Duke Energy®

139 East Fourth Street, R. 25 At II
P.O. Box 960
Cincinnati, Ohio 45201-0960
Tel: 513-419-1843
Fax: 513-419-1846
John.Finnigan@duke-energy.com

John J. Finnigan, Jr.
Associate General Counsel

VIA OVERNIGHT DELIVERY

RECEIVED
FEB 07 2008
PUBLIC SERVICE COMMISSION

February 6, 2008

Ms. Elizabeth O'Donnell
Executive Director
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, KY 40602

Re: In the Matter of The Annual Cost Recovery filing for Demand Side Management by Duke Energy Kentucky, Inc. Case No. 2007-00369

Dear Ms. O'Donnell:

I have enclosed for filing seven sets of Duke Energy Kentucky, Inc.'s responses to the Attorney General's first set of data requests. Please file these responses in the docket for this matter, and return a file-stamped copy of this letter in the enclosed, return-addressed envelope.

Sincerely,

John J. Finnigan, Jr.
Associate General Counsel

JJF/bsc

cc: Honorable Paul Adams (w/encl.)

225015

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-001

REQUEST:

Please provide the number of Kentucky jurisdictional customers served by the company broken out by customer type. Please indicate whether such customers receive electric, natural gas or both services from the Company.

RESPONSE:
See table below.

Customers as of December 31, 2007					Total Customers Served	
	Gas only	Electric only	Combination		Electric	Gas
Residential	18,070	49,511	69,732		119,243	87,802
Commercial	2,004	8,282	5,236		13,518	7,240
Industrial	115	276	115		391	230
Other Public Authority	155	771	220		991	375

PERSON RESPONSIBLE: Richard G. Stevie

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-002

REQUEST:

Please reference the Application at page 9. With respect to the Residential conservation and Energy education Program, please provide a breakdown of those customers receiving benefits under Tier 1 and Tier 2 along with the average cost per participant for each tier group.

RESPONSE:
Over the last year the customers participating in the program broke down in the following manner.

	Tier One Participants	Tier One Avg. Costs	Tier Two Participants	Tier Two Avg. Costs
7/1/06 – 6/30/07	49	$593.82	134	$1787.65

PERSON RESPONSIBLE: Richard Morgan
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-003

REQUEST:

Please describe in detail how the Residential conservation and Energy education Program is coordinated with other weatherization programs offered to low income customers (i.e., Federal Weatherization Assistance Program, etc.).

(a) Does the company believe that, given the availability of other programs offering the same or similar services, it needs to offer these services?

(b) If so, why?

RESPONSE:

The company's Residential Conservation and Energy Educations Program (RCEE) works hand in hand with the Federal Weatherization assistance Program (HWAP). This is done through a referral system to the local CAP agency. The benefits of having a coordinated offering are several. First, not all measures and approaches to the weatherization provided in the home are the same between the Company's program and the HWAP program. HWAP does not have a Tier system and has limits with respect to how much it can spend. It also does not have the cost effectiveness requirements that the Company has. So homes can get additional measures covered where its makes sense. Second the demand for weatherization is greater than the funds available to either organization. As described in the filing, Duke Energy estimates that approximately 6000 homes are income-qualified in the area. The number of homes served by Duke is around 250 per year. The Northern Kentucky Community Action Agency serves approximately 600 homes per year. Together this is less than 15% of the total market potential. So by providing a program through Duke Energy, more homes can be served. Third, leveraging the weatherization funding among the programs helps with cost effectiveness as savings are greater and costs are shared. Lastly, a low income weatherization program helps owners control their energy use and reduces their bills. With a more manageable energy bill it is hoped that they can keep current on their bills, or at worst, lower their arrearage balance. This helps all ratepayers through a reduction in delinquent accounts.
a) Yes the Company believes that it needs to offer these services.
b) See benefits listed above.

PERSON RESPONSIBLE: Richard Morgan
Kathy Schroder
Michael Goldenberg

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-004

REQUEST:

Does the company believe that the Residential conservation and energy Education Program duplicates services offered under other weatherization programs? (i.e., Federal Weatherization Assistance Program). If not, why?

(a) How do the programs differ?

(b) Please state the Company's rationale for continuing this program.

RESPONSE:

Duke Energy does not believe that the RCEE duplicates other weatherization programs. Given the significant demand and the different approaches, these are complimentary services. No home will get the same weatherization measures that could be funded by the other. For the Duke Energy program, if the HWAP program completed a measure, that would be identified in the audit and considered in the NEAT Audit. Thus the measure would not get funded. Second, the measure has to comply with the Savings Investment Ratio (SIR) of 1.5 to get Duke Energy funding. Third, if the State weatherizes the home to a high enough efficiency level, the homes lower energy consumption would then push it to a Tier One level and thus get limited funds from Duke Energy. These checks and balances assure that the programs on both sides are optimized. Please note that the Director of the Northern Kentucky Community Action Agency is on the Duke Energy Kentucky Collaborative, and so has input into the program offerings of Duke Energy. Further information on the HWAP program guidelines is available from the KY State Energy Office.

(a) See above.

(b) See above and response to AG-DR-01-003.

PERSON RESPONSIBLE: Richard Morgan
Kathy Schroder
Michael Goldenberg

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-005

REQUEST:

Does the company collect information on property addresses provided with weatherization services under the Residential Conservation and Energy Education Program?

(a) If so, is there any policy to ensure that such addresses are not provided such services multiple times?

(b) If so, please state the policy.

RESPONSE:

The Company tracks all participants that get weatherized. This tracking includes property address, account numbers and what measures were installed. Through the Duke Energy billing system (CMS) there is a code assigned electronically to all customer addresses receiving weatherization services which identifies participants. This assures that the customer and dwelling are not served multiple times.

(a) The Company does have a policy to ensure that addresses are not provided services multiple times.

(b) The policy of the Company is that homes must not have been weatherized through the program anytime after 9/1/95. This will be modified to read "the customer cannot have been weatherized by the program in the last 10 years" when the next contract is issued for implementation. The Duke Energy Weatherization Contractor must verify that this customer and home has not been a participant in the Duke Energy program since 9/1/95 or in the last ten years.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-006

REQUEST:

Please describe the type of educational materials and/or information furnished to customers participating in the Residential Conservation and Energy Education Program. Provide copies of all materials furnished to participants.

RESPONSE:
Education materials provided to customers are developed by the US Department of Energy. Education materials provided to customers are developed by the US Department of Energy. This booklet entitled "Energy Savers", Tips on Saving Energy & Money at Home is located for review on line at ***www.eere.energy.gov/consumer/tips/***.

The following describes the elements of the education session with the participant. It is designed to not only educate, but to reinforce the energy efficient habits of a participant.

- Health and Safety discussion which should include: carbon monoxide issues, hot water heater temperature, flue clean-out, furnace filter changing, draining/bleeding of water heaters and boiler heating systems, and other maintenance issues. Heating and air conditioning and which appliances are the major contributors to utility bills.

- Lighting Audit: Supplier shall perform a lighting audit during the education session of the customer's home. Supplier should ask the Customer which lights are used the most, using approximately two (2) or more hours each day as the guideline. Upon completion of the lighting audit the Supplier shall install up to three (3) compact fluorescent bulbs in the customer's home. Duke Energy shall provide fluorescent bulbs.

- Supplier shall provide information to the customers on other programs they may be eligible for or agencies that may be able to provide them additional assistance.

- Closing Energy Education Session: Supplier shall close the education session by obtaining the customer's signature on the Program sign-off sheet. Supplier should discuss with the customer at least three (3) actions the customer can do to decrease their energy usage, and note them on the sign-off sheet. Review the actions the customer has agreed to take.

- Supplier will discuss and list with the customer three (3) areas for improvement in the home pertaining to energy savings. The purpose of this is to answer any customer questions concerning their weatherization or energy education and to reinforce the customer action plans. Supplier shall record it on the Program sign-off sheet.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-007

REQUEST:

Please describe what specific types of customer information are collected under the Residential Conservation and Energy Education Program.

(a) Additionally, describe how any personal information collected under the program is protected from disclosure by the company and any contractors.

(b) State the terms of the policy of the company and any contractors regarding retention of this information.

RESPONSE:

The customer information collected and discussed in response to AG-DR-01-005 has three parts, information on the customer, information on the dwelling, and information on what measures were installed including:

- Customer Name, Address, City, State, Zip Code, utility account number, utility usage, and past weatherization services
- Dwelling characteristics as needed by the National Energy Audit Tool (NEAT Audit)
- Listing of specific measures installed such as caulking, insulation and equipment.

(a) Customer records are kept in the protected company computer systems with limited access. Contractors must sign as part of their contract confidentiality agreements to protect Company and Customer information. Customer signs a release form to allow Contractor to view customer bill history records.

(b) Retention of records is indefinite.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-008

REQUEST:

Please indicate what percentage, if known, of Residential Conservation and Energy Education Program participants are homeowners.

(a) If any program participants are tenants, does the company believe that it is appropriate for ratepayers to subsidize the costs of implemented measures that are arguably more attributable as the responsibility of the landlord? If so, why?

RESPONSE:

The percentage of owners to renters is 56% owners and 44% renters, obtained from the 12 month period July 2006 to June 2007. Landlords are required to approve participation and changes to their building. In addition the Landlord must sign a release agreeing to the following: :"*Rent on the Property shall not be increased due to the weatherization provided under the Program for at least one year from the date of installation of the weatherization materials.*"

(a) Benefits from a low income program include reductions in energy use that helps Duke Energy Kentucky lower costs to all ratepayers (UCT>1) and helps reduce arrearages and delinquent bills which also saves all ratepayers money. Duke Energy also believes that it has a social responsibility to help its disadvantaged customers to use energy wisely.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-009

REQUEST:

Please provide the number of Residential Conservation and Energy Education Program participants for the time period encompassing July1, 2006 through June 30, 2007.

RESPONSE:

Participation is noted on page 8 of the filing. Totals for this specific period are 187 participants.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-010

REQUEST:

Please reference the Application at page 9. Describe how the Gas WX program interfaces with the Residential Conservation and Energy Education Program in instances where furnace replacement is necessary.

RESPONSE:

Where there is a bad furnace causing a health and safety risk to the customer, the gas program provides funding for a high efficiency furnace replacement. Furnaces must be 90+ efficiency condensing furnaces so the program also gets energy savings from the replacement. For this period 28 furnaces were replaced of which 11 were in Tier 1 Homes and 17 were in Tier 2 Homes.

PERSON RESPONSIBLE: Richard Morgan
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-011

REQUEST:

Please reference the Application at page 9. Describe the type of "limited structural corrections that affect health, safety and energy up to $100.00" that the Company performs under the Residential Conservation and Energy Education Program. Indicate the number of participants receiving these measures in each tier along with the average cost per participant.

RESPONSE:

The limited structural corrections that affect health, safety and energy up to $100.00 are not tracked separately and are not available. However those costs are included within the program costs when determining cost effectiveness and all evaluation calculations.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-012

REQUEST:

Please reference the Application at page 10. Describe in detail how the Company calculates its Savings – Investment Ratio (SIR). Indicate whether this payback is calculated over the life of the installed measure and, if so, state the assumed life of each measure to be implemented under the program.

RESPONSE:

Savings are computed using the National Energy Audit Tool (NEAT Audit) developed by the US Department of Energy Oak Ridge National Lab. This industry standard heat loss calculation tool uses local material costs and rates applied against the lifetime savings of a measure. Standard measure life is included in the tool. Additional details on determination of measure life are available from Oak Ridge National Lab.

PERSON RESPONSIBLE: Richard Morgan

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-013

REQUEST:

Please reference the Application Appendix B at page 2. In its evaluation, Morgan Marketing Partners cites the footnoted study (which Mr. Morgan, the evaluator of the Company's program, co-authored). In the referenced study, the authors note that "[o]ne should be cautious of annual energy reduction estimates from sampling of just 2 hours or measure the temperature delta across the refrigerator wall." In light of those cautionary statements by its own program evaluator, why does the Company believe that its' savings estimates based on only two hours of measurement are reasonable?

(a) Why does the Company believe that elimination of the measurement of the temperature delta across the refrigerator wall is reasonable?

(b) Why has the Company not followed the criteria outlined by the study for appliance replacement?

RESPONSE:

In the research cited, the authors note "one should be cautious of annual energy reduction estimates from sampling of just 2 hours or measure the temperature delta across the refrigerator wall." However that statement is taken out of context and does not reflect the full findings of the study, nor reflect what Duke Energy has done to make improvements to the methodology due to that study. There are further statements within the study that better reflect the approach used by Duke Energy.

> *This procedure, nevertheless, is a good method for identifying refrigerators that exhibit very high energy usage as to warrant immediate replacement. (page 1) Previous national models for refrigerator replacement programs (Pratt & Miller 1998) have required extensive metering to select high usage models as candidates for replacement (Kinney & Cavallo 2000) or very simple selection based on visual inspection of the physical condition of candidate replacement models. Both approaches have significant limitations.* (emphasis added) *Extensive metering is time consuming, expensive and may require return visits for monitoring periods greater than one day. The advantage is that accurate estimates of potential energy savings can be obtained. Visual inspection has the advantage that it requires only a short time. However, the selection criteria are difficult to replicate from one auditor to another. In addition, potential energy savings are difficult to obtain unless there is extensive post replacement measurement of refrigerators removed during the program. These measurements occur under a test condition*

and may not represent actual savings realized under occupant operating conditions.
In order to obtain a balance between accuracy and available audit time, a simplified selection criterion was used to target high usage refrigerators for replacement.

Given these findings, Duke Energy finds that the balance between accuracy and costs is best served with the existing protocol. The magnitude of available funds and budget for evaluation, measurement and verification is limited. Prudent determinations of the right balance of desired accuracy and cost must be made. Finally, note the concluding remarks of the cited study to provide further, and final evidence, that the current Duke Energy approach is a reasonable approach.

Though one needs to be careful reading too much into an estimate that comes from only one season of the year, does not measure the temperature delta across the refrigerator wall, and does not monitor for more than two hours, the difference between the measured results for the refrigerators identified for replacement and those identified for retention is sufficiently great that even if the estimate was off by 25 percent, the savings from replacement with Energy Star units would be cost-effective.

(a) The Company never did measurements of the temperature delta across the refrigerators wall, so it was not eliminated. Given that this is not a controlled lab environment in the home, this is not a relevant test and is more suited to a controlled lab environment. Significantly greater variance in measure performance is likely to be driven by operating and usage factors such as number people in the home, or the time that doors are open.

(b) The Company did make changes to its testing procedure after this study. New meters were purchased that recorded the peak watts of the unit during the test. This enables the auditor to tell if the unit went into defrost mode during the test period, thus increasing accuracy of the impact measurement. Duke Energy also records the testing time more accurately addressing another recommendation. The new meter automatically records total minutes so no computation is needed by the auditor. And we have retained the criteria through our protocol maximum consumption threshold to replace the unit, if operating cycle time exceeds 70% thus insuring the non-efficient units are replaced. Finally, note the recommendations of the cited study do not indicate that other savings approaches or protocols should be used by Duke Energy for this program.

PERSON RESPONSIBLE: Richard Morgan
Kathy Schroder
Michael Goldenberg

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-014

REQUEST:

Please reference the Application Appendix B at page 2. In its evaluation, Morgan Marketing Partners cites the footnoted study (which Mr. Morgan, the evaluator of the Company's program, co-authored). In the referenced study, the authors note that "[o]ne needs to be careful reading too much into an estimate that comes from only one season of the year..." In light of that caution by its own program evaluator, why does the Company believe that its savings estimates are reasonable?

(a) Why has the Company not followed the criteria outlined by the study for appliance replacement?

RESPONSE:

See response to AG-DR-01-013.

PERSON RESPONSIBLE: Richard Morgan

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-015

REQUEST:

Please reference the Application Appendix B. From the evaluator's website (www.morganmp.com), it appears that Morgan Marketing Partners is primarily a marketing company "specializing in helping companies focus their marketing planning and strategies to improve effectiveness and profits." Describe the Company's reasoning behind choosing a marketing company to perform an engineering evaluation of the program.

(a) Please provide a description of Mr. Morgan's engineering education.

RESPONSE:

See Attachment AG-DR-01-015.

Mr. Morgan of Morgan Marketing Partners is a leader in the energy efficiency field, having worked in the industry for over 30 years, helping utilities with many aspects of their energy efficiency programs, including evaluation. In his current capacity working with Duke Energy, Mr. Morgan is the primary contractor for energy efficiency evaluation, and retains secondary subcontractors to address specific skill areas. Engineering estimation is one of these areas. Subcontractors specializing in mechanical engineering specialties that have been used by Mr. Morgan for Duke Energy Kentucky projects include Architectural Engineering Corporation and Franklin Engineering. Further, Mr. Morgan has significant experience and knowledge unique to Duke Energy Kentucky projects. He has worked with Duke Energy on energy efficiency since 1994 and with the Kentucky Collaborative since 1997. In that role Mr. Morgan has helped with program design, implementation planning, protocol development, energy efficiency filings, and helped oversee many evaluations. Mr. Morgan also helps other utilities and Commissions. He was part of the Evaluation Team hired by the California Energy Commission to evaluate all the electric utility efficiency plans. Some of his clients include Wisconsin Focus on Energy, Detroit Edison, Kansas City Power & Light, Rochester Public Utilities, and the Energy Trust of Oregon. Mr. Morgan is also on the Board of the Association of Energy Services Professionals, one of the leading associations in this field.

With respect to the evaluation of the refrigerator replacement program, the engineering algorithms are not complicated, and given the discussion in response to AG-DR-001-013, a straightforward data analysis and reporting was all that was required. Existing data is used based on actual field readings. And Duke Energy does not perceive that additional accuracy from more complicated measurements is warranted, given budgetary

constraints. Given that Mr. Morgan helped develop these protocols, and understands the desired balance of accuracy and cost in this case, Duke Energy determined that he would be the best person to analyze the data and report the results. Mr. Morgan's resume is provided at Attachment AG-DR-01-015..

(a) Mr. Morgan is not an engineer by training, but as discussed above, serves as a primary contractor to Duke Energy, subcontracting engineering work to Architectural Engineering Corporation, Franklin Engineering and other firms, as needed. Further, this evaluation did not require engineering expertise.

PERSON RESPONSIBLE: Richard Morgan
Kathy Schroder
Michael Goldenberg
Thomas L. Osterhus

MMP

Morgan Marketing Partners

RICHARD A. MORGAN, President

Mr. Richard Morgan has over 30 years of management, planning, program design, evaluation, implementation and marketing experience in the energy field. As president of Morgan Marketing Partners, established in 1995, he helps utilities and energy companies throughout the U.S. with their marketing and program design challenges. Services provided include program design, strategic marketing consulting, reengineering and redesign of existing programs, implementation/operations assistance, new product and service development, management assistance, evaluation/assessments of existing programs and development of energy efficiency plans to increase and improve program results. His clients are some of the leading utilities and energy companies/organizations in the country including Duke Energy, California Public Utility Commission, Detroit Edison, Energy Trust of Oregon, PSE&G, Northeast Utilities, Wisconsin Gas, Jackson EMC, Rochester Public Utilities, MidAmerican Energy, Hawaii Electric, Northwest Energy Efficiency Alliance, the State of Indiana and Wisconsin Focus on Energy administered by Wisconsin Energy Conservation Corporation.

Prior to starting his own company, Mr. Morgan spent four years as a manager and consultant with A&C Enercom, a leading energy services and consulting company. He was also Marketing Manger for EWI Engineering, a 100 person engineering consulting firm.

Before joining EWI Engineering, Mr. Morgan spent over 11 years with Wisconsin Power & Light Company in their marketing and energy efficiency department. He held numerous positions managing many different services including residential services, commercial and industrial gas services, demand-side management programs, low-income programs, and marketing/sales initiatives. Within his various positions his responsibilities have included program planning, evaluation oversight, new product/service development, program design, market research, advertising/promotion planning, implementation and operations management, budgeting, tracking, training, government interface, sales, field customer service support, quality control, and business center operations. Prior to the utility, Mr. Morgan worked for the Oregon Department of Energy and the Western SUN, a federally funded regional solar center.

Mr. Morgan holds a B.S. in Resource Management from Ohio State University, School of Natural Resources. He is the Past President of the American Marketing Association, Madison Chapter, and a current Board Member and VP Business Development for the Association of Energy Services Professionals. Mr. Morgan has published many articles on energy and marketing.

6205 Davenport Drive, Madison, WI 53711 608-277-9518

MMP

Morgan Marketing Partners

PARTIAL CLIENT LIST

- CINERGY
- DUKE ENERGY
- CALIFORNIA PUBLIC UTILITY COMMISSION
- DETROIT EDISON
- EDISON ELECTRIC INSTITUTE
- ENERGY TRUST OF OREGON
- E SOURCE
- FEDERAL ENERGY MANAGEMENT PROGRAM
- HAWAII ELECTRIC
- HONEYWELL
- INTERSTATE POWER COMPANY
- JACKSON EMC
- KANSAS CITY POWER & LIGHT
- MADISON GAS & ELECTRIC
- MIDAMERICAN ENERGY
- MISSOURI RIVER ENERGY SERVICES
- MITSUBISHI
- NORTHEAST UTILITIES
- NORTHERN STATES POWER – WISCONSIN
- NORTHWEST ENERGY EFFICIENCY ALLIANCE
- PUBLIC SERVICE ELECTRIC & GAS
- ROCHESTER PUBLIC UTILITIES
- STATE OF INDIANA
- SUPERIOR WATER LIGHT & POWER
- WISCONSIN ENERGY CONSERVATION CORP
- WISCONSIN GAS

6205 Davenport Drive, Madison, WI 53711 608-277-9518

MMP

Morgan Marketing Partners

SAMPLE PROJECTS

- Principal Planner and Advisor to Wisconsin Energy Conservation Corp. and the State of Wisconsin on the statewide residential and business public benefits efficiency program, *Wisconsin Focus on Energy* since 2001. Assists with program design, annual planning, evaluation coordination, evaluation review and overall management. Lead Business Program transition team at start-up and acted as interim Director of Business Programs while recruiting.

- One of two Principal Auditors to complete a Management Audit for the Energy Trust of Oregon. The audit was commissioned by the Energy Trust Board to review all aspects of the Trust including organizational structure, program design/delivery, support systems, public involvement and overall management.

- Principal Consultant for Duke Energy and their "Collaboratives" in five states. The Collaboratives are committees of Residential Interest groups, Commercial and Industrial customers, and citizens who advise the Company on potential future services. As the Principal Consultant, Mr. Morgan has performed many different tasks including the Collaborative program planning process, designing DSM programs, conducting research, overseeing evaluations, providing technical input for cost effectiveness modeling and developing new program ideas. The scope of work since MMP began work with the various programs in 1994 has included: Design and Development of various education programs, low income weatherization services, refrigerator replacement programs, commercial audit programs, home energy audit services, library program, and other DSM services. Development of an overall program planning process for the Collaborative Board and the various interest groups. He has planned executed and overseen research and evaluation of various program options. Technology measures screening for Integrated Resource Planning. Market segmentation of customers. Management and quality control assistance with implementation of all programs. Advise and help oversee program evaluation process.

- One of a team of reviewers hired by the California Public Utility Commission to review, evaluate and advise them on the portfolio of utility DSM programs for 2006-2008. The CA statewide portfolio of programs from the four investor owned utilities is valued at more than $1 Billion dollars. The team reviewed all the utility submittals to assess whether the portfolio goals could be achieved, lost opportunities avoided, program delivery was sound, and the program offerings were cost effectiveness.

- Principal Consultant and Designer of Refrigerator Replacement Program for State of Indiana. Program recognized by ACEEE as "Exemplary Program".

- Guest Author for E Source conducting research and writing two reports for the large commercial customer series: *New Construction Programs: Get to the Table Early for Your Share of the Pie, and Developing Happily-Ever-After Relationships with Large Commercial Accounts.*

- Contracted by Rochester (MN) Public Utilities to implement their Aggressive DSM program. This municipal utility is a leader in the Midwest in DSM program offerings.

- Project Manager and Market Researcher study and interview of Key Account Customers for five different gas and electric companies across the US. In-depth personal interviews were conducted with the company's largest industrial, commercial, health care, and government customers. Interviews were designed to look at perceptions of the utilities, potential new services, structure of marketing department, and retail wheeling threats. Results were used to help restructure the marketing and sales function and will be used for account planning and potential new services.

6205 Davenport Drive, Madison, WI 53711 608-277-9518

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-016

REQUEST:

Given that actual data is available in regard to the Refrigerator replacement portion of the Residential Conservation and Energy Education Program, explain why actual data is not used for calculating energy savings?

RESPONSE:

Actual data was used for this analysis based on the two hour metering of 149 refrigerators tested in Kentucky.

PERSON RESPONSIBLE: Thomas L. Osterhus

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-017

REQUEST:

Please reference the Application at page 13. Indicate where the most recent evaluation study results concerning the Residential Home Energy House Call Program may be found within the application.

RESPONSE:

The most recent evaluation was filed with the Kentucky Public Service Commission in Case No. 2005-00402. A copy of the evaluation is provided as Attachment AG-DR-01-017.

PERSON RESPONSIBLE: Richard G. Stevie

Error

An error occurred while processing this page. See the system log for more details.

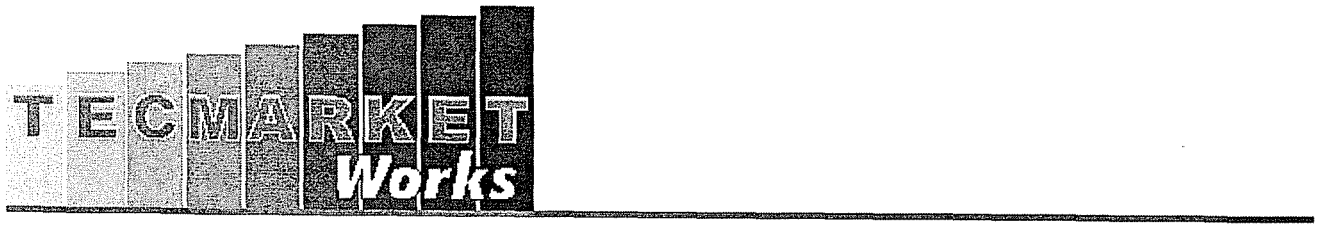

TECMARKET
Works

Table of Contents

Executive Summary

Introduction

This report presents the results of an impact evaluation of the Home Energy House Call (HEHC) Program conducted by Cinergy Corp in the state of Kentucky. Customers in the Cinergy / ULH&P service area can request and receive an on-site energy audit of their homes. The HEHC program provides no-cost energy audits by energy specialists specifically trained in identifying ways to control energy costs in the customer's home. The specialists provide the following services during the audit:

- Analyze total home energy usage
- Checks home for air leaks
- Examines insulation levels
- Reviews appliances and heating/cooling systems

From the information collected during the audit, a detailed report identifying steps the customer can take to increase efficiency and reduce their energy bill is prepared and mailed to the customer for their review and record.

This evaluation of the energy impacts as a result of the HEHC program focuses on audits performed from August 2002 through June 2003.

Comparing the HEHC participants to a comparison group of those that did not receive the audit will provide estimates of changes in energy consumption that can be attributed to the information that the participants received as a part of their participation in the HEHC program. This report compares the energy savings by the fuel sources used for heating and cooling. Other factors, such as the square footage of the home, the year the home was built, type and year of water heater used, the number of people living in the home, and the energy service firm that performed the audit, were included in the data provided by Cinergy. This data was analyzed for savings trends. The result of this analysis is reported in Appendix A. However, because of the small sample size of the participant population once segregated into sub-groups, and the lack of strong correlation between key customer characteristics, the evaluation is unable to identify significant relationships between the amounts of energy saved beyond the program-wide savings levels for major fuel use groups. As a result, the reader is encouraged to focus on the savings in the main section of the report where the sample sizes are larger and provide for more statistical accuracy.

Summary of Findings

TecMarket Works examined all participant energy usage records for a period of one to three years before the program and for one to two years following the program (depending on record availability). However, because of data reliability issues, the energy saving analysis of the HEHC program is based on a sub-sample of the 439

Error

An error occurred while processing this page. See the system log for more details.

Evaluation Methodology

The study methodology consisted of a weather-normalized energy usage analysis to determine if participation in the Home Energy House Call (HEHC) program resulted in energy consumption changes.

Energy savings of the HEHC participants were determined by looking at the change between pre- and post-program energy usage of the participants compared to the change in usage of a comparison group of eligible customers who did not participate in the program. The Princeton Scorekeeping Method (PRISM™) software was used to conduct this analysis. The primary purpose of the PRISM™ software is to provide weather-normalized data analysis of energy use between groups of participants and a comparison or control group. A PRISM analysis was conducted on six groups of participants, four for kWh consumption, and two for therm consumption. The groups analyzed for kWh consumption are:

1. Customers with natural gas heat.
2. Customers with electric heat.
3. Customer with central air and natural gas heat.
4. Customers with electric heat and an air conditioning unit.[1]

Therm consumption was divided into two groups:

1. Customers with natural gas heat.
2. Customers with central air and natural gas heat.

The HEHC participants were matched with customers in the same service area that had not participated in the program. The identification of the comparison group was made by selecting neighbors of the participants who have been offered participation in the program, but who elected not to participate. This matching was conducted so that the comparison group would match the enrollment criteria for the participant group (neighborhood targeting) and who had similar types of homes (neighbors).

There are four comparison groups utilized in this study, all of which are from the same larger core comparison group provided by Cinergy. These comparison groups are:

1. Therm data for all customers with natural gas heat.
2. Kilowatt-hour data for customers with electric heat.
3. Kilowatt-hour data for customers with natural gas heat.
4. Kilowatt-hour data for customers with electric heat and air conditioning.

After the comparison group was selected, further cleaning was conducted to eliminate those customers that did not have sufficient data for the study and to eliminate accounts

[1] These customers were determined by kWh consumption analysis using PRISM. PRISM has a "heating and cooling" model that analyzes kWh consumption as it would fit into the home's heating and cooling needs. This group is not based on data provided by Cinergy, but by the energy consumption model's fit.

in which there was a tenant change. This cleaning left 1,545 customers out of the approximately 3,500 customers that could be used for the matched comparison group for the Home Energy House Call participants' therm savings analysis. Kilowatt-hour analysis required the use of three different comparison groups. These groups and the number of customers that remained in the study following data cleaning include:

1. Kilowatt-hour data for customers with electric heat, n=314.
2. Kilowatt-hour data for customers with natural gas heat, n=806.
3. Kilowatt-hour data for customers with electric heat and air conditioning, n=286.

All comparison group customers were randomly assigned false audit dates to establish the pre- and post-program analysis periods for the comparison group.

Participants' data was also separated into pre and post periods. Participants who were audited had their pre data begin before the audit and their post data begin two months after the audit to ensure that the customer received the audit report and had at least some time to incorporate one or more of the recommended actions that were recommended in their audit report. Data between the end of the pre-program period and the start of the post-program period is not included in the analysis.

The comparison and participant groups were analyzed to be sure that the mix of customer's energy habits were similar. The following three graphs show that the comparison group and the participant groups (for the months before the HEHC audit) were nearly identical in their energy consumption patterns.

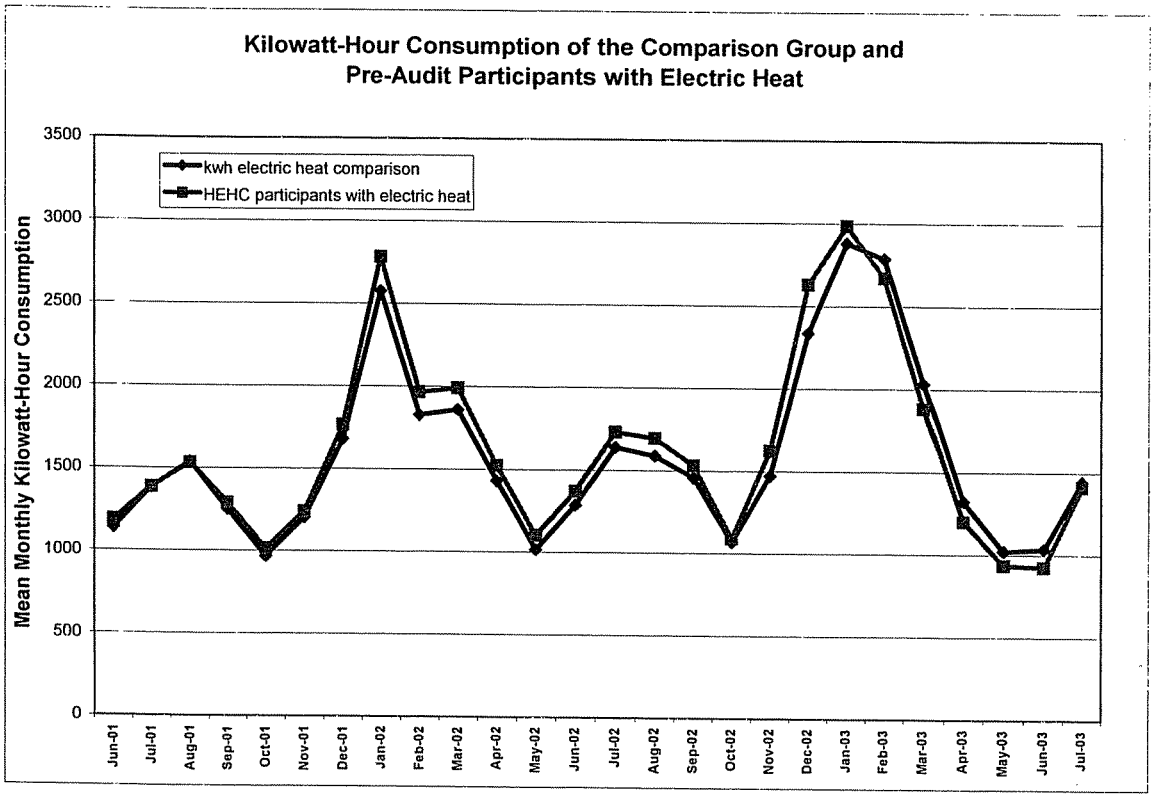


Figure 1. Kilowatt-Hour Consumption of the Comparison Group and Pre-Audit Participants with Electric Heat

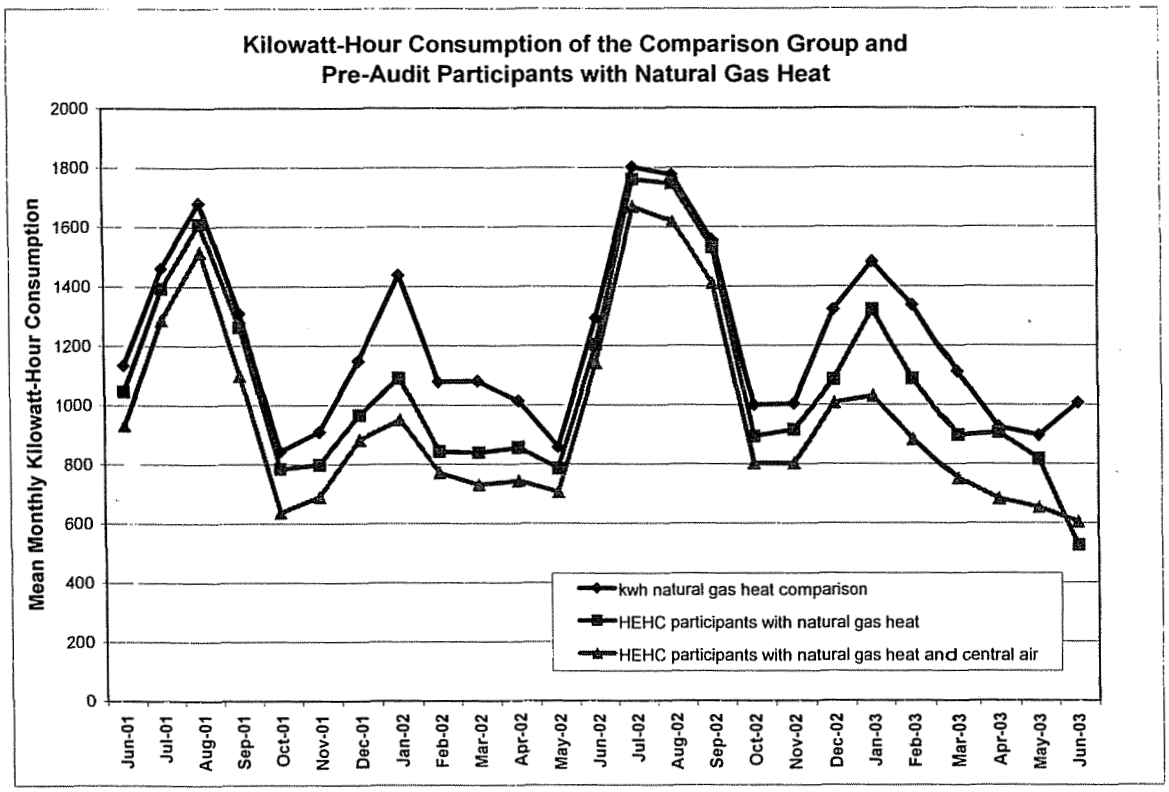


Figure 2. Kilowatt-Hour Consumption of the Comparison Group and Pre-Audit Participants with Natural Gas Heat

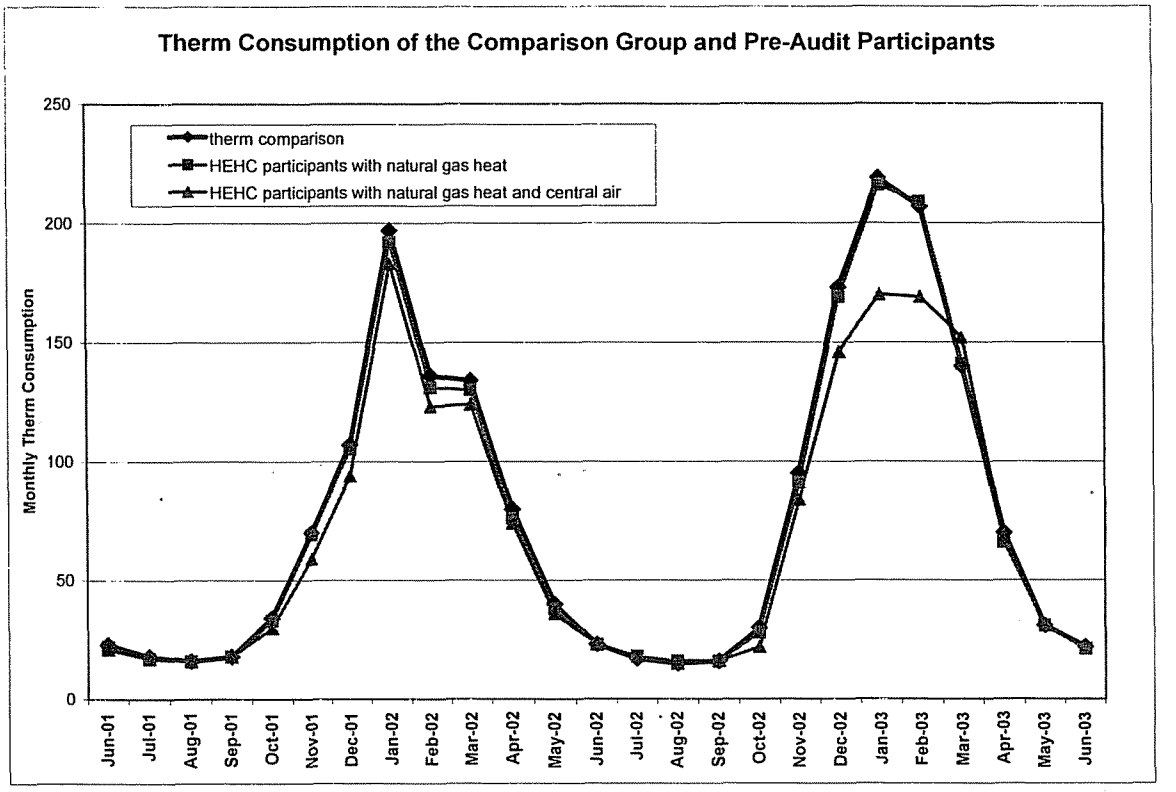


Figure 3. Therm Consumption of the Comparison Group and Pre-Audit Participants

The data that was used in this analysis was provided from Cinergy's monthly-metered account database. The data was provided in therms and kilowatt-hours per month per customer for up to three years before the program and for up to twenty-four months after the program.

This report presents the savings in kilowatt-hours of electricity and therms of natural gas. Mean savings summaries are provided for each of the groups of customers. A description of the PRISM™ software is provided below.

PRISM™ Analysis Software

Program impacts were examined using PRISM™ Advanced Version 1.0 software for Windows developed at Princeton University's Center for Energy and Environmental Studies.

PRISM™ is a commercially available analysis software package designed to estimate energy savings for heating and/or cooling loads in residential and small commercial buildings. The current Advanced Version permits users to enter and edit data from a variety of sources, to carry out sophisticated reliability checks, to eliminate cases that do not meet standards, and to display results in graphical and textual forms.

PRISM™ allows the user to estimate the change in energy consumption per heating or cooling degree-day for the periods before and after measures are installed in homes by

combining energy consumption and weather data. By subtracting the estimate of energy use per degree-day after the measures are installed from the value before the measures are installed and multiplying by an appropriate annual degree-day value, total annual normalized energy savings can be estimated.

Degree-days vary from year to year, which potentially presents a problem for deciding on a value for annual degree-days. This is especially problematic if one is trying to determine paybacks. For example, one could normalize the savings to the period preceding the installation of measures or the period after. If one selects a warm period, then savings may be too low and paybacks too long. If one selects a cool period for normalization, then the estimate of paybacks may be too high.

PRISM™ mitigates this problem by effectively averaging temperatures over a twelve-year period and providing an estimate of degree-days that is typical for the region of the study, although not one that necessarily matches the specific weather conditions in any given year. The advantage of normalizing to the PRISM™ recommended period is that the results will be consistent from study to study over a period of time. The same end can be achieved by consistently using the same user selected time frame. For this study we chose the period from January 1, 1992 through December 31, 2002, recommended by PRISM™ support.

A major feature of PRISM™ is the ability to evaluate cases against reliability criteria. The first criterion is the R^2 value (explained variance), a measure of the fit of the degree-day and energy consumption data, statistically described as the amount of variance in energy consumption explained by changes in degree-days. Energy consumption is assumed to be a linear function of degree-day. R^2 varies from 0 to 1. If R^2 is close to zero, it means that factors other than outdoor temperature are driving energy consumption. If the R^2 is close to 1 it means that outdoor temperature is almost entirely responsible for energy consumption. Outdoor temperature is usually the overriding factor in both heating and air conditioning fuel use and the goal of the weatherization program is to improve the thermal characteristics of the building shell and the fuel use rate of the heating and air conditioning systems to reduce fuel use related to outdoor temperature. The PRISM™ default for R^2 is at .7. This means that at least seventy percent of energy use is temperature dependant. If less than 70 percent of the energy used in a building is temperature related, then it becomes difficult to understand the effects of the weatherization measures and the case is dropped from the analysis. We used .7 in this study although most of the R^2 values in this study were .85 or higher. In other words, 85 percent or more of heating fuel use in this study is temperature driven. PRISM™ has a second measure of reliability which is the coefficient of variation for the normalized annual consumption (CV(NAC)). Normalized annual consumption is the amount of fuel consumed by a unit for a typical weather year. When estimating normalized annual consumption some estimates may have a very tight error band while others may have a band that is quite wide. In estimating the average consumption we want estimates of unit consumption that are very close to the actual and we want to eliminate values that may not be very close because they may cause the estimates of the average consumption for all units to vary significantly from the actual. Because the variation in the estimates of normalized annual consumption generally will be higher in homes with higher

consumption, the estimate of the variation in normalized annual consumption is divided by the estimate of normalized consumption to obtain CV(NAC). This provides a standardized measure of the variability of the normalized consumption that is comparable across homes. The PRISM™ default for CV(NAC) is 7 percent and that is the value used in this study.

Energy Use Analysis and Findings

The primary goal of the Home Energy House Call Program is to provide information customers need to help make their homes more energy efficient, and to provide it in a way that causes participants to take the recommended actions contained in their energy audit. By taking these actions the participant's home should be more energy efficient causing a decrease in their energy usage. In this analysis, we examined and compared energy usage of HEHC participants and a comparison group of non-participants over the years before and after the program.

Sample Size

The Home Energy House Call results are based on a small sample of participants that is sufficient to provide an indication of the program's effects, however is not sufficient to provide an assessment of the impacts of the program beyond general fuel-type analysis levels. The sample size for all groups used in the analysis is displayed with the analyses results and the savings range for an 80% confidence interval around the reported impacts. The reader should view these results as an indication of what the savings may be for the analysis groups as a whole with the understanding that a larger (or different) sample pulled from the population may produce somewhat different results that would be expected to fall within the 80% confidence range.

Statistical Precision

All of the analytical runs conducted in PRISM™ provide a R^2 and CV(NAC) value that indicates the strength of the results provided. The higher the R^2 value (maximum value is 1.0), and the lower the CV value, the more reliable the results are.

The customers' energy usage was processed through PRISM using pre-determined reliability criteria that needed to be met in order for the customer's usage to be included in the group being analyzed. The coefficient of variance for each customer had to be less than 7.0% in all cases. The R^2 is set at 0.0 for the analyses that did not have to regress with weather data (such as kilowatt hour usage for those with gas heat). The R^2 is set at 0.7 for analyses that is controlled by weather (such as kilowatt hour usage for those with electric heat, or therm usage for customers with natural gas heat). The number of participants whose data passed the statistical precision criteria is noted in each of the results discussions. For more information on PRISM™ and these statistics, please see the section on methodology.

Section 1: Changes in Kilowatt-Hour Consumption

The Home Energy House Call program is, in some cases, successful at helping customers reduce their electrical consumption. To draw this conclusion we examined electrical savings for several groups of customers. First, we examined program-wide electrical savings, followed by an assessment of those that increased their consumption and those that decreased their consumption.

Program-Wide Effects on Electrical Consumption

The electrical savings of the HEHC program varies depending on the group analyzed. Figure 4 shows the mean annual savings for each of the four groups examined in this analysis. Those with electric heat are the only electric energy savers. This group saved an average of almost 400 kilowatt-hours in their annual consumption, a 2.8% reduction. When the analysis is conducted to capture the electrical savings associated with those who cool their home with air conditioning, the savings drop into the negative levels, indicating an increase in electrical consumption despite the audit and report showing the customers ways in which they can achieve energy savings.

Those with natural gas heat do not achieve electric savings overall, with both groups (natural gas heat, and natural gas heating with central air) increasing electrical consumption. However, those with central air conditioning increase their consumption by substantially less (100 kwh/yr, or 0.6%) than those without central air (563 kwh/yr, or 4.5%). The following graphics report the average annual electric savings and the average percent savings for each of the groups analyzed, along with the 80% confidence range of the savings achieved.

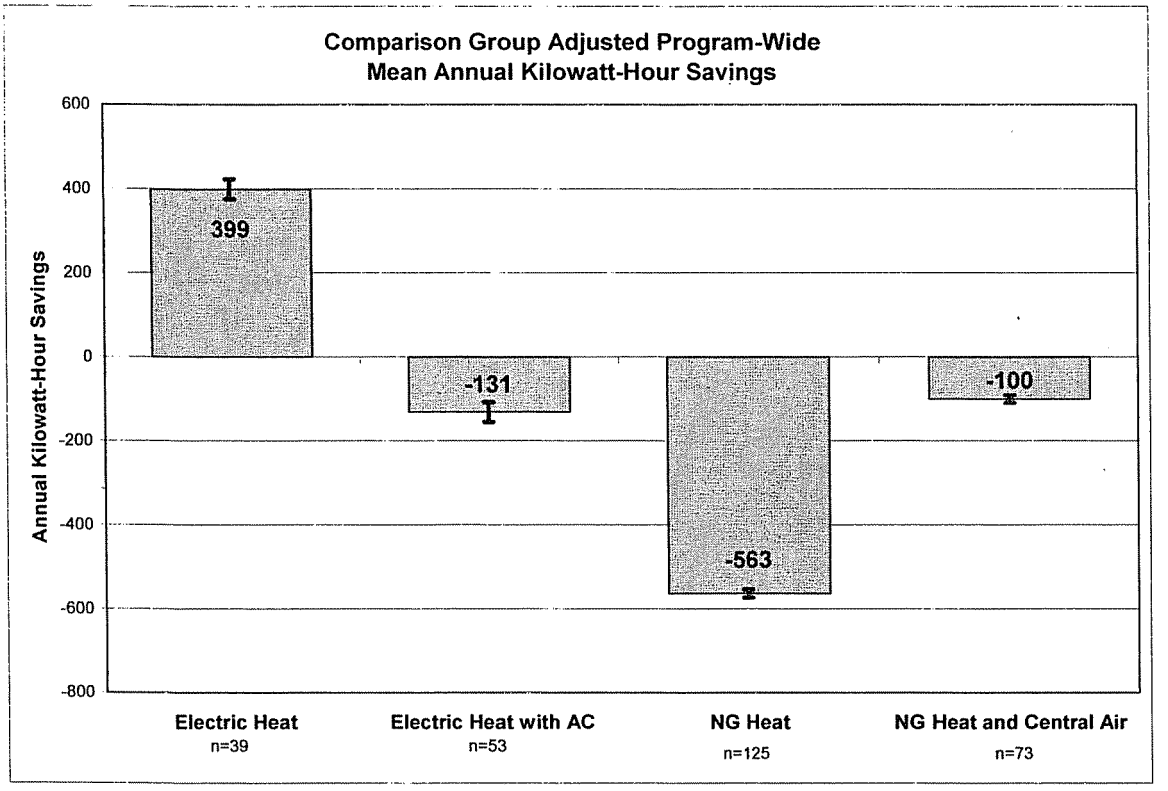


Figure 4. Comparison Group Adjusted Program-Wide Mean Annual Kilowatt-Hour Savings

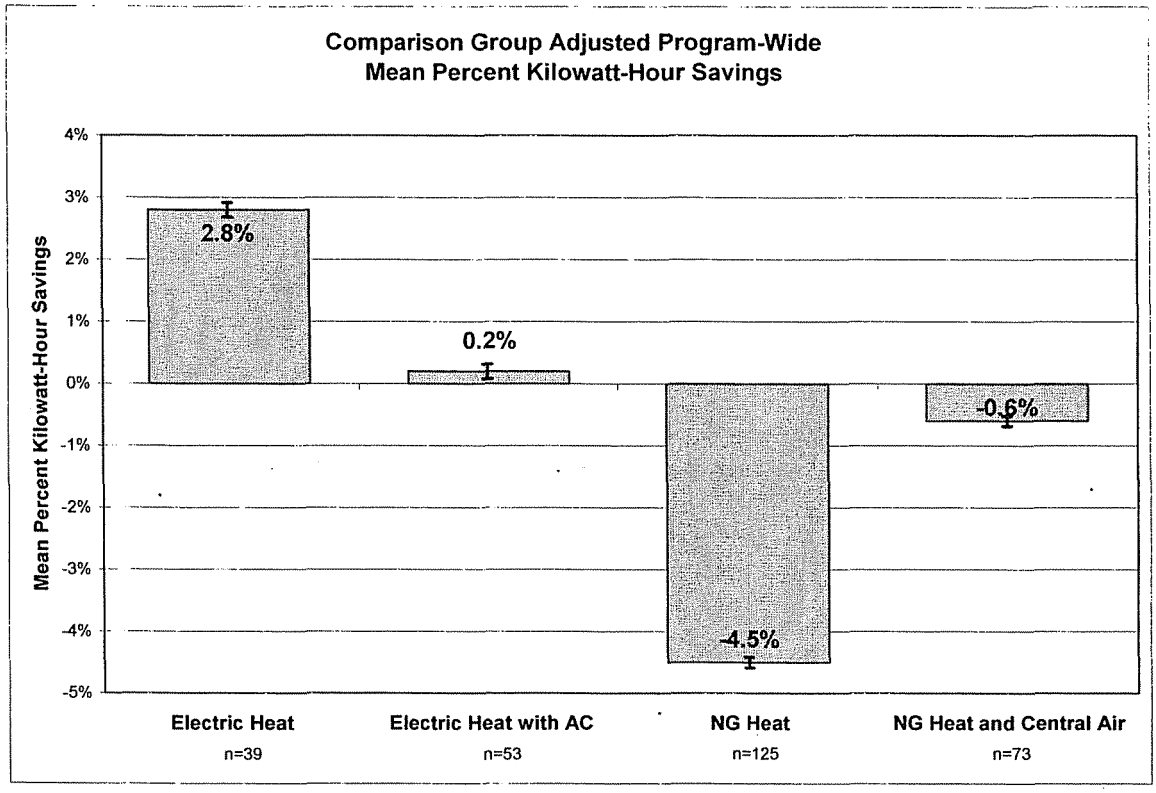


Figure 5. Comparison Group Adjusted Program-Wide Percent Kilowatt-Hour Savings

To provide additional perspectives to these findings we segregated the groups into increasers and decreasers and examined the changes for those that decreased their consumption and those that increased consumption during the post-program period.

Increasing or Decreasing Electrical Consumption: A Breakdown

Because this program relies on the customer to implement measures that would decrease their energy consumption, there is the realistic assumption that some of the homes will not heed the advice offered to them within the study period, despite the fact that they requested the audit be conducted. Many things can result in lack of savings during the study period: lack of time or money needed to take the actions, lack of interest at a level needed to rapidly take the recommended actions, lack of a belief that the actions will save enough energy, lack of a belief that taking the actions will result in a lower utility bill, among other reasons. Likewise, there are reasons for increased consumption, including adding more energy consuming equipment, more people living in the home, adoption of behaviors that use more energy, and/or changes in economic status of the occupants. In this analysis we do not have behavior or use condition information, and as a result we are not able to classify participants or comparison group members into action / behavior categories for additional analysis. However, in this section, we break apart the four categories of homes in the kilowatt-hour analysis findings section and report the number of homes increasing their electrical consumption and by how much they increase their consumtion. Likewise, we report the same metrics for those that decreased their

consumption. Table 1 shows that in all groups, except for the group of customers with electric heat, more than half of the participants increased their electrical consumption following receipt of the audit report.

Table 1. Percent of Customers Increasing or Decreasing Electrical Consumption After the HEHC Audit

	Total	Percent Increasing	Percent Decreasing
Electric Heat	39	43.6%	56.4%
Electric Heat with AC	53	60.4%	39.6%
NG Heat	125	61.6%	38.4%
NG Heat and Central Air	73	52.1%	47.9%

By dividing these groups into "increasers" and "decreasers," we can assess the energy savings of those that made some changes in their homes or behavioral patterns that resulted in savings, presumably as a result of the audit and subsequent report. The findings also mean that the lack of overall savings shown in some of these groups is the result of a slight majority of participants that increase their consumption enough to hide the true energy savings of those that do make physical or behavioral changes to decrease their kilowatt-hour consumption. This is important to consider because it may mean that while the audit helps the customer save energy, in many cases the increase in consumption may offset the achieved savings. In this case, the HEHC program may be saving energy that results in a slower increase in consumption than what would have occurred without the program. Of course, without the behavioral information to know what is occurring in the participant's homes, it remains just as likely that the participants in the non-electric heating groups are increasing their consumption after their participation in the HEHC program. Certainly the HEHC report may be more important to those customers who have electric heat and have the greatest need for the energy savings strategies included in the HEHC report.

Participants That Decrease Their Electrical Consumption

As indicated above, those with electric heat reduced their kilowatt-hour consumption the most, however when only those that decrease consumption are considered, it is the group with both electric heat and air conditioning that save the most, just over 2,000 kwh/yr, or 10.3% of their annual consumption, when they make the effort to conserve. Those with natural gas heat that reduce their consumption also have substantial reductions of over 1,000 kilowatt-hours per year (which is a reduction of just under 12%). However, this savings is offset by the participants that increase their consumption.

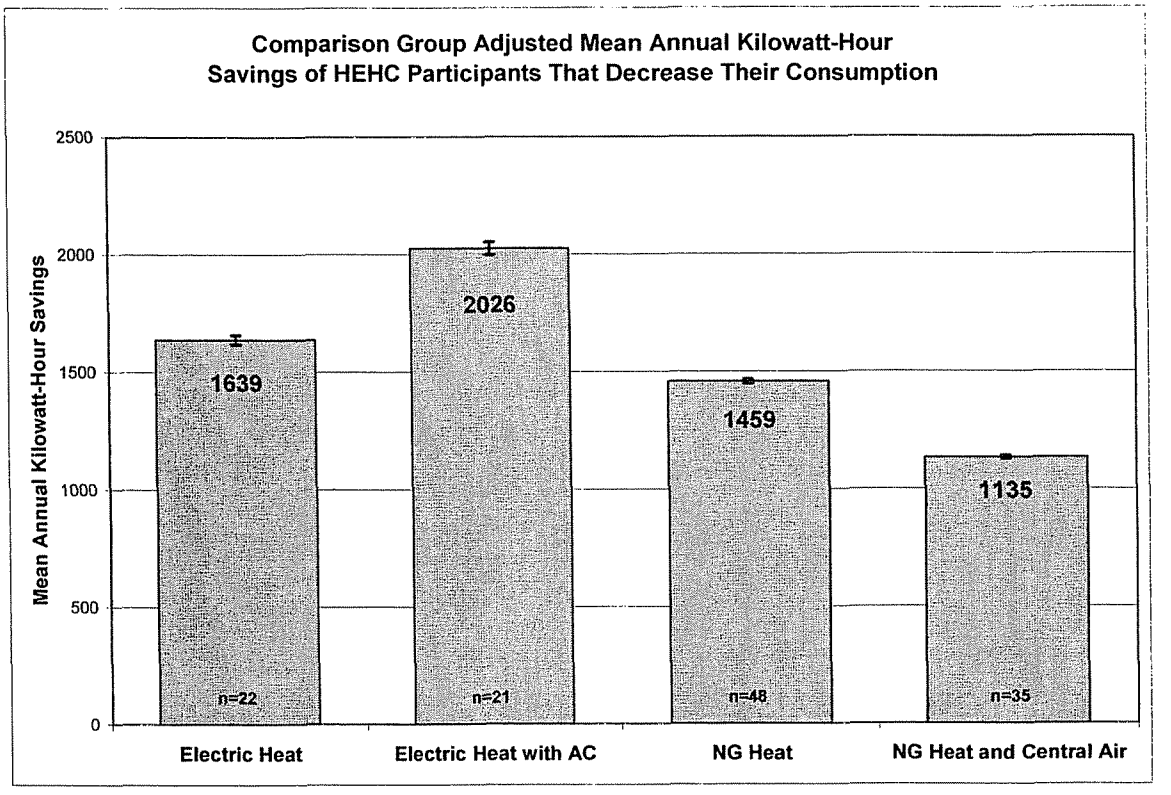


Figure 6. Comparison Group Adjusted Mean Annual Kilowatt-Hour Savings of HEHC Participants That Decrease Their Consumption

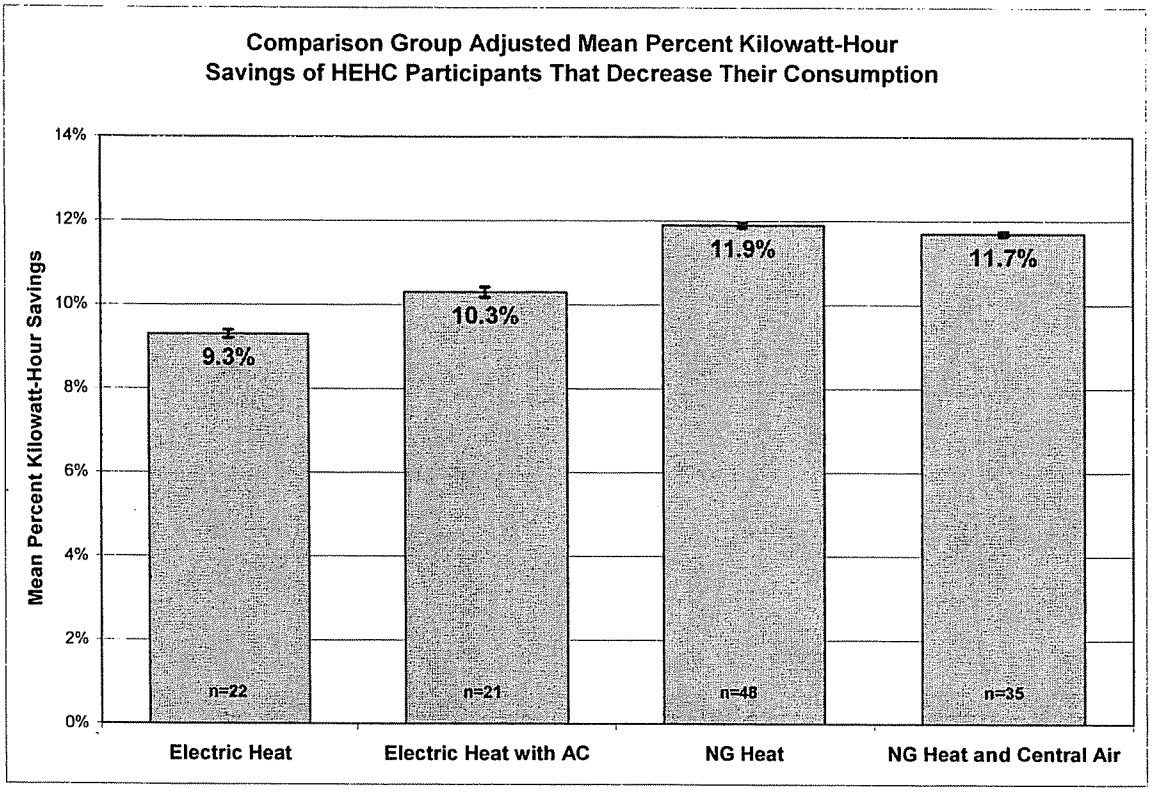


Figure 7. Comparison Group Adjusted Mean Percent Kilowatt-Hour Savings of HEHC Participants That Decrease Their Consumption

Participants That Increase Their Electrical Consumption

Figure 8 below shows the mean annual kilowatt-hour increases in consumption for those participants that increased their energy. Those with natural gas heat have higher increases than those without central air, increasing by 1,823 kilowatt-hours per year (or 14.7%) without central air, while those with central air that increase their consumption only do so by 1,237 (or 11.8%).

Participants with electric heat that increase their consumption do not increase as much as those with natural gas heat. Electric heated home (that increase) increase by 1,248 mean kilowatt-hours per year, a 6.1% increase in consumption. Those with air conditioning units increase slightly more, by 1,582 kilowatt-hours per year, or 6.8%.

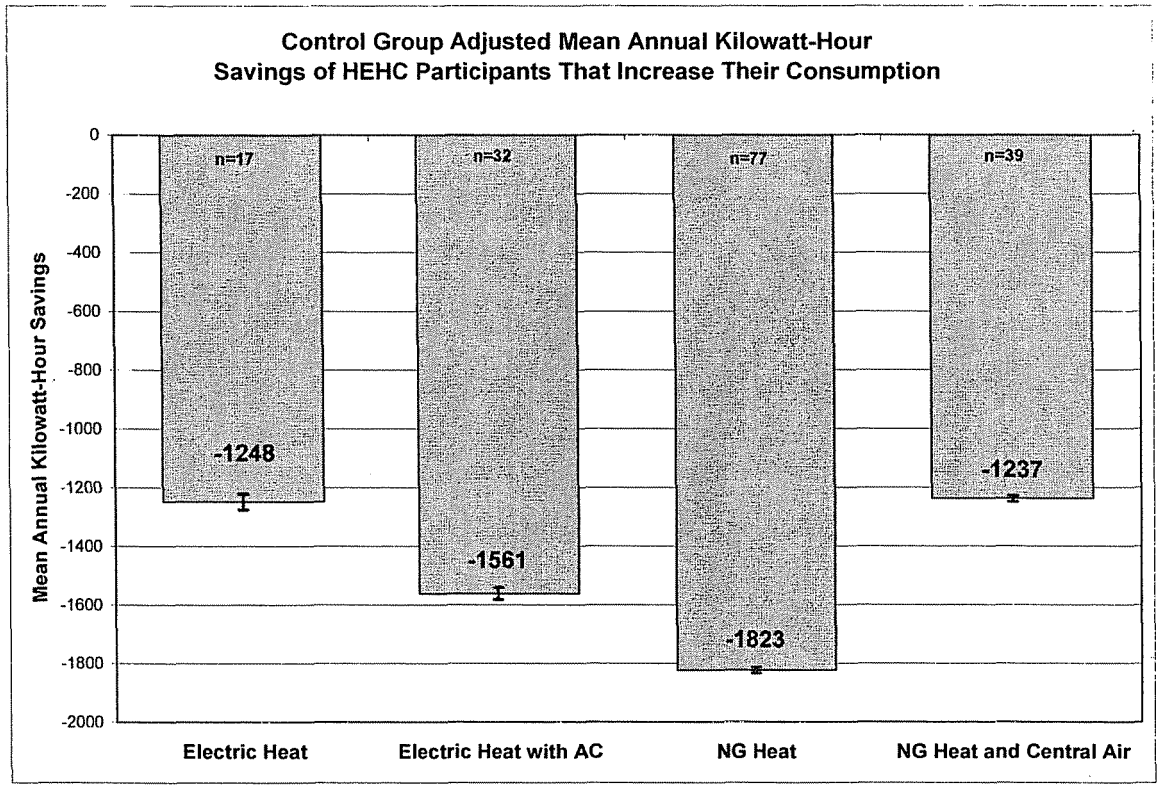


Figure 8. Comparison Group Adjusted Mean Annual Kilowatt-Hour Savings of HEHC Participants That Increase Their Consumption

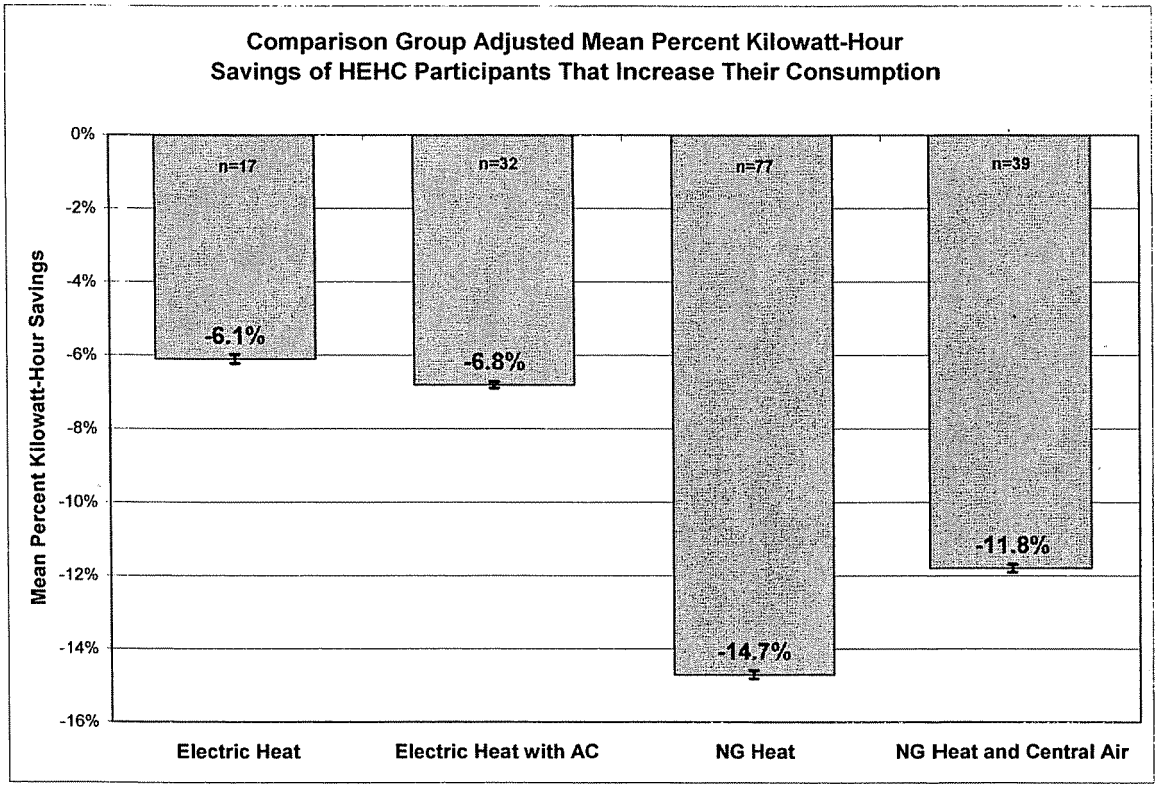


Figure 9. Comparison Group Adjusted Mean Percent Kilowatt-Hour Savings of HEHC Participants That Increase Their Consumption

Section 2: Changes in Therm Consumption

In this section we report how those with natural gas heat changed their consumption after the HEHC audit and report. Customers with electric heat are not in this section, because they have little therm consumption to change, if any. (These would be customers with natural gas water heaters, of which there were too few to analyze.)

Program-Wide Effects on Therm Consumption

As demonstrated in Figure 10 below, there is no statistical difference in natural gas savings between natural gas heating participants based on whether they have central air conditioning. Both groups reduce their therm consumption by just over 20 therms per year (after being adjusted for the comparison group.) This represents an overall reduction of 3.4% for those with natural gas heating, and 2.7% for those with natural gas heating and central air.

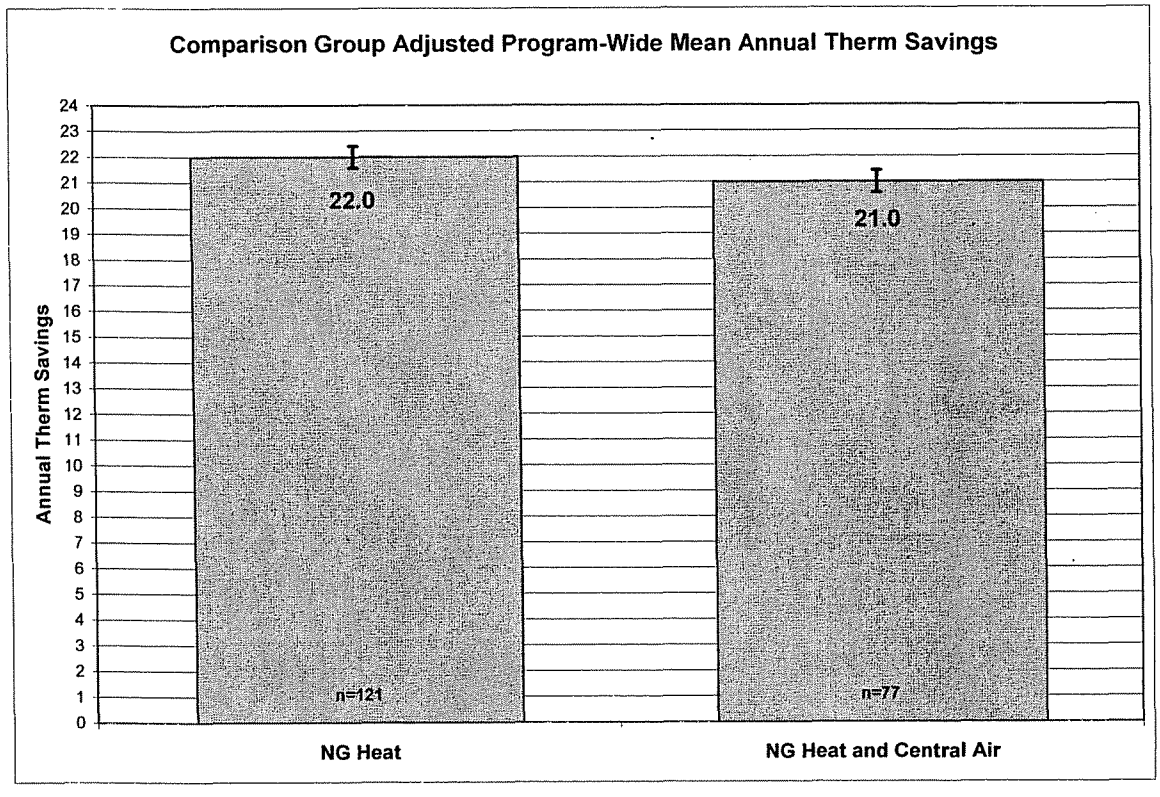


Figure 10. Comparison Group Adjusted Program-Wide Mean Annual Therm Savings

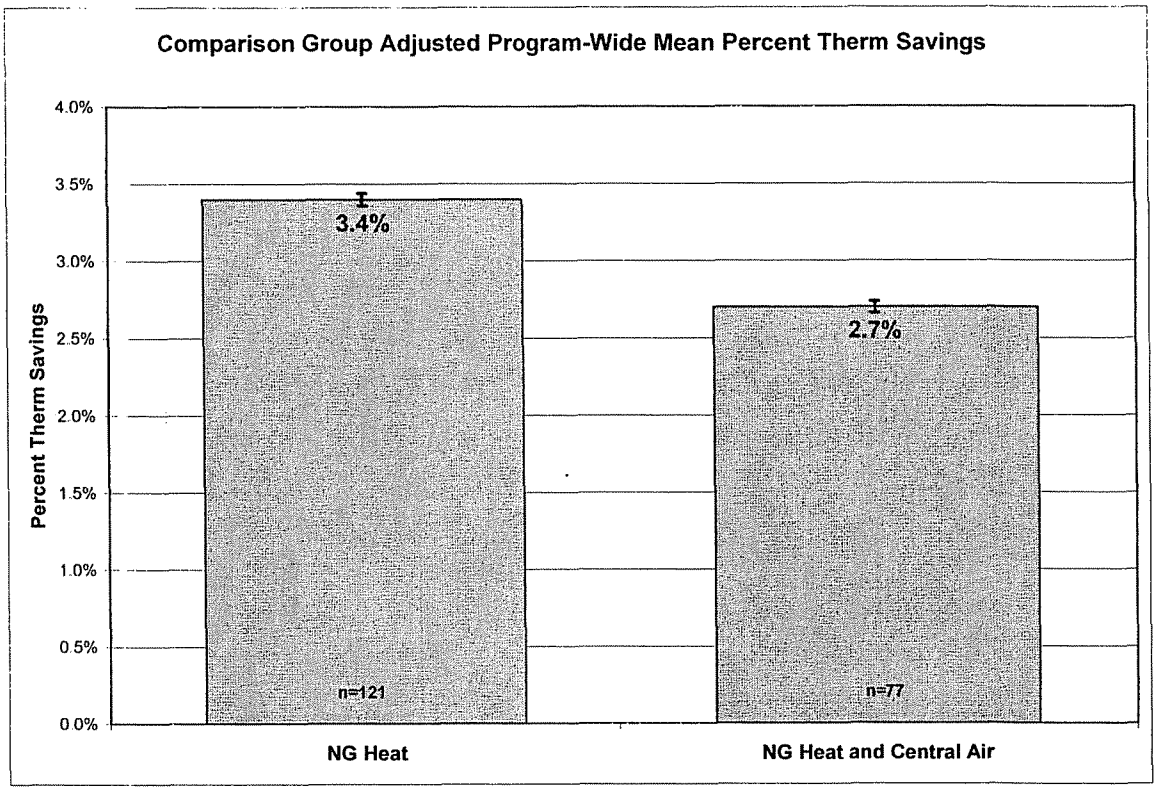


Figure 11. Comparison Group Adjusted Program-Wide Mean Percent Therm Savings

Increasing or Decreasing Therm Consumption: A Breakdown

As reported in the kilowatt-hour analysis, the majority of those with natural gas heat increased their electrical consumption. However, more than 60% of the HEHC participants with natural gas heat decreased their therm consumption after receiving the audit report.

Table 2. Percent of Customers Increasing or Decreasing Therm Consumption After the HEHC Audit

	Total	Percent Increasing	Percent Decreasing
NG Heat	125	38.8%	61.2%
NG Heat and Central Air	73	36.4%	63.6%

Participants That Decrease Their Therm Consumption

When we separate the increasers from the decreasers, we see a slight difference between those with central air and those without. Those without central air save a mean 86 therms per year after the audit (9.6%), while those with central air conditioning save a mean of 75 therms per year after the audit (7.9%).

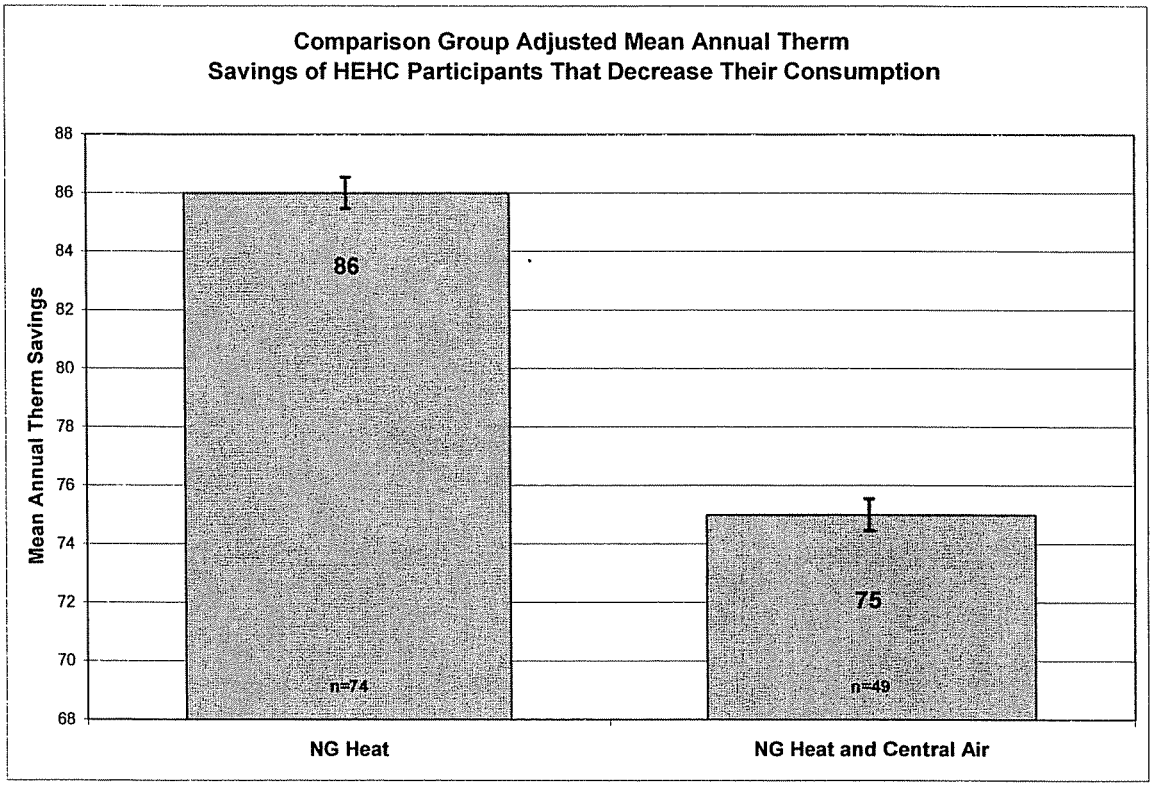


Figure 12. Comparison Group Adjusted Mean Annual Therm Savings of HEHC Participants That Decrease Their Consumption

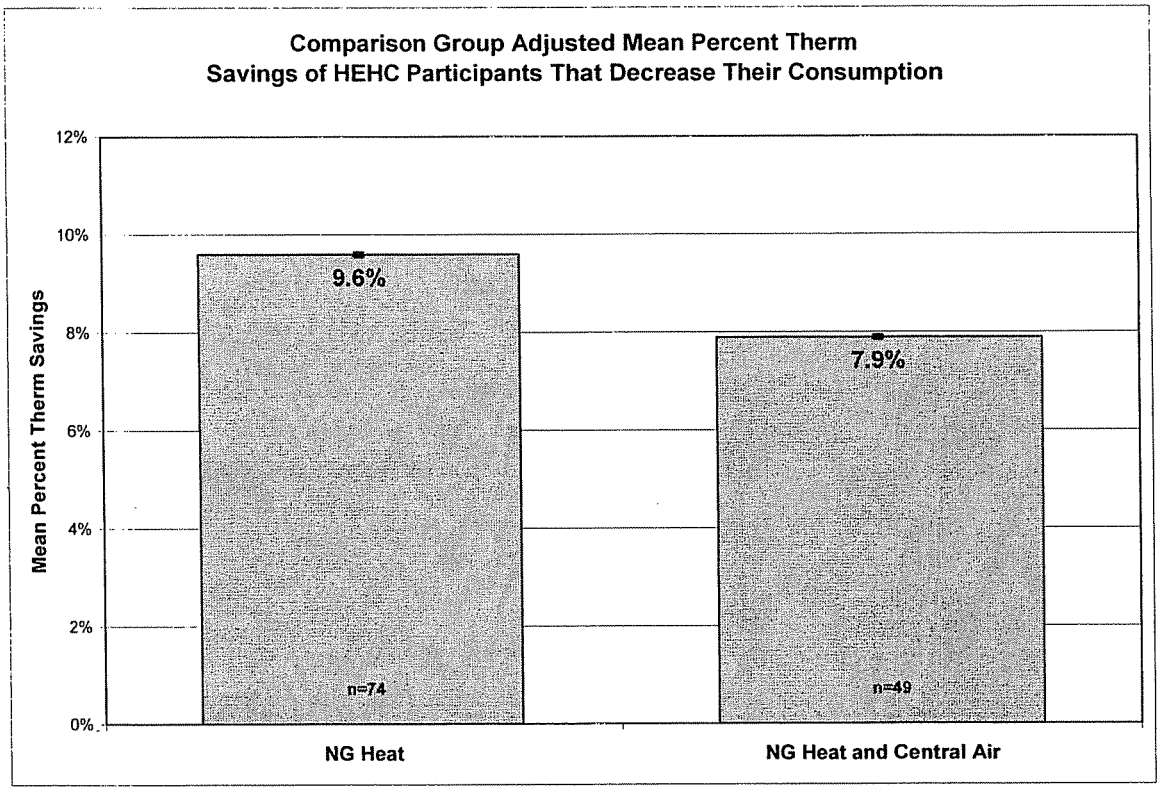


Figure 13. Comparison Group Adjusted Mean Percent Therm Savings of HEHC Participants That Decrease Their Consumption

Participants That Increase Their Therm Consumption

In the next analysis, we looked at only those customers that increased their therm consumption after the audit. Those without central air increase their therm consumption by a mean 77 therms per year (or 7.5%), and those with central air increase their consumption by a mean 67 therms per year (6.6%).

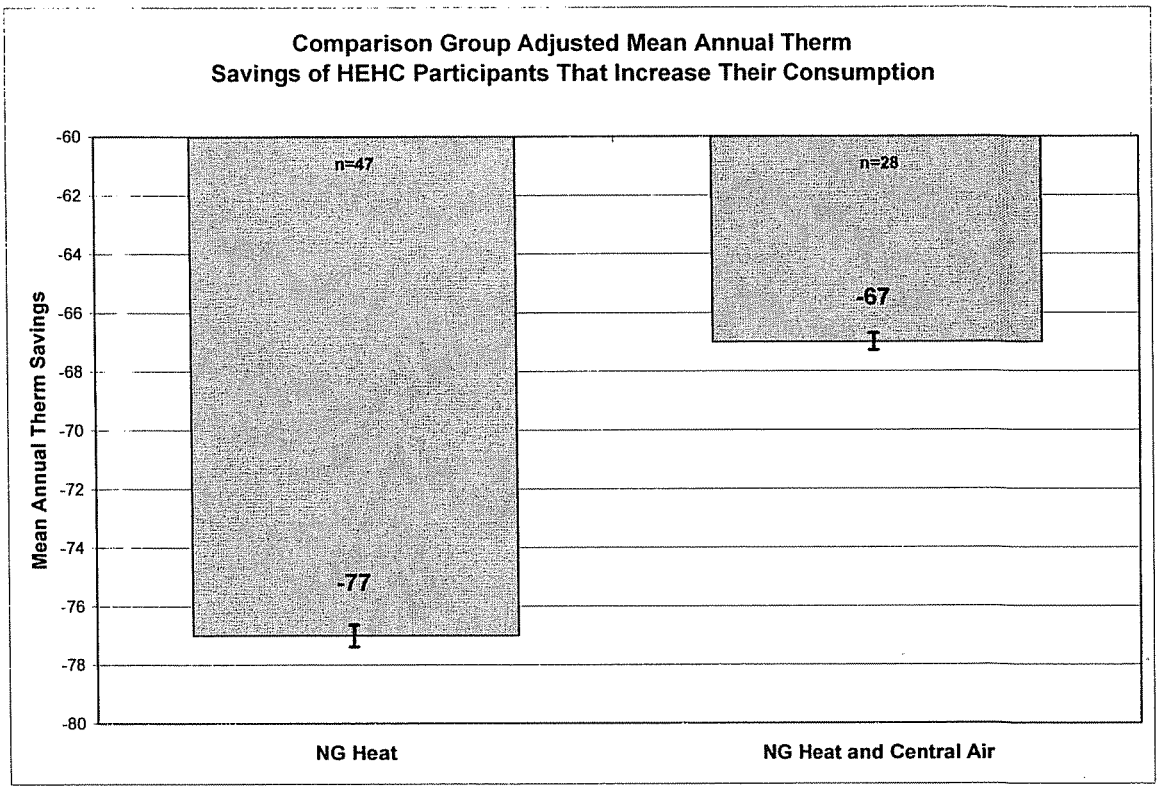


Figure 14. Comparison Group Adjusted Mean Annual Therm Savings of HEHC Participants That Increase Their Consumption

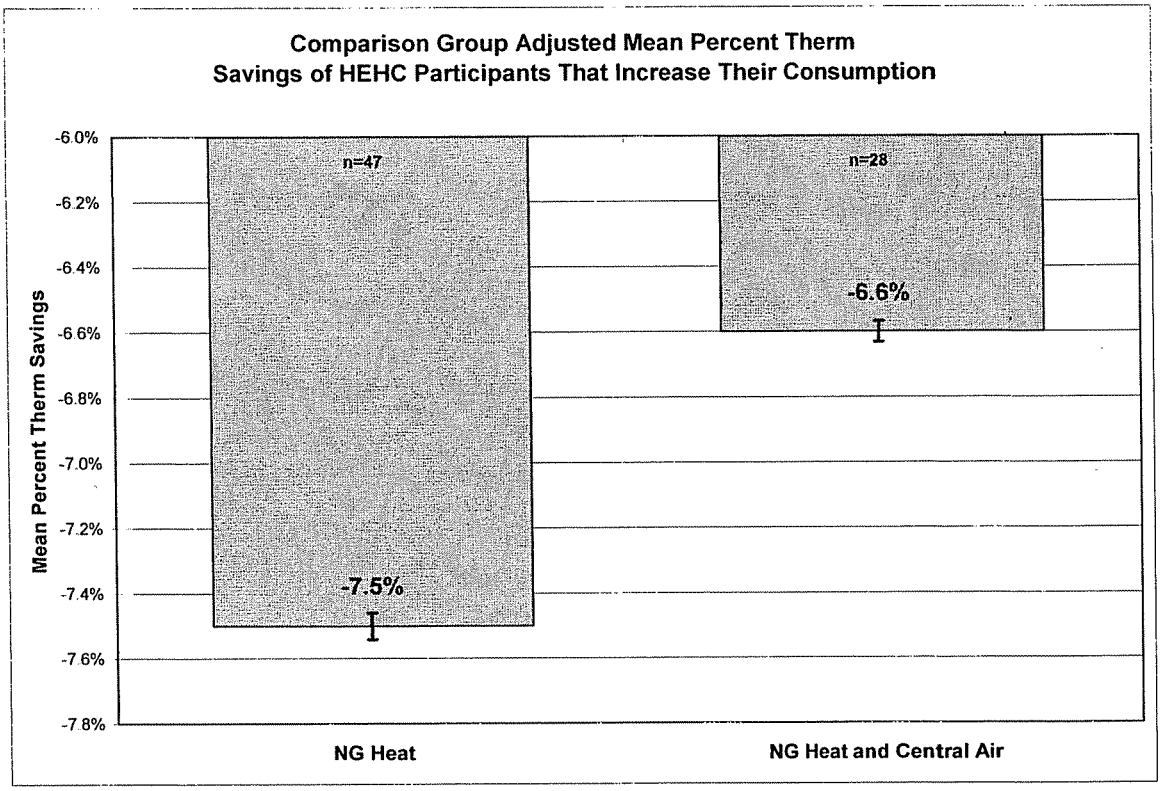


Figure 15. Comparison Group Adjusted Mean Percent Therm Savings of HEHC Participants That Increase Their Consumption

Study Conclusions

The findings presented herein indicate that the home energy audit has resulted in decreased energy consumption in certain groups, while consumption has increased in other groups. Specifically, the HEHC program results in energy consumption reductions for heating fuels (electric or gas). Participants with electric heat reduce their electrical consumption, and those with natural gas heat reduce their therm consumption. This data indicates that the HEHC is a program that reduces heating costs.

Specific findings indicate that:

1. Program-wide kilowatt-hour savings were achieved only by those participants that heat their home electrically. This group saves a mean 399 kilowatt-hours per year; or 2.8% of their annual consumption.
2. Of the customers that decrease their kilowatt-hour consumption, those with electric heat and air conditioning units have the highest savings, with 2,026 kilowatt-hours per year reductions, or 10.3% of their annual consumption.
3. The HEHC program does result in a natural gas savings for homes that heat with natural gas. On average, the savings are just over 20 therms saved per year, comparison group adjusted. Those without central air reduce their consumption by 22 therms a year (3.4%), and those with central air reduce their consumption by 21 therms per year, or 2.7%.
4. Those with natural gas heat and central air conditioning remain the most stable between the pre- and post-program periods. Of this group that increased their electric consumption, they increased, on average, about 1,237 kilowatt-hours per year. This increase averaged 11.8% of their annual consumption. Those that decreased their consumption did so the least, averaging a 1,135 kilowatt-hours per year decrease, representing 11.7% of their annual consumption. About the same amount of participants increased and decreased consumption about the same amount after the program, making the average effect for this group an increase in consumption of 100 kilowatt-hours.

The results of this study indicate that the Home Energy House Call program is successful at helping save heating costs. In summary, participants that heat with natural gas save natural gas and those that heat with electricity save electricity. However, this study utilizes relatively small sample sizes for this analysis, and we cannot guarantee that the customers analyzed represent the population of the HEHC program. Further analysis should be done on more customers, with a sampling strategy that better reflects the population as a whole.

Appendix A: Other Findings

In addition to the findings presented in the main body of this report, TecMarket Works also looked at the differences in savings by the square footage of the home, the year the home was built, type and age of water heater used, the number of people living in the home, and the energy service firms performing the audit. However, splitting the participant groups into these small categories reveals only speculative findings due to the low sample size. Therefore, only when trends were spotted are these findings presented in this report. The reader is cautioned about the sample size and reminded that the results presented are only possible indications of trends. Further analysis on a larger group of participants would need to be conducted to reach any conclusions, definitive or otherwise. These findings are reported below.

Square Footage of the Home

Results for the kilowatt-hour analysis by area of conditioned spaced produced sporadic results that do not seem to follow any clear trend. However, the therm consumption seems to decrease as the home gets larger, with two anomalies in the larger homes analyzed.

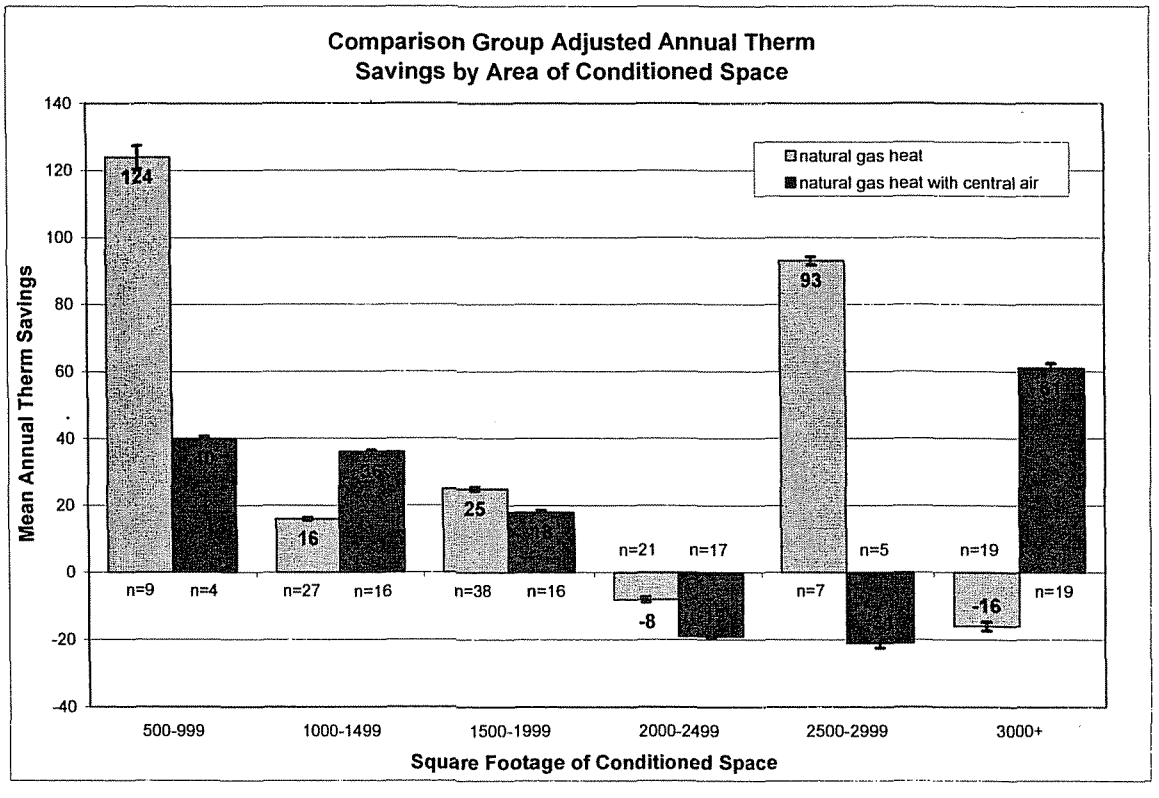


Figure 16. Comparison Group Adjusted Annual Therm Savings by Area of Conditioned Space

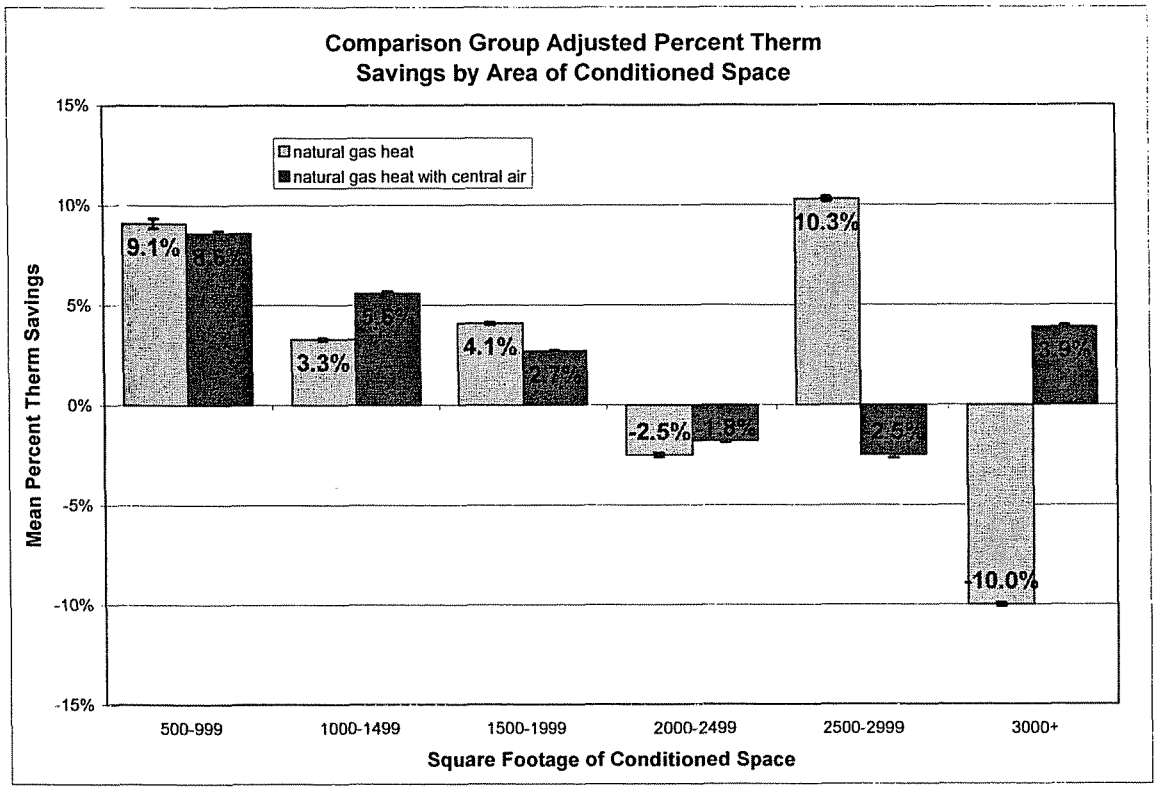


Figure 17. Comparison Group Adjusted Percent Therm Savings by Area of Conditioned Space

Vintage of Home

When we looked at the energy savings by the age of the home, the therm consumption did not reveal any probable trends. However, it seems that the owners of the newer homes increased their consumption more than those living in older homes for those with electric heat and air conditioning, and those with natural gas heat. This may indicate that those that can afford newer homes do not view the savings of conserving electricity as significantly or important as others, and therefore are less likely to not make physical or behavioral changes to decrease their electrical consumption.

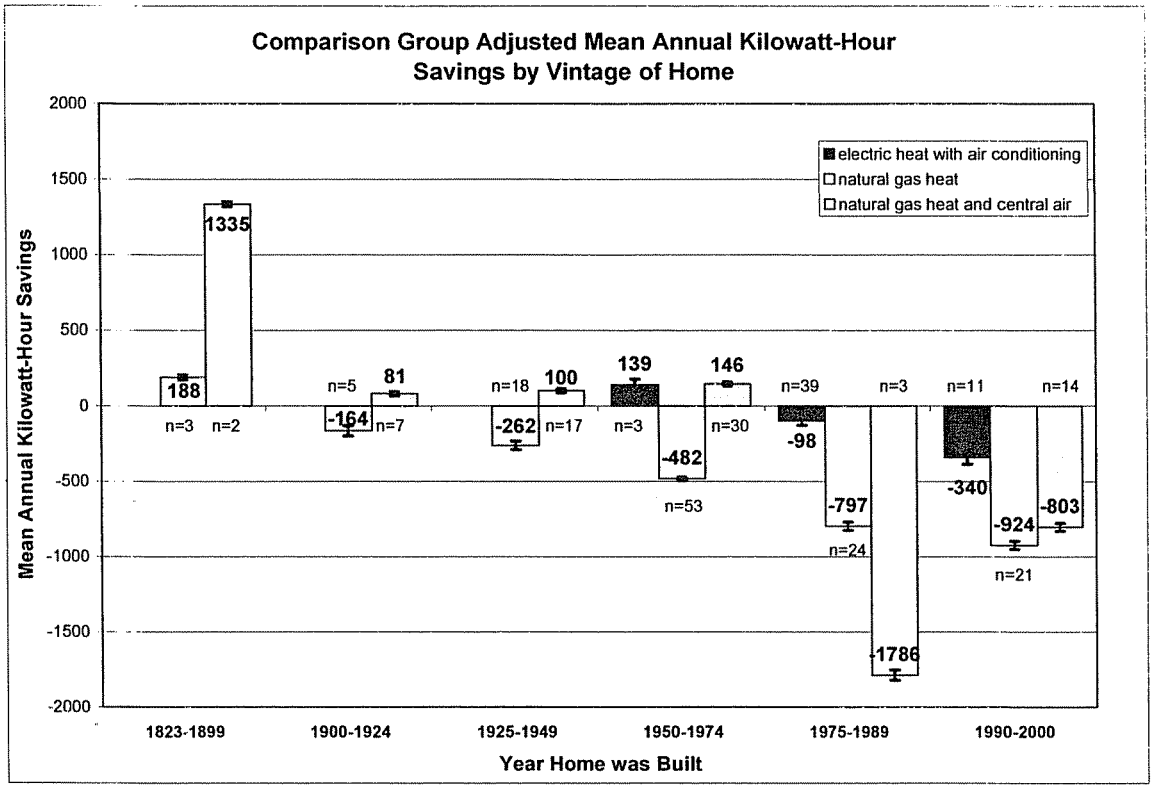


Figure 18. Comparison Group Adjusted Mean Annual Kilowatt-Hour Savings by Vintage of Home

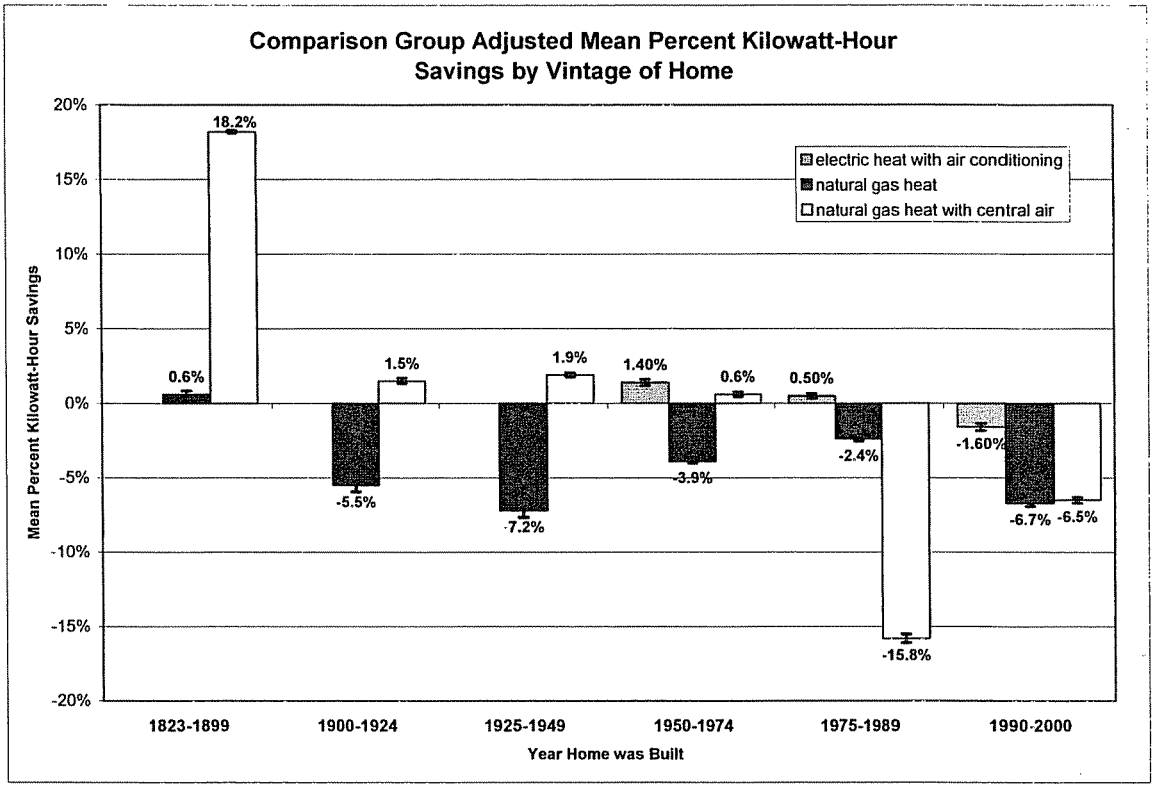


Figure 19. Comparison Group Adjusted Mean Percent Kilowatt-Hour Savings by Vintage of Home

Type and Age of Water Heater

The type and age of a home's water heater does not have an impact on energy savings. However, the water heater temperature setting was recorded during many of the audits. The water heater temperature settings are shown in Figure 20 below. An analysis of the water heater temperature data compared to the age of the installed water heater shows no relationship, suggesting factory water heater settings are almost always changed by the individual who installs or uses the heater. While not important to this study, this finding suggests that programs that focus on changing the manufacturer's temperature setting to a lower temperature have little influence on the temperatures of the installed water heaters.

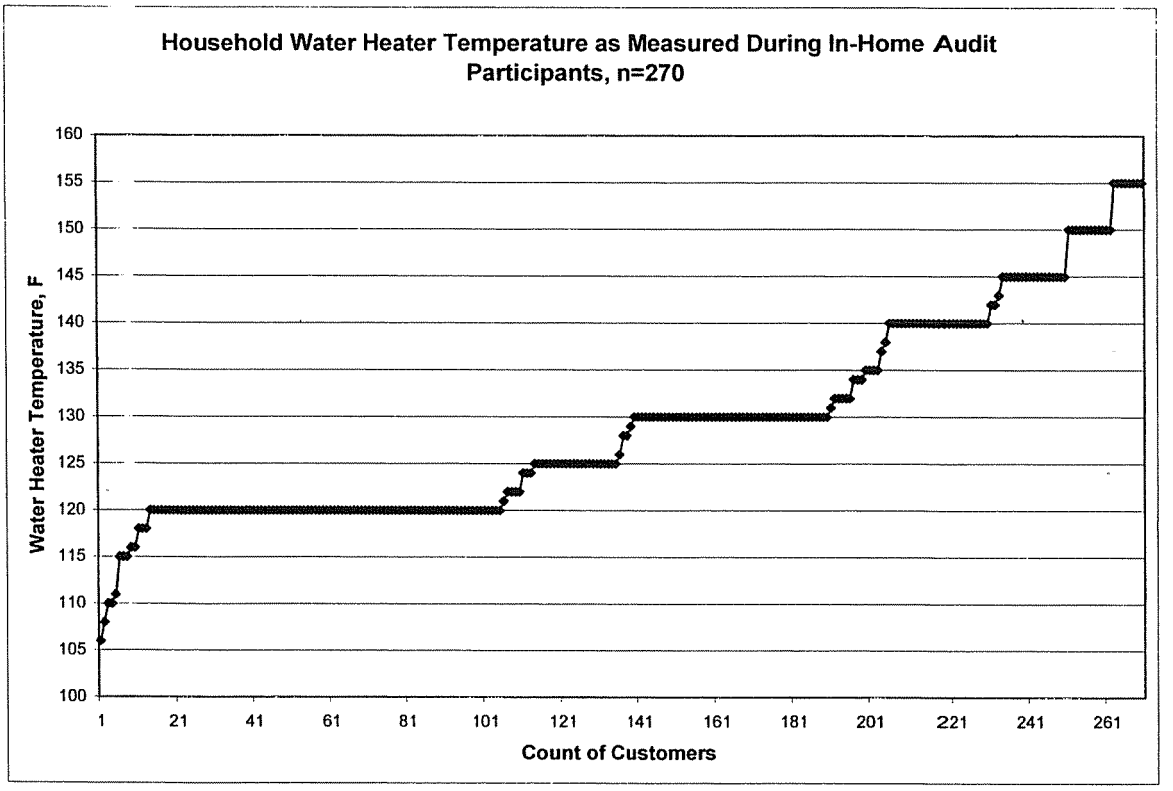


Figure 20. Water Heater Temperature at the Time of the HEHC Audit

Number of People Living in the Home

There is no apparent connection between the number of people living in the home and the energy savings realized by the HEHC participants. Overall increases and decreases in consumption were scattered, with one exception: all the homes occupied by a single person (one individual) had an overall decrease in consumption. This finding indicates that people living alone are more likely to benefit from the HEHC than people living with others in the home.

Auditor

A look at the energy savings of homes by the auditor conducting the examination revealed no significant differences in energy savings. Six of the seven auditors had groups that increased their consumption overall, and groups that decreased their consumption overall. One auditor had overall decreases in consumption, but this is most likely a coincidence given the small sample sizes when each of the groups is divided into seven smaller groups.

Days to Mail the Audit Report

Home Energy House Call managers claim that the reports are mailed within ten days of the audit. However, this is not consistent with the data examined in this study. Many audit reports were mailed three weeks or more after the audit. However, most of these delays occurred in the beginning of the program when the auditing firms were

experiencing start-up difficulties. According to Cinergy Program Managers, the more recent participants are receiving their audit reports within 10 days. The following graphic indicates the time between the audit and the mailing of the audit report for the population examined in this study. The delays in the receipt of the audit report may be expected to have an impact on the customer's ability to implement actions taken or maintain customer interest in taking actions.

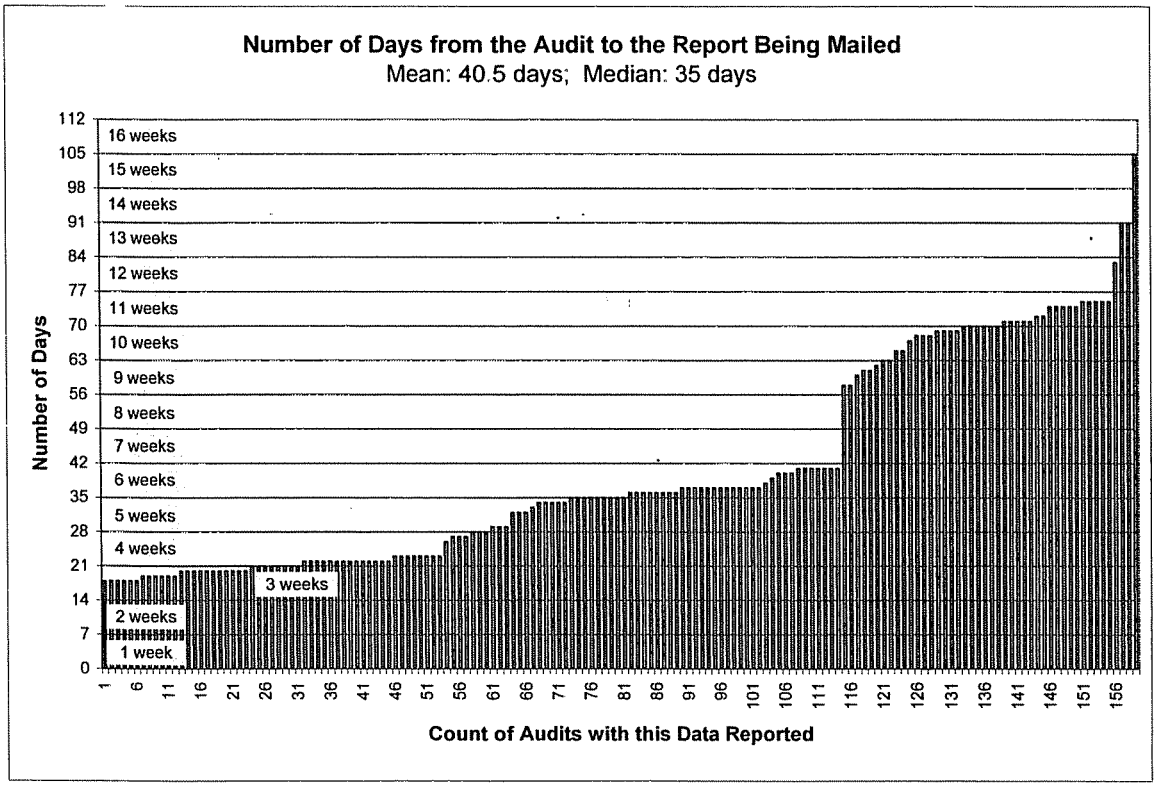


Figure 21. Number of Days from the Audit to the Report Being Mailed

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-018

REQUEST:

Please reference the Application at page 12. Provide the cost of the kit furnished to customers as part of the home audit.

RESPONSE:

The cost per kit prior to February 2007, was $12.35. In February 2007, Duke Energy negotiated a price of $10.82/kit.

PERSON RESPONSIBLE: Connie Rhodes

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-019

REQUEST:

Please indicate whether customers are charged for the audits provided under the Residential Home Energy House Call and, if so, provide information concerning the charges.

RESPONSE:

Customers are not charged for the Home Energy House Call audit.

PERSON RESPONSIBLE: Connie Rhodes

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-020

REQUEST:

Please reference the Application at page 14. Provide details of all costs associated with the program, including the costs of seminars, training sessions, workshops, etc., along with the costs of material distributed to participants.

RESPONSE:

The Company does not budget to that level of detail in our financial tool. The following spreadsheet is what was spent by activity for the calendar year 2007 (January through December).

2007 Kentucky NEED Budget - Duke Energy

EXPENSE LINE ITEMS	TOTAL BUDGET
Program Management/Administration	**$32,000.00**
Development/Public Awareness	**$2,000.00**
Workshop Training and Materials	**$5,900.00**
Teacher Training Conferences	**$20,441.00**
Curriculum Materials	**$8,850.00**
150 NEED Membership Kits	$3,500.00
25 Supplemental Classroom materials	$1,250.00
Science Kits (SOE, M&M, Electric, EW)	$4,100.00
Energy Efficiency Kit Program	**$1,000.00**
Energy Efficiency Kit Cost (take home)	**$7,965.00**
National & State Youth Awards Prog	**$4,050.00**
State Awards Luncheon	$500.00
State Awards Travel/Substitute Fees	$1,000.00
Plaques & Certificates	$150.00
3 National Youth Award Registrations	$1,500.00
Travel Allowance to National Youth Awards	$900.00
Substitute Pay/Teacher Stipends	**$1,000.00**
Total Program Dollars	**$83,206.00**

PERSON RESPONSIBLE: Michael Goldenberg
Connie Rhodes

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-021

REQUEST:

Please describe the type of materials and/or information furnished to participants in the Residential Comprehensive Energy Education Program. Provide copies of all materials furnished to participants.

RESPONSE:

See Attachment AG-DR-01-021.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder

The NEED Project
Putting Energy into Education

Northern Kentucky NEED Project – Program Components

K-12 Energy Curriculum and Training NEED's energy curriculum materials are aligned to state and national standards, designed to teach energy in an inquiry based manner, and encourage teachers to adopt a Kids Teaching Kids approach to energy education. Training is provided to classroom teachers to improve their knowledge of energy and to provide the training needed to implement energy programs in the classroom at any grade level and in any discipline. Workshops provide general energy background, but can include specific topic sections appropriate for the local region.

NEED's **Energy Infobooks** are provided in primary, elementary, intermediate, and secondary reading levels. The booklets provide resource information on the sources of energy, electricity, transportation, conservation and efficiency, and consumption. The infobooks are used in the classroom as a resource for many NEED activities. The Infobooks are revised each year to provide complete, up-to-date energy information.

Hands-on Energy Kits NEED provides a variety of hands-on kits for use in the classroom. The primary kits used in the N. KY program are as follows:

Science of Energy – Six stations of experiments that explore the different forms of energy and how energy is transformed from one form to another.

EnergyWorks – Background information and hands-on experiments that explore the basic concepts of energy and the tasks energy performs, including motion, light, sound, heat, growth and powering technology.

Building Buddies, Monitoring & Mentoring, Learning and Conserving – These kits provide students with activities that explore basic concepts of energy use, methods of measuring energy usage, determining costs and quantifying environmental effects. Students conduct comprehensive surveys of the school building and school energy consumption and develop a comprehensive energy management plan for their schools.

Home Energy Efficiency Kits – This kit provides the opportunity for students to take the lessons they are learning in the classroom to their homes. The kits include measures designed to help reduce energy use at home and give students and their families a chance to see how even small measures can make a substantial difference in reducing energy use.

Conservation and Efficiency NEED provides a selection of activities with a focus on energy conservation and efficiency for grades K-12. The activities highlighted through our N. KY program are:

Energy House – Students 'insulate' a cardboard house with a variety of insulating materials, learning about energy conservation, energy savings and diminishing returns.

Energy Conservation Contract – Students ask their families to assess energy usage by their families. They then sign contracts in which they agree to save energy at home and one the road for a one month period, then compare the energy usage before and after, calculating the energy savings.

Today in Energy – This primary activity introduces students to the concepts of choice, trade-offs and costs. Students use math and critical thinking skills get them through the day with a limited supply of energy bucks.

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-022

REQUEST:

Please reference the Application at page 14. Describe in detail any and all funding received by the program as part of the grant from the Governor's Office of Energy Policy and/or the U.S. Department of Energy.

RESPONSE:

1. Energy Smart Schools Program: The Governor's Office of Energy Policy (GOEP) provides funding for a 1/2 time employee whose primary responsibility is to work with Karen Reagor, the KY NEED coordinator, to coordinate and plan our energy efficiency in the schools program. This project began in Northern Kentucky (Duke Energy's service Territory) and has now expanded statewide with the annual High Performance Schools workshops.

2. Change a Light Campaign: The Governor's Office of Energy Policy provides funding to support $350.00 mini-grants for schools and not-for-profits to plan and implement Change a Light activities in their schools and communities. This is a state-wide program. Grants have been offered twice -Earth Week 2007 in April and Energy Awareness Month in October 2007. NEED administers this grant for GOEP. In April 2007, two (2) organizations in Northern Kentucky received mini-grants. In October 2007, nine (9) Northern Kentucky organizations received mini-grants.

3. The GOEP provides supplemental funding to state-level winners in NEED's Youth Award for Energy Achievement who wish to attend the national conference in Washington, DC. Two Northern Kentucky schools have received funds for this event in the past two years. Blending funds from the Duke Energy program and GOEP allows NEED to send more students/teachers to the awards.

PERSON RESPONSIBLE: Michael Goldenberg
Connie Rhodes

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-023

REQUEST:

Please reference the Application at page 15. Provide cost and content information concerning the energy savings "kit" furnished under the program. Please indicate how many "kits" have been distributed under the program from July 1, 2006 through June 30, 2007.

RESPONSE: 235 kits were distributed from July 1, 2006 through June 30, 2007.

Kit Content @ $15.93 per kit:
Low Flow Showerhead
Kitchen Low Flow Aerator
Bathroom Low flow Aerator
Water Temperature Gauge
(1) Energy Efficiency Night Light
(1) Spool thread and seal tape
Water Flow Meter Bag
15 watt cfl
23 watt cfl
Water Temperature Gauge
(10) pkg of 12 outlet and switch plate insulators
(1) Copy of the Dept. of Energy's "Energy Saver Tips" booklet

PERSON RESPONSIBLE: Michael Goldenberg
Connie Rhodes

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-024

REQUEST:

Please reference the Application at page 15. Provide the factual basis for the statement by the Company that "[t]he result of this change has demonstrated that measures are being installed in the home." Please include any data that support or refute this statement.

RESPONSE:

The statement is based on previous evaluation of the program, completed in 2005, and provided with in Case No. 2005-00402. A copy of the evaluation is provided at Attachment AG-DR-01-024 for reference. The change noted in the current filing is the addition of the student survey instruments that are incorporated into the curriculum. It is these surveys that provide data for evaluation.

PERSON RESPONSIBLE: Thomas L. Osterhus

Final Report

APPENDIX C

Kentucky NEED: Impact Evaluation

Prepared for:
Cinergy

Prepared by:

Lauren Miller Gage
M. Sami Khawaja, Ph.D.
Tony Larson
Quantec, LLC

September 12, 2005
K:\2005 Projects\2005-29 (Cinergy) KY NEED\Report\KYN_Report_091205.doc

Introduction

National Energy Education Development (NEED) is a Washington, DC-based nonprofit association with the mission of promoting "an energy conscious and educated society by creating effective networks ... to design and deliver objective, multi-sided energy education programs."[1] The NEED Program includes curriculum materials that teach the scientific concepts of energy and includes information to, "educate students about energy efficiency and conservation, and tools to help educators, energy managers and consumers use energy wisely."

In December of 1994, Kentucky began a NEED Program. Shortly thereafter, Karen Reagor was hired to establish the KYNEED Program. It was her responsibility to secure funding and statewide Program delivery. In October 1997, Union Light Heat and Power (ULH&P) began funding the KYNEED-ULH&P Program. Since then, the Program has hosted teacher/student workshops, sponsored teachers' attendance at summer training conferences, participated in Teacher In-Service and professional development opportunities, and sponsored award-winning teachers and students to attend NEED's National Youth Awards Conference in Washington, DC.

Currently, the KYNEED project goal includes providing "non-biased energy education programs in schools in Boone, Campbell, Kenton, Gallatin, Grant and Pendleton counties, with a focus on energy conservation and efficiency". The following table provides an update regarding goals, targets and current progress.

Figure I.1: KYNEED Goals, Targets and Progress

Goal	Target	Progress
Provide NEED Energy Education Materials to Teachers	100 teachers receive materials	94 Teachers registered in the KYNEED program
Conduct Teacher/Student Training Workshops	Three workshops	Three conducted
Plan, Coordinate and Facilitate Teacher In-Services	Three teacher in-services and a classroom presentation for university education majors	8 teacher in-service and one university presentation
Provide In-depth Training for Teachers via NEED curriculum	Encourage teachers from the collaborative service territory to attend NEED's trainings	12 teachers attended from the territory
Develop, Coordinate and Facilitate a Parent/Student Energy Efficiency & Conservation Program	500 students and their families participate	To-date, 238 kits have been distributed and 9 participating teachers enrolled for fall 2005
Energy Efficiency and Conservation Practices in the Schools	Provide information to all school districts and work with those who request assistance	Working directly with 2 schools and co-hosted High Performance Schools Workshop in May
Promote participation in the NEED Youth Awards Program for Energy Achievement	Encourage schools in the six county area to participate	Six participating schools

[1] http://www.need.org/info.htm

A major Program enhancement was introduced in 2003. In addition to the current educational Program, a Conservation Action Kit was distributed to participating students. This kit contained energy-saving measures that were intended to facilitate hands-on learning and ultimately encourage energy awareness and behaviors that could ultimately lead to a lower energy bill. The kit contained several energy-efficient devices that required minimal installation time and effort, including:

- A compact fluorescent light bulb. This low-energy bulb was intended to replace the commonly-used higher energy incandescent light bulb.
- A high-efficiency showerhead that reduces water usage when used instead of an existing, higher-flow showerhead.
- Kitchen and bathroom aerators that reduce water flow when installed in bathroom and kitchen sinks.
- Thermometers that monitor temperature for rooms, hot water heaters and refrigerator/freezer components. These thermometers increase energy use awareness, which may in turn cause students to adjust their energy devices accordingly.
- A plastic bag that measures shower and faucet flow rates..

Along with the kit, students were asked to return an audit form that had three components:

1. ***House and Appliance Characteristics,*** which asks students if they are ULH&P customers and basic information about their home, such as number of occupants, if they have certain appliances, and the fuel usage of heating and cooling equipment.

2. ***Behavioral Assessment,*** which is presented in two separate forms—one to be filled out before the lessons and the other afterwards. The top portion asks questions about the number of incandescent and fluorescent bulbs in the home, use of the Energy Saver feature found on dishwashers, cold water laundry usage, the number of baths and showers in the home, and the temperature settings on cooling and heating equipment. The bottom portion of the form is more qualitative, and asks students to report the number of times per day that lights and electronics are left on, if water is run needlessly or if a window is left open.

3. ***Installation Survey.*** This final component asks students about what occurs in their household with each measure. For example, if they installed the compact fluorescent lights (CFLs), what bulb Wattage was replaced, and how long is the bulb on each day? If they didn't use the CFL, why not, and do they plan to in the future?

Evaluation Overview

This evaluation assessed energy savings attributable to Program efforts and provided feedback about the Program delivery in ULH&P's Kentucky service territory, particularly with regard to the kit. The evaluation consisted of the following:

- Program document review
- Program staff interviews (3)
- Program instructor interviews (2)
- An assessment of returned student surveys and the associated savings

Conservation Lessons Delivery

Quantec's 2002 Program evaluation recommended improvements in five areas: 1) increase conservation emphasis of lessons, 2) develop targeted, measure-based lessons, 3) provide students with conservation measures, 4) provide measurable metrics, and 5) improve data collection instruments. The KYNEED Program has made significant progress on all of these recommendations.

Prior to 2002, the KYNEED Program had an implied conservation message throughout its curriculum. An Energy Conservation Contract was then used to increase awareness about saving energy at home. Since 2003, the Program developed curriculum that focuses on energy efficiency generally, but also emphasizes the kit. Each student receives an "Energy Efficiency Notebook" that contains nine lessons, each including a journal and homework assignment. Through this medium, each measure in the kit is introduced, and students are asked to take them home to install or implement some recommended behavioral changes. Teachers are provided with a Teacher's Guide containing additional information.

In addition to the notebook, audit forms are provided to students as a separate homework assignment. The *Energy Usage Before* survey is the homework assignment for Lesson 1, "What is Energy." Both the *Energy Usage After* and *Installation* surveys are part of the Lesson 9, "Landscaping Investigations,"[2] assignment.

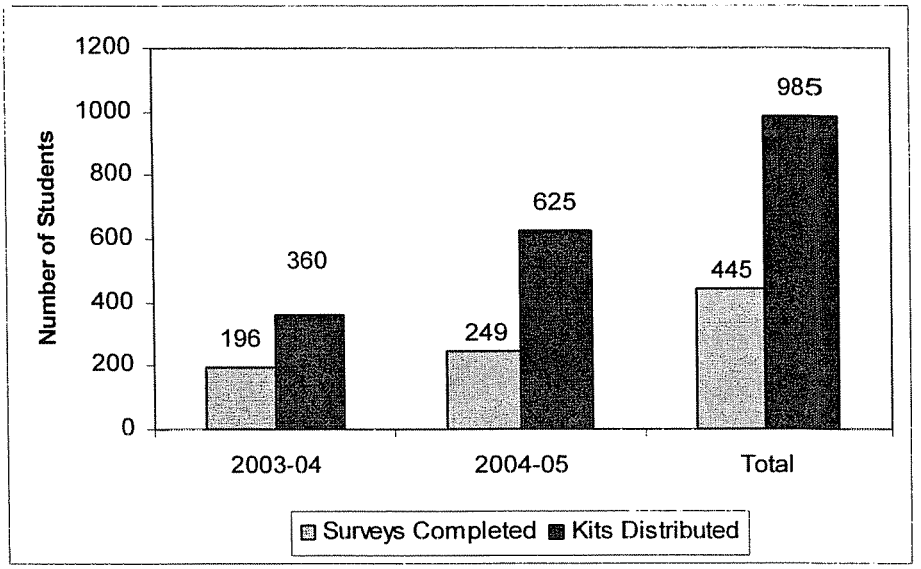
Teachers and Program staff interviews indicated that teachers, parents and school administrators are excited about the new conservation focus. Several mentioned that the measures' "hands-on" nature is extremely beneficial in the classroom. Teachers are currently on waiting lists to receive additional kits of measures.

Teachers noted that their most significant concern was the confusion caused when only some of the students receive kits. UHL&P only provides measures to their customers even though many teachers have households served by Owen Electric, thus a portion of the class may not receive measures to take home.

From 2003 to 2005 (covering two Program years), UHL&P provided a total of 985 kits for an approximate cost of $30,000. Overall, nearly half of the students returned some portion of the audit forms. In 2003 to 2004 the response rate was 54%, which dropped down to 40% in 2004 to 2005.

[2] One teacher noted that this lesson was skipped because it was too difficult for 5th graders and beyond their control.

Figure I.2: Surveys Returned and Kits Provided



Demographics

The *House and Appliance Characteristics* portion of the audit form was designed to describe students' home, energy-using equipment and baseline consumption characteristics.

The average home occupancy for respondents was 4.4, including 2.1 adults, 0.6 teens (12-18 years of age) and 1.8 children. The average home age is 21 years. Participants were also asked if they had certain appliances, as shown in Table I.2 below.

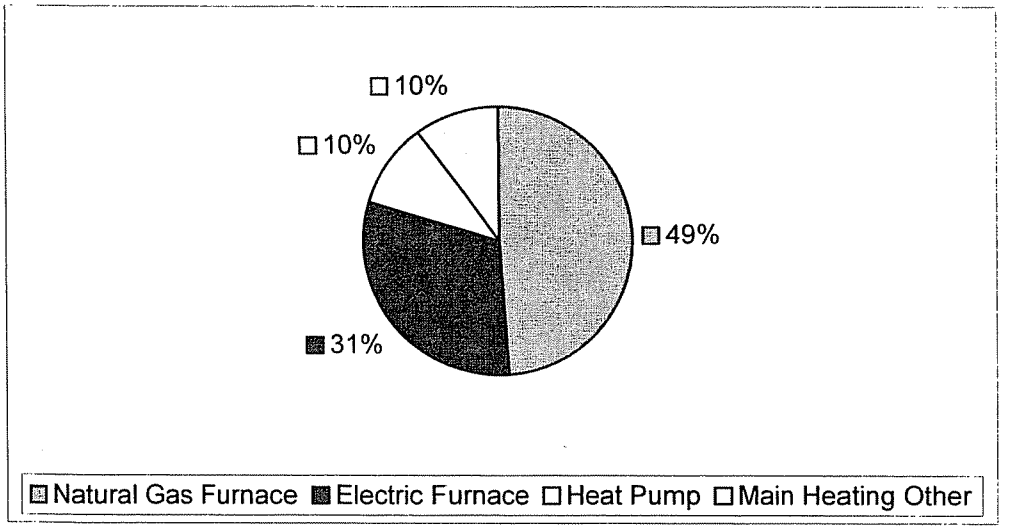
Table I.2: Appliance Saturations, % of Respondents (N=445)

Refrigerator	Television	Clothes Dryer	Clothes Washer
98%	98%	96%	95%
Computer	**Dishwasher**	**Video Game System**	**Stand Alone Freezer**
93%	89%	86%	41%

For heating water, 51% of participants use electricity and 46% use natural gas.[3] Central air conditioning is used in 85% of the homes and 5% utilize room units. Most families heat their homes using natural gas (49%) and a smaller but significant amount use electric (31%), as shown by Figure I.2.

[3] Remainder "don't know."

Figure I.3: Primary Heating Source (N=445)



Behavioral Assessment

The second audit form section was designed as a fundamental part of the curriculum as well as a way for Program staff to assess energy saving behaviors. Because the pre-2002 Energy Conservation Contract was the primary teaching tool, the behavioral assessment in the audit tool remained similar to the previous contract in order to provide a way to teach students new behaviors.

As described above, this behavioral assessment was handed out before the lessons and then again at the end of the lessons as a separate assignment. The objective was to see how students had improved on their energy behaviors, such as removing incandescent light bulbs, increasing air conditioners temperatures, leaving lights on and not allowing water to run needlessly.

Response rates for this section of the audit form were quite high, showing that most students responded to both the before and after questions. Ideally, the evaluation team would estimate the change in behavior for each indicator then estimate the resulting energy savings. Yet, a significant number of responses indicated that students were using *more* energy (an extremely unlikely result of the Program). Figure I.3 displays the percent of responses in each of three categories: using more energy, no change and using less energy.

Figure I.4: Behavioral Responses (N=407[4])

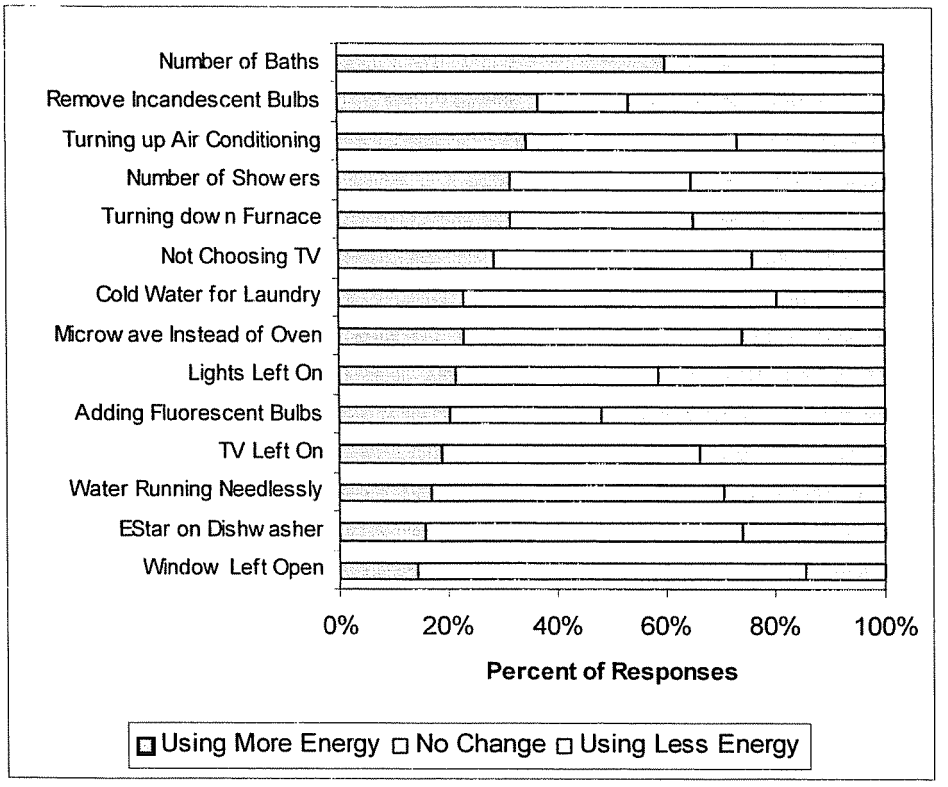


Table I.3 outlines the average change[5] in behaviors for answers that indicated less energy use, more energy use, and the average for all responses. In addition, the number of units are provided. Because of the high propensity for students to report an increase in energy-consuming behaviors, the overall averages indicate little overall change in energy consumption due to behaviors.

[4] Average number of responses across questions.

[5] Calculated as after lessons response minus before lessons

Table I.3: Average Behavioral Changes

Energy Saving Behavior	Average Change for Less Energy	Average Change For More Energy	Overall Average	Units
Window Left Open	-1.6	1.8	0.0	Times per day
EStar on Dishwasher	2.6	-2.8	0.2	Loads per Week
Water Running Needlessly	-2.3	2.4	-0.3	Times per day
TV Left On	-2.5	2.1	-0.4	Times per day
Adding Fluorescent Bulbs	3.8	-5.8	0.8	No. Bulbs
Lights Left On	-3.1	2.8	-0.7	Times per day
Microwave Instead of Oven	2.2	-2.0	0.1	Times per day
Cold Water for Laundry	2.6	-3.6	-0.3	Loads per Week
Not Choosing TV	2.7	-2.8	-0.1	Times per day
Turning down Furnace	-4.0	3.9	-0.4	Degrees
Number of Showers	-8.3	7.2	-0.7	Showers per week
Turning up Air Conditioning	4.9	-5.3	-0.3	Degrees
Remove Incandescent Bulbs	-17.3	15.4	-2.4	No. Bulbs
Number of Baths	-4.5	4.2	0.7	Baths per Week

* Change calculated as Post-behavior minus Pre-behavior

Due to the magnitude and direction of many responses, we have concerns about the reliability of these data. Therefore, we did not estimate behavioral energy savings attributable to the Program, except in one case (turning down furnace). Some examples of the responses' inconsistencies are provided below.

One typical energy conservation lesson students learn is to reduce their number of baths and conversely, increase their number of showers. Taking a bath uses significantly more hot water, so showers can contribute to lower energy usage. On average, students reported an additional 0.73 baths taken in their home each week, driven by 60% of respondents who indicated *more* baths taken in their home each week. Complementing this result is that students reported 0.7 *fewer* showers each week.

Ideally, students would learn about energy efficient lighting through the Program, which would prompt their families to replace incandescent light bulbs with CFLs. Nearly half (47%) of students reported that they removed incandescent bulbs as a result of the Program, with an average of 17.3 removed bulbs. Yet, 40% of students stated that they *increased* the number of traditional bulbs after the Program at an average rate of 15.4 bulbs. Regardless of direction, the magnitude of these changes indicates a reporting issue. Specifically, one would expect that if large quantities of incandescent lights were removed from a home, a similar number of CFLs would be installed. This was not the case. CFLs were reported to be added at a rate of 3.8 per household (52% of respondents) and removed at a rate of 5.8 (20% of respondents).

In terms of appliance usage, a surprising number of students indicated an increased energy use, with 35% reporting that air conditioning temperature was turned *down*, 31% reporting that their furnace was turned *up*, 23% reporting that cold water was used for laundry *less* often after the lessons, and 16% stating that the energy saving feature on the dishwasher was used *less* often.

There are several possibilities why the results are so inconsistent with expectations:

- ***Students have not learned energy saving behaviors***. It is possible that students do not know what to do to conserve energy as related to the topics on the behavioral assessment. This could be caused by incomplete lesson information. If the lessons are teaching this information, students could be forgetting it by the time they complete their "after" survey.

- ***Students are not aware of their "pre" response***. Program staff rationally decided that it was best for the "before" and "after" surveys to be on separate pages, which would reveal the "true" results of their behavioral change. Yet, if families have forgotten their pre-responses, it may be difficult to indicate their changes in behavior.

We have noted survey improvement recommendations at the end of this report in the *Conclusions* section.

Measure Installation

The third portion of the audit form asked students specifically about the Conservation Action Kit measures' installation and use. Participants were asked if they had installed each measure, and if not, why.

Generally, this section had a much lower response rate than the first two sections, as only half of the *returned* surveys contained installation information.

Lighting

Each kit included a 15-Watt compact fluorescent bulb. Of the 985 kits delivered, 24% responded to whether they had installed the CFL. Of those respondents, 73% affirmed that they installed the bulb; the average incandescent removed was 68 Watts. The CFLs were most often put in the bedroom and used just over four hours per day.

Table I.4: Installation Characteristics of CFLs (N=233)

% Response Rate	% Installed By Respondents	Average Wattage Replaced*	Average hours Used
24%	73%	67.9	4.2

* Limited to less than100 Watts

Of the 64 respondents who reported not installing the CFL, only six stated that the bulb didn't fit, and 40 plan to install it in the future. Five respondents specified other reasons why they didn't install the bulb, including "did not want to," and "don't like fluorescents."

Hot Water Savings Measures

Each kit contained three measures to reduce hot water usage in the home: high efficiency showerhead, bathroom aerator, and kitchen aerator. Like the CFL, the response rate was a consistent 24% of provided kits.

The high efficiency showerhead was most often installed; 40% of respondents utilized this measure in their homes. The kitchen aerator and bathroom aerators were installed by 34% and 31% of respondents, respectively. Program participants were also asked to measure the pre- and post-installation flow rates, which were used to determine the average flow reduction for each device, measured in gallons per minute (GPM), as shown on Table I.5.

Table I.5: Installation Characteristics Hot Water Measures (N=233)

Measure	Response Rate	% Installed by Respondents	Average Reduction in GPM*
Showerhead	24%	40%	0.89
Kitchen Aerator	24%	34%	0.96
Bathroom Aerator	24%	31%	0.90

* Post GPM – Pre GPM, each limited between 1 and 7 GPM

Of the 139 students who reported not installing the showerhead, 25% indicated that it did not fit, 25% stated that they already had an efficient model, 15% said they plan to install at a later time, 10% are renters or struggled with installation, and 7% prefer their existing measure.

For the kitchen aerator, 31% (of 153) reported that the new model did not fit at their home, 12% indicated they already had the measure, and only 3% plan to install at a later time. For the bathroom aerator, a similar rate of respondents (32% of 162) stated that the measure did not fit in their home, 10% already have the measure in place, and 10% plan to install later.

Educational Measures

The kit provided several devices to provide information for students to adjust various appliances, including hot water heaters, refrigerators, freezers, stand-alone freezers, furnaces, and air conditioners.[6]

Adjustment rates for these measures were below the installation rates above. This may be expected due to a student's lack of control over major appliances. Of the measures on the installation survey, the refrigerator was most often reported to be adjusted (17%), followed by the freezer (15%), the hot water heater (13%) and stand-alone freezer 5%.

[6] Furnace and air conditioning changes were queried on the Behavioral Assessment; therefore the responses are not directly comparable.

Table I.6: Appliance Adjustments

Appliance Adjusted	Response Rate	% Adjusted by Respondents*	% Who Plan To Adjust	Average Change in Temperature*
Hot Water Heater	22%	13%	42%	-12.6
Refrigerator	22%	17%	40%	1.1
Freezer	22%	15%	45%	0.4
Stand Alone Freezer	18%	5%	27%	0.3
Furnace**	32%	61%	NA	-0.4
Air Conditioning**	29%	81%	NA	-0.3

* Post-temperature minus Pre-temperature, each limited: hot water heater 100-200°F, refrigerator 30-44°F, freezer and stand-alone freezer -10-30°F, furnace and air conditioning 50-90°F

** Responses provided on Section 2 of the audit form

Although adjustment rates were relatively low, the portion of students who plan to adjust was quite high. For all measures, except the stand-alone freezers, over 40% reported that they planned on adjusting the temperature but had not completed this yet (this question was not asked for furnaces and air-conditioning units).

For those families that did make adjustments, the average reported changes are relatively small. When the audit tool asked students why they did not make the recommended changes, the most frequently provided response was that they were already set at the correct temperature[7]. In addition, several comments were made by respondents that their current temperature settings were preferred or they were not sure how to make the recommended adjustments. For hot water heaters, several commented that they rent and therefore do not have control over that particular appliance.

Additionally, respondents were asked to report any other changes made in their energy consumption. Few responses were provided (7), including insulation, weatherization, new doors, and turning off lights.

Energy Savings

We calculate a range of energy savings by measure for the average respondent. Additional details are provided in the Appendix. For the high-case, we assume that the non-respondents' installation rates are equal to that of the respondents. For the low-case, we assume that one-half as many non-respondents installed measures as compared to respondents. For example, if 50% of respondents indicated that they installed a particular measure, we assumed 25% of the non-respondents installed the measure. We feel this range of energy savings is relatively conservative since we are not crediting the Program with additional savings for those who "plan to install" and are not estimating energy savings from behavioral changes.

[7] Refrigerators: 24 of 65 responses, Freezers: 18 of 56, Stand Alone Freezers 19 of 41

We find that, based on the equipment saturations, baseline consumption patterns, and installation rates (reported in Appendix), the average participant saved between 240 and 360 kWh and between 10 and 16 therms per year. This translates to first year average cost savings of between $25 and $38, assuming rates of $0.07/kWh and $0.80/therm. The table below outlines estimated savings by measure.

Table I.7: Estimates of Energy Savings

Measure	High Savings Estimates		Low Savings Estimates	
	Electric (kWh/year)	Natural Gas (therms/year)	Electric (kWh/year)	Natural Gas (therms/year)
CFL-1	59		38	
Showerhead	214	9	147	7
Kitchen Aerator	32	1	22	1
Bathroom Aerator	25	1	18	1
Adjust Hot Water heater	10	1	7	0
Adjust Refrigerator	2		1	
Adjust Freezer.	1		1	
Adjust Stand Alone Freezer	0		0	
Adjust Furnace	19	3	8	1
Total Savings (energy units)	**362**	***16***	**243**	**10**
Total Cost Savings (Annually)	**$38**		**$25**	

Using high and low savings results, the levelized cost of conserved energy was calculated for the kits only ($30/kit) and kits plus admin ($162,000)[8]. As shown below, when compared to the kit prices only, the energy savings are relatively inexpensive, $0.02/kWh. Yet, when administrative costs are included, this cost per kWh increases ten-fold.

Table I.8: Levelized Cost of Conserved Energy

	Kits Only	Kits Plus Administrative
High Case	$0.015	$0.097
Low Case	$0.022	$0.143

[8] Admin costs were reported to be $81,000 per year. Discount rate was assumed to be 7.5% and line losses were assumed to be 10%.

Conclusions

Overall, the evaluation team is impressed with the progress made in the KYNEED-UHL&P Program, particularly with respect to conservation lessons. The combination of UHL&P's kit provision and the associated targeted curriculum has undoubtedly increased student conservation understanding. The Energy Efficiency Notebook has created a focused effort toward improving energy behaviors and installing kit measures.

The primary areas of Program improvement is related to the data collection instrument and encouraging installation of measures.

- ***Focus on collecting measure-based data.*** The primary goal of data collection for UHL&P should be verification of provided measures and related feedback. Therefore, it is possible for the audit form to be reduced to the final page and only a few demographic questions.

- ***Integrate verification into lessons.*** So far, the Program has done a sound job of integrating the conservation lessons and the measures taken home by students. Yet, the low response rates for the installation survey were below expectations. A reason for this could be that Lessons 4 through 8 cover the measure distribution but the *Installations* survey assignment is a requirement of Lesson 9, "Landscaping Investigations." We recommend integrating the questions about verifying installation into the lessons that distribute the measures.

- ***Set goals for increased response rates.*** The audit form response rates, particularly for the *Installation* survey, need to significantly improve. We expect that reduced data-collection requirements and integration into lessons will help. In addition, KYNEED should stress to teachers the importance of the data collection for their funding sources. Cinergy should set a reasonable response rate goal, possibly around 75%.

- ***Set goals for increased installation rates.*** Many of the installation rates, as reported by respondents, are lower than other school-based programs we have evaluated, as shown in Table I.9. Therefore, we recommend that the Program set the goal of increasing installation rates. One option is to provide a core set of measures (e.g., CFL, thermometers) and then provide hot-water measures, such as showerheads and aerators, only to those who do not already have an efficient unit at home. Another option may be for students to return the measures if they are not needed or don't fit in their homes. In addition, the program could provide incentives for students that install measures, such as additional lightbulbs.

Table I.9: Installation Rate Comparison

	Washington	Utah	Iowa	KYNEED
% Respondents that Installed				
CFL	87%	99%	92%	73%
Showerhead*	33%	63%	75%	40%
Bathroom Aerator	-	70%	73%	34%
Kitchen Aerator	-	-	-	31%
% Participants that Adjusted				
Water Heater	9%	62%	16%	13%
Refrigerator	10%	38%	6%	17%
Freezer	8%	64%	6%	15%
Stand-Alone Freezer	2%	-	--	5%
Furnace	65%	69%	28%	61%
AC	71%	65%	25%	81%

** Only given to those households using electric water heaters replacing an inefficient showerhead received showerheads*

- ***Consider a way for students to follow up on installation.*** When asked why they didn't install or adjust measure, many respondents said they "plan to," which was not counted toward energy savings for this evaluation. It would be ideal if students have an opportunity to follow up on these questions in the future and verify actual installation.

- ***Consider optional behavioral assessment.*** Although a primary Program goal is to teach students energy saving behaviors, the audit form's behavioral assessment did not provide useful information. If UHL&P would like to collect behavioral changes data, we recommend making significant changes to the current format. Otherwise, we recommend that the Program ensure that the behaviors on the audit tool are integrated into the lessons themselves, and this portion of the audit form is removed.

- ***Develop reporting functionality.*** We recommend that UHL&P develop a process to more regularly track statistics on returned survey results, which will enable more mid-stream process changes.

- ***Consider measure changes.*** If after one year, installation rates do not improve, it may be wise for UHL&P to consider removing those measures with the worst performance and adding others to replace them. For example, it may be possible to add weather-stripping, outlet covers or a room-temperature switch plate.

Appendix: Energy Savings Calculation Details

Installation Rate Assumptions

Installation	High	Low
CFL-1	73%	47%
Showerhead	40%	28%
Kitchen Aerator	34%	24%
Bathroom Aerator	31%	22%
Adjust Hot Water heater	13%	9%
Adjust Fridge	17%	12%
Adjust Freezer	15%	10%
Adjust Stand Alone Freezer	5%	3%
Adjust Furnace	61%	25%

CFL Details

	Lifetime	Pre-Watt	Post-Watt	Hours per Day	Saturation*
Electric Savings	6	67.9	15.0	4.2	100%

Showerhead Details

	Lifetime	Change in GPM	Shower Minutes per week*	Saturation	Conversion from GPM To kW or Therms
Electric Savings	8	0.9	183.7	51%	0.12
Gas Savings				46%	0.006

**shower minutes per week = average occupants * average post-lesson length of shower*

Kitchen Aerator Details

	Lifetime	Change in GPM	Water Flow In Minutes per Day*	Saturation	Conversion from GPM
Electric Savings	3	1.0	21.8	51%	0.073
Gas Savings				46%	0.004

**Water Flow = % of HH Without Dishwasher * (15^1 + Occupants * 2^1) + (% of HH With Dishwasher) * (3^2 + Occupant * 0.5^2)*

Assumptions :
1) Without Dishwasher-15 Minutes of Use Per Day Plus 2 Minutes for Each Occupant
2) With Dishwasher- 3 Minutes Per Day + 0.5 Minutes for Each Occupant)

Bathroom Aerator Details

	Lifetime	Change in GPM	Water Flow In Minutes per Day*	Saturation	Conversion from GPM
Electric Savings	5	0.9	6.7	51%	0.073
Gas Savings				46%	0.004

** Water Flow = Occupants • 1.5 minutes*

Temperature of Hot Water Heater Details

	Lifetime	Change in Temp °F	% Savings /° F*	Saturation	Savings (unit)/year	Average Savings (unit/year)
Electric Savings	2	12.6	0.40%	51%	154.9	7.1
Gas Savings				46%	11.6	0.5

**% Savings / °F = 4%/10 – conversion for change in temperature found in DOE, Consumer Energy for Hot Water Heaters*

Temperature of Fridge Details

	Lifetime	Change in Temp °F	% Savings / ° F*	Saturation
Electric Savings	2	-1.1	-2.50%	98%

** OPALCO estimate of 25% per 10 deg F.*
Negative value used to convert negative change in temperature to positive energy savings

Temperature of Freezer Details

	Lifetime	Change in Temp °F	% Savings / ° F	Saturation
Electric Savings	2	- 0.4	-3.60%	98%

**% savings / °F = -18% / 5 - conversion for change in temperature found Based on Home Energy Article for Freezer*
Negative value used to convert negative change in temperature to positive energy savings

Temperature of Stand Alone Freezer Details

	Lifetime	Change in Temp °F	% Savings / ° F	Saturation
Electric Savings	2	0.3	-3.60%	41%

** % savings / °F = -18% / 5 - conversion for change in temperature found Based on Home Energy Article for Freezer*
Negative value used to convert negative change in temperature to positive energy savings

Temperature of Furnace Details

	Lifetime	Change in Temp °F	% Savings /° F*	Saturation
Electric Savings	2	0.7	3.00%	41%
Gas Savings				49%

• % savings / °F = 3%- conversion for change in temperature for a furnace found based on Kentucky Natural Resources and Environmental Protection Cabinet for "Make Your Home More Energy Efficiency and Save Money" fact sheet

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-025

REQUEST:

Please reference the Application at page 17. Describe in detail the factual basis for the statement by the Company that "the cost effectiveness results have decreased, due to increasing costs of the program."

(a) Describe in detail all such cost increases and quantify the decrease in cost effectiveness for this program.

RESPONSE:

The decline in cost-effectiveness is expected to be temporary. Energy efficiency kits were purchased for a set number of schools and students. Unfortunately, one of the schools dropped out of the program after the kits were purchased. This reduced the cost-effectiveness result. It is expected that the cost-effectiveness will return to the previous level for the next program year.

(a) No analysis was performed since it is expected to be a temporary event.

PERSON RESPONSIBLE: Michael Goldenberg

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-026

REQUEST:

Please reference the Application at page 11. Describe in detail how outreach efforts to school children relates to the Company's DSM efforts.

(a) Does the company believe that such efforts will have any impact on energy consumption?

(b) Does the company believe that these efforts are more reasonably related to general corporate "goodwill" efforts?

(c) Please describe any other programs involving school outreach programs which the company has been involved with for the past five years and the costs associated with those programs.

RESPONSE:

(a) Yes – both now and in the future. Teaching children about energy, efficiency and conservation, helps them understand how their use of energy in their schools/homes can have a positive impact on the environment, lower their family's utility bill and decrease the need to build more power plants. Providing kits to the students to take home, gives them the opportunity to share what they have learned with their families and encourage the installation of these measures so their parents can begin seeing immediate savings. These same children will some day be the consumers of tomorrow. This will give them the knowledge to make informed decisions regarding how they use energy when they become adults.

(b) Fostering corporate goodwill was not the objective for offering this program. Through modeling of the measures contained in the kit, Duke Energy can show justification for including this program as part of Duke Energy's Kentucky portfolio of DSM programs by the savings that can be achieved from installing the measures in their homes. The impacts associated with this program are based only on the installation of the kit measures and not from any other savings opportunities achieved through this program.

(c) Other than the KY NEED program, there have not been any other school out-reach programs of this type.

PERSON RESPONSIBLE: Michael Goldenberg/Connie Rhodes

Attorney General First Set Data Requests
Duke Energy Kentucky Case No. 2007-00369
Date Received: December 27, 2007
Response Due Date: January 16, 2008

AG-DR-01-027

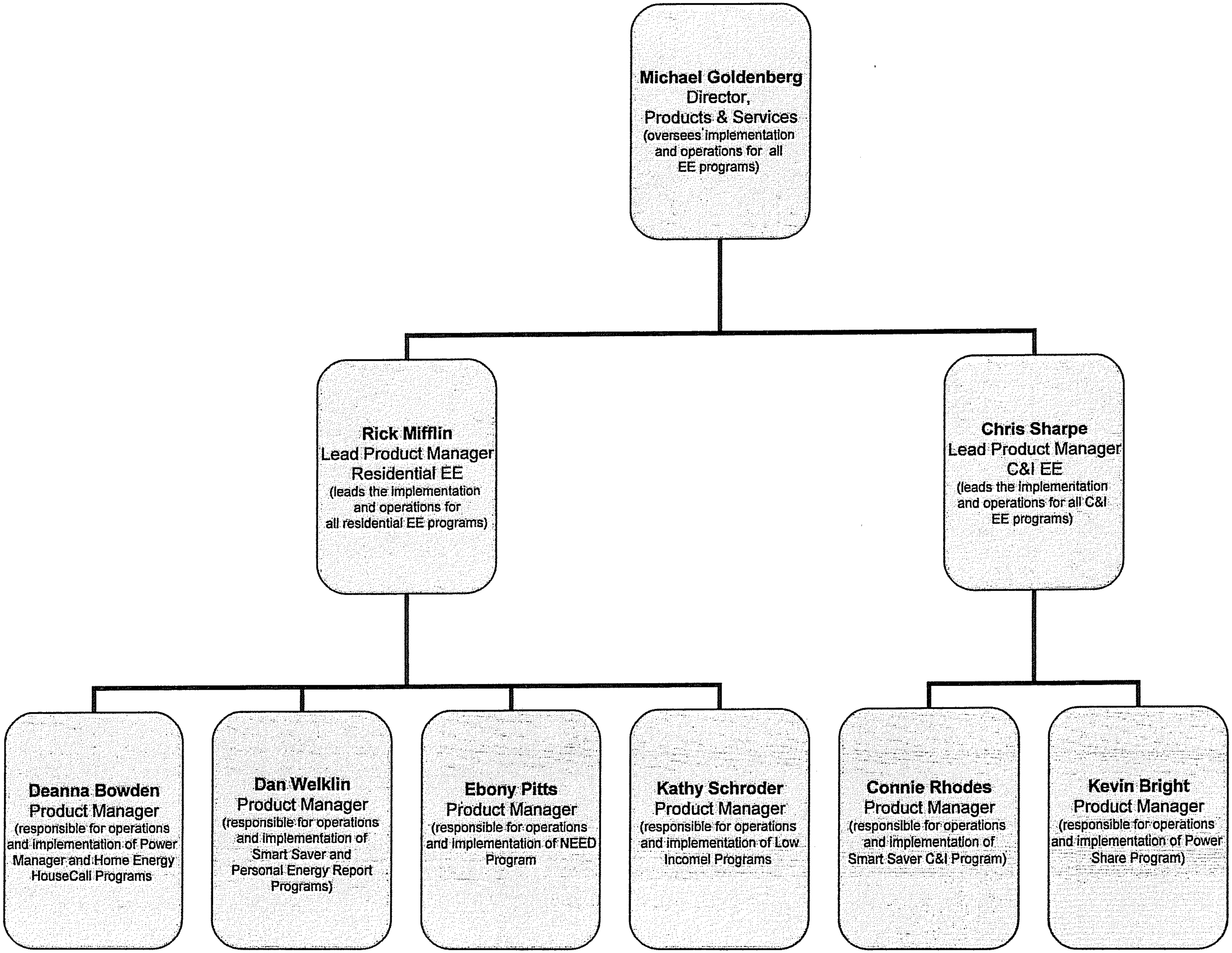
REQUEST:

Please reference the Application at page 17. Provide an organizational chart illustrating personnel and position titles for employees associated with the Company's Kentucky DSM programs along with a description of duties for each of the identified positions.

RESPONSE:

An organizational chart is provided at Attachment AG-DR-01-027.

PERSON RESPONSIBLE: Michael Goldenberg
Kathy Schroder


Michael Goldenberg
Director,
Products & Services
(oversees implementation and operations for all EE programs)
Rick Mifflin
Lead Product Manager
Residential EE
(leads the implementation and operations for all residential EE programs)
Chris Sharpe
Lead Product Manager
C&I EE
(leads the implementation and operations for all C&I EE programs)
Deanna Bowden
Product Manager
(responsible for operations and implementation of Power Manager and Home Energy HouseCall Programs
Dan Welklin
Product Manager
(responsible for operations and implementation of Smart Saver and Personal Energy Report Programs)
Ebony Pitts
Product Manager
(responsible for operations and implementation of NEED Program
Kathy Schroder
Product Manager
(responsible for operations and implementation of Low Incomel Programs
Connie Rhodes
Product Manager
(responsible for operations and implementation of Smart Saver C&I Program)
Kevin Bright
Product Manager
(responsible for operations and implementation of Power Share Program)