to complete. May we begin?

Understanding the Program

We would like to ask you about your understanding of the Smart $aver program. We would like to start by first asking you to…

1. Please review for me how you are involved in the program and the steps you take in the participation process. Walk me though the typical steps you take to help a customer become eligible for this program and what you do to receive or help the customer receive the program incentive.

2. What kinds of problems or issues have come up in the Smart $aver program?

3. Have you heard of any customer complaints that are in any way associated with this program? Have callbacks increased due to the program technologies?

Program Design and Design Assistance

4. Do you feel that the proper technologies and equipment are being covered through the program?

5. Are the incentive levels appropriate? How do they impact the choice by the customers of the higher efficient equipment?

6. Are there other technologies or energy efficient systems that you think should be included in the program?

7. Are there components that are now included that you feel should not be included? What are they and why should they not be included?

Reasons for Participation in the Program

We would like to better understand why contractors become partners in the Smart $aver Program.

9. How long have you been a partner in the Smart $aver Program?

10. What are your primary reasons for participating in the program? Why do you continue to be a partner?.... *If prompts are needed...* Is this a wise business move for you, is it something you believe in professionally, does it provide a service to your customers, do you want to build a relationship with Duke Energy, or other reasons?

11. Has this program made a difference in your business? How?

12. How do you think Duke Energy can get more contractors to participate in this program?

Program Participation Experiences

The next few questions ask about the process for submitting participation forms and obtaining the incentive payments.

13. Do you think the process could be streamlined in any way? How?

14. How long does it take between the time that you apply for your incentive, to the time that you and your customer receive the payments? Is this a reasonable amount of time? What should it be? Why?

15. Do you have the right amount of materials such as forms, information sheets, brochures or marketing materials that you need to effectively show and sell your Smart $aver® heat pumps and air conditioners? What else do you need?

16. Overall, what about the Smart $aver Program do you think works well and why?

17. What changes would you suggest to improve the program?

18. Do you feel that communications between you and Duke Energy's Smart $aver program staff is adequate? How might this be improved?

19. What benefits do you receive as a result of participating in Duke Energy's Smart $aver Program or from selling Smart $aver items?

20. What do you think are the primary benefits to the people who buy a Smart $aver appliance? Are there other benefits that are important to a potential customer?

Market Impacts and Effects

21. How do you make customers aware of the Program?

22. Are customers more satisfied with this equipment? Why or why not?

23. Do you have fewer calls or more calls to correct problems with the Smart $aver appliances?

24. Do you market or sell the Smart $aver equipment differently than your other equipment? How?

25. What percent of Smart $aver buyers do you think are replacing older equipment that is still functioning, but less efficient? What percent of Smart $aver buyers do you think are replacing failed units?

26. Other than the energy efficient heat pumps and air conditioners, has the program influenced you to carry other energy efficient equipment that is not rebated through the program?

    a. *If yes*, what do you now carry?

    b. *If yes,* About how many of these units did you install/sell in the last year?

27. Do you bundle air conditioners with any other efficiency options?
    a. If yes, what percent?

Heat Pump Questions

28. Has the program influenced your decision to market or sell more high efficiency equipment than you would have without the program?

    a. *If yes,* To what extent?

29. Of the Energy Efficient equipment that was rebated through the program, what percent of those customers do you think would have still gone with an energy efficient model if the Duke Energy rebate were not available?

30. What percent of these customers do you think were in some way influenced by the rebate Duke Energy offered?

31. What percent of your total high efficiency equipment sales were rebated through the Smart $aver program last year?

19) Have you added any major electrical appliances besides your new [equipment - air conditioner or heat pump] to your home in the past year?*
( ) Yes

( ) No

20) Have you participated in the past, or currently a participant in any of the following Duke Energy programs:
(read all, and check all that apply)

[ ] Power Manager

[ ] Home Energy House Call

[ ] My Home Energy Report

For programs not checked in Q19, ask the following question

On a scale from 1-10, with 1 indicating not at all interested and 10 indicating very interested, please rate your interest in Duke Energy providing the following program(s):

if "Power Manager" is NOT checked in q19, ask:

21) A program that provides bill credits in exchange for allowing Duke Energy to temporarily cycle your air conditioning unit during periods of high use
Not at all interested

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

Very interested

if "Home Energy House Call" is NOT checked in q19, ask:

22) A program in which an assessor comes to your house, suggests energy efficiency improvements, and Duke Energy provides certain low-cost improvement materials for free.

Not at all interested

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

Very interested

if "My Home Energy Report" is NOT checked in q19, ask:

23) A program that provides an ongoing comparison of your energy use with that of people who live in similar homes

Not at all interested

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

Very interested

24) What other services could Duke Energy provide to help improve home energy efficiency?*

25) Generally speaking, how important are environmental issues to you? Would you say they are...*
(read all and select one answer)

( ) Very Important

( ) Important

( ) Neutral

( ) Not Important, or

( ) Not At All Important

26) How important are climate change issues to you? Would you say they are...*
(read all and select one answer)

( ) Very Important

( ) Important

( ) Neutral

( ) Not Important, or

( ) Not At All Important

27) How important is reducing air pollution to you? Would you say it is...*
(read all and select one answer)

( ) Very Important

( ) Important

( ) Neutral

( ) Not Important, or

( ) Not At All Important

If yes to question 31, ask:

31a. Were your questions or needs effectively handled by the Duke Energy?*
( ) Yes

( ) No

( ) DK/NS

If no to question 31a,

31b. How might this be improved?*

32) Overall, what did you like most about the Smart $aver Program?*

33) What did you like least?*

We would like to ask you a few questions about your satisfaction with 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 the program and a 10 means that you are very satisfied.

How would you rate your satisfaction with…

34) The amount of the rebate provided by the program*
( ) Not Applicable

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

If 7 or less to question 34, ask:

34a. What could have been done to make this better?*

_____

How would you rate your satisfaction with…

35) The ease of filling out the form to receive the rebate.*

( ) Not Applicable

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

If 7 or less to question 35, ask:

35a. What could have been done to make this better?*

_____

How would you rate your satisfaction with…

36) The time it took for your to receive your rebate check*

( ) Not Applicable

( ) 1

( ) 2

( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10

If 7 or less to question 36, ask:

36a. What could have been done to make this better?*

_____

How would you rate your satisfaction with…

37) The number and kind of technologies covered in the program*
very dissatisfied
( ) 1
( ) 2
( ) 3
( ) 4
( ) 5
( ) 6
( ) 7
( ) 8
( ) 9
( ) 10
very satisfied

If 7 or less to question 37, ask:

37a. What could have been done to make this better?*

_____

How would you rate your satisfaction with…

38) The information you were provided explaining the program*
very dissatisfied

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

very satisfied

If 7 or less to question 38, ask:

38a. What could have been done to make this better?*

_____

39) Considering all aspects of the program, how would you rate your overall satisfaction with the Smart $aver Program?*
very dissatisfied

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

very satisfied

If 7 or less to question 39, ask:

39a. What could have been done to make your experience better, or have we already covered it?*

_____

40) How would you rate your overall satisfaction with Duke Energy?*
very dissatisfied

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10

very satisfied

If 7 or less to question 40, ask:

40a. Why were you less than satisfied with Duke Energy?*

_____

Demographic Questions

Finally, we have some general demographic questions...

41) In what type of building do you live?*
( ) Single-family home, detached construction
( ) Single family home, factory manufactured/modular
( ) Single family, mobile home
( ) Row House
( ) Two or Three family attached residence-traditional structure
( ) Apartment (4 + families)---traditional structure
( ) Condominium---traditional structure
( ) Other
( ) Refused
( ) DK/NS

42) What year was your residence built?*
( ) 1959 and before
( ) 1960-1979
( ) 1980-1989
( ) 1990-1997
( ) 1998-2000
( ) 2001-2007
( ) 2008-present
( ) DK/NS

43) How many rooms are in your home (excluding bathrooms, but including finished basements)?*
( ) None
( ) 1-3
( ) 4
( ) 5

( ) 6

( ) 7

( ) 8

( ) 9

( ) 10 or more

( ) DK/NS

44) Which of the following best describes your home's heating system?*
(Mark all that apply)

[ ] None

[ ] Central forced air furnace

[ ] Electric Baseboard

[ ] Heat Pump

[ ] Geothermal Heat Pump

[ ] Other

[ ] DK/NS

45) How old is your heating system?*

( ) 0-4 years

( ) 5-9 years

( ) 10-14 years

( ) 15-19 years

( ) 20 years or older

( ) Don't know

( ) Do not have

46) What is the primary fuel used in your heating system?*

( ) Electricity

( ) Natural Gas

( ) Oil

( ) Propane

( ) Other: _____*

( ) None

( ) DK/NS

47) What is the secondary fuel used in your primary heating system, if applicable?*

( ) Electricity

( ) Natural Gas

( ) Oil

( ) Propane

( ) Other

( ) None

48) Do you use one or more of the following to cool your home?*

(Mark all that apply)

[ ] None, do not cool the home

[ ] Heat pump for cooling

[ ] Central air conditioning

[ ] Through the wall or window air conditioning unit

[ ] Geothermal Heat pump

[ ] Other

[ ] DK/NS

49) How many window-unit or "through the wall" air conditioner(s) do you use?*

( ) None

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8 or more

50) What is the fuel used in your cooling system?*

( ) Electricity

( ) Natural Gas

( ) Oil

( ) Propane

( ) Other: _____*

( ) None

( ) DK/NS

51) How old is your cooling system?*

( ) 0-4 years

( ) 5-9 years

( ) 10-14 years

( ) 15-19 years

( ) 20 years or older

( ) DK/NS

( ) Do not have

52) What is the fuel used by your water heater?*

(Mark all that apply)

[ ] Electricity

[ ] Natural Gas

[ ] Oil

[ ] Propane

[ ] Other

[ ] No water heater

[ ] DK/NS

53) How old is your water heater?*
( ) 0-4 years
( ) 5-9 years
( ) 10-14 years
( ) 15-19 years
( ) 20 years or older
( ) No water heater
( ) DK/NS

54) What type of fuel do you use for indoor cooking on the stovetop or range?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No stovetop or range

55) What type of fuel do you use for indoor cooking in the oven?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil
[ ] Propane
[ ] Other
[ ] No oven

56) What type of fuel do you use for clothes drying?*
(Mark all that apply)
[ ] Electricity
[ ] Natural Gas
[ ] Oil

[ ] Propane

[ ] Other

[ ] No clothes dryer

More Demographic Questions

57) About how many square feet of living space are in your home?*

(Do not include garages or other unheated areas)
Note: A 10-foot by 12 foot room is 120 square feet

( ) Less than 500

( ) 500 – 999

( ) 1000 – 1499

( ) 1500 – 1999

( ) 2000 – 2499

( ) 2500 – 2999

( ) 3000 – 3499

( ) 3500 – 3999

( ) 4000 or more

( ) DK/NS

58) Do you own or rent your home?*

( ) Own

( ) Rent

59) How many levels are in your home (not including your basement)?*

( ) One

( ) Two

( ) Three

60) Does your home have a heated or unheated basement?*

( ) Heated

( ) Unheated

( ) No basement

61) Does your home have an attic?*
( ) Yes

( ) No

If they have an attic, ask:

60a. Are your central air/heat ducts located in the attic?*
( ) Yes

( ) No

62) Does your house have cold drafts in the winter?*
( ) Yes

( ) No

63) Does your house have sweaty windows in the winter?*
( ) Yes

( ) No

64) Do you notice uneven temperatures between the rooms in your home?*
( ) Yes

( ) No

65) Does your heating system keep your home comfortable in winter?*
( ) Yes

( ) No

66) Does your cooling system keep your home comfortable in summer?*
( ) Yes

( ) No

67) Do you have a programmable thermostat?*
( ) Yes

( ) No

68) What temperature is your thermostat set to on a typical summer weekday afternoon?*
( ) Less than 69 degrees

( ) 69-72 degrees

( ) 73-78 degrees

( ) Higher than 78 degrees

( ) Off

( ) DK/NS

69) What temperature is your thermostat set to on a typical winter weekday afternoon?*
( ) Less than 67 degrees

( ) 67-70 degrees

( ) 71-73 degrees

( ) 74-77 degrees

( ) Higher than 78 degrees

( ) Off

( ) DK/NS

70) Do you have a swimming pool, spa or hot-tub?*
( ) Yes

( ) No

71) Would a two-degree increase in the summer afternoon temperature in your home affect your comfort....*
(read all)

( ) **Not at all**

( ) **Slightly**

( ) **Moderately, or**

( ) **Greatly**

72) How many people live in this home?*

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8 or more

( ) Prefer Not to Answer

73) How many people are usually home on a weekday afternoon?*

( ) 0

( ) 1

( ) 2

( ) 3

( ) 4

( ) 5

( ) 6

( ) 7

( ) 8 or more

( ) Prefer Not to Answer

74) Are you planning on making any large purchases to improve energy efficiency in the next 3 years?*

( ) Yes

( ) No

( ) DK/NS

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.

75) What is your age group?*

(read all)

( ) **18-34**

( ) **35-49**

( ) **50-59**

( ) **60-64**

( ) **65-74**

( ) **Over 74**

( ) Prefer Not to Answer

76) Please indicate your annual household income.*

(read all)

( ) **Under $15,000**

( ) **$15,000-$29,999**

( ) **$30,000-$49,999**

( ) **$50,000-$74,999**

( ) **$75,000-$100,000**

( ) **Over $100,000**

( ) Prefer Not to Answer

We have reached the end of the survey. Do you have any comments that you would like for me to pass on to Duke Energy?

That completes our survey. As I mentioned at the start of the survey, we'd like to send you $20 for your time. Should we send it to [name] at [address]?

(Politely end call. Note any address change in the calling sheet)

Please enter the Survey ID again for verification purposes.*

_____

Thank you for taking our survey. Your response is very important to us.

Appendix D: Household Characteristics and Demographics

Frequency of visits to Duke Energy's web site

Overall, 59.9% (112 out of 187) of Smart $aver participants in this survey report that they have never even visited the Duke Energy web site. Only 7.0% (13 out of 187) visit Duke Energy's web site at least once a month, though this percentage is higher in North Carolina (9.7% or 9 out of 93) than South Carolina (4.3% or 4 out of 94).

Table 56. Frequency of visits to Duke Energy's web site, by state

	NC N=93	SC N=94	Total N=187
Often (once a month or more)	9.7%	4.3%	7.0%
Sometimes (less than once a month)	31.2%	35.1%	33.2%
Never	59.1%	60.6%	59.9%

Respondents from multiple rebate households are more likely to visit the Duke Energy web site, and to visit it more often. As Table 57 indicates, nearly two-thirds of single rebate respondents (62.7% or 106 out of 169) have never visited Duke Energy's web site, while only one-third (33.3% or 6 out of 18) of multiple rebate respondents have never visited the site. Multiple rebate respondents are also three times as likely to visit the Duke Energy site every month (16.7% or 3 out of 18, compared to 5.9% or 10 out of 169 single rebate households; this difference is significant at the $p<.05$ level using student's t-test).

Table 57. Frequency of visits to Duke Energy's web site by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Often (once a month or more)	16.7%	5.9%	7.0%
Sometimes (less than once a month)	50.0%	31.4%	33.2%
Never	33.3%	62.7%	59.9%

Smart $aver Participants' Dwellings Characteristics

As seen in Table 58, almost everyone who participated in this study owned their own home (98.9% or 185 out of 187). The vast majority of Smart $aver participants live in single family detached homes, and even more so in North Carolina (94.6% or 88 out of 93) than South Carolina (85.1% or 80 out of 94).

More participants in South Carolina live in modular single family homes (7.4% or 7 out of 94)

and mobile homes (2.1% or 2 out of 94) than in North Carolina (where 1.1% or 1 out of 93 lived in modular homes, and none or 0.0% of 93 lived in mobile homes). Only 2.7% (5 out of 187) overall lived in condominiums, and no one in our survey reported living in multi-family buildings or apartments (0 out of 187).

Table 58. Smart Saver participants' dwelling structures, by state

	NC N=93	SC N=94	Total N=187
Own home	98.9%	98.9%	98.9%
Rent home	0.0%	1.1%	0.5%
Did not specify	1.1%	0.0%	0.5%
Single family detached	94.6%	85.1%	89.8%
Single family modular	1.1%	7.4%	4.3%
Condominium	2.2%	3.2%	2.7%
Row house	2.2%	1.1%	1.6%
Single family mobile	0.0%	2.1%	1.1%
Other (not specified)	0.0%	1.1%	0.5%
Two or three family attached residence	0.0%	0.0%	0.0%
Apartment building (4 or more families)	0.0%	0.0%	0.0%

Table 59 shows that over half (58.1% or 54 out of 93) of North Carolina participants live in structures that were built in 1979 or earlier, while only 37.2% (35 out of 94) of South Carolina participants' homes are that old. Meanwhile 12.8% (12 out of 94) of participants in South Carolina live in homes built in 2001 or more recently, compared to only 3.2% (3 out of 93) in North Carolina.

There is also a large difference between homes built in the 1980's, with 22.3% (20 out of 94) of South Carolina homes in our study built in that decade, compared to only 7.5% (7 out of 93) of North Carolina homes built in the 1980's.

Table 59. Smart $aver participants' dwelling age, by state

	NC N=93	SC N=94	Total N=187
1959 or before	23.7%	14.9%	19.3%
1960-1979	34.4%	22.3%	28.3%
1980-1989	7.5%	21.3%	14.4%
1990-1997	18.3%	19.1%	18.7%
1998-2000	8.6%	8.5%	8.6%
2001-2007	2.2%	7.4%	4.8%
2008-present	1.1%	5.3%	3.2%
Don't know	4.3%	1.1%	2.7%

As Table 60 shows, heat pump rebate redeemers are somewhat more likely to live in homes built since 2001 (10.2% or 13 out of 127) compared to central air rebate redeemers (3.4% or 2 out of 59), and a larger share of central air redeemers have houses built in the 1950's or earlier (25.4% or 15 out of 59) compared to heat pump rebate redeemers (16.5% or 21 out of 127).

Table 60. Smart $aver participants' dwelling age, by rebate

	Redeemed HP rebate N=127	Redeemed CAC rebate N=59	Total N=186
1959 or before	16.5%	25.4%	19.4%
1960-1979	29.9%	25.4%	28.5%
1980-1989	16.5%	10.2%	14.5%
1990-1997	17.3%	20.3%	18.3%
1998-2000	7.1%	11.9%	8.6%
2001-2007	6.3%	1.7%	4.8%
2008-present	3.9%	1.7%	3.2%
Don't know	2.4%	3.4%	2.7%

Note: One respondent who received both types of rebate was not included in this table.

Smart $aver participants in North and South Carolina have similar distributions of the sizes of their homes in terms of number of rooms. Overall, 38.0% (71 out of 187) live in homes with 5 or 6 rooms, and 35.8% (67 out of 187) live in homes with 7 or 8 rooms. Only 23.5% (44 out of 187) have homes with 9 or more rooms, and only 2.7% (5 out of 187) have just 4 rooms (the smallest number of rooms reported in this survey).

Table 61. Smart $aver participants' dwellings: number of rooms, by state

	NC N=93	SC N=94	Total N=187
4 or fewer	3.2%	2.1%	2.7%
5	15.1%	9.6%	12.3%
6	25.8%	25.5%	25.7%
7	18.3%	18.1%	18.2%
8	16.1%	19.1%	17.6%
9	10.8%	11.7%	11.2%
10 or more	10.8%	13.8%	12.3%

Table 62 indicates that households which claimed Smart $aver rebates for installing central air conditioning are more likely to be larger (32.2% or 19 out of 59 have 9 or more rooms) compared to heat pump rebate recipients (19.7% or 25 out of 127 have 9 or more rooms).

Table 62. Smart $aver participants' dwellings: number of rooms by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
4 or fewer	2.4%	3.4%	2.7%
5	13.4%	10.2%	12.4%
6	27.6%	22.0%	25.8%
7	20.5%	13.6%	18.3%
8	16.5%	18.6%	17.2%
9	7.9%	18.6%	11.3%
10 or more	11.8%	13.6%	12.4%

Note: One respondent who received both types of rebate was not included in this table.

Participants in North and South Carolina also have similar distributions in the number of floors to their dwellings. Overall 54.0% (101 out of 187) live in one-story homes, 41.2% (77 out of 187) have two stories, and just 4.3% (8 out of 187) have three stories (no one reported having more than three stories).

Table 63. Smart $aver participants' dwellings: number of floors, by state

	NC N=93	SC N=94	Total N=187
1 floor	57.0%	51.1%	54.0%
2 floors	37.6%	44.7%	41.2%
3 floors	4.3%	4.3%	4.3%
Did not specify	1.1%	0.0%	0.5%

Just as they tend to have more rooms, households which claimed a Smart $aver rebate for central air conditioning are also somewhat more likely to live in three-story dwellings (6.8% or 4 out of 59, versus 3.1% or 4 out of 127 heat pump redeemers).

Table 64. Smart $aver participants' dwellings: number of floors, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
1 floor	53.5%	54.2%	53.8%
2 floors	42.5%	39.0%	41.4%
3 floors	3.1%	6.8%	4.3%
Did not specify	0.8%	0.0%	0.5%

Note: One respondent who received both types of rebate was not included in this table.

In terms of square footage, there are more Smart $aver participants with large homes of over 3000 square feet in South Carolina (26.6% or 25 out of 94) than in North Carolina (16.1% or 15 out of 93). South Carolina (11.7% or 11 out of 94) also has somewhat fewer smaller homes of under 1500 square feet than North Carolina (18.3% or 17 out of 93). In both states, about half of homes are in the 1500-2999 square foot range (overall 54.0% or 101 out of 187).

Table 65. Smart $aver participants' dwellings: square footage, by state

	NC N=93	SC N=94	Total N=187
500-999 sqft	0.0%	3.2%	1.6%
1000-1499 sqft	18.3%	8.5%	13.4%
1500-1999 sqft	25.8%	21.3%	23.5%
2000-2499 sqft	16.1%	18.1%	17.1%
2500-2999 sqft	14.0%	12.8%	13.4%
3000-3499 sqft	8.6%	14.9%	11.8%
3500-3999 sqft	1.1%	4.3%	2.7%
4000 sqft or more	6.5%	7.4%	7.0%
Don't know	9.7%	9.6%	9.6%

In terms of square footage, Table 66 indicates again that respondents redeeming rebates for central air conditioning tend to live in bigger houses than those who received rebates for new heat pumps. Homes with over 3000 square feet made up 28.8% (17 out of 59) of central air rebate homes, compared to 18.1% (23 out of 127) heat pump rebate redeemers, while homes under 2000 square feet made up 42.5% (54 out of 127) of heat pump households and only 30.5% (18 out of 59) of central air households.

Table 66. Smart $aver participants' dwellings: square footage, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
500-999 sqft	1.6%	1.7%	1.6%
1000-1499 sqft	14.2%	11.9%	13.4%
1500-1999 sqft	26.8%	16.9%	23.7%
2000-2499 sqft	17.3%	15.3%	16.7%
2500-2999 sqft	12.6%	15.3%	13.4%
3000-3499 sqft	10.2%	15.3%	11.8%
3500-3999 sqft	1.6%	5.1%	2.7%
4000 sqft or more	6.3%	8.5%	7.0%
Don't know	9.4%	10.2%	9.7%

Note: One respondent who received both types of rebate was not included in this table.

Most homes in the Carolinas have attics (87.7% or 164 out of 187), but only about a third have basements (32.1% or 60 out of 187). Of those that do, heated basements (18.2% or 34 out of 187) are slightly more common than unheated basements (13.9% or 26 out of 187). Pools, spas and hot tubs are more common in South Carolina homes (20.2% or 19 out of 94) than in North Carolina (11.8% or 11 out of 93).

Table 67. Smart $aver participants' dwellings: attics, basements, pools and spas by state

	NC N=93	SC N=94	Total N=187
Home has attic	88.2%	87.2%	87.7%
Home does not have attic	10.8%	12.8%	11.8%
Home does not have basement	63.4%	71.3%	67.4%
Home has basement (heated)	20.4%	16.0%	18.2%
Home has basement (not heated)	15.1%	12.8%	13.9%
Home has a pool, spa or hot tub	11.8%	20.2%	16.0%
Did not specify basement, pool, spa, tub	1.1%	0.0%	0.5%

Fewer households that claimed heat pump rebates from the Smart $aver program have attics (85.8% or 109 out of 127), but more have basements (34.6% or 44 out of 127), when compared to households that redeemed rebates for central air conditioning (91.5% or 54 out of these 59 homes have attics, while only 25.4% or 15 out of 59 have basements).

Table 68. Smart $aver participants' dwellings: attics, basements, pools and spas, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Home has attic	85.8%	91.5%	87.6%
Home does not have attic	13.4%	8.5%	11.8%
Home does not have basement	64.6%	74.6%	67.7%
Home has basement (heated)	18.9%	15.3%	17.7%
Home has basement (not heated)	15.7%	10.2%	14.0%
Home has a pool, spa or hot tub	16.5%	15.3%	16.1%
Did not specify basement, pool, spa, tub	0.8%	0.0%	0.5%

Note: One respondent who received both types of rebate was not included in this table.

Smart $aver Participants' Household Characteristics

Most Smart Survey participants in our survey live in two-person households (63.1% or 118 out of 187).

Table 69. Smart $aver participants' household size (number of residents)

	NC N=93	SC N=94	Total N=187
One person	14.0%	14.9%	14.4%
Two people	64.5%	61.7%	63.1%
Three people	11.8%	10.6%	11.2%
4 or 5 people	8.6%	12.8%	10.7%
Did not specify	1.1%	0.0%	0.5%

As seen in the previous section, participants who redeemed Smart $aver rebates for central air conditioning tend to live in larger homes. Table 70 shows that they also tend to have more people living in them; households that installed new central air conditioning reported three or more residents in 32.2% (19 out of 59) cases, compared to only 17.3% (22 out of 127) among heat pump rebate households.

Table 70. Smart $aver participants' household size (number of residents)

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
One person	14.2%	13.6%	14.0%
Two people	67.7%	54.2%	63.4%
Three people	9.4%	15.3%	11.3%
4 or 5 people	7.9%	16.9%	10.8%
Did not specify	0.8%	0.0%	0.5%

Note: One respondent who received both types of rebate was not included in this table.

Most Smart $aver participant households have at least one person at home on a typical weekday afternoon (87.7% or 164 out of 187).

Table 71. How many people are usually at home on a weekday afternoon?

	NC N=93	SC N=94	Total N=187
Nobody	12.9%	10.6%	11.8%
One person	43.0%	24.5%	33.7%
Two people	34.4%	53.2%	43.9%
Three people	7.5%	7.4%	7.5%

4 or 5 people	1.1%	4.3%	2.7%
Did not specify	1.1%	0.0%	0.5%

Households that claimed heat pump rebates are slightly less likely to have nobody home on a typical weekday afternoon (9.4% or 12 out of 127) compared to central air conditioning rebate households (15.3% or 9 out of 59).

Table 72. How many people are usually at home on a weekday afternoon?

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Nobody	9.4%	15.3%	11.3%
One person	35.4%	30.5%	33.9%
Two people	44.1%	44.1%	44.1%
Three people	7.9%	6.8%	7.5%
4 or 5 people	2.4%	3.4%	2.7%
Did not specify	0.8%	0.0%	0.5%

Note: One respondent who received both types of rebate was not included in this table.

Age distributions between states were generally similar, with respondents to this survey skewing older than the general population. Overall, only 13.9% (26 out of 187) of the participants in this study are under the age of 50, while 44.9% (84 out of 187) are age 65 or older.

Table 73. Survey respondent's age by state

	NC N=93	SC N=94	Total N=187
18 to 34	3.2%	3.2%	3.2%
35 to 49	10.8%	10.6%	10.7%
50 to 59	25.8%	22.3%	24.1%
60 to 64	11.8%	20.2%	16.0%
65 to 74	25.8%	28.7%	27.3%
75 and older	21.5%	13.8%	17.6%
Prefer not to state	1.1%	1.1%	1.1%

Although nobody in this survey under the age of 35 claimed a Smart $aver rebate for central air conditioning (0.0% out of 59, versus 4.7% or 6 out of 127 under age 35 for heat pumps), the age differences between the two types of rebate recipients are not statistically significant.

Table 74. Survey respondent's age by rebate

	Heat Pump	Central Air	Total

	N=127	Conditioning N=59	N=186
18 to 34	4.7%	0.0%	3.2%
35 to 49	8.7%	13.6%	10.2%
50 to 59	22.0%	28.8%	24.2%
60 to 64	17.3%	13.6%	16.1%
65 to 74	29.1%	23.7%	27.4%
75 and older	17.3%	18.6%	17.7%
Prefer not to state	0.8%	1.7%	1.1%

Note: One respondent who received both types of rebate was not included in this table.

Nearly one respondent in four (23.5% or 44 out of 187) declined to state their income for this survey, and there was a difference between states in this response rate (30.9% or 29 out of 94 South Carolinians did not want to give their income, compared to only 16.1% or 15 out of 93 North Carolinians).

The overall income distribution of Smart $aver participants in this survey tends toward the high side, with 34.2% (64 out of 187) respondents reporting annual household incomes of over $75,000. However, 12.8% (24 out of 187) respondents had annual household incomes of under $30,000 per year.

Table 75. Survey respondent's income by state

	NC N=93	SC N=94	Total N=187
Household income under $15k	4.3%	4.3%	4.3%
Household income $15-30k	9.7%	7.4%	8.6%
Household income $30-50k	15.1%	10.6%	12.8%
Household income $50-75k	16.1%	17.0%	16.6%
Household income $75-100k	16.1%	11.7%	13.9%
Household income over $100k	22.6%	18.1%	20.3%
Prefer not to answer	16.1%	30.9%	23.5%

Table 76 indicates that respondents who claimed heat pump rebates were more likely to be on the lower end of the income scale, with 30.7% (39 out of 127) having annual household incomes under $50,000, compared to only 13.6% (8 out of 59) under $50,000 among central air conditioning rebate households. In contrast, 27.1% (16 out of 59) respondents who claimed central air rebates reported income of over $100,000, versus just 17.3% (22 out of 127) households that claimed rebates for heat pumps.

However, there was also a large difference between these groups in terms of preferring not to answer the question, with 33.9% (20 out of 59) of central air conditioning households declining

to state their household income, compared to just 18.9% (24 out of 127) among heat pump rebate households. The difference in distribution between the two types of rebates was statistically significant (Pearson chi-square p<.05).

Table 76. Survey respondent's income by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Household income under $15k	5.5%	1.7%	4.3%
Household income $15-30k	9.4%	6.8%	8.6%
Household income $30-50k	15.7%	5.1%	12.4%
Household income $50-75k	18.9%	11.9%	16.7%
Household income $75-100k	14.2%	13.6%	14.0%
Household income over $100k	17.3%	27.1%	20.4%
Prefer not to answer	18.9%	33.9%	23.7%

Note: One respondent who received both types of rebate was not included in this table.

Smart $aver Participants' Home Heating Systems

Everyone who participated in this survey has a heating system for their home (0 out of 187 reported their heating system as "none"). In fact 17.6% (33 out of 187) reported having 2 or 3 different types of heating systems.

The most common system for Smart $aver participants was a heat pump (65.2% or 122 out of 187), which corresponds closely to the 68.4% (128 out of 187) respondents in this survey who collected rebates for heat pumps. The next most common heating system was central forced air, installed in the homes of 51.1% (48 out of 94) in South Carolina and 37.6% (35 out of 93) in North Carolina.

Geothermal pumps were installed in the homes of only 3.2% (6 out of 187) of participants, and electric baseboard heat accounted for 2.1% (2 out of 94) of homes in South Carolina and 0% (0 out of 93) of homes in North Carolina. Another 4.8% (9 out of 187) overall reported they had some "other" heating system, but details were not specified.

Table 77. Smart $aver participants' home heating system, by state

	NC N=93	SC N=94	Total N=187
Heat Pump	68.8%	61.7%	65.2%
Central Forced Air	37.6%	51.1%	44.4%
Geothermal Pump	4.3%	2.1%	3.2%
Electric baseboard	0.0%	2.1%	1.1%
Other (not specified)	6.5%	3.2%	4.8%
None	0.0%	0.0%	0.0%

Reported only 1 heating system	84.9%	79.8%	82.4%
Reported 2 or 3 heating systems	15.1%	20.2%	17.6%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Since participation in this survey was predicated on participation in the Residential Smart $aver HVAC program which gave rebates for the purchase of new heat pumps and central air conditioning, there is a strong correspondence between the type of rebate redeemed and the type of heating system in the home. Many more households that claimed a heat pump rebate had a heat pump (90.6% or 115 out of 127) than households that claimed the central air conditioning rebate, though 10.2% (6 out of 59) of central air households reported having a heat pump as well. Correspondingly, 89.8% (53 out of 59) respondents who claimed a central air conditioning rebate from Smart $aver have central forced air for heat, compared to only 22.8% (29 out of 127) of heat pump rebate households reporting that they also have central forced air.

Additionally, Table 78 shows that all of the geothermal pumps in this survey were owned by respondents who claimed a heat pump rebate (4.7% or 6 out of 127, versus 0% or 0 out of 59 for central air rebate households). Heat pump households were also more likely to report multiple heating systems (22.0% or 28 out of 127 have 2 or 3 heating systems, versus only 6.8% or 4 out of 59 central air conditioning rebate households with more than one heating system).

Table 78. Smart $aver participants' primary home heating system by rebate

	Heat Pump N=127	**Central Air Conditioning** N=59	**Total** N=186
Heat Pump	90.6%	10.2%	65.1%
Central Forced Air	22.8%	89.8%	44.1%
Geothermal Pump	4.7%	0.0%	3.2%
Electric baseboard	0.8%	1.7%	1.1%
Other (not specified)	4.7%	5.1%	4.8%
None	0.0%	0.0%	0.0%
Reported only 1 heating system	78.0%	93.2%	82.8%
Reported 2 or 3 heating systems	22.0%	6.8%	17.2%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

Figure 23 shows that the vast majority of respondents in the Residential Smart $aver survey (overall 93.6% or 175 out of 187) have a heating system that is no more than 4 years old. Only 4.3% (8 out of 187) have heating systems that are more than 10 years old, and 1.6% (3 out of 187) are not sure how old their system is.

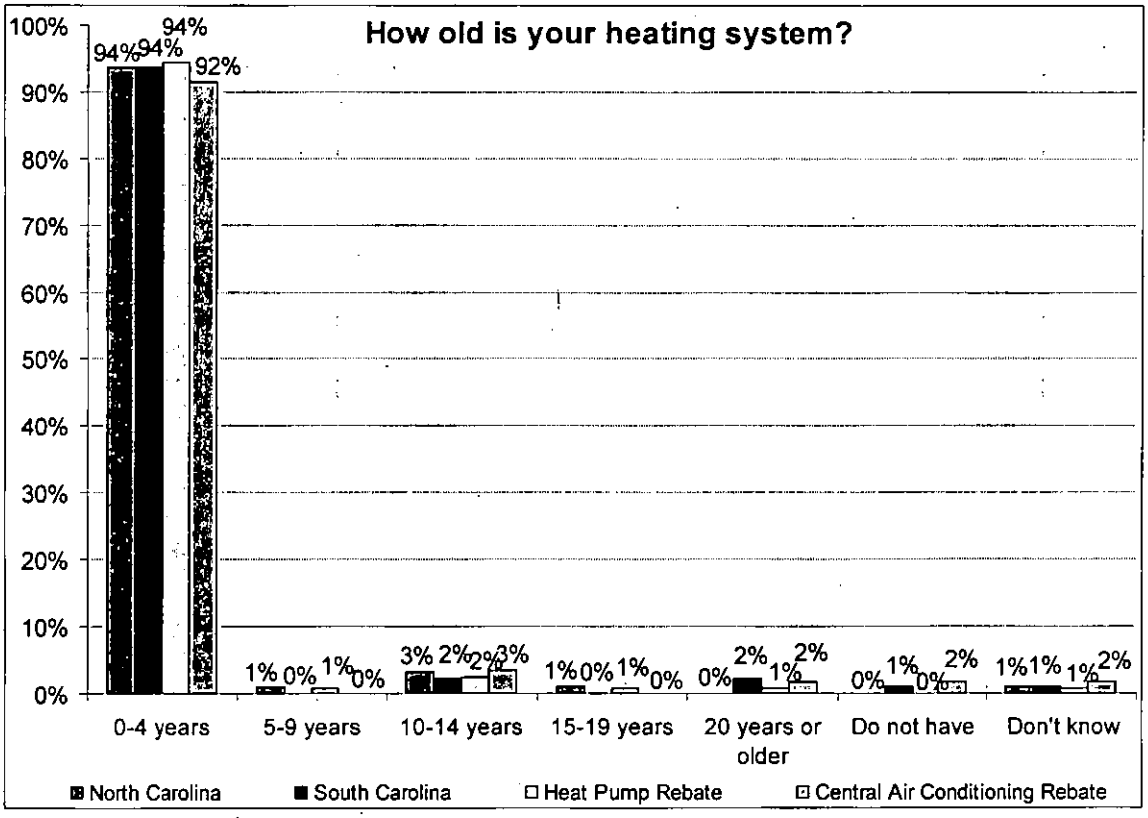

Figure 23. Age of heating system
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

The majority of Smart $aver participants in the Carolinas heat their homes primarily with electricity (65.2% or 122 out of 187), with natural gas (31.6% or 59 out of 187) being less common as a primary heating source.

Table 79. Primary fuel source for primary heating system, by state

	NC N=93	SC N=94	Total N=187
Electricity	61.3%	69.1%	65.2%
Natural Gas	35.5%	27.7%	31.6%
Propane	3.2%	0.0%	1.6%
Oil	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%

None	0.0%	1.1%	0.5%
Don't Know	0.0%	2.1%	1.1%

However the distribution of electricity versus natural gas corresponds very closely with the type of Smart $aver rebate that was claimed, with the vast majority of heat pump rebates going to homes with electric heat (91.3% or 116 out of 127) and the vast majority of central air conditioning rebates going to natural gas-heated homes (88.1% or 52 out of 59).

Table 80. Primary fuel source for primary heating system, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Electricity	91.3%	10.2%	65.6%
Natural Gas	4.7%	88.1%	31.2%
Propane	1.6%	1.7%	1.6%
Oil	0.0%	0.0%	0.0%
Other	0.0%	0.0%	0.0%
None	0.8%	0.0%	0.5%
Don't Know	1.6%	0.0%	1.1%

Note: One respondent who received both types of rebate was not included in this table.

Only 23.5% (44 out of 187) of respondents have a secondary heating system, most of which are either powered by electricity (11.2% or 21 out of 187) or natural gas (8.0% or 15 out of 187).

Table 81. Secondary fuel source for primary heating system by state

	NC N=93	SC N=94	Total N=187
Do not have secondary fuel source for primary heating system	78.5%	74.5%	76.5%
Secondary fuel source is Electricity	10.8%	11.7%	11.2%
Secondary fuel source is Natural Gas	7.5%	8.5%	8.0%
Secondary fuel source is Propane	0.0%	3.2%	1.6%
Secondary fuel source is Oil	1.1%	0.0%	0.5%
Secondary fuel source is Other (not specified)	2.2%	2.1%	2.1%

Households that received a Smart $aver rebate for replacing central air conditioning were more likely to have a secondary source of power for their heating system (28.8% or 17 out of 59) than those who claimed heat pump rebates (20.5% or 26 out of 127), and the secondary fuel source in those central air households was a lot more likely to be electricity (20.3% or 12 out of 59),

compared to the use of backup electric heat in heat pump rebate households (6.3% or 8 out of 127). The difference in distributions between the two types of rebate is statistically significant (Pearson chi-square $p<.05$).

Recall from Table 80 that most air conditioning rebate households have natural gas as their primary heat source, which may explain why they are more likely to have electricity as a secondary source. Table 82 also shows that most heat pump rebate households already have electricity as their primary source of heating power.

Table 82. Secondary fuel source for primary heating system, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Do not have secondary fuel source for primary heating system	79.5%	71.2%	76.9%
Secondary fuel source is Electricity	6.3%	20.3%	10.8%
Secondary fuel source is Natural Gas	7.9%	8.5%	8.1%
Secondary fuel source is Propane	2.4%	0.0%	1.6%
Secondary fuel source is Oil	0.8%	0.0%	0.5%
Secondary fuel source is Other (not specified)	3.1%	0.0%	2.2%

Note: One respondent who received both types of rebate was not included in this table.

Smart $aver Participants' Home Cooling Systems

Everybody who participated in this survey has at least one system to cool their home (0 out of 187 reporting "do not cool the home"). Heat pumps were used by a majority (66.8% or 125 out of 187), though nearly half have central air (45.5% or 85 out of 187). Overall 22.5% (42 out of 187) reported using more than one cooling system.

Table 83. Smart $aver participants' primary home cooling system, by state

	NC N=93	SC N=94	Total N=187
Heat pump for cooling	65.6%	68.1%	66.8%
Central air conditioning	43.0%	47.9%	45.5%
Other (not specified)	3.2%	9.6%	6.4%
Geothermal heat pump	4.3%	2.1%	3.2%
Through the wall air conditioner(s)	2.2%	1.1%	1.6%
Do not cool the home	0.0%	0.0%	0.0%
Don't know	0.0%	0.0%	0.0%
Reported only 1 cooling system	81.7%	73.4%	77.5%
Reported 2 or 3 cooling systems	18.3%	26.6%	22.5%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Residential Smart $aver rebates redeemed correspond very closely to home cooling systems, with 92.1% (117 out of 127) of heat pump rebate households using their heat pump for cooling, while 94.9% (56 out of 59) of central air conditioning rebate households use central air to cool their homes. Heat pump rebate households were also more likely to have multiple cooling systems (27.6% or 35 out of 127) than central air rebate households (10.2% or 6 out of 59).

Table 84. Smart Saver participants' primary home cooling system, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Heat pump for cooling	92.1%	11.9%	66.7%
Central air conditioning	22.0%	94.9%	45.2%
Geothermal heat pump	4.7%	0.0%	3.2%
Through the wall air conditioner(s)	2.4%	0.0%	1.6%
Do not cool the home	0.0%	0.0%	0.0%
Other (not specified)	7.9%	3.4%	0.0%
Don't know	0.0%	0.0%	0.0%
Reported only 1 cooling system	72.4%	89.8%	78.0%
Reported 2 or 3 cooling systems	27.6%	10.2%	22.0%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

Table 85 indicates that "through the wall" and window air conditioner units are more common in South Carolina households (11.7% or 11 out of 94) than North Carolina households (2.2% or 2 out of 93). However when compared to Table 83, it seems that "through the wall" units usually are not the primary cooling system in South Carolina (only 1.1% or 1 out of 94 said they used this system as their primary cooling source).

Table 85. Households with window and through the wall air conditioners by state

	NC N=93	SC N=94	Total N=187
Have no window or through the wall AC	97.8%	88.3%	93.0%
Have 1 window or wall unit	2.2%	9.6%	5.9%
Have 2 window or wall units	0.0%	2.1%	1.1%

As seen in Table 86, there is not much difference in the use of "through the wall" air conditioners between heat pump and central air rebate redeemers. Overall, only 7.0% (13 out of 186) of respondents in this study report using this type of air conditioner.

Table 86. Households with window and through the wall air conditioners by rebate

	Heat Pump	Central Air	Total

	N=127	Conditioning N=59	N=186
Have no window or through the wall AC	92.9%	93.2%	93.0%
Have 1 window or wall unit	6.3%	5.1%	5.9%
Have 2 window or wall units	0.8%	1.7%	1.1%

Note: One respondent who received both types of rebate was not included in this table.

Electricity is by far the most common energy source for home cooling, being used by 93.0% (174 out of 187) across the Carolinas. Natural gas and other sources made up only 4.8% (9 out of 187), and 2.1% (4 out of 187) were not sure what energy their home cooling system used.

Table 87. Primary fuel source for primary cooling system, by state

	NC N=93	SC N=94	Total N=187
Electricity	92.5%	93.6%	93.0%
Natural Gas	4.3%	3.2%	3.7%
Propane	0.0%	0.0%	0.0%
Oil	0.0%	0.0%	0.0%
Other	1.1%	1.1%	1.1%
Don't Know	2.2%	2.1%	2.1%

Table 88 shows that among households that claimed Smart $aver rebates for central air conditioning, 88.1% (52 out of 59) used electricity to cool their homes while 8.5% (5 out of 59) used natural gas for cooling. Heat pump rebate redeemers were skewed even more heavily toward electric cooling with 95.3% (121 out of 127) mentioning that source and only 1.6% (2 out of 127) mentioning natural gas as a source of power for cooling.

Recall from Table 80 that 88.1% (52 out of 59) of central air conditioning rebate recipients in this study heat their homes with natural gas. While most heat pump rebate recipients are using the same source of energy (electricity) for both heating and cooling, most central air redeemers use two different sources of energy: electricity for cooling and natural gas for heating.

Table 88. Primary fuel source for primary cooling system, by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Electricity	95.3%	88.1%	93.0%
Natural Gas	1.6%	8.5%	3.8%
Propane	0.0%	0.0%	0.0%
Oil	0.0%	0.0%	0.0%
Other	0.8%	1.7%	1.1%

Don't Know	2.4%	1.7%	2.2%

Note: One respondent who received both types of rebate was not included in this table.

Two respondents (1.1% out of 187) said they used "other" fuel sources for their primary cooling system. Their verbatim responses are listed below:

- *"Geothermal Heat Pump also runs cooling."*
- *"Natural gas and electric"*

As seen in Figure 24, virtually all of the Smart $aver participants in this survey have a home cooling system that is less than 4 years old (96.8% or 181 out of 187). Only 2.1% (4 out of 187) reported having a system at least 5 years old, and 1.1% (2 out of 187) were not sure.

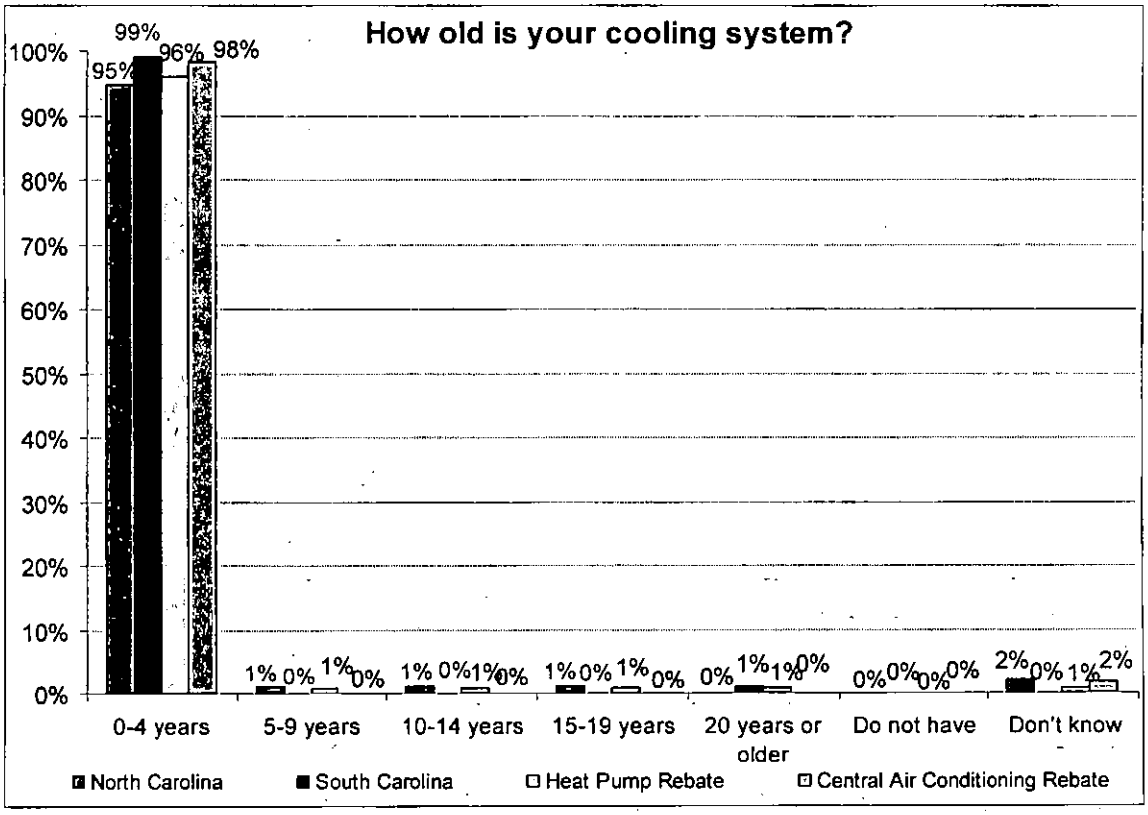

Figure 24. Age of home cooling system
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

Performance of Participant's Home Heating and Cooling Systems

Smart $aver participants in this survey overwhelmingly report that their recently-installed heating and cooling systems work as they are supposed to, with 97.3% (182 out of 187) reporting that their homes are comfortably warm in winter, and the same percentage (97.3% or 182 out of 187) reporting that their home is comfortably cool in the summer.

Table 89. Performance of heating and cooling systems in winter and summer, by state

	NC N=93	SC N=94	Total N=187
Heating keeps home comfortable in winter	97.8%	96.8%	97.3%
Cooling keeps home comfortable in summer	96.8%	97.9%	97.3%

Table 90 indicates that a large majority of respondents in this survey have a programmable thermostat (87.2% or 163 out of 187). The most common temperature setting for a typical winter weekday afternoon is reported as 67-70 degrees (by 48.1% or 90 out of 187), and the most common temperature setting for a corresponding summer day is 73-78 degrees (reported by 62.6% or 117 out of 187).

Table 90. Programmable thermostat and seasonal weekday afternoon temperature settings, by state

	NC N=93	SC N=94	Total N=187
Have a programmable thermostat	88.2%	86.2%	87.2%
Typical winter weekday afternoon temperature setting: less than 67	12.9%	10.6%	11.8%
Typical winter weekday afternoon temperature setting: 67-70	43.0%	53.2%	48.1%
Typical winter weekday afternoon temperature setting: 71-73	29.0%	27.7%	28.3%
Typical winter weekday afternoon temperature setting: 74 or higher	11.8%	6.4%	9.1%
Typical winter weekday afternoon temperature setting: off	1.1%	0.0%	0.5%
Typical winter weekday afternoon temperature setting: don't know	1.1%	2.1%	1.6%
Typical summer weekday afternoon temperature setting: less than 69	3.2%	1.1%	2.1%
Typical summer weekday afternoon temperature setting: 69-72	21.5%	26.6%	24.1%
Typical summer weekday afternoon temperature setting: 73-78	59.1%	66.0%	62.6%
Typical summer weekday afternoon temperature setting: 78 or higher	8.6%	3.2%	5.9%

Typical summer weekday afternoon temperature setting: off	1.1%	0.0%	0.5%
Typical summer weekday afternoon temperature setting: don't know	5.4%	3.2%	4.3%

Smart $aver participants in North Carolina are more likely to report cold drafts in winter (23.7% or 22 out of 93, versus 12.8% or 12 out of 94 in SC), sweaty windows in winter (12.9% or 12 out of 93, versus 8.5% or 8 out of 94 in SC) and uneven temperatures between rooms (40.9% or 38 out of 93, versus 34.0% or 32 out of 94 in SC).

Across the Carolinas, most Smart $aver participants think a 2 degree increase in the summer afternoon temperature in their home would have only a "slight" (67.9% or 127 out of 187) effect on their comfort, and the rest feel the effect would be nonexistent (31.6% or 59 out of 187). Zero out of 187 (0.0%) reported that they would be "moderately" or "greatly" effected by a two degree increase in summer temperature in their home.

Table 91. Smart $aver participants reporting temperature issues in their homes

	NC N=93	SC N=94	Total N=187
Home has cold drafts in winter	23.7%	12.8%	18.2%
Home has sweaty window in winter	12.9%	8.5%	10.7%
Notice uneven temperatures between rooms	40.9%	34.0%	37.4%
Two degree summer temperature increase would have no effect on comfort	33.3%	29.8%	31.6%
Two degree summer temperature increase would have a slight effect on comfort	65.6%	70.2%	67.9%
Two degree summer temperature increase would have a moderate or great effect on comfort	0.0%	0.0%	0.0%
Did not specify	1.1%	0.0%	0.5%

Respondents who redeemed Smart $aver rebates for central air conditioning were a little more likely to report that their home has cold drafts in winter (25.4% or 15 out of 59) compared to heat pump rebate redeemers (15.0% or 19 out of 127), and to notice uneven temperatures between rooms (42.4% or 25 out of 59, versus 34.6% or 44 out of 127 for heat pump rebates).

Table 92. Smart $aver participants reporting temperature issues in their homes

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Home has cold drafts in winter	15.0%	25.4%	18.3%
Home has sweaty window in winter	9.4%	11.9%	10.2%
Notice uneven temperatures between rooms	34.6%	42.4%	37.1%
Two degree summer temperature increase	34.6%	25.4%	31.7%

would have no effect on comfort			
Two degree summer temperature increase would have a slight effect on comfort	64.6%	74.6%	67.7%
Two degree summer temperature increase would have a moderate or great effect on comfort	0.0%	0.0%	0.0%
Did not specify	0.8%	0.0%	0.5%

Note: One respondent who received both types of rebate was not included in this table.

Smart $aver Participants' Other Major Appliances

As Table 93 indicates, everyone in our survey has a water heater, with 66.8% (125 out of 187) powered by electricity and 30.5% (57 out of 187) powered by natural gas. There is very little overlap, with only 1.1% (2 out of 187) reporting more than one energy source for heating water.

Table 93. Smart $aver participants' water heater energy source by state

	NC N=93	SC N=94	Total N=187
Do not have water heater	0.0%	0.0%	0.0%
Electricity	62.4%	71.3%	66.8%
Natural Gas	34.4%	26.6%	30.5%
Propane	2.2%	1.1%	1.6%
Other	1.1%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Don't know	1.1%	2.1%	1.6%
Reported only 1 water heater energy source	97.8%	96.8%	97.3%
Reported 2 water heater energy sources	1.1%	1.1%	1.1%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Energy sources for water heating correspond strongly with the type of Smart $aver rebate respondents claimed, as seen in Table 94. Heat pump rebate recipients reported heating water by electricity in 83.5% of homes (106 out of 127) and natural gas in only 12.6% (16 out of 127), while recipients of central air conditioning rebates usually had natural gas heated water (67.8% or 40 out of 59) and electricity was less common (32.2% or 19 out of 59).

Table 94. Smart $aver participants' water heater energy source by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Do not have water heater	0.0%	0.0%	0.0%
Electricity	83.5%	32.2%	67.2%
Natural Gas	12.6%	67.8%	30.1%
Propane	2.4%	0.0%	1.6%

Other	0.8%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Don't know	0.8%	3.4%	1.6%
Reported only 1 water heater energy source	99.2%	93.2%	97.3%
Reported 2 water heater energy sources	0.0%	3.4%	1.1%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

As seen in Figure 25, water heaters in Smart $aver participants' homes tend to be older than their home heating and cooling systems, with only 32.1% (60 out of 187) reporting their system is 4 years old or newer. 27.8% (52 out of 187) have water heaters that are 5-9 years old, and 28.3% (53 out of 187) have water heaters that are 10-19 years old. Another 6.4% (12 out of 187) have water heaters that are more than 20 years old, and 5.3% (10 out of 187) are not sure.

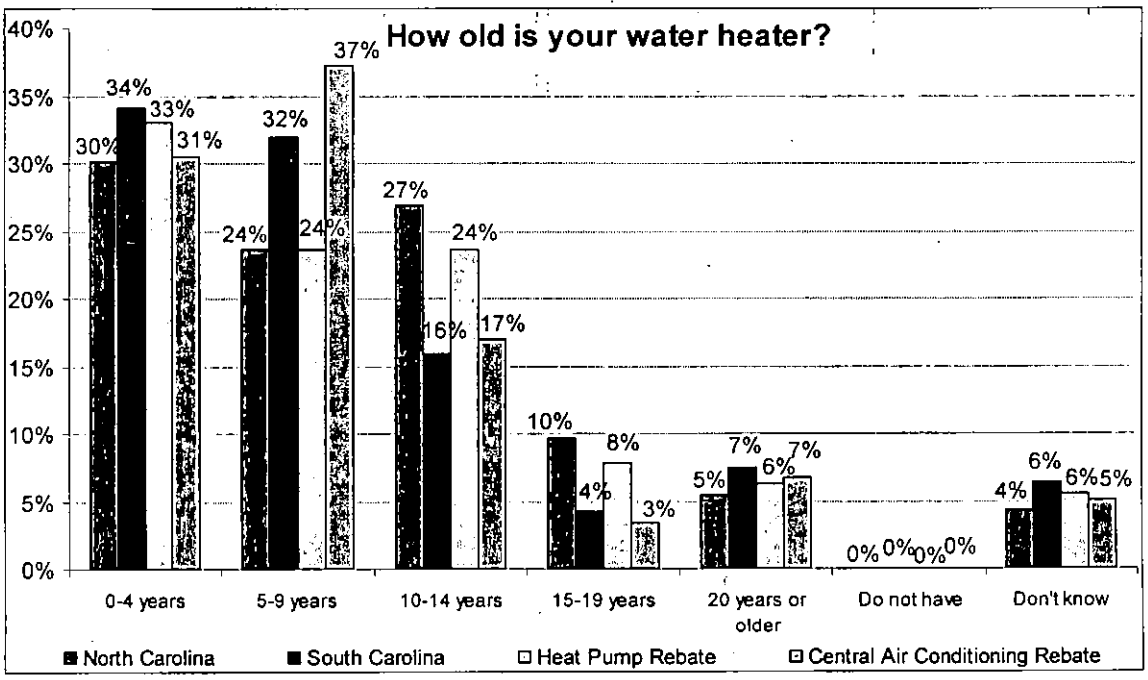

Figure 25. Age of home water heater
(N=187 by state, N=186 by rebate because one respondent who had both types of rebate was dropped from this analysis)

As seen in Table 95 through Table 98, everyone who participated in the Smart $aver survey reported having a cooking stove and oven (0.0% or 0 out of 187 reporting "do not have a stove" and "do not have an oven"). Electricity is by far the most common source of energy for both stoves (86.6% or 162 out of 187) and ovens (94.1% or 176 out of 187) across the Carolinas, with most of the remainder powered by natural gas (12.3% or 23 out of 187 for stoves and 5.3% or 10 out of 187 for ovens). Virtually everyone in this survey reported a single source of energy for their stoves (98.9% or 185 out of 187) and ovens (99.5% or 186 out of 187).

Table 95. Smart $aver participants' indoor cooking stove energy source by state

	NC N=93	SC N=94	Total N=187
Do not have stove	0.0%	0.0%	0.0%
Electricity	84.9%	88.3%	86.6%
Natural Gas	14.0%	10.6%	12.3%
Propane	1.1%	2.1%	1.6%
Other	1.1%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Reported only 1 stove energy source	98.9%	98.9%	98.9%
Reported 2 stove energy sources	1.1%	1.1%	1.1%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Table 96. Smart $aver participants' indoor cooking oven energy source by state

	NC N=93	SC N=94	Total N=187
Do not have oven	0.0%	0.0%	0.0%
Electricity	93.5%	94.7%	94.1%
Natural Gas	5.4%	5.3%	5.3%
Propane	1.1%	0.0%	0.5%
Other	1.1%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Reported only 1 oven energy source	98.9%	100.0%	99.5%
Reported 2 oven energy sources	1.1%	0.0%	0.5%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Table 97 and Table 98 once again show that respondents who claimed Smart $aver rebates for central air conditioning were more likely to have natural gas powered appliances, with 28.8% (17 out of 59) having gas stoves and 11.9% (7 out of 59) having gas ovens, compared to just 4.7% with gas ovens (6 out of 127) and 2.4% (3 out of 127) with gas stoves among heat pump rebate redeemers.

Table 97. Smart $aver participants' indoor cooking stove energy source by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Do not have stove	0.0%	0.0%	0.0%
Electricity	93.7%	71.2%	86.6%
Natural Gas	4.7%	28.8%	12.4%

Propane	2.4%	0.0%	1.6%
Other	0.8%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Reported only 1 stove energy source	98.4%	100.0%	98.9%
Reported 2 stove energy sources	1.6%	0.0%	1.1%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

Table 98. Smart $aver participants' indoor cooking oven energy source by rebate

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Do not have oven	0.0%	0.0%	0.0%
Electricity	96.9%	88.1%	94.1%
Natural Gas	2.4%	11.9%	5.4%
Propane	0.8%	0.0%	0.5%
Other	0.8%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Reported only 1 oven energy source	99.2%	100.0%	0.5%
Reported 2 oven energy sources	0.8%	0.0%	99.5%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

Only one respondent in our Smart $aver survey did not have a clothes dryer (0.5% or 1 out of 187), and again electricity was the predominant energy source for clothes dryers (91.4% or 171 out of 187) followed distantly by natural gas (7.5% or 14 out of 187). Only one respondent (0.5% or 1 out of 187) reported more than one energy source for clothes drying, and one respondent (0.5% or 1 out of 187) was not sure of the energy source for their clothes dryer.

Table 99. Smart $aver participants' clothes dryer energy source

	NC N=93	SC N=94	Total N=187
Do not have clothes dryer	0.0%	1.1%	0.5%
Electricity	92.5%	90.4%	91.4%
Natural Gas	6.5%	8.5%	7.5%
Propane	1.1%	0.0%	0.5%
Other	1.1%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Don't know	0.0%	1.1%	0.5%

Reported only 1 dryer energy source	98.9%	98.9%	98.9%
Reported 2 dryer energy sources	1.1%	0.0%	0.5%

Note: Multiple responses were accepted for this question; rows can total more than 100%.

Table 100 again shows a relationship between central air conditioning rebates and natural gas powered appliances, with 18.6% (11 out of 59) AC rebate redeemers reporting a natural gas powered clothes dryer in their home, versus just 2.4% (3 out of 127) among heat pump rebate redeemers with natural gas dryers.

Table 100. Smart Saver participants' clothes dryer energy source

	Heat Pump N=127	Central Air Conditioning N=59	Total N=186
Do not have clothes dryer	0.0%	0.0%	0.0%
Electricity	96.1%	81.4%	91.4%
Natural Gas	2.4%	18.6%	7.5%
Propane	0.8%	0.0%	0.5%
Other	0.8%	0.0%	0.5%
Oil	0.0%	0.0%	0.0%
Don't know	0.8%	0.0%	0.5%
Reported only 1 dryer energy source	98.4%	100.0%	98.9%
Reported 2 dryer energy sources	0.8%	0.0%	0.5%

Note: Multiple responses were accepted for this question; rows can total more than 100%.
One respondent who received both types of rebate was not included in this table.

Multiple Rebate Homes

As seen in Table 101 through Table 103, households that claimed more than one Smart $aver rebate tend to live in larger homes. Two-thirds of multiple rebate homes (66.7% or 12 out of 18) are more than 3000 square feet, versus only one-sixth of single rebate households (16.6% or 28 out of 169). Nearly three-quarters of multiple rebate homes (72.2% or 13 out of 18) have 9 or more rooms, compared to only 18.3% (31 out of 169) of single rebate homes with that many rooms. Only one-sixth of multiple rebate households (16.7% or 3 out of 18) are single-story, versus more than half of single rebate households (58.0% or 98 out of 169).

Table 101. Smart Saver participants' dwellings: square footage by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
500-999 sqft	0.0%	1.8%	1.6%
1000-1499 sqft	0.0%	14.8%	13.4%
1500-1999 sqft	0.0%	26.0%	23.5%

2000-2499 sqft	11.1%	17.8%	17.1%
2500-2999 sqft	16.7%	13.0%	13.4%
3000-3499 sqft	50.0%	7.7%	11.8%
3500-3999 sqft	0.0%	3.0%	2.7%
4000 sqft or more	16.7%	5.9%	7.0%
Don't know	5.6%	9.5%	9.1%

Table 102. Smart $aver participants' dwellings: number of rooms by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
4 or fewer	0.0%	3.0%	2.7%
5	0.0%	13.6%	12.3%
6	5.6%	27.8%	25.7%
7	5.6%	19.5%	18.2%
8	16.7%	17.8%	17.6%
9	27.8%	9.5%	11.2%
10 or more	44.4%	8.9%	12.3%

Table 103. Smart $aver participants' dwellings: number of floors by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
1 floor	16.7%	58.0%	54.0%
2 floors	83.3%	36.7%	41.2%
3 floors	0.0%	4.7%	4.3%
Did not specify	0.0%	0.6%	0.5%

Although multiple and single rebate households are about equally likely to have attics and basements, multiple rebate households are three times as likely to have a pool, spa or hot tub (38.9% or 7 out of 18, versus 13.6% or 23 out of 169 single rebate households).

Table 104. Smart $aver participants' dwellings: attics, basements, pools and spas by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Home has attic	94.4%	87.0%	87.7%
Home does not have attic	5.6%	12.4%	11.8%

Home does not have basement	66.7%	67.5%	67.4%
Home has basement (heated)	22.2%	17.8%	18.2%
Home has basement (not heated)	11.1%	14.2%	13.9%
Home has a pool, spa or hot tub	38.9%	13.6%	16.0%
Did not specify basement, pool, spa, tub	0.0%	0.6%	0.5%

Single rebate homes also tend to be a bit older than multiple rebate homes: just over half (50.9% or 86 out of 169) were built before 1980, compared to only one-sixth (16.7% or 3 out of 18) of multiple rebate homes. Conversely, 61.1% (11 out of 18) of multiple rebate homes were built since 1990, compared to only 32.5% (55 out of 169) of single rebate homes.

Table 105. Smart $aver participants' dwelling age by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
1959 or before	0.0%	21.3%	19.3%
1960-1979	16.7%	29.6%	28.3%
1980-1989	22.2%	13.6%	14.4%
1990-1997	33.3%	17.2%	18.7%
1998-2000	16.7%	7.7%	8.6%
2001-2007	0.0%	5.3%	4.8%
2008-present	11.1%	2.4%	3.2%
Don't know	0.0%	3.0%	2.7%

Nearly all the multiple rebate households in this survey have both a central forced air furnace (94.4% or 17 out of 18) and central air conditioning (94.4% or 17 out of 18), while fewer than half of the single rebate households have central forced air heat (39.1% or 66 out of 169) or central air conditioning (40.2% or 68 out of 169).

Table 106. Central heating and central air conditioning by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Have central forced air furnace	94.4%	39.1%	44.4%
Have central air conditioning	94.4%	40.2%	45.5%

As seen in Table 107 and Table 108, multiple rebate households also tend to be younger and larger. A plurality (44.4% or 8 out of 18) of respondents from multiple rebate households are age 49 or younger, compared to only 10.7% (18 out of 169) of single rebate households. A larger percentage of multiple rebate households have 4 or 5 people living in them (27.8% or 5 out of 18) than single rebate households with that many people (8.9% or 15 out of 169).

Table 107. Survey respondent's age by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
18 to 34	0.0%	3.6%	3.2%
35 to 49	44.4%	7.1%	10.7%
50 to 59	22.2%	24.3%	24.1%
60 to 64	5.6%	17.2%	16.0%
65 to 74	11.1%	29.0%	27.3%
75 and older	16.7%	17.8%	17.6%
Prefer not to state	0.0%	1.2%	1.1%

Table 108. Smart Saver participants' household size by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
One person	16.7%	14.2%	14.4%
Two people	50.0%	64.5%	63.1%
Three people	5.6%	11.8%	11.2%
4 or 5 people	27.8%	8.9%	10.7%
Did not specify	0.0%	0.6%	0.5%

In keeping with their larger homes, multiple rebate households also tend to be higher income. The majority (61.1% or 11 out of 18) of multiple rebate households in this survey reported incomes over $100,000, compared to just one-sixth (16.0% or 27 out of 169) of single rebate households.

Table 109. Survey respondent's income by number of rebates

	Multiple rebates N=18	Single rebate N=169	Total N=187
Household income under $15k	5.6%	4.1%	4.3%
Household income $15-30k	0.0%	9.5%	8.6%

Household income $30-50k	11.1%	13.0%	12.8%
Household income $50-75k	5.6%	17.8%	16.6%
Household income $75-100k	11.1%	14.2%	13.9%
Household income over $100k	61.1%	16.0%	20.3%
Prefer not to answer	5.6%	25.4%	23.5%

Multiple rebate households are more likely to say they "notice uneven temperatures between rooms" (61.1% or 11 out of 18) compared to single rebate households (34.9% or 59 out of 169). Households that claimed more than one Smart $aver rebate were also more likely to say that a two degree increase in summer temperature would have a "slight" effect on their comfort (94.4% or 17 out of 18), compared to households that received only one rebate (65.1% or 110 out of 169).

Table 110. Smart $aver participants reporting temperature issues in their homes by number of rebates

	Multiple rebates N=18	**Single rebate** N=169	**Total** N=187
Home has cold drafts in winter	22.2%	17.8%	18.2%
Home has sweaty window in winter	11.1%	10.7%	10.7%
Notice uneven temperatures between rooms	61.1%	34.9%	37.4%
Two degree summer temperature increase would have no effect on comfort	5.6%	34.3%	31.6%
Two degree summer temperature increase would have a slight effect on comfort	94.4%	65.1%	67.9%
Two degree summer temperature increase would have a moderate or great effect on comfort	0.0%	0.0%	0.0%
Did not specify	0.0%	0.6%	0.5%

Process Evaluation of the Energy Efficiency for Schools Program (The National Theatre for Children (NTC)) in the Carolina System

Final Report

Prepared for
Duke Energy
139 East Fourth Street
Cincinnati, OH 45201

November 27, 2012

Submitted by

Nick Hall, Dave Ladd, and Johna Roth

Subcontractor
Minerva Smith

TecMarket Works
165 West Netherwood Road
Oregon, WI 53575
(608) 835-8855

TECMARKET Works

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Significant Process Evaluation Findings

Key Findings from the Management Interviews

- Duke Energy's Energy Efficiency (EE) for Schools program is a solid, well-run program with an excellent network of implementers to support and exceed Duke Energy's distribution goals for this program. Although this program has only been offered since 2011 in the Carolinas, the program is exceeding its goals for energy efficiency kit distribution.

Key Findings from the Performance Reviews

- The performers are professional and courteous. They arrived at each school on time and always set up and readied their efforts well before the students arrived.
- "The Energized Guyz" performance was well-received by the students and got children excited about and focused on receiving their energy efficiency kit.
- Every staff person we spoke with indicated that The National Theatre for Children was "wonderful" to work with.
- The troupes successfully altered the complexity of the material presented to match the comprehension ability of the age of the children attending. This is important because if the information is too advanced to understand, the lessons are lost to the younger children, and if the lessons are too simple the older students lose interest.

Key Findings from the Participant Surveys

Two hundred and two (202) participating student families that live in Duke Energy's service territory in the Carolinas participated in an online survey which asked about what kit items they used and their satisfaction with the items. Surveys were completed by 102 households in North Carolina and 100 households in South Carolina.

The most commonly installed items, with installation rates of 75% or higher, were the kit's lighting items: 13-watt CFLs (87.6%), 18-watt CFLs (77.2%), and the night light (78.7%). These data indicate the kits are being well received and the kit items are being installed. The Department of Energy (DOE) booklet was the only other item used by over half of respondents (68.8%), although most of the remaining items had installation rates of over 40%. The kit items that respondents were least likely to use were the bathroom aerator (31.7%) and the water flow meter bag (21.3%). Ratings of satisfaction by those who installed the kit items generally range from 8.5 to 9.5 on a 10-point scale, except for the water flow meter bag (mean rating 7.95).

	Percent Installed or Used	Mean Satisfaction Score
13-watt CFL	87.6%	8.53
night light	78.7%	9.44
18-watt CFL	77.2%	8.99

booklet	68.8%	9.22
kitchen aerator	48.0%	8.71
low flow showerhead	45.5%	8.38
water temp card	42.6%	9.30
switch and outlet gaskets	41.1%	8.93
bathroom aerator	31.7%	9.09
water flow meter bag	21.3%	7.95

Recommendations

- Consider the development of a second kit so that troupes can visit a school more than once in a three year period, as long as cost effective savings are achieved.
- Inform troupes that slowing their rate of speech[1] may improve students' comprehension of the material they are presenting. The typical adult speaks 160 words per minute. The central nervous system of pre-school through third grade children can process about 120 words per minute. Fourth grade students process 124-128 words per minute[2].
- Consider revising the script so that saving energy is equated with their families lowering their utility bills and supporting environmental stewardship.
- Distribute the kit's "Decoder Ring" to each of the troupes. This ring was much more effective than the night light in getting the children excited about ordering the kit, and it can be easily incorporated into the script.

[1] "Spot checks" were conducted on portions of the performances using a timer and the known count of words used by the actors from the script. While these checks were not scientific, overall speech rates were found to be slightly too fast for the ages of the audience.

[2] Banotai, Alyssa. "How to Talk to Children". ADVANCE Speech-Language Pathologists & Audiologists, Vol. 18, Issue 3. January 21, 2008.
http://speech-language-pathology-audiology.advanceweb.com/Article/How-to-Talk-to-Children.aspx

Introduction and Purpose of Study

Overview and Objective

This document presents the process evaluation report for Duke Energy's Energy Efficiency for Schools Program as it was administered in the Carolina System. The evaluation was conducted by TecMarket Works. The objective of this process evaluation is to document program operations and identify if there are any areas of improvement for future program implementation.

Summary of the Evaluation Data

The findings presented in this report were analyzed using participant survey data from student families, NTC performance reviews, and with program managers and vendors as presented in Table 1 below.

Table 1. Evaluation Date Ranges

Evaluation Component	Start Date of Participation	End Date of Participation[3]	Dates of Survey	Dates of Analysis
Participant Surveys	November 11th 2011	June 30th 2012	Surveys were conducted from 8/18/12 through 9/19/12	October 2012
Performance Reviews	March 7th 2012	March 16th 2012	March 2012	March 2012 – May 2012
Program Managers and Vendors	November 11th 2011	June 30th 2012	June 2012 – August 2012	June 2012 – October 2012

Duke Energy conducted an online survey with a random[4] sample of 202 participants from the Carolinas between August 18th and October 8th, 2012.

TecMarket Works visited 10 schools and reviewed 17 out of 21 NTC performances scheduled at those schools in March of 2012.

Two management interviews were conducted with program implementation staff and management in July and October of 2012.

[3] Cut-off date for when customer became a participant in EE for Schools, and last date of pre consumption data before post EE measure install data can be used in the EMV analysis.
[4] Email addresses for participating families were selected at random and sent invitations to complete the survey.

Description of Program

Duke Energy has partnered with The National Theatre for Children (NTC) for the Energy Efficiency Education for Schools program. The Energy Efficiency Education program is an energy conservation program available in Ohio, North Carolina and South Carolina and is available to K-12 students enrolled in public and private schools who reside in households served by Duke Energy Carolinas.

The Energy Efficiency Education Program for Schools provides principals and teachers with an innovative math and science related curriculum that educates students about energy, resources, electricity, ways energy is wasted and how to use our resources wisely. Education materials focus on concepts such as energy, renewable fuels, and energy conservation through classroom and take home assignments to engage student's families. Curriculum materials are enhanced with a live 25 minute theatrical production for elementary students and a live 40 minute theatrical production for middle school students, both performed by two professional actors. The current program is developed to educate students - kindergarten through eighth grade. School principals are the main point of contact and NTC schedules the performance at their convenience for the entire school.

Once the principal has confirmed the performance date and time, two weeks prior to the performance, all curriculum materials are delivered to the principal's attention for teacher distribution. Materials include school posters, teacher guides, and classroom and family activity books. Students are encouraged to complete a home energy survey with their family (found in their activity book), to receive an Energy Efficiency Starter Kit that contains specific energy efficiency measures to reduce home energy consumption. Customers can receive a Duke Energy or non-Duke Energy Energy Efficiency Starter Kits.

Duke Energy Customers received:

- 1.5 GPM low flow shower head
- 1.5 GPM kitchen faucet aerator with swivel and flip valve
- Water flow meter bag
- Water temperature gauge card (Hot Water Temp Card)
- 13 watt Energy Star rated mini compact fluorescent (60 watt incandescent equivalent), with 12,000 hour life
- 18 watt Energy Star rated mini compact fluorescent (75 watt incandescent equivalent), with 12,000 hour life
- 1.0 GPM needle spray bathroom faucet aerator
- Combination Pack of switch and outlet gasket insulators - 8 outlets and 4 socket gaskets
- Energy Efficient Limelight style night light
- Duke Energy labeled DOE "Energy Savers" booklet
- Roll of Teflon tape for showerhead, Product information and instruction sheet
- Glow Ring Toy

Non-Duke Energy Customers received:

- Water flow meter bag
- Water temperature gauge card (Hot Water Temp Card)

- 13 watt Energy Star rated mini compact fluorescent (60 watt incandescent equivalent), with 12,000 hour life
- 8 outlet gasket insulators
- Duke Energy labeled DOE "Energy Savers" booklet
- Glow Ring Toy

Methodology

Overview of the Evaluation Approach

This process evaluation had three components: management interviews, performance reviews, and participant surveys.

Study Methodology

Management Interviews

Two management interviews were conducted with program implementation staff and management in order to capture their insights about the programs operations and challenges. We interviewed Duke Energy's EE for Schools product manager and the project manager for the program at The National Theatre for Children (NTC).

Performance Reviews

Ten participating schools were visited to review 17 NTC performances in March of 2012. The reviews included gauging responses from teachers and children, and discussing the program with the school staff person that coordinated with NTC for the visit, covering various aspects of the program, such as program operations, aspects of their involvement, and communications with NTC.

Participant Surveys

This survey was conducted online with participating students' families that, according to program tracking records, received an energy efficiency kit from Duke Energy.

Data collection methods, sample sizes, and sampling methodology

Management Interviews

Two management interviews were conducted with program implementation staff and management in order to capture their insights about the programs operations and challenges. We interviewed Duke Energy's EE for Schools product manager and the project manager for the program at NTC.

Performance Reviews

Ten participating schools were visited to review 17 NTC performances in March of 2012. The reviews included gauging responses from teachers and children, and discussing the program with the school staff person that coordinated with NTC for the visit, covering various aspects of the program, such as program materials, aspects of their involvement, and communications with NTC.

Participant Surveys

A list of 14,220 Duke Energy participant records and 9,328 non-Duke Energy participant records (between the dates of November 11th 2011 and June 30th 2012) were randomly sorted by TecMarket Works. Email invitations were sent to a few hundred participants at a time until the target for completed surveys was reached. Surveys were conducted online.

Number of completes and sample disposition for each data collection effort

Performance Reviews

From the list of 109 NC performances and 39 SC performances scheduled in March 2012, 17 performances were reviewed in March of 2012 at 10 participating schools.

Participant Surveys

From the participant list of 14,220 Duke Energy customer records, students' families were invited to complete the survey online between August 18th, 2012 and October 8th, 2012, and a total of 202 usable surveys were completed by Duke Energy customers. Of the 202 completed interviews, 102 were conducted for homes in North Carolina and 100 were conducted for South Carolina homes.

From the participant list of 9,328 non-Duke Energy participant records, student families were invited to complete the survey online between August 18th, 2012 and October 8th, 2012, and a total of 177 usable surveys were completed by non-Duke Energy customers. Of the 177 completed interviews, 100 were conducted for homes in North Carolina and 77 were conducted for South Carolina homes.

Expected and achieved precision

Participant Surveys

Duke Energy Customers: The survey sample methodology had an expected precision of 90% +/- 6.5% and an achieved precision of 90% +/- 5.7%.

Non-Duke Energy Customers: The survey sample methodology had an expected precision of 90% +/- 6.54% and an achieved precision of 90% +/- 6.1%.

Description of measures and selection of methods by measure(s) or market(s)

Duke Energy Customers received:

- 1.5 GPM low flow shower head
- 1.5 GPM kitchen faucet aerator with swivel and flip valve
- Water flow meter bag
- Water temperature gauge card (Hot Water Temp Card)
- 13 watt Energy Star rated mini compact fluorescent (60 watt incandescent equivalent), with 12,000 hour life
- 18 watt Energy Star rated mini compact fluorescent (75 watt incandescent equivalent), with 12,000 hour life
- 1.0 GPM needle spray bathroom faucet aerator
- Combination Pack of switch and outlet gasket insulators - 8 outlets and 4 socket gaskets
- Energy Efficient Limelight style night light
- Duke Energy labeled DOE "Energy Savers" booklet
- Roll of Teflon tape for showerhead, Product information and instruction sheet

- Glow Ring Toy

Non-Duke Energy Customers received:

- Water flow meter bag
- Water temperature gauge card (Hot Water Temp Card)
- 13 watt Energy Star rated mini compact fluorescent (60 watt incandescent equivalent), with 12,000 hour life
- 8 outlet gasket insulators
- Duke Energy labeled DOE "Energy Savers" booklet
- Glow Ring Toy

Management Interviews

The management interviews revealed that the program is operating very well and is surpassing its goals for energy efficiency kit distribution. Overall, the satisfaction with program operations and communications is high.

The National Theatre for Children

The National Theatre for Children (NTC) is the contracted third-party implementer for the Energy Efficiency for Schools Program. The project manager for this program at NTC is the main liaison for Duke Energy and attends the weekly meetings with Duke Energy.

Program Goals

The program goals are as follows:

- The delivery of grade appropriate energy efficiency learning activities such as energy usage and conservation into existing science and/or math based curriculum across the selected territory served by Duke Energy.
- Integrate Duke Energy's Energy Efficiency Starter Kit sign up process into the science and/or math curriculum.
- Achieve target participation and energy impacts through the installation and tracking of energy efficiency measures to the specific household account of Duke Energy students.
- Create sustainability of the program and new impacts year after year of new families that haven't participated in the program in the last three (3) years.

NTC and Duke Energy agree that the program is meeting its goals.

The 2011-2012 school year was the first year of NTC's contract, and the goals for energy efficiency kit distributions for the first year were exceeded, and the staff expressed no doubt that goals will be exceeded again in the future.
All interviewees agree that the program is successful at meeting its goals. However, in order to exceed the stated distribution goals more than the current rates of distribution at the current rate of school service, there would need to be a second kit distribution so households could participate again.
This condition is in part due to the incentives provided through the program. There are multiple contests that involve the schools and the participating students' families that are designed to increase savings. The first is a contest by school, in which two schools in North Carolina and two schools in South Carolina are eligible to win $1,000 for their schools by having the highest percentages of students ordering the kit in that state. The prizes are awarded by percent of students so that smaller schools would be just as likely to succeed as larger schools. These contests are promoted throughout the schools with posters, as can be seen in on the left of Figure 1 below. These posters were for the school administrators to gauge how well the school was doing with its energy efficiency kit orders.

The school prizes are awarded in September of the following school year (September of 2012 for the school year ending in Spring of 2012) so that the schools are in session and the children can

enjoy the announcement, and so that the photo opportunity it presented would revitalize the interest in the program in the territory.

The second offered contest is for the students' families (across Ohio and the Carolina System). Students' families that return the Business Reply Card are eligible to win $5,000 through random selection.

Figure 1. School Hallway with Two NTC Posters

Marketing

The program is marketed by NTC with mass mailings to school administrators occurring two or three times a year[5], and with smaller, more targeted campaigns throughout the year. Since the EE for Schools program is for grades kindergarten through 8, the NTC has flexibility in choosing the targeted schools and grades for the program. NTC decided that the younger children would be more likely to discuss the presentation and the availability of the free kit than older students, so the focus is on elementary students, with some programs also being presented to middle school children. At this time, there are no plans to target high school students.

NTC has the zip codes that are within the Duke Energy territory in the Carolina System, and also supplies statistics on the number of Duke Energy customers within each zip code, which allows NTC to target schools with a higher propensity of having a high number of Duke Energy customers with children enrolled at those schools. In the first year, NTC was able to schedule a performance at more than 50% of the schools it contacted about the program.

[5] See the letter to Principals in Appendix F: Letter to School Principal.

With this success rate, managers agree that the program should consider a second visit within the three year time frame, but offer a second, different kit to the students' families.

Quality Control

When a request for an energy efficiency kit is received, it is reviewed for eligibility. If a customer is a Duke Energy customer that has a child in a participating school, they are sent a Duke Energy energy efficiency kit. If the request is coming from a family that is not a Duke Energy customer but has a child in a participating school, they are sent a non-Duke Energy energy efficiency kit. This is because Duke Energy is not allowed to count the energy savings from the non-Duke Energy serviced homes. The kit that is sent to non-Duke Energy customers contains fewer measures as a way to reduce the costs associated with providing kits for which Duke Energy cannot claim energy-savings credit.

However, in early 2012, many requests for kits were made from outside of Duke Energy's territory. This was a result of when NBC presented the availability of the free kits during its NBC Today Show advising listeners to log on and request a kit. The exposure caused increases in requests for non-Duke Energy kits in the targeted schools. Following this, many blogs that focus on household budgeting and couponing also featured Duke Energy's offer.

With the requests coming in at a rate of thousands per day, the program's processing and quality control efforts were tested. The program was successful at handling the increased load and processing requirements.

The site for ordering kits[6] includes a disclaimer indicating eligibility requirements[7], but the disclaimer was either not read or not heeded by many visitors. The process for handling the increased requests were to ignore kit requests from outside of the United States[8] or in states far removed from where the program operates. Customers within the United States that did not have a child attending a qualifying school were sent a letter (from NTC, on Duke Energy letterhead) explaining to them that they were not qualified and ineligible to receive a kit. There were no complaints from people that requested kits but were not eligible to receive them or about how the situation was handled.

Communication

Duke Energy and NTC report that they conduct weekly meetings to discuss scheduling, communications, problems that may have come up and the associated solutions, and program delivery strategies. During those meetings, NTC reported to Duke Energy about any issues that were identified during the week. NTC states that the Duke Energy program manager was always willing to consider new ideas and make adjustments to the program operations.

[6] https://www.myenergykit.org/default.aspx

[7] "Duke Energy Customers! Has your child's school recently hosted THE ENERGIZED GUYZ presentation sponsored by Duke Energy? Then your household may be qualified to receive a Free Energy Efficiency Kit as part of an approved curriculum for residents in Ohio, North Carolina and South Carolina."

[8] Program Managers report that many requests came from Russia.

Summary

Duke Energy's EE for Schools program seems to be well structured and managed with a skilled network of implementers to support and exceed Duke Energy's distribution goals for this program. Although this program has only been offered in the Carolinas since 2011, the program is exceeding its goals for energy efficiency kit distribution.

Performance Reviews

Seventeen performances in Duke Energy's Carolina System were reviewed in March of 2012. Most of the NTC performances were conducted at elementary schools. This review focuses on those performances.

Short onsite interviews were conducted with teachers and administrators depending on their involvement in the program and their availability during the visit to the school. TecMarket Works asked interviewees about various aspects of the program, such as their satisfaction with the program materials and with their communications with NTC staff.

The review also included discussions with NTC actors and an evaluation review of the performance. At times the troupes were aware of the evaluators' presence, at times they were not. There was no difference in the performances based on their awareness of the evaluators' presence.

We also visited classrooms after the performance to gauge the children's reaction to the performance and discuss the program with the teachers. The results of the site visits are presented below.

After the performances were conducted and the teachers and students had left the assembly area, each teacher was provided with a flier that contained detailed instructions on how their students could obtain an energy efficiency kit for their family. An example of this flier can be found in Appendix E: Teacher Survey and Instruction Flyer.

"The Energized Guyz" Performances

The primary purpose of the performance review was to see if NTC was fulfilling the goal of Duke Energy to share energy conservation tips and have students' families[9] order the energy efficiency kit. TecMarket Works and Minerva Smith, an educational consultant, observed five troupes perform seventeen programs. Each troupe consisted of two people playing five characters: Nikki Neutron, U.R. Fired, Dr. Maybe, Cape Cod and Tech Guy.

Every performance started out by mentioning that the program was being provided by Duke Energy, and the troupes displayed the Duke Energy logo as shown in Figure 2 below. Duke Energy was also thanked at the end of each performance.

[9] As not all students live in households served by Duke Energy, there were two kits available, one for Duke Energy customers, and a smaller kit for non-Duke Energy customers, as described in in the Description of Program on page 6.

Figure 2. Duke Energy Sign on the Stage

Elementary School Performances

The actors were enthusiastic and energetic and the performance started with the actors listing the four main points for the program. The main points were: how energy and electricity are made, uses of electricity, how energy is wasted, and how to conserve energy. The children were told that coal, oil, natural gas and sometimes uranium are burned at a power plant to boil water and create steam. Diagrams were used to show the energy resources and the path they took to create electricity. The actors stated clearly that the more electricity we use, the more resources we use.

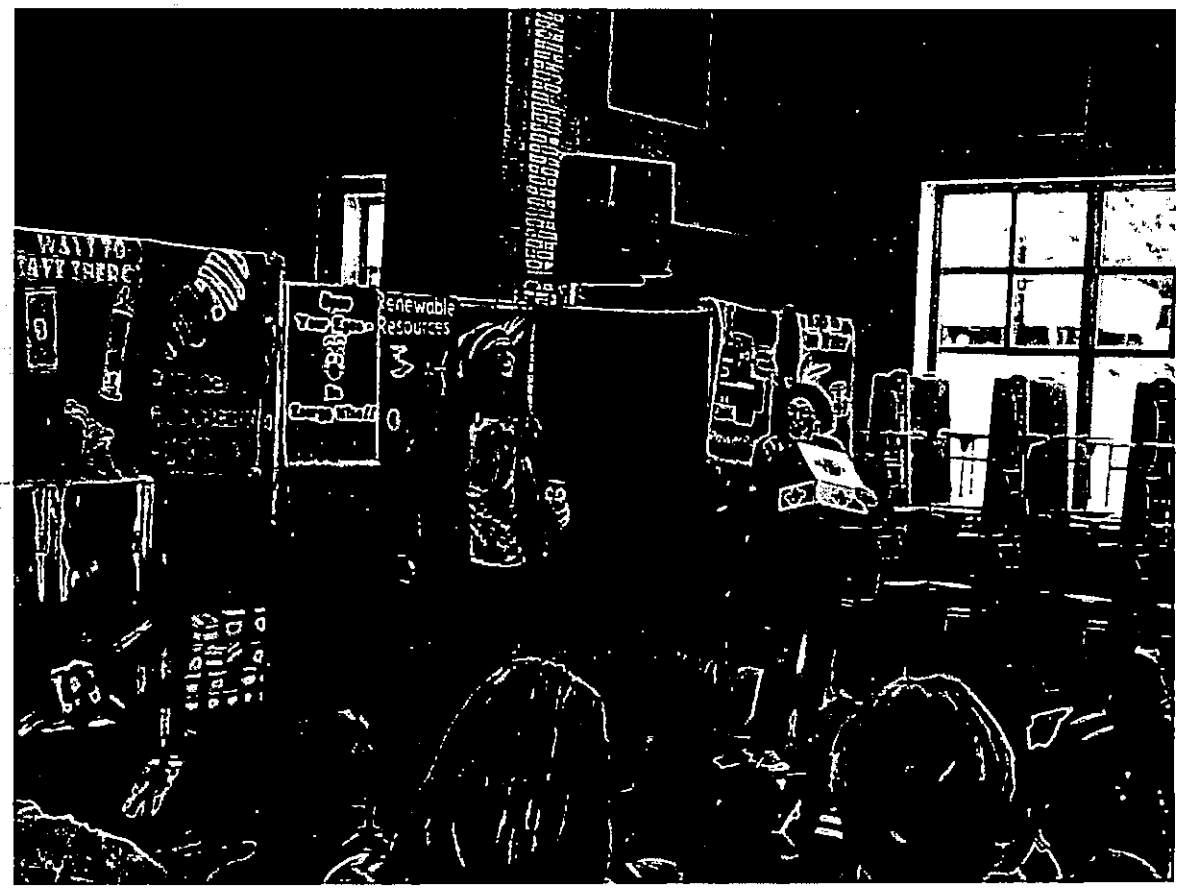


Figure 3. Elementary School Performance in Action

The next portion of the program told the children how to save electricity by turning off lights and appliances, turning the water heater to 120 degrees, and using compact fluorescent light bulbs. Solar, hydro and wind were explained and identified as renewable resources. Coal and natural gas were identified as non-renewable resources. The audience was told power companies use a combination of these resources. Again, diagrams were used to identify resources.

The importance of water conservation was also discussed. Suggested ways to conserve water included: shutting off the water when brushing teeth and washing hands, fixing leaky faucets, doing full loads when using dishwashers and washing machines, shutting off the hose when washing a car, filling up pitchers with water and storing them in the refrigerator, and using low flow showerheads.

Ways to save electricity were repeated five times throughout the 20-25 minute program, and renewable resources were identified three times. The slogan "*Open Your Eyes, Be Energy Wise*" was repeated at least six times, with the children enthusiastically joining in at the end of the performance.

The children were shown three items from the energy kit to encourage them to order a kit for their families. They were told how to get a kit by going online or mailing in the card from the

workbook that they either received before or after the performance in their classrooms from their teachers. Trading cards that had the web site address and a toll free number for ordering the energy kit were also given to the children to take home.

Children were told that their school had the opportunity to win $1,000, depending on how many kits were ordered from their school. The prize was awarded to the school with the highest percentage of students ordering the kit in the Carolina System. In addition, their parents would be eligible to win $5,000 by ordering the energy kit, with the winning family selected at random. These prizes seemed to get the children excited and motivated.

Our overall observation was that the program followed the information in the workbook provided to each child.

What Works Well

In reviewing the performances, the following were noted as working well in gaining attention and in relaying the energy efficiency information to the children.

1. Directions and expectations for behavior were set before the program began.
2. Key energy efficiency points were made repeatedly, with visuals and enthusiasm.
3. Children were involved by repeating the key points of information.
4. The actors would select a child from the audience, which increased excitement.
5. When visiting classrooms after the performance, all of the children were eager to share information they had learned.
6. Many teachers told us they thought that the program was great.
7. Fourth and fifth grade teachers said the performance addressed some of their science state standards.
8. Some principals said they planned to make a robo-call to all of the parents to let them know about the performance their children attended, and to let them know how to order the kit.
9. Use of charts during the performance gave the children a visual image to help them remember information.
10. When children were talking, one of the actors stood silent until they stopped. Very effective!
11. All of the children were attentive during the program and seemed to enjoy it very much.
12. When the troupes had room to be on the floor walking among the children, they seem to garner even more attention.
13. The troupes successfully altered the complexity of the material depending on the age of the children attending. This is very important because if the information is too difficult. you lose younger children, and if it is too simple you lose the interest of the older children.

Recommendations

While the performance was informative and the troupes were effective at delivering the information, we offer the following recommendations for consideration.

1. All but one of the troupes said that Dr. Maybe couldn't decide which color of tennis shoes to wear for a field trip. It took so long to decide, that by the time he did, he missed the bus. After that he decided to waste energy. We could not see a connection between

missing a field trip and wasting energy. One troupe altered the script so that Dr. Maybe couldn't decide if he wanted a peanut butter, ham or turkey sandwich for lunch. By the time he made up his mind, lunch was over and he had no energy for the rest of the day. This revision made a little more sense to us but the point of the two was not clear with respect to the way energy is wasted or saved.

2. Some troupes said non-renewable resources "disappear", while others said that they run out. Run out would be a more accurate terminology to use.
3. Some of the actor's rate of speech was too fast at times[10]. The typical adult speaks 160 words per minute. The central nervous system of a pre-school through third grade children can process 120 words per minute. Fourth grade students process 124-128 words per minute. Slowing the rate of speech will improve comprehension.[11]
4. Only one troupe mentioned that saving energy saves money[12]. Given the focus on the cash prizes at the end of the performance that garnered so much attention and excitement, it may be helpful to incorporate this message into the performance.
5. There was no mention of phantom power that is used when leaving appliances that many children use, such as game systems and computers.
6. Only one troupe had the "Decoder Ring" in their kit to show. The children became very interested in the ring when they saw it. The ring was much more effective than the night light in getting the children excited about ordering the kit, and the troupe with the ring was able to successfully incorporate it into the script.
7. One troupe pulled the CFLs and low-flow showerhead out of the kit at the end and asked the children if they would help save electricity, which resulted in getting agreements from the children that they understood the lessons presented.
8. Some of the cultural references were lost on the younger children. Troupes would reference YouTube, Facebook and Twitter. Facebook requires children to be 13 years of age to have an account and all of these children were 12 and under.
9. When the term "energy efficiency" is first used in the performance, the scripted response is to say "Hold on, those are some mighty big syllables there." Kindergarten children are just learning about syllables and it confuses students when incorrect information is presented. It may make teachers question the accuracy of the rest of the information.

Middle School Performances

The middle school performance was divided into four sketches. Each sketch addressed one of the four points that they were emphasizing through comedy with help from the attending children. The performances were excellent and provided good information and were well-received by the students.

What Works Well

1. The actors asked for certain types of words to be put in the idea bucket before the performance began. Some of the students included teacher's names. When a teacher's

[10] "Spot checks" were conducted on portions of the performances using a timer and the known count of words used by the actors from the script. While these checks were not scientific, overall speech rates were found to be slightly too fast for the ages of the audience.

[11] Banotai, Alyssa. "How to Talk to Children". ADVANCE Speech-Language Pathologists & Audiologists, Vol. 18, Issue 3. January 21, 2008.
http://speech-language-pathology-audiology.advanceweb.com/Article/How-to-Talk-to-Children.aspx

[12] This troupe mentioned that switching from incandescent bulbs to CFLs could save as much as $200 per year.

name was used in the script the kids reacted positively and interest was strengthened. They also included references to music bands and current movies in which the children were interested. This was effective in holding the children's attention.
2. The information presented to middle school students had more complex information.
3. Use of game systems and turning off power was included, providing examples that are relevant to their lives.
4. Excellent connections and examples were made about how saving energy impacts their lives and can add up over time. The troupes stated that if you left the water on while brushing your teeth you were wasting 1- 5 gallons of water each time, and then extrapolated that amount over a year. They also said that a leaky faucet could fill an above ground pool in a year.
5. The students were engaged during the whole performance and even came up to the actors after it was over. Middle school students are generally less reactive and do not express how much they are enjoying something, but this was not the case for these presentations that engaged the students' interests.

After reviewing the performances, the evaluation team visited selected classrooms to gauge students' satisfaction with the performance by obtaining a simple "thumbs up" or "thumbs down" regarding their satisfaction with the performance. Very few students gave the program a "thumbs down". Most students found the performance to be funny and informative.

Program Materials

The onsite visits indicate that NTC is supplying the schools with enough program materials before the performance to allow the schools to distribute the materials. The materials provided seemed to effectively promote the program and its objectives to the school staff and to the students. The materials provided include: teacher and student workbooks with energy-related assignments and instructions for ordering the kit, posters to display around the school, character trading cards for the kids (with the back of the card including instructions on how to order the kit), and NTC provided evaluation surveys for the teacher to complete and return to NTC. Some of these items can be seen in Appendix F: Program Materials.

Program Communications

All teachers and administrators that the evaluation team was able to speak to indicated that the communications with NTC in scheduling the performance and determining the logistics of the visit were appropriate. They indicated that NTC was very professional, and provided timely and detailed responses to their questions. When asked about the program NTC was repeatedly praised by the teachers and administrators.

While the school visits and performances are subject to "acts of nature" such as illness or transportation issues, the onsite reviews revealed only one such case in which an actor became ill and could only do one performance instead of two. The issue was communicated to the appropriate contact at the school immediately. The second performance for the day at that particular school was canceled and most of the students that were to attend the second performance were able to attend the first. The school staff was completely satisfied with the communication from NTC, indicating that "these things happen and they handled it very well; we were happy we could still get them to come and perform at our school".

Summary

TecMarket Works agrees with the visited schools that this is a well-run program that offers valuable energy-efficiency related lessons to the children and an opportunity for the students' families to receive the energy efficiency kit.

Participant Survey Results: Duke Energy Customers

Survey invitations were sent to the participating students' families that live in Duke Energy's territory in North Carolina and South Carolina and ordered an energy efficiency kit. Participants returned a total of 379 surveys from two groups of respondents:

- Group A: 202 surveys[13] were completed by participants that received the energy efficiency kit for Duke Energy customers. North Carolina households completed 102 of these surveys, and South Carolina households completed another 100 surveys.
- Group B: 177 surveys were completed by participants that received the Non-Duke Energy customer energy efficiency kit because they did not live in Duke Energy's service territory. Of the Non-Duke Energy customers surveyed, 100 were from North Carolina and 77 were from South Carolina.

The responses to the surveys are provided below. Group A and Group B are reported separately.

Use of the K12 Duke Energy Kit Measures

CFLs

Table 2 below shows responses to the questions about the 13-watt CFL. Nearly nine out of ten respondents (87.6% or 177 out of 202) installed the 13-watt CFL, and more than three-quarters of these installations (79.1% or 140 out of 177) replaced working bulbs. Most of these installations (66.1% or 117 out of 177) replaced a 45 to 70-watt bulb with the 13-watt CFL, and the replacement was done on lights that were used 3-4 hours per day on average.

Table 2. Frequency of Installation: 13-watt CFL

	Carolinas Kits (n)	Carolinas Kits (%)
Installed 13w bulb		
Yes	177	87.6%
No, but plan to	10	5.0%
No, do not plan to	3	1.5%
No, not sure if will	3	1.5%
Don't Know/Blank	9	4.5%
Wattage of bulb removed		**Percent of Those Using the Item**
Less than 44w	18	10.2%
45-70w	117	66.1%
71-99w	24	13.6%
Greater than 100w	18	10.2%
Functionality of bulb removed		
CFL replaced working bulb	140	79.1%
CFL replaced bulb that was not working (or empty socket)	37	20.9%
Don't know	-	0%

[13] Six of the 202 respondents in the Carolinas indicated that they did not have young children in the household, including some who may have been teachers at schools involved with the program. However, all respondents surveyed did send away for the kit, so their energy efficiency actions are deemed to have been influenced by the K12 program.

Hours of use per day		
<1	10	5.6%
1-2	38	21.5%
3-4	73	41.2%
5-10	49	27.7%
11-12	5	2.8%
13-24	2	1.1%

On average, the 177 Duke Energy customers who installed the 13-watt CFL rated their satisfaction with this kit item at 8.53 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Forty of 177 respondents (22.6%) who installed the 13-watt CFL reported their satisfaction with the bulb at a "7" or less on a 10-point scale. The reasons for these lower levels of satisfaction are listed below.

- Not bright enough (n=20, mean rating 5.75)
- Do not like quality/color of light (n=5, mean rating 5.40)
- Bulbs wear out too soon (n=4, mean rating 4.50)
- Takes too long to come on (n=3, mean rating 5.00)
- Disposal/toxicity concerns (n=2, mean rating 5.50)
- Haven't noticed a difference/no benefit (n=2, mean rating 6.00)
- Shape/does not fit lamp (n=1, rating "5")
- Not dimmable (n=1, rating "5")
- Wanted more bulbs than were offered (n=1, rating "5")
- Bulb exploded (n=1, rating "1")
- Don't know/not specified (n=6, mean rating 5.67)

The list above totals to more than 40 responses because respondents could give multiple reasons.

Table 3 summarizes the responses to questions about the 18-watt CFL, which was installed by more than three-quarters of respondents (77.2% or 156 out of 202). Four out of five of the 18-watt CFLs installations (80.8% or 126 out of 156) replaced working bulbs. Almost half of the 18-watt CFLs that were installed (44.2% or 69 out of 156) replaced bulbs of over 70 watts, and the average usage of the lights these bulbs were installed in was 3-4 hours per day.

Table 3. Frequency of Installation: 18-watt CFL

	Carolinas Kits (n)	Carolinas Kits (%)
Installed 18w bulb		
Yes	156	77.2%
No, but plan to	25	12.4%
No, do not plan to	2	1.0%
No, not sure if will	5	2.5%
Don't Know/Blank	14	6.9%
Wattage of bulb removed		**Percent of Those Using the Item**
Less than 44w	6	3.8%
45-70w	81	51.9%
71-99w	37	23.7%
Greater than 100w	32	20.5%

Functionality of bulb removed		
CFL replaced working bulb	126	80.8%
CFL replaced bulb that was not working (or empty socket)	30	19.2%
Don't know	-	0%
Hours of use per day		
<1	7	4.5%
1-2	37	23.7%
3-4	71	45.5%
5-10	33	21.2%
11-12	6	3.8%
13-24	2	1.3%

On average, the 156 Duke Energy customers who installed the 18-watt CFL rated their satisfaction with this kit item at 8.99 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Nineteen of 156 respondents (12.2%) who installed the 18-watt CFL reported their satisfaction with the bulb at a "7" or less on a 10-point scale. The reasons for these lower levels of satisfaction are listed below.

- Not bright enough (n=12, mean rating 5.83)
- Takes too long to come on (n=4, mean rating 5.75)
- Do not like quality/color of light (n=2, mean rating 6.50)
- Disposal/toxicity concerns (n=2, mean rating 5.50)
- Haven't noticed a difference/no benefit (n=1, rating "7")
- Not dimmable (n=1, rating "7")
- Don't know/not specified (n=3, mean rating 5.33)

The list above totals to more than 19 responses because respondents could give multiple reasons.

Uninstalling CFLs and Purchasing Additional CFLs

Twenty-two respondents (14.1% of 156[14]) reported that they have removed at least one of the CFLs they installed. The stated reasons for removing the bulbs are listed below; in over a third of these cases (36.4% or 8 out of 22), it was because the CFL burned out.

- Bulb burned out already (n=8)
- Bulb is not bright enough (n=5)
- Takes too long to come on (n=3)
- Do not like quality/color of light (n=2)
- Disposal/toxicity concerns (n=2)
- Bulb is too bright (n=1)
- Was just trying something new (n=1)

Fifty-eight of the respondents who installed either of the kit-provided CFLs (30.9% of 188) have purchased additional CFLs since receiving the kit, with those 58 respondents indicating that they

[14] In addition to 14 respondents who did not install any kit-provided CFLs and who were not asked this question, 32 respondents who installed the 13-watt CFL but not the 18-watt CFL, were not asked this question either. One hundred and forty-five of the 156 respondents who were asked this question installed both CFLs.

have purchased an average of 5.4 additional CFLs per household (ranging from 2 bulbs to 15 bulbs). Additionally, five of the 14 respondents (35.7%) who did not install either kit-provided CFLs purchased an average of an additional 9.2 CFLs per household since participating in the program.

CFL Freeridership for Duke Energy Customers

TecMarket Works utilized two questions[15] from the participant survey to estimate CFL freeridership. The first question asked survey respondents whether or not they had installed CFLs prior to participating in the program, and if so, how many they had installed. The second question asked respondents if they had planned on buying any CFLs before participating in the program.

Quantities of pre-installed CFLs range from 1 to 40 among the 74.3% (150 out of 202) of Duke Energy customers who indicated having pre-installed CFLs.

Freeridership ratios based on survey responses are assigned using a Bass product adoption curve based on diffusion of innovation product adoption concepts. Zero pre-installed CFLs correspond to an assigned freeridership score of zero percent, and fourteen or more CFLs correspond to a freeridership level of 100 percent. This allows higher credit for savings to participants with the lowest pre-existing use of CFLs and lower savings to those with a history of CFLs. The inflection point of the curve is seven CFLs, which is the typical level of CFL penetration among these participants. A graph of this curve is shown in Figure 4, with the corresponding freeridership levels by CFL count shown in Table 4. This approach to estimating freeridership is consistent with the field of product adoption and diffusion research and represents a standard approach within the field of product adoption research. It also recognizes that the more CFLs a home has, the less likely the addition of new Duke Energy CFLs will have an impact on product adoption and use behaviors.

[15] Going forward an expanded approach will be used that employs three or more questions in compliance with Commission suggestions.

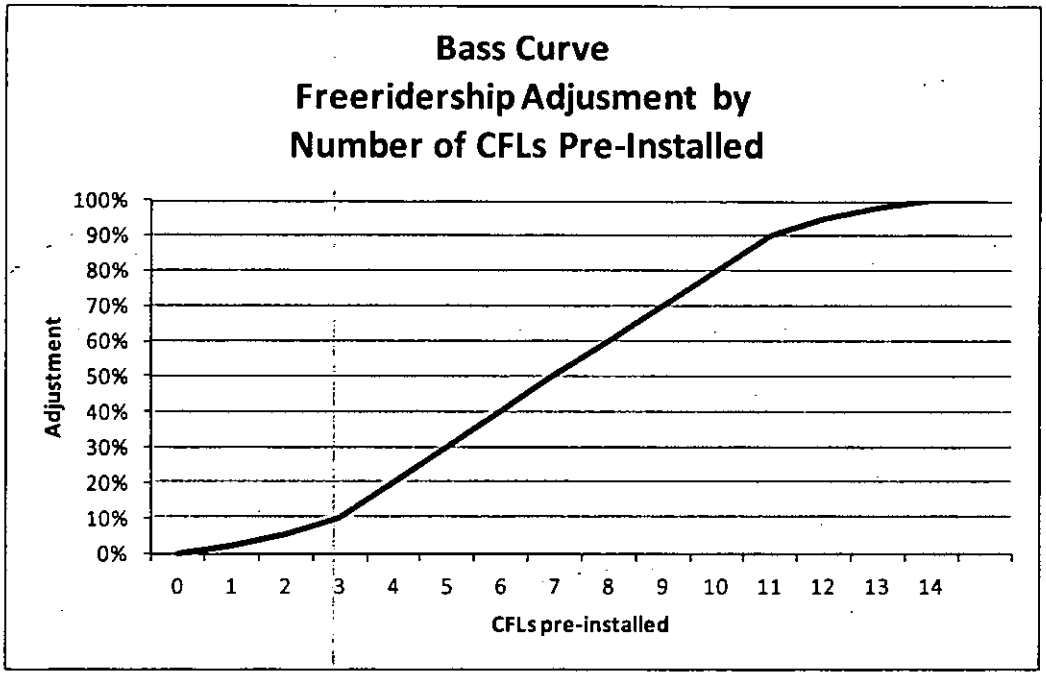


Figure 4. Bass Curve Freeridership Adjustment by Number of CFLs Pre-Installed

Table 4. CFL Freeridership Adjustment Determined by S Curve

Number of CFLs pre-installed	Freeridership Pre-installation adjustment factor	Number of customers with number of pre-installed CFLs
0	0%	52
1	2%	5
2	5%	14
3	10%	12
4	20%	20
5	30%	17
6	40%	11
7	50%	4
8	60%	6
9	70%	4
10	80%	19
11	90%	0
12	95%	8
13	98%	0
14 or more	100%	30

In addition to the pre-installation adjustment factor, TecMarket Works applied a freeridership multiplier based on whether or not respondents indicated they had planned on purchasing the measure (CFLs) before receiving the K12 energy efficiency kit. These multipliers are shown in Table 5.

Table 5. Freeridership Multiplier Based on Measure Purchasing Plans

Did you plan on purchasing <measure> before receiving the K12 kit?	Freeridership multiplier
Yes	1.25 (result cannot exceed 100%) (reduces program savings)
Maybe	1
Don't Know	1
No	0.25 (results cannot be lower than 0%) (increases program savings)
No, already installed in all possible places	Automatic 100% freeridership score

The results of the Freerider analysis will be presented in the energy impact report to be submitted under separate cover.

Low-Flow Showerhead

Nearly half of the kit recipients (45.5% or 92 out of 202) said that they had installed the low-flow showerhead, and another 19.3% (39 out of 202) say they plan to install it in the future. Most (78.3% or 72 out of 92) who installed the showerhead also used the Teflon tape. More than half of those who installed the showerhead (55.4% or 51 out of 92) say that it decreased the flow of water compared to their previous showerhead.

Table 6. Frequency of Installation: Low-Flow Showerhead

	Carolinas Kits (n)	Carolinas Kits (%)
Installed low-flow showerhead		
Yes	92	45.5%
No, but plan to	39	19.3%
No, do not plan to	27	13.4%
No, not sure if will	43	21.3%
Don't Know/Blank	1	0.5%
Showers Taken Per Week		**Percent of Those Using the Item**
0-4	4	4.3%
5-10	35	38.0%
11-15	25	27.2%
16-20	17	18.5%
21+	11	12.0%
Flow of Water after install		
Less than old showerhead	51	55.4%
About the same	35	38.0%
More than old showerhead	6	6.5%
Used the Teflon tape		
Yes	72	78.3%
No	5	5.4%
Don't Know	15	16.3%

Only one of the respondents who installed the showerhead (1.1% of 38) indicated they had difficulty with the installation (quote: "*it did not fit*").

On average, the 92 Duke Energy customers who installed the low-flow showerhead rated their satisfaction with this kit item at 8.38 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Twenty-two of the 92 participants (23.9%) who installed the low-flow showerhead rated their satisfaction with the item a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Water pressure is too low (n=14, mean rating 5.07)
- Takes too long to wash/rinse (n=7, mean rating 4.43)
- Doesn't work/doesn't fit (n=2, mean rating 2.00)
- Preferred old showerhead (n=2, mean rating 7.00)
- Haven't noticed any difference/no benefits (n=1, rating "6")
- Don't know/not specified (n=2, mean rating 6.00)

The list above totals to more than 22 responses because respondents could give multiple reasons.

Low-flow Showerhead Freeridership for Duke Energy Customers

TecMarket Works utilized two questions[16] from the participant survey to estimate freeridership for low-flow showerheads. The first question asked survey respondents whether or not they had installed low-flow showerheads prior to participating in the program, and if so, how many they had installed. The second question asked respondents if they had planned on buying any low flow showerheads before participating in the program.

Twenty of the 92 respondents (21.7%) who installed the low-flow showerhead indicated that they already had a low-flow showerhead installed in their home before receiving the K12 kit.

Seven of the twenty respondents (35.0%) with low-flow showerheads installed before the program indicated that they had not been planning to purchase or use another low-flow showerhead until receiving the K12 kit (but did not have low-flow showerheads installed in every shower). Another ten of these respondents (50.0% of 20) indicated that they either already intended to install more low-flow showerheads before the program, or else already have them in every shower. The other three participants (15.0% of 20) responded "maybe" to the question about their intention to install further measures in the absence of the program.

Sixty-six of the 92 respondents (71.7%) who installed the kit-provided showerhead didn't have any low-flow showerheads previously installed.

Additionally, three respondents were not sure if they had any previously installed low-flow showerheads, but did not intend to install any more before participating in the program. Finally, three respondents who installed a kit-provided showerhead did not know if they had any previously installed low-flow showerheads, and did not know if they would have installed any in the absence of the program.

[16] Going forward an expanded approach will be used that employs three or more questions in compliance with Commission suggestions.

The results of the Freerider analysis will be presented in the energy impact report to be submitted under separate cover.

Purchasing Additional Low-flow Showerheads
Five of the 92 respondents (5.4%) who installed the low-flow showerhead provided with the kit indicated that they have purchased additional showerheads since participating in the program. Two of the 109 respondents (1.8%) who did not install the kit-provided showerhead have also purchased low-flow showerheads since participating in the program. The five respondents who purchased showerheads after installing the showerhead included in the kit purchased an average of 1.6 additional showerheads apiece. The two respondents who purchased showerheads though they did not install the kit-provided showerhead both purchased two additional showerheads apiece.

Faucet Aerators

Table 7 indicates that 31.7% of Duke Customers (64 out of 202) installed the kit-provided bathroom faucet aerator, and Table 8 show a 48.0% (97 out of 202) installation rate for the kitchen faucet aerator. Though customers are only about as likely to have installed either of the two faucet aerators as the low-flow showerhead included in the K12 kit, a larger percentage of surveyed respondents say they still intend to install the bathroom (39.1% or 79 out of 202) and kitchen aerators (26.2% or 53 out of 202) in the future.

Table 7. Frequency of Installation: Bathroom Faucet Aerator

	Carolinas Kits (n)	Carolinas Kits (%)
Installed the bathroom aerator		
Yes	64	31.7%
No, but plan to	79	39.1%
No, do not plan to	59	29.2%
Don't Know/Blank	-	0%
Replaced an aerator that was already installed		**Percent of Those Using the Item**
Yes	17	26.6%
No	47	73.4%
Don't Know	-	0%
Estimate of water flow		**Percent of Those Replacing**
Less than the old aerator	10	58.8%
About the same as the old aerator	7	41.2%
More than the old aerator	-	0%

Two respondents (3.1% of 64) who installed the bathroom aerator said that it was difficult to install (quotes: "*different type of faucet*" and "*I could not do it*").

On average, the 64 Duke Energy customers who installed the bathroom aerator rated their satisfaction with this kit item at 9.09 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Nine of the 64 participants (14.1%) who installed the bathroom aerator rated their satisfaction with the item a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Water pressure too low (n=2, mean rating 5.50)
- Preferred old faucet (n=1, rating "7")
- Too noisy (n=1, rating "6")
- Haven't noticed any difference/no benefits (n=1, rating "7")
- Don't know/not specified (n=4, mean rating 6.50)

Table 8. Frequency of Installation: Kitchen Faucet Aerator

	Carolinas Kits (n)	Carolinas Kits (%)
Installed the kitchen aerator		
Yes	97	48.0%
No, but plan to	53	26.2%
No, do not plan to	52	25.7%
Don't Know/Blank	-	0%
Replaced an aerator that was already installed		**Percent of Those Using the Item**
Yes	18	18.6%
No	79	81.4%
Don't Know	-	0%
Estimate of water flow		**Percent of Those Replacing**
Less than the old aerator	7	38.9%
About the same as the old aerator	10	55.6%
More than the old aerator	1	5.6%

Two respondents (2.1% of 97) who installed the bathroom aerator said that it was difficult to install (quotes: "*it leaked and wouldn't stop even with the tape used*" and "*it was hard to remove the old caps and I had a hard time lining the new ones up but with persistent attitude the guys finally got it on*").

On average, the 97 Duke Energy customers who installed the kitchen aerator rated their satisfaction with this kit item at 8.71 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Twenty of the 97 participants (20.1%) who installed the kitchen aerator rated their satisfaction with the item a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Water pressure is too low (n=7, mean rating 4.43)
- Preferred old faucet (n=2, mean rating 6.50)
- Haven't noticed any difference/no benefits (n=2, mean rating 6.50)
- Doesn't work/doesn't fit (n=2, mean rating 7.00)
- Hard to operate (n=1, rating "7")
- Don't know/not specified (n=6, mean rating 6.50)

Faucet Aerator Freeridership for Duke Energy Customers

TecMarket Works utilized two questions[17] from the participant survey to estimate freeridership for faucet aerators. The first question asked survey respondents whether or not they had installed

[17] Going forward an expanded approach will be used that employs three or more questions in compliance with Commission suggestions.

any faucet aerators prior to participating in the program, and if so, how many they had installed. The second question asked respondents if they had planned on buying any faucet aerators before participating in the program.

Fifteen of the 115 respondents (13.0%) who installed either or both of the kitchen or bathroom faucet aerators indicated that they already had at least one aerator already installed in their home before receiving the K12 kit.

Eleven of the 15 respondents (73.3%) who indicated that they already had an aerator installed said that they had not been planning to install another aerator before receiving the K12 kit (but did not already have aerators installed on all faucets). One participant (6.7% of 15) with aerators already installed responded "maybe" to the question about their intention to install further measures in the absence of the program. The other three survey respondents (20.0% of 15) who had aerators previously installed already have aerators on all their faucets (there were no respondents who had aerators previously installed, but not on every faucet, who were intending to purchase more aerators before participating in the study).

Ninety-seven of the 115 respondents (84.3%) who installed at least one kit aerator had no faucet aerators installed before the program.

Additionally, there was one respondent who did not know if they previously had aerators installed, and was not planning to purchase any more before participating in the program. The last two respondents who installed a kit-provided aerator did not know if they had any previously installed aerators, and did not know if they would have installed any in the absence of the program.

The results of the Freerider analysis will be presented in the energy impact report to be submitted under separate cover.

Purchasing Additional Faucet Aerators

Three respondents who did not have any aerators installed before installing the kit-provided aerators purchased additional aerators after participating in the program. Two of these three respondents installed both faucet aerators from the kit while the third did not install either kit-provided aerator; these three participants purchased a combined total of seven additional aerators after the program.

One respondent who already had faucet aerators and installed the kit-provided kitchen aerator (but not the bathroom aerator) purchased one additional aerator after participating in the program.

Outlet and Switch Gaskets

About four in ten kit recipients (41.1% or 83 out of 202) installed the outlet and switch gaskets, and another three in ten (29.2% or 59 out of 202) say they intend to but have not done so yet. The kit provided 12 gaskets in total, and on average these respondents installed about 5.4 per household -- but unfortunately most of them were installed on interior walls where they do not

provide any energy savings. In fact, nearly half of those who installed the kit-provided gaskets (44.6% or 37 out of 83) did not install any gaskets on exterior walls.

Table 9. Frequency of Installation: Outlet Gaskets

	Carolinas Kits (n)	Carolinas Kits (%)
Installed the gaskets		
Yes	83	41.1%
No, but plan to	59	29.2%
No, do not plan to	17	8.4%
No, not sure if will	31	15.3%
Don't Know	12	5.9%
Number installed interior wall		**Percent of Those Using the Item**
0	11	13.3%
1-2	28	33.7%
3-5	23	27.7%
6-8	11	13.3%
9-12	5	6.0%
Don't Know	5	6.0%
Average number of gaskets installed on interior walls: 3.4 per household		
Number installed exterior wall		**Percent of Those Using the Item**
0	37	44.6%
1-2	20	24.1%
3-5	12	14.5%
6-8	8	9.6%
9-12	2	2.4%
Don't Know	4	4.8%
Average number of gaskets installed on exterior walls: 2.0 per household		

On average, the 83 Duke Energy customers who installed outlet gaskets rated their satisfaction with this kit item at 8.93 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Nine of the 83 participants (10.8%) who installed the outlet gaskets rated their satisfaction with the items a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Haven't noticed any difference/no benefits (n=4, mean rating 6.00)
- Doesn't work/doesn't fit (n=1, rating "7")
- Not allowed to install because live in apartment (n=1, rating "1")
- Don't know/not specified (n=3, mean rating 6.00)

Gasket Freeridership for Duke Energy Customers

TecMarket Works utilized two questions[18] from the participant survey to estimate freeridership for outlet gasket insulators. The first question asked survey respondents whether or not they had installed outlet gaskets prior to participating in the program, and if so, how many they had

[18] Going forward an expanded approach will be used that employs three or more questions in compliance with Commission suggestions.

installed. The second question asked respondents if they had planned on buying any gaskets before participating in the program.

Twenty of the 83 respondents (24.1%) who installed outlet or switch gaskets indicated that they already had gaskets installed in their home before receiving the K12 kit.

Four of the 20 respondents (20.0%) who indicated that they already had installed gaskets (but not on all available outlets or switches) also indicated that they had not been planning to purchase or use more gaskets before receiving the K12 kit. Twelve survey respondents (60.0% of 20) either already intended to install more gaskets before the program, or already have gaskets installed on all outlets. Four participants (20.0%) with gaskets already installed responded "maybe" to the question about their intention to install further measures in the absence of the program.

Sixty-three respondents (75.9%) who used the kit-provided gaskets indicated that they did not have any gaskets installed prior to the program.

None of the customers who installed the kit-provided gaskets were unsure if they had gaskets installed before participating in the program.

The results of the Freerider analysis will be presented in the energy impact report to be submitted under separate cover.

Purchasing Additional Outlet Gasket Insulators

Three respondents who did not have any gaskets installed before the program purchased an average of 7.3 additional gaskets after participating in the program and installing the kit-provided gaskets. There were also four respondents who already had gaskets installed before participating in the program that also installed the kit-provided gaskets and purchased an average of an additional 5 gaskets apiece after the program. There was one respondent who already had gaskets installed before the program, who did not install the kit-provided gaskets, but purchased 6 additional gaskets after the program.

Water Flow Meter Bag

Only about one in five kit recipients (21.3% or 43 out of 202) used the water flow meter bag, though another one in four (24.8% or 50 out of 202) say they intend to in the future but have not done so yet. Only four respondents (9.3% of 43 respondents who used the item) decreased the rate of flow of their water after using the water flow meter bag (three respondents adjusted GPM down only on their shower, while one adjusted GPM down on their shower as well as their kitchen and bathroom faucets). Thus the overall rate of respondents decreasing the GPM on at least one faucet due to this program was only 2.0% (4 out of 202).

Table 10. Frequency of Use: Water Flow Meter Bag

	Carolinas Kits (n)	Carolinas Kits (%)
Used the Water Meter Bag		
Yes	43	21.3%
No, but plan to	50	24.8%
No, do not plan to	44	21.8%
No, not sure if will	53	26.2%

Don't Know	12	5.9%
Tested in Shower		**Percent of Those Using the Item**
Hot Water	2	4.7%
Cold Water	11	25.6%
Both	15	34.9%
Adjusted GPM down	4	9.3%
Tested in Kitchen		
Hot Water	-	0%
Cold Water	8	18.6%
Both	9	20.9%
Adjusted GPM down	1	2.3%
Tested in Bathroom		
Hot Water	-	0%
Cold Water	2	4.7%
Both	4	9.3%
Adjusted GPM down	1	2.3%
Tested in Utility Sink		
Hot Water	-	0%
Cold Water	-	0%
Both	2	4.7%
Adjusted GPM down	-	0%
Tested in Other Area		
Hot Water	-	0%
Cold Water	-	0%
Both	-	0%
Adjusted GPM down	-	0%

On average, the 43 Duke Energy customers who used the water flow meter bag rated their satisfaction with this kit item at 7.95 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Thirteen of the 43 participants (30.2%) who used the water flow meter bag rated their satisfaction with the items a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Couldn't figure it out/didn't see the point (n=4, mean rating 5.25)
- Takes too much time/waste of time (n=2, mean rating 6.00)
- Kit item was missing or damaged (n=2, mean rating 3.00)
- Don't know/not specified (n=5, mean rating 5.20)

Water Temperature Gauge Card

Fewer than half of respondents surveyed (42.6% or 86 out of 202) used the water temperature gauge card that was included with the kit, while another 19.3% (39 out of 202) say they intend to but have not done so yet. Of those that did use it, the median and most common temperature reading was 120 degrees. Only three of those that used the card (3.5% of 86) had their water temperature set at 150 degrees or higher, and 24 respondents (27.9% of 86) lowered the temperature setting on their water heater after using the item.

Table 11. Frequency of Use: Water Temperature Gauge Card

	Carolinas Kits (n)	Carolinas Kits (%)
Used the Water Temperature Card		
Yes	86	42.6%
No, but plan to	39	19.3%
No, do not plan to	27	13.4%
No, not sure if will	38	18.8%
Don't Know	12	5.9%
Initial Temperature Reading		**Percent of Those Using the Item**
Under 120	12	14.0%
120	43	50.0%
130	21	24.4%
140	7	8.1%
150+	3	3.5%
Adjusted Water Temperature		
Yes	24	27.9%
No	55	64.0%
Don't Know	7	8.1%

The initial and adjusted water temperature readings for those who made an adjustment after using the gauge card are shown in Table 12. Twenty-two out of 24 respondents who adjusted their water temperature turned the temperature down by at least 10 degrees (shown by counts in green cells), up to a maximum downward adjustment of about 30 degrees in the case of two respondents (adjusted from "150 or more" down to 120 degrees, and from 140 degrees down to "less than 120"). No one in the survey made an adjustment of less than 10 degrees (shown in white cells), while two participants reported turning up their water temperature by 10 degrees or more (shown in red cells). Both of the participants who turned their water temperature up had initial temperature settings of "less than 120 degrees".

Table 12. Temperature Adjustments after Using Water Temperature Gauge Card

Counts per cell (N)	Initial temp 120 or less	Initial temp 120	Initial temp 130	Initial temp 140	Initial temp 150 or more
Adjusted temp 120 or less	-	8	4	1	0
Adjusted temp 120	1	-	4	3	1
Adjusted temp 130	1	0	-	0	1
Adjusted temp 140	0	0	0	-	0
Adjusted temp 150 or more	0	0	0	0	-

Overall, 10.9% of participants surveyed (22 out of 202) turned their water down by 10 degrees or more based on their participation in this program.

On average, the 86 Duke Energy customers who used the water temperature gauge card rated their satisfaction with this kit item at 9.30 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Only six of the 86 participants (7.0%) who used the water

temperature gauge card rated their satisfaction with the items a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Not sure it was accurate (n=1, rating "7")
- Don't know/not specified (n=5, mean rating 6.40)

LED Night Light

The night light is one of the more popular items with 78.7% (159 out of 202) of survey respondents using it. However, only 50.3% (80 out of 159) of those using this item used it in place of another night light.

Table 13. Frequency of Use: LED Night Light

	Carolinas Kits (n)	Carolinas Kits (%)
Using the Night Light		
Yes	159	78.7%
No, but plan to	21	10.4%
No, do not plan to	8	4.0%
No, not sure if will	12	5.9%
Don't Know	2	1.0%
Installed		**Percent of Those Using the Item**
In a previously empty outlet	78	49.1%
Replaced another light	80	50.3%
Don't Know/Blank	1	0.6%

On average, the 159 Duke Energy customers who used the night light rated their satisfaction with this kit item at 9.44 on a 10-point scale (satisfaction ratings for all kit items can be found in Table 16). Nine of the 159 participants (5.7%) who used the night light rated their satisfaction with the items a "7" or lower on a 10-point scale. The stated reasons for their low satisfaction are listed below.

- Not bright enough (n=3, mean rating 6.00)
- Too sensitive/not sensitive enough (n=1, rating "7")
- It broke (n=1, rating "4")
- Don't know/not specified (n=4, mean rating 5.75)

DOE Energy Savers Booklet

Table 14 indicates that about two-thirds of respondents (68.8% or 139 out of 202) read the DOE booklet that was included in the kit, and nearly three-quarters of those who read the booklet (72.7% or 101 out of 139) read it and discussed it with their families.

Table 14. Frequency of Use: DOE Energy Savers Booklet

	Carolinas Kits (n)	Carolinas Kits (%)
Read the Booklet		
Yes	139	68.8%
No but will	58	28.7%
Don't Know	5	2.5%
Read the Booklet and		**Percent of Those**

Discussed with Family		Using the Item
Yes	101	72.7%
No but will	32	23.0%
Don't Know	6	4.3%

On average, the 139 Duke Energy customers who read the booklet rated the information provided by this kit item at 9.22 on a 10-point scale (ratings for all kit items can be found in Table 16). Only 8 out of 139 (5.8%) customers who read the booklet rated the information provided at a "7" or lower on 10-point scale.

Table 15 shows actions taken, and intentions for future actions, based on the advice in the DOE Energy Savers booklet.

Table 15. Actions Based on Advice in DOE Energy Savers Booklet

	Carolinas Kits (n)	Carolinas Kits (% of 139 respondents who read the booklet)
Purchased and installed high efficiency equipment based on booklet's advice	20	14.4%
Insulation and air leaks		
Already taken action	68	48.9%
Intend to take action	35	25.2%
Heating and cooling system		
Already taken action	94	67.6%
Intend to take action	20	14.4%
Water heating		
Already taken action	62	44.6%
Intend to take action	24	17.3%
Windows		
Already taken action	52	37.4%
Intend to take action	31	22.3%
Lighting		
Already taken action	116	83.5%
Intend to take action	10	7.2%
Appliances		
Already taken action	75	54.0%
Intend to take action	21	15.1%
Home Office		
Already taken action	44	31.7%
Intend to take action	15	10.8%
Home Electronics		
Already taken action	84	60.4%
Intend to take action	17	12.2%
Driving / car maintenance		
Already taken action	76	54.7%
Intend to take action	20	14.4%
Renewable energy		
Already taken action	52	37.4%
Intend to take action	26	18.7%

One in seven respondents who read the Energy Savers booklet (14.4% or 20 out of 139) say they have already purchased and installed high efficiency equipment based on the booklet's recommendation. The items installed are listed below:

- Hybrid heating and air with computerized thermostat
- HVAC system
- AC units for a new addition
- Air filter
- Dish washer
- High efficiency washer and dryer
- Washer and dryer
- Refrigerator and stove
- Wall oven
- Energy Star windows
- Circuit breaker multi outlet plug-in strips
- Belkin switch efficiency timers, CFL bulbs, LED torch light
- Light bulbs
- Light bulbs and night lights
- LEDs
- Not specified (n=5)

In terms of other actions already taken based on the booklet's advice, the most common areas are lighting (83.5% or 116 out of 139 who read the booklet), heating and cooling systems (67.6%), home electronics (60.4%), automobiles (54.7 %) and appliances (54.0%). The areas in which actions were least likely to have been taken were those dealing with windows (37.4%), renewable energy (37.4%) and home offices (31.7%).

The highest levels of intention for future actions inspired by the booklet are in the areas of insulation and air leaks (25.2%), windows (22.3%) and renewable energy (18.7%).

Finally, respondents were asked if they had taken any other actions influenced by the DOE Energy Savers booklet. The verbatim responses of the fourteen respondents who had additional comments are listed below:

- "*Clean air filters, modest thermostat settings.*"
- "*Energy saving electronics.*"
- "*If you're not using it keep it off or unplugged, even down to a cell phone charger.*"
- "*Keeping lights off more and unplugging things that are not in use.*"
- "*Lights not left on.*"
- "*Shorter showers.*"
- "*Shutting computer off at night.*"
- "*We are still changing.*"
- "*Thermostat on a schedule when home and not home.*"
- "*Turning electrical equipment off when not in use.*"

- *"Turning off lights when leaving a room. Timer switch for outdoor lighting. Not letting the water run while brushing our teeth and learning to live without changing the thermostat a lot."*
- *"Using a water source heat pump for AC and water heater."*
- *"We checked all outdoor faucets for possible leaks."*
- *"Will be insulating walls and garage door."*

Satisfaction with Kit Items

Respondents indicated a high level of satisfaction with the kit items, as seen in Table 16 and Figure 5. Satisfaction scores were highest (median score 10 out of 10) for the night light (mean 9.44), water temperature card (mean 9.30), DOE Energy Savers booklet (mean 9.22), bathroom aerators (mean 9.09) and 18-watt CFL (mean 8.99). The lowest satisfaction rating was for the water meter bag (mean 7.95, median 8.5). Weighting the mean scores of each of the kit items provides a mean score of 8.92 for the kit as a whole.

Table 16. Satisfaction Ratings for Duke Energy Customer Kit Items

	Count	Minimum Score	Maximum Score	Mean Score	Median Score
13-watt CFL	177	1	10	8.53	9
18-watt CFL	156	2	10	8.99	10
low flow showerhead	92	1	10	8.38	9
kitchen aerator	97	1	10	8.71	9
bathroom aerator	64	4	10	9.09	10
switch and outlet gaskets	83	1	10	8.93	9
water flow meter bag	43	1	10	7.95	8.5
water temp card	86	5	10	9.30	10
night light	159	3	10	9.44	10
Booklet (rating "how informative")	139	4	10	9.22	10

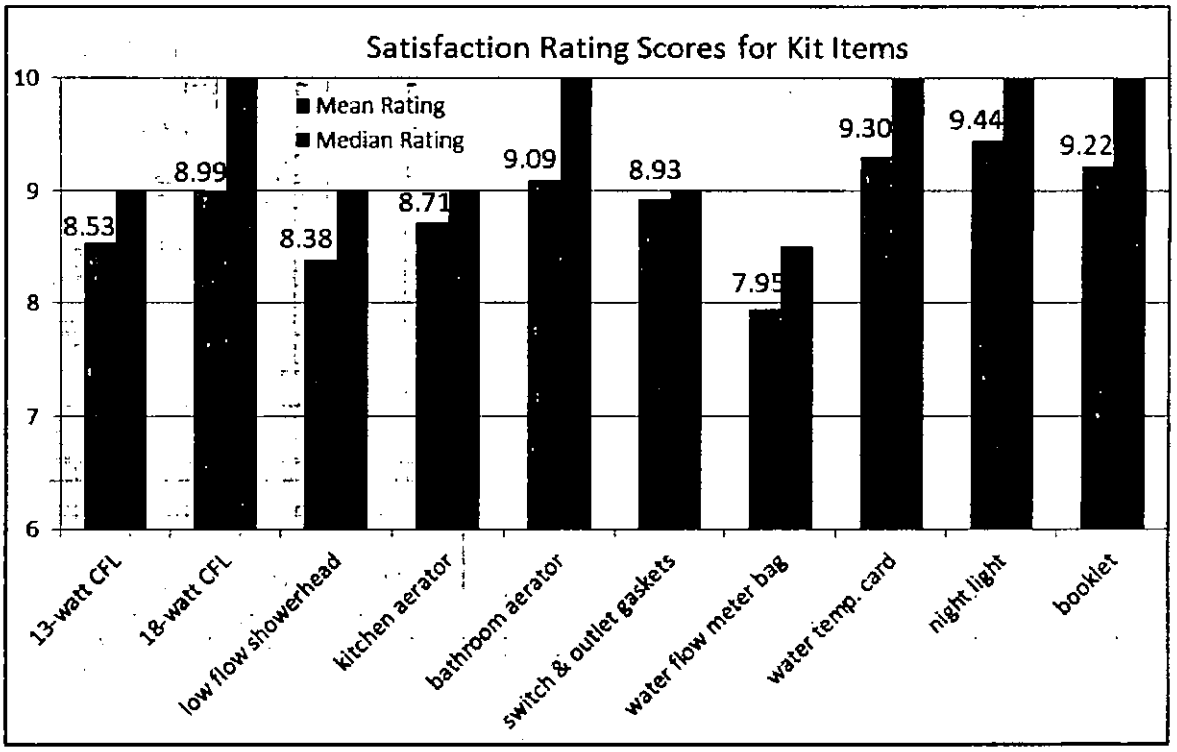


Figure 5. Mean and Median Satisfaction Rating Scores For Kit Items

Parent-Child Discussion Topics

Duke Energy customers were asked a series of questions about what topics they discussed with their children after they participated in the program. Table 17 indicates that roughly 4 out of 5 participants surveyed discussed saving energy (79.7% or 161 out of 202) and saving water (78.7%), as well as how to achieve this by turning off lights and appliances (78.2%) and turning off water (80.2%), though only half (50.0%) discussed fixing leaky faucets. The NTC production of "The Energized Guyz" was also frequently mentioned (by 71.3% or 144 out of 202), though renewable energy (38.6%) and CFLs (34.7%) were only discussed by a minority of parents and children.

Table 17. Topics Discussed With Children After Participating in the Program

	Carolinas Kits (n)	Carolinas Kits (%)
Turning off the water when it is not being used	162	80.2%
Saving energy	161	79.7%
Saving water	159	78.7%
Turn lights and appliances off when not in use	158	78.2%
NTC performance	144	71.3%
Fixing leaky faucets	101	50.0%
Renewable energy	78	38.6%
CFLs	70	34.7%

Duke Energy customers were asked if they had discussed anything else with their children after participating in the program. Table 18 indicates that three-quarters of respondents had nothing more to volunteer (151 or 74.8% of 202), and among those that did, no topics emerged as dominating conversations, though the most common responses had to do with the performance being enjoyable (3.5% or 7 out of 202) and the program as a whole being enjoyable (3.0% or 6 out of 202).

Table 18. Additional Topics Discussed With Children After Participating in the Program

	Carolinas Kits (n)	Carolinas Kits (%)
Enjoyed performance/performers/characters	7	3.5%
Program was fun/enjoyable	6	3.0%
Insisted on sending for kit/using kit	6	3.0%
Saving the earth/environment	6	3.0%
Saving energy (in general)	5	2.5%
Leaks/drafts/insulation/closing doors & windows	4	2.0%
Changing lights	3	1.5%
Turning things off/using less	3	1.5%
Renewable/alternative energy	3	1.5%
Thermostat settings	2	1.0%
Recycling	1	0.5%
Saving water	1	0.5%
Saving money	1	0.5%
No kids in school or teacher	6	3.0%
Nothing/don't know/not specified	151	74.8%

The table above totals to more than 202 responses because respondents could give multiple responses.

Duke Energy customers were asked a series of questions about what topics they discussed with their children after they participated in the program. Table 19 indicates that 77.2% of respondents (156 out of 202) feel they are more educated about energy efficiency after participating in the program, and 70.3% (142 out of 202) say they are more concerned about energy efficiency after the program. However, 86.1% (174 out of 202) also say they were already concerned about energy efficiency before the program.

Table 19. Perceived Educational Value of the Program

	Carolinas Kits (n)	Carolinas Kits (%)
Is your household more or less educated about energy efficiency since receiving the kit?		
Yes, we are more educated	156	77.2%
There is no change in our education	42	20.8%
No, we are less educated	4	2.0%
Before receiving the kit . . .		
Never been concerned about energy efficiency	28	13.9%
Always concerned about energy efficiency	174	86.1%
Since receiving the kit, is your household . . .		
More concerned about energy efficiency	142	70.3%
There is no change in our concern	58	28.7%
Less concerned about energy efficiency	2	1.0%

Kits Sent to Non-Duke Energy Customers

Invitations to participate in this online survey were also sent to Non-Duke Energy customers in the Carolinas, and 177 surveys were completed (100 from North Carolina and 77 from South Carolina). Non-Duke Energy customers that participated in the K12 program received a kit with the following items:

- 13-watt CFL
- 8 Outlet gasket insulators
- Bag for testing water flow
- Water temperature card
- DOE booklet

Use of the K12 Non-Duke Energy Kit Measures

CFL

The CFL included in the K12 kit was installed by 88.7% (157 out of 177) of the Non-Duke Energy respondents. Table 20 below shows a summary of the responses to the questions about the 13-watt CFL. Most of the kit recipients (68.8% or 108 out of 157) replaced a 45 to 70-watt bulb with the 13-watt CFL, and in most cases (82.2% or 129 out of 157) replaced a bulb that was still functional. The median and most common amount of usage for the light where the CFL bulb was installed was 3-4 hours per day on average.

Table 20. Frequency of Installation: 13-watt CFL

	Carolinas Kits (n)	Carolinas Kits (%)
Installed 13w bulb		
Yes	157	88.7%
No, but plan to	13	7.3%
No, do not plan to	4	2.3%
Don't Know	3	1.7%
Wattage of bulb removed		**Percent of Those Using the Item**
Less than 44w	14	8.9%
45-70w	108	68.8%
71-99w	25	15.9%
Greater than 100w	10	6.4%
Functionality of bulb removed		
CFL replaced working bulb	129	82.2%
CFL replaced bulb that was not working (or empty socket)	27	17.2%
Don't know	1	0.6%
Hours of use per day		
<1	13	8.3%
1-2	34	21.7%
3-4	72	45.9%
5-10	31	19.7%

11-12	2	1.3%
13-24	5	3.2%

The mean satisfaction rating for the 157 non-customers who installed the CFL was 8.46 (satisfaction ratings for all non-customer kit items can be found in Table 25). Thirty-six of 157 (22.9%) Non-Duke Energy customers surveyed who installed the 13-watt CFL rated their satisfaction with the bulb at "7" or lower on a 10-point scale. The reasons for these lower levels of satisfaction are listed below.

- Not bright enough (n=15, mean rating 6.20)
- Do not like quality/color of light (n=9, mean rating 6.00)
- Didn't notice any difference/no benefits (n=5, mean rating 4.60)
- Takes too long to come on (n=4, mean rating 6.25)
- Bulbs wear out too soon (n=4, mean rating 4.50)
- Disposal/toxicity concerns (n=2, mean rating 4.00)
- Don't know/not specified (n=1, rating "7")

The list above totals to more than 36 responses because respondents could give multiple reasons.

Purchasing Additional CFLs

Nearly half of the Non-Duke Energy customers who installed the kit-provided bulb (74 or 47.1% of 157) have purchased additional CFLs since receiving the kit, with these respondents indicating that they have purchased an average of an additional 8.1 CFLs per household (ranging from one CFL to 57 CFLs). There were also three respondents who did not install the kit-provided CFL (15.0% of 20), but said they have purchased an average of 4.7 CFLs since receiving the kit.

Previous Use of CFLs

One hundred and twenty-three of the Non-Duke Energy customers (69.5% of 177) indicated that they had at least one CFL installed in their homes previous to receiving the K12 kit. These families report that they had from one to sixty CFLs installed in their homes, with the average reported number of previously installed CFLs being 10.4 per household.

Seventy-six of these respondents (42.9% of 177) indicated that they were definitely planning on purchasing CFLs before receiving the kit, and another 41 (23.2% of 177) were possibly planning on buying CFLs. Twenty of the Non-Duke Energy customers (11.3% of 177) indicated that they had not planned on purchasing more CFLs because they already have CFLs installed in all of their household's sockets.

Outlet Gasket Insulators

Sixty Non-Duke Customers surveyed (33.9% of 177) installed the outlet insulating gaskets. The kits provided 8 gaskets in total, but unfortunately almost as many gaskets were installed on interior walls (where they do not provide any energy savings) as on exterior walls.

Table 21. Frequency of Installation: Outlet Gaskets

	Carolinas Kits (n)	Carolinas Kits (%)
Installed the gaskets		
Yes	60	33.9%
No, but plan to	45	25.4%
No, do not plan to	23	13.0%
Don't Know	49	27.7%
Number installed interior wall		**Percent of Those Using the Item**
0	24	40.0%
1-2	12	20.0%
3-5	11	18.3%
6-8	12	20.0%
Don't Know	1	1.7%
Average number of gaskets installed on interior walls: 2.5 per household		
Number installed exterior wall		
0	21	35.0%
1-2	10	16.7%
3-5	12	20.0%
6-8	16	26.7%
Don't Know	1	1.7%
Average number of gaskets installed on exterior walls: 3.0 per household		

The mean satisfaction rating for the 60 non-customers who installed gaskets was 8.55 (satisfaction ratings for all non-customer kit items can be found in Table 25). Ten of 60 Non-Duke Energy customers surveyed who installed the gasket insulators (16.7%) rated their satisfaction with the bulb at "7" or lower on a 10-point scale. The reasons for these lower levels of satisfaction are listed below.

- Haven't noticed any difference/no benefits (n=7, mean rating 5.86)
- Had to cut them to make them fit outlets (n=1, rating "7")
- Don't know/not specified (n=2, mean rating 6.50)

Purchasing Additional Gaskets

Nine of the 60 Non-Duke Energy customers who installed the kit-provided outlet gasket insulators reported that they have purchased additional outlet gaskets since participating in the program. These nine respondents purchased an average of 18.9 gaskets apiece, though the average is skewed by two respondents who say they purchased 50 and 60 gaskets; the median number of gaskets purchased per household is only 10. Among the 117 Non-Duke Energy customers who did not use the kit-provided gaskets, only one has purchased a total of four additional gaskets since the program.

Previous Use of Gaskets

Eight (13.3%) of the sixty respondents who installed gasket insulators indicated that they already had at least one gasket insulator installed in their home before receiving the K12 kit, including three (5.0% of 60) who already had them on every outlet in their home. Seven (6.0%) of the 117 respondents that did not install any kit-provided gaskets also indicated that they already had some gaskets installed (five of these respondents, or 4.3% of 117, said they already had gasket insulators on every outlet in their home).

Of the eight respondents who installed the kit-provided gaskets though they already had other gaskets installed, two said they were definitely planning to install more gaskets before receiving the kit, none said they might ("maybe") have been planning to install gaskets before receiving the kit, and three said they definitely were not planning to install any more gaskets before receiving the kit. Among the other 52 respondents who installed the kit-provided gaskets (but who did not previously have any gaskets installed), five (9.6% of 52) said they were considering installing more gasket insulators before the kit arrived.

Among the 117 respondents who did not install the kit-provided gaskets, none (0.0%) said they were definitely planning to install them before the program, though eleven (9.4% of 117) said they might be planning to install them before receiving the kit ("maybe"). Only one of these eleven respondents who said that they "might" install gaskets had them installed before the program.

Water Flow Meter Bag

Only 16.4% (29 out of 177) respondents used the water flow meter bag, though another 22.6% (40 out of 177) say they intend to use it. Only four respondents (13.8% of 29 who used the item, or 2.3% of all 177 non-customers surveyed) adjusted the GPM down on their shower, and none adjusted the GPM on any other faucets.

Table 22. Frequency of Use: Water Flow Meter Bag

	Carolinas Kits (n)	Carolinas Kits (%)
Used the Water Meter Bag		
Yes	29	16.4%
No, but plan to	40	22.6%
No, do not plan to	40	22.6%
No, not sure if will	62	35.0%
Don't Know/blank	6	3.4%
Tested in Shower		**Percent of Those Using the Item**
Hot Water	2	6.9%
Cold Water	8	27.6%
Both	13	44.8%
Adjusted GPM down	4	13.8%
Tested in Kitchen		
Hot Water	-	0%
Cold Water	8	27.6%
Both	3	10.3%
Adjusted GPM down	-	0%
Tested in Bathroom		
Hot Water	-	0%
Cold Water	3	10.3%
Both	1	3.4%
Adjusted GPM down	-	0%
Tested in Utility Sink		
Hot Water	-	0%
Cold Water	-	0%
Both	1	3.4%

Adjusted GPM down	-	0%

The mean satisfaction rating for the 29 non-customers who used the water meter bag was 8.14 (satisfaction ratings for all non-customer kit items can be found in Table 25). Eight out of the 29 (27.6%) Non-Duke Energy customers surveyed who used the water flow meter bag rated their satisfaction with the bulb at "7" or lower on a 10-point scale. The reasons for these lower levels of satisfaction are listed below.

- Using item is awkward/messy/not easy (n=3, mean rating 4.67)
- Couldn't figure it out/didn't see the point (n=2, mean rating 4.50)
- Didn't notice any difference/no benefits (n=1, rating "6")
- Kit item was missing or damaged (n=1, rating "7")
- Don't know/not specified (n=1, rating "5")

DOE Energy Savers Booklet

Three quarters of non-customers (76.8% or 136 out of 177) read the DOE Energy Savers Booklet, and almost two-thirds of those who did (64.7% or 88 out of 136) discussed it with their families.

Table 23. Frequency of Use: DOE Energy Savers Booklet

	Carolinas Kits (n)	Carolinas Kits (%)
Read the Booklet		
Yes	136	76.8%
No but will	39	22.0%
Don't Know/blank	2	1.1%
Read the Booklet and Discussed with Family		**Percent of Those Using the Item**
Yes	88	64.7%
No but will	42	30.9%
Don't Know/blank	6	4.4%

Non-Duke Energy customers were asked to rate how informative they found the Energy Savers booklet on a 10-point scale; the mean rating of the 136 non-customers who read the booklet was 8.37 (ratings for all non-customer kit items can be found in Table 25). Thirty-four out of 136 (25.0%) non-customers who read the booklet rated the information provided at a "7" or lower on 10-point scale.

Further Actions Inspired by DOE Energy Savers Booklet

Almost one quarter of Non-Duke Energy customers who read the Energy Savers booklet (23.5% or 32 out of 136) say they have installed high efficiency equipment based on the booklet's advice, as seen in Table 24. The most commonly mentioned equipment were clothes washers and/or dryers (mentioned by 25.0% or 8 out of 32), HVAC equipment (mentioned by 21.9% or 7 out of 32) and dishwashers (mentioned by 9.4% or 3 out of 32). The equipment purchased and installed by these 32 respondents is listed below.

- Replaced AC unit with a high efficiency unit
- Trane AC unit
- New central AC unit
- Window AC unit
- Heat Pump
- Heating and cooling system, heat pump
- Water heater and HVAC
- Front load washing machine and front load dryer
- Clothes washer and dryer (4 responses)
- Clothes washer (2 responses)
- Dryer
- Refrigerator
- Refrigerator and water heater
- Refrigerator and dishwasher
- Dishwasher (2 responses)
- Gas stove and microwave
- Desktop computer and monitor, 40" TV
- Television
- Digital thermostat and storm door
- Light bulbs and water miser shower heads
- Faucet
- Did not specify (n=6)

Table 24. Actions Based on Advice in DOE Energy Savers Booklet

	Carolinas Kits (n)	**Carolinas Kits** (% of 136 respondents who read the booklet)
Purchased and installed high efficiency equipment based on booklet's advice	32	23.5%
Insulation and air leaks		
Already taken action	62	45.6%
Intend to take action	32	23.5%
Heating and cooling system		
Already taken action	80	58.8%
Intend to take action	19	14.0%
Water heating		
Already taken action	48	35.3%
Intend to take action	27	19.9%
Windows		
Already taken action	46	33.8%
Intend to take action	30	22.1%
Lighting		
Already taken action	105	77.2%
Intend to take action	6	4.4%
Appliances		
Already taken action	55	40.4%
Intend to take action	20	14.7%

Home Office		
Already taken action	37	27.2%
Intend to take action	12	8.8%
Home Electronics		
Already taken action	68	50.0%
Intend to take action	14	10.3%
Driving / car maintenance		
Already taken action	68	50.0%
Intend to take action	15	11.0%
Renewable energy		
Already taken action	40	29.4%
Intend to take action	29	21.3%

Among other actions recommended by the booklet, the most commonly done involve lighting (by 77.2% or 105 out of 136), heating and cooling systems (58.8%), home electronics (50.0%), and driving/car maintenance (50.0%). The actions respondents are most likely to say they intend to do in the future (but have not done yet) involve insulation and air leaks (23.5%), windows (22.1%), and renewable energy (21.3%).

As a follow-up question, non-customers were asked if they have taken any other actions inspired by the booklets which were not previously asked about. Fifteen respondents (11.0% of 136 who read the booklet) volunteered additional activities, listed below:

- "*Blinds to keep out summer sun and heat.*"
- "*Educate family about saving energy by turning off lights, shaving and brushing teeth with water off.*"
- "*Had a contractor come out about our bonus room over garage which stays hot in summer and cold in winter and had assessment of heating and cooling systems.*"
- "*Keep thermostat higher in the summer and lower in winter.*"
- "*Lowered cooling and heating temps to a year round indoor temp of around 75.*"
- "*More aware of turning lights off, closing shades during hottest part of day. I live on a very short budget & need to have lowest bill I can get. Thank you Duke Power for all your info & help. Sincerely, Kim Brown.*"
- "*More concise energy usage.*"
- "*New entry doors and fixed air ducts.*"
- "*Programmable thermostat control system, turning off lights when not needed, shorter showers, washing clothes in cold water only, unplugging appliances when not being used.*"
- "*Talked to my children about limiting time in the shower and leaving lights on.*"
- "*Unplug unused energy consuming items.*"
- "*Unplugging electronics and turning off lights.*"
- "*Using power strips to control and turn off computers and lights.*"
- "*We make sure lights are turned off when rooms are not in use. We also limit times that computers and TV are used. I have limited the times a week that I run the washer and dryer. We changed the settings for our thermostat.*"
- "*We use less power by cutting back. We are more aware of water usage also.*"

Satisfaction with Kit Items

Respondents indicate a high level of satisfaction with the kit items (for the DOE booklet, the satisfaction question was worded in terms of "how informative" rather than "how satisfied"). Mean satisfaction scores were highest (8.55 out of 10) for the outlet gasket insulator, and lowest for the water flow meter bag (8.14 out of 10). Weighting the mean scores of each of the kit items provides a mean score of 8.42 for the kit as a whole.

Table 25. Satisfaction Ratings For Non-Duke Energy Customer Kit Items

	Count	Minimum Score	Maximum Score	Mean Score	Median Score
13-watt CFL	157	1	10	8.46	9
Outlet gaskets insulators	60	5	10	8.55	9
Water flow meter bag	29	2	10	8.14	8.5
Booklet (rating "how informative")	136	4	10	8.37	8

Respondents' General Comments

The survey provided an area for Non-Duke Energy customers to add their thoughts about the program. Sixty-six respondents provided comments which are listed below:

Positive Comments:

- *"Enjoyed it."*
- *"Excellent program. Need to read the information provided in the package."*
- *"Good program would love to get the kit or any other kit again!"*
- *"Good program."*
- *"Great idea. My child loved reading with me and trying out the products."*
- *"Great program and excellent educational resources for students and families."*
- *"Great program educating those between 10 and 40 and is necessary for future energy savings."*
- *"Great program to involve the whole family."*
- *"Great program, continue to educate everyone."*
- *"I personally think it is good, especially in that the children in school took an interest in it."*
- *"I am thankful there is a website here. Since my mom and dad don't have time to go out and shop, they could do a click of the mouse and the items are ready to be shipped. Thank you!!!"*
- *"I am very grateful for your help."*
- *"I like your bulb, small wattage but it provides bright light."*
- *"I really enjoyed the booklet. It gave information that I didn't know."*

- *"I really enjoyed the program and was glad to get the valuable information provided. I learned a few things that I was not aware of. I have since moved out of state and wish that the light company here offered the same or similar energy kit to use for my home. Unfortunately, they don't, but the things I learned from your kit has better informed me on the things that I could do to reduce energy cost at my new location."*
- *"I really thought this was nice. I have three children, at two different schools, and they mentioned this program several times. The youngest (6 years) was the most enthusiastic, she was on me all the time about the kit. They all asked me at least once to be sure and order the kit online. I knew about most of the things in the kit, except for the outlet gaskets, those were great and I'm going to buy more. I had noticed a draft around our outlets but didn't know I could buy those to fix the problem, so that especially helped me. I think it's a great idea, letting people sample an item before purchasing and being able to see if it really saves energy or not."*
- *"I think it is a great idea to create awareness for the community."*
- *"I think this is a good program and my children were excited about the package and installing the items when they received them."*
- *"I went and unplugged a bunch of stuff when I don't use."*
- *"INFORMATIVE about things that are simple to change."*
- *"Is very good."*
- *"It was a great program for students at my school."*
- *"It was good information."*
- *"Loved the kit."*
- *"Loved the kit and bought bulbs to share with my Mother."*
- *"My husband usually handles all home maintenance and he usually stays on top of things. I am all for saving resources and eliminate unnecessary spending & waste."*
- *"My son heard of this at his school so we got the kit, I was happy to see the students in 5th grade were learning how to save energy."*
- *"Our family already uses many of the items in the kits, but this is a great way to inform people of the way to use them and what the items will look like. The play was very entertaining but also was packed full of good information for the children to take home and tell their families how to save energy."*
- *"Thank you."*
- *"Thank you for educating students about energy."*
- *"Thank you for providing this savings pack."*
- *"Thank you for the donation and ability to start family discussions."*
- *"Thank you for the free kit and information. It was nice to read to my family to justify some points we have talked about in general conversation."*
- *"Thanks for getting us started."*
- *"Thanks for providing it to me."*

- *"Thanks for sharing and taking the time to show how you can save on energy!"*
- *"Thanks."*
- *"Thanks. Always interested in energy conservation."*
- *"The assembly program was great."*
- *"The guide was very helpful. It provided real and simple things that families could do to immediately start saving more energy."*
- *"The kit was a great conversation starter for my children. They really got excited about finding additional ways to "save" energy, much like they try to save money. Thank you for providing this!"*
- *"The program is a good introduction to steps to take to save electricity. Thanks for making it available."*
- *"This really had my son excited about energy conservation. It made something relatively boring fun and exciting."*
- *"This was a cool program. I had never seen the outlet covers before and need to get some additional ones to finish all of the exterior walls."*
- *"Thought this was a great idea. I already use many CFL bulbs and will use this one when the next incandescent burns out. I have had a few CFL bulbs burn out earlier than they should. Already have outlet covers on all exterior wall outlets. Have water flow savers on my shower heads, but will try the bag just to check. Very good program."*
- *"Very helpful."*
- *"It was an excellent program for the students. I appreciated the information, but as a home owner I have for several years been replacing my appliances with Energy Star as needed."*
- *"We love the shows/programs that they put on at our school (St. James elementary in Denver, NC). The kids get very excited and encouraged about energy. Thanks so much!"*
- *"Wonderful program! The reason I have not purchased bulbs and outlet covers is because of the cost. Perhaps you can include coupons in the box, too!"*
- *"Would buy the bulbs, but they cost too much for me."*

Mixed Comments:

- *"Great box but need more light bulbs."*
- *"Great concept. Some of my kids are still too young to understand the concepts."*
- *"I hope it is more than just corporate window dressing. There was useful information included."*
- *"The bulbs were poor quality and the blue on the water flow bag came off onto my bathroom sink and stained it. Should warn people that this could happen or fix it. But this is a great program and should continue. Thank You."*
- *"The program is a great idea but I have a few issues with it, the biggest is the CFLs - these bulbs are toxic and only made in COMMUNIST China. Get some LEDs or other*

type of bulbs that are healthy & made in USA or other nation (not to mention ones that don't give off an industrial looking light). Another huge issue is going to the school touting the kids receiving a kit including numerous items then receiving a smaller kit as they/we aren't Duke customers - you tick kids off to your company right off the bat (my son was sorely disappointed), not very good customer relations in my not so humble opinion! The program was a great one! My kiddos enjoyed it!"

Negative Comments:

- *"I didn't get a shower head."*
- *"I didn't get everything the program was supposed to send. I only received a light bulb, water bag and outside."*
- *"I never received this kit. I asked if I could get it never received it."*
- *"I was not able to figure out what one of the items was in my kit. It was not labeled and I couldn't find anything in the booklet that matched it."*
- *"I was very disappointed in this kit as I only received a few items whereas I spoke with a family member who got the kit and she received a lot more items such as a shower head and some more things!"*
- *"Our kit was not complete. There was no water saving shower head included in our kit."*
- *"Send more light bulbs!"*
- *"The outlet insulators did not fit the outlets in our house."*
- *"We never got half the stuff in the kit. We got the book and light bulbs nothing else."*
- *"I have not received my energy kit, so unfortunately I was not able to answer the questions very well. I am interested in doing these things, but just haven't yet received the energy kit."*
- *"I have not received this box yet. I signed up to receive it, but it has not been delivered yet. Once it arrives, I will definitely use the products."*

Appendix A: Management Interview Instrument

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the NTC program. We'll talk about the NTC program and its objectives, your thoughts on improving the program, and the technologies the program covers. The purpose of this study is to capture the program's operations as well as help identify areas where the program might be improved. Your responses will feed into a report that will be shared with Duke Energy and the state regulatory agency. I want to assure you that the information you share with me will be kept confidential; we will not identify you by name. However, you may provide some information or opinions that could be attributed to you by virtue of your position and role in this program. If there is sensitive information you wish to share, please warn me and we can discuss how best to include that information in the report.

The interview will take about an hour to complete. Do you have any questions for me before we begin?

(1) Program Background and Objectives (15 min)

1. Please describe your role and scope of responsibility in detail.
2. How long have you been involved with the program?
3. Have there been any recent changes been made to your duties since you started?
    a. If YES, please tell us what changes were made and why they were made. What are the results of the change?
4. In your own words, please describe the Program's objectives. (e.g. enrollment, energy savings, non-energy benefits)
5. Of the program objectives you mentioned earlier, do you feel any of them will be particularly easy to meet, and why?
6. Which program objectives, if any, do you feel will be relatively difficult to meet, and why?

7. Are there any objectives you feel should be revised prior to the end of this program cycle? If yes, why?

(2) Rebates (15 min)

8. Describe your quality control and process for tracking participants and other program data.

9. Do you believe that the program currently offers rebates on enough energy efficient products to meet your customers' needs?

    a. If not, what products would you like to add? Are these currently being considered?

10. Is the program offering enough of an incentive to motivate your customers to participate?

    a. If not, what do you think should be changed, and why?

(1) Improvements (10 min)

11. Are you currently considering any changes to the program's design or implementation?

    a. What are the changes?

    b. What is the process for deciding whether or not to make these changes?

12. Do you have suggestions for improvements to the program that would increase participation rates, or is Duke Energy happy with the current level of participation?

13. Do you have suggestions for increasing energy impacts *per participant*, given the same participation rates, or is Duke Energy happy with the current per participant impact?

14. Overall, what would you say about the program is working really well?

    a. Is there anything in this program you could highlight as a best practice that other utilities might like to adopt?

15. What area needs the most improvement, if any?

    a. (If not mentioned before) What would you suggest can be done to improve this?

16. Are there any other issues or topics we haven't discussed that you feel should be included in this report?

17. Do you have any further questions for me about this study or anything else?

Appendix B: Participant Survey Instruments

Duke Customer Survey:

Duke Customer Survey

Non-Duke Customer Survey:

Non-Duke Customer Survey

Appendix C: Request Form

The National Theatre for Children

PROGRAM REQUEST FORM

Elementary Schools

Mail, fax or e-mail your response to:
The National Theatre for Children
2733 Park Avenue, Minneapolis, MN 55407
Fax: 877-270-2734
Email: jtrones@nationaltheatre.com

PROGRAM NAME: ***The Energized Guyz***
BROUGHT TO YOU BY: **Duke Energy**

NTC WILL BE IN YOUR AREA: Mon, Nov. 7 through Fri, Dec. 16, 2011
AND Tue, Jan. 17 through Fri, Mar. 16, 2012

Days you prefer: _____ (1st choice) _____ (2nd choice) _____ (3rd choice)

Times of day you prefer: _____ (1st choice) _____ (2nd choice) _____ (3rd choice)

Number of assemblies preferred: _____

School start time: _____ School dismissal time: _____ Lunch hours: _____

Number of K-2 students: _____ Number of 3-6 students: _____ Number of teachers: _____

Please note any dates or days, your school **CANNOT** be scheduled during the offered dates (include holidays, vacations, In service days, conferences, testing, etc.)_____

Contact Information: (please print)

_____
Primary contact and title email

_____
Alternate contact and title email

_____
School name Area code and phone number Fax number

_____
School street address City State Zip Code

To receive information from The National Theatre for Children via e-mail regarding news or information of interest, please e-mail optin@nationaltheatre.com. We will not share, sell, or otherwise distribute your personal information.

Appendix D: Letter to School Principal

Duke Energy.

ENERGY EFFICIENCY IN SCHOOLS

Duke Energy
EC21A / 526 South Church St.
Charlotte, NC 28202

Dear Educator:

Duke Energy is committed to helping educate young people about our main product—electricity, and how to use energy resources wisely.

That's why we are thrilled to offer at NO COST to your school a live theatrical production focusing on using energy wisely, designed for students in kindergarten through sixth grade!

The program—*The Energized Guyz* —features a zany cast of characters, including the energy villain Dr. Maybe, energy-wise guys Cape Cod and Tech Guy, and energy hero extraordinaire, Nikki Neutron. Together, they will have your students rolling in the aisles as they deliver important messages about energy efficiency and green energy decisions that will make the world a better place for us all.

The Energized Guyz is performed by professional actors from **The National Theatre for Children.** Based in Minneapolis, Minnesota, this organization specializes in writing and performing educational programs for children nationwide using simple sets and audience participation.

Here are the details:

Who:	K-6th grade students in Duke Energy's service territory. Individual presentations are tailored for K-2 and 3-6 grade audiences.
What:	25-minute live theatre show, classroom & family activity books for each student, comprehensive teacher guides, and classroom & hallway posters.
Where:	YOUR SCHOOL—the gym, cafeteria, assembly area or wherever a maximum of 350 students can be comfortably seated on the floor. (Because of their small sets The National Theatre for Children actors can go just about anywhere!)
When:	Fall 2011 during regular school hours. (See enclosed Request Form concerning available dates for your location.)
Why:	To teach the importance of energy efficiency through a fun experience.
How:	To arrange for a performance at your school, please complete and return the enclosed Request Form via mail or FAX to the number on your request form.

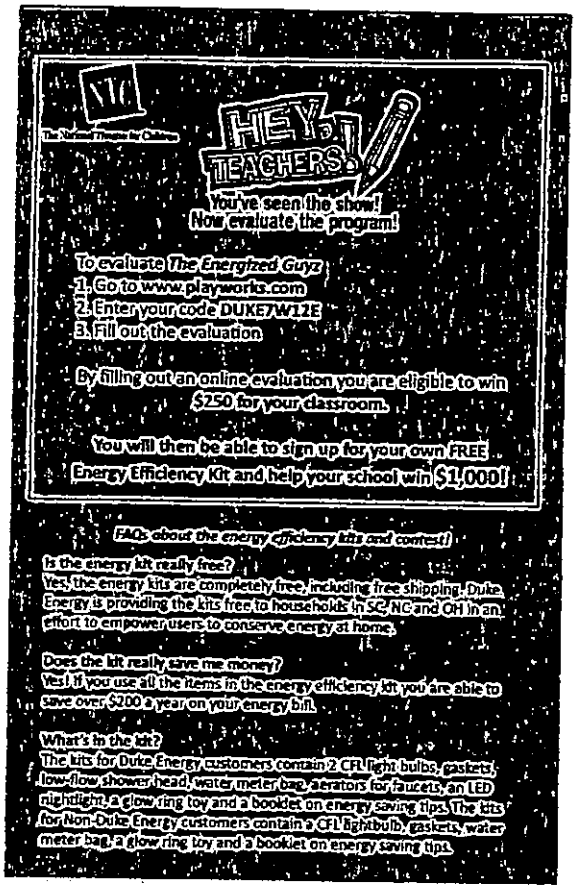
If you have questions, or would like to schedule by phone, please call The National Theatre for Children at 1-800-858-3999, ext. 1. Scheduling is on a first-come, first-served basis and calendars are limited – schedule *The Energized Guyz* for your school today!

Sincerely,

Lindsey Palmer
Program Manager

www.duke-energy.com

Appendix E: Teacher Survey and Instruction Flyer



HEY, TEACHERS!

You've seen the show!
Now evaluate the program!

To evaluate *The Energized Guyz*
1. Go to www.playworks.com
2. Enter your code DUKE7W12E
3. Fill out the evaluation

By filling out an online evaluation you are eligible to win $250 for your classroom.

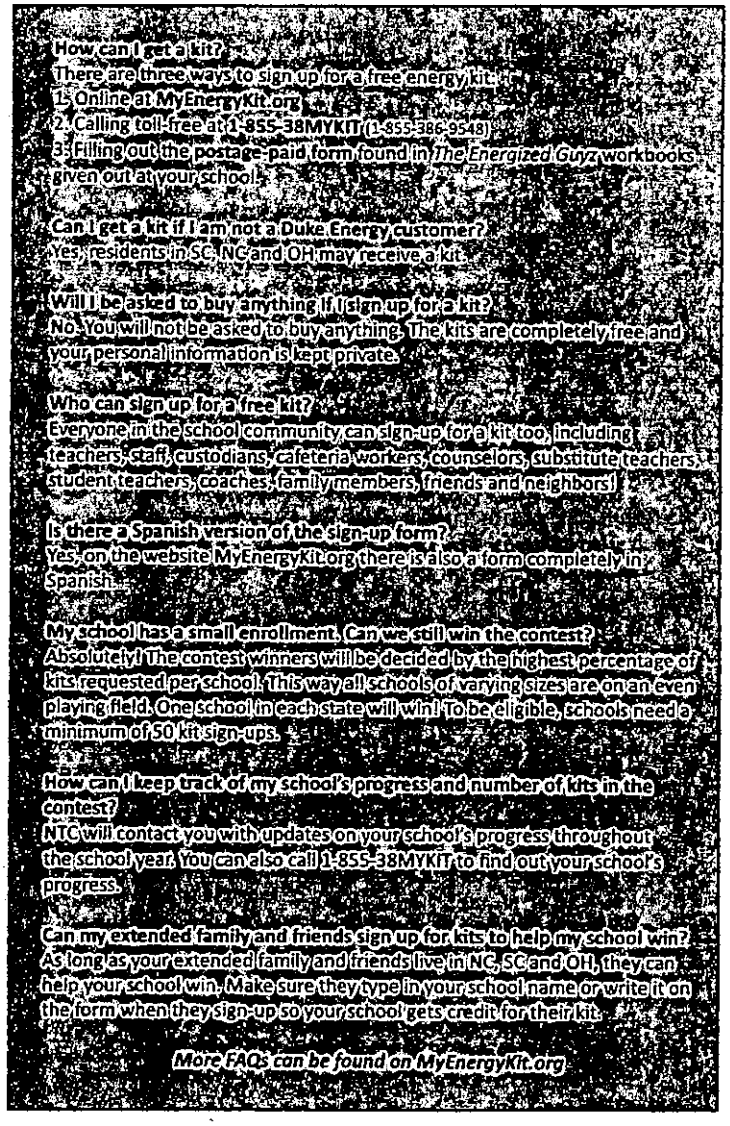
You will then be able to sign up for your own FREE Energy Efficiency Kit and help your school win $1,000!

FAQs about the energy efficiency kits and contest!

Is the energy kit really free?
Yes, the energy kits are completely free, including free shipping. Duke Energy is providing the kits free to households in SC, NC and OH in an effort to empower users to conserve energy at home.

Does the kit really save me money?
Yes! If you use all the items in the energy efficiency kit you are able to save over $200 a year on your energy bill.

What's in the kit?
The kits for Duke Energy customers contain 2 CFL light bulbs, gaskets, low-flow shower head, water meter bag, aerators for faucets, an LED nightlight, a glow ring toy and a booklet on energy saving tips. The kits for Non-Duke Energy customers contain a CFL lightbulb, gaskets, water meter bag, a glow ring toy and a booklet on energy saving tips.



How can I get a kit?
There are three ways to sign up for a free energy kit:
1. Online at MyEnergyKit.org
2. Calling toll-free at 1-855-38MYKIT (1-855-386-9548)
3. Filling out the postage-paid form found in *The Energized Guyz* workbooks given out at your school.

Can I get a kit if I am not a Duke Energy customer?
Yes, residents in SC, NC and OH may receive a kit.

Will I be asked to buy anything if I sign up for a kit?
No. You will not be asked to buy anything. The kits are completely free and your personal information is kept private.

Who can sign up for a free kit?
Everyone in the school community can sign-up for a kit too, including teachers, staff, custodians, cafeteria workers, counselors, substitute teachers, student teachers, coaches, family members, friends and neighbors!

Is there a Spanish version of the sign-up form?
Yes, on the website MyEnergyKit.org there is also a form completely in Spanish.

My school has a small enrollment. Can we still win the contest?
Absolutely! The contest winners will be decided by the highest percentage of kits requested per school. This way all schools of varying sizes are on an even playing field. One school in each state will win! To be eligible, schools need a minimum of 50 kit sign-ups.

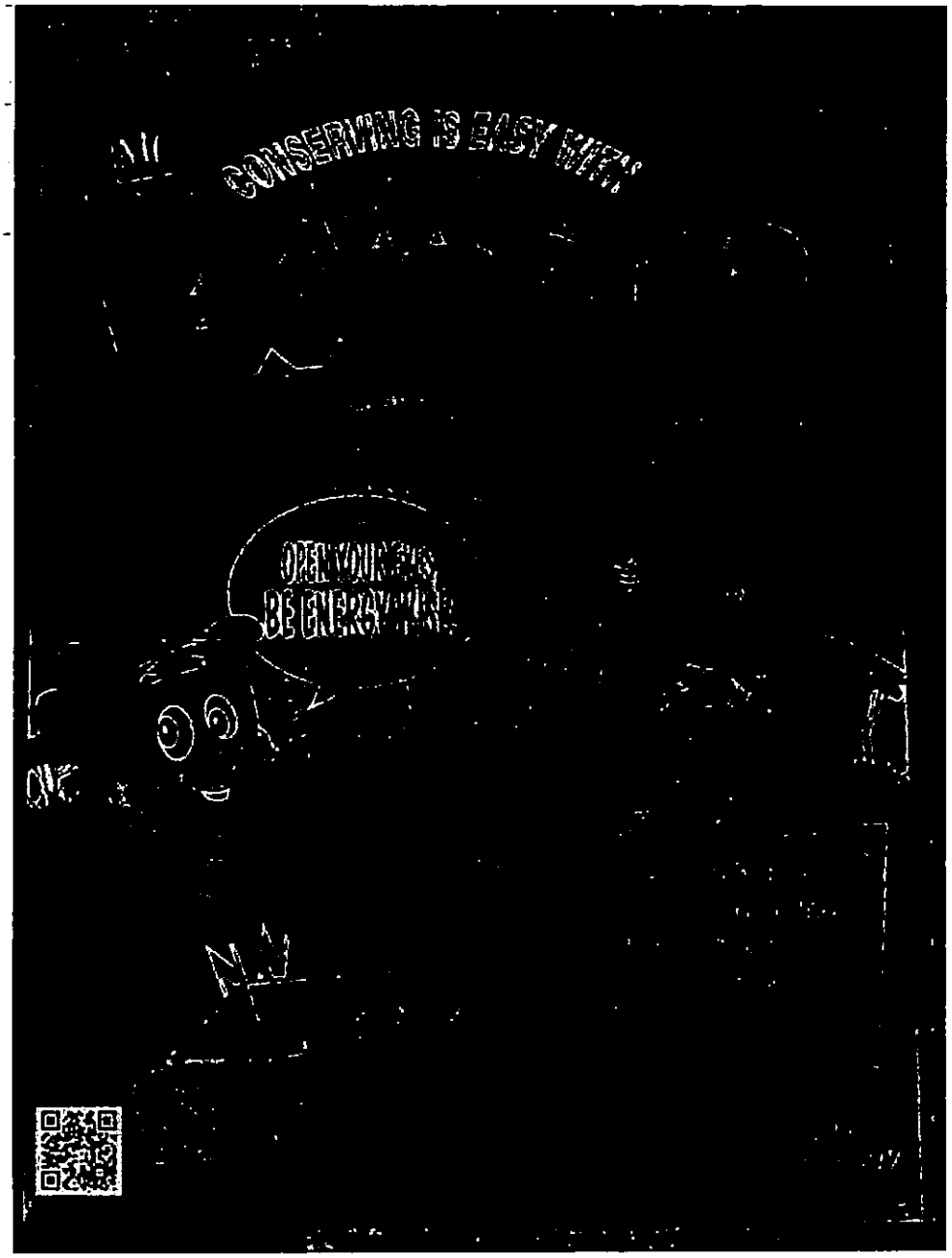
How can I keep track of my school's progress and number of kits in the contest?
NTC will contact you with updates on your school's progress throughout the school year. You can also call 1-855-38MYKIT to find out your school's progress.

Can my extended family and friends sign up for kits to help my school win?
As long as your extended family and friends live in NC, SC and OH, they can help your school win. Make sure they type in your school name or write it on the form when they sign-up so your school gets credit for their kits.

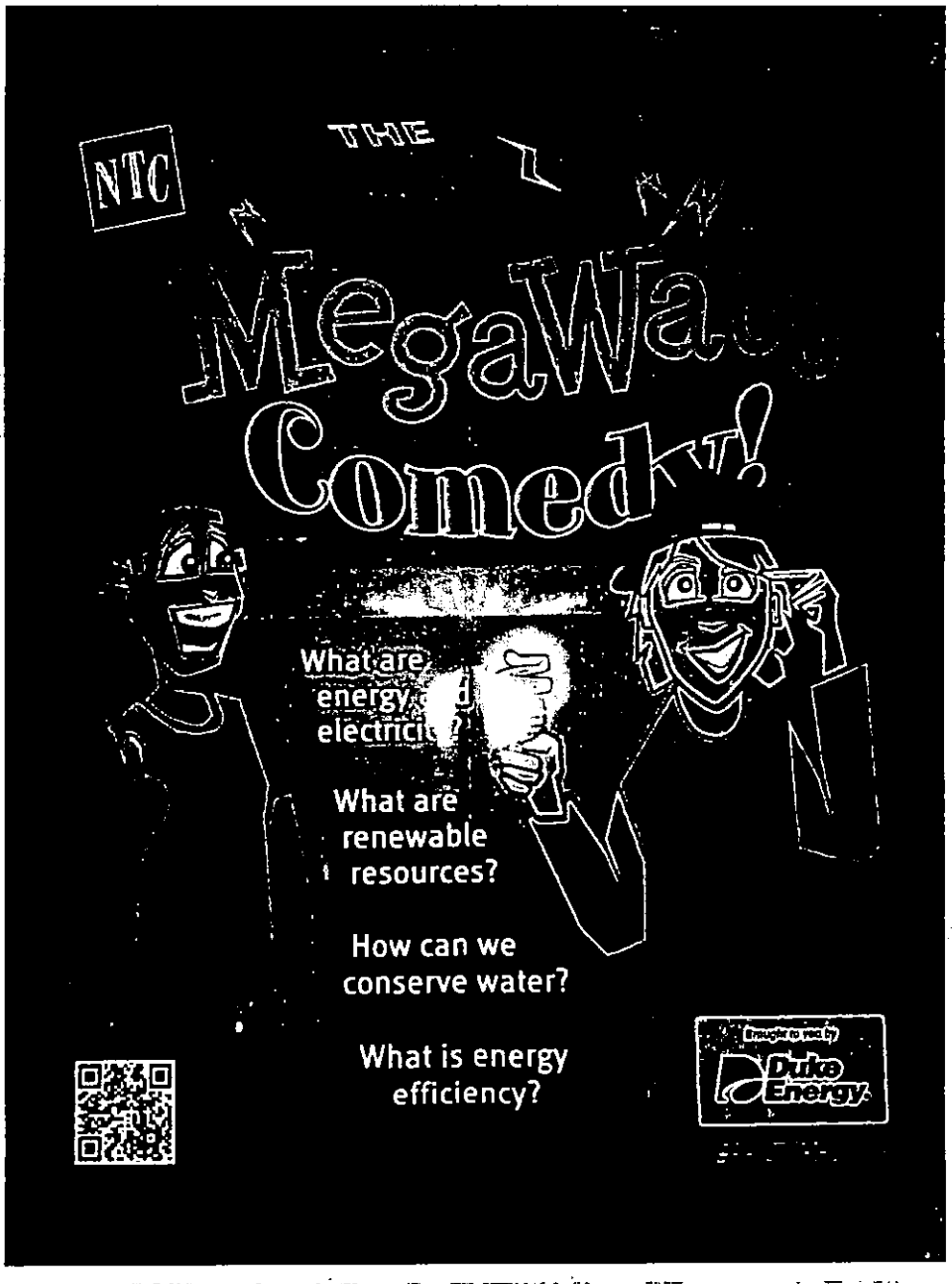
More FAQs can be found on MyEnergyKit.org

Appendix F: Program Materials

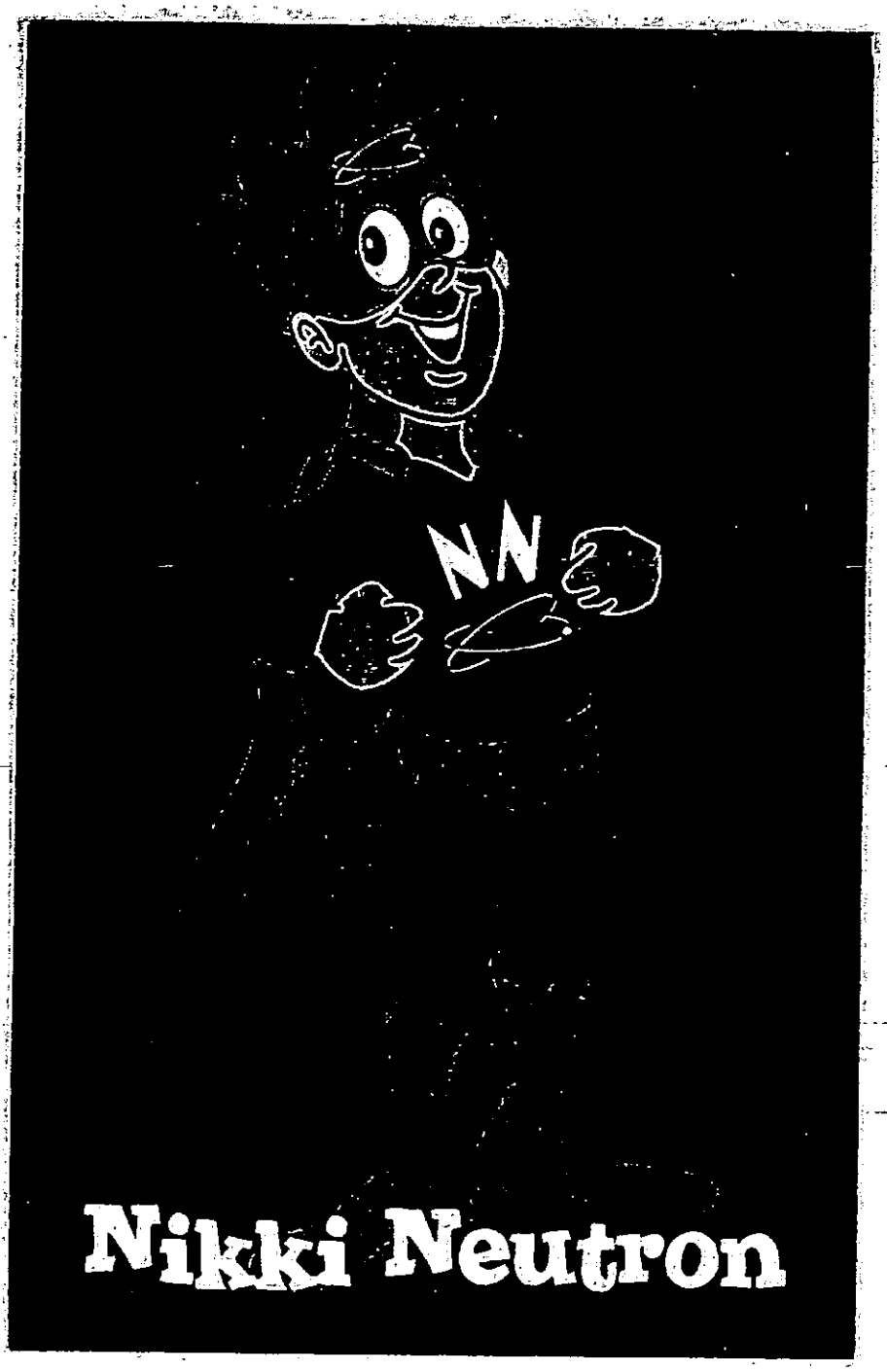
The poster provided to the participating elementary schools:



The poster provided to participating middle schools:



The front of the trading card provided to elementary students:



The back of the trading card provided to elementary students: