


**Save big.
And save yourself
from UltraMegaMart.**

There may be some good reasons for trekking across a big-box store to do your shopping, but buying energy-efficient bulbs isn't one of them.


Start saving now

Now you can get the light bulbs you need – ENERGY STAR® qualified, long-lasting and affordable – at the Duke Energy Savings Store.

You'll find a range of CFL bulbs as well as even more efficient LED bulbs that last 25,000 hours – that's about three years! With these name-brand bulbs at prices up to 92 percent lower than retail, buying from the Savings Store is a great way to conserve your budget. And your sanity.




**\$5 flat rate shipping on
all orders through Oct. 31st**





FEATURED DEAL:
*This 11-watt, long-life Philips® LED Capsule, now only \$8.95
typical retail cost: \$19.99 per bulb*

Visit the Duke Energy Savings Store
Save up to 92% off a wide variety of energy-saving light bulbs!

[Learn more](#)

 Duke Energy Storm on Twitter
Follow us for severe weather tips and restoration updates.

 Duke Energy Storm on Facebook
Get the latest storm, outage and safety information in your news feed.

 youility™ on Facebook
Discover new ways to save energy and money at home.

[Update Your Subscriptions](#) | [Unsubscribe](#) | [Privacy Policy](#) | www.duke-energy.com

Duke Energy | 550 South Tryon Street | Charlotte, NC 28202



Share this on:  

Figure 49. HTML Email Example

Appendix F: Website Screen Images

Because the Duke Energy Savings Store is only accessible to verified Duke Energy customers the following images are shown to provide a sampling of some of the website's features.

Additional images are shown throughout the *Duke Energy Savings Store Website* portion of the Management Interviews section of this evaluation.

DUKE ENERGY Savings Store
energy-saving discounts for Duke Energy residential customers

order questions/support:
click or call for assistance
phone: 866.849.9704

efi

Home Logoff | My Account | Cart | Checkout

SEARCH
Advanced Search

BRANDS
Please Select...

ITEMS
Candelabra
Capsules
Globes
Reflectors
Spirals
Additional Items

SUPPORT
FAQs
Shipping & Returns
Privacy Notice
Contact Us
Package Tracking

McAfee SECURE
TESTED DAILY 26-FEB

The cycle of savings starts here —
with up to 92% off retail prices.

Candelabra
Capsule
Globe
Reflector
Spiral

Play again

NEED HELP?
Bulb Types
What's the right bulb for me?
More Resources

Most Popular
TCP G25 Globe
\$3.99
\$1.30

Free shipping* on all orders of \$25 or more
*offer ends March 31, 2014

This Philips LED capsule:
Now only \$8.95
That's more than 50% off retail.
Buy this bulb

Curious how much you could save by switching to energy-efficient bulbs?
Find out now

Wednesday 26 February, 2014

Products offered have been selected through a competitive bidding process and are subject to change at Duke Energy's discretion. Prices are also subject to change without notice.

These energy-saving offers are available to Duke Energy customers in North Carolina.

© Energy Federation Incorporated

Energy Federation (EFI)
Southborough, Massachusetts
866.849.9704
customerservice@efi.org

GREEN
Certified Site

Figure 50. Savings Store Home Page

Lighting Benefits

As you shop on this site, consider how your purchases will affect your electric bill and impact the environment. Here are some benefits from energy-efficient lighting:

- **They save energy.** These bulbs typically use 75% less energy to produce the same brightness.
- **They last longer.** CFLs last about 10 times longer than incandescents, or roughly 10,000 hours. LEDs last about 25,000 hours, potentially up to 25 years.
- **They help the environment.** If every U.S. household replaced an incandescent with a CFL, the energy saved would light three million homes and prevent greenhouse gas emissions equivalent to taking 800,000 cars off the road.
- **They reduce waste.** Using energy efficient bulbs reduces the number of incandescent bulbs that wind up in landfills.

For savings information about your bulbs, click the "Estimated Savings" tab. You'll see the energy that would be saved, the amount of CO₂ emissions that would be avoided and the potential savings to your pocketbook over the course of a year. Of course, these are just average gains based on certain criteria. Savings will vary based on actual use and electric rates in your state.

MaxLite Flame Tip



This flame tip style compact fluorescent light (CFL) bulb is suitable for locations requiring a decorative bulb where a lot of light is not needed. This 5 watt bulb is roughly equivalent to a 25 watt incandescent light bulb. It is suitable for use in a standard base socket.



| Program Pricing | Estimated Savings | Product Specifications | Other Information |
|--------------------------------|---------------------|------------------------|-------------------|
| Make the Switch... | | | |
| Electric Demand | 25 watts | 5 watts | |
| Utilization | 3 hours per day | 3 hours per day | |
| Annual Use | 27.4 kilowatt hours | 5.5 kilowatt hours | |
| Annual Electricity Savings | | 21.9 kilowatt hours | |
| Annual Carbon Dioxide Savings* | | 27.2 pounds | |
| Annual Dollar Savings* | | \$2.01 | |
| Expected Product Life | | 9.1 years | |

* Based on CO₂ emission coefficient of 1.24 pounds per kWh and an electric rate of 9.2 cents per kWh. Individual savings will vary based upon actual use and source of electricity.

MORE INFORMATION

The assumptions used include the following:

Electric Demand
The product wattages used in these calculations are intended to represent the actual consumption.

Utilization
To the extent that your actual use is more or less than the hours per day referenced your annual kilowatt hour savings will be different, but this provides a common time frame to use for comparison. The formula for calculating your actual kilowatt hour usage is below:

$$\text{Annual kWh} = \text{watts} \times (\text{hours per day} \times 365) / 1000$$

Carbon Dioxide Savings
Carbon dioxide (CO₂) is one of a number of gases emitted into the atmosphere from fossil fuel-fired electric power plants. Carbon dioxide is a greenhouse gas (GHG), contributing to global warming. The CO₂ emissions associated with electricity use will vary depending on the type of fuel used to generate the electricity. Coal, oil, and natural gas power plants all result in increased atmospheric carbon dioxide, though to different degrees. (more info)

Dollar Savings Rate
The electric rate is used is based on data reported by the US Energy Information Administration and/or your local utility. (more info - pdf)


Every product page has an Estimated Savings tab with energy and money savings information.

Figure 51. Lighting Benefits Explanation

About Brightness

When switching to energy-efficient bulbs, you should know the difference between watts and lumens, which measure two completely different things. Lumens are a unit of brightness. The more the lumens, the brighter the light. Consumers have typically referred to watts to gauge brightness, but watts actually measure the energy used. The chart below shows the wattage of commonly used Incandescent bulbs and the equivalent wattage generated by energy-efficient CFLs and LEDs, which use 75 percent less energy.


Video source: U.S. Department of Energy



| Incandescent Bulb (Watts) | Brightness (Lumens) | ENERGY STAR® (Watts) |
|---------------------------|---------------------|----------------------|
| 25 | 250 | 4 to 9 |
| 40 | 450 | 9 to 13 |
| 60 | 800 | 13 to 15 |
| 75 | 1,100 | 18 to 25 |
| 100 | 1,600 | 23 to 30 |
| 125 | 2,000 | 22 to 40 |
| 150 | 2,600 | 40 to 45 |


Figure 52. Brightness Explanation

Recycling and Safety




Where can I recycle CFLs?

Unlike incandescents, which end up in landfills when thrown away, CFLs can - and should - be recycled. Many local governments collect CFLs as part of their hazardous waste collection programs. Many home improvement stores - Home Depot, Lowe's and Ace Hardware - and other retailers also offer convenient recycling programs at no cost. For more information about how and where you can recycle CFLs, please visit this [U.S. Environmental Protection Agency \(EPA\) site](#).




Are CFLs safe?

All CFLs contain a trace amount of mercury, typically fewer than 3 mg - which would just about cover the tip of a ballpoint pen. Compare that with older thermometers, which contained about 500 mg of mercury, which is a highly toxic element. When a CFL no longer works, you should recycle it properly since it's illegal in many communities to throw away such bulbs in your trash.



What if a CFL breaks?

If a CFL breaks, mercury is released as a vapor that can be inhaled or as a fine powder that can settle in a surface, such as a carpet. You need to take certain steps to avoid or lessen the potential harm from a shattered bulb. For instructions on how to properly dispose of a broken CFL, please visit this [EPA site](#).




What if the CFLs I receive in the mail are broken?

It's rare you would receive any broken CFL bulbs - given the cushioning used in the package - when they arrive. If you do, we advise you to place the package containing the broken bulbs in a plastic bag and dispose of it in the trash. It's likely the mercury has already dissipated by the time the package reaches you. For more information, please [contact us](#).

Figure 53. Recycling and Safety Explanation

Application Types

| | | | | | | |
|----------------|-----------------|-----------------------|----------------|--------------|------------------------|---------------|
| Track Lighting | Recessed Lights | Table and Floor Lamps | Pendant Lights | Wall Sconces | Mounted Ceiling Lights | Vanity Lights |
|----------------|-----------------|-----------------------|----------------|--------------|------------------------|---------------|



Track Lighting

Fixtures are attached along a continuous track, which can be mounted on ceilings or walls. They can focus light on an area or item or provide general illumination.

Bulb Option:

Reflector
Emits directional light that can be focused in different concentrations depending on the bulb style.

[Shop for reflector bulbs](#)

Figure 54. Application Types Explanation

Dimmable Spirals



Dimmable compact fluorescents tend to dim well with mechanical slide and rotary controls, but less so with electronic dimming controls, programmable controls, and remote controls. These special bulbs should not be screwed into "hot" sockets; so be sure to turn off power to the socket before installation of the bulb. Finally, dimmable fluorescents will generally not light when the dimming control is at less than full power. Turn the control to full power, turn on the switch, and then dim the fluorescent to the desired level.

Purchase Limit for this Category: 6 incented CFL dimmable spirals.



TCP Dimmable SpringLamp

Watts: 23
Lumens: 1,500
Life: 12,000 hours

PRICE BREAKDOWN



Retail: \$8.30
Savings Store: \$6.75
Duke Incentive: \$4.40
You Pay: \$2.35

~~\$6.75~~

\$2.35

Figure 55. Bulb Category Description Page

TCP Dimmable SpringLamp

This TCP 23 watt Dimmable SpringLamp® is designed for general use around the home. This bulb is a suitable replacement for a 100 watt incandescent light bulb. This lamp is dimmable down to 20%, and UL approved for enclosed fixtures. Intelligent circuit design automatically turns bulb off at a preset position to avoid low-end flicker. End-of-life circuit design meets EURO IEC and UL standards, shutting the bulb off automatically if it senses any lamp starting issues or end of life conditions.

Program Pricing Estimated Savings Product Specifications Installation Instructions

Retail: \$8.30
Savings Store: \$6.75
Duke Incentive: \$4.40
You Pay: \$2.35

Displaying 1 to 2 (of 2 products) Result Pages: 1

| PART #+ | ITEM NAME | PRICE | AVAILABLE |
|--------------|---|-------------------------------------|-----------|
| R1100.7701 | TCP 23 watt Dimmable SpringLamp 1-Pack (incented) | \$6.75 \$2.35 | 6826 |
| R1100.7701_2 | TCP 23 watt Dimmable SpringLamp 2-Pack (incented) | \$13.25 \$4.45 | 3399 |



Displaying 1 to 2 (of 2 products) Result Pages: 1

ENERGY STAR

[printable view](#)

Figure 56. Bulb Description Page - Pricing

TCP Dimmable SpringLamp

This TCP 23 watt Dimmable SpringLamp® is designed for general use around the home. This bulb is a suitable replacement for a 100 watt incandescent light bulb. This lamp is dimmable down to 20%, and UL approved for enclosed fixtures. Intelligent circuit design automatically turns bulb off at a preset position to avoid low-end flicker. End-of-life circuit design meets EURO IEC and UL standards, shutting the bulb off automatically if it senses any lamp starting issues or end of life conditions.

Program Pricing Estimated Savings Product Specifications Installation Instructions

| Make the Switch... | Old Technology | New Technology |
|--------------------------------|----------------------|---------------------|
| Electric Demand | 100 watts | 23 watts |
| Utilization | 3 hours per day | 3 hours per day |
| Annual Use | 109.5 kilowatt hours | 25.1 kilowatt hours |
| Annual Electricity Savings | | 84.4 kilowatt hours |
| Annual Carbon Dioxide Savings* | | 104.6 pounds |
| Annual Dollar Savings* | | \$7.51 |
| Expected Product Life | | 9.1 years |

* Based on CO2 emission coefficient of 1.24 pounds per kWh and an electric rate of 8.9 cents per kWh. Individual savings will vary based upon actual use and source of electricity.

Figure 57. Bulb Description Page - Savings (part 1)

MORE INFORMATION

The assumptions used include the following:

Electric Demand
The product wattages used in these calculations are intended to represent the actual consumption.

Utilization
To the extent that your actual use is more or less than the hours per day referenced your annual kilowatt hour savings will be different, but this provides a common time frame to use for comparison. The formula for calculating your actual kilowatt hour usage is below:



$$\text{Annual kWh} = \text{watts} \times (\text{hours per day} \times 365) / 1000$$

Carbon Dioxide Savings
Carbon dioxide (CO₂) is one of a number of gases emitted into the atmosphere from fossil fuel-fired electric power plants. Carbon dioxide is a greenhouse gas contributing to global warming. The CO₂ emissions associated with electricity use will vary depending on the type of fuel used to generate the electricity. Coal, oil, and natural gas power plants all result in increased atmospheric carbon dioxide, though to different degrees. (more info)

Dollar Savings Rate
The electric rate is used is based on data reported by the US Energy Information Administration and/or your local utility. (more info - pdf)

hp/products_id/3331

Displaying 1 to 2 (of 2 products) Result Pages: 1


| PART #+ | | ITEM NAME | PRICE | AVAILABLE | |
|--------------|---|---|------------------------------|-----------|--|
| R1100.7701 |  | TCP 23 watt Dimmable SpringLamp 1-Pack (incented) | \$6.75 \$2.35 | 6826 | <input type="text" value="1"/> <input type="button" value="add to cart"/> |
| R1100.7701_2 |  | TCP 23 watt Dimmable SpringLamp 2-Pack (incented) | \$13.25 \$4.45 | 3399 | <input type="text" value="1"/> <input type="button" value="add to cart"/> |

Displaying 1 to 2 (of 2 products) Result Pages: 1

Figure 58. Bulb Description Page - Savings (part 2)


TCP


TCP Dimmable SpringLamp





This TCP 23 watt Dimmable SpringLamp® is designed for general use around the home. This bulb is a suitable replacement for a 100 watt incandescent light bulb. This lamp is dimmable down to 20%, and UL approved for enclosed fixtures. Intelligent circuit design automatically turns bulb off at a preset position to avoid low-end flicker. End-of-life circuit design meets EURO IEC and UL standards, shutting the bulb off automatically if it senses any lamp starting issues or end of life conditions.

Program Pricing

Estimated Savings

Product Specifications

Installation Instructions

- Input Power: 120 volts AC
- Power Consumption: 23 watts
- Light Output: 1,500 lumens
- Efficacy: 65.2 lm/w
- Length: 4.9 inches
- Diameter: 2.4 inches
- Rated Life: 12,000 hours
- Color Temperature: 2,700 degrees Kelvin
- Color Rendering: 82 CRI
- Maximum Operating Temperature: 140 degrees F
- Dimmable: Yes
- Manufacturer Residential Warranty: Limited 24 Month
- Base Type: E26 medium screw base
- UL listed: Yes
- RoHS Compliant: Yes
- Origin: China

Note: This lamp should not be used outdoors where it would be exposed to the elements. Use only with photocells, motion detectors, and electronic timers that are suitable for use with compact fluorescent light bulbs. This lamp contains mercury. Please recycle at the end of its life.

Displaying 1 to 2 (of 2 products)
 Result Pages: 1

Figure 59. Bulb Description Page - Specifications



TCP Dimmable SpringLamp





This TCP 23 watt Dimmable SpringLamp® is designed for general use around the home. This bulb is a suitable replacement for a 100 watt incandescent light bulb. This lamp is dimmable down to 20%, and UL approved for enclosed fixtures. Intelligent circuit design automatically turns bulb off at a preset position to avoid low-end flicker. End-of-life circuit design meets EURO IEC and UL standards, shutting the bulb off automatically if it senses any lamp starting issues or end of life conditions.

Program Pricing


Estimated Savings


Product Specifications

Installation Instructions

Prior to installing this light bulb, turn power off to the socket at the switch. If it had previously been on allow the existing light bulb to cool. Unscrew the existing light bulb by turning counter clockwise. Install this new light bulb by turning it clockwise until it is secure in the socket. Do not over-tighten.

Figure 60. Bulb Description Page - Installation

What's In My Cart? 

| Remove | Qty. | Part # | Item(s) | Total |
|---|--------------------------------|-----------|---------------------------------|--------------------|
|  | <input type="text" value="1"/> | R1160.973 | Philips 8w LED PAR20 (incented) | \$14.95 |
| | | | | Sub-Total: \$14.95 |

[update cart](#) [continue shopping](#) [checkout](#)

[printable view](#)

Figure 61. Shopping Cart Screen 1

Delivery Information

Shipping Address

If the order is not to be shipped to the address shown to the right, click change address.

change address

Shipping Address:

 HICKORY, NC 28601
 United States

Shipping Options / Transit Time Estimates

Please select your preferred shipping method for this order.

Please Select

| | | |
|---|---------|----------------------------------|
| Any Carrier | | |
| Regular (del: 7-10 Business Days) | \$5.00 | <input type="radio"/> |
| United Parcel Service | | |
| Ground (del: March 3, 2014 By 11:00 Pm) | \$10.77 | <input type="radio"/> |
| United States Postal Service | | |
| First-class Mail (del: 2 - 5 Business Days) | \$4.12 | <input checked="" type="radio"/> |

* Transit times are estimates, intended to help customers compare options. They do not necessarily represent guaranteed delivery dates and times.

E-Mail Address (required)

Type an email address to continue the order.

Email Address:

Add Comments About Your Order

If neither the billing address nor the shipping address provided is the service address associated with your electric utility/energy efficiency account, please enter that service address below.


Continue Checkout Procedure to select the preferred payment method.

continue

Delivery Information Payment Information Confirmation Finished!

Figure 62. Shopping Cart Screen 2

Payment Information



Billing Address

If the billing address is not the address shown to the right, click change address.

change address 

Billing Address: 
HICKORY, NC 28601
United States

Promotion Codes/Credit Vouchers (if any)


- When redeeming a **Credit Voucher Code**, you must enter it into the Code box and click "Redeem". The value of your voucher will appear in the shopping cart box in the upper right after the page refreshes. Repeat for each Credit Voucher Code.
- When redeeming a **Promo Code**, enter it into the Code box, enter your payment information, and click **CONTINUE** at the bottom of the page. (Do not click "Redeem.")
- When redeeming **BOTH a Credit Voucher Code and a Promo Code**, you must enter the Credit Voucher Code first and click "Redeem." The value of your voucher will appear in the shopping cart box in the upper right after the page refreshes. Next, enter the Promo Code in the same box but DO NOT click "Redeem." Instead, leave the Promo Code in the Code box and "Continue" at the bottom of the page. Your Promo discount will appear on the next page.



Code:



Payment Method

Please select a payment method below.

Please Select 

Credit Card    

Enter your credit card account information below. Charges are preauthorized during checkout, but not settled until after the order has shipped. **All transactions are in U.S. dollars.**

Credit Card Owner:

Credit Card Number:

Credit Card Expiration Date: February 2014

Card Verification # (what is this?):

Check/Money Order

If you wish to pay by check/money order, select this option, complete the checkout process, print a copy of your order, and mail your check/money order (**payable to Energy Federation**) with a copy of your order to EFI. Your order will be shipped upon receipt of payment, unless you have a Net 30 account with EFI in which case you will be billed.

Add Comments About Your Order

If neither the billing address nor the shipping address provided is the service address associated with your electric utility/energy efficiency account, please enter that service address below.

Figure 63. Shopping Cart Screen 3 (part 1)

Terms and Conditions

1. Products must be installed at the premise address associated with the account number purchasing the products.
2. Products cannot be resold under any circumstances.
3. Duke Energy reserves the right to revise incentive levels and/or equipment eligibility at any time.
4. Duke Energy and the third-party order fulfillment vendor have signed a confidentiality agreement to protect customer's personal information.
5. I agree to indemnify, hold harmless and release Duke Energy and its affiliates from any actions or claims in regards to the installation, operation and disposal of equipment (and related materials) covered herein including liability from incidental or consequential damages.
6. Duke Energy does not expressly or implicitly warrant the performance of installed purchased products and is not liable for any damage caused by the installation of these products or for any damage caused by the malfunction of the installed purchased products.

☐ Please check this box to agree to the terms and conditions above, and then click 'Continue' to confirm your order.

Continue Checkout Procedure to confirm this order. [continue](#)

Delivery Information **Payment Information** Confirmation Finished!

Figure 64. Shopping Cart Screen 3 (part 2)





| Order Review  | | | | | | | | | |
|--|---|------------|--------|---|--------|-------------|--------|---------------|---------------|
| Please review order. If correct click the 'Confirm Order' button at the bottom of the page to submit order for processing. | | | | | | | | | |
| Delivery Address (Edit) <div style="background-color: black; width: 100px; height: 15px; margin-bottom: 5px;"></div> <div style="background-color: black; width: 100px; height: 15px; margin-bottom: 5px;"></div> HICKORY, NC 28601 United States Shipping Method (Edit) United States Postal Service (FIRST CLASS) \$4.12 | Items (Edit) 1 x TCP 9w Candelabra-Base Torpedo 1-Pack (incented) \$1.54 | | | | | | | | |
| Billing Information (all transactions are in U.S. Dollars) | | | | | | | | | |
| Billing Address (Edit) <div style="background-color: black; width: 100px; height: 15px; margin-bottom: 5px;"></div> <div style="background-color: black; width: 100px; height: 15px; margin-bottom: 5px;"></div> HICKORY, NC 28601 United States Payment Method (Edit) Check/Money Order | <table border="0"> <tr> <td>Sub-Total:</td> <td>\$1.54</td> </tr> <tr> <td>United States Postal Service (FIRST CLASS):</td> <td>\$4.12</td> </tr> <tr> <td>Sales Tax*:</td> <td>\$0.00</td> </tr> <tr> <td>Total:</td> <td>\$5.66</td> </tr> </table> | Sub-Total: | \$1.54 | United States Postal Service (FIRST CLASS): | \$4.12 | Sales Tax*: | \$0.00 | Total: | \$5.66 |
| Sub-Total: | \$1.54 | | | | | | | | |
| United States Postal Service (FIRST CLASS): | \$4.12 | | | | | | | | |
| Sales Tax*: | \$0.00 | | | | | | | | |
| Total: | \$5.66 | | | | | | | | |
| <p>*If sales tax has not been added to this order you may be required to file a sales or use tax return directly. You are advised to consult with the Department of Revenue in your state to determine your sales or use tax obligations.</p> | | | | | | | | | |
| Payment Information | | | | | | | | | |
| <p>Make Payable To: Energy Federation</p> <p>Send To: Energy Federation (EFI) Program: Duke Energy (NC residential) 1 Willow Street, Suite 2 Southborough, MA 01772-1026</p> <p>Your order will not ship until we receive payment.</p> | | | | | | | | | |
| <p>IF YOU ENTERED A PROMOTION OR CREDIT VOUCHER CODE ON THE PAYMENT SCREEN, PLEASE CONFIRM THE APPROPRIATE DISCOUNT WAS APPLIED BEFORE PROCEEDING.</p> <p style="text-align: right;">confirm order </p> | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center; margin-top: 20px;"> Delivery Information Payment Information  Confirmation Finished! </div> | | | | | | | | | |


Figure 65. Shopping Cart Screen 4


Package Tracking



UPS (United Parcel Service) Packages:

You may enter either your order number or the UPS assigned tracking code in the appropriate box below. You can obtain your order number through the 'My Account' section of the site. Log in to your account, view 'Order History', and click the 'Track UPS Packages' link of the order you wish to track.

 **TRACK BY ORDER NUMBER**

 **TRACK BY UPS TRACKING NUMBER**

USPS (US Postal Service) Packages:

These orders are not traceable while in transit, but we can request delivery information from the Postal Service. Call 866-849-9704 to request delivery confirmation for your order if the 'My Account' section of the site shows the order has shipped.

Figure 66. Package Tracking

Appendix G: Household Characteristics and Demographics

Program Participant and Non-Participant Market Segment Comparison

Duke Energy provided PRIZM segmentation codes for program participants and non-participants. Table 143 shows the distributions of PRIZM income, social and lifestyle segments among the pool of Carolinas participants and non-participants.⁵¹ This table also shows index scores that compare the relative distributions of participants to non-participants (an index score of 100 indicates an identical distribution of participants and non-participants; index scores less than 100 indicate less representation among the participant group relative to the non-participant group, and scores greater than 100 indicate more representation among the participant group⁵²).

The participant group skews toward relatively higher income groups (20.6% versus 15.8% of non-participants, index of 131) and to a lesser extent towards suburbanites (26.0% versus 23.1% of non-participants, index of 112). Participants are less likely than non-participants to be in the lowest income segments (21.3% versus 27.7% of non-participants, index of 77) and living in “Second City” neighborhoods (12.7% versus 15.5% of non-participants, index of 82; note that no households in the Carolina System are categorized as “Urban” Social Groups according to the PRIZM system⁵³). These differences are all statistically significant at $p < .05$ or better using Student’s t-test.

In terms of age groups (Lifestyle segments), the participants skew slightly towards the “Mature Years” group (predominantly “empty nesters” and household heads over 55 years old; 42.0% versus 39.5% of non-participants, index 106) and away from the “Younger Years” group (predominantly singles and childless couples under age 45; 28.5% versus 31.1% of non-participants, index 91). These differences are also statistically significant at $p < .05$ or better using Student’s t-test.

The proportion of these groups in the middle income and “Town and Rural” segments (each of which accounts for more than half of Carolinas customers) are very similar, as are the

⁵¹ The income distribution shown in the table is based on the Social Group segmentation; as such it is a relative measure (it shows high or low income relative to other households in the same Social Group segment, not absolute high or low income compared to all households). A key to PRIZM segmentation can be found at <http://www.srds.com/frontMatter/ips/lifestyle/reports/prizm.html>

⁵² PRIZM market segmentation reports often include a similarly-scaled “Index” score, however PRIZM scores are computed so that 100 represents a segment or subgroup being equal to the average distribution across all American households. The index scores presented in this appendix compare program participants in the Carolina System to non-participants in the Carolina System.

⁵³ PRIZM segmentation defines “urban” households as those in neighborhoods with a population density at or higher than the 85th percentile of all American households (there are no neighborhoods this densely populated in the Carolinas). The “second city” segment includes households with population densities between the 40th and 85th percentile which are also population centers (including the central areas of relatively “smaller” cities such as Charlotte). The “suburban” segment has population densities ranging from the 40th to 90th percentile but these neighborhoods are not population centers (they are adjacent to more densely-populated areas). Households in the “town and rural” segment live in neighborhoods with a population density in the 40th percentile or lower.

proportions in the “Family Life” Lifestyle segment (predominantly middle-aged households with children); indexes for these segments range from 100 to 103. The index score of 103 for the middle income segment does represent a statistically significant difference between groups at $p < .05$ using Student’s t-test (this relatively small difference is significant due to large sample sizes), however the index scores of 100 and 101 do not represent significant differences ($p > .10$ using Student’s t-test).

Table 143. PRIZM Market Segmentation for Participants and Non-Participants

| <i>Base: all Carolinas customers in uncleaned data files with valid PRIZM codes</i> | Participant data file (N=8,125) | Non-Participant data file (N=75,562) | Participant Index (participant divided by non-participant; 100=same proportion) |
|---|--|---|---|
| Income segments: | | | |
| Highest income | 20.6% | 15.8% | 131 * |
| Middle income | 58.1% | 56.5% | 103 * |
| Lowest income | 21.3% | 27.7% | 77 * |
| Social Group segments: | | | |
| Second City | 12.7% | 15.5% | 82 * |
| Suburban | 26.0% | 23.1% | 112 * |
| Town and Rural | 61.3% | 61.3% | 100 |
| Lifestyle segments: | | | |
| Younger Years | 28.5% | 31.1% | 91 * |
| Family Life | 29.6% | 29.4% | 101 |
| Mature Years | 42.0% | 39.5% | 106 * |

* Asterisks indicate a significant difference between groups at $p < .05$ or better using Student’s t-test.

Participant Survey Households

One hundred and thirty-six program participants in the Carolina System were surveyed for this evaluation (106 in North Carolina and 30 in South Carolina). This appendix presents household and demographic data collected during the participant survey.

In what type of building do you live? * State

| | | | State | | Total |
|---|---|----------------|-------------------|-------------------|--------|
| | | | North Carolina | South Carolina | |
| In what type of building do you live? | Single-family home, detached construction | Count | 96 | 28 | 124 |
| | | % within State | 90.6% | 93.3% | 91.2% |
| | Single family home, factory | Count | 4 | 1 | 5 |
| | | % within State | 3.8% | 3.3% | 3.7% |
| | manufactured/modular | | | | |
| | Single family, mobile home | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Apartment (4 + families)---traditional structure | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Condominium--- traditional structure | Count | 4 | 0 | 4 |
| | | % within State | 3.8% | 0.0% | 2.9% |
| | Other: "single family home converted so that upstairs and downstairs are separate units" | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | | | | | |
| Total | | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What year was your residence built? * State

| | | | State | | Total |
|--|-----------------|----------------|-------------------|-------------------|--------|
| | | | North Carolina | South Carolina | |
| What year was your residence built? | 1959 and before | Count | 18 | 5 | 23 |
| | | % within State | 17.0% | 16.7% | 16.9% |
| | 1960-1979 | Count | 28 | 10 | 38 |
| | | % within State | 26.4% | 33.3% | 27.9% |
| | 1980-1989 | Count | 20 | 5 | 25 |
| | | % within State | 18.9% | 16.7% | 18.4% |
| | 1990-1997 | Count | 8 | 3 | 11 |
| | | % within State | 7.5% | 10.0% | 8.1% |
| | 1998-2000 | Count | 11 | 0 | 11 |
| | | % within State | 10.4% | 0.0% | 8.1% |
| | 2001-2007 | Count | 11 | 2 | 13 |
| | | % within State | 10.4% | 6.7% | 9.6% |
| | 2008-present | Count | 9 | 3 | 12 |
| | | % within State | 8.5% | 10.0% | 8.8% |
| | DK/NS | Count | 1 | 2 | 3 |
| | | % within State | 0.9% | 6.7% | 2.2% |
| Total | | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How long have you lived in your current home? * State

| | | State | | Total |
|--|---|---------------------------------|--------------------------------|----------|
| | | North Carolina (valid N=106) | South Carolina (valid N=30) | |
| | Average years | 19.40 | 14.87 | 18.40 |
| | Median years | 15.00 | 9.00 | 15.00 |
| | Maximum | 66 years | 50 years | 66 years |
| | Minimum | 7 months | 6 months | 6 months |
| | Percent living in current home for 5 years or less | 25.5% | 36.7% | 27.9% |

How many rooms are in your home (excluding bathrooms, but including finished basements)? * State

| | | | State | | Total |
|--|------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many rooms are in your home (excluding bathrooms, but including finished basements)? | 4 | Count | 5 | 3 | 8 |
| | | % within State | 4.7% | 10.0% | 5.9% |
| | 5 | Count | 17 | 3 | 20 |
| | | % within State | 16.0% | 10.0% | 14.7% |
| | 6 | Count | 18 | 4 | 22 |
| | | % within State | 17.0% | 13.3% | 16.2% |
| | 7 | Count | 18 | 8 | 26 |
| | | % within State | 17.0% | 26.7% | 19.1% |
| | 8 | Count | 15 | 8 | 23 |
| | | % within State | 14.2% | 26.7% | 16.9% |
| | 9 | Count | 12 | 1 | 13 |
| | | % within State | 11.3% | 3.3% | 9.6% |
| | 10 or more | Count | 21 | 3 | 24 |
| | | % within State | 19.8% | 10.0% | 17.6% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| Which of the following best describes your home's heating system? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|---|-------------------------|-------|------------------------|-------|----------------|-------|
| None | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Central forced air furnace | 64 | 60.4% | 19 | 63.3% | 83 | 61.0% |
| Electric Baseboard | 2 | 1.9% | 0 | 0.0% | 2 | 1.5% |
| Heat Pump | 47 | 44.3% | 10 | 33.3% | 57 | 41.9% |
| Geothermal Heat Pump | 2 | 1.9% | 0 | 0.0% | 2 | 1.5% |
| Gas pack / gas log fireplace | 1 | 0.9% | 1 | 3.3% | 2 | 1.5% |
| Other: listed below | 6 | 5.7% | 1 | 3.3% | 7 | 5.1% |
| Don't know | 1 | 0.9% | 0 | 0.0% | 1 | 0.7% |

May total to more than 100% because respondents could give multiple responses.

Seven surveyed participants mentioned "other" types of heating system; these are listed below.

- *Electric space heaters (NC)*
- *Hybrid heat pump furnace (NC)*
- *Propane-powered heater (NC)*
- *Space heaters and solar pump wood stove (NC)*
- *Ultra-red space heater (NC)*
- *Wood stove with fan distribution (NC)*
- *Fireplace heaters and space heaters (SC)*

How old is your heating system? * State

| | | | State | | Total |
|---------------------------------|-------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How old is your heating system? | 0-4 years | Count | 31 | 9 | 40 |
| | | % within State | 29.2% | 30.0% | 29.4% |
| | 5-9 years | Count | 33 | 11 | 44 |
| | | % within State | 31.1% | 36.7% | 32.4% |
| | 10-14 years | Count | 13 | 3 | 16 |
| | | % within State | 12.3% | 10.0% | 11.8% |
| | 15-19 years | Count | 12 | 1 | 13 |
| | | % within State | 11.3% | 3.3% | 9.6% |
| | 19 years or older | Count | 10 | 3 | 13 |
| | | % within State | 9.4% | 10.0% | 9.6% |
| | DK/NS | Count | 7 | 3 | 10 |
| | | % within State | 6.6% | 10.0% | 7.4% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

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

| | | | State | | Total |
|--|-------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What is the primary fuel used in your heating system? | Electricity | Count | 50 | 12 | 62 |
| | | % within State | 47.2% | 40.0% | 45.6% |
| | Natural Gas | Count | 49 | 16 | 65 |
| | | % within State | 46.2% | 53.3% | 47.8% |
| | Oil | Count | 3 | 0 | 3 |
| | | % within State | 2.8% | 0.0% | 2.2% |
| | Propane | Count | 2 | 1 | 3 |
| | | % within State | 1.9% | 3.3% | 2.2% |
| | Wood | Count | 1 | 0 | 2 |
| | | % within State | 0.9% | 0.0% | 1.5% |
| | DK/NS | Count | 1 | 1 | 1 |
| | | % within State | 0.9% | 3.3% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What is the secondary fuel used in your primary heating system, if any? * State

| | | | State | | Total |
|---|-------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What is the secondary fuel used in your primary heating system, if any? | Electricity | Count | 26 | 9 | 35 |
| | | % within State | 24.5% | 30.0% | 25.7% |
| | Natural Gas | Count | 5 | 0 | 5 |
| | | % within State | 4.7% | 0.0% | 3.7% |
| | Propane | Count | 1 | 1 | 2 |
| | | % within State | 0.9% | 3.3% | 1.5% |
| | Other | Count | 9 | 0 | 9 |
| | | % within State | 8.5% | 0.0% | 6.6% |
| | None | Count | 65 | 19 | 84 |
| | | % within State | 61.3% | 63.3% | 61.8% |
| | DK/NS | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Nine North Carolina participant survey respondents mentioned “other” secondary fuel sources; these are listed below.

- Fuel oil and propane gas pack
- Gas logs
- Propane gas fireplace
- Solar and wood
- Space heaters
- Two gas log fireplaces
- Wood stove and gas log fireplace
- Wood stove and propane
- Water

| Do you use one or more of the following to cool your home? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|--|-------------------------|-------|------------------------|-------|----------------|-------|
| None, do not cool the home | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Heat pump for cooling | 46 | 43.4% | 10 | 33.3% | 56 | 41.2% |
| Central air conditioning | 62 | 58.5% | 19 | 63.3% | 81 | 59.6% |
| Through the wall or window air conditioning unit | 5 | 4.7% | 2 | 6.7% | 7 | 5.1% |
| Geothermal Heat pump | 2 | 1.9% | 0 | 0.0% | 2 | 1.5% |
| Don't know | 1 | 0.9% | 0 | 0.0% | 1 | 0.7% |

May total to more than 100% because respondents could give multiple responses.

How many window-unit or through the wall air conditioner(s) do you use? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| d9 How many window-unit or through the wall air conditioner(s) do you use? | 1 | Count | 6 | 1 | 7 |
| | | % within State | 5.7% | 3.3% | 5.1% |
| | 2 | Count | 1 | 2 | 3 |
| | | % within State | 0.9% | 6.7% | 2.2% |
| | 3 | Count | 2 | 0 | 2 |
| | | % within State | 1.9% | 0.0% | 1.5% |
| | None | Count | 97 | 27 | 124 |
| | | % within State | 91.5% | 90.0% | 91.2% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| What is the fuel used in your cooling system? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|---|-------------------------|-------|------------------------|--------|----------------|-------|
| Electricity | 104 | 98.1% | 30 | 100.0% | 134 | 98.5% |
| Natural Gas | 2 | 1.9% | 0 | 0.0% | 2 | 1.5% |
| None (no cooling system) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

How old is your cooling system? * State

| | | | State | | Total |
|---------------------------------|-------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How old is your cooling system? | 0-4 years | Count | 33 | 9 | 42 |
| | | % within State | 31.1% | 30.0% | 30.9% |
| | 5-9 years | Count | 34 | 11 | 45 |
| | | % within State | 32.1% | 36.7% | 33.1% |
| | 10-14 years | Count | 12 | 3 | 15 |
| | | % within State | 11.3% | 10.0% | 11.0% |
| | 15-19 years | Count | 10 | 1 | 11 |
| | | % within State | 9.4% | 3.3% | 8.1% |
| | 19 years or older | Count | 9 | 3 | 12 |
| | | % within State | 8.5% | 10.0% | 8.8% |
| | DK/NS | Count | 8 | 3 | 11 |
| | | % within State | 7.5% | 10.0% | 8.1% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| What is the fuel used by your water heater? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|---|-------------------------|-------|------------------------|-------|----------------|-------|
| Electricity | 60 | 56.6% | 16 | 53.3% | 76 | 55.9% |
| Natural Gas | 44 | 41.5% | 11 | 36.7% | 55 | 40.4% |
| Solar pre-heated | 1 | 0.9% | 1 | 3.3% | 2 | 1.5% |
| No water heater | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 3 | 2.8% | 2 | 6.7% | 5 | 3.7% |

May total to more than 100% because respondents could give multiple responses.

How old is your water heater? * State

| | | | State | | Total |
|-------------------------------|--------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How old is your water heater? | 0-4 years | Count | 31 | 10 | 41 |
| | | % within State | 29.2% | 33.3% | 30.1% |
| | 5-9 years | Count | 36 | 12 | 48 |
| | | % within State | 34.0% | 40.0% | 35.3% |
| | 10-14 years | Count | 16 | 2 | 18 |
| | | % within State | 15.1% | 6.7% | 13.2% |
| | 15-19 years | Count | 10 | 1 | 11 |
| | | % within State | 9.4% | 3.3% | 8.1% |
| | More than 19 years | Count | 4 | 2 | 6 |
| | | % within State | 3.8% | 6.7% | 4.4% |
| | DK/NS | Count | 9 | 3 | 12 |
| | | % within State | 8.5% | 10.0% | 8.8% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| What type of fuel do you use for indoor cooking on the stovetop or range? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|---|-------------------------|-------|------------------------|-------|----------------|-------|
| Electricity | 89 | 84.0% | 24 | 80.0% | 113 | 83.1% |
| Natural Gas | 17 | 16.0% | 6 | 20.0% | 23 | 16.9% |
| Propane | 1 | 0.9% | 0 | 0.0% | 1 | 0.7% |
| None (no stove) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

| What type of fuel do you use for indoor cooking in the oven? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|--|-------------------------|-------|------------------------|-------|----------------|-------|
| Electricity | 95 | 89.6% | 27 | 90.0% | 122 | 89.7% |
| Natural Gas | 10 | 9.4% | 5 | 16.7% | 15 | 11.0% |
| Propane | 1 | 0.9% | 0 | 0.0% | 1 | 0.7% |
| None (no oven) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

| What type of fuel do you use for clothes drying? | North Carolina N=106 | | South Carolina N=30 | | Total N=136 | |
|--|-------------------------|-------|------------------------|-------|----------------|-------|
| Electricity | 93 | 87.7% | 28 | 93.3% | 121 | 89.0% |
| Natural Gas | 13 | 12.3% | 3 | 10.0% | 16 | 11.8% |
| None (no dryer) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

About how many square feet of living space are in your home? * State

| | | | State | | Total |
|--|--------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| About how many square feet of living space are in your home? | 500 to 999 | Count | 2 | 1 | 3 |
| | | % within State | 1.9% | 3.3% | 2.2% |
| | 1000 to 1499 | Count | 17 | 5 | 22 |
| | | % within State | 16.0% | 16.7% | 16.2% |
| | 1500 to 1999 | Count | 30 | 9 | 39 |
| | | % within State | 28.3% | 30.0% | 28.7% |
| | 2000 to 2499 | Count | 16 | 8 | 24 |
| | | % within State | 15.1% | 26.7% | 17.6% |
| | 2500 to 2999 | Count | 8 | 3 | 11 |
| | | % within State | 7.5% | 10.0% | 8.1% |
| | 3000 to 3499 | Count | 10 | 1 | 11 |
| | | % within State | 9.4% | 3.3% | 8.1% |
| | 3500 to 3999 | Count | 4 | 1 | 5 |
| | | % within State | 3.8% | 3.3% | 3.7% |
| | 4000 or more | Count | 8 | 0 | 8 |
| | | % within State | 7.5% | 0.0% | 5.9% |
| | DK/NS | Count | 11 | 2 | 13 |
| | | % within State | 10.4% | 6.7% | 9.6% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Do you own or rent your home? * State

| | | | State | | Total |
|-------------------------------|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you own or rent your home? | Own | Count | 105 | 29 | 134 |
| | | % within State | 99.1% | 96.7% | 98.5% |
| | Rent | Count | 1 | 1 | 2 |
| | | % within State | 0.9% | 3.3% | 1.5% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many levels are in your home (not including your basement)? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many levels are in your home (not including your basement)? | One | Count | 55 | 18 | 73 |
| | | % within State | 51.9% | 60.0% | 53.7% |
| | Two | Count | 41 | 11 | 52 |
| | | % within State | 38.7% | 36.7% | 38.2% |
| | Three | Count | 10 | 1 | 11 |
| | | % within State | 9.4% | 3.3% | 8.1% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your home have a heated or unheated basement? * State

| | | | State | | Total |
|--|-------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your home have a heated or unheated basement? | Heated | Count | 20 | 4 | 24 |
| | | % within State | 18.9% | 13.3% | 17.6% |
| | Unheated | Count | 13 | 1 | 14 |
| | | % within State | 12.3% | 3.3% | 10.3% |
| | No basement | Count | 73 | 25 | 98 |
| | | % within State | 68.9% | 83.3% | 72.1% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your home have an attic? * State

| | | | State | | Total |
|-------------------------------|----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your home have an attic? | Yes | Count | 85 | 24 | 109 |
| | | % within State | 80.2% | 80.0% | 80.1% |
| | No | Count | 21 | 6 | 27 |
| | | % within State | 19.8% | 20.0% | 19.9% |
| Total | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Are your central air/heat ducts located in the attic? * State

| | | | State | | Total |
|---|----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Are your central air/heat ducts located in the attic? | Yes | Count | 32 | 7 | 39 |
| | | % within State | 30.2% | 23.3% | 28.7% |
| | No | Count | 50 | 16 | 66 |
| | | % within State | 47.2% | 53.3% | 48.5% |
| | N/A | Count | 22 | 6 | 28 |
| | | % within State | 20.8% | 20.0% | 20.6% |
| | DK/NS | Count | 2 | 1 | 3 |
| | | % within State | 1.9% | 3.3% | 2.2% |
| Total | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Does your house have cold drafts in the winter? * State

| | | | State | | Total |
|---|----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your house have cold drafts in the winter? | Yes | Count | 15 | 6 | 21 |
| | | % within State | 14.2% | 20.0% | 15.4% |
| | No | Count | 90 | 24 | 114 |
| | | % within State | 84.9% | 80.0% | 83.8% |
| | DK/NS | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| Total | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Does your house have sweaty windows in the winter? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your house have sweaty windows in the winter? | Yes | Count | 14 | 5 | 19 |
| | | % within State | 13.2% | 16.7% | 14.0% |
| | No | Count | 92 | 24 | 116 |
| | | % within State | 86.8% | 80.0% | 85.3% |
| | DK/NS | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Do you notice uneven temperatures between the rooms in your home? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you notice uneven temperatures between the rooms in your home? | Yes | Count | 44 | 10 | 54 |
| | | % within State | 41.5% | 33.3% | 39.7% |
| | No | Count | 62 | 19 | 81 |
| | | % within State | 58.5% | 63.3% | 59.6% |
| | DK/NS | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your heating system keep your home comfortable in winter? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your heating system keep your home comfortable in winter? | Yes | Count | 103 | 29 | 132 |
| | | % within State | 97.2% | 96.7% | 97.1% |
| | No | Count | 3 | 1 | 4 |
| | | % within State | 2.8% | 3.3% | 2.9% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your cooling system keep your home comfortable in summer? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your cooling system keep your home comfortable in summer? | Yes | Count | 97 | 28 | 125 |
| | | % within State | 91.5% | 93.3% | 91.9% |
| | No | Count | 8 | 1 | 9 |
| | | % within State | 7.5% | 3.3% | 6.6% |
| | DK/NS | Count | 1 | 1 | 2 |
| | | % within State | 0.9% | 3.3% | 1.5% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Do you have a programmable thermostat? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you have a programmable thermostat? | Yes | Count | 63 | 14 | 77 |
| | | % within State | 59.4% | 46.7% | 56.6% |
| | No | Count | 42 | 16 | 58 |
| | | % within State | 39.6% | 53.3% | 42.6% |
| | DK/NS | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many thermostats are there in your home? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many thermostats are there in your home? | 0 | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | 1 | Count | 74 | 22 | 96 |
| | | % within State | 69.8% | 73.3% | 70.6% |
| | 2 | Count | 24 | 6 | 30 |
| | | % within State | 22.6% | 20.0% | 22.1% |
| | 3 | Count | 8 | 0 | 8 |
| | | % within State | 7.5% | 0.0% | 5.9% |
| | DK/NS | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What temperature is your thermostat set to on a typical summer weekday afternoon? * State

| | | | State | | Total |
|---|------------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What temperature is your thermostat set to on a typical summer weekday afternoon? | Less than 69 degrees | Count | 3 | 2 | 5 |
| | | % within State | 2.8% | 6.7% | 3.7% |
| | 69-72 degrees | Count | 40 | 5 | 45 |
| | | % within State | 37.7% | 16.7% | 33.1% |
| | 73-78 degrees | Count | 55 | 21 | 76 |
| | | % within State | 51.9% | 70.0% | 55.9% |
| | Higher than 78 degrees | Count | 4 | 1 | 5 |
| | | % within State | 3.8% | 3.3% | 3.7% |
| | Off | Count | 3 | 1 | 4 |
| | | % within State | 2.8% | 3.3% | 2.9% |
| | DK/NS | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What temperature is your thermostat set to on a typical winter weekday afternoon? * State

| | | | State | | Total |
|---|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What temperature is your thermostat set to on a typical winter weekday afternoon? | Less than 67 degrees | Count | 15 | 2 | 17 |
| | | % within State | 14.2% | 6.7% | 12.5% |
| | 67-70 degrees | Count | 51 | 19 | 70 |
| | | % within State | 48.1% | 63.3% | 51.5% |
| | 71-73 degrees | Count | 24 | 7 | 31 |
| | | % within State | 22.6% | 23.3% | 22.8% |
| | 74-77 degrees | Count | 13 | 2 | 15 |
| | | % within State | 12.3% | 6.7% | 11.0% |
| | 78 degrees or higher | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Off | Count | 2 | 0 | 2 |
| | | % within State | 1.9% | 0.0% | 1.5% |
| Total | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Do you have a swimming pool, hot-tub or spa? * State

| | | | State | | Total |
|--|----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you have a swimming pool, hot-tub or spa? | Yes | Count | 7 | 2 | 9 |
| | | % within State | 6.6% | 6.7% | 6.6% |
| | No | Count | 99 | 28 | 127 |
| | | % within State | 93.4% | 93.3% | 93.4% |
| | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort *

| State | | | State | | Total |
|--|----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Would a two-degree increase in the summer afternoon temperature in your home affect your comfort | Not at all | Count | 28 | 6 | 34 |
| | | % within State | 26.4% | 20.0% | 25.0% |
| | Slightly | Count | 33 | 10 | 43 |
| | | % within State | 31.1% | 33.3% | 31.6% |
| | Moderately, or | Count | 28 | 8 | 36 |
| | | % within State | 26.4% | 26.7% | 26.5% |
| | Greatly | Count | 15 | 5 | 20 |
| | | % within State | 14.2% | 16.7% | 14.7% |
| | DK/NS | Count | 2 | 1 | 3 |
| | | % within State | 1.9% | 3.3% | 2.2% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many people live in this home? * State

| | | | State | | Total |
|------------------------------------|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many people live in this home? | 1 | Count | 24 | 5 | 29 |
| | | % within State | 22.6% | 16.7% | 21.3% |
| | 2 | Count | 52 | 14 | 66 |
| | | % within State | 49.1% | 46.7% | 48.5% |
| | 3 | Count | 13 | 3 | 16 |
| | | % within State | 12.3% | 10.0% | 11.8% |
| | 4 | Count | 14 | 7 | 21 |
| | | % within State | 13.2% | 23.3% | 15.4% |
| | 5 | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | 6 | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 3.3% | 0.7% |
| | 8 or more | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Prefer not to answer | Count | 1 | 0 | 1 |
| | | % within State | 0.9% | 0.0% | 0.7% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many of them are teenagers age 13-19? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many of them are teenagers age 13-19? | 0 | Count | 95 | 25 | 120 |
| | | % within State | 89.6% | 83.3% | 88.2% |
| | 1 | Count | 7 | 2 | 9 |
| | | % within State | 6.6% | 6.7% | 6.6% |
| | 2 | Count | 4 | 3 | 7 |
| | | % within State | 3.8% | 10.0% | 5.1% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many persons are usually home on a weekday afternoon? * State

| | | | State | | Total |
|----------------------|----------------|--|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| 0 | Count | | 4 | 2 | 6 |
| | % within State | | 3.8% | 6.7% | 4.4% |
| 1 | Count | | 50 | 11 | 61 |
| | % within State | | 47.2% | 36.7% | 44.9% |
| 2 | Count | | 41 | 11 | 52 |
| | % within State | | 38.7% | 36.7% | 38.2% |
| 3 | Count | | 5 | 2 | 7 |
| | % within State | | 4.7% | 6.7% | 5.1% |
| 4 | Count | | 2 | 4 | 6 |
| | % within State | | 1.9% | 13.3% | 4.4% |
| 5 | Count | | 2 | 0 | 2 |
| | % within State | | 1.9% | 0.0% | 1.5% |
| 7 | Count | | 1 | 0 | 1 |
| | % within State | | 0.9% | 0.0% | 0.7% |
| Prefer not to answer | Count | | 1 | 0 | 1 |
| | % within State | | 0.9% | 0.0% | 0.7% |
| Total | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Are you planning on making any large purchases to improve energy efficiency in the next 3 years? *

State

| | | | State | | Total |
|-------|----------------|--|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Yes | Count | | 29 | 6 | 35 |
| | % within State | | 27.4% | 20.0% | 25.7% |
| No | Count | | 71 | 17 | 88 |
| | % within State | | 67.0% | 56.7% | 64.7% |
| DK/NS | Count | | 6 | 7 | 13 |
| | % within State | | 5.7% | 23.3% | 9.6% |
| Total | Count | | 106 | 30 | 136 |
| | % within State | | 100.0% | 100.0% | 100.0% |

What is your age group? * State

| | | | State | | Total |
|-------------------------|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What is your age group? | 18-34 | Count | 8 | 3 | 11 |
| | | % within State | 7.5% | 10.0% | 8.1% |
| | 35-49 | Count | 10 | 6 | 16 |
| | | % within State | 9.4% | 20.0% | 11.8% |
| | 50-59 | Count | 23 | 4 | 27 |
| | | % within State | 21.7% | 13.3% | 19.9% |
| | 60-64 | Count | 13 | 4 | 17 |
| | | % within State | 12.3% | 13.3% | 12.5% |
| | 65-74 | Count | 34 | 9 | 43 |
| | | % within State | 32.1% | 30.0% | 31.6% |
| | Over 74 | Count | 12 | 4 | 16 |
| | | % within State | 11.3% | 13.3% | 11.8% |
| | Prefer not to answer | Count | 6 | 0 | 6 |
| | | % within State | 5.7% | 0.0% | 4.4% |
| | Total | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Please indicate your annual household income * State

| | | | State | | Total |
|--|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Please indicate your annual household income | Under \$15,000 | Count | 2 | 0 | 2 |
| | | % within State | 1.9% | 0.0% | 1.5% |
| | \$15,000-\$29,999 | Count | 5 | 3 | 8 |
| | | % within State | 4.7% | 10.0% | 5.9% |
| | \$30,000-\$49,999 | Count | 21 | 4 | 25 |
| | | % within State | 19.8% | 13.3% | 18.4% |
| | \$50,000-\$74,999 | Count | 15 | 3 | 18 |
| | | % within State | 14.2% | 10.0% | 13.2% |
| | \$75,000-\$100,000 | Count | 15 | 5 | 20 |
| | | % within State | 14.2% | 16.7% | 14.7% |
| | Over \$100,000 | Count | 16 | 4 | 20 |
| | | % within State | 15.1% | 13.3% | 14.7% |
| | Prefer Not to Answer | Count | 30 | 11 | 41 |
| | | % within State | 28.3% | 36.7% | 30.1% |
| | DK/NS | Count | 2 | 0 | 2 |
| | | % within State | 1.9% | 0.0% | 1.5% |
| Total | | Count | 106 | 30 | 136 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Non-Participant Survey Households

Eighty customers in the Carolina System who did not participate in the Specialty Bulbs program were surveyed for this evaluation (67 in North Carolina and 13 in South Carolina). This appendix presents household and demographic data collected during the non-participant survey.

In what type of building do you live? * State

| | | | State | | Total |
|---------------------------------------|--|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| In what type of building do you live? | Single-family home, detached construction | Count | 47 | 9 | 56 |
| | | % within State | 70.1% | 69.2% | 70.0% |
| | Single family home, factory manufactured/modular | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | Single family, mobile home | Count | 3 | 0 | 3 |
| | | % within State | 4.5% | 0.0% | 3.8% |
| | Row House | Count | 2 | 1 | 3 |
| | | % within State | 3.0% | 7.7% | 3.8% |
| | Two or Three family attached residence-traditional structure | Count | 3 | 2 | 5 |
| | | % within State | 4.5% | 15.4% | 6.3% |
| | Apartment (4 + families)---traditional structure | Count | 2 | 0 | 2 |
| | | % within State | 3.0% | 0.0% | 2.5% |
| | Condominium---traditional structure | Count | 5 | 1 | 6 |
| | | % within State | 7.5% | 7.7% | 7.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What year was your residence built? * State Crosstabulation

| | | | State | | Total |
|---|-----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What year was your residence built? | 1959 and before | Count | 13 | 4 | 17 |
| | | % within State | 19.4% | 30.8% | 21.3% |
| | 1960-1979 | Count | 17 | 2 | 19 |
| | | % within State | 25.4% | 15.4% | 23.8% |
| | 1980-1989 | Count | 12 | 4 | 16 |
| | | % within State | 17.9% | 30.8% | 20.0% |
| | 1990-1997 | Count | 7 | 0 | 7 |
| | | % within State | 10.4% | 0.0% | 8.8% |
| | 1998-2000 | Count | 3 | 1 | 4 |
| | | % within State | 4.5% | 7.7% | 5.0% |
| | 2001-2007 | Count | 6 | 1 | 7 |
| | | % within State | 9.0% | 7.7% | 8.8% |
| | 2008-present | Count | 5 | 1 | 6 |
| | | % within State | 7.5% | 7.7% | 7.5% |
| | DK/NS | Count | 4 | 0 | 4 |
| | | % within State | 6.0% | 0.0% | 5.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How long have you lived in your current home? * State

| | | State | | Total |
|--|--|--------------------------------|--------------------------------|----------|
| | | North Carolina (valid N=67) | South Carolina (valid N=13) | |
| | Average years | 15.53 | 10.09 | 14.65 |
| | Median years | 14.00 | 7.00 | 13.00 |
| | Maximum | 44 years | 25 years | 44 years |
| | Minimum | 1 week | 1 year | 1 week |
| | Percent living in current home for 5 years or less | 38.8% | 46.2% | 40.0% |

How many rooms are in your home (excluding bathrooms, but including finished basements)? * State

| | | | State | | Total |
|--|------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many rooms are in your home (excluding bathrooms, but including finished basements)? | 1-3 | Count | 3 | 0 | 3 |
| | | % within State | 4.5% | 0.0% | 3.8% |
| | 4 | Count | 6 | 2 | 8 |
| | | % within State | 9.0% | 15.4% | 10.0% |
| | 5 | Count | 14 | 2 | 16 |
| | | % within State | 20.9% | 15.4% | 20.0% |
| | 6 | Count | 14 | 4 | 18 |
| | | % within State | 20.9% | 30.8% | 22.5% |
| | 7 | Count | 13 | 1 | 14 |
| | | % within State | 19.4% | 7.7% | 17.5% |
| | 10 or more | Count | 9 | 3 | 12 |
| | | % within State | 13.4% | 23.1% | 15.0% |
| | DK/NS | Count | 8 | 1 | 9 |
| | | % within State | 11.9% | 7.7% | 11.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| Which of the following best describes your home's heating system? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|---|------------------------|-------|------------------------|-------|---------------|-------|
| None | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Central forced air furnace | 30 | 44.8% | 9 | 69.2% | 39 | 48.8% |
| Electric Baseboard | 3 | 4.5% | 0 | 0.0% | 3 | 3.8% |
| Heat Pump | 31 | 46.3% | 3 | 23.1% | 34 | 42.5% |
| Geothermal Heat Pump | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Gas pack / gas log fireplace | 0 | 0.0% | 1 | 7.7% | 1 | 1.3% |
| Other: listed below | 5 | 7.5% | 0 | 0.0% | 5 | 6.3% |
| Don't know | 2 | 3.0% | 0 | 0.0% | 2 | 2.5% |

May total to more than 100% because respondents could give multiple responses.

Five surveyed non-participants in North Carolina mentioned "other" types of heating system; these are listed below.

- *Three portable electric heaters*
- *Four space heaters*
- *Ceiling radiant heat*
- *Hot water system*
- *MPI Monitor 441 (forced air kerosene heater)*

How old is your heating system? * State

| | | | State | | Total |
|---------------------------------|-------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How old is your heating system? | 0-4 years | Count | 26 | 4 | 30 |
| | | % within State | 38.8% | 30.8% | 37.5% |
| | 5-9 years | Count | 13 | 1 | 14 |
| | | % within State | 19.4% | 7.7% | 17.5% |
| | 10-14 years | Count | 10 | 3 | 13 |
| | | % within State | 14.9% | 23.1% | 16.3% |
| | 15-19 years | Count | 3 | 0 | 3 |
| | | % within State | 4.5% | 0.0% | 3.8% |
| | 19 years or older | Count | 8 | 2 | 10 |
| | | % within State | 11.9% | 15.4% | 12.5% |
| | DK/NS | Count | 7 | 3 | 10 |
| | | % within State | 10.4% | 23.1% | 12.5% |
| Total | Count | | 67 | 13 | 80 |
| | % within State | | 100.0% | 100.0% | 100.0% |

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

| | | | State | | Total |
|---|-----------------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What is the primary fuel used in your heating system? | Electricity | Count | 42 | 2 | 44 |
| | | % within State | 62.7% | 15.4% | 55.0% |
| | Natural Gas | Count | 18 | 9 | 27 |
| | | % within State | 26.9% | 69.2% | 33.8% |
| | Oil | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | Propane | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Other: <i>gas fireplace</i> | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 7.7% | 1.3% |
| | Other: <i>kerosene</i> | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | DK/NS | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 7.7% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What is the secondary fuel used in your primary heating system, if any? * State

| | | | State | | Total |
|---|---------------------------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What is the secondary fuel used in your primary heating system, if any? | Electricity | Count | 10 | 2 | 12 |
| | | % within State | 14.9% | 15.4% | 15.0% |
| | Natural Gas | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Other: <i>kerosene</i> | Count | 2 | 0 | 2 |
| | | % within State | 3.0% | 0.0% | 2.5% |
| | Other: <i>wood stove</i> | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Other: <i>wood stove and gas logs</i> | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | None | Count | 48 | 9 | 57 |
| | | % within State | 71.6% | 69.2% | 71.3% |
| | DK/NS | Count | 4 | 2 | 6 |
| | | % within State | 6.0% | 15.4% | 7.5% |
| Total | Count | | 67 | 13 | 80 |
| | % within State | | 100.0% | 100.0% | 100.0% |

| Do you use one or more of the following to cool your home? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|--|------------------------|-------|------------------------|-------|---------------|-------|
| None, do not cool the home | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Heat pump for cooling | 29 | 43.3% | 3 | 23.1% | 32 | 40.0% |
| Central air conditioning | 30 | 44.8% | 8 | 61.5% | 38 | 47.5% |
| Through the wall or window air conditioning unit | 8 | 11.9% | 1 | 7.7% | 9 | 11.3% |
| Geothermal Heat pump | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Other: listed below | 1 | 1.5% | 1 | 7.7% | 2 | 2.5% |
| Don't know | 1 | 1.5% | 0 | 0.0% | 1 | 1.3% |

May total to more than 100% because respondents could give multiple responses.

Two surveyed non-participants mentioned "other" types of cooling system; these are listed below.

- *Ceiling fans* (NC)
- *Gas pack* (SC)

How many window-unit or through the wall air conditioner(s) do you use? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many window-unit or through the wall air conditioner(s) do you use? | 1 | Count | 4 | 4 | 8 |
| | | % within State | 6.0% | 30.8% | 10.0% |
| | 2 | Count | 6 | 0 | 6 |
| | | % within State | 9.0% | 0.0% | 7.5% |
| | 10210 | Count | 57 | 9 | 66 |
| | | % within State | 85.1% | 69.2% | 82.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| What is the fuel used in your cooling system? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|---|------------------------|-------|------------------------|--------|---------------|-------|
| Electricity | 65 | 97.0% | 13 | 100.0% | 78 | 97.5% |
| Natural Gas | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| None (no cooling system) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 2 | 3.0% | 0 | 0.0% | 2 | 2.5% |

May total to more than 100% because respondents could give multiple responses.

How old is your cooling system? * State

| | | | State | | Total |
|---------------------------------|-------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How old is your cooling system? | 0-4 years | Count | 32 | 3 | 35 |
| | | % within State | 47.8% | 23.1% | 43.8% |
| | 5-9 years | Count | 14 | 2 | 16 |
| | | % within State | 20.9% | 15.4% | 20.0% |
| | 10-14 years | Count | 8 | 3 | 11 |
| | | % within State | 11.9% | 23.1% | 13.8% |
| | 15-19 years | Count | 3 | 0 | 3 |
| | | % within State | 4.5% | 0.0% | 3.8% |
| | 19 years or older | Count | 3 | 2 | 5 |
| | | % within State | 4.5% | 15.4% | 6.3% |
| | DK/NS | Count | 7 | 3 | 10 |
| | | % within State | 10.4% | 23.1% | 12.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| What is the fuel used by your water heater? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|---|------------------------|-------|------------------------|-------|---------------|-------|
| Electricity | 54 | 80.6% | 3 | 23.1% | 57 | 71.3% |
| Natural Gas | 12 | 17.9% | 8 | 61.5% | 20 | 25.0% |
| Propane | 1 | 1.5% | 1 | 7.7% | 2 | 2.5% |
| No water heater | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 1 | 1.5% | 1 | 7.7% | 2 | 2.5% |

May total to more than 100% because respondents could give multiple responses.

How old is your water heater? * State

| | | | State | | Total |
|-------------------------------|--------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How old is your water heater? | 0-4 years | Count | 20 | 6 | 26 |
| | | % within State | 29.9% | 46.2% | 32.5% |
| | 5-9 years | Count | 17 | 2 | 19 |
| | | % within State | 25.4% | 15.4% | 23.8% |
| | 10-14 years | Count | 7 | 2 | 9 |
| | | % within State | 10.4% | 15.4% | 11.3% |
| | 15-19 years | Count | 2 | 1 | 3 |
| | | % within State | 3.0% | 7.7% | 3.8% |
| | More than 19 years | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | DK/NS | Count | 16 | 2 | 18 |
| | | % within State | 23.9% | 15.4% | 22.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

| What type of fuel do you use for indoor cooking on the stovetop or range? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|---|------------------------|-------|------------------------|-------|---------------|-------|
| Electricity | 61 | 91.0% | 12 | 92.3% | 73 | 91.3% |
| Natural Gas | 6 | 9.0% | 1 | 7.7% | 7 | 8.8% |
| Propane | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| None (no stove) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

TecMarket Works

Appendices

| What type of fuel do you use for indoor cooking in the oven? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|--|------------------------|-------|------------------------|--------|---------------|-------|
| Electricity | 63 | 94.0% | 13 | 100.0% | 76 | 95.0% |
| Natural Gas | 4 | 6.0% | 0 | 0.0% | 4 | 5.0% |
| Propane | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| None (no oven) | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

| What type of fuel do you use for clothes drying? | North Carolina N=67 | | South Carolina N=13 | | Total N=80 | |
|--|------------------------|-------|------------------------|-------|---------------|-------|
| Electricity | 63 | 94.0% | 12 | 92.3% | 75 | 93.8% |
| Natural Gas | 1 | 1.5% | 1 | 7.7% | 2 | 2.5% |
| Propane | 1 | 1.5% | 0 | 0.0% | 1 | 1.3% |
| None (no dryer) | 2 | 3.0% | 0 | 0.0% | 2 | 2.5% |
| DK/NS | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |

May total to more than 100% because respondents could give multiple responses.

About how many square feet of living space are in your home? * State

| | | | State | | Total |
|--|--------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| About how many square feet of living space are in your home? | 500 to 999 | Count | 6 | 2 | 8 |
| | | % within State | 9.0% | 15.4% | 10.0% |
| | 1000 to 1499 | Count | 18 | 5 | 23 |
| | | % within State | 26.9% | 38.5% | 28.8% |
| | 1500 to 1999 | Count | 18 | 2 | 20 |
| | | % within State | 26.9% | 15.4% | 25.0% |
| | 2000 to 2499 | Count | 10 | 1 | 11 |
| | | % within State | 14.9% | 7.7% | 13.8% |
| | 2500 to 2999 | Count | 2 | 0 | 2 |
| | | % within State | 3.0% | 0.0% | 2.5% |
| | 3000 to 3499 | Count | 2 | 0 | 2 |
| | | % within State | 3.0% | 0.0% | 2.5% |
| | 3500 to 3999 | Count | 2 | 2 | 4 |
| | | % within State | 3.0% | 15.4% | 5.0% |
| | 4000 or more | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | DK/NS | Count | 8 | 1 | 9 |
| | | % within State | 11.9% | 7.7% | 11.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Do you own or rent your home? * State

| | | | State | | Total |
|-------------------------------|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you own or rent your home? | Own | Count | 54 | 10 | 64 |
| | | % within State | 80.6% | 76.9% | 80.0% |
| | Rent | Count | 13 | 3 | 16 |
| | | % within State | 19.4% | 23.1% | 20.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many levels are in your home (not including your basement)? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many levels are in your home (not including your basement)? | One | Count | 44 | 9 | 53 |
| | | % within State | 65.7% | 69.2% | 66.3% |
| | Two | Count | 18 | 4 | 22 |
| | | % within State | 26.9% | 30.8% | 27.5% |
| | Three | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your home have a heated or unheated basement? * State

| | | | State | | Total |
|--|-------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your home have a heated or unheated basement? | Heated | Count | 13 | 1 | 14 |
| | | % within State | 19.4% | 7.7% | 17.5% |
| | Unheated | Count | 4 | 2 | 6 |
| | | % within State | 6.0% | 15.4% | 7.5% |
| | No basement | Count | 50 | 10 | 60 |
| | | % within State | 74.6% | 76.9% | 75.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your home have an attic? * State

| | | | State | | Total |
|-------------------------------|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your home have an attic? | Yes | Count | 48 | 12 | 60 |
| | | % within State | 71.6% | 92.3% | 75.0% |
| | No | Count | 19 | 1 | 20 |
| | | % within State | 28.4% | 7.7% | 25.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Are your central air/heat ducts located in the attic? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Are your central air/heat ducts located in the attic? | Yes | Count | 18 | 1 | 19 |
| | | % within State | 26.9% | 7.7% | 23.8% |
| | No | Count | 32 | 11 | 43 |
| | | % within State | 47.8% | 84.6% | 53.8% |
| | N/A | Count | 17 | 1 | 18 |
| | | % within State | 25.4% | 7.7% | 22.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your house have cold drafts in the winter? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your house have cold drafts in the winter? | Yes | Count | 21 | 2 | 23 |
| | | % within State | 31.3% | 15.4% | 28.8% |
| | No | Count | 44 | 9 | 53 |
| | | % within State | 65.7% | 69.2% | 66.3% |
| | DK/NS | Count | 2 | 2 | 4 |
| | | % within State | 3.0% | 15.4% | 5.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your house have sweaty windows in the winter? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your house have sweaty windows in the winter? | Yes | Count | 11 | 2 | 13 |
| | | % within State | 16.4% | 15.4% | 16.3% |
| | No | Count | 53 | 10 | 63 |
| | | % within State | 79.1% | 76.9% | 78.8% |
| | DK/NS | Count | 3 | 1 | 4 |
| | | % within State | 4.5% | 7.7% | 5.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Do you notice uneven temperatures between the rooms in your home? * State

| | | | State | | Total |
|---|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you notice uneven temperatures between the rooms in your home? | Yes | Count | 26 | 8 | 34 |
| | | % within State | 38.8% | 61.5% | 42.5% |
| | No | Count | 40 | 5 | 45 |
| | | % within State | 59.7% | 38.5% | 56.3% |
| | DK/NS | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your heating system keep your home comfortable in winter? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your heating system keep your home comfortable in winter? | Yes | Count | 58 | 12 | 70 |
| | | % within State | 86.6% | 92.3% | 87.5% |
| | No | Count | 6 | 0 | 6 |
| | | % within State | 9.0% | 0.0% | 7.5% |
| | DK/NS | Count | 3 | 1 | 4 |
| | | % within State | 4.5% | 7.7% | 5.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Does your cooling system keep your home comfortable in summer? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Does your cooling system keep your home comfortable in summer? | Yes | Count | 61 | 13 | 74 |
| | | % within State | 91.0% | 100.0% | 92.5% |
| | No | Count | 6 | 0 | 6 |
| | | % within State | 9.0% | 0.0% | 7.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Do you have a programmable thermostat? * State

| | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you have a programmable thermostat? | Yes | Count | 42 | 9 | 51 |
| | | % within State | 62.7% | 69.2% | 63.8% |
| | No | Count | 24 | 4 | 28 |
| | | % within State | 35.8% | 30.8% | 35.0% |
| | DK/NS | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many thermostats are there in your home? * State

| | | | State | | Total |
|--|-----------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many thermostats are there in your home? | 0 | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | 1 | Count | 50 | 11 | 61 |
| | | % within State | 74.6% | 84.6% | 76.3% |
| | 2 | Count | 6 | 2 | 8 |
| | | % within State | 9.0% | 15.4% | 10.0% |
| | 3 | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | 4 or more | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What temperature is your thermostat set to on a typical summer weekday afternoon? * State

| | | | State | | Total |
|---|------------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What temperature is your thermostat set to on a typical summer weekday afternoon? | Less than 69 degrees | Count | 3 | 1 | 4 |
| | | % within State | 4.5% | 7.7% | 5.0% |
| | 69-72 degrees | Count | 22 | 5 | 27 |
| | | % within State | 32.8% | 38.5% | 33.8% |
| | 73-78 degrees | Count | 34 | 5 | 39 |
| | | % within State | 50.7% | 38.5% | 48.8% |
| | Higher than 78 degrees | Count | 2 | 1 | 3 |
| | | % within State | 3.0% | 7.7% | 3.8% |
| | Off | Count | 3 | 1 | 4 |
| | | % within State | 4.5% | 7.7% | 5.0% |
| | DK/NS | Count | 3 | 0 | 3 |
| | | % within State | 4.5% | 0.0% | 3.8% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What temperature is your thermostat set to on a typical winter weekday afternoon? * State

| | | | State | | Total |
|---|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What temperature is your thermostat set to on a typical winter weekday afternoon? | Less than 67 degrees | Count | 5 | 1 | 6 |
| | | % within State | 7.5% | 7.7% | 7.5% |
| | 67-70 degrees | Count | 33 | 4 | 37 |
| | | % within State | 49.3% | 30.8% | 46.3% |
| | 71-73 degrees | Count | 10 | 3 | 13 |
| | | % within State | 14.9% | 23.1% | 16.3% |
| | 74-77 degrees | Count | 11 | 2 | 13 |
| | | % within State | 16.4% | 15.4% | 16.3% |
| | 78 degrees or higher | Count | 2 | 1 | 3 |
| | | % within State | 3.0% | 7.7% | 3.8% |
| | Off | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 7.7% | 1.3% |
| | DK/NS | Count | 6 | 1 | 7 |
| | | % within State | 9.0% | 7.7% | 8.8% |
| Total | Count | | 67 | 13 | 80 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Do you have a swimming pool, hot-tub or spa? * State

| | | | State | | Total |
|--|----------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Do you have a swimming pool, hot-tub or spa? | Yes | Count | 3 | 1 | 4 |
| | | % within State | 4.5% | 7.7% | 5.0% |
| | No | Count | 64 | 12 | 76 |
| | | % within State | 95.5% | 92.3% | 95.0% |
| | Count | | 67 | 13 | 80 |
| | % within State | | 100.0% | 100.0% | 100.0% |

Would a two-degree increase in the summer afternoon temperature in your home affect your comfort *

| State | | | State | | Total |
|---|------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Would a two-degree increase in the summer afternoon temperature in your home affect your comfort | Not at all | Count | 15 | 4 | 19 |
| | | % within State | 22.4% | 30.8% | 23.8% |
| | Slightly | Count | 19 | 5 | 24 |
| | | % within State | 28.4% | 38.5% | 30.0% |
| | Moderately | Count | 24 | 3 | 27 |
| | | % within State | 35.8% | 23.1% | 33.8% |
| | Greatly | Count | 8 | 0 | 8 |
| | | % within State | 11.9% | 0.0% | 10.0% |
| | DK/NS | Count | 1 | 1 | 2 |
| | | % within State | 1.5% | 7.7% | 2.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many people live in this home? * State

| | | | State | | Total |
|---------------------------------------|-----------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many people live in this home? | 1 | Count | 17 | 3 | 20 |
| | | % within State | 25.4% | 23.1% | 25.0% |
| | 2 | Count | 29 | 6 | 35 |
| | | % within State | 43.3% | 46.2% | 43.8% |
| | 3 | Count | 14 | 2 | 16 |
| | | % within State | 20.9% | 15.4% | 20.0% |
| | 4 | Count | 5 | 1 | 6 |
| | | % within State | 7.5% | 7.7% | 7.5% |
| | 5 | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | 6 | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 7.7% | 1.3% |
| | 8 or more | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many of them are teenagers? * State

| | | | State | | Total |
|---------------------------------|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many of them are teenagers? | 0 | Count | 62 | 11 | 73 |
| | | % within State | 92.5% | 84.6% | 91.3% |
| | 1 | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | 2 | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 7.7% | 1.3% |
| | 5 | Count | 0 | 1 | 1 |
| | | % within State | 0.0% | 7.7% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

How many persons are usually home on a weekday afternoon? * State

| | | | State | | Total |
|---|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| How many persons are usually home on a weekday afternoon? | 0 | Count | 8 | 4 | 12 |
| | | % within State | 11.9% | 30.8% | 15.0% |
| | 1 | Count | 24 | 4 | 28 |
| | | % within State | 35.8% | 30.8% | 35.0% |
| | 2 | Count | 25 | 3 | 28 |
| | | % within State | 37.3% | 23.1% | 35.0% |
| | 3 | Count | 6 | 1 | 7 |
| | | % within State | 9.0% | 7.7% | 8.8% |
| | 4 | Count | 2 | 1 | 3 |
| | | % within State | 3.0% | 7.7% | 3.8% |
| | 5 | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Prefer not to answer | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Are you planning on making any large purchases to improve energy efficiency in the next 3 years? *

| State | | | State | | Total |
|--|-------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Are you planning on making any large purchases to improve energy efficiency in the next 3 years? | Yes | Count | 19 | 4 | 23 |
| | | % within State | 28.4% | 30.8% | 28.8% |
| | No | Count | 41 | 6 | 47 |
| | | % within State | 61.2% | 46.2% | 58.8% |
| | DK/NS | Count | 7 | 3 | 10 |
| | | % within State | 10.4% | 23.1% | 12.5% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

What is your age group? * State

| | | | State | | Total |
|-------------------------|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| What is your age group? | 18-34 | Count | 13 | 3 | 16 |
| | | % within State | 19.4% | 23.1% | 20.0% |
| | 35-49 | Count | 10 | 2 | 12 |
| | | % within State | 14.9% | 15.4% | 15.0% |
| | 50-59 | Count | 16 | 3 | 19 |
| | | % within State | 23.9% | 23.1% | 23.8% |
| | 60-64 | Count | 11 | 2 | 13 |
| | | % within State | 16.4% | 15.4% | 16.3% |
| | 65-74 | Count | 11 | 2 | 13 |
| | | % within State | 16.4% | 15.4% | 16.3% |
| | Over 74 | Count | 5 | 1 | 6 |
| | | % within State | 7.5% | 7.7% | 7.5% |
| | Prefer not to answer | Count | 1 | 0 | 1 |
| | | % within State | 1.5% | 0.0% | 1.3% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Please indicate your annual household income * State

| | | | State | | Total |
|--|----------------------|----------------|----------------|----------------|--------|
| | | | North Carolina | South Carolina | |
| Please indicate your annual household income | Under \$15,000 | Count | 5 | 0 | 5 |
| | | % within State | 7.5% | 0.0% | 6.3% |
| | \$15,000-\$29,999 | Count | 12 | 2 | 14 |
| | | % within State | 17.9% | 15.4% | 17.5% |
| | \$30,000-\$49,999 | Count | 9 | 2 | 11 |
| | | % within State | 13.4% | 15.4% | 13.8% |
| | \$50,000-\$74,999 | Count | 8 | 3 | 11 |
| | | % within State | 11.9% | 23.1% | 13.8% |
| | \$75,000-\$100,000 | Count | 4 | 3 | 7 |
| | | % within State | 6.0% | 23.1% | 8.8% |
| | Over \$100,000 | Count | 7 | 2 | 9 |
| | | % within State | 10.4% | 15.4% | 11.3% |
| | Prefer Not to Answer | Count | 18 | 1 | 19 |
| | | % within State | 26.9% | 7.7% | 23.8% |
| | DK/NS | Count | 4 | 0 | 4 |
| | | % within State | 6.0% | 0.0% | 5.0% |
| | Total | Count | 67 | 13 | 80 |
| | | % within State | 100.0% | 100.0% | 100.0% |

Appendix H: Suggestions for Improving the Program

Program participants were asked to rate the program overall, and various particular aspects of the program, on a ten-point scale where “10” is best; the mean ratings are shown below in Table 144.

Table 144. Mean Satisfaction Ratings for the Savings Store and Aspects of the Specialty Bulbs Program (N=136)

| | Average Rating | Valid N (not including don't know) | Percentage of ratings at “7 out of 10” or lower |
|---|----------------|--|--|
| Satisfaction with the Savings Store overall | 9.15 | 135 | 9.6% |
| Satisfaction with store return practices | 10.00 | 4 | 0.0% |
| Satisfaction with “Contact Us” feature provided for store | 10.00 | 1 | 0.0% |
| Satisfaction with phone support provided for store | 9.45 | 11 | 0.0% |
| Ease of using the shopping cart function at the website | 9.35 | 128 | 3.1% |
| Ease of completing purchase online | 9.32 | 133 | 6.8% |
| Satisfaction with delivery time for bulb order | 9.26 | 133 | 9.0% |
| Ease of logging on to website | 9.23 | 132 | 4.5% |
| Ease of navigating website | 9.20 | 130 | 6.9% |
| Satisfaction with price of bulbs | 9.04 | 133 | 13.5% |
| Ease of finding the items you were looking for | 8.79 | 134 | 14.2% |
| Helpfulness of bulb descriptions | 8.76 | 131 | 16.8% |
| Helpfulness of energy savings estimate per bulb | 8.64 | 99 | 18.2% |
| Satisfaction with order tracking feature | 8.61 | 18 | 16.7% |
| Helpfulness of informational resources at web site | 7.86 | 43 | 32.6% |
| Helpfulness of the energy savings calculator | 7.42 | 24 | 33.3% |

Customers who gave ratings of “7” or lower on a ten-point scale were asked the reason for their relatively low ratings. These responses are listed below for all of the ratings shown in the table above.

Satisfaction with the Savings Store overall (N=13)

- *I had also ordered a six-pack of spiral CFLs that were not delivered. I called to check the status, and even though my order was processed and my credit card was debited, the order did not come. So I called to request a refund and have heard nothing for the past year.*
- *In terms of shipping, my bulbs were not packaged very well. I received them and seven out of the twenty-one I ordered were broken and I had to throw them out. Improve the packaging.*
- *I got something totally different than I thought I was getting. I thought I was getting a six-pack of each, but I ended up with one bulb each. It seemed very misleading to me. I just ordered the wrong bulbs at the wrong price. Make it more clear as to what you're*

actually purchasing, confirmation as to what exactly you're buying, the number of bulbs and whether it's a multipack.

- *The Savings Store could provide a clear itemized description of a customer's order before it's finalized.*
- *I needed more information about the brightness of the bulbs as I was unaware that there are three types of light quality for the CFLs. Since doing this survey I realize that there was more information available that I did not take advantage of.*
- *They could have told me that there was a longer wait time on attaining full brightness. I don't want to be in the bathroom waiting on it to get bright.*
- *The shipping was expensive and I couldn't compare two different bulbs to each other. Also, I would prefer to pay for the bulbs through Paypal or have them billed to my account.*
- *The Savings Store should have better pricing than I could get at a regular home improvement store.*
- *The Savings Store should have a more intuitive website, higher limits on the discounted price, and better explanation videos.*
- *The Savings Store could offer appliance bulbs for ranges and refrigerators.*
- *The Savings Store should have better navigation and more availability of bulb types.*
- *I'm not dissatisfied. The pamphlet gave details and explanations of the capabilities of the bulbs. The Store made it easy to purchase these bulbs, and know what you were purchasing.*
- *I had problems while shopping at the site, but it's probably just me; I'm not too great with computers or doing things online.*

Ease of using the shopping cart function at the website (N=4)

- *It's not an issue really. Yes, there's a limit to the number of bulbs you can purchase. There's no feedback that you've reached your limit and that there's an increased price. Because the price in the shopping cart is giving you the discounted price, it would be easy for people to spend too much without knowing. Run a filter of sorts, or send a message, that you've reached your limit and that this will increase your cost. It's too easy to spend too much.*
- *My biggest problem was getting into the account. The website kept saying 'you already have received your free light bulbs,' even though I was trying to buy. Getting into the site was a pain.*
- *I vaguely remember having some sort of problem while shopping and placing my order. I can't remember what specifically the problem was. The problem might just have been me though, I don't usually buy anything online and I'm not 'a natural' with the online shopping experience.*
- *I don't know.*

Ease of completing purchase online (N=9)

- *The site kept saying I had received 15 free bulbs, but I wanted to buy specialized bulbs. It kept interrupting as I was trying to buy, and that made the process more confusing.*
- *It wasn't hard to complete my purchase but something made me pause. I think it was that I had to pay with my credit/debit card. I would have preferred using Paypal or having Duke bill my account. I also disliked that the shipping charges were so high.*
- *It wouldn't take my wife's credit card, but it took mine fine.*
- *The purchase itself was easy enough, but one of the bulbs I ordered wasn't available so Duke sent me an alternate type of bulb.*
- *I found the log-on process to be difficult.*
- *The site isn't quite as well thought-out as it should be. Run a filter of sorts, or send a message, that you've reached your limit and that this will increase your cost. It's too easy to spend too much.*
- *I vaguely remember having some sort of problem while shopping and placing my order. I can't remember what specifically the problem was. The problem might just have been me though, I don't usually buy anything online and I'm not 'a natural' with the online shopping experience.*
- *I don't know. (N=2)*

Satisfaction with delivery time for bulb order (N=12)

- *Duke could verify that the bulbs they offer are in stock. I experienced a slight delay when one of the bulbs I ordered was unavailable and they had to send me a comparable replacement.*
- *When we call to order, bulbs should be send out immediately and the cost should be added to our utility bill.*
- *I shop on Amazon a lot and I'm used to two-day delivery.*
- *The delivery was slow. It took three weeks.*
- *I was expecting it to be a bit faster, like three or four business days. I think the actual time for processing and delivery was two weeks.*
- *It took almost two weeks, so getting them out faster might help.*
- *It took about a week and a half for the two I received; I think it could have been better.*
- *I would have liked to get them in three or four days rather than a week.*
- *I would like faster delivery.*
- *The bulbs could have come sooner.*
- *I don't know. (N=2)*

Ease of login on to website (N=6)

- *I couldn't navigate to it at first because I assumed it was part of the Duke Power site. It took me a while before I found the link. It was my fault in part; I lost the mailing insert that gave the web page.*

- *I had a problem with the link from home page. It's been too long for me to remember the exact problem, but I remember having a problem.*
- *I didn't think that the various modules, or pages, that you had to bring up were very intuitive.*
- *There are a lot of different hoops during sign-in; it should have quicker access.*
- *I guess the logging on was rather routine, that's why I give it a "5".*
- *I don't know.*

Ease of navigating website (N=9)

- *I remember it being awkward and hard to navigate.*
- *I was unable to compare one bulb to another easily. It took several clicks to get the details about the bulbs making it difficult to compare them.*
- *Navigating the website requires overly precise clicks. I would prefer being able to click anywhere on a picture to bring up the description of that item.*
- *I didn't think that the various modules, or pages, that you had to bring up were very intuitive.*
- *The website could update its inventory so that customers don't waste time attempting to purchase bulbs that are out of stock.*
- *I was on the phone with customer support to help me navigate around the site because I am not that good at working on the computer.*
- *I remember having problems while shopping on the site and placing my order. I don't specifically remember what problem I had because it was quite some time ago. I did contact the customer service phone line eventually, after I finally found the phone number to call, which was not an easy number to call.*
- *I was just looking and comparing.*
- *I don't know.*

Satisfaction with the price of bulbs (N=18)

- *I found the prices at the Savings Store were not competitive with Lowe's or other big box stores. Often, I found I could get the bulbs at cheaper prices elsewhere.*
- *When Lowe's runs sales on light bulbs they are sometimes cheaper.*
- *Compared to retailer prices, some of the bulbs are cheaper and some were more expensive at the Savings Store.*
- *The prices did not seem to be lower than what I could find in other stores.*
- *The price was still pretty high. I got some free ones from Duke, but I think I could have gotten the ones that I bought for cheaper at Walmart.*
- *The price of the light bulbs matched those that I could find at Walmart.*
- *The prices were the same as I had gotten other places.*
- *They weren't free, and they were just a tad bit more expensive than the ones in the store. But ordering online means that I didn't have to use gas to go to the store.*

- *I went to stores; I looked at WalMart and Lowe's for their prices. I found that Duke's price was slightly lower, but I thought it would have been even lower still because of what Duke is trying to do with energy efficiency. If they want customers to save money and use these bulbs, then they need to have a reasonable price.*
- *They were reasonably fair or reasonably expensive, depending on how you look at it. I didn't comparison shop, but my grandson said they were priced equal to or less than the stores.*
- *I think that all fluorescent bulbs are more expensive. I'm not used to the price of them yet.*
- *I think they're all overpriced, but the prices are better with Duke than other places.*
- *I would prefer that the bulbs were less expensive.*
- *They were kind of expensive.*
- *I really didn't know what to compare them to. I just took it to be a reasonable price.*
- *I got something totally different than I thought I was getting. I thought I was getting a six-pack of each, but I ended up with one bulb each. It seemed very misleading to me. I just ordered the wrong bulbs at the wrong price.*
- *I don't really remember the price.*
- *I don't know.*

Ease of finding the items I was looking for (N=19)

- *I was looking for lower-wattage dimmable bulbs that were equivalent to the 60W incandescent bulbs I have on a dimmer switch. I found Duke offered 23W bulbs which are 100W equivalents, but not 13W or 18W dimmable CFLs. The 23W dimmable CFLs are too large for my fixtures.*
- *I was looking for smaller bulbs; ones that were thinner and shorter, but with a standard base and 13W. These are for fan lights. I had trouble finding those.*
- *I was looking for the brightest bulb possible that could go in a 60W socket. I needed help finding a bulb that fit those parameters as I was having a hard time finding that online alone.*
- *Provide a description of the fixture that the bulbs would fit into.*
- *The Savings Store could provide more specifications about the size and threading of the bulbs.*
- *I was trying to determine how they compared, and I didn't know how they compared in size and illuminating standpoint.*
- *I was unable to compare one bulb to another easily. It took several clicks to get the details about the bulbs making it difficult to compare them.*
- *It would help if there were better descriptions of the bulbs.*
- *Duke could provide a more concise list of bulbs based on availability.*
- *It took longer than it should have for me to find the LEDs. I shop online often.*
- *It was only difficult because you had to make an account to actually purchase the bulbs, and I found logging on was difficult at the Savings Store site.*

- *It took a while to find what I needed.*
- *It's probably average. You have to hunt around.*
- *They could use more detail on specifications. I don't know if it showed the wattage or not; if they did, I don't recall. The more information you could provide, the easier it is and the better it is. Six out of ten times I shop online, I end up calling the telephone number to get help completing my purchase or to get clarification. I look for a phone number. I don't order online unless I have someone to call. I'm not tech savvy.*
- *I was on the phone with customer support to help me navigate around the site because I am not that good at working on the computer.*
- *I did not visit the online Savings Store personally. The Savings Store brochure needs to be less complicated and show customers what they're getting.*
- *I don't know. (N=3)*

Helpfulness of bulb descriptions (N=22)

- *Duke could provide wattage and light output level equivalency comparisons of incandescent bulb versus CFLs. Customers are more familiar with the numbers associated with standard incandescent bulbs.*
- *I needed more information about the different types of light quality available for the CFLs. I was also unable to find information on the different types of specialty bulbs that the Saving Store was selling.*
- *I think there needs to be better descriptions for the LEDs and give examples of where they should be used in the house and what sort of lighting situations they work the best, like if they are better used as a spotlight or a reading lamp light and so on.*
- *More information about indoor versus outdoor use. The bulbs that were delivered were 5-10 Watts shy of what they were advertised at on the website.*
- *They could probably provide a little bit better visual description of how they look. I found that the descriptions were too general, not specific enough. The bulbs that I received in the mail did not look the same as what was described on the website.*
- *I wasn't understanding the descriptions. When I tried to pull up the picture of the bulbs, I was confused and ended up ordering a different bulb than I wanted. I think I can still use these bulbs; I still need to find the bulbs for the ceiling fans.*
- *I was unable to compare one bulb to another easily. It took several clicks to get the details about the bulbs making it difficult to compare them.*
- *I wasn't sure how to compare to the regular light bulbs I had.*
- *I would like a little more description of the bulb, such as how they would be used.*
- *It gives you the wattage and everything but it doesn't tell you the physical size of the bulb itself. The bulbs I purchase barely fit into my fans. It does not say what it will fit into.*
- *Provide a description of the fixture that the bulbs would fit into.*
- *The Savings Store could provide more specifications about the size and threading of the bulbs.*

- *It would have helped to know about the slow warm-up time required for the candelabra bulbs. My bulbs had a very slow warm-up period. I think it would be useful if the website had some sort scale or way to measure the amount of time a bulb takes to attain a full brightness capacity.*
- *The Savings Store could provide more information about the elemental dangers of some bulbs and about proper disposal methods.*
- *It would be helpful if you could do something for people who vision impaired.*
- *The descriptions were a little confusing.*
- *Duke could provide more informative bulb descriptions.*
- *The bulb descriptions need better wording.*
- *I got something totally different than I thought I was getting. I thought I was getting a six-pack of each, but I ended up with one bulb. It seemed very misleading to me. I have to really look at this sucker to know what I'm getting.*
- *It was reasonably descriptive.*
- *We already knew what we wanted.*
- *I don't know.*

Helpfulness of energy savings estimates per bulb (N=18)

- *The savings estimates didn't much matter to me, especially because we don't have a choice in getting incandescent bulbs anymore to even compare the savings; we are basically forced to use CFLs.*
- *I didn't pay that much attention to the energy estimates, so I'm neutral on that experience. I was already sold on CFLs.*
- *I would like to see a comparison of energy savings between a standard incandescent, a CFL, and an LED.*
- *Duke could include more information with the energy savings estimates.*
- *The energy savings estimates need to be customizable based on usage in order to provide a more accurate estimate.*
- *Duke could improve the energy savings estimates by simply telling me how much money I'll save annually.*
- *The energy savings wasn't very impressive. I think it was given in monthly savings; if it had been given in annual savings, that would have been more impressive. The calculator could have been better.*
- *They could be more specific, like provide the energy savings expected on a years' time-frame, or maybe the savings expected each month. These savings estimates would be more realistic than the 'lifetime savings'.*
- *They were helpful. I don't think they transferred into dollar savings, but I can feel ecologically sound.*

- *The bulb descriptions were nice but I'm fairly educated about different types of bulbs and didn't really need the information. As far as those energy savings estimates go, no one can really know how much energy they are actually saving with CFLs.*
- *It wasn't that it needed improvement, I had already realized the energy savings of CFLs, so those savings estimates were not helpful to me. It's not a matter improving those savings estimates provided, it's that I don't care for them, or don't really need them because I am already aware.*
- *I already had that knowledge.*
- *I didn't really use this feature because I was more concerned about the bulb prices.*
- *I wasn't looking at energy saving as the most important thing, I was looking for particular bulbs and making sure where they would fit or if I would be able to use them in the light fixtures that I wanted them for.*
- *I noticed this feature but didn't use to help pick out bulbs for my home.*
- *I didn't look at the energy saving estimates at all.*
- *Those estimates of energy savings have no impact on me.*
- *I don't recall enough about that feature.*

Satisfaction with order tracking feature (N=3)

- *It took a long time for them even to show up in the system. I shop online a lot and I can usually see information about my order within 12-24 hours. It took much longer than what I'm accustomed to.*
- *There were too many steps for me to do to track my order. I got annoyed and just hoped that the bulbs would be delivered.*
- *In addition to the order-tracking link, Duke could provide the name of the delivery company.⁵⁴*

Helpfulness of informational resources at website (N=14)

- *We didn't realize how big of a deal recycling bulbs was before that.*
- *It could go either way, so I'm going to give it a middle of the road rating, partly because the bulb descriptions were lacking information. They got real technical and need better descriptions that identify bases and sockets; I had to research that.*
- *I was confused by the descriptions.*
- *It's hard to know what you're getting. The videos very short and rudimentary. The production value was in the toilet. It's a utilitarian website, very basic.*
- *The descriptions for the bulbs were important; I just hate watching videos, though.*
- *I didn't use this feature, other than the bulb descriptions.*

⁵⁴ This is a valid comment that refers to the fact that the Store offers three shipping methods including the U.S. Post Office, UPS, and "any carrier," which is the cheapest of the three choices. The carrier is not specified since the system selects the least expensive method, which is often but not always FedEx Post which uses a combination of FedEx and the U.S. Post Office.

- *I had no need for these resources. I knew what light bulbs I wanted to order.*
- *It wasn't something I looked at in particular.*
- *I don't know. (N=6)*

Helpfulness of energy savings calculator tool (N=8)

- *The Energy Savings Calculator could be made more customizable and user-friendly, especially for senior citizens. I did not feel the Calculator accurately represented our energy usage.*
- *The Energy Savings Calculator could be more accurate. How are the savings estimates derived? My energy usage is different than what was calculated. Home energy audits could provide more accurate energy-use estimates.*
- *The calculator asks for too much information and nothing in there is realistic.*
- *I just think that giving a more basic price comparison, such as comparing the cost of operating six incandescent bulbs versus six of the newer type. Present this as a pre-calculated example.*
- *If it told me how many watts I was going to use, that's all that's really important to me. If you're reasonably educated, you can tell from the specifications.*
- *I had already done my research before viewing the Calculator.*
- *I don't know. (N=2)*

Overall Satisfaction with Duke Energy

Satisfaction with Duke Energy is generally high among these program participants, with a mean rating of 8.34 on a ten-point scale where “10” means “very satisfied.” Thirty-three participants (24.3% of 136) rated their satisfaction with Duke Energy at “7” or less on a ten-point scale and were asked how this situation could be improved; these responses are listed below. The most common responses have to do with concerns about high energy rates and the recent Dan River coal ash spill (especially for North Carolina customers), and these two issues are often linked.

North Carolina customers (N=27)

- *I was annoyed when I read “thank you for your business” on the bottom of my bill because Duke Energy is a monopoly. Someone from Duke Energy dug up my yard to repair the cable in February or March of this year and they threw some grass seed over the area. The grass didn't grow and they never came back to fix my lumpy, muddy yard.*
- *We were going to have trees cut on our property and I called Duke and scheduled when to have the power lines dropped. The people from Duke were four hours later than the appointment. Our contractor managed to work around the lines, which caused delays for him and potentially could have endangered the power lines, my family, or the contractor, and it would have been at my expense and responsibility. I was and still am unsatisfied about that experience and lack of customer service on Duke Energy's part.*
- *We just had a major ice storm and we are all very dissatisfied with length of time it took to get back up. We're all feeling pretty low about it, as it's messed up the environment and is very political. It's really hurt our community.*

- *Clean up the coal ash spill and do a better job avoiding situations like that in the future.*
- *Duke could clean up the coal ash mess.*
- *Duke could be more proactive cleaning up the recent coal ash river pollution fiasco, regardless of the cost.*
- *I am not happy about them passing on the cost of their coal ash clean up. Duke's management made the mistake; their stockholders should pay for this not the customers. Otherwise, Duke's service is good. Good response time to a fallen line after a storm. No complaints about their rates.*
- *I've had Duke Energy for a long time and their service has always been great but they have a long history of environmental negligence. They were recently got caught dumping ash and I heard on the radio that Duke implied that it would be inconvenient and expensive to clean it up so they shouldn't have to clean it up and they are looking for another rate hike so they can pay for the clean-up. Duke Energy made more than \$2.5 billion last year so they should be able to pay the millions of dollars needed for the clean-up.*
- *The carelessness or neglect that caused the coal ash spill in the Dan River. Duke Energy is always requesting rate increases and now with the spill they're going to need a hefty rate increase so they can keep making billions of dollars for the stock holders.*
- *It's the cost of energy from Duke. Duke had a big environmental problem, and the customer is the one that's going to end up paying the bill. The Energy Commission said that coal ash cleanup will cost \$25 billion, and somebody's going to pay for it. The other problem Duke has is that since the customers all went to using CFLs, the energy use per customer is down. So for the utility to stay profitable the rates were allowed to go up. This means that over the longer term, you don't get the cost savings you think you should get. You might think the bulbs will save you energy, and they might, but the average customer won't see a cost savings.*
- *Rates could be lower. Switching more towards solar power would be great because it's more sustainable than coal and then there wouldn't be as much risk for a coal ash spill occurring.*
- *They raise prices too quickly. I'd also like to see them clean up their act with the coal ash spills in the rivers.*
- *I'm very unhappy about the coal ash in the Dan River, especially when I'm likely to be one of the people paying to clean it up. They should not have kept it in a storage pond next to the Dan River in the first place.*
- *I am not happy with Duke because of the ash spill and the possibility that I will have to clean it up. It's time for the company to take ownership and pay for it themselves. For example, if I damaged your utility box on my house, I would have to pay for the damage; it's my responsibility. The customers should not have to pay. I understand it on the business side but not on the morality side. Also, I have a best friend who had her furnace regulator break. The system kept running, even though the temperature didn't rise. Duke knew about the problem but said nothing. If you cared about customers, why wouldn't you offer to help them, especially when her bill was \$1,200 versus her usual \$169 rate. When she called to explain the circumstance, Duke would not adjust her bill. That's not good customer service. I feel Duke should have at least offered her some discount. She*

had to get loan to pay it off. Now we're hearing we'll be paying an extra \$20 per month; that's like kicking us all over again. Be nicer to customers when you know that something is wrong.

- *I'm fine with service but I'm not happy with how Duke Energy management has been making decisions. I don't like how they have been dealing with the coal ash situation. Duke Energy gave the Democratic National Committee a loan for \$10 million so they would have the convention in Charlotte but DNC couldn't pay it back so Duke just wrote it off.*
- *I had a problem last year with the power bill and I can't figure it out. The Feb 2013 bill skyrocketed. It was about three times as high as usual. I called Duke Energy to see why but they didn't know either. I still can't figure out what caused it, but I'm relieved that I haven't had that problem again. If my bill had stayed that high I would not be able to make the monthly payments.*
- *I think they ask for rate increases too often. Also, last year our bill had a major jump, and we didn't know what was happening until after we had spent \$1,200 on electric over three months. It turned out we had a well pump running nonstop because of a leak. For a long time we had no idea of where the extra energy use was coming from. I think someone at Duke should have noticed this and called to ask us why; perhaps even help us to trouble shoot the problem. It was obvious that something was going on, but nobody seemed to care.*
- *I'm using less wattage with my lighting since I've switched to CFLs but my power bill is just as expensive. Duke Energy needs to work on keeping the cost of power down, it seems like it is constantly increasing even though we are making efforts to be more energy efficient. I want to see savings, not breaking even.*
- *Duke could verify that the amount of electricity they charge for matches the actual usage.*
- *The rates keep going up, but I haven't had any problems with service.*
- *The energy price seems a little high already, and they're asking for an increase of 12%.*
- *The rates keep going up and we can barely afford to pay the winter bills and pay for other necessities.*
- *Rates are too high / lower the rates (N=3)*
- *I don't know. (N=2)*

South Carolina customers (N=6)

- *A lot of it is customer support issues over the phone, the people working in Duke's customer service are typically rude and they don't ever seem to want to be helpful. I suggest Duke Energy puts some concentration on improving the quality of their customer service over the phone.*
- *I don't like the automated calls when my bill is late. I get about four calls in a row. I feel like I am being chased down.*
- *Duke's commitment to the community is questionable. Overall, Duke is a for-profit company and they looking out for themselves. But, they need to look out for their consumer economically, rather than continuing to raise their rates and look out for themselves. Environmentally, they want to control the solar energy thing. Duke and the*

natural gas people want to control what's free and that's not a very friendly way to do things. The energy company is the only company that can sell the sun back to the homeowner. That's bogus. They want to control solar and don't want to let anybody else in. They do good things, but they're not doing good things with the solar energy issues.

- *Energy costs are too high in general, and I also had a problem with my power bill itself. Up until four months ago, my bill was about \$125 per month. Then it grew to \$200, then \$300, and finally over \$400. I'm on a tight budget and didn't see any reason why it went up so much. I called to get an explanation from Duke, and they just said, "oh, it's colder than last year." That's a crock. I've been taking temperatures and calculating the mean average for the last three years. There's only a 2.5 degree difference for this year compared with previous years. That doesn't account for the big change in my bill and no one can logically explain why my bill went that high. What's more, last year I had two other people living here and using energy that weren't here this past winter. We've done energy-saving steps like turning the night temperature down to 67. We had the hot water tank and wiring checked. I know the Duke method is to ask for a 16% rate increase and settle for 7%. While Duke corporate executives and even middle managers get nice earnings, we're struggling.*
- *Stop asking customers for rate hikes.*
- *Duke could limit the number and amount of their rate increases.*

Appendix I: Explanations of Influence Ratings

Survey respondents were asked to explain the influence ratings they gave for the reduced price of bulbs, the information provided at the Savings Store website and the convenience of online ordering on their decision to purchase bulbs from the Savings Store. These comments are categorized and listed below.

Influence of Savings Store reduced pricing: rating “10 out of 10”

- *The lower price was the main reason I ordered from the website. I wanted the CFLs for my home and when I saw the website when I was paying my bill online I decided to have a look at the website. It was easy to use and I found what I was looking for my home right away. It was such a good price that I ordered them right away.*
- *The pricing got me to buy right away. I didn't have to think it over long. I knew that I was going to save money on my power bill by using the CFLs and LEDs and the lower prices got me to buy them.*
- *Would not have bought the same amount if they were at the full price. It allowed me to change out a whole room at once.*
- *I would not have purchased so many light bulbs if not for the reduced pricing.*
- *I needed a lot of bulbs, so since they were on a reduced price I was able to get as many bulbs as I needed.*
- *I wanted the CFLs for the chandelier because we keep it on all day but I couldn't afford to get CFLs at the store. The CFL bulbs are expensive and if you need five like I did they are too expensive.*
- *I wanted to try some of the specialty CFLs without having to pay a lot for them and the reduced pricing made that possible.*
- *I wanted to get cheaper specialty CFLs so I could try them out before I commit to using them everywhere in the house.*
- *We recently moved into the house and the previous owners had all incandescent bulbs installed. Since we moved in I have been switching the old bulbs out for CFLs and being able to shop for discounted CFLs helped us save money on our purchase.*
- *I wanted inexpensive bulbs as I start switching over to CFLs in the house.*
- *We wanted discounted bulbs. I could have gotten them anywhere really but it was the Savings Store's lower prices that got me ordering the CFLs offered. I did not order the LEDs because they aren't comparable to the prices I can get elsewhere.*
- *It was the main reason why I bought bulbs from the Savings Store. I'd already been to Lowe's and other retail stores, so I knew what sorts of bulbs I wanted and what the current pricing was in stores. The main reason I bought the bulbs from Duke was mostly because of the reduced price they offered.*
- *They were much cheaper than anything I'd priced. I'd been to WalMart and Costco.*
- *Reduced pricing was my primary influence. I compared the Savings Store's pricing to both Lowe's and Home Depot.*
- *The Savings Store had the best prices compared to Home Depot and Lowe's.*

- *I wanted to try out LEDs and wanted to find them at the lowest possible price so I wouldn't feel like I was wasting money if I didn't like them. I had been comparing prices at local stores like Lowe's and Home Depot, but the ones offered from the website were the lowest price I could find.*
- *I went to the Home Depot and, as I recall, they were \$10 or \$15 apiece and, if I recall, Duke was \$3 or \$4 a piece. I think Duke Energy's prices were very good.*
- *Those bulbs were way more expensive at Lowe's and Home Depot, almost twice as much. It was like \$40 for one bulb at Lowe's.*
- *The price for them online was less expensive than at Home Depot or Lowe's.*
- *The reduced pricing was the main reason I chose the Savings Store; otherwise I would have bought the bulbs at Home Depot.*
- *The price offered at the Savings Store was much cheaper than Lowe's or Home Depot, which is why I bought the bulbs from the Duke site.*
- *That was mostly the main reason I made the purchase for the globe bulbs, the price was right. I wanted globe CFLs and I was aware that these were priced the lowest than any I had seen anywhere else, like at Lowe's or Walmart.*
- *It was cheaper than at Lowe's or anywhere else that I looked.*
- *I wanted cheaper lights. The CFLs at the Savings Store were cheaper than at Lowe's.*
- *The price is better than at Lowe's.*
- *The price on Duke's site was cheaper, I compared to Lowe's priced for these bulbs and Duke's were cheaper so that's why I bought them from the Duke site.*
- *The discounted pricing, which was substantially lower than what other stores were offering, was very influential.*
- *Because I was looking for bulbs and I wanted the cheapest bulbs, and this site had the cheapest bulbs.*
- *The price of an item is usually what will bring me to buy something or not. These bulbs that I wanted were offered at a much better price than I could find at local retailers, so I chose the Savings Store.*
- *The reduced pricing was very influential. I would have purchased the bulbs from somewhere else if I could have found a better deal.*
- *The reduced pricing was very influential because I couldn't find a better deal elsewhere.*
- *If I had bought those same type of CFL outdoor reflector lights from the store, they would have been much more pricey. The Savings Store had them at a better price than I could find elsewhere.*
- *I wanted to save money on the specialty CFLs. They are cost prohibitive at the store even though I wanted them for my home.*
- *The CFLs were less expensive than at a retail store.*
- *The price was reasonable compared to what they were selling it for at the store.*
- *I knew what they cost retail, and that they were less at the website.*
- *They were considerably less expensive than in a store.*

- *The prices at the home stores here are so much more than the Savings Store price; it was a great deal.*
- *I wanted to save money on the LED bulbs and they were cheaper at the Saving Store than anywhere else.*
- *It's reduced a good 50% from retail; three-way bulbs are normally around \$15 to \$18 apiece and yours about \$6. It's almost a no-brainer.*
- *I remember the Energy Store price being 70% less than I would have paid in the stores*
- *The Savings Store price is discounted about 80% from the normal market price.*
- *I needed six bulbs. If I had paid retail, they would have cost me five to ten times what I paid for the same bulbs from Duke.*
- *The price at the Saving Store is considerably less than in stores so they're more affordable.*
- *These bulbs were offered much cheaper than buying them at a store.*
- *I compared prices.*
- *That was whole point, I bought the bulbs because they were offered at such a great, low price.*
- *It's just a good product at good price.*
- *I wanted inexpensive CFLs bulbs for my home. This was the main reason I choose to purchase bulbs from the Savings Store.*
- *I wanted inexpensive bulbs.*
- *The bulbs were the cheapest around.*
- *They were cheap.*
- *The prices were really good.*
- *The price was great!*
- *The prices were great!*
- *The price was amazing!!*
- *Any time the price is lower, that's a good thing.*
- *They were the cheapest I could find and I'm always looking for ways to save money.*
- *When you are on a limited income, you look for the best deal for the money.*
- *I was looking to save money on my light bulb purchases and I know that soon enough we won't be able to buy incandescent bulbs anymore.*
- *Money talks, and price wins. The reduced pricing was the main reason why I bought bulbs from the Savings Store.*
- *The discounted pricing was probably the deciding factor.*
- *Low price was definitely the deal maker.*
- *The lower prices was the deciding factor is getting us to purchase the CFLs from the Saving Store.*
- *The reduced pricing was very influential in my overall decision-making process.*

- *They showed the price and then the reduced price was shown. Since I needed six or eight of them, it did influence me.*
- *Reduced bulb pricing and projected energy savings were the biggest influences.*
- *The reduced pricing and bulb availability were influential, along with the simplicity of the transaction and the benefit of not having to incur any travel costs of my own.*
- *The reduced pricing, along with cost savings, energy efficiency, and bulb longevity were all very influential.*
- *The price and need was the reason I bought them.*
- *I try to save money where I can. I found some of the bulbs I needed at a discounted price at this Savings Store, so I bought them.*
- *I was looking for inexpensive bulbs that were still a good quality bulb.*
- *The discounted prices was the main reason I purchased bulbs from the Saving Store.*
- *It was a good price. It would be the only reason to purchase it from the Savings Store.*
- *This was the main reason that I ordered bulbs from the Saving Store.*
- *The reduced pricing was very influential because I am frugal.*
- *The reduced price helped me save money both for getting the CFLs in the first place and eventually saving some energy and money on my electric bill once the bulbs were installed.*
- *I wanted competitive prices for the bulbs. It wasn't the cheapest but it was easier to order online than drive around looking for the bulbs in stores.*
- *I was considering it anyway and it was an easy way to do it without having to start running around town.*
- *The LEDs are reasonably priced but the shipping costs made them just as expensive as other stores that offer the same products at a higher cost that have no shipping cost.*
- *I kind of knew how much they should have been in the first place from what I've seen retailers offer. The savings was barely comparable when you add the cost of shipping. Once I saw that they had either reduced or offered the shipping costs for free (I can't remember which), that's when I decided to buy bulbs from the Savings Store.*
- *In past, I haven't bought this sort of bulb because they did not seem as durable as what they claimed. These bulbs were also so much more expensive, so from an economic and ecological basis, they were not as promised. The lower prices with Duke at least take care of the economics.*
- *I bought the bulbs, so it must have influenced me.*

Influence of Savings Store reduced pricing: rating "8 or 9 out of 10"

- *I wanted cheaper light bulbs than offered in stores. I probably would not have tried out the LEDs at the store price.*
- *The discount on the webpage made trying the specialty CFLs the best choice because it was affordable. I'm on a fixed income so coming up with the money to buy CFLs is harder because they are so expensive. Hopefully these bulbs will save enough money over time so I can afford to use only CFLs.*

- *They had pretty decent savings. We went to some electric stores, and Home Depot and Lowe's, and to Ace Hardware; Ace was particularly expensive. So I would say Duke's price was very influential.*
- *I was influenced by the reduced pricing after comparing it to Home Depot and Lowe's.*
- *The prices were better than at Home Depot.*
- *I had already done price comparisons with other retailers like Lowe's and I found that the Duke Savings Store prices were about 60% less than what the retailers were going for.*
- *The Savings Store's pricing seemed akin to that of Lowe's and Home Depot's.*
- *I wanted to buy the CFLs for less than at stores.*
- *The prices of the bulbs seem lower than at most stores.*
- *Their price was about the same or less than in stores, according to my grandson.*
- *They were slightly cheaper and were just as good as store-bought bulbs; same lumens for less money.*
- *I compared that to some of the retail stores where I usually go and found that the Duke Energy store was more of a price reduction. But, there were not that many brands available. I think all of them come from the same manufacturer.*
- *I had done comparison shopping of these bulbs; all types of these special bulbs are expensive, although I know they last longer. I also know the old bulbs are being phased out; maybe one day the price will come down as the sales go up, and they'll be more economical.*
- *That's probably the main reason why I purchased the bulbs from the Savings Store. They offered a much lower price than I could find elsewhere, I thought they were a good deal.*
- *Even if they weren't reduced, they're still a little bit cheaper; that probably cinched a few of them. I bought more spares.*
- *Price was a major part of the decision.*
- *The reduced pricing was very influential because I like to save money.*
- *I like to save money.*
- *I wanted to save money on CFLs.*
- *I wanted inexpensive light bulbs.*
- *Reduced price is always good.*
- *I thought it was a good price.*
- *The prices were really good.*
- *It sounded like a good price for us.*
- *I was very satisfied with the prices.*
- *I knew I was still going to buy them, and I knew I would have to get more than were offered at the sale price. But it was still a fair price.*
- *Something was misleading on there and I wish I could pinpoint it. I just ordered the wrong bulbs at the wrong price.*

- *I really just needed the bulbs I needed for their brightness, wattage, and safety. The price didn't make much of a difference to me.*

Influence of Savings Store reduced pricing: rating “6 or 7 out of 10”

- *Because it was influential in me buying them, but I would have looked anyway. The price just made it easier to justify buying 12 at a time instead of a four-pack.*
- *I think the availability of multi-packs was more influential in my decision.*
- *The reduced pricing was fine, but I was mainly interested in bulb longevity.*

Influence of Savings Store reduced pricing: rating “5 or less out of 10”

- *I really didn't notice the reduced pricing.*
- *I don't think that there were reduced prices.*
- *I was not aware Duke offered any 'reduced pricing'.*
- *The price was slightly different than in stores, but not as much as I would have thought.*
- *I really just needed light bulbs and it was convenient at the time. The pricing had no effect on my decision to buy the bulbs from the saving store. If they would have been lower in price I would have purchased more.*
- *Price was not what drove me to the Savings Store. I bought because of the variety of bulbs offered, not the price.*
- *I don't remember.*

Influence of Savings Store reduced pricing: rating “don't know”

- *I think the bulbs were cheaper at Duke, but I can't recall specifics as to how much.*
- *I didn't notice that there were reduced prices.*
- *I don't recall there being a reduced price.*
- *I was not aware that there were discounted prices.*
- *It would have been an influence, if the prices were really reduced.*
- *I really didn't think that the price was reduced. I could have bought new ones at Walmart cheaper.*
- *I don't know if the price was good or not. I did not compare it with any other place.*
- *I didn't compare prices to other stores.*
- *The pricing did not influence me.*
- *I don't know / can't recall (N=6)*

Influence of information at the Savings Store website: rating “10 out of 10”

- *Once I got past the past a socket size issue, they covered everything else. That's the reason I logged off the second time I went to the website. Unless you know exactly what you're looking for, it can be hard to find out if the specs are right, unless you know how to read those descriptions. The descriptions are too technical for the average person. It*

didn't bother me so much, but I got off and measured all my sockets. Sometimes, the bulbs are the same, but the base is different. Once I figured it out, I'd give it a ten.

- *Because you can trust Duke Energy. It's always been that way. I know there are people who are upset about rates, but Duke has been a good provider for energy.*
- *I felt like I trust what they, Duke Energy, was saying.*
- *We trust Duke Energy so we knew that all the information they were providing us was accurate. I didn't look at the CFLs much because I knew that I wanted to try out the LEDs, but the information provided about the LEDs made me feel confident that I would like them.*
- *The information provided at the website, particularly the pricing information that I then compared to Home Depot & Lowe's, was very influential in my decision to purchase through the Savings Store.*
- *I had no problems. It's one of the easier websites I've ever used; all of the information I needed to make a decision was provided right there for me.*
- *I had trouble finding the correct bulb for my garage light which is on a sensor. The website and the support person I spoke with made me feel confident that I was getting the correct bulb.*
- *I liked it. The information made me feel better informed so I knew my choices were going to be the right ones.*
- *I just thought it was easy and simple, they gave everything to me that was needed to make an appropriate purchase for what I needed.*
- *It laid everything out very well and it was pretty easy to decide what bulb I wanted. The three-way switch was very important to me.*
- *There were so many different types of bulbs that I had to make sure that I ordered the bulbs that I actually wanted.*
- *I was able go at my pace and to learn more about my purchase. I feel like I'm more educated about light quality and lumens and can pick out light bulbs better than before.*
- *I felt like it was easy enough to order and the information helped me with knowing what to order.*
- *We had already decided, but the information provided on the website was influential too.*
- *They explained the bulbs very clearly, it made it easy for me to make my decisions.*
- *The information helped me make a decision.*
- *Because I needed help picking out which bulbs I wanted.*
- *I didn't have any problems using the website and I liked how easy it was to use and find what I was looking for.*
- *The information provided was good and it helped my decision making.*
- *I was influenced by the price of the item and the practicality of the product.*
- *The information provided let me know that purchasing and using these light bulbs would save me money.*

- *Because I'd already been to Lowe's and other retail stores, so I knew what sorts of bulbs I wanted and what the current pricing was in stores. The main reason I bought the bulbs from Duke was mostly because of the price they offered.*
- *The information about cost savings and bulb pricing were very influential on my decision.*
- *The price information was very influential for me.*
- *The prices were really good.*
- *I didn't realize Duke Energy sold them and, when I found them at this price, I was excited to purchase them.*
- *The Savings Store was a good process that made it easy to locate hard-to-find items.*
- *It was nice to have the information right there ready to use.*
- *The information was very straightforward and clear. It indicated the savings from using the bulbs and savings on the price of the bulbs.*
- *I read about the benefits and pricing of CFLs. The products were explained thoroughly.*
- *It was good information that was presented in an easy to understand format. It was user-friendly.*
- *I wasn't sure what size I needed as far as the Globe lights go. I was worried that they weren't going to fit. Also, I didn't know that they made CFL three-way bulbs.*
- *It gives you the price range to compare the prices to see what you want. I was looking to save some money and looked through how it described them.*
- *The information told me what I needed to know about the different bulb types and brightnesses.*
- *It was exactly the information I was looking for. It answered my questions fully*
- *Overall, the information on that site was very good and certainly all the CFLs, both for lumen output and wattage reduction, are very good compared to incandescent bulbs. You certainly know what your comparisons are going to be.*
- *All the information given was self-explanatory. They gave really good written and visual descriptions of the bulbs.*
- *Well, I bought the bulbs. So it was influential.*
- *Overall the website was very good and easy to navigate.*
- *The information was accurate and it helped me find exactly what I wanted.*
- *Everything just worked perfect.*
- *Everything was very easy and clear.*
- *It described what I needed.*
- *That's just how I feel. I don't remember at this point why I'm giving it that number.*
- *I don't know.*

Influence of information at the Savings Store website: rating “8 or 9 out of 10”

- *I just looked at the price and wattage and they were good in comparison to the other places I was looking at for those types of CFL bulbs. I was comparing to what I could find at Lowe's and Walmart.*
- *All the information was good and up to date about the LEDs. Right after I had ordered these bulbs we had someone come to my workplace to give a lecture on LEDs and everything I read about the LEDs on the Saving Store website was brought up.*
- *The descriptions helped out for determining bulb size, and identified the different bases. I was looking for short bulbs to fit some ceiling fixtures.*
- *It gave implication that the brightness would be better and that they would not be as expensive to operate.*
- *Because I found out these bulbs were going to save me more money than I was already saving using the existing spiral energy saving bulbs.*
- *Because for one thing, I did not know for sure if the bulbs that I was going to need were really going to save me as much money on utility costs as they said they would.*
- *I could tell by looking at the dimensions provided on the website whether the bulb would fit, that was the most important aspect and information for me, and it was good.*
- *I like the ratings provided on the site for each bulb.*
- *I already had information on bulbs from other sources, but I made the final decision on where to get bulbs by looking at the website.*
- *I kind of rely on them to give me the help in purchasing the right bulbs.*
- *The information was influential because it inspired me to purchase a lot of light bulbs.*
- *The information about the globe CFLs I was shopping was sufficient for my decision to make the purchase.*
- *I think the information provided played a large part in my decision-making process.*
- *The information and descriptions influenced my decision and made it easier to order the bulbs.*
- *It gave me the information I needed to make a decision.*
- *The information was very helpful in deciding which bulbs to buy.*
- *The information was good enough for me to know that was the specific bulb that I needed.*
- *The information made it so that I knew I was ordering the exact bulbs I needed.*
- *It clearly explained to me what the energy efficiency was and what the different types of bulbs were.*
- *They said you could save money and the information was very useful.*
- *I wanted the LEDs but they were still too expensive.*
- *I picked out the ones that looked nice.*
- *The information was influential, as well as the discounted pricing and convenience.*
- *I looked at the information and found it helpful.*
- *The information was clear, concise, and easy to digest.*

- *The information was helpful.*
- *The information provided was helpful.*
- *The information provided was great.*
- *The website was good, very easy to order from.*
- *I was looking to get energy efficient bulbs and that's the information that was provided.*
- *It was all good information.*
- *It was a pretty reasonable deal.*
- *It was helpful information but there is always room for improvement.*
- *I had already done my own research prior to visiting the Savings Store.*
- *I knew what I was looking for and ordering online was easy.*
- *The information was influential, though one of the bulb types I received wasn't exactly what I was expecting. The bulb descriptions could have been more clearly defined.*
- *Something was misleading on there and I wish I could pinpoint it. I just ordered the wrong bulbs at the wrong price.*
- *I didn't really use that feature so I kind of guessed.*
- *I was already shopping for specialty bulbs. I was mostly comparing prices, the savings offered was a little bit of an influence. I already knew that I wanted LEDs and that they were a good, energy efficient lighting option, so the information provided did not have a high impact on my decision.*
- *I have a lot of knowledge of light bulbs, so I didn't need a lot of the information that was provided.*
- *I knew what I wanted before I even visited the site.*
- *I can't remember the details.*
- *I don't know.*

Influence of information at the Savings Store website: rating "6 or 7 out of 10"

- *The Savings Store is simple to use which makes it superior to similar sites.*
- *It helped me pick out the bulbs that I needed for the home, but the discounted price is the main reason I purchased bulbs from the Saving Store.*
- *I knew what I was looking for. Once I saw the right picture, that drove my purchase. I just needed to see what it looked like and to know it was high efficiency. I ended up buying the higher lumen output bulb based on the comparisons offered.*
- *I knew a lot of information about the CFL bulbs already; they were not a new thing to me. The dimmable bulbs that were offered weren't exactly what I was looking for, however. I was hoping to find different choices for dimmable bulbs.*
- *I was in a hurry, no time to go to store, so it was easier for me to just order the bulbs online.*
- *I was unable to compare one bulb to another easily. It took several clicks to get the details about the bulbs making it difficult to compare them.*

- *I needed the bulbs but I needed more information about lumens and what bulbs were safe for fixtures that take three 60W bulbs. I needed more about what fixtures the bulbs are safe for.*
- *I needed more information about the different types of light quality available for the CFLs. I was also unable to find information on the different types of specialty bulbs that the Savings Store was selling.*
- *The information on the bulbs was not the greatest, it took me a while to find the one I needed.*
- *When I looked at the bulbs it said a 5,000 hour usage and I don't have more than 200 hours on these bulbs and one is already burnt out.*
- *I felt the energy savings estimates were inaccurate.*
- *The energy savings wasn't very impressive. I think it was given in monthly savings; if it had been given in annual savings, that would have been more impressive. The calculator could have been better.*
- *Since I had to compare those prices with other prices, when I first saw, I had no idea how it would compare elsewhere.*
- *The information is a little technical, but it's not so difficult.*
- *The information provided at the Savings Store was part of my research. I knew what I wanted.*
- *I already knew that I wanted CFLs for the house but the information was helpful in picking out the bulbs.*
- *I was going to buy them either way, the information was nice though.*
- *I went there wanting to buy bulbs, because that's what the site sells. The information provided did not matter much to me because I was going to buy the bulbs anyhow.*
- *I had already decided about the bulbs that I wanted. I didn't really need the information as much as someone else might.*
- *I was thinking about getting them already, I knew I wanted specialty CFLs, the information really was not influential in my decision to buy these from Duke's website.*
- *I already knew I needed globe bulbs, so the information wasn't important to me.*
- *I already knew what I wanted.*

Influence of information at the Savings Store website: rating "5 or less out of 10"

- *The information, availability, and convenience were influential factors.*
- *I had already made up mind to get CFLs but the information helped me make decisions about which CFLs to try out.*
- *I knew what kind of LEDs I was looking for: A19 and PA LED four-foot tubes. I decided to purchase the A19 LED but there were no PA LEDs.*
- *The information only gave me enough to make a guess on whether it was the right bulb. I didn't find what I wanted.*

- *I already sort-of knew which bulbs I wanted. The Savings Store website could include information about the color of light that the bulbs emit.*
- *I ordered the bulbs that we needed for the house we just moved into. The former owners had all incandescent bulbs installed and I knew that I wanted to switch to CFLs like we had been using in the past. The discounted bulbs offered at the Saving Store made the switching to all CFLs at the same time more affordable. However, the information provided about the bulbs didn't make a difference to me at all.*
- *It was convenient at a time when I needed light bulbs. I knew enough about the light bulbs so I didn't really use the information provided.*
- *I wanted to start buying CFLs anyways so the information about the bulbs really didn't influence me to shop at the store. It really was the lower prices and the ordering online that influenced me.*
- *We didn't really use the information as we already knew what type of bulbs we wanted. The main reason we chose to order the bulbs from the Saving Store was because of the lower prices.*
- *I knew what I wanted. I counted the number of bulbs that we could use in the house and bought what we needed.*
- *I was looking for bulbs that save energy anyhow, the descriptions didn't affect me, I was going to get them anyhow.*
- *I think energy efficient light bulbs was something I already read about and knew about, I was already educated on the matter, so the information provided on the website did not have much influence on me.*
- *I already made my decision of what bulbs I wanted to buy via the advertisement which was given to me in the mail.*
- *I was neutral about it.*
- *The information did not have much that I didn't already know.*
- *I was already familiar.*
- *I already knew what I wanted to purchase.*
- *I don't think I was influenced at all.*

Influence of information at the Savings Store website: rating "don't know"

- *It was good information and I didn't have any questions or confusion about the bulbs.*
- *I didn't pay any attention to the information; I figured if they said they were energy efficient they would be OK. I received bulbs before for free from Duke and I've converted most of my lights over to energy-efficient bulbs*
- *The information provided at the website did not have any bearing on my purchase. I didn't visit the store personally. I used the Savings Store brochure to figure out which bulbs I wanted and then my girlfriend placed the online order for me.*
- *My grandson did all of the online work. But he was able to find what we needed and didn't say it was difficult.*
- *I don't really remember any of the information.*

- *I honestly don't remember much about that part of the website.*
- *I don't recall.*

Influence of convenience of shopping online: rating "10 out of 10"

- *I gave it that score because of the help I had verbally with a person from Duke, when she walking me through the purchase and explained the packaging.*
- *I live pretty far out in the county so I order a fair amount of items online and have them delivered to the home. I like to save on gas.*
- *These bulbs are not available locally so it's a whole lot easier to order online than having to drive into town. I live in a rural area.*
- *It's just an easy way to do it. I'm handicapped, so anything I can order and have delivered to me is a blessing.*
- *I don't like having to go anywhere because I'm disabled. Having things delivered directly to my home really helps me out.*
- *I'm wheelchair-bound so I find it more convenient to shop online than in stores most of the time.*
- *I like ordering online. I do most of my shopping online and hope that someday I'll be able to purchase my groceries online and have them delivered. I don't like the hassle of going to stores. You have to drive there, park, and then deal with crowds and lugging bags into the house.*
- *I like not having to go out of the house, to stand there and look for stuff at Home Depot only to find out they don't have it. Then, you have to go to Lowe's only to find the wrong wattage and wrong light. It makes you crazy. It's just easier all the way around.*
- *It was so easy and very convenient to be able to shop at my own pace, from my own home. While shopping for bulbs at home I am able to see what I need for my fixtures by comparing the bulbs with what currently is installed, and I can see how many I need. I also liked that I had access to all the information provided about each type of bulb.*
- *I'm older than dirt, but I've adapted to the digital age very well. I appreciate the opportunity to get the bulbs in a reasonable amount of time at a reasonable price online. I'd rather not fight the crowds at the stores.*
- *I didn't have to drive to the store to get them and I saved gas money. The website was easy to use.*
- *I didn't have to look for the light bulbs at a large store. I don't like walking around the big stores. We live away from most of the stores so I'd have to drive into town.*
- *It was easier than shopping at a store for them. There's so many different brands, types of light bulbs, and wattages that it's easy to be overwhelmed at the store. I was able to sit and relax while I shopped for the specialty CFLs.*
- *I do a lot of ordering online, it saves me time and is much more convenient than trying to shop for something in a retail store.*
- *It was very easy to shop online and the website was easy to use. I do a lot of online shopping because it's easier than sorting through too many options on the store shelves.*

- *The convenience of shopping online and having the bulbs delivered was uncomplicated. I didn't have to worry about which bulbs to try at the store and it will be easy to reorder the bulbs in the future if we decide to do so.*
- *Because it's easy. I can look at everything to see what's available to suit my needs instead of having to go up and down the aisles.*
- *It was very easy. You can compare the different light bulbs from the comfort of your home instead of in a store aisle full of too many light bulbs. It's less confusing online and it's easier to get the information that you need.*
- *We do a lot of online ordering. I hate going to the stores when there are crowds.*
- *Even though I'm female, I do not like to go shopping.*
- *It is so convenient. No driving to get the bulbs I really wanted.*
- *I guess the convenience of shopping for light bulbs online and having them delivered. I didn't have to drive into town to go to the store.*
- *The convenience of shopping online was very influential. Clicking a few buttons is a lot easier than driving to the store.*
- *The convenience of online shopping was very influential because it meant I didn't have to go out.*
- *I like shopping online, it saves me money and time if I don't have to go to a store to buy these sorts of things.*
- *Ease of not having to go out and look around. With so many options for lighting, having a small selection online narrowed it down.*
- *I like shopping online because it is usually easy to do and you can look around on other webpages to compare items and prices.*
- *It was easy, I could look at all of the different types of bulbs, it was easy to find what I was looking for. I was able to quickly compare prices between the retailers and amongst the Savings Store site.*
- *I always shop online.*
- *We order online a lot.*
- *I like shopping online.*
- *I like to buy things online. I'd say I do 90% of my shopping online.*
- *I do a lot of shopping online. I like that you don't have to carry a lot of things around. It's just easier.*
- *I like shopping online because it's so easy and effortless to do. I normally shop places that offer free shipping.*
- *I appreciate the convenience of online shopping. Time is a very important commodity.*
- *Time savings. With me, if I can save some time ordering online, then I'll be an online shopper.*
- *I really like the convenience of online shopping and having delivery to straight to my home, it saved me time in the long run.*

- *Not only was I saving time by shopping online, I also saved money with the reduced price and not having to go out somewhere to get them.*
- *It's just much more convenient to have things delivered to my home. With my work schedule, home delivery is top of the line.*
- *The convenience of online shopping makes the process easy. It saves time and money.*
- *The convenience of shopping online was very influential because it meant I did not have to leave the house.*
- *It was easy because I could order from home.*
- *It was easier to shop for them online from the comforts of my own home.*
- *Because it was easy, it was cheap, and I could shop at any time.*
- *I like the flexibility of being able to shop at 6:00 or 6:30 in the morning.*
- *It was just so very easy: a lot easier than going to the store. That's the way I want to continue to buy my bulbs.*
- *I really like that my order was delivered to my door.*
- *It was easy to do and I like having things delivered.*
- *It was easy to shop for the bulbs online and have them delivered.*
- *Purchasing bulbs online is easy.*
- *It was an easy service to use.*
- *It was pretty easy.*
- *It was easy.*
- *It wasn't difficult at the time.*
- *The convenience, speed, and ease of shopping online were very influential.*
- *It was just the convenience. I like the fact that it wasn't an urgent need, so I could go in there and go through and take whatever I needed.*
- *I like the convenience, period: not having to shop around for much.*
- *The convenience of ordering online and the information educating me provided by the website helped me make decisions about which lights to purchase.*
- *The convenience of online shopping was very influential, as was the promotional flyer that came in the mail.*
- *It was very convenient; it was easy to go through the process and the replacement was expeditious.*
- *It was convenient having the bulbs available online and on one site.*
- *It was convenient.*
- *I didn't have any trouble at all. It was great.*

Influence of convenience of shopping online: rating "8 or 9 out of 10"

- *I know that I can trust Duke Energy. When I did a search for these lights, it took me to several other web sites. But I didn't trust them. You know you're not going to be hoodooed by Duke.*

- *I needed help with picking out a light bulb, and calling someone who knew about the website helped me pick out the brightest bulb I could find that was safe enough to install in a fixture that takes three 60W incandescents.*
- *It can be convenient to go there, but the Store's web site doesn't work well on a mobile device. I was using a tablet, and it didn't work like it should. I had to navigate using different methods.*
- *I like having the convenience, even though I don't normally go online. I wanted to try it and see how it worked.*
- *Because I was at the site and everything seemed reasonable so I said 'let's do it'. I got enough bulbs to do all the chandelier lights*
- *I think I had a plan to get them all at one place, all at one time. The availability of selection and ease of using the online ordering feature, as well as home delivery helped me make a decision to go through the Savings Store for my bulbs.*
- *I do a lot of shopping online. If the bulbs weren't available online I would not have purchased them when I did.*
- *I would have needed them anyway and, if I found them someplace else at a decent price, I maybe would have bought them there. I'm lazy and I just like the convenience of shopping online.*
- *I just like shopping online, it's better than going to a store and trying to shop at a retailer.*
- *They made it as easy as can be. A lot of times when you go to major chain stores, there's such a selection that it becomes confusing, and hard to find what you need. These stores also rate their lighting in lumens, not in watts. I didn't have anything at the stores to compare lumens to watts.*
- *It was great to have a big selection and not having to drive to the store.*
- *The convenience of online shopping meant I didn't have to drive anywhere. I got the bulbs for a good price.*
- *It's easy to be able to shop at home online. I liked not having to go out to shop for specialty bulbs; simple.*
- *I like shopping online. It was a deciding factor in our decision to purchase the CFLs from the Saving Store.*
- *The convenience of online shopping was very influential because I like being able to sit down, shop, and have the items delivered to my home.*
- *I enjoy the convenience of ordering things like light bulbs from home.*
- *Shopping online is easy to do and you can easily compare prices.*
- *I wanted a way to buy specialty CFLs without going to the store where I possibly would have been overwhelmed by the choices and lack of information.*
- *I like shopping online in general but we also live outside of town and I like to save money on gas.*

- *To me it was a lot easier to read the research and review it right there, then order the bulbs, rather than go to all the stores and use up the gas. You're just defeating the purpose of saving energy through using these bulbs by running around to get them.*
- *It saved me a trip out to get them. I didn't have to hunt through what the selection was and bring them home.*
- *It was easier than go to the store for the LEDs and it saved me gas money.*
- *It saves me the hassle of going to store when I can compare them at home and have them delivered.*
- *Because it was easier than getting my fat butt in the car and driving to the store to buy bulbs.*
- *The convenience of online shopping meant I didn't have to expend the time, effort, and gas needed to drive to the store.*
- *I do a lot of online shopping through Amazon or Cabella's, so I'm familiar with online shopping. I find online shopping to be better than fighting the crowds in stores, it's easier to shop for specific items and get full descriptions of products online.*
- *I am an online shopper. It's easier to order online. The features of home delivery can be added to that.*
- *I do a lot of shopping online because it's easy and I don't have to go to the store.*
- *It was very influential to be able to order bulbs online and have them shipped directly to my home.*
- *I like shopping online so you can compare prices.*
- *I like shopping online.*
- *I like shopping online so I can look for deals, but I really don't mind going to the store.*
- *It is not that inconvenient to buy CFLs at a retail store, but it was easy to do online too.*
- *Shopping online did save me some time.*
- *My grandson did the ordering. To his generation, time is important, along with convenience and price. All three are equally important. That's why societally, they buy online.*
- *Buying online was very easy.*
- *Ordering them online was easy, fast and convenient.*
- *The convenience of ordering online made the process very easy.*
- *The convenience of shopping online was a key factor in my decision-making process.*
- *It was nice to not have to price-shop at the store, but I think that these bulbs were cheaper at Walmart.*
- *I like the price more than the ease of shopping.*
- *I was more influenced by the price.*
- *I like shopping online but I needed more information about the different types of light quality.*
- *The convenience of shopping online was nice, but the main influence was probably the Savings Store promotional letter I received in the mail.*

- *Online shopping is very easy and I prefer it.*
- *I usually buy things online.*
- *It's good and I like shopping online, but I'm happy I can still get them at department stores.*
- *It was convenient to order online.*
- *The convenience of shopping online was nice.*
- *It was very easy.*
- *It was easy to get it done and have extras laying around.*
- *I don't know.*

Influence of convenience of shopping online: rating "6 or 7 out of 10"

- *I order online a lot because I'm a disabled veteran.*
- *It was as convenient as any other online purchase I have made.*
- *The convenience of shopping online was influential, though navigating the website required practice.*
- *I really don't care about shopping online. I hate using the internet so I would have been just as happy to purchase these bulbs through a mail order catalog.*
- *It's just as easy for me to pick up light bulbs from Lowe's or Home Depot.*
- *I'd be happy to pick them up at a store.*
- *I usually go to Lowe's, but this price was better.*
- *Shopping online was nice, but the price influenced me more.*
- *The price was more influential than going online.*
- *I really just wanted to take advantage of the reduced prices. I really didn't care about being able to order online.*
- *I really don't like to wait for them to be delivered.*

Influence of convenience of shopping online: rating "5 or less out of 10"

- *It was easier than going to the store.*
- *I really could have gotten them anywhere. I don't mind going to the store. It was really the low prices that got us to order.*
- *The price was more important than being able to order online. My son actually did the ordering of the bulbs for us as we're not computer literate. Without his help we would not have ordered the bulbs.*
- *I don't use computers. My girlfriend helps me occasionally by making online purchases on my behalf. I would have preferred being able to call an 800 number to place the order myself.*
- *I would have preferred ordering by telephone; online is not my preferred method of ordering things that are not available in-store.*

- *Because I go to the Home Depot and I go to Lowe's regularly; sometimes it is nice to see it plugged in. Otherwise it's a leap of faith because I wasn't sure of color or temperature if it was over 100. I did a lot research to verify whether I even wanted to do the order.*
- *The bulbs I need can be conveniently purchased just about anywhere.*
- *I can buy them online or go to the store to buy them, it does not really matter to me either way.*
- *I don't know.*

Influence of convenience of shopping online: rating "don't know"

- *I do not recall visiting the Savings Store online. I'm not computer savvy. I submitted my Savings Store order via mail. The convenience of being able to place my order from home was nice.⁵⁵*

⁵⁵ Although the Savings Store does accept payments by mail, orders must be placed online. Since this customer was identified as a Savings Store customer by program records, a friend or family member of this customer may have performed the online portion of the order process using the customer's account number.

Appendix J: Non-Participant Feedback

Non-participant respondents were asked to provide feedback regarding many store attributes. While the overall survey findings were discussed in the main body of this evaluation, verbatim quotes can be found below. Comments are categorized and referenced to the relevant sections.

Verbatim Comments on What Non-Participants Most Liked About the Store

The comments below refer to the discussion on page 161.

- *The prices (N=4)*
- *The variety of bulbs is interesting to say the least. I didn't know they made that many bulbs.*
- *I liked the descriptions of everything.*
- *I liked the variety of bulbs and the information the Store provided.*
- *I liked how cheap & reasonable the pricing was.*
- *I liked the variety of bulbs and low pricing.*
- *I liked the possibilities of bulb and energy savings.*
- *I liked the ease of website navigation and the clarity of the information provided.*
- *I liked being able to look at everything available, including the information provided.*
- *The website is easy to use. It was easy to find the items I was looking for.*
- *That I was able to go in and see what I could save on. I rent so I can't change anything in the apartment but someday I'll be in a house that I can install whatever light bulbs I want in.*
- *That I could save money on the LEDs and CFLs.*
- *I like the descriptions, the energy savings, and the look of the bulbs where you could see everything.*
- *The websites ease of use.*
- *The variety of bulbs you could purchase.*
- *The presentation of the different light bulbs was excellent. The website shows great effort and caring for the customer.*
- *The ease of looking at the light bulbs available.*
- *The good descriptions about the bulbs and how long the bulbs last.*
- *Cheaper prices. It's all about saving money so I can spend it somewhere else.*
- *I thought it was easy to navigate around, and that it was well organized; everything was right there. I felt I had all the options I could need for light bulbs.*
- *The variety of bulbs offered.*
- *I liked how it was organized.*
- *They had what I could have used if I was in the market to buy bulbs.*
- *The convenience.*
- *I liked the organization. It was easy to see what was for sale.*
- *The prices were very good.*

- *I like the convenience of being able to look around anytime.*
- *I think it's convenient to be able to shop from home.*
- *The website is well laid out, visual appealing, and easy to navigate.*
- *The interface was fairly easy to use and I like the fact that my energy company is trying to save me some money.*
- *The website showed a lot options for light bulbs.*
- *The availability and prices.*
- *The variety of bulbs in front of me that I could choose from.*
- *It's easy. I could just go online, set it up, pay for it and that's it.*
- *I like the selection. They have a lot of different specialty bulb types available.*
- *The website brought up everything. You didn't have to jump from screen to screen to find what you want.*
- *The layout was fast and easy.*
- *I like the convenience of being able to order online.*
- *It was easy to navigate.*
- *That it was easy to get to from the Duke website.*
- *The information about the bulbs. Very clear.*
- *Everything was in one place.*

Verbatim Comments on What Non-Participants Least Liked About the Savings Store

The comments below refer to the discussion on page 161.

- *The website does not appear very polished. The function is fine, but the aesthetics are not very good looking. For example, the entire page reloads when you click on different items instead of the center section or the specific section that I'm trying to select. Overall, the site needs to be more dynamic, the design and look of the site should be updated.*
- *Because you had to order them and have them shipped.*
- *Cost of shipping.*
- *I couldn't find what I was looking for. I was looking for outdoor reflector and dimmable LEDs.*
- *I did not have any funds at the time so it would have been good if I could have been billed.*
- *I did not like not being able to find the bulb that I needed.*
- *I didn't like having to go through the extra steps to research in order to buy what I need. I need to know that I'm buying what fits as compared to what I'm replacing, that it's the right size.*
- *I didn't like that I had to go online to do it.*
- *I disliked having to incur any type of shipping costs.*
- *I disliked that the potential savings weren't worth the extra hassle of ordering bulbs through the Store.*

- *I disliked the comparatively high pricing.*
- *I disliked the limited selection of LED bulbs.*
- *I disliked the shipping costs.*
- *I wasn't really interested in looking at bulbs I hadn't use before, but it was pretty enlightening.*
- *I would have liked more products, from large appliances, to smaller electrical things (including window A/C units and lamps).*
- *It seemed like me like you have to order the multiple packs and you can't just buy one or two bulbs.*
- *Not being able to find what I was looking for. I felt there was a fairly limited selection.*
- *The flat rate for shipping did not seem very reasonable.*
- *The descriptions didn't seem to match the pictures of the items.*
- *The lack of LEDs available.*
- *The lack of product.*
- *The log on process.*
- *The price of the bulbs.*
- *The price.*
- *The prices are too high.*
- *The prices. I buy LEDs on eBay and I can get a 10 pack for \$70 and they arrive in 6 weeks.*
- *The Saving Store didn't carry the globe and candelabra CFLs I wanted.*
- *The shipping prices.*
- *We couldn't find the small chandelier bulbs we were looking for.*

Verbatim Suggestions from Non-Participants for New Items for the Savings Store

The comments below refer to the discussion on page 162.

- *Anti-vampire power strips.*
- *Anything dealing with recessed lighting.*
- *Appliances, electrical things (large and small), and LED lights. I would also like financing on larger purchases so that you could pay for your appliances along with the bills.*
- *Candelabra bulbs and globe bulbs.*
- *Daylight CFLs.*
- *Decorative lighting.*
- *I'd be game for other power saving features that can easily be installed in the home, like automatic light switches and automatic dimmers for lights. Basically, small things that the homeowner can install themselves to help improve energy efficiency.*
- *I have a very old lamp with a flicker light that I would like to replace with a CFL flicker light.*

- *I saw everything that I would need. I thought it was pretty complete. They could venture into fixtures themselves, anything to do with lighting or replacement parts.*
- *I was looking for a higher intensity LED. I needed grow lights for house plants.*
- *I would like to be able to order a discounted NEST programmable thermostat.*
- *I would like to be able to order photographic studio bulbs.*
- *I would like to be able to order timers for lights.*
- *I'd like to see a bigger LED selection, especially LED exterior lights. I'd like to see them offer the same selection of LED lights as they have of CFLs.*
- *Landscape lighting bulbs; CFLs that are quick to come up to full light.*
- *LED spotlights that are much smaller than the indoor reflector lights so they could replace the 50 W halogens we have that are used to light up artwork.*
- *More options for LEDs.*
- *More options of LEDs and LED replacement bulbs for appliances.*
- *Offer light fixtures that would accept the energy savings bulbs. Some of my light fixtures will not work with the new bulbs.*
- *Outdoor reflector, candelabra, and dimmable LEDs.*
- *Replacement appliance light bulbs.*
- *Small chandelier bulbs and the plug in bulbs which snap into place.*
- *Smart power strips.*
- *Smart thermostats.*
- *Surge protectors.*
- *Three prong plug adapters.*
- *Under the cabinet LEDs.*

Verbatim Suggestions from Non-Participants for Website Improvements and Additions

The comments below refer to the discussion on page 163.

- *Lower the shipping fees. (N=3)*
- *A better log on process.*
- *A feature that you could say what fixture you need a bulb for that tells you the best options.⁵⁶*
- *Duke could provide more educational information on the Store website. Also, they could send out promotional emails about the Savings Store.*
- *More information about lumens instead of just the information about the wattage equivalent.*
- *Increased search functionality to find what I was looking for.*
- *I didn't check to see if they have a good search engine. Good search features are very important to me. I want to be able to go directly to what I'm looking for.*

⁵⁶ This feature already exists on the Store website.

- *Make the website prettier, more eye-catching.*
- *It could offer a greater variety of hues.*
- *I would like the Store website to make it as simple & safe as possible to use my credit card for purchases.*
- *The Savings Store could lower its bulb pricing and offer more promotional deals.*
- *Maybe lower the price just a little bit.*
- *Just the price.*
- *Keep the cheap prices and cheap shipping.*
- *Free shipping, like e-Bay and lower prices.*
- *Free shipping.*
- *Have lower shipping costs or free shipping.*
- *If they ship the light bulbs and they get jarred they might not work.*
- *Offer a payment plan.*
- *Financing on large items.*
- *Open the store to non-Duke customers.*

Verbatim Suggestions from Non-Participants to Increase Store Purchases

The comments below refer to the discussion on page 167.

- *A broader range of product and offer greater discounts randomly.*
- *A lot of times I just throw away the pamphlets, but having a good variety available on the computer right in front of you is very good.*
- *Advertise on TV. Continue advertising on the Duke website with a pop-up when the website is first opened. The ad needs to be in a more prevalent place on the page.*
- *Advertise the discounts more and the website itself. I'm not sure that a lot of people know about it.*
- *Better marketing.*
- *By word of mouth I think.*
- *Continue to put the information about the Savings Store in with our bills and also consider doing some TV commercials to let more people know about the website.*
- *Do more advertising, or call people on a Friday night to let them know about the website. Or, if they mailed every customer and gave them a \$5 off coupon or free shipping incentive there would probably be more interest to buy.*
- *Duke could include advertising inserts in customer's energy bills.*
- *Duke could send emails to let customers know about the Store. They could also have ads on the Duke Energy website and the ability to click a direct link to the Store.*
- *Duke could use promotional flyers to advertise the Savings Store.*
- *Free shipping and discounts for buying more, like buy five and get the sixth bulb free.*
- *Get more information about the website to your customers and offer free shipping.*

- *Get more people to look at the Saving Store through advertising and offer free shipping.*
- *Have better pricing than the big box store and free shipping.*
- *Have more advertisements and have testimonials.*
- *Have more advertising.*
- *Have people call with surveys.*
- *I don't know. More information might help. It seems like people don't read the bill inserts.*
- *I don't know; I haven't looked closely enough at the bulbs available. I imagine bundling would help: if you sold them in groups of 12 for a lower price per bulb. But I think you may already do that.*
- *I don't know; keep putting it with the bill? Somehow you need to get the public's attention. I know I look through the mailing inserts, but I don't know that others do.*
- *I heard about the website while paying my bill online and I have told people about being able to get the free CFLs from Duke. I think more advertising would get more people interested. It seems like everyone I told about the website hadn't heard of it and I've been telling everybody.*
- *I think Duke could advertise the Savings Store more.*
- *I think Duke could advertise the Store more broadly, expand the selection of bulbs, and provide customers with a better sense of incandescent bulb wattage equivalents.*
- *I think Duke could do more advertising and send mailers featuring Savings Store promotions.*
- *I think Duke could keep reminding people about the Savings Store. People are forgetful, so it's effective to remind them occasionally.*
- *I think Duke could offer various types of pricing promotions - deals for first time buyers and coupon codes in energy bills.*
- *I think that if you had a note when people logged onto the Saving Store that offered them something special for that day or for a limited time that it would peak people's interest. Like free shipping or a free sixth bulb when you buy five when you enter a code in at the end of the transaction. People like that stuff because it's kind of fun.*
- *I think that the flyer that they send in the mail is a good marketing tool. Direct mail is good. A lot of people like me don't open their bills, they just pay it online. Reminders are nice.*
- *I think there could be more advertising sent via mailers and email. The information provided could include specific energy use and shopping comparisons. The online process at the Savings Store could be simplified.*
- *I think there's enough publicity at this juncture. I think one thing that's needed is more accessibility to high wattage output. I like bright light in certain applications. Promotion of the idea that they're available probably would help.*

- *I think they should have a little store and their own place to pay the light bill. They could have a counter where you pay your bill and then a little space off to the side where they have the light bulbs for sale.*
- *I think word-of-the-mouth. When they were doing the free light bulbs, I told everyone at work.*
- *I try to go for more local, smaller companies. There's very little they could do to get me to buy from them.*
- *If other retailers stop selling energy efficient bulbs, Duke Energy could close in on the entire market and then more people would have to get their bulbs directly from Duke Energy instead of being able to just go on down to Walmart or wherever and just picking them up at those places.*
- *If they could see more visible content in a flyer or in monthly statements, or have phone calls like this about the program.*
- *I'm not sure. The only reason I haven't purchased bulbs from the Saving Store is because I haven't needed any light bulbs.*
- *Just keep letting people know it's there.*
- *Keep sending out the e-mails reminding people about the website because every time I see the e-mail I go to the website. I couldn't find the candelabra or globe bulbs that I was looking for. I probably would have purchased them from the website had I seen them.*
- *Keep the prices reasonable and cheaper than local competitors. And have some sort of benefits or customer loyalty program.*
- *Let people know about what is being sold there. I didn't really know about the different specialty bulbs that are being sold at the Saving Store.*
- *Let us know when there's a special. Carry candelabras and globe bulbs.*
- *Lower the prices, about half the prices you have to make them comparable to the ones I buy at e-Bay.*
- *Lower the shipping from \$25 to \$12. Offer free or reduced price shipping.*
- *Make it cheaper than other places and make it free shipping and returns. Do like they did before by making them free to try out. If they're wonderful, I'll buy more. I love to try new things.*
- *Make them more affordable.*
- *Maybe include information in the paper bills. I found out about the website while I was paying my bill online.*
- *Maybe more advertisements? I don't know how many people know about the store.*
- *More advertising.*
- *More advertising on bills. I pay online so I don't know if Duke puts information about the Saving Store in their paper bills.*
- *More advertising and let people know how much they can save by using the CFLs.*

- *More advertising because I don't read the inserts. Send a separate card in the mail that isn't with the bill and make it colorful. You could also do TV or radio advertisements, but not the internet. After this phone call I will be reading the inserts more because you raised my awareness about what those inserts contain.*
- *More advertising because I really don't know much about the website. Get more information out about the different specialty light bulbs that you carry. I didn't know that you could buy the energy savers for outdoor flood lights or for chandeliers.*
- *More advertising would help. All the people I told about the Saving Store hadn't heard of it.*
- *More advertising. Let more people know about the program. I don't always read the inserts that come with the bills. If my father hadn't have pointed it out to me, I wouldn't have known about the website at all.*
- *More awareness about the website and how much money people can save as a result of using the more efficient bulbs. Offer free or reduced shipping from time to time.*
- *More online advertising. Send larger print for seniors advertising in with our bills.*
- *More varieties of LEDs.*
- *Not sure because I just don't use the internet.*
- *Offer a free shipping policy.*
- *Open it up to non-customers.*
- *People are looking for a bargain and the best [cheapest] buy with easy access, shipping, and receiving.*
- *Provide more inserts in the paper bills they send out.*
- *Raise rates so people are more interested in conserving energy.*
- *Say how much you'd save over time and have comparable prices.*
- *The price of shipping needs to be addressed. The prices are too high.*
- *There is nothing that you can do. I will never use the internet or have a computer in my home.*
- *There's a lot of us that pay online, so make it more prominent on the site.*
- *They could offer deals like buy one get one free sometimes.*
- *They could send out a flyer included with things like restaurant coupons and Dish Network, like once a month in that coupon packet.*
- *They need to advertise more.*

Verbatim Suggestions from Non-Visitors to Increase Visits to the Savings Store

The comments below refer to the discussion on page 170. Note this list appears to total more than 31 respondents because it includes replies from an initial question and a follow up question.

- *Calling and asking would be good, but they really do need a place to purchase the light bulbs.*

- *Duke could include a link to the Savings Store when customers access their account online.*
- *Duke could offer an incentive for first time buyers.*
- *Duke Energy needs a big store here where people can go to the store and buy things like refrigerators and light bulbs.*
- *Get more information to the customers about the CFLs and how they can save energy and money even though the bulbs are more expensive than the old ones.*
- *I don't know if they have a page on Facebook.*
- *I don't know that I read all the literature. For me to sit and read every brochure is not going to happen. If you want the public to know, make it simple, clear, and big letters. Make it darned easy and simple to understand.*
- *I don't use the internet at all and I don't think that there is anything anyone could say to get me to order something online.*
- *I keep meaning to go online but I am busy and forget.*
- *I love how they doing where they come to check your house; that would lead more people to the site.*
- *I try to go for more local, smaller companies. There's very little they could do to get me to buy from them.*
- *I would like a mail order option instead of going online If you would mail out a sheet or pamphlet like the pamphlet you sent already, but with a list of bulb types and prices. Many people aren't that computer savvy.*
- *If I see more commercials on TV, or on the radio while driving down the road, it might encourage me to get on and buy.*
- *If something came that stuck out more it would grab my attention a little faster.*
- *If the flyers had said there was an online store, or that I'd be saving money at the store, that might catch my attention.*
- *If they had a little store somewhere, that would be much, much better. Not everybody has a computer.*
- *I'm a shopper; I want to look, see, and touch. Something can look good on your TV or laptop, but when you get it, it's cheap. I also don't really buy anything online with my credit card.*
- *In the ads, it's not clear how many bulbs are in a pack.*
- *Is there any kind of an ad on TV that tells people about it? I'm a visual person, and a lot of other people I think are as well.*
- *It'd help if they sent out a catalog so you could apply through the mail.*
- *Make sure sizing is clear because, if you're looking at a thing, you got to make sure you're getting the right bulb. It's really frustrating to have it not fit and have to send it back.*

- *Maybe I would have paid more attention to it if it was in the bill. I usually look more carefully at the things in the bill. It's just junk mail a lot of the time when it comes separately.*
- *Maybe if I had more information about it.*
- *Maybe someone you could call and order the bulbs from because I just don't have the computer skills necessary to get to the webpage.*
- *Maybe they could include something in your bill, if it was explained better. Maybe they could have a flyer in there that you receive more than just one time, just in case someone misses it one time.*
- *Maybe they could tie it in to how you compare with other people. It's not connected in as well as it could be to the other energy saving information. It's already kind of busy and you already have a lot of information coming at you. Make it more prominent. It'd make you want to investigate. Otherwise things tend to get lost.*
- *More advertising because I really don't know anything about this website. One of my friends mentioned it, but I haven't seen any commercials for it. I would need to know more about the prices for the light bulbs and how they compare with the local stores.*
- *More advertising. I knew about the Saving Store because I pay my bill online but I hadn't heard about it anywhere else.*
- *More advertising.*
- *More information about the program in general, like what types of bulbs you are selling.*
- *My father told me about the Saving Store and showed me the insert that had come with his bill. From what I saw the Saving Store seemed very enticing. The prices seemed good and there's was information on how much using CFLs can save you.*
- *Nothing. I am in a rental apartment right now and I really don't have any control over the lighting except for the lamp that I own. I really don't use it all that often and I'm going to wait until the 3-way florescent bulbs I have burn out before I switch over to CFLs.*
- *Nothing. It all seemed pretty self-explanatory.*
- *Presentation goes a long, long way. On the outside of the envelope, put brilliant idea inside.*
- *Put on there that they're a real energy saver and tell people what they'd save on their light bills.*
- *Stress that these are green measures or that you'll save lots of money with dollar signs.*
- *The only thing that has kept me from looking at the website is that I don't really know how to get there. I can check my e-mails fine, but I have a hard time with the rest of the stuff.*
- *The pamphlet that I received in the mail from Duke showed a variety of different light bulbs. I just need to take the time to go to the site to order some bulbs.*

- *There needs to be more advertisements with visual images to get into people's heads, like TV commercials. Usually, once people see something they will have a better time at making a connection with something and typically will want something more once they see it.*
- *They need better marketing. I just threw my flyer away after glancing at it.*
- *We don't use credit cards to make payments online. We just get our light bulbs at Walmart or something.*

Verbatim Suggestions from Non-Visitors for Store Inventory

The comments below refer to the discussion on page 171.

- *Come out with a bulb that we can really read by and fits our old lamps.*
- *If it were a better product in quality somehow, as in longevity and greater energy savings, something that would make it unique.*
- *Offer good quality bulbs.*
- *Three-way CFL bulbs. They are nearly impossible to find in stores, although I found some that I have in some lamps. I was able to get CFL floodlights.*
- *Have more LED light bulbs and home security measures like motion detector outside lights.*
- *I believe that the website carries all the different specialty bulbs that I might need in the future.*
- *I just didn't need any CFLs for my rental apartment. I've got them installed in most spots but we're not home very often anyways. When we get a house that we own we will probably need more of the CFLs.*
- *I'd like more items appropriate to someone who lives in an apartment as a renter.*
- *I'd like to see them offer energy efficient window blinds and other stuff you may need in your home to keep it energy efficient. Small things that people can install themselves to attain an energy saving impact.*
- *If it was something I couldn't get any place else, I might consider it.*
- *If they offered things like [electrical] breakers, I would probably get a member of my family to install it. They should offer electrical supplies. If I could locate it online, and I knew it was from Duke Energy, I would trust it was a good product.*
- *I'm not sure what all they sell.*
- *I'm pretty sure that you would carry everything that I could need. I just lack the necessary computer skills.*
- *Maybe appliances. I don't know.*
- *Maybe they could have some type of pictures of what they have. What else does it sell? Do they have an LED bulb for the fridge?*
- *Offer more deals and free shipping, like right before Christmas or something like that.*

- *For people that are disabled and living on a budget, they could offer a store where they can get help to save energy.*
- *This survey makes me want to go and look at the store now.*

Verbatim Non-Visitor Suggestions for Store Discounts

The comments below refer to the discussion on page 171.

- *Anytime somebody can save money, it'd cause them to want to look at it to see what kind of deal they could get versus somewhere else.*
- *Competitive pricing is significant and free shipping gets a lot of people's attention because so many people have shipping and handling that exceeds the value of the product.*
- *Everybody's looking for a bargain. Make a better offer than the big box store and savings on shipping.*
- *Free shipping is always a plus.*
- *Good prices are always appealing.*
- *Have comparable pricing on the literature.*
- *I don't know, but I do know I'm looking for something less than the regular hardware store.*
- *I don't know. Sometimes you order stuff to be delivered to your home and you think that you got such a good price, but then the shipping costs so much that the discounts don't add up to much savings.*
- *I guess just keep offering people the discounted bulbs. When we own a home we'll need them but we just don't need them in our apartment.*
- *I love offers with buy one, get one, or half off, or maybe even if you buy two of these bulbs, we'll send you a \$5 gift card to Walmart.*
- *I really think that if they would just stop increasing the rates for electricity we would not be forced into paying for all of these new products to be more energy efficient.*
- *I suspect that the prices are pretty good compared to buying the bulbs at the stores, but I would hope that you offer free shipping like Amazon.*
- *I think it comes down to pricing. People would be more interested in the Savings Store if they could get a cheaper deal there.*
- *If shipping is too expensive, I probably wouldn't do it.*
- *Just compare the prices. A lot of people around here don't use the LED because they stick to the old stuff. We're in an old mill town where people are older and like to pay their bill by money order and in person.*
- *Make it cheaper than I can get it somewhere else and make it free. I buy an awful lot on the Internet. If shipping is not free, I don't buy it. And, have free returns.*
- *Maybe they could bring the prices down a little.*
- *More coupons.*

- *Offer specials, like free shipping for Christmas so you can give the gift of saving money or something like that.*
- *Offer them cheaper than I can buy them for at Lowe's, plus give a good guarantee for replacement for free, if needed.*
- *People are always looking for a good deal on pricing. I can't think of any specific suggestions offhand.*
- *The prices looked pretty good so I'm not sure what else you could do. I bought some spiral CFLs at Walmart and the prices seemed comparable.*
- *The Savings Store could offer free bulbs, special discounts, and ways to earn reward points.*
- *They could have something like \$5 off; I'm sure that catches people's eyes.*
- *Yes to discounts. I have been buying the bulbs at Sam's in packs of four or five at a lower rate. The price goes down to \$3 to \$4 a bulb when they are sold in five-packs; the bulbs are normally \$6 to \$10 each.*
- *Yes, if they offer free shipping more people would be more willing to make a purchase.*

Appendix K: Impact Algorithms

Specialty Bulbs

General Algorithm

Gross Summer Coincident Demand Savings

$$\Delta kW = \text{ISR} \times \left[\frac{\text{Watts}_{\text{base}} - \text{Watts}_{\text{ee}}}{1000} \right] \times \text{CF} \times (1 + \text{WHF}_d)$$

Gross Annual Energy Savings

$$\Delta kWh = \text{ISR} \times \left[\frac{(\text{Watts} \times \text{HOURS})_{\text{base}} - (\text{Watts} \times \text{HOURS})_{\text{ee}}}{1000} \right] \times 365 \times (1 + \text{WHF}_e)$$

where:

ΔkW = gross coincident demand savings

ΔkWh = gross annual energy savings

Watts_{ee} = connected load of energy-efficient unit = 14.5

$\text{Watts}_{\text{base}}$ = connected (nameplate) load of baseline unit(s) displaced = 47.7

HOURS = Average daily hours of use (based on connected load) = 4.19

CF = coincidence factor = 0.148

WHF_e = HVAC system interaction factor for annual electricity consumption = -0.037

WHF_d = HVAC system interaction factor for demand = 0.168

WHF_e - the HVAC interaction factor for annual energy consumption depends on the HVAC system, heating fuel type, and location. The HVAC interaction factors for annual energy consumption were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix. The weights were determined through appliance saturation data from the Home Profile Database supplied by Duke Energy.

Charlotte, NC

| Heating Fuel | Heating System | Cooling System | Weight | WHFe | WHFd |
|------------------------|------------------------------------|----------------------|--------|--------|-------|
| Other | Any except Heat Pump | Any except Heat Pump | 0.0042 | 0.069 | 0.170 |
| | | None | 0.0004 | 0 | 0.000 |
| Any | Heat Pump | Heat Pump | 0.2782 | -0.1 | 0.170 |
| Gas Propane Oil | Central Furnace | None | 0.0067 | 0 | 0.000 |
| | | Room/Window | 0.5508 | 0.069 | 0.170 |
| | | Central AC | | 0.069 | 0.170 |
| Electricity | Electric baseboard/central furnace | None | 0.0030 | -0.43 | 0.000 |
| | | Room/Window | 0.1493 | -0.31 | 0.170 |
| | | Central AC | | -0.31 | 0.170 |
| None | None | Any | 0.0074 | 0 | 0.170 |
| Total Weighted Average | | | 1 | -0.037 | 0.168 |

WHF_d - the HVAC interaction factor for demand depends on the cooling system type. The HVAC interaction factors for summer peak demand were taken from DOE-2 simulations of the residential prototype building described at the end of this Appendix.

Prototypical Building Model Description

The impact analysis for many of the HVAC related measures are based on DOE-2.2 simulations of a set of prototypical residential buildings. The prototypical simulation models were derived from the residential building prototypes used in the California Database for Energy Efficiency Resources (DEER) study (Itron, 2005), with adjustments made for local building practices and climate. The prototype “model” in fact contains 4 separate residential buildings; 2 one-story and 2 two-story buildings. The each version of the 1 story and 2 story buildings are identical except for the orientation, which is shifted by 90 degrees. The selection of these 4 buildings is designed to give a reasonable average response of buildings of different design and orientation to the impact of energy efficiency measures. A sketch of the residential prototype buildings is shown in Figure 67.

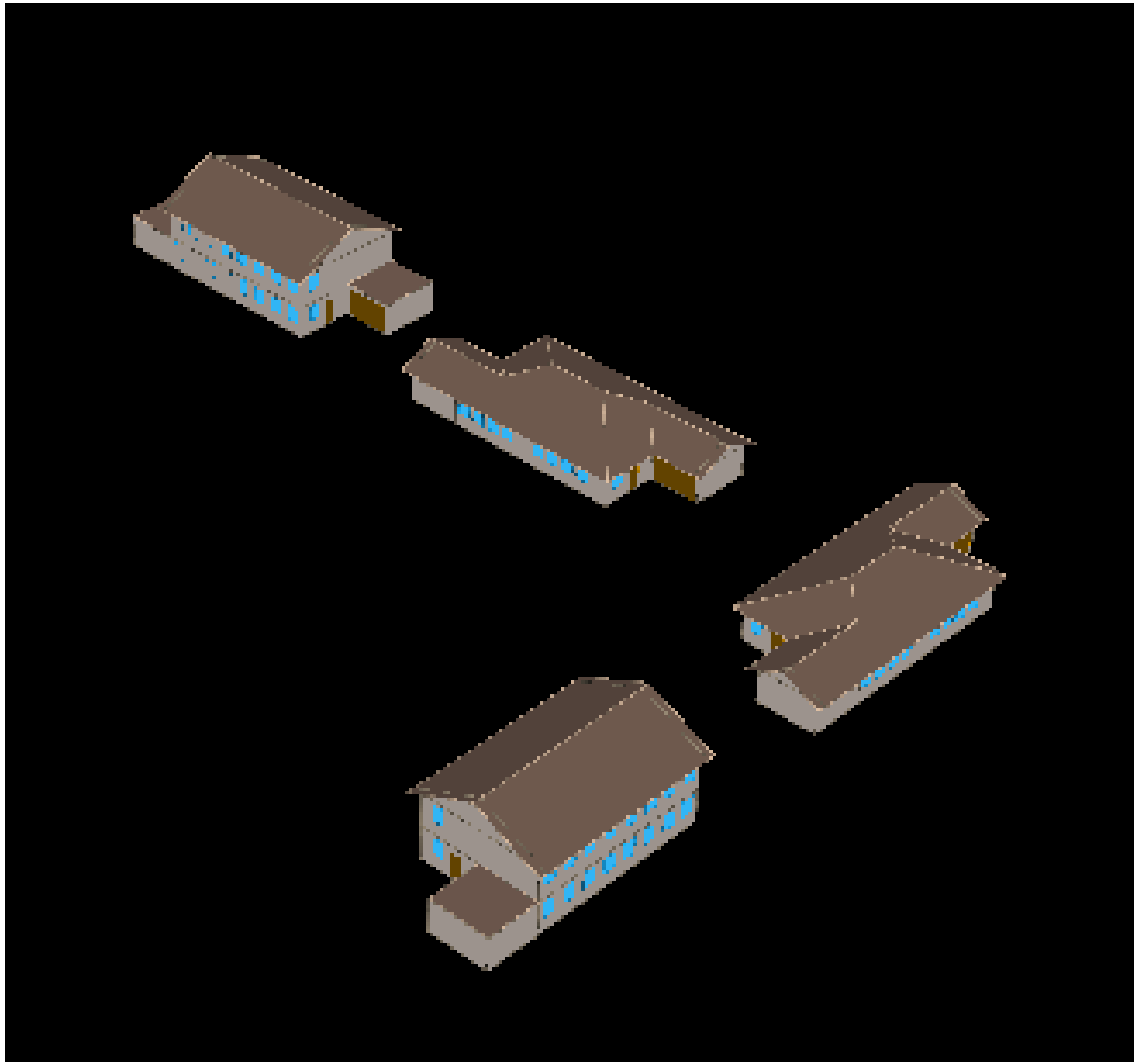


Figure 67. Computer Rendering of Residential Building Prototype Model

The general characteristics of the residential building prototype model are summarized below:



Residential Building Prototype Description

| Characteristic | Value |
|--------------------------------------|---|
| Conditioned floor area | 1 story house: 1465 SF 2 story house: 2930 SF |
| Wall construction and R-value | Wood frame with siding, R-11 |
| Roof construction and R-value | Wood frame with asphalt shingles, R-19 |
| Glazing type | Single pane clear |
| Lighting and appliance power density | 0.51 W/SF average |
| HVAC system type | Packaged single zone AC or heat pump |
| HVAC system size | Based on peak load with 20% oversizing. Average 640 SF/ton |
| HVAC system efficiency | SEER = 8.5 |
| Thermostat setpoints | Heating: 70°F with setback to 60°F Cooling: 75°F with setup to 80°F |
| Duct location | Attic (unconditioned space) |
| Duct surface area | Single story house: 390 SF supply, 72 SF return Two story house: 505 SF supply, 290 SF return |
| Duct insulation | Uninsulated |
| Duct leakage | 26%; evenly distributed between supply and return |
| Cooling season | Charlotte – April 17 to October 6 |
| Natural ventilation | Allowed during cooling season when cooling setpoint exceeded and outdoor temperature < 65°F. 3 air changes per hour |

References

Itron, 2005. “2004-2005 Database for Energy Efficiency Resources (DEER) Update Study, Final Report,” Itron, Inc., J.J. Hirsch and Associates, Synergy Consulting, and Quantum Consulting. December, 2005. Available at <http://eega.cpuc.ca.gov/deer>

Appendix L: DSMore Table

| Per Measure Impacts Summary for Specialty Bulbs Carolinas Duke Energy Customers | | | | | | | | | | | | |
|---|--------------|--------------|-------------------------------|--------------------------------------|--|-----------------|--|-----------------------------|------------------------------------|--|--------------------------|--------------------|
| Impacts  | Product code | State | EM&V gross savings (kWh/unit) | EM&V gross kW (coincident peak/unit) | EM&V gross kW (non-coincident peak/unit) | Unit of measure | Combined spillover less freeridership adjustment | EM&V net savings (kWh/unit) | EM&V net kW (coincident peak/unit) | EM&V net kW (non-coincident peak/unit) | EM&V load shape (yes/no) | EUL (whole number) |
| Technology  | | | | | | | | | | | | |
| CFL - Indoor Reflector (Recessed) | | NC,SC | 39.5 | 0.0046 | 0.0314 | bulb | 24.1% | 30.0 | 0.0035 | 0.0238 | yes | 8 |
| CFL - Dimmable Reflector (Recessed Dimmable) | | NC,SC | 38.3 | 0.0045 | 0.0307 | bulb | 24.1% | 29.1 | 0.0034 | 0.0233 | yes | 8 |
| CFL - Outdoor Reflector (Recessed Outdoor) | | NC,SC | 100.4 | 0.0061 | 0.0414 | bulb | 24.1% | 76.2 | 0.0047 | 0.0314 | yes | 5 |
| LED - Reflector (Recessed LED) | | NC,SC | 67.4 | 0.0061 | 0.0414 | bulb | 24.1% | 51.2 | 0.0047 | 0.0314 | yes | 12 |
| CFL - Globe | | NC,SC | 22.3 | 0.0034 | 0.0230 | bulb | 24.1% | 17.0 | 0.0026 | 0.0174 | yes | 6 |
| CFL - Candelabra | | NC,SC | 18.6 | 0.0022 | 0.0149 | bulb | 24.1% | 14.1 | 0.0017 | 0.0113 | yes | 7 |
| CFL - Three Way Spiral | | NC,SC | 53.1 | 0.0062 | 0.0422 | bulb | 24.1% | 40.3 | 0.0047 | 0.0320 | yes | 7 |
| CFL - Dimmable Spiral | | NC,SC | 59.0 | 0.0070 | 0.0476 | bulb | 24.1% | 44.8 | 0.0053 | 0.0361 | yes | 7 |
| CFL - Capsule (A Line) | | NC,SC | 34.6 | 0.0041 | 0.0279 | bulb | 24.1% | 26.3 | 0.0031 | 0.0212 | yes | 9 |
| LED - Capsule (A Line LED) | | NC,SC | 37.6 | 0.0044 | 0.0299 | bulb | 24.1% | 28.5 | 0.0034 | 0.0227 | yes | 12 |
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| | | | | | | | | | | | | |
| Program wide | | NC,SC | 38.5 | 0.0042 | 0.0284 | bulb | 24.1% | 29.2 | 0.0032 | 0.0215 | yes | 7 |
| Notes: 1. Technology names should match the DSMore naming convention. | | | | | | | | | | | | |
| 2. Energy impacts are average per installed unit for each DSMore technology and unit description (measure/ton/sq.ft., etc.) | | | | | | | | | | | | |
| 3. Any analysis using a control group (such as billing analysis with a control group) does not need a freeridership adjustment (it is already in the analysis via the control group adjustment) | | | | | | | | | | | | |
| 4. EM&V load shape: "no" if using standard DSMore load shape for technology units, "yes" if an evaluation-provided load shape should be used for DSMore. | | | | | | | | | | | | |

Final Report

Evaluation of the Residential Smart \$aver[®] Additional Measures Program in the Carolina System

**Prepared for
Duke Energy**

139 East Fourth Street
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December 10, 2014

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Executive Summary

Key Findings and Recommendations

An overview of the key findings identified through this evaluation is presented in this section.

Significant Evaluation Findings

1. The attic insulation and whole house infiltration sealing measure provided more than 83% of the savings for the Insulate and Seal component of the program.
2. The duct leakage and sealing measure is most effective in ductwork installed in unconditioned spaces such as attics, where summer temperature, humidity and solar heat gains create conditions that maximize savings. The majority of customers had ducts sealed and insulated in unconditioned basements or crawlspaces, where the impacts are smaller. A small number of customers had ducts sealed and insulated in a conditioned basement. Insulating and sealing ductwork located in conditioned spaces provides no savings.
3. Overall, the energy savings for the Health Check component of the program were estimated at about 4% of compressor energy consumption, compared to the program ex-ante assumption of 10%. Eliminating units with identical test-in/test-out data increased the savings fraction to about 6.3%.
4. Based on the Health Check diagnostics report, about 15% of the work requests brought into the Health Check component of the program did not require any apparent service. The test-in report indicated the unit passed all relevant tests. About 30% of the work requests did not require refrigerant charge or air flow adjustments.
5. Results of the Health Check diagnostics were compared to an independent diagnostic protocol. The results were directionally similar, but the program protocol “passed” more systems than the independent protocol.
6. Quality control checks conducted by this evaluation revealed some potential data quality issues. A small number of measurements provided by the contractors were not physically possible. Identical test-in/test-out data were provided for about 30% of the units, which is unlikely given the program requirement for some level of service as a condition of participation. A large fraction (63%) of the units recorded a time difference of less than 10 minutes between test-in and test-out results. Generally, an HVAC unit should run for at least 10 minutes to attain stable operation. These observations indicate a need to increase quality control on the input data and contractor procedures.
7. The contents of the Health Check diagnostics report were not consistent across all units. The results were inconclusive in about 10% of the reports.

Recommendations

1. To maximize per job energy savings, the program should consider limiting duct leakage and sealing measures to duct systems located in unconditioned spaces. Duct systems located in attics have the greatest potential for energy savings.
2. The program collects valuable information on measure quantities and the results of whole house infiltration and duct leakage tests conducted by participating contractors. Some of these data were not entered into the program tracking database supplied to Duke Energy

- by the program administrator, requiring a supplemental data request. Duke Energy should consider establishing additional data requirements on the program tracking database.
3. Duke Energy should consider revising ex-ante assumptions for the Health Check program to account for customers entering the program with systems that do not require airflow or refrigerant charge adjustments.
 4. Duke Energy should consider conducting on-site measurement and verification activities to verify the Health Check efficiency improvements calculated in this evaluation. The results are based on contractor-supplied measurements which may be subject to measurement or data entry errors.
 5. Duke Energy should follow up with the Health Check program vendor to investigate physically impossible measurement results and review data entry quality control procedures, and standardize output reporting to unambiguously state the final condition of the unit.
 6. Duke Energy should investigate potential performance issues with contractors who provided identical test-in/test-out data or who did not appear to allow sufficient time between test-in and test-out readings.

Description of Program

The Duke Energy Residential Smart \$aver Additional Measures program has two components: 1) Insulation and Seal (IS) offers insulation and sealing services and includes attic insulation, air leakage sealing, duct insulation, and duct leakage sealing; and 2) the Health Check (HC) component provides HVAC system tune-ups, focusing on refrigerant charge and air flow (RCA) adjustments.

Program Participation

This evaluation utilized data from participants in the program from August, 2012 through May, 2014. The number of customers participating in each component is shown below.

| Program | Participation Count for August 2012 through May 2014 |
|---|--|
| Residential Smart \$aver: Insulate and Seal | 346 |
| Residential Smart \$aver: Health Check | 137 |

There may be some overlap, as customers in Insulate and Seal may have also participated in Health Check. Individual measure counts are higher, since customers may have participated in more than one aspect of each program and/or had multiple HVAC units serviced at their home.

Methodology

Participant Surveys

TecMarket Works fielded a telephone survey with randomly selected participants in order to measure freeridership and spillover. Eighty (80) surveys were completed with program participants in the Carolina System whose insulation, sealing, and/or tune-up services were performed between October 17, 2012 and August 25, 2014 according to program records. Roughly half of the participants surveyed live in North Carolina (52.5% or 42 out of 80) and roughly half live in South Carolina (47.5% or 38 out of 80).

Trade Ally Surveys

TecMarket Works fielded a telephone survey with trade allies who participated in the program in order to assess freeridership and spillover. Eighteen (18) surveys were completed with trade allies in the Carolina System who currently participate in this program performing insulation, sealing, and/or tune-up services.

Engineering Analysis

A desk review of the measures installed under the Residential Smart \$aver Additional Measures program was conducted. The Insulate and Seal (IS) component included attic insulation, air leakage sealing, duct insulation, and duct leakage sealing. The Health Check (HC) component provided HVAC system tune-ups, focusing on refrigerant charge and air flow (RCA) adjustments. For IS, DOE-2 simulations of prototypical single family residential buildings were conducted to provide unit energy savings estimates for each of the measures installed under the program. The unit energy savings were applied to the measure quantity and type recorded in the program tracking database. For HC, HVAC technician reports were reviewed for each of the participating customers, and the fault detection and diagnostic (FDD) information was reviewed to determine how many customers required RCA service, whether the service was conducted by the technician, whether the system was successfully tuned-up, and how much the efficiency improved as a result of the service. The energy savings were calculated using DOE-2 simulations of prototypical single family residential buildings, based on the incremental improvements in unit efficiency calculated from the FDD information.

Data collection methods, sample sizes, and sampling methodology

Participant Surveys

Duke Energy provided TecMarket Works with a list of 986 records of Additional Measure services performed in the Carolina System (516 in North Carolina and 470 in South Carolina). After aggregating measures by customer account number and removing records with missing contact information or duplicate records, “do not contact” numbers and customers who have recently been surveyed about other programs, the sample list consisted of 699 contactable customers. The survey was conducted by telephone by TecMarket Works staff from the list of 699 participant customers, and 80 respondents completed the survey (42 from North Carolina and 38 from South Carolina). The survey instrument can be found in *Appendix A: Participant Survey Instrument*.

Trade Ally Surveys

Duke Energy provided TecMarket Works with records for 35 trade allies currently offering Additional Measures services through the Smart Saver program (29 companies based in North Carolina and 6 based in South Carolina). The survey was conducted by telephone by TecMarket Works staff from the list of 35 participating trade allies, and 18 trade allies completed the survey (16 companies from North Carolina and 2 companies from South Carolina). The survey instrument can be found in *Appendix B: Trade Ally Survey Instrument*.

Engineering Analysis

The engineering analysis was conducted on a census of participants. No surveying was required. Data were compiled from the program tracking database and program application information provided by Duke Energy.

Number of completes and sample disposition for each data collection effort*Participant Surveys*

From the sample list of 699 participating customers, 383 were called between September 23 and 26, 2014, and a total of 80 usable telephone surveys were completed, yielding a response rate of 20.9% (80 out of 383) and a sample rate of 11.4% (80 out of 699).

Trade Ally Surveys

From the sample list of 35 participating trade allies, all 35 were called between September 24 and October 2, 2014, and a total of 18 usable telephone surveys were completed, yielding a response rate of 51.4% (18 out of 35).

Table 1. Summary of Data Collection Efforts

| Smart Saver Additional Measures Program (Insulate & Seal, Health Check) | | | | | |
|--|--|-------------------------|--------------------------|---|--|
| Data Collection Effort | Size of Population in Sample for Surveys | # of Attempted Contacts | # of Successful Contacts | Response Rate (surveyed out of attempted) | Sample Rate (surveyed out of population) |
| Participant Surveys | 699 | 383 | 80 | 20.9% | 11.4% |
| Trade Ally Surveys | 35 | 35 | 18 | 51.4% | 51.4% |

Engineering Analysis

No surveying was done as part of the gross engineering analysis. Participant surveys described above were used to identify spillover measures and calculate spillover savings in the participant survey sample.

Expected and achieved precision*Participant Surveys*

The survey sample methodology had an expected precision of 90% +/- 8.7% and an achieved precision of 90% +/- 8.7%.

Trade Ally Surveys

The survey sample methodology had a targeted precision of 90% +/- 9.5% and an achieved precision of 90% +/- 13.7%.

Engineering Analysis

No surveying was done as part of the gross engineering analysis. Participant surveys described above were used to calculate spillover savings.

Description of baseline assumptions, methods and data sources

Engineering Estimates

The existing or "as-found" condition of the home or the HVAC system defines the baseline. The as-found condition was documented by the installing contractor and submitted on the rebate application. Key data from the applications were provided with the program tracking data. Images of the applications and supplemental site reports on HVAC system tune-ups were also provided and were used to establish the as-found conditions.

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

Engineering Estimates

DOE-2.2 simulations were used to develop unit energy savings estimates for all measures. Engineering calculations based on contractor data from the HVAC system tune-ups were also used to estimate HVAC system efficiency changes resulting from tune-ups. The unit energy savings were applied to measure quantity data from the program tracking database to estimate savings at the customer and program level.

Threats to validity, sources of bias and how those were addressed

Engineering Estimates

Any potential for bias in the engineering estimates is minimized through the use of building energy simulation models, which are considered to be state of the art for building shell and HVAC system analysis. Seasonality in heating and cooling energy use, and the use of natural ventilation during mild weather in the cooling season is incorporated to reduce upward bias in the engineering estimates. The evaluation is a desk review based on data supplied by the installing contractor; no on-site data collection was performed. Independent checks on the data for internal consistency were done to identify potentially erroneous data. The gross analysis was conducted for all participants, eliminating sampling bias or error. Spillover savings were estimated from a random sample of customers to minimize sampling bias in the spillover savings calculations. Engineering biases in the spillover calculations are difficult to quantify, but are expected to be minimal.

Snapback and Persistence

The theoretical additional energy and capacity used by customers that may occur from implementing an energy efficiency product, often called "snapback" if it occurs, was not addressed in this analysis. However, the level of savings resulting from these measures are not expected to encourage snapback. The measures are permanently installed, so removal is unlikely.

The persistence of savings in HVAC tune-ups however, is not well-known at this time. Impact evaluations tend to focus on first year savings. Longer term studies required to establish persistence have not been conducted for HVAC tune-up measures.

Use of TRM values and explanation if TRM values not used

This evaluation did not rely on a Technical Reference Manual (TRM) to inform the calculation estimating the energy impact. Instead, a more reliable approach using DOE-2 simulations and fundamental engineering equations were used to estimate the savings. Spillover measures were analyzed using a combination of deemed savings estimates from the Duke ex-ante savings database, or calculations using equations from the Ohio TRM.

Impact Evaluation Results

The impact evaluation used a desk review approach to estimate gross savings. Desk reviews involve reviews of program tracking data and program ex-ante assumptions, accompanied by engineering analysis to estimate energy impacts. On-site surveys and site measurement and verification (M&V) was not conducted; all of the data collection and analysis was done without leaving the desk. Desk reviews are conducted on programs with relatively small expected energy savings, where the costs of more involved primary data collection and M&V are not justified.

The desk review results are presented for the Insulate and Seal (IS) component and the HVAC system Health Check (HC) component separately. The HC program contractors collected extensive HVAC system performance data during the course of HVAC system diagnosis and tune-up, which provided a rich data resource for the evaluation team.

Insulate and Seal

The Insulate and Seal (IS) component included attic insulation, air leakage sealing, duct insulation, and duct leakage sealing. DOE-2 simulations of prototypical single family residential buildings were conducted to provide unit energy savings estimates for each of the measures installed under the program. The prototypical simulation models were derived from the residential building prototypes used in the California Database for Energy Efficiency Resources (DEER) study (Itron 2005), with adjustments made for local building practices and climate. The prototype “model” contains four separate residential buildings; 2 one-story and 2 two-story buildings. Each version of the one story and two story buildings are identical except for the orientation, which is shifted by 90 degrees. A sketch of the residential prototype buildings is shown in Figure 1.

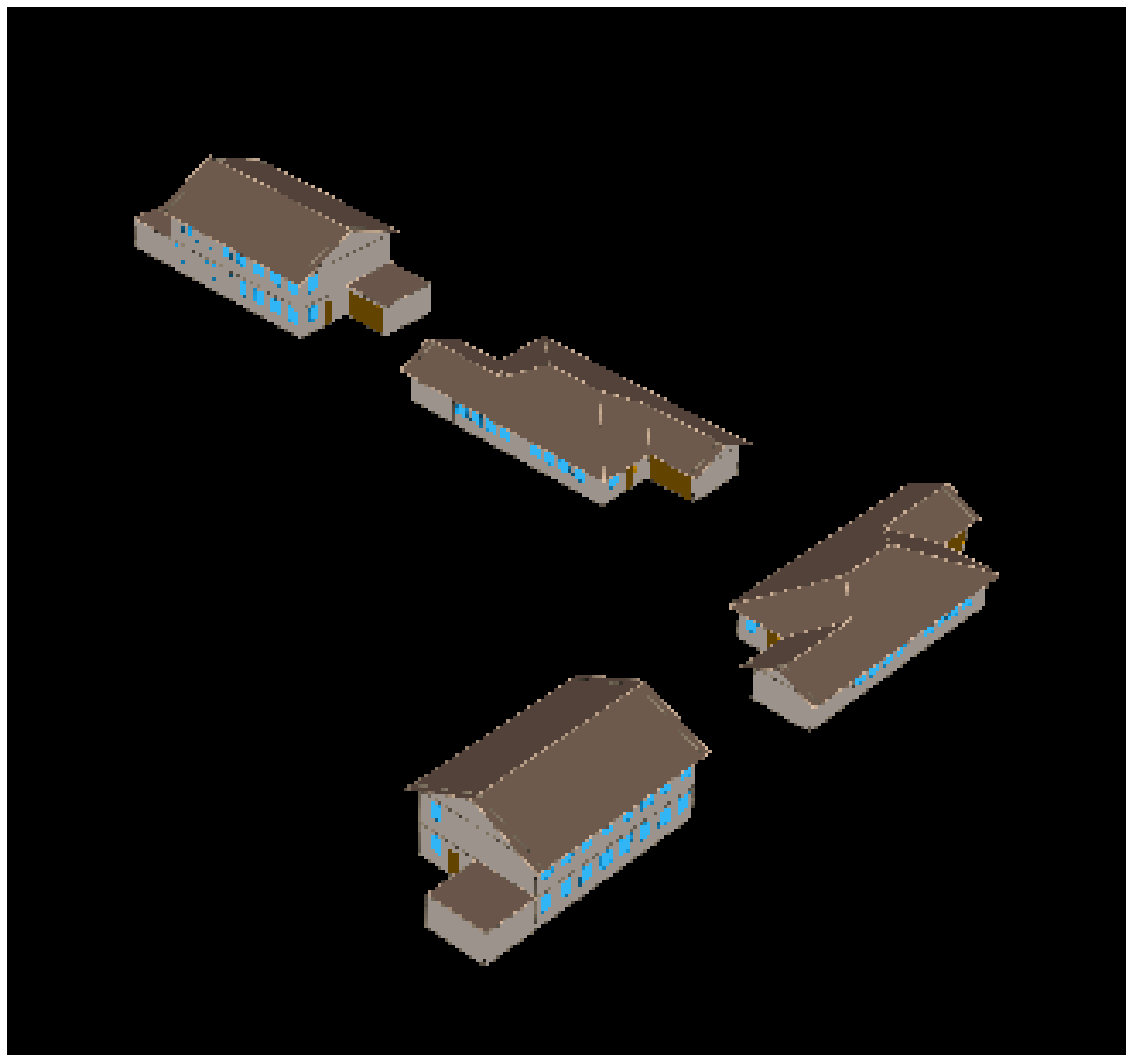


Figure 1. Residential Prototypical DOE-2 Model

The general characteristics of the residential building prototype model are summarized in Table 2.

Table 2. Residential Building Characteristics

| Characteristic | Value |
|--------------------------------------|---|
| Conditioned floor area | 1 story house: 1465 SF (not including basement) 2 story house: 2930 SF (not including basement) |
| Wall construction and R-value | Wood frame with siding, R-11 |
| Roof construction and R-value | Wood frame with asphalt shingles, R-value varies for each run |
| Glazing type | Properties vary by vintage |
| Lighting and appliance power density | 0.51 W/SF average |
| HVAC system types | Packaged single zone AC with gas heat Air source heat pump |
| HVAC system size | Based on design day sizing run with 20% oversizing. |
| HVAC system efficiency | SEER = 10 Furnace efficiency = 0.78 AFUE |
| Thermostat setpoints | Heating setpoint/setback: 70/65 Cooling setpoint/setback: 75/80 |
| Duct location | Buildings without basement: Unconditioned attic Buildings with basement: Basement |
| Duct surface area | Single story house: 390 SF supply, 72 SF return Two story house: 505 SF supply, 290 SF return |
| Duct leakage | Varies according to each run, evenly distributed between supply and return |
| Cooling season | Asheville, NC: Mar 25 - Sep 29 Charlotte, NC: Mar 17 – Oct 6 Greenville, SC: Mar 23 – Oct 7 |
| Natural ventilation | Allowed during cooling season when cooling setpoint exceeded and outdoor temperature < 65°F. 3 air changes per hour |

Attic and Duct Insulation

The prototypical simulations provided unit energy savings (UES) kWh/unit and kW/unit estimates for attic insulation, air leakage sealing, duct insulation, and duct leakage sealing measures as a function of HVAC system type. For the attic and duct insulation measures, UES values were developed at a series of discrete pre- and post-installation R-values. A matrix of simulation results is shown in Appendix D: DOE-2 Simulation Results. Pre- and post-installation R-value information were obtained from the program tracking data, and the energy savings were interpolated between the discrete values in the savings tables to estimate the unit energy savings for the specific pre- and post-installation R-values reported in the program tracking database.

Duct Leakage Sealing

The program tracking database contained duct leakage information from the IS contractors. The pre- and post-sealing leakage data were obtained from “duct blaster¹” tests of the duct system. The leakage data were converted leakage as a percent of total system flow-rate. The DOE-2 simulations provided energy savings estimates at discrete levels of pre- and post-sealing leakage percentages. A matrix of simulation results is shown in *Appendix D: DOE-2 Simulation Results*. These leakage levels were interpolated between the discrete values in the savings tables to

¹ Most, but not all contractors used duct blaster tests to measure pre and post total duct leakage. A few tests were done using a pressure pan method. These test results were converted to % leakage.

estimate the unit energy savings for the specific pre- and post-installation leakage percentages reported in the program tracking database.

Air Leakage Sealing

The program tracking database contained test-in and test-out information from blower door tests conducted by the IS contractors. The blower door information was converted to natural infiltration rates using the “LBL” method documented in the Energy Conservatory blower door user manual². Reductions in natural infiltration rates were applied to UES values for infiltration reductions from the prototypical building simulations. UES tables for infiltration measures are shown in *Appendix D: DOE-2 Simulation Results*.

Results for Insulate and Seal

The results of the Insulate and Seal measure analysis are shown in Table 3.

Table 3. Insulate and Seal Savings Results

| Measure | No. Of Jobs | Savings | | Savings per job | |
|----------------------------------|-------------|---------|------|-----------------|-------|
| | | kWh | kW | kWh | kW |
| Attic Insulation and Air Sealing | 278 | 323,200 | 56.2 | 1,163 | 0.202 |
| Duct Sealing | 147 | 37,437 | 9.7 | 255 | 0.066 |
| Duct Insulation | 53 | 27,529 | 5.0 | 519 | 0.094 |
| Total | | 388,165 | 70.9 | | |

The attic insulation and air leakage sealing measure accounted for about 83% of the savings in the IS component of the program. The duct leakage and sealing measure was applied to homes with ductwork located in basements, crawlspaces and attics. The distribution of duct locations is shown in Table 4.

² Energy Conservatory, Minneapolis Blower Door Operation Manual for Model 3 and Model 4 Systems, May, 2004.

Table 4. Duct System Location for Duct Leakage and Sealing Participants

| Measure | Duct location | Number of Jobs |
|-----------------|-----------------------------|----------------|
| Duct Sealing | Attic | 26 |
| | Conditioned Basement | 2 |
| | Closed Crawlspace | 13 |
| | Uncon bsmt/ Open crawlspace | 68 |
| | Missing data | 38 |
| | Total | 147 |
| Duct Insulation | Attic | 5 |
| | Conditioned Basement | 1 |
| | Closed Crawlspace | 14 |
| | Uncon bsmt/ Open crawlspace | 21 |
| | Missing data | 12 |
| | Total | 53 |

Note: energy savings from duct leakage sealing and insulation measures were calculated for ducts located in unconditioned spaces only. Sealing and insulating ducts located in the conditioned basements were assigned zero savings in Table 3, since duct losses contribute to meeting heating and cooling loads. Customers with missing data were also assigned zero savings in Table 3. The per customer results with all zero savings jobs removed are shown in Table 5. The number of jobs includes customers with ducts located in conditioned space and only those customers with sufficient data to perform the calculation. Table 5 represents the potential savings from the program if quality control procedures are put in place to reject applications with incomplete data or duct systems located in conditioned spaces.

Table 5. Duct Leakage and Sealing Savings per Job with Ducts in Unconditioned Spaces

| Duct Location | Measure | No. of Jobs | Savings | | Savings per job | |
|---|----------------------|-------------|---------|-----|-----------------|-------|
| | | | kWh | kW | kWh | kW |
| Attic | Duct Leakage Sealing | 26 | 19,854 | 5.3 | 764 | 0.205 |
| | Duct Insulation | 5 | 7,287 | 2.0 | 1,457 | 0.394 |
| Closed and Open Crawlspace / Unconditioned Basement | Duct Leakage Sealing | 81 | 17,582 | 4.4 | 217 | 0.054 |
| | Duct Insulation | 35 | 20,242 | 3.0 | 578 | 0.086 |
| All Unconditioned Space | Duct Leakage Sealing | 107 | 37,436 | 9.7 | 350 | 0.091 |
| | Duct Insulation | 40 | 27,529 | 5 | 688 | 0.125 |

Note: No. of jobs includes only those jobs with sufficient data for the calculation.

Health Check

The Health Check (HC) component provided HVAC system tune-ups, focusing on refrigerant charge and air flow (RCA) adjustments. HVAC technician reports were reviewed for each of the

participating customers, and the fault detection and diagnostic (FDD) information was reviewed to determine how many customers required RCA service, whether the service was conducted by the technician, whether the system was successfully tuned-up, and how much the efficiency improved as a result of the service. The energy savings were calculated using DOE-2 simulations of prototypical single family residential buildings, based on the incremental improvements in unit efficiency calculated from the FDD information. FDD information collected by the technicians included:

- Suction (low side) temperature and pressure
- Liquid (high side) temperature and pressure
- Outdoor drybulb temperature
- Return air drybulb and wetbulb temperatures
- Supply air drybulb temperature
- Outdoor unit current (amps)
- Outdoor unit nominal voltage
- Refrigerant type (R-22 or R-410a)
- Expansion device type (fixed or thermal expansion valve (TXV))

A typical FDD report is shown in *Appendix E: Heath Check Diagnostic Report*.

Air Flow Diagnostics

The unit air flow was assessed by the program contractors using a “T-split” method. The T-split method calculates the difference between the return air and supply air drybulb temperatures (the T-split), and compares the measured T-split to target values established as a function of test conditions. If the T-split is too high, low air flow is the suspected cause. If the T-split is too low, excessive airflow or low cooling capacity is the suspected cause. Two sets of tests are generally run: “test-in” records the results prior to service and is used to diagnose airflow faults. “Test-out” records the condition of the system after airflow adjustments are made, and documents that the airflow is correct. The customer FDD report provided by the program contractor shows the results of the T-split test, the air flow fault diagnosis, and any actions taken by the contractor to correct suspected air flow faults.

The measured T-split values were independently compared to target values, using the T-split diagnostic tables contained in the California Energy Commission (CEC) Title 24 energy efficiency standards documentation³. The diagnosis of the system as reported by the contractor was compared to the CEC targets, and an independent diagnosis of air flow faults was developed. The results of this comparison are shown in Table 6.

³ California Energy Commission Title 24 Joint Appendices, Appendix RA-3, 2008.

Table 6. Comparison of Vendor and CEC Airflow FDD Protocol Results

| FDD Test Result | Vendor | | Evaluation | |
|-----------------|---------|----------|------------|----------|
| | Test-In | Test-Out | Test-In | Test-Out |
| PASS | 56 | 151 | 53 | 76 |
| FAIL | 69 | 5 | 56 | 32 |
| NO DATA | 50 | 19 | 66 | 67 |
| TOTAL | 175 | 175 | 175 | 175 |

Approximately 32% of the jobs passed the Vendor airflow FDD protocol during test-in. Eight-six percent (86%) of the jobs were shown to pass the Vendor FDD protocols at the conclusion of the service. Only 3% of the jobs were recorded as not passing the FDD protocol at the conclusion of the service. The Vendor FDD report was either not available or was inconclusive for the remaining 11% of the jobs.

A similar fraction of the jobs (30%) were shown to pass the CEC FDD protocol at test-in. A smaller fraction (43%) of jobs were shown to pass the CEC protocol at test-out, while 18% of the jobs failed the CEC protocol at test-out. About 38% of tests were conducted outside the allowable test conditions for the CEC protocol, so no FDD information is available for those projects.

The number of jobs passing the vendor FDD protocol at test-out is surprisingly high. It is generally difficult to correct all airflow problems without some ductwork modifications, which are generally outside the scope of tune-up activities. The number of jobs tested outside of the conditions allowed by the CEC protocol indicates the vendor protocol is capable of providing FDD analysis over a wider range of temperature and humidity conditions.

Note, 52 of the 175 jobs (30%) had identical test-in / test-out data. This is highly unlikely, given the program requirement for rendering service on all claimed units and the dynamic nature of HVAC operation. It is possible some contractors may have “gamed” the system by simply copying the test-in data into the test-out field. Also, 110 of the 175 jobs (63%) had test-out data recorded less than 10 minutes after the test-in data were recorded. Generally, an HVAC unit must operate for at least 10 minutes to attain stable operation. It is possible that the contractors were not allowing the units to fully stabilize during the FDD process.

Refrigerant Charge Diagnostics

Refrigerant charge FDD activities were conducted using the vendor FDD tool. The vendor tool uses low side and high side pressure and temperature measurements to calculate the suction (low-side) refrigerant superheat⁴ or the liquid (high-side) subcooling⁵. Units with fixed metering devices are diagnosed using the superheat method, while units with TXV metering devices are diagnosed using the subcooling method. Target values for superheat or subcooling are developed

⁴ Superheat is defined as the difference between refrigerant gas temperature and the saturation temperature at the measured low-side pressure.

⁵ Subcooling is defined as the difference between the saturation temperature at the measured high-side pressure, and the refrigerant liquid temperature.

as a function of outdoor drybulb temperature and return air wetbulb temperature. Two sets of tests are generally run: “test-in” records the condition of the system prior to service and is used to diagnose refrigerant charge faults. “Test-out” records the condition of the system after service is completed, and documents that the refrigerant charge is correct.

The FDD system uses the difference between the measured and target values to diagnose refrigerant charge faults. Systems with superheat values exceeding the target are generally undercharged, while systems with superheat values under the target are generally overcharged. Conversely, systems with subcooling values exceeding the target are generally overcharged while systems with subcooling values under the target are generally undercharged. Technicians are trained to add or remove refrigerant until the target value is reached. Note: target values are generally expressed as a range, where the target value is the midpoint of the range, and an acceptable deviation (e.g. +/- 5 deg F) is established.

The refrigerant charge FDD information recorded by the contractors was reviewed, and the number of systems requiring service and the results of the service were tabulated. The refrigerant charge diagnostics were independently assessed, using the CEC tables for superheat and a fixed 10 deg subcooling target for all TXV systems. The results of this comparison are shown Table 7.

Table 7. Comparison of Vendor and CEC Refrigerant Charge FDD Protocol Results

| FDD Test Result | Vendor | | Evaluation | |
|-----------------|---------|----------|------------|----------|
| | Test-In | Test-Out | Test-In | Test-Out |
| PASS | 56 | 147 | 77 | 107 |
| FAIL | 85 | 5 | 81 | 53 |
| NO DATA | 34 | 23 | 17 | 15 |
| TOTAL | 175 | 175 | 175 | 175 |

Approximately 32% of the jobs passed the Vendor charge FDD protocol during test-in. Eighty-four percent (84%) of the jobs were shown to pass the Vendor FDD protocols at the conclusion of the service. Only 3% of the jobs were recorded as not passing the FDD protocol at the conclusion of the service. These values are nearly identical to the airflow FDD results. The Vendor FDD report was either not available or was inconclusive for the remaining 13% of the jobs.

A slightly higher fraction of the jobs (44%) were shown to pass the CEC FDD protocol at test-in. A smaller fraction (61%) of jobs were shown to pass the CEC protocol at test-out, while 30% of the jobs failed the CEC protocol at test-out. About 9% of tests were either conducted outside the allowable test conditions for the CEC protocol or had insufficient information to conduct the FDD.

The number of jobs passing the vendor FDD protocol at test-out is very high. Although results for about 10% of the jobs were inconclusive, this indicates the contractors were able to complete the charge service for most of the customers. A smaller fraction (61%) of the jobs passed the

CEC protocol at test-out. This is not surprising, since different protocols can produce different FDD results⁶. The CEC protocol expects the technicians to meet target values within +/- 5 degrees F. Loosening the tolerance on the test data will increase the number of jobs that pass. The subcooling criterion used in this desk review is a nominal value of 10 degrees F. Target subcooling values recommended by the manufacturer are on a label in the unit and are generally available to the technicians during service. Using the actual subcooling criteria from the manufacturer may result in more systems passing the FDD test at test-out than the typical value assumed in this desk review.

System Efficiency Improvements

The FDD data collected by the contractors was used to estimate changes in system efficiency as a result of the HC tune-up. The unit efficiency was defined as:

$$\text{Efficiency} = \text{cooling delivered} / \text{input power}$$

A refrigerant-side analysis was used to estimate delivered cooling. The refrigerant enthalpy (in Btu/lb) entering and leaving the evaporator was estimated from the refrigerant temperature and pressure measurements. The evaporator entering enthalpy was estimated from the liquid side temperature and pressure, assuming an isentropic (constant enthalpy) expansion process across the expansion device. The evaporator leaving enthalpy was calculated directly from the low side temperature and pressure measurements. Refrigerant mass flow rate (lb/hr) was estimated using a typical compressor curve and the compressor entering and leaving pressures⁷. Input power was estimated from the outdoor unit current and nominal voltage; and a constant power factor assumption of 0.9. The details of the efficiency analysis are shown in *Appendix F: Compressor Energy Savings Analysis*.

The results of the efficiency improvement analysis are shown in Table 8.

Table 8. Efficiency Improvement Analysis Results

| Parameter | Number of Observations ⁸ | Average Change | Relative Precision | Confidence Interval |
|-----------------------|-------------------------------------|----------------|--------------------|---------------------|
| Compressor efficiency | 149 | 4.1% | +/- 56% | 1.7% - 6.5% |

Note, the coefficient of variation⁹ in the results was on the order of 4.3; thus the relative precision in the mean savings is fairly poor, even with a fairly large number of sites in the analysis.

An additional calculation of efficiency change was conducted, where sites that tested in OK or had identical test-in/test-out data were eliminated. The purpose of this calculation is to estimate

⁶ Yuill, D and J Braun. Evaluating Fault Detection and Diagnostics Protocols Applied to Air-Cooled Vapor Compression Air Conditioners. Purdue University, West Lafayette, IN. 2012.

⁷ Compressor discharge pressure was estimated to be 15 psig above the liquid line pressure to account for condenser pressure drop.

⁸ Units with missing or physically impossible data were removed from the analysis.

⁹ The coefficient of variation (CV) is defined as the sample standard deviation divided by the mean. A CV of 0.5 to 1.0 is typically assumed in sample design calculations.

the potential savings after jobs not meeting the program criteria were eliminated. The results are shown in Table 9.

Table 9. Efficiency Improvement Analysis Results with Ineligible Units Removed.

| Parameter | Number of Observations | Average Change | Relative Precision | Confidence Interval |
|-----------------------|------------------------|----------------|--------------------|---------------------|
| Compressor efficiency | 81 | 6.3% | +/- 52% | 3.0% - 9.6% |

Results from Health Check

The average efficiency change was projected into the annual compressor energy consumption from the DOE-2 simulations to estimate the overall energy and peak demand impacts. The results are shown in Table 10.

Table 10. Estimated Energy Savings Resulting from the Health Check Component

| System | kWh/ton | kWh/unit | Units | Total |
|-------------------|---------|----------|-------|--------|
| AC Tune-Up | 23.4 | 70.2 | 83 | 5,827 |
| Heat Pump Tune-Up | 79.1 | 237.2 | 92 | 21,823 |
| Totals | | | 175 | 27,650 |

Projecting the potential savings from Table 9 into the DOE-2 simulation results gives the following per-unit savings estimates:

Table 11. Unit Savings Estimates with Ineligible Units Removed

| System | kWh/ton | kWh/unit |
|-------------------|---------|----------|
| AC Tune-Up | 28.2 | 84.5 |
| Heat Pump Tune-Up | 148.1 | 444.2 |

In the analysis above, compressor efficiency changes were estimated during tests with the unit in cooling mode. The same incremental change in efficiency is assumed to apply to heat pump compressor operation in heating mode. Although approximately 15% of the units passed the vendor FDD protocol at test-in and did not require service, savings were claimed in the program tracking database for all jobs. According to the analysis described above, HC activities improved the efficiency of the units by about 4% across all participants. When units that tested in OK or units with identical test-in/test-out data were removed from the analysis, the savings percentage went up to about 6.3%. These savings fractions are lower than the program ex-ante assumption of 10% savings across all units. Based on these results, the program can be expected to achieve about a 6.3% savings in compressor energy once enhanced quality control procedures designed to eliminate ineligible units or screen out erroneous data are implemented.

The vendor and CEC FDD protocols returned different results, with the vendor protocol providing more “PASS” results than the CEC protocol in all cases. It is expected that two protocols will return different results, but the systematic differences in the results may warrant some field investigation. We did note some of the test-in and test-out values were identical except for the date/time stamps which seems unlikely. We also noticed some “non-physical” data in the reports, meaning temperature and pressure values recorded in the reports for liquid

refrigerant turned out to describe refrigerant in a gaseous state, and vice versa. Presumably, the vendor FDD system has internal checks to identify potentially erroneous data, but these checks were not effective in all cases.

Net-to-Gross Analysis for Impact Estimates

Freeridership

TecMarket Works utilized three sets of questions from the participant survey to estimate freeridership.

For the first set of calculations, the primary “gateway” question asks whether they would have had the rebated services performed without the Smart Saver program. Follow-up questions ask those who say they would have delayed these services to estimate how long they would have delayed the purchase, and ask those who say they would have had a different service performed instead what service would have been performed without the program.

The gateway question asked survey respondents what their behavior would have been if the Smart Saver rebate program had not been available. The four categories of response are:

- a.) exact same service at the same time
- b.) exact same service at a later time
- c.) would have had a different service performed
- d.) no service would have been performed

The breakdown of responses to the gateway question can be seen in Table 12 and Table 13. Participants who indicated that they would have bought the same unit at the same time were assigned a gateway freeridership score of 100%. Participants answering that they would not have any service performed without the program are assigned 0% gateway freeridership.

Freeridership for participants who indicated that they would have had a different service, or the same service performed at a later time, are assigned gateway freeridership scores higher than 0% and less than 100% based on the alternative service and/or the length of delay.

Table 12. Gateway Freeridership Responses for Insulation and Sealing Measures

| Gateway question response and gateway freerider score | Attic Insulation & Sealing (N=32) | Duct Insulation (N=10) | Duct Sealing (N=19) |
|--|-----------------------------------|------------------------|---------------------|
| Exact same service at same time (100% freerider) | 56.3% | 90.0% | 68.4% |
| Exact same service within 6 months (75% freerider) | 0.0% | 0.0% | 0.0% |
| Exact same service 6-12 months later (50% freerider) | 6.3% | 0.0% | 0.0% |
| Exact same service 12-24 months later (25% freerider) | 0.0% | 0.0% | 0.0% |
| Exact same service than 24 months later (0% freerider) | 3.1% | 0.0% | 0.0% |
| Exact same service, not sure when (mean % freerider of the five rows above) | 6.3% | 0.0% | 10.5% |
| Different service performed without the program (0% to 75% freerider, depending on the alternate service considered) | 12.5% | 0.0% | 0.0% |
| No service performed without the program (0% freerider) | 12.5% | 10.0% | 21.1% |
| Not sure what would have happened without the program (withhold from freeridership calculations) | 3.1% | 0.0% | 0.0% |

Table 13. Gateway Freeridership Responses for HVAC Health Check Measures

| Gateway question response and gateway freerider score | Heat pump tune-ups (N=16) | AC tune-ups (N=21) |
|--|---------------------------|--------------------|
| Exact same service at same time (100% freerider) | 75.0% | 76.2% |
| Exact same service within 6 months (75% freerider) | 12.5% | 0.0% |
| Exact same service 6-12 months later (50% freerider) | 0.0% | 4.8% |
| Exact same service 12-24 months later (25% freerider) | 0.0% | 0.0% |
| Exact same service than 24 months later (0% freerider) | 0.0% | 0.0% |
| Exact same service, not sure when (mean % freerider of the five rows above) | 6.3% | 4.8% |
| Different service performed without the program (0% to 75% freerider, depending on the alternate service considered) | 0.0% | 9.5% |
| No service performed without the program (0% freerider) | 6.3% | 4.8% |
| Not sure what would have happened without the program (withhold from freeridership calculations) | 0.0% | 0.0% |

The responses to the gateway question indicate that a significant number of people were to some degree considering taking the same or similar action before their exposure to the program.

However, self-reported intent alone is not a predictor of actions; a set of adjustment questions are asked to assess the degree to which a participant might take a specific action in the absence of program. Net to gross (freerider) analysis is based on the participant's responses to a series of questions which together allow the evaluation expert to predict the degree to which the program played a role in causing a specific event or action to occur.

The first set of adjustments to the gateway freeridership question is based on questions which ask how participants found out about the Additional Measures program.

The four main categories of responses to these questions are:

- a.) customer contacted trade ally about something other than the services performed through the Additional Measures program, and this program was recommended
- b.) a trade ally recommended the Additional Measures program to the customer during a routine maintenance or service call
- c.) a trade ally contacted the customer to solicit their participation the Additional Measures program (including via advertising)
- d.) customer found out about the Additional Measures program from somewhere other than a trade ally and then sought out a participating trade ally (including Duke Energy website and flyers)

The breakdown of responses to the first adjustment factor can be seen in Table 14 and Table 15. Participants who indicated that they contacted a trade ally about something other than the services offered by this program and had Additional Measures recommended to them receive a multiplier adjustment of 1.0 (no change), since this behavior indicates that they had an intention to do something relating to the program-rebated services before learning about the program (otherwise they would not have contacted an HVAC or insulation contractor on their own initiative).

Customers who first found out about the program from a trade ally who had already come to their home for some type of maintenance or repairs receive a multiplier adjustment of 0.5 (gateway freeridership reduced by 50%), since this behavior is less indicative that they had intended to do something similar to the rebated services before the program (these customers could have declined the Additional Measures that were recommended, or chosen to do something else instead, such as HVAC replacement).

Customers who were contacted by a trade ally soliciting their program participation, and customers who found out about the program from somewhere other than a trade ally (usually from Duke Energy program marketing), receive a multiplier adjustment of 0.25 (gateway freeridership reduced by 75%). Responding to program information and vendor solicitations is less indicative of freeridership, and more indicative of the program having a direct influence on customer's decision-making.

Three surveyed participants who had attic insulation and air sealing performed (9.4% of 32) reported that they found out about the program when their property manager or condo

association told them that arrangements had been made for their building to participate. These three participants are withheld from freerider calculations for this measure, since they did not make the decision to participate. For the other four measures in this program, all surveyed participants were the decision makers.

Table 14. Freeridership Adjustments for Insulation and Sealing Measures Based on How Customers Found Out About the Program

| Gateway question response and gateway freerider score | Attic Insulation & Sealing (N=32) | Duct Insulation (N=10) | Duct Sealing (N=19) |
|--|-----------------------------------|------------------------|---------------------|
| Customer contacted the trade ally about something other than the program and this program was recommended (adjustment multiplier: 1.0) | 18.8% | 10.0% | 10.5% |
| Trade ally suggested during routine maintenance or service call (adjustment multiplier: 0.5) | 12.5% | 40.0% | 10.5% |
| Trade ally contacted customer to solicit participation (adjustment multiplier: 0.25) | 0.0% | 0.0% | 0.0% |
| Customer found out about the program somewhere else and sought a participating trade ally (adjustment multiplier: 0.25) | 56.3% | 40.0% | 68.4% |
| Not sure / don't recall (adjustment multiplier: mean adjustment multiplier for customers who gave the same response to the gateway question) | 3.1% | 10.0% | 10.5% |
| Property manager / condo association made arrangements (withhold from freeridership calculations) | 9.4% | 0.0% | 0.0% |

Table 15. Freeridership Adjustments for HVAC Health Check Measures Based on How Customers Found Out About the Program

| Gateway question response and gateway freerider score | Heat pump tune-ups (N=16) | AC tune-ups (N=21) |
|--|---------------------------|--------------------|
| Customer contacted the trade ally about something other than the program and this program was recommended (adjustment multiplier: 1.0) | 0.0% | 14.3% |
| Trade ally suggested during routine maintenance or service call (adjustment multiplier: 0.5) | 50.0% | 57.1% |
| Trade ally contacted customer to solicit participation (adjustment multiplier: 0.25) | 12.5% | 0.0% |
| Customer found out about the program somewhere else and sought a participating trade ally (adjustment multiplier: 0.25) | 37.5% | 28.6% |
| Not sure / don't recall (adjustment multiplier: mean adjustment multiplier for customers who gave the same response to the gateway question) | 0.0% | 0.0% |
| Property manager / condo association made arrangements (withhold from freeridership calculations) | 0.0% | 0.0% |

The second and final set of adjustments to gateway freeridership is based on questions which ask participants to rate the influence of the Smart Saver incentive and the Smart Saver program information and technical assistance. Influence ratings were provided for both the program incentive and information, using a ten-point scale where “1” indicates minimal influence and “10” indicates maximum influence.

Participants were also asked if they were aware of the incentive rebate at the time they made the decision to participate in the program. If the participant was not aware of the incentive, then their rating for the influence of the program information and technical assistance is used to assign their adjustment multiplier (since the incentive rebate could not have influenced their decision if they did not know they were getting a rebate when they made this decision). If the participant was aware that they would receive an incentive, then the higher of their two influence scores is used.

The adjustment multipliers associated with participants' influence ratings are shown in Table 16. A high influence rating (“10”) receives a .05 multiplier (reduces freeridership score by 95%) while a low influence score (“1”) receives a 2.0 multiplier (doubles freeridership score) and moderate scores of “5” and “6” receive 1.0 multipliers (no change to freeridership score).

Table 16. Freeridership Adjustment Multipliers Assigned for Influence Ratings

| Influence rating | Freeridership Adjustment Multiplier |
|---------------------|-------------------------------------|
| 10 (most influence) | 0.05 |
| 9 | 0.25 |
| 8 | 0.50 |
| 7 | 0.75 |
| 6 | 1.00 |
| 5 | 1.00 |
| 4 | 1.25 |
| 3 | 1.50 |
| 2 | 1.75 |
| 1 (least influence) | 2.00 |

The average influence ratings given by participants are presented in Figure 3 on page 37. The algorithm described above (using the higher of two ratings unless they were not aware of the rebate when they decided to participate) produces average program influence ratings of 7.94 for attic insulation, 7.10 for duct insulation, 8.11 for duct sealing, 7.38 for heat pump tune-ups and 7.19 for AC tune-ups.

The final step is to multiply the baseline freeridership scores by the two adjustment factors for every participant with valid responses, which produces a freeridership score for each measure received by each participant. Measure-level freeridership is the average freerider score among surveyed participants who received that measure: duct sealing has the lowest level of freeridership at 11.6% and AC tune-ups have the highest at 29.9%, as seen in Table 17.

Program-level freeridership is calculated by weighting the measure-level freerider scores according to the distribution of measures in the participant population. Thus, program-level freeridership for the Smart Saver Additional Measures program is estimated at 19.6%.

Table 17. Freeridership by Measure and at the Program Level

| Program measure | Average freeridership score for measure | Valid surveys used to calculate freeriders | Measure count in participant population | Measure percent in participant population | Weighted contribution to program freeridership (FR X % in population) |
|-------------------------------------|---|--|---|---|---|
| Attic insulation and air sealing | 14.6% | 29 | 343 | 34.8% | .0509 |
| Duct insulation | 24.8% | 10 | 75 | 7.6% | .0189 |
| Duct sealing | 11.6% | 19 | 192 | 19.5% | .0225 |
| Heat pump tune-up | 23.7% | 16 | 170 | 17.2% | .0408 |
| Air conditioner tune-up | 29.9% | 21 | 206 | 20.9% | .0625 |
| Program-level freeridership: | | | | | 19.6% |

Validity and Reliability of the Freerider Estimation Approach

The field of freeridership assessment as specified in the California Evaluation Protocols basic estimation approach requires the construction of questions that allow the evaluation contractor to estimate the level of freeridership. The basic approach used in this evaluation is based on the results of a set of freerider questions incorporated into participant survey instruments that meets the reliability standards for freerider questions. The approach used in this assessment examines the various ways in which the program influences the customer's decision to have incented measures performed as part of the Residential Smart Saver Additional Measures program, and allocates a freeridership factor for each of the types of responses contained in the survey questions. The allocation approach assigns high freeridership values to participants who would have acquired the same services on their own, and that factor is influenced by their stated intentions regarding the timing and efficiency level of this acquisition. The scoring approach is proportional to the degree to which the participant would have acquired equivalent services on their own.

Spillover

In order to estimate the spillover savings attributed to the program several questions were added to the participant questionnaire aimed at determining the extent to which the program's information and incentives caused additional non-incented spillover actions to be taken by the participants. All 80 survey participants answered the net to gross question battery.

Respondents that had taken additional measures were asked about the type of equipment and when it was installed. No spillover was assigned to those respondents that took additional actions unless they also indicated that their experience with the program influenced them, to some degree, to take additional actions. Influence of the program was rated on a scale from one to ten, with ten being the most influential.

This rating is referred to as the participant's attribution score. Spillover savings was adjusted based on the strength of their attribution score. For example, if the respondent indicated an attribution score of seven out of ten, then their spillover savings were multiplied by 0.7 to estimate their spillover contribution to the program net to gross ratio.

Table 18. Participant Spillover Savings and Attribution

| Measure | kWh Savings | Attribution Score | Spillover kWh Savings |
|---|---------------|-------------------|-----------------------|
| 14.5 SEER AC | 525 | 10 | 525 |
| Weatherstripping doors, fireplace, and windows, water heater wrap | 426 | 10 | 426 |
| Water heater | 277 | 10 | 277 |
| Outlet gaskets | 20 | 10 | 20 |
| Setback Thermostat, window and door sealing | 602 | 8 | 482 |
| Cool roof | 83 | 8 | 66 |
| Geothermal heat pump, new windows | 8,578 | 7 | 6,005 |
| Outlet gaskets | 20 | 6 | 12 |
| Setback Thermostat | 531 | 5 | 266 |
| New windows, new door | 462 | 5 | 231 |
| Water heater | 277 | 4 | 111 |
| Window sealing | 63 | 4 | 25 |
| TOTAL | 11,866 | | 8,446 |

There were 12 survey participants who took additional actions for which enough information was provided to calculate energy savings. Their savings, attribution scores, and spillover contributions are shown in Table 18.

Spillover energy savings were estimated from the customer description of the measure taken and ex-ante savings estimates from the Duke Energy Midwest Master Database for that measure, or in the case of the infiltration measures, using the ASHRAE tables, equations, and calculation methods described in the 2005 ASHRAE Fundamentals Handbook, Chapter 27, “Ventilation and Infiltration.” Tables S3.1, S3.2, S3.3, and S3.4.

The spillover savings were not subject to ex-post evaluation. Actions taken by respondents that provided insufficient data to estimate impact, or whose attribution score was one out of ten, received zero spillover credit. Table 19 shows the spillover percentage for the program of 12.4%.

Table 19. Spillover Percentage

| Survey Respondent kWh Savings Excluding Spillover | Survey Respondent Spillover kWh savings | Spillover Percentage |
|---|---|----------------------|
| 68,297 | 8,446 | 12.4% |

Program Net to Gross Adjustment

The combination of the reduction in energy savings attributed to freeriders plus the adjustment attributed to spillover provides a net to gross ratio of 90.4%.

The net to gross ratio is calculated as follows:

Program Freeridership = 19.6%
Program Spillover = 12.4%
 $NTGR = (1 + \text{spillover}) * (1 - \text{freeridership})$
 $= 1.124 * 0.804$
 $= 0.904$

Participant Survey Results

Program Participation

TecMarket Works surveyed 80 program participants in the Carolina System who received rebates for insulation and sealing and/or HVAC tune-ups through the Duke Energy Residential HVAC Energy Efficiency Program, also referred to as the Smart \$aver Additional Measures program. The distributions of measures among surveyed participants and among the entire population of participants are shown in Table 20. All surveyed customers confirmed the receipt of the measures that were shown in program records.

Four out of five program participants only received one rebated measure from the program (82.5% of surveyed customers and 81.0% of the program population), and none received more than three different measures from the program. The most common measure received from this program is attic insulation and air sealing (performed for 40.0% of surveyed customers and 42.7% of the program population), and the least common is duct insulation (performed for 12.5% of surveyed customers and 9.3% of the program population).

Table 20. Measures Received by Program Participants

| Measures installed: | Surveyed Participants (N=80) | | Total Program Participation (N=804) | |
|--|-------------------------------------|----------------|--|----------------|
| | Count | Percent | Count | Percent |
| Attic insulation & air sealing | 32 | 40.0% | 343 | 42.7% |
| Duct insulation | 10 | 12.5% | 75 | 9.3% |
| Duct sealing | 19 | 23.8% | 192 | 23.9% |
| Heat pump tune-up | 16 | 20.0% | 170 | 21.1% |
| Central air conditioner tune-up | 21 | 26.3% | 206 | 25.6% |
| Number of measures installed per participant: | | | | |
| One measure | 66 | 82.5% | 651 | 81.0% |
| Two measures | 10 | 12.5% | 124 | 15.4% |
| Three measures | 4 | 5.0% | 29 | 3.6% |

Percentages total to more than 100% because participants can receive multiple measures.

More than a third of surveyed customers (36.3% or 29 out of 80) report that they have participated in other Duke Energy programs, as seen in Table 21. The most-mentioned programs are Residential Smart \$aver: Free CFLs (20.0% or 16 out of 80) and Power Manager (10.0% or 8 out of 80). Five surveyed participants (6.3% of 80) have also received rebates for installing new heat pumps or central air conditioners through the Residential Smart \$aver HVAC program.

Table 21. Participation in Other Duke Energy Programs

| | Surveyed Participants (N=80) | |
|--|------------------------------|--------------|
| | Count | Percent |
| Participated in other Duke Energy programs | 29 | 36.3% |
| Free CFLs | 16 | 20.0% |
| Power Manager | 8 | 10.0% |
| Residential Smart \$aver HVAC | 5 | 6.3% |
| Home Energy House Call | 4 | 5.0% |
| My Home Energy Report | 3 | 3.8% |
| Appliance Recycling | 1 | 1.3% |
| Savings Store (specialty bulbs) | 1 | 1.3% |
| Other, listed below | 3 | 3.8% |
| Have not participated in other Duke Energy programs | 48 | 60.0% |
| Don't know / can't recall | 3 | 3.8% |

Percentages total to more than 100% because participants can participate in multiple programs.

Three participants mentioned participating in other Duke Energy programs, which are listed below.

- *I think I participated in a rebate program after having a new roof and windows installed.¹⁰*
- *I made an appliance purchase through Duke in the 1980s.*
- *I pay the all-electric e-rate.*

Only about a third of surveyed program participants had previously hired the vendor or contractor who performed their Smart \$aver-rebated services, as seen in Table 22.

Table 22. Participant Relationship with Trade Allies

| | Surveyed Participants (N=80) | |
|--|------------------------------|---------|
| | Count | Percent |
| Had hired this contractor/vendor before participating in the Additional Measures program | 27 | 33.8% |
| Never hired this contractor/vendor before participating in the Additional Measures program | 52 | 65.0% |
| Don't know / can't recall | 1 | 1.3% |

Figure 2 shows how customers found out about the Additional Measures program, which differs by the measures that were performed. Participants who had heat pump (50.0% or 8 out of 16) and AC tune-ups (57.1% or 12 out of 21) were most likely to have learned about the program from a trade ally during a service call or routine maintenance visit. A majority of customers who had duct sealing (52.6% or 10 out of 19) and pluralities of those who had duct insulation (40.0%

¹⁰ This customer is mistaken, as Duke Energy does not offer rebates for these measures.

or 4 out of 10) and attic insulation (34.4% or 11 out of 32) learned about the program through communications from Duke Energy. Heat pump tune-ups were the only measures for which customers said trade allies had solicited them directly about participation (25.0% or 4 out of 16). Attic insulation and air sealing was the only measure for which customers said they were informed by their landlords (9.4% or 3 out of 32).

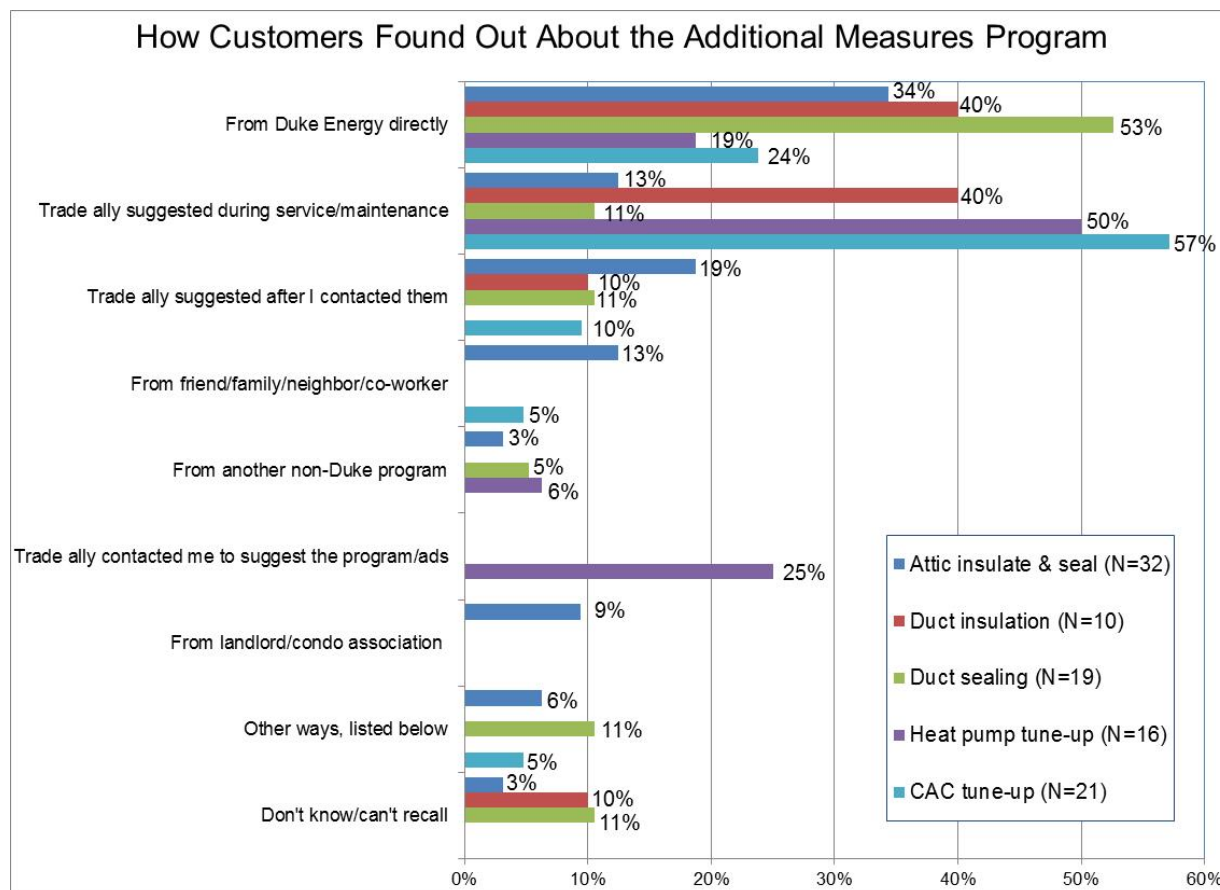


Figure 2. Source of Program Awareness by Measure Received

Three participants (accounting for five measures) learned about the program in “other ways”, which are listed below.

- *I had gotten a mailing from Duke Energy about the program and the contractor we went with was also a participating vendor. So we heard about the program twice. (Attic insulation and duct sealing)*
- *I learned about the program in a newspaper article, which led me to then contact the city government representative that is coordinating the program for the City of Greensboro Accounting Division/Planning and Community Development. (Attic insulation and duct sealing)*
- *I was researching online for a company to give me a second opinion on whether I needed a service recommended by my home warranty company and I found the program listed on Carolina Heating's website. (Air conditioner tune-up)*

Three participants (accounting for three measures) learned about the program from other non-Duke Energy programs, which are listed below.

- *I participated in the Worthwhile Investments Save Energy (WISE) program. They informed me about the Smart Saver program. (Attic insulation)*
- *The Chapel Hill Wise Homes and Buildings Program, who offered to pay 60% of the costs for these additional energy efficiency measures, must have signed us up for the program. I was otherwise unaware of the rebate program until a check from Duke Energy was sent to me. (Duct sealing)*
- *Saint Paul Catholic School sent us some information about the program by giving our kids pamphlets to take home. (Heat pump tune-up)*

Many customers learned about the Additional Measures program directly from Duke Energy; the channels they received these communications through are listed in Table 23. Most customers who heard about the program from Duke Energy first heard about it from Duke Energy mailings; this is true for all specific measures except for heat pump tune-ups, where two of the three participants who learned about the program from Duke Energy found out about it at the website.

Table 23. Channels for Participants Who Found Out About the Program from Duke Energy

| Base: customers who heard about the program from Duke Energy | Attic insulate & air sealing (N=11) | Duct insulation (N=4) | Duct sealing (N=10) | Heat pump tune-up (N=3) | CAC tune-up (N=5) |
|---|--|------------------------------|----------------------------|--------------------------------|--------------------------|
| Mailings or bill inserts | 54.5% | 75.0% | 80.0% | 33.3% | 80.0% |
| Duke Energy website | 18.2% | 25.0% | 10.0% | 66.7% | 0.0% |
| Duke Energy representative or another Duke Energy program | 18.2% | 0.0% | 10.0% | 0.0% | 20.0% |
| Not specified | 9.1% | 0.0% | 0.0% | 0.0% | 0.0% |

Four customers mentioned that they heard about this program from a Duke Energy representative or through participation in another Duke Energy program: Two participants who received attic insulation found out about this program through participation in Home Energy House Call, one participant who received duct sealing heard about it while participating in the Appliance Recycling program, and one participant who received an AC tune-up reported that “a Duke representative told me about it at an event in Greenville; I can't remember what the event was.”

Participants were asked if they were aware that they would be receiving a rebate from the program when they made their decision to participate. As seen in Table 24, a clear majority of participants were aware of the rebate for every measure in the program; awareness of the rebate ranges from 68.4% (13 out of 19) for duct sealing up to 81.3% (13 out of 16) for heat pump tune-ups.

Table 24. Customers' Awareness of the Program Rebate When Deciding To Participate

| <i>Percent of customers who were aware of the rebate when they made their decision to participate</i> | Surveyed Participants | |
|---|-----------------------|-------------------------|
| | Measures installed | Percent aware of rebate |
| Attic insulation & air sealing | 32 | 71.9% |
| Duct insulation | 10 | 70.0% |
| Duct sealing | 19 | 68.4% |
| Heat pump tune-up | 16 | 81.3% |
| Central air conditioner tune-up | 21 | 71.4% |

Measures Received

The Additional Measures program provides three insulation and sealing measures: attic insulation and air sealing, duct insulation, and duct sealing. Participants who received these measures were asked what they would have done if the Duke Energy Additional Measures program had not been available to them. Table 25 shows that most participants believe they would have done the same thing at the same time without the Duke Energy program.

Table 25. Insulation and Sealing Measures: What Would Have Happened in the Absence of the Program

| | Attic Insulation & Air Sealing (N=32) | Duct Insulation (N=10) | Duct Sealing (N=19) |
|--|---------------------------------------|------------------------|---------------------|
| Exact same service at same time | 56.3% | 90.0% | 68.4% |
| Exact same service at a later time | 15.6% | 0.0% | 10.5% |
| Would have had a different service performed | 9.4% | 0.0% | 0.0% |
| Would not have had any service performed | 12.5% | 10.0% | 21.1% |
| Would have done something else (none of the above) | 3.1% | 0.0% | 0.0% |
| Don't know / can't recall | 3.1% | 0.0% | 0.0% |

Customers who said they would have had different services performed (or done "something else" instead of the services performed by the program) were asked what they would have done instead; these responses are listed below. None of the participants who received duct sealing or duct installation measures reported that they would have had a different service without the program.

Attic insulation & air sealing (N=4)

- *I would have had the attic insulation and air sealing done, but I would have gone with a different contractor who quoted me with a cheaper price and the quality of the rating of the insulation was not as good as what I eventually went with.*
- *We would have chosen a similar yet less expensive service.*
- *I would have only had the garage insulated.*

- *I've been having breathing problems and was trying to figure out what I should have done. This was suggested to me and it worked out very well.*

The Additional Measures program also provides two HVAC “Health Check” measures: heat pump tune-ups and central air conditioner tune-ups. As seen in Table 26, most participants who received these measures also report that they believe they would have done the same thing at the same time without the Duke Energy program.

Table 26. Health Check Measures: What Would Have Happened in the Absence of the Program

| | Heat Pump Tune-Up (N=16) | Central AC Tune-Up (N=21) |
|--|--------------------------------|---------------------------------|
| Exact same service at same time | 75.0% | 76.2% |
| Exact same service at a later time | 18.8% | 9.5% |
| Would have had a different service performed | 0.0% | 0.0% |
| Would not have had any service performed | 6.3% | 4.8% |
| Would have done something else (none of the above) | 0.0% | 9.5% |
| Don't know / can't recall | 0.0% | 0.0% |

Customers who said they would have had different services performed (or done “something else” instead of the services performed by the program) were asked what they would have done instead; these responses are listed below. None of the participants who received heat pump tune-ups reported that they would have had a different service without the program.

Central AC tune-up (N=2)

- *Either way, I still had to have AC service work performed so that it would properly cool.*
- *I was contacting the vendor, Carolina Heating, for a second opinion on whether my coils needed to be acid washed, so I would have had that service done either by Carolina Heating or my home warranty-covered company. The PSI was set too high for a couple years and they found that the relay was just on the borderline of being out of spec; these were the reasons my air conditioner was not performing well. My coils weren't so dirty they needed a \$400 procedure. He said I could wash those off with a garden hose.*

Participants were asked to rate the influence of the program rebate, program information and technical assistance on a ten-point scale where “10” indicates the highest possible influence. Average influence ratings are shown in Figure 3 and range from 5.8 to 7.5 which indicates moderate to high levels of influence. For all measures in this program, customers report that the information and technical assistance had a greater influence on participation than the rebate.

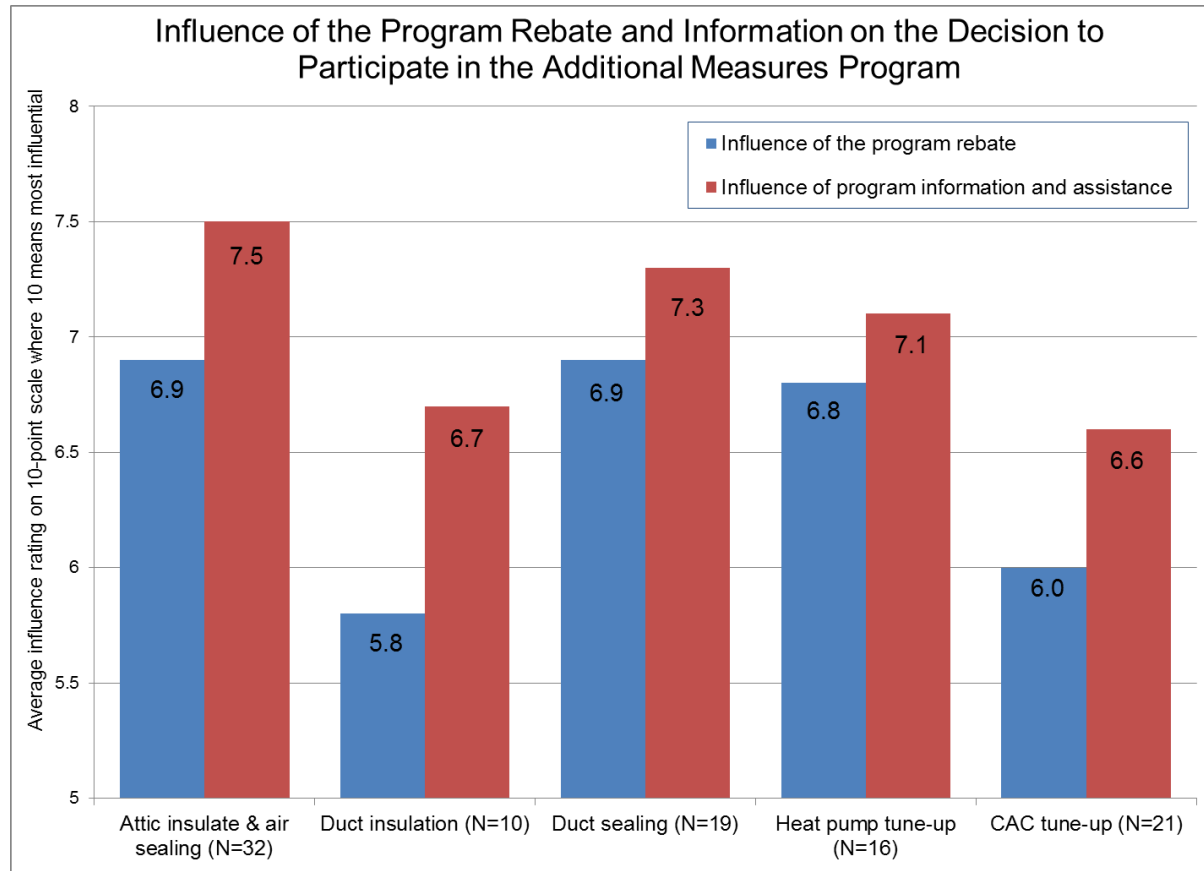


Figure 3. Influence of the Rebate and Information on Program Participation

Participants were asked if they had anything else done at the same time that they had their program-rebated services performed. Table 27 indicates that most duct sealing (80.0%) and duct insulation (68.4%) measures were accompanied by other repairs and services, as were about half of attic insulation and air sealing measures (53.1%). However, only a minority of heat pump (31.3%) and AC tune-ups (33.3%) involved other repairs or services being performed.

Table 27. Other Repairs and Services Performed at the Same Time as Program Measures

| | Surveyed Participants | |
|---------------------------------|-----------------------|--|
| | Measures installed | Percent with other repairs and services at the same time |
| Attic insulation & air sealing | 32 | 53.1% |
| Duct insulation | 10 | 80.0% |
| Duct sealing | 19 | 68.4% |
| Heat pump tune-up | 16 | 31.3% |
| Central air conditioner tune-up | 21 | 33.3% |

Participants were also asked to rate the influence of the Additional Measures program on their decision to have other work done at the same time. Table 28 through Table 32 list all actions reported by customers who gave the program an influence rating of at least “2 out of 10” on a ten-point scale where “10” means most influential. The simultaneous actions inspired by each

measure are listed in a separate table; some actions are included in more than one table for customers who received more than one program measure.

Table 28. Other Repairs and Services Performed at About the Same Time as Attic Insulation and Air Sealing (N=13)

| Actions taken at about the same time as program participation that have influence ratings of "2 out of 10" or higher | Rating of program influence on actions (10-point scale) |
|--|--|
| <i>We installed a new central AC.</i> | 10 |
| <i>Duct Sealing (two measures from this program at once)</i> | 10 |
| <i>Duct sealing; vector support; insulation on two water heaters, sealing in the furnace closet, weatherstripping and air sealing around three exterior doorframes, around the fireplace mantel, and around windows; air sealing around skylights in the attic; and improvements to the vapor barrier underneath the house.</i> | 10 |
| <i>I had the garage attic space insulated as well.</i> | 10 |
| <i>I put in a solar attic fan as well.</i> | 8 |
| <i>I had a new high-efficiency roof put on.</i> | 8 |
| <i>We installed an insulated blanket above the access door in our attic.</i> | 7 |
| <i>We had geothermal done, new duct work and new windows installed.</i> | 7 |
| <i>I also got a new heat pump.</i> | 7 |
| <i>We encapsulated the crawl space at the same time as well. We also changed out the panes of glass in a large bay window to low-E. We also replaced an old door with a more substantial, new, solid wood door. The energy audit (HEHC) we had before the attic insulation was installed was the most influential aspect of making all these improvements.</i> | 5 |
| <i>I had a new air handler and heat pump installed.</i> | 5 |
| <i>Duct sealing; they also did work for drainage issues and a wet crawlspace.</i> | 4 |
| <i>I had my windows sealed, vacuum testing, I switched out many CFLs to LEDs, and I had my heat pump tested for amount of flow.</i> | 4 |

Table 29. Other Repairs and Services Performed at About the Same Time as Duct Insulation (N=6)

| Actions taken at about the same time as program participation that have influence ratings of "2 out of 10" or higher | Rating of program influence on actions (10-point scale) |
|---|--|
| <i>I had a new furnace, whole-house humidifier, and water heater installed at the same time.</i> | 10 |
| <i>We installed a new central AC.</i> | 10 |
| <i>I had a new air handler and heat pump installed.</i> | 5 |
| <i>They installed a new heat pump and new thermostats.</i> | 5 |
| <i>I had a 3 or 4 inch media filter installed on the system as well.</i> | 3 |
| <i>He also installed a new gas pack insulation heater.</i> | 2 |

Table 30. Other Repairs and Services Performed at About the Same Time as Duct Sealing (N=9)

| Actions taken at about the same time as program participation that have influence ratings of "2 out of 10" or higher | Rating of program influence on actions (10-point scale) |
|---|--|
| <i>We installed a new central AC.</i> | 10 |
| <i>Attic insulation and air sealing (two measures from this program at once).</i> | 10 |
| <i>Attic insulation and sealing; vector support; insulation on two water heaters, sealing in the furnace closet, weatherstripping and air sealing around three exterior doorframes, around the fireplace mantel, and around windows; air sealing around skylights in the attic; and improvements to the vapor barrier underneath the house.</i> | 10 |
| <i>I had a new furnace, whole-house humidifier, and water heater installed at the same time.</i> | 10 |
| <i>I had the whole house air sealing and went up to R-38 insulation in the attic.</i> | 10 |
| <i>We had our crawlspace sealed, and a new forced air furnace & air conditioner installed.</i> | 7 |
| <i>New heat pump.</i> | 7 |
| <i>I had a new air handler and heat pump installed.</i> | 5 |
| <i>Attic insulation and air sealing; they also did work for drainage issues and a wet crawlspace.</i> | 4 |

Table 31. Other Repairs and Services Performed at About the Same Time as Heat Pump Tune-Up (N=3)

| Actions taken at about the same time as program participation that have influence ratings of "2 out of 10" or higher | Rating of program influence on actions (10-point scale) |
|---|--|
| <i>The contractor also replaced the air flow regulator on the heat pump.</i> | 10 |
| <i>I don't technically know what it's called, but it was what Freon used to be called; they added that.</i> | 9 |
| <i>I had a new heat pump installed.</i> | 6 |

Table 32. Other Repairs and Services Performed at About the Same Time as Central Air Conditioner Tune-Up (N=2)

| Actions taken at about the same time as program participation that have influence ratings of "2 out of 10" or higher | Rating of program influence on actions (10-point scale) |
|---|--|
| <i>I had the relay or capacitor replaced. If they hadn't done the diagnostic tests during the tune-up, I would have never known this needed replacing. The home warranty-covered company didn't catch this.</i> | 10 |
| <i>As suggested by the contractor who performed the central air conditioner tune-up, they removed Freon from my air conditioning unit.</i> | 9 |

Additional Actions to Save Energy

Three surveyed participants (3.8% of 80) have installed new HVAC equipment since participating in the Additional Measures program (as opposed to installing new HVAC equipment at about the same time that they participated in the program, which is reported in the previous section of this document). These customers installed one new heat pump and two new central air conditioners.

Table 33. New HVAC Units Installed Since Participating in the Program

| | Surveyed Participants (N=80) | |
|---|------------------------------|---------|
| | Count | Percent |
| New heat pump installed since program | 1 | 1.3% |
| New furnace installed since program | 0 | 0.0% |
| New central AC installed since program | 2 | 2.5% |
| No new HVAC units installed since program | 76 | 95.0% |
| Don't know / can't recall | 1 | 1.3% |

Percentages total to more than 100% because participants can install multiple units.

Customers who installed new HVAC units since the program were asked if their participation in the Additional Measures program caused them to make these purchases any sooner or later than they would have otherwise. All three customers who purchased new HVAC units after participating in the Additional Measures program report that they would have had these units installed at the same time with or without the program. Details about additional HVAC installations are listed below in Table 34.

Table 34. Influence of the Program on New HVAC Units Installed Since Participating in the Program

| New HVAC units installed (N=11) | Rating of program influence on new HVAC installation (10-point scale) |
|---|---|
| New AC installed, high efficiency rated 15 SEER | Not rated |
| New AC installed, not sure of efficiency rating | 1 |
| New heat pump installed, standard efficiency | 8 |

Surveyed participants were also asked if they have done anything else to save energy in their home since participating in the Additional Measures program; about a third of participants report taking additional actions since the program, as seen in Table 35.

Table 35. Additional Energy-Saving Actions Taken Since Participating in the Program

| | Surveyed Participants (N=80) | |
|--|------------------------------|---------|
| | Count | Percent |
| Additional action(s) taken to save energy since participating in the program | 25 | 31.3% |
| No additional actions taken | 53 | 66.3% |
| Don't know / can't recall | 2 | 2.5% |

Percentages total to more than 100% because participants can install multiple units.

Participants who took additional actions to save energy were asked to rate the influence of the Additional Measures program on these actions. Among the 25 surveyed customers who took additional actions, the average influence rating for the program was 3.20 on a ten-point scale where ten is highest, and the median rating is one out of ten; this indicates a low level of influence of the program on these additional actions. Actions taken by the twelve customers who gave the influence of the program a “2 out of 10” or higher rating are listed in Table 36.

Table 36. Energy-Saving Actions Influenced by Participation in the Program

| Additional actions with influence ratings of “2 out of 10” or higher (N=12) | Rating of program influence on actions (10-point scale) |
|--|---|
| <i>I sealed up air leaks behind and around sockets.</i> | 10 |
| <i>I changed the type of air conditioner filters to the ones our contractor recommended during the tune-up. We disconnected the foot warmers in our bed, which were pretty much on all the time.</i> | 8 |
| <i>We have adjusted our heating and cooling settings, instead of keeping the cooling at 73 degrees, we now keep it at about 76 degrees. We also installed some new seals on the windows and doors.</i> | 8 |
| <i>I have installed CFLs throughout the house.</i> | 7 |
| <i>I insulated behind sockets.</i> | 6 |
| <i>I had the air handler replaced soon after.</i> | 6 |
| <i>Our repair man came to our home and found that the breakers from the old radiant heaters which were in the ceiling had not been turned off. The breakers were still on and consuming energy! For over 10 years 18% of the Kilowatt Hours used in this old house were from those old, unused radiant heaters. We had always wondered why our energy usage was above average according to the My Home Energy Report. Part of the reason we decided to have the Heat Pump tune-up was to make sure it was running efficiently and hopefully figure out why our energy usage was so high. Fortunately our repair man realized where the excessive power draw was coming from. Besides this incident, we save energy in our home by drying the laundry outside on the clothesline and we keep the air conditioner set at 78 degrees in the summer.</i> | 6 |
| <i>We had new ductwork and new insulation put in.</i> | 4 |
| <i>I got some insulation for the attic area.</i> | 4 |
| <i>We installed a new water heater.</i> | 4 |
| <i>We've been changing over to LED bulbs.</i> | 2 |
| <i>We switched to CFLs when someone from Duke Energy brought them to the house.</i> | 2 |

Customer Satisfaction

Surveyed participants were asked to rate their satisfaction with the Additional Measures program and Duke Energy on a ten-point scale where “10” means most satisfied. As seen in Table 37, the average overall satisfaction rating for this program is high at 8.96 out of 10. Satisfaction with specific aspects of the program and Duke Energy overall are slightly lower, ranging from 8.39 for the information provided by vendors and contractors up to 8.68 for the variety of services covered by the program.

Table 37. Satisfaction with the Program and with Duke Energy (N=80)

| | Average Rating on 10- point scale |
|--|---|
| Satisfaction with the rebate amount offered by the program | 8.47 |
| Satisfaction with the variety of services covered by the program | 8.68 |
| Satisfaction with the information provided by your vendor or contractor about this program | 8.39 |
| Overall satisfaction with Additional Measures program | 8.96 |
| Overall satisfaction with Duke Energy | 8.46 |

Percentages total to more than 100% because participants can install multiple units.

Trade Ally Survey Results

Measures Offered through the Program

TecMarket Works surveyed 18 trade allies in the Carolina System who currently perform insulation, sealing, and/or HVAC tune-ups which are rebated through the Duke Energy Smart Saver Additional Measures program. The distributions of services performed by trade allies are shown in Table 38.

Duke Energy provided program records which indicated the services performed (or measures installed) by participating trade allies through May 31, 2014. When TecMarket Works surveyed these trade allies in September of 2014, respondents were asked which measures their company offered through the Smart Saver program. These responses do not correspond exactly for a couple of reasons: first, trade allies continued to perform services for customers during the four months between the time program records were provided and the time of the trade ally survey, and second, it is possible that a trade ally's measure offerings and services performed may change over time (for example, a company may have offered duct sealing before May 31, 2014 but did not have any completed duct sealing installations in the program records at that time).

A larger number of surveyed trade allies confirmed offering three, four, or five different measures (61.1% or 11 out of 18 surveyed trade allies), compared to the numbers of trade allies shown as having performed this many types of services (28.6% or 10 out of 35 participating trade allies had completed measures in three or more categories according to program records as of May 31, 2014). In particular, surveyed trade allies are more likely to report that they offer duct insulation (61.1% or 11 out of 18) compared to program records, which show that 37.1% or 13 out of 35 participating trade allies had completed measures in this category during the evaluation's timeframe.

Table 38. Type of Measures Offered by Trade Allies

| Measure Type: | Services Offered by Surveyed Trade Allies (from survey; N=18) | | Services Performed by All Participating Trade Allies (from program records; N=35) | |
|---------------------------------|--|----------------|--|----------------|
| | Trade Ally Count | Percent | Trade Ally Count | Percent |
| Attic insulation & air sealing | 13 | 72.2% | 24 | 68.6% |
| Duct insulation | 11 | 61.1% | 13 | 37.1% |
| Duct sealing | 15 | 83.3% | 22 | 62.9% |
| Heat pump tune-up | 7 | 38.9% | 9 | 25.7% |
| Central air conditioner tune-up | 7 | 38.9% | 8 | 22.9% |
| Number of Measures: | | | | |
| One measure | 1 | 5.6% | 6 | 17.1% |
| Two measures | 6 | 33.3% | 19 | 54.3% |
| Three measures | 6 | 33.3% | 8 | 22.9% |
| Four measures | 3 | 16.7% | 2 | 5.7% |
| Five measures | 2 | 11.1% | 0 | 0.0% |

Percentages total to more than 100% because trade allies can offer multiple measures.

Table 39 compares the services performed by surveyed trade allies with the services performed by the population of trade allies from the sample list. The attic insulation and air sealing measure is somewhat under-represented in the survey compared to the sample population, while duct sealing and HVAC tune-up measures are somewhat over-represented in the survey. Overall, the surveyed trade allies account for more than half of the total services performed according to program records (from 57.0% or 81 out of 142 duct insulations up to 90.0% or 54 out of 60 for AC tune-ups), except for attic insulation where surveyed trade allies account for only 45.6% (124 out of 272) of the measures installed in program records. Overall, according to program records, 59.1% (355 out of 601) of all measures installed during the evaluation timeframe were installed by trade allies who participated in this survey.

Table 39. Quantity of Measures Installed/Services Performed by Trade Allies

| Measures Installed: | Surveyed Trade Allies (N=355 measures) | | All Participating Trade Allies (N=601 measures) | |
|---------------------------------|---|----------------|--|----------------|
| | Measure Count | Percent | Measure Count | Percent |
| Attic insulation & air sealing | 124 | 34.9% | 272 | 45.3% |
| Duct insulation | 81 | 22.8% | 142 | 23.6% |
| Duct sealing | 40 | 11.3% | 49 | 8.2% |
| Heat pump tune-up | 56 | 15.8% | 78 | 13.0% |
| Central air conditioner tune-up | 54 | 15.2% | 60 | 10.0% |

Trade allies were asked if they market, sell or present program measures any differently from the non-rebated measures that they offer. Although a substantial minority of trade allies offering insulation and sealing do present these measures differently (ranging from 26.7% up to 45.5% by measure), none of the surveyed trade allies who offer HVAC tune-ups present these services differently from their non-rebated measures.

Table 40 shows what trade allies believe about the effect of program measures on HVAC replacement. The results for duct sealing and HVAC tune-ups are very similar, with about 30% believing that these measures have a net effect of causing customers to delay HVAC replacement while about 70% believe there is no net effect and none (0%) believe that replacements are occurring earlier than otherwise due to offering these measures. Duct insulation is believed to have less impact on delaying HVAC replacement, with only 9.1% (1 out of 11) saying that offering this service causes delays while 81.8% (9 out of 11) say it has no net effect on replacement timing. However, attic insulation is deemed by these trade allies to be the measure that is most likely to cause customers to delay HVAC replacement (38.5% or 5 out of 13), nearly as many as the percentage of trade allies saying this measure has no net effect (46.2% or 6 out of 13). One trade ally (7.7% of 13) believes that attic insulation and air sealing encourages earlier HVAC replacement, the only survey respondent to say this about any of the program measures.

Table 40. Presentation of Rebated Measures and Effect of Measures on HVAC Replacement

| | Measures Offered | | | | |
|---|----------------------------------|------------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=13) | Duct insulation (N=11) | Duct sealing (N=15) | Heat pump tune-up (N=7) | Air conditioner tune-up (N=7) |
| Market, sell or present this measure differently to customers than non-rebated measures | 30.8% | 45.5% | 26.7% | 0.0% | 0.0% |
| Offering this measure encourages more customers to: | | | | | |
| Replace HVAC units sooner | 7.7% | 0.0% | 0.0% | 0.0% | 0.0% |
| Replace HVAC units later | 38.5% | 9.1% | 26.7% | 28.6% | 28.6% |
| No net effect on replacements | 46.2% | 81.8% | 66.7% | 71.4% | 71.4% |
| Not sure | 7.7% | 9.1% | 6.7% | 0.0% | 0.0% |

Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 53 though there are only 18 survey respondents).

Trade allies who said they market, sell or present their rebated program measures differently than their non-rebated services and equipment were asked what is different. These responses are listed below by measure; some comments are repeated for more than one measure. None of the surveyed trade allies said that they offer HVAC tune-ups differently than their non-rebated measures.

Attic insulation and air sealing (N=4)

- *If we find the folks who are R-19 or less, we will let them know there is an opportunity to do both under the program. We usually market and price them as separate services.*
- *When they call us about the program, we focus primarily on the rebated items, but offer our services that we think they need.*
- *I ask first if they are a Duke Energy customer; if they're not, I go no further. Whatever the rebates, I offer them to all of my customers who are with Duke Energy. Not all are eligible, though.*
- *I wouldn't say we market Attic Insulation & Air Sealing any differently than our other services. We send direct mailers, advertise on television, have a company website, and our service technicians can provide informative handouts.*

Duct insulation (N=5)

- *We don't advertise the service the same way as we do with the manufacturer rebates.*
- *When they call us about the program, we focus primarily on the rebated items, but offer our services that we think they need.*
- *We use the Smart Saver rebate as a selling point when marketing duct insulation services.*

- *That one's not flying too well. If they've got the old metal ductwork, I don't recommend they insulate it. I recommend flex duct. I'm just not a big fan of trying to insulate old metal ductwork: with holes, coming apart at the seams, dirty, often 30-years-old . . . It's just a band aid at that point. Also, the rebate is only about 10% percent of the total cost. The two I did were feasible. I do this work on metal ductwork about ten percent of the time, when it's feasible.*
- *We don't do it because it requires us to run duct blasters and we usually use a pressure pan because it takes a quarter of the time to do and we get the same results. With duct insulation, it's mighty expensive, and \$75 is nothing and only covers about 5%. So, it's not even worth talking about.*

Duct sealing (N=4)

- *We don't advertise the service the same way as we do with the manufacturer rebates.*
- *When they call us about the program, we focus primarily on the rebated items, but offer our services that we think they need.*
- *I ask first if they are a Duke Energy customer; if they're not, I go no further. Whatever the rebates, I offer them to all of my customers who are with Duke Energy. Not all are eligible, though.*
- *We don't do it because it requires us to run duct blasters and we usually use a pressure pan because it takes a quarter of the time to do and we get the same results. With duct insulation, it's mighty expensive, and \$75 is nothing and only covers about 5%. So, it's not even worth talking about.*

Estimates of the Program's Effect on Customers

Trade allies were asked to estimate what percentage of the measures covered by the program that they performed for Duke Energy customers received rebates through the program. Table 41 indicates there is again a wide range of estimates, from 0% to 100% for each measure. Mean estimates range from 29.5% to 51.5% by measure, though median estimates range from 1% to 50% by measure; the large difference between means and medians for HVAC tune-ups reflects a bipolar distribution (a majority of these trade allies estimated low numbers close to zero, while a minority gave estimates closer to 100%, without many estimates in between the extreme values).

Table 41. Trade Ally Estimate of What Percentage of Measures They Performed for Duke Energy Customers were Rebated through the Program

| <i>N's shown are the number of trade allies who provided estimates for this question</i> | Measures Offered | | | | |
|--|----------------------------------|-----------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=12) | Duct insulation (N=9) | Duct sealing (N=14) | Heat pump tune-up (N=7) | Air conditioner tune-up (N=7) |
| Lowest estimate | 6% | 0% | 0% | 0% | 0% |
| Highest estimate | 95% | 100% | 100% | 95% | 95% |
| Mean estimate | 31.7% | 48.2% | 51.5% | 29.5% | 29.5% |
| Median estimate | 25.0% | 50.0% | 50.0% | 1.0% | 1.0% |

Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 49 though there are only 18 survey respondents).

Trade allies were asked to estimate what percentage of their customers that receive Smart \$aver-rebated measures would have had exactly the same services performed if the Duke Energy program had not been available. Table 42 indicates a very wide range of estimates, ranging from 0% to 100% for most measures, with average estimates ranging from 46.7% to 77.5% by measure, and median estimates ranging from 60.0% to 85.0%.

Table 42. Trade Ally Estimate of How Many Customers Would Have Done Exactly the Same Thing without the Program

| <i>N's shown are the number of trade allies who provided estimates for this question</i> | Measures Offered | | | | |
|--|----------------------------------|------------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=10) | Duct insulation (N=10) | Duct sealing (N=12) | Heat pump tune-up (N=5) | Air conditioner tune-up (N=6) |
| Lowest estimate | 25% | 0% | 0% | 5% | 0% |
| Highest estimate | 100% | 100% | 100% | 100% | 75% |
| Mean estimate | 77.5% | 62.0% | 66.7% | 58.0% | 46.7% |
| Median estimate | 85.0% | 67.5% | 70.0% | 60.0% | 67.5% |

Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 42 though there are only 18 survey respondents).

Trade allies were also asked to rate the influence of the program incentive and information on their customers' purchases of rebated measures through the program on a ten-point scale where "10" means most influential. Table 43 shows moderate influence ratings, ranging from 4.30 to 6.43 depending on the measure. Though the sample sizes are too small for significance testing, influence ratings for the incentive are consistent (ranging from 5.29 to 5.73 by measure), while there is more variation in the influence ratings for the information and technical assistance. Trade allies rated the influence of program information on duct-related measures (4.30 to 4.50) lower than the influence of the incentive for these measures, while for HVAC tune-ups the program information received a higher rating (6.00 to 6.43) than the incentive. The two influence ratings are similar for attic insulation and air sealing measures (5.69 for incentive and 5.92 for program information).

Table 43. Trade Ally Ratings of Program Influence for Customers

| <i>N's shown are the number of trade allies who provided ratings</i> | Measures Offered | | | | |
|--|---------------------------------|------------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=8) | Duct insulation (N=11) | Duct sealing (N=15) | Heat pump tune-up (N=7) | Air conditioner tune-up (N=7) |
| Influence of incentive on customer's purchase | 5.69 | 5.73 | 5.53 | 5.50 | 5.29 |
| Influence of program information and technical assistance on customer's purchase | 5.92 | 4.30 | 4.50 | 6.43 | 6.00 |

Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 42 though there are only 18 survey respondents).

Trade allies were also asked to estimate what percentage of their customers who participated in the Duke Energy program came to the program through various acquisition channels. Table 44 shows the mean estimated percentages for several common methods separately for each measure offered; since these channels may overlap, and respondents were not required to give responses totaling 100%, these estimates should be considered directional indicators and not precise measurements.

For HVAC tune-ups, the most common method of recruiting participant customers is through recommendations made during maintenance or service calls (mean estimates are 48.6% for heat pump tune-up customers and 57.1% for air conditioning). For the insulation and sealing measures, the most common method is customers contacting trade allies about participation in the program (mean estimates range from 38.8% to 47.2% by measure), followed by trade allies contacting customers for other reasons and the trade allies recommend the program (mean estimates range from 34.8% to 46.1%). Trade allies soliciting customers is estimated to be the least frequent method of recruiting customers, especially soliciting among customers who have previously done business with the trade ally before (mean estimates range from 3.5% to 18.9%).

Table 44. Estimated Distribution of Methods Trade Allies Use to Recruit Customers for the Additional Measures Program

| <i>Percentages in this table are the means of estimated percentages. N's shown are the number of trade allies who provided estimates for these questions</i> | Measures Offered | | | | |
|--|----------------------------------|-----------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=12) | Duct insulation (N=9) | Duct sealing (N=13) | Heat pump tune-up (N=7) | Air conditioner tune-up (N=7) |
| Recommend during maintenance / service calls | 23.9% | 31.7% | 28.8% | 48.6% | 57.1% |
| Solicit participation from customers they have done business with before | 3.5% | 18.9% | 16.5% | 10.7% | 17.9% |
| Solicit participation from potential new customers (have not done business with this company before) | 22.5% | 22.8% | 28.1% | 17.1% | 15.7% |
| Customers contact trade ally specifically about participating in the Duke Energy program | 38.8% | 47.2% | 46.5% | 33.6% | 26.4% |
| Customers contact trade ally about another issue and the program is recommended to them | 34.8% | 46.1% | 37.3% | 32.1% | 32.1% |
| Other methods, specified below | 2.1% | 2.8% | 1.9% | NA | NA |

Columns do not total to 100% because respondents gave estimated percentages and their estimates were not required to add up to 100%.¹¹ Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 48 though there are only 18 survey respondents).

Three trade allies who volunteered that they have “other methods” of recruiting program participation were asked to describe those methods. These responses are listed below by the measures these trade allies were referring to. The trade ally who placed ads on Craigslist and Homeadvisor.com estimates that 25% of their program participants come to them through this channel, while the other two trade allies could not estimate how many participants they get through the channels they mentioned.

- For attic insulation and duct insulation: *I put an ad on Craigslist and HomeAdvisor.com that I'm a Duke Energy Trade Ally.*
- For attic insulation and duct insulation: *We put Smart \$aver brochures out at a trade show or any event where we have a booth and are promoting our business.*
- For all three insulate and seal measures: *We put the Duke rebates on our website.*

¹¹ Aside from the survey instrument not requiring these responses to add up to 100%, the categories can overlap and may not be exhaustive, so percentages may total to more or less than 100%. For example, a customer could be solicited by the trade ally (via advertising) and then that same customer contacts the trade ally about participating in the program.

Effect of the Program on Participating Trade Allies

Table 45 shows the percentage of trade allies that agree with several statements about the effect of the program on their business. Trade allies were asked if they thought the incentive levels were appropriate for the measures in this program; a majority of those offering HVAC tune-ups do find them appropriate (71.4% or 5 out of 7 for both heat pumps and air conditioners), though a minority of those offering insulation and sealing agreed (from 36.4% to 40.0%) by measure offered).

Every surveyed trade ally (100.0%) agreed that if the Smart \$aver program did not offer incentives for these measures, that they would still offer these services to their customers. Allies who offer HVAC tune-ups were also asked if they would offer the exact same level of service without the program incentive, and all agreed that they would (100.0%). However, some trade allies did report that their approach to offering these measures would change in some way without the program incentive, from only 14.3% (1 out of 7) among trade allies that offer HVAC tune-ups up to 45.5% (5 out of 11) of trade allies offering duct insulation.

Although only about a quarter of surveyed trade allies (from 20.0% to 28.6% by measure offered) agreed that the program has influenced them to sell more efficient equipment and services than they would have otherwise, a majority (from 53.8% to 71.4% by measure offered) do report that offering the measures covered by the program has increased the number of customers they serve.

Table 45. Trade Allies' Agreement with Statements about the Effects of the Program on Their Businesses

| | Measures Offered | | | | |
|---|----------------------------------|------------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=13) | Duct insulation (N=11) | Duct sealing (N=15) | Heat pump tune-up (N=7) | Air conditioner tune-up (N=7) |
| Agree that program's incentive levels are appropriate | 38.5% | 36.4% | 40.0% | 71.4% | 71.4% |
| Agree that if program did not offer customers incentive that they would still offer these measures | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Agree that if program did not offer customers incentives that they would change their approach to offering these measures | 38.5% | 45.5% | 33.3% | 14.3% | 14.3% |
| Agree that if program did not offer customers incentives that they would offer the exact same level of HVAC tune-up | NA | NA | NA | 100.0% | 100.0% |
| Agree that program influenced them to market or sell higher volumes of efficiency-related services and equipment than otherwise | 23.1% | 27.3% | 20.0% | 28.6% | 28.6% |
| Agree that offering program measures has increased number of customers served | 53.8% | 63.6% | 60.0% | 71.4% | 71.4% |

Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 53 though there are only 18 survey respondents).

The ten trade allies who did not agree that the program's incentive levels are appropriate were asked why not. Their verbatim comments are listed below according to the measures offered by the respondent company.

- Offers all three insulate and seal measures: *I used to do a lot more of them when I would do an energy audit of the houses. I would have all the pretesting all done. To get my rebate, I would have to do all the testing before and after, which cost a lot more than the \$100. Blower door and combustion safety testing before and after cost money. Stop doing the \$25 audits and have them pay for a full audit. They're not doing a full audit for things and things are being missed.*
- Offers all three insulate and seal measures: *They could actually be a little bit more. If they were a little more, it might change a few people's minds. I think for the attic insulation and air sealing, \$350 instead \$250. Reverse the insulation being the higher rebate between duct sealing and insulation; \$175 is not a big incentive to do both those things either.*
- Offers all three insulate and seal measures: *They need to be significantly higher to get a better response rate. They should offer rebates for 50% of the cost up to \$1,000.*

- Offers all three insulate and seal measures: *They're minimal. I don't think the incentives have gotten any business for us. Everything you're doing to market the program is encouraging customers to have us come out, but the rebates haven't been a deal breaker.*
- Offers all three insulate and seal measures: *We had federal tax credits available of \$1,500 and the Greensboro Better Buildings Program provided up to \$2,000, or 50 percent on the dollar. I think that people have been somewhat spoiled by these programs. What it's forced us to do is we're matching the Smart Saver rebate for whatever they qualify for. So, if they qualify for \$350, we match \$350 to make it a true rebate. The Smart Saver Rebate isn't anything for most people.*
- Offers attic insulation and duct sealing: *Air sealing is much more beneficial and should be done before anything. Insulation rebates give a false sense that there's going to be improvement. But, customers only care about getting their insulation and their rebate with the program. They don't get a proper assessment.*
- Offers attic insulation and duct sealing: *I am in favor of the testing requirements but the incentive levels are insufficient. As of now, there is very little incentive for the homeowner to have these tests performed. Duke could provide a separate \$200-300 rebate for just the testing itself.*
- Offers duct insulation and duct sealing: *I think they're low. The repairs can be very high for the consumer. They are too low across the board.*
- Offers HVAC tune-ups: *The incentive levels are insufficient. We charge \$150 for a 'health check', which takes an average of four hours. The learning curve needed to operate the equipment is steep. A \$50 incentive isn't enough to justify the expense, especially if the customer does not end up qualifying for the incentive or if their repairs amount to hundreds of dollars more.*
- Offers all five measures: *I think they're low, in my opinion, for all the services.*

The five trade allies who agreed that the program has influenced them to market and sell more energy efficient equipment and services were asked what changed due to this influence. Their verbatim comments are listed below according to the measures offered by the respondent company.

- Offers all three insulate and seal measures: *It's been a very good lead generation tool for me and they have provided a number of customer leads that I wouldn't have gotten otherwise.*
- Offers duct insulation and duct sealing: *Everybody likes to get a little bit of money back in their pocket.*
- Offers attic insulation: *It is giving us something to offer people to try to get them to purchase the service. It is helping us get more full house audits. And, when people hear they're getting money back, they get very excited. I've had two or three people said they did it to get that rebate. I've even had people say to me, 'You mean I'm getting something back from Duke?'*
- Offers HVAC tune-ups: *Customers are enticed by the rebate. They are more likely to employ our services or have equipment installed if a rebate is involved.*

- Offers all five measures: *The program hasn't influenced the types of services we provide but it does help market them more effectively. Rebates are an added bonus, i.e. the cherry on top.*

The ten trade allies who reported that the program has increased the number of customers they serve were asked to estimate the amount of the increase. In percentage terms, these ten trade allies' estimated increases range from 1% to 50% with an average increase of 16.3% and a median increase of 10%. In absolute terms, estimates ranged from two to 100 additional customers, with an average estimate of 47 additional customers and median estimate of 34 additional customers. One customer volunteered additional comments, which are listed below.

- Offers all three insulate and seal measures: *Our increase in customers has been about 10%, but that's starting to change. We're matching the rebate, and we're getting a lot more interest from out of our pocket; \$125 just doesn't excite people. But, I always tell our customers you don't buy a service because of the rebate, you buy because of the service. But you'll still have those people that will do it just because there's a rebate.*

The six surveyed trade allies who said that they would change how they market or offer these services if they were no longer rebated through the program were asked what would change. These responses are listed below.

- Offers all three insulate and seal measures: *I would look at other strategic partners to help market my services with.*
- Offers all three insulate and seal measures: *I wouldn't ask if they're a Duke Energy customer or not.*
- Offers all three insulate and seal measures: *If you need it, you need it, but I wouldn't go into whether they qualify or not before assessing the services they need.*
- Offers duct insulation and duct sealing: *As I said, everybody likes to get a little money back. If you can put that in your sales pitch, it definitely helps.*
- Offers attic insulation: *I'm not sure.*
- Offers all five measures: *We would continue to offer the same services but remove that tool from our toolbox.*

Trade allies were asked to estimate the percentage of their Smart Saver Additional Measures customers that purchase additional *non-rebated* energy efficiency equipment or services from them at the same time. The range of estimates is wide, ranging from 0% to 100% for every measure. Mean estimates for insulation and sealing measures range from 49.1% to 59.4% purchasing additional non-rebated services or equipment, which is higher than the 35.7% to 37.1% range estimated for HVAC tune-ups.

Table 46. Trade Allies' Estimates for the Percentage of Participating Customers who Purchase Additional Non-Rebated Energy Efficiency Equipment and Services at About the Same Time

| <i>N's shown are the number of trade allies who provided estimates for this question</i> | Measures Offered | | | | |
|--|----------------------------------|------------------------|---------------------|-------------------------|-------------------------------|
| | Attic insulate & air seal (N=13) | Duct insulation (N=11) | Duct sealing (N=15) | Heat pump tune-up (N=7) | Air conditioner tune-up (N=7) |
| Lowest estimate | 0% | 0% | 0% | 0% | 0% |
| Highest estimate | 100% | 100% | 100% | 90% | 90% |
| Mean estimate | 59.4% | 49.1% | 56.3% | 37.1% | 35.7% |
| Median estimate | 70.0% | 50.0% | 50.0% | 20.0% | 20.0% |

Respondents that offer more than one measure are included in the column for every measure they offer (thus column N's total to 53 though there are only 18 survey respondents).

Appendix A: Participant Survey Instrument

Enter Month and Year

Installation Date _____

for answering machine 1st through penultimate attempts:

Hello, my name is [full name] and I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey about the Smart \$aver energy-efficiency program in which you participated. This program provided your household with <insert service performed here>. I'm sorry I missed you. I'll try again another time.

for answering machine - Final Attempt:

Hello, my name is [full name] and I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey about the Smart \$aver energy efficiency program in which you participated. This program provided your household with <insert service performed here>. This is my last attempt at reaching you, my apologies for any inconvenience.

if person answers

Hello, my name is [full name]. I am calling from TecMarket Works on behalf of Duke Energy to conduct a customer survey about the Smart \$aver energy efficiency program in which you participated. This program provided your household with <insert service performed here>. May I speak with _____ please?

If person talking, proceed. If person is called to the phone reintroduce. If not home, ask when would be a good time to call and schedule the call-back:

We are conducting this survey to obtain your opinions about Duke Energy's Smart \$aver program in which you participated. We are not selling anything. For your time and feedback, you will receive a \$10 check for completing this survey. The survey will take about 10 to 15 minutes to complete. Your answers will be kept confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?

1a. Do you recall participating in the Smart \$aver program?

- ☐ Yes
- ☐ No
- ☐ DK/NS

If No or DK/NS, read statement then ask Q1b:

This program was provided through Duke Energy in conjunction with local HVAC and insulation vendors. In this program, Duke Energy provides customers a rebate for the purchase and installation of efficient heat pumps and air conditioning, as well as attic and duct insulation, duct and air sealing, and heat pump and air conditioner tune-ups.

1b. Do you remember participating in this program?

- ☐ Yes
- ☐ No

() DK/NS

If No or DK/NS, thank them, terminate interview and go to next participant.

2. According to our records, you had [LIST ALL MEASURES RECEIVED] performed in your home. Is this correct? (CHECK ALL MEASURES CONFIRMED BY PARTICIPANT, OR ELSE CHECK "DO NOT RECALL" IF THEY CANNOT CONFIRM ANY MEASURES)

- () Attic Insulation & Air Sealing
- () Duct Insulation
- () Duct Sealing
- () Heat Pump Tune-Up
- () Central Air Tune-Up
- () Do not recall any of the above - *THANK AND TERMINATE*

3a. Have you participated in any other energy efficiency programs offered by Duke Energy, either in the past or since your [insert response from Q2] was performed?

- () Yes
- () No
- () DK/NS

If Yes, ask:

3b. Which other energy efficiency programs offered by Duke Energy have you participated in? About when was that?

(Interviewer: do not record any Additional Measures reported in Q2 here.)

Record response:

REPEAT Q4a THROUGH Q9c ONCE FOR EACH MEASURE CHECKED IN Q2

4a. Next I am going to ask you some questions specifically about [insert response from Q2]. Which of the following statements best describes how you found out about this program?

- () A contractor or vendor suggested the program during a service call or routine maintenance visit
- () A participating contractor or vendor contacted me to suggest the program without me contacting them first
- () I contacted the contractor or vendor about something else, and they suggested this program
- () I learned about the program from somewhere other than the contractor or vendor and then sought out a participating contractor or vendor, or
- () I learned about the program some other way (in other words, none of the above)
- () DK/NS (do not read)

If "learned about the program somewhere else" OR "some other way (none of the above)" checked for Q4a, then ask 4b:

4b. Where did you learn about the [insert response from Q2] service offered through Duke Energy's Smart \$aver program?

Record: _____

Everyone gets asked Q4c-d:

4c. When you made the decision to have [insert response from Q2] performed through the Smart \$aver program, were you aware that you would receive a rebate from the program for this service?

- ☐ Yes
- ☐ No
- ☐ DK/NS

4d. Please indicate from the following choices what you would have done if the Duke Energy rebate program had not been available to you at the time you participated?

- ☐ I would not have had the [insert response from Q2] performed.
- ☐ I would have had the exact same [insert response from Q2] performed at the same time.
- ☐ I would have had the exact same [insert response from Q2] performed, but at a different time.
- ☐ I would have had a somewhat different service performed instead of [insert response from Q2].
- ☐ Or, I would have done something different than what I did, but not any of the options mentioned above.
- ☐ DK/NS (do not read)

If "different time" checked for Q4d, then ask Q5a-d before skipping to Q8a:

5a. Would you have had the [insert response from Q2] service performed sooner or later than you did if Duke Energy's Smart \$aver rebate program had not been available?

- ☐ Sooner, ask: 5b. **How many months sooner?** _____
- ☐ Later, ask: 5c. **How many months later?** _____
- ☐ Other response, record: 5d. _____
- ☐ DK/NS

If "different service" checked for Q4d, then ask Q6a-b (and possibly Q6c-f) before skipping to Q8a:

6a. What would have been different if the Smart \$aver [insert response from Q2] program had not been available?

Record response: _____

6b. If the Smart \$aver program had not been available, would you have done this service at about the same time that you had your [insert response from Q2] performed?

- ☐ Yes
- ☐ No
- ☐ DK/NS

If "No" checked for Q6b, then ask Q6c-f before skipping to Q8a:

6c. Would you have had this alternate service performed sooner or later than you had the [insert response from Q2] performed?

- () Sooner, ask: 6d. **How many months sooner?** _____
- () Later, ask: 6e. **How many months later?** _____
- () Other response, record: 6f. _____
- () DK/NS

If “done something different” checked for Q4d, then ask Q7a-b (and possibly Q7c-f) before continuing from Q8a:

7a. What would you have done instead of [insert response from Q2] if the Smart \$aver program had not been available?

Record response: _____

7b. If the Smart \$aver program had not been available, would you have done this at about the same time that you had your [insert response from Q2] performed?

- () Yes
- () No
- () DK/NS

If “No” checked for Q7b, then ask Q7c-f before continuing from Q8a:

7c. Would you have had this alternate service performed sooner or later than you had the [insert response from Q2] performed?

- () Sooner, ask: 7d. **How many months sooner?** _____
- () Later, ask: 7e. **How many months later?** _____
- () Other response, record: 7f. _____
- () DK/NS

8a. Thinking about the program rebate, on a scale of 1 to 10, where 1 means that the rebate had zero influence and a 10 means that the rebate had a major influence, please rate the level of influence the program rebate had on your decision to participate in the Smart Saver program [insert response from Q2].

- () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10 () DK/NS

8b. Aside from the financial rebate, Duke Energy also provides information about energy efficiency and technical assistance with energy efficiency services. Some of this information and assistance is provided directly to customers, and some of it reaches customers indirectly through vendors and contractors who participate in the program. Using the same scale, where a 1 means the information and assistance provided had zero influence and a 10 means the information and assistance provided had a major influence, please rate the level of influence the program information and technical assistance had on your decision to participate in the Smart Saver program [insert response from Q2].

- () 1 () 2 () 3 () 4 () 5 () 6 () 7 () 8 () 9 () 10 () DK/NS

9a. When your [insert response from Q2] was performed, did you have any repairs or other services performed, or new equipment installed, at about the same time?

- () Yes
- () No
- () DK/NS

If "Yes" checked for Q9a, then ask Q9b and Q9c:

9b. What other repairs or services were performed and/or what new equipment was installed?

record: _____

9c. On a scale of 1 to 10, where 1 means zero influence and 10 means a major influence, please rate the level of influence your participation in the Smart Saver [insert response from Q2] program had on your decision to have these additional repairs or services performed and/or new equipment installed at the same time.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ DK/NS

AFTER ASKING Q4a THROUGH Q9c SEPARATELY FOR EACH MEASURE CHECKED IN Q2, THEN CONTINUE FROM Q10a

10a. Have you had a new furnace, heat pump or central air conditioner installed since you participated in this Smart Saver program? (check all that apply)

- ☐ Yes, new heat pump
- ☐ Yes, new furnace
- ☐ Yes, new central air conditioner
- ☐ No, none of the above - skip to Q11a
- ☐ DK/NS - skip to Q11a

If any "Yes" is checked in Q10, then ask Q10b:

10b. Did your participation in the Smart Saver program lead you to have this new equipment installed any sooner or later than you would have otherwise?

(Interviewer: if there are multiple outcomes for multiple units, record details in Q10e)

- ☐ No, would have done it at the same time regardless
- ☐ Yes, got new unit(s) sooner than otherwise, ask: 10c. **How many months sooner?**

☐ Yes, got new unit(s) later than otherwise, ask: 10d. **How many months later?**

☐ Other response, record: 10e. _____

☐ DK/NS

If "Yes, sooner" is checked in Q10b, then ask Q10f:

10f. Did you receive a rebate from Duke Energy for your new [insert all "yes" items from Q10a]?

(Interviewer: if there are multiple outcomes for multiple units, record details in Q10e)

- ☐ Yes, received rebate(s) from Duke Energy (for all new units)
- ☐ No, did not receive any rebate(s) from Duke Energy
- ☐ Received rebates for some units but not others, specify: **10g.** _____
- ☐ DK/NS

If "Yes, sooner" is checked in Q10b, then ask Q10h-j once for each item checked "yes" in Q10a:

10h. On a scale of 1 to 10, where 1 means that participating in the Smart Saver program had zero influence and a 10 means that this program had a major influence, please rate the level of influence that participating in this program had on your decision to install a new [insert "yes" items from Q10a].

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ DK/NS

10i. Is your new [insert “yes” items from Q10a] a high-efficiency model or a standard-efficiency model?

- ☐ High efficiency - continue with Q10j
☐ Standard efficiency - skip to Q11a
☐ DK/NS - skip to Q11a

10j. What is the efficiency rating of your new [insert “yes” items from Q10a]?

- ☐ Know rating, record: _____
☐ DK/NS

11a. Have you done anything else to save energy in your home since your [insert all responses from Q2] was/were completed?

- ☐ Yes
☐ No
☐ DK/NS

If “Yes” checked for Q11a, then ask Q11b and Q11c:

11b. What else have you done?

record: _____

11c. On a scale of 1 to 10, where 1 means zero influence and 10 means a major influence, please rate the level of influence your participation in the Smart \$aver program had on your decision to take these additional measures to save energy in your home?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ DK/NS

We would like to ask you a few questions about your satisfaction with various aspects of the program. For these questions we would like you to rate your satisfaction using a 1 to 10 scale where a 1 means that you are very dissatisfied with that aspect and a 10 means that you are very satisfied.

How would you rate your satisfaction with:

12. The amount of the rebate provided by the program

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ NA ☐ DK/NS

13. The variety of services covered by the program

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ NA ☐ DK/NS

14. The information provided by your vendor or contractor about the Smart \$aver Program

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ NA ☐ DK/NS

15. Before participating in this program, had you ever hired the contractor who provided your [insert all responses from Q2] services before?

- ☐ Yes, had hired this contractor before participating in the program
☐ No, had not hired this contractor before participating in the program
☐ Other response, *record*: 15b. _____
☐ DK/NS

16. Now, considering all aspects of the program, how would you rate your overall satisfaction with the Smart \$aver program on a scale from 1 to 10 where 1 means very dissatisfied and 10 means very satisfied?

- ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ DK/NS

17. Using the same 1 to 10 scale, how would you rate your overall satisfaction with Duke Energy?

- ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ DK/NS

18. We have reached the end of the survey. Do you have any comments that you would like for me to pass on to Duke Energy?

That's all the questions I have for you today. Thank you for your time!
(politely end call)

Appendix B: Trade Ally Survey Instrument

Name: _____

Title: _____

Position description and general responsibilities:

for answering machine 1st through penultimate attempts:

My name is _____ and I am calling from TecMarket Works on behalf of Duke Energy to conduct an interview regarding Duke Energy's Residential Smart Saver Program under which your business has offered energy efficiency services. I'm sorry to have missed you. I will try you again another time, or I may be reached at <give phone number>. Thank you for considering helping us.

for answering machine - Final Attempt:

My name is _____ and I am calling from TecMarket Works on behalf of Duke Energy to conduct an interview regarding Duke Energy's Residential Smart Saver Program under which your business has offered energy efficiency services. This is my final attempt to reach you. I may be reached at <give phone number> if you are able to help us with this 15-minute survey by <give final day and time>. Thank you for considering helping us.

if person answers

My name is _____ and I am calling from TecMarket Works on behalf of Duke Energy. We are conducting this interview to obtain your opinions about, and experiences with, services you offered through Duke Energy's Residential Smart Saver Program. The opinions we are looking for are specific to service-related actions, such as air and duct sealing services, as well as heat pump or A/C tune-ups. We would like to know your thoughts on how this program is affecting customers' purchasing decisions and how it is affecting your business. This interview will take about 15 minutes to complete. Your responses will be kept confidential and will help to make improvements to the program. May we begin?

V1. Which of the following services has your company provided to customers that have been associated with the Residential Smart Saver program? (READ LIST, CHECK ALL THAT APPLY)

- ☐ Attic Insulation & Air Sealing
- ☐ Duct Insulation

- () Duct Sealing
 () Heat Pump Tune-Up
 () Central Air Tune-Up

V2a. In your opinion, are the incentive levels offered by Duke Energy appropriate for this program?

- () Yes - SKIP TO V3a
 () No - ASK V2b THEN CONTINUE
 () DK/NS - ASK V2b THEN CONTINUE

V2b. Why do you say that?

Record response:

REPEAT V3a THROUGH V8e ONCE FOR EACH MEASURE CHECKED IN V1

V3a. Do you market, sell or present the Smart \$aver rebated <INSERT RESPONSE FROM V1> to your customers any differently than your non-rebated services and equipment?

- () Yes - ASK V3b THEN CONTINUE
 () No - SKIP TO V4a
 () DK/NS - SKIP TO V4a

V3b. What is different about the way you market, sell or present <INSERT RESPONSE FROM V1> compared to other services and equipment?

Record response:

V4a. Thinking only about customers who purchased the Smart \$aver-rebated <INSERT RESPONSE FROM V1>, what percent of those customers do you think would have still had the exact same service performed if the Duke Energy program had not been available?

Record response (try to get a percentage number if possible; record verbal response if they won't give a number):

V4b. Using a scale of 1 to 10, where 1 means not at all influential and 10 means very influential, how important would you say the incentive rebate is to your customers' decision to purchase these services from your company?

Circle one:

| | | | | | | | | | | |
|------------------------|---|---|---|---|---|------------------|---|---|----|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | DK/NS |
| Not at all influential | | | | | | Very influential | | | | |

V8b. What else does your company do to get your customers to participate in the <INSERT RESPONSE FROM V1> program (that I have not already mentioned?)

Record response:

V8c. What percentage of your customers who have participated in the Smart \$aver <INSERT RESPONSE FROM V1> program joined through this method/these methods?

Record percent (record multiple percents if multiple methods are mentioned in V8b):

V8d. About what percentage of your customers who receive rebates for <INSERT RESPONSE FROM V1> purchase additional non-rebated energy efficient equipment or efficiency-related services from you at about the same time?

Enter a percentage if possible; if they cannot provide a number record their verbal response ("just a few", etc.):

Record: _____

V8e. Next I am going to read three statements. Please tell me which of these three statements you think best describes the situation at your company.

() One: Offering <INSERT RESPONSE FROM V1> encourages more customers to replace their old HVAC units sooner.

() Two: Offering <INSERT RESPONSE FROM V1> encourages more customers to delay replacing their old HVAC.

() Three: Offering <INSERT RESPONSE FROM V1> has no net effect on the timing of old HVAC unit replacement.

() DK/NS (do not read)

AFTER ASKING V3a THROUGH V8e SEPARATELY FOR EACH MEASURE CHECKED IN Q1, THEN CONTINUE FROM Q9a

V9a. Has this program influenced your decision to push, market or sell higher volumes of efficiency-related services and equipment than you would have without the program?

- () Yes - ASK V9b THEN CONTINUE**
- () No - SKIP TO V10a**
- () DK/NS - SKIP TO V10a**

V9b. Why do you say that? (What has changed due to the influence of the program?)

Record response:

V10a. Has offering Smart \$aver-rebated <INSERT RESPONSES FROM V1> increased the number of customers your company serves?

- ☐ Yes - ASK V10b and V10c
- ☐ No - SKIP TO V11a
- ☐ DK/NS - SKIP TO V11a

V10b. Please estimate the percentage increase in your customer base due to offering Smart \$aver-rebated <INSERT RESPONSES FROM V1> .

Enter a percentage if possible; if they cannot provide a number record their verbal response (“just a few”, etc.):

Record: _____

V10c. About how many customers per year is that?

Enter a number if possible; if they cannot provide a number record their verbal response (“a couple dozen”, etc.):

Record: _____

V11a. There are no plans to terminate this program, but we would like to know how the program affects contractors. If the Residential Smart \$aver program did not offer customers incentives for these specific services, would you still market or sell <INSERT RESPONSES FROM V1> to your customers?

- ☐ Yes - CONTINUE WITH V11b
- ☐ No - SKIP TO Q11f
- ☐ DK/NS - SKIP TO Q11f

V11b. Would your approach to offering these services change in any way?

- ☐ Yes - ASK V11c-e THEN SKIP TO V12
- ☐ No - SKIP TO V12
- ☐ DK/NS - SKIP TO V12

V11c. What would be different without the program?

Record response:

Ask V11d-e only if they have “heat pump tune-up” or “AC tune-up” checked in V1.

V11d. In the absence of the program, would you continue to offer the exact same level of HVAC tune-up service to your customers?

- ☐ Yes - SKIP TO V12
- ☐ No - ASK V11e THEN SKIP TO V12
- ☐ DK/NS - SKIP TO V12

V11e. What would be different about the level of HVAC tune-up services your company offers without the program?

Record response:

V11f. Why do you say that? (What would be different without the program?)

Record response:

V12. We have reached the end of the survey. Do you have any comments that you would like for me to pass on to Duke Energy?

Record response (if any):

Thank you for your time today!
(politely end call)

Appendix C: Participant and Trade Ally Suggestions for Duke Energy

At the end of the survey, interviewers asked participants if they had any comments to pass on to Duke Energy. Thirty-six out of 80 surveyed participants made comments, which are categorized and listed below; many of these comments do not relate to the Additional Measures program.

Comments about the Smart Saver Additional Measures program

- I thought the \$50 rebate was off the price of the central air conditioner tune-up, I guess it was unclear to me that you really only got the \$50 off if additional services were performed, which is why I went along with the additional services. The rebate and required qualifications were unclear to me. Another thing is that the company who performed the services suggested having the Freon removed from the air conditioning unit, which I've never heard of doing, but they went ahead and removed the Freon and charged that as an additional service. I don't think it was the right thing to have done to the unit. Also during the time of the services that the vendor or contractor was at my house I had questions that they were unable to answer and I could not find any additional contact information from Duke Energy to ask those questions about the services, the program, or the rebate qualifications. I suggest this program offer a follow-up from Duke Energy so if customers had questions they could be dealt with. Oh, and another thing, I have two units, and it turned out that this particular contractor charged separately for each tune-up, they had problems with the second unit and said they were going to come back to fix the second unit, and they didn't come back. After I called them about when they were coming to service the second unit, they said they were no longer part of the Smart Saver program and were unable to help me. I paid over \$200 for additional services to have the Freon removed, an additional service I thought I really did not need, but was convinced by the contractor that I needed to get the additional services in order to get the Smart Saver rebate. I am still quite unclear about how the Smart Saver program was supposed to work. I would really appreciate if Duke Energy could do a follow up with me about my participation and the services that were performed.*
- The one thing that frustrated me a little bit was, when the contractor was done, they conducted all the testing that they were certified to do. Then, someone from Duke Energy had to come out do the exact same testing. I wish they'd accepted the results from the contractor and not had to come back out. It was very inconvenient for us.*
- As a result of participating of the program, we became an Energy Star certified home. This program should offer information on the reduced rates for Energy Star certified homes. If I'd known about this earlier, I would have applied to Duke Energy for these reduced rates months ago.*
- Having the ducts sealed and adding insulation to the attic and our crawlspace has cut the house's energy consumption in half. I knew that getting these things done would help the efficiency so I was planning on doing them even without the rebate. The rebate did help ease the financial burden of having the work done and we're reinvesting the savings in new windows, which will be installed next month.*

- *I did appreciate and enjoy participating in the program, however I did not see the results in the reduction of my bill. It appears to be about the same. I have the equal payment plan. Maybe it'll go down when I get re-evaluated. I did notice improved comfort, though.*
- *Well, I was told that by investing in having the attic insulation and air sealing performed on my house it was supposed to make a huge difference with my heating and cooling costs and efficiency. I really have not seen or noticed an improvement, so I am slightly disappointed with the lack of those results. Besides that, I thought the contractor who performed the work was very helpful and very professional.*
- *I think this is a great program. It saved me money and the people were very informative.*
- *They could send us some more bulbs, if they want to. We're 100% satisfied with the rebates and we're well satisfied with the unit we got.*
- *The initial rebate was great and the results are still coming in over time. The coal ash spill has not reflected well on their ability to control things, and as a stockholder I don't want the pay for the spill. The spill has affected my satisfaction with Duke Energy. I'm enthusiastic about trying to clean up the environment and moving to renewable sources of energy, like solar panels.*
- *There were problems with submitting the whole house air sealing and attic insulation. I believed ERS had submitted for the attic insulation and air sealing. When my rebate for the duct sealing came, but the insulation rebate didn't come, I called ERS to ask what happened. Apparently, it was a processing error on Duke's part where they didn't separate the applications. I got busy with work and by the time I figured out what was going on, the 90-day window had passed. I would have liked if they'd let me know prior that there was a time period for processing the rebate, so that I could have had an indication that there was an issue with the attic insulation rebate. I would have liked that money.*
- *I wondered why the rebate took two to three months; I feel this should have been a little shorter in time.*
- *It took me a long time to get my rebate check. I even had to call a few times. I also didn't understand a lot about what they actually did with this program. It wasn't explained to me very well.*
- *Duke Energy could provide rebates for attic fans. Our fan has lowered our energy bill approximately 20%.*
- *I think it's good when Duke Energy has incentives to benefit the customer for doing home improvements. I hope they continue to offer these incentives and offer even more in the future.*
- *I have some confusion about how we got our name on your list of people who participated in this Smart Saver program, it must have been the company who did the work on my home who applied us for the program. I really did not receive any information about the program, but I did get the rebate check for \$100, so I guess we qualified for the Smart Saver.*
- *I was very disappointed to hear that this program was ending¹² and I was very disappointed to hear that it was timeboxed. I don't think they're investing enough with*

¹² TMW does not know the source of this misinformation.

alternative energy and they don't seem to care about safety, especially with this coal ash spill. And, it's continuing. They're not interested in finding innovative solutions for our safety and sustainable energy sources. To be energy efficient, I bought an electric car, so my electric use went up. The government gave me a rebate, but Duke Energy didn't offer anything. They're a stodgy, stodgy company. I wouldn't buy stock in them. When I invest my money, that's my ultimate test. I will never buy stock in Duke.

Comments that are not about the Smart Saver Additional Measures program

- Your power service and stuff is good, but your ability to communicate with the disabled community sucks. I am blind and your website is horrific. It's not encoded for the disabled community, as it should be by law. And, you are required by law to give me a bill in braille, which I only get it if I ask for it each time. I have to truck the bill to my mom's house and she has to pay the bill for me. If I did not have my mom, then I'm in a world of hurt. I'd have to pay somebody to pay my Duke Energy bill for me. I think she finally set up online bill paying, so she didn't have to write checks for me. Other than my one complaint of all of your program opportunities, energy-efficiency information, and billing information being entirely inaccessible to me without my mom's help, I have no other complaints about Duke's service. My power seems to stay on while everyone around me has outages when we have storms.*
- I think the rates are high and that Duke Energy should take responsibility for their coal ash spill. They're the ones who didn't keep the ash contained well enough so they should have to clean it up.*
- I am upset about the coal ash spill and Duke's anti-solar lobbying efforts. Duke Energy should support renewable energies.*
- I am pleased with their services; they've always been very helpful with anything I've ever needed.*
- I am very grateful that Duke Energy is always communicating with their customers and trying to improve their services.*
- I love their automatic billing. I hate writing checks.*
- Duke Energy could bury power lines.*
- Duke Energy could monitor customers' daily usage and notify them via email in cases of uncharacteristic spikes. This would be akin to a service formally provided by the now defunct Piedmont Energy.*
- Our 'My Home Energy Report' might be inaccurate. We have added onto our house and have made changes. I have called customer service and was unable to get an answer to our question. I want to know if the report is based on our original house or our renovated house.*
- Duke Energy could improve customer service. I dislike the convoluted phone menu options. Please make it easier for me to speak to a helpful customer service representative straight away when I call.*
- They could make their website easier to get around on. Specifically what kind of heat pump do I buy in order to receive a rebate? There needs to be a better way to search for information.*

- *I would like to encourage Duke Energy to use those solar funds, and continue to encourage alternative clean energies. I want more alternatives; I'd like to see a decline in the use of coal power and to completely stop using nuclear power.*
- *I would like to encourage Duke Energy to explore renewable energy resources, especially with solar energy. I'd like them to support a program which would help customers with installation of solar panels for their properties, or even have renting opportunities of the renewable systems. Why is Duke not doing this? It only makes sense for a region that has a surplus of sun to harvest that energy. Also, especially for customers with older homes, somehow have Duke Energy check to make sure those old radiant heat sources have their breakers turned off, or have that be a 'double-check suggestion' on the My Home Energy Report so more people are aware of that energy wasting potential.*
- *A long time ago, and they did correct it, but when they were putting lines underground, they caused a blockage in my sewer line. They did pay what the plumber costs me, but I kind of feel like I should have been better compensated. I mean, I had sewage in my house. Maybe their customer service is better now. That's the reason I didn't rate my satisfaction as high.*
- *I was somehow removed from the even billing payment plan, which I had never approved. We somehow got a \$300 bill which we couldn't pay for because we're on a fixed income. I had paid the bills every month so I was surprised by the \$300 bill and I couldn't figure out when we used that energy because I keep all of our bills. When I called Duke Energy about the bill, no one could tell me when we used that power.*
- *Duke Energy could be less profit-driven and reduce rates for customers.*
- *I am less than satisfied with Duke Energy because the rates keep going up.*
- *I'd like to see Duke Energy lower the cost of their rates. I'd like to see Duke Energy offer me a military discount on my utility services.*
- *Don't raise their rates anymore.*
- *Give back more money. They got plenty and they can afford to give back to their customers and less to their stockholders. They need to reduce their stockholder percentage by 10%. I mean, how many stocks do you know of where you're guaranteed 20%?*

At the end of trade ally interviews, trade allies were also asked if they had any comments about to share with Duke Energy. Twelve trade allies offered comments about the Additional Measures program, which are listed below.

- *Offers all five measures: Replacing an HVAC unit leads customers to participate in other Smart Saver services at the same time. The program application form is a bit cumbersome. Building Performance Institute (BPI) standards are not the ultimate qualifier here in the Carolinas. There are other factors to consider.*
- *Offers all five measures: Sometimes, we get a call from customers who had the Duke Energy audit done only to find out they just had a walkthrough. People become confused because they actually didn't know that what they had was only a walkthrough and they don't understand why they have to have another audit. If you don't check something like the backdraft, it's unsafe for the customers. It goes to logic to do a full energy audit*

before doing the work. We follow BPI protocol. It's going to take a bigger tax credit to offer full audits to people. Duke needs to have clear language with people who have the free walkthrough done.

- Offers all three insulate and seal measures: *I would love to see them put larger rebates into this program to make it more effective.*
- Offers all three insulate and seal measures: *The one thing that has probably got me out to more houses for energy audits was the comparison report Duke sends out. That's a very good marketing tool and it really helps us out. People trust you guys that say they have high power bills because you'd be the ones least likely to say that unless it were true.*
- Offers all three insulate and seal measures: *I would absolutely love for Duke Energy to let me know how I'm doing. I've heard some good comments on audits. But, what I'd love is to hear back from Duke Energy about how the customers in this program are doing energy-wise, how much they're saving.*
- Offers all three insulate and seal measures: *I noticed on the website, when I went to the program, that my company was at the bottom of the list and that there was no link to my website. My company is a longtime participant in this program, probably as long as the program has been available.*
- Offers all three insulate and seal measures: *I just encourage you to keep the program and increase the value on the rebates. Big thumbs up on the program!*
- Offers all three insulate and seal measures: *I just spoke with my Duke rep yesterday about these concerns with this program. Duke Energy is doing a major disservice to their customers by offering walkthrough efficiency audits through a third party. It's actually harming the homeowner. There's no accountability in the process with these third party auditors. All they care about is getting their \$50 and moving on to eight other homes that day. When we get to the home, nothing coincides on the paperwork provided by these auditors with what's actually going on in the house. An example is we had a lady in a 1936 house who was told she needed attic insulation and sealing and that was it. The third party audit had checked off on air leaks and other things. When we got there, there was no insulation and sealing anywhere the auditor checked off on. Attic Insulation and sealing was only about one tenth of what this lady needed and she thought she only needed attic insulation. They completely BS'd her. The people that Duke Energy is contracting out to do these audits suck and they're dumber than a stick horse. These audits are doing more harm than providing benefit. These audits are designed to bring people to the Smart Saver Program website. The third party auditor, through [REDACTED], is [REDACTED]. Another example is we had a call from a lady in a 1932 house that had such a terrible audit conducted that she called us. She said she showed the auditor a place where air was leaking under her cabinetry and the auditor said, 'You know that mismatched sock from the dryer? The one where you can't find the other one? Stuff that in there and it'll stop the leak.' That suggestion was beyond absurd. Our company is trying to lend creditability to the industry as a whole, but things like this damage the industry. I have recommendations for the program. First, Duke Energy should turn over the energy audits that are being done by third parties to the contractors participating in the Smart Saver Program. We are properly certified and we have a vested interest in doing the work properly, regardless of rebate costs. We do a free field site seeing survey for all of our customers. Then we do diagnostics. We never charge our customers for walkthrough audits. Second, if they do not turn over the walkthrough audits to program*

contractors, they need greater accountability measures and they need to require that the third party auditors go into the home with a list of program contractors and program information. You don't save kilowatts by audits, but by doing the work. Third, they need to add a small incentive for windows because that's what people think will save them energy. And, fourth, there has to be some kind of educational aspect to this program. Have Duke Energy give a quarterly, or bi-annual, public presentation on exactly what services promote efficiency. These presentations will raise awareness of the program and methods to save energy, and will go a long way toward the longevity and level of success of this program.

- *Offers attic insulation and duct sealing: Duke Energy and Duke Energy Progress could merge their incentive programs or clarify the differences between them. Duke could market the health & safety aspects of the program, and also show customers how it could lower their energy bills. Provide more training about proper duct & attic sealing techniques.*
- *Offers attic insulation and duct sealing: I don't think this is a good program at all. The first step needs to be a comprehensive energy assessment, not a Duke Energy pitiful assessment. I think this program gives people a false sense of improvement, and is not a good use of customers' finances.*
- *Offers duct insulation, duct sealing and HVAC tune-ups: I would suggest providing customers with two different rebate options: a smaller rebate if their system passes the initial test, or a larger rebate if it fails. Customers don't like the idea of their system needing to fail the test in order to qualify for the incentive.*
- *Offers HVAC tune-ups: I don't know how many people truly look at the program postcards Duke sends out. We gave them a list of customers and we probably only got back one percent from that. Get the word out that there's rebate programs out there.*

Appendix D: DOE-2 Simulation Results

Table 47. Infiltration (Air Leakage Sealing) Unit Energy Savings

| City | Duct location | HVAC System | kWh/cfm | kW/cfm |
|------------|---------------|-------------|---------|--------|
| Asheville | Attic | AC Gas Heat | 1.3 | 0.0000 |
| Asheville | Basement | AC Gas Heat | 1.2 | 0.0043 |
| Asheville | Attic | Heat Pump | 20.1 | 0.0000 |
| Asheville | Basement | Heat Pump | 17.1 | 0.0022 |
| Charlotte | Attic | AC Gas Heat | 2.3 | 0.0000 |
| Charlotte | Basement | AC Gas Heat | 2.2 | 0.0012 |
| Charlotte | Attic | Heat Pump | 12.1 | 0.0000 |
| Charlotte | Basement | Heat Pump | 10.9 | 0.0012 |
| Greenville | Attic | AC Gas Heat | 2.7 | 0.0000 |
| Greenville | Basement | AC Gas Heat | 2.2 | 0.0013 |
| Greenville | Attic | Heat Pump | 16.7 | 0.0000 |
| Greenville | Basement | Heat Pump | 15.0 | 0.0013 |

Table 48. Cooling System Size

| City | Duct location | SF/ton 2 story prototype | SF/ton Single Story Prototype | SF/ton avg |
|------------|---------------|--------------------------------|--|------------|
| Asheville | Attic | 709 | 634 | 671 |
| Asheville | Basement | 705 | 496 | 600 |
| Charlotte | Attic | 593 | 495 | 544 |
| Charlotte | Basement | 693 | 598 | 646 |
| Greenville | Attic | 598 | 507 | 553 |
| Greenville | Basement | 703 | 615 | 659 |

Table 49. Annual HVAC Compressor Energy Consumption

| City | HVAC type | Cooling (kWh/ton) | Compressor heating (kWh/ton) | Total compressor (kWh/ton) |
|------------|----------------------|----------------------|------------------------------------|----------------------------------|
| Asheville | AC with gas heat | 344 | 0 | 344 |
| Asheville | Air source heat pump | 483 | 2,248 | 2,731 |
| Charlotte | AC with gas heat | 643 | 0 | 643 |
| Charlotte | Air source heat pump | 771 | 962 | 1,734 |
| Greenville | AC with gas heat | 530 | 0 | 530 |
| Greenville | Air source heat pump | 635 | 1,338 | 1,973 |

Table 50. Attic Insulation Measure Unit Energy Savings

| City | Duct location | HVAC System | Rbase | Rmeasure | kWh/kSF | kW/kSF |
|-----------|---------------|-------------|-------|----------|---------|--------|
| Asheville | Attic | AC Gas Heat | 0 | 11 | 305.6 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 346.8 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 30 | 373.2 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 38 | 380.0 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 49 | 387.0 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 60 | 392.7 | 0.000 |
| Asheville | Attic | AC Gas Heat | 11 | 19 | 41.1 | 0.000 |
| Asheville | Attic | AC Gas Heat | 11 | 30 | 67.6 | 0.000 |
| Asheville | Attic | AC Gas Heat | 11 | 38 | 74.4 | 0.000 |
| Asheville | Attic | AC Gas Heat | 11 | 49 | 81.4 | 0.000 |
| Asheville | Attic | AC Gas Heat | 11 | 60 | 87.0 | 0.000 |
| Asheville | Attic | AC Gas Heat | 19 | 30 | 26.5 | 0.000 |
| Asheville | Attic | AC Gas Heat | 19 | 38 | 33.3 | 0.000 |
| Asheville | Attic | AC Gas Heat | 19 | 49 | 40.3 | 0.000 |
| Asheville | Attic | AC Gas Heat | 19 | 60 | 45.9 | 0.000 |
| Asheville | Attic | AC Gas Heat | 30 | 38 | 6.8 | 0.000 |
| Asheville | Attic | AC Gas Heat | 30 | 49 | 13.8 | 0.000 |
| Asheville | Attic | AC Gas Heat | 30 | 60 | 19.5 | 0.000 |
| Asheville | Attic | AC Gas Heat | 38 | 49 | 7.0 | 0.000 |
| Asheville | Attic | AC Gas Heat | 38 | 60 | 12.6 | 0.000 |
| Asheville | Basement | AC Gas Heat | 0 | 11 | 315.7 | 0.290 |
| Asheville | Basement | AC Gas Heat | 0 | 19 | 357.3 | 0.341 |
| Asheville | Basement | AC Gas Heat | 0 | 30 | 376.5 | 0.375 |
| Asheville | Basement | AC Gas Heat | 0 | 38 | 384.0 | 0.375 |
| Asheville | Basement | AC Gas Heat | 0 | 49 | 391.8 | 0.392 |
| Asheville | Basement | AC Gas Heat | 0 | 60 | 397.6 | 0.410 |
| Asheville | Basement | AC Gas Heat | 11 | 19 | 41.6 | 0.051 |
| Asheville | Basement | AC Gas Heat | 11 | 30 | 60.8 | 0.085 |
| Asheville | Basement | AC Gas Heat | 11 | 38 | 68.3 | 0.085 |
| Asheville | Basement | AC Gas Heat | 11 | 49 | 76.1 | 0.102 |
| Asheville | Basement | AC Gas Heat | 11 | 60 | 81.9 | 0.119 |
| Asheville | Basement | AC Gas Heat | 19 | 30 | 19.1 | 0.034 |
| Asheville | Basement | AC Gas Heat | 19 | 38 | 26.6 | 0.034 |
| Asheville | Basement | AC Gas Heat | 19 | 49 | 34.5 | 0.051 |
| Asheville | Basement | AC Gas Heat | 19 | 60 | 40.3 | 0.068 |
| Asheville | Basement | AC Gas Heat | 30 | 38 | 7.5 | 0.000 |
| Asheville | Basement | AC Gas Heat | 30 | 49 | 15.4 | 0.017 |
| Asheville | Basement | AC Gas Heat | 30 | 60 | 21.2 | 0.034 |
| Asheville | Basement | AC Gas Heat | 38 | 49 | 7.8 | 0.017 |
| Asheville | Basement | AC Gas Heat | 38 | 60 | 13.7 | 0.034 |

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Appendices

| City | Duct location | HVAC System | Rbase | Rmeasure | kWh/kSF | kW/kSF |
|-----------|---------------|-------------|-------|----------|---------|--------|
| Asheville | Attic | Heat Pump | 0 | 11 | 3214.8 | 0.324 |
| Asheville | Attic | Heat Pump | 0 | 19 | 3587.0 | 0.392 |
| Asheville | Attic | Heat Pump | 0 | 30 | 3806.7 | 0.444 |
| Asheville | Attic | Heat Pump | 0 | 38 | 3894.9 | 0.461 |
| Asheville | Attic | Heat Pump | 0 | 49 | 3966.4 | 0.478 |
| Asheville | Attic | Heat Pump | 0 | 60 | 4014.3 | 0.495 |
| Asheville | Attic | Heat Pump | 11 | 19 | 372.2 | 0.068 |
| Asheville | Attic | Heat Pump | 11 | 30 | 591.8 | 0.119 |
| Asheville | Attic | Heat Pump | 11 | 38 | 680.0 | 0.137 |
| Asheville | Attic | Heat Pump | 11 | 49 | 751.5 | 0.154 |
| Asheville | Attic | Heat Pump | 11 | 60 | 799.5 | 0.171 |
| Asheville | Attic | Heat Pump | 19 | 30 | 219.6 | 0.051 |
| Asheville | Attic | Heat Pump | 19 | 38 | 307.8 | 0.068 |
| Asheville | Attic | Heat Pump | 19 | 49 | 379.4 | 0.085 |
| Asheville | Attic | Heat Pump | 19 | 60 | 427.3 | 0.102 |
| Asheville | Attic | Heat Pump | 30 | 38 | 88.2 | 0.000 |
| Asheville | Attic | Heat Pump | 30 | 49 | 159.7 | 0.000 |
| Asheville | Attic | Heat Pump | 30 | 60 | 207.7 | 0.000 |
| Asheville | Attic | Heat Pump | 38 | 49 | 71.5 | 0.017 |
| Asheville | Attic | Heat Pump | 38 | 60 | 119.5 | 0.034 |
| Asheville | Basement | Heat Pump | 0 | 11 | 2755.1 | 0.461 |
| Asheville | Basement | Heat Pump | 0 | 19 | 3067.7 | 0.546 |
| Asheville | Basement | Heat Pump | 0 | 30 | 3252.0 | 0.580 |
| Asheville | Basement | Heat Pump | 0 | 38 | 3322.0 | 0.597 |
| Asheville | Basement | Heat Pump | 0 | 49 | 3383.1 | 0.614 |
| Asheville | Basement | Heat Pump | 0 | 60 | 3423.4 | 0.631 |
| Asheville | Basement | Heat Pump | 11 | 19 | 312.6 | 0.085 |
| Asheville | Basement | Heat Pump | 11 | 30 | 496.9 | 0.119 |
| Asheville | Basement | Heat Pump | 11 | 38 | 566.9 | 0.137 |
| Asheville | Basement | Heat Pump | 11 | 49 | 628.0 | 0.154 |
| Asheville | Basement | Heat Pump | 11 | 60 | 668.3 | 0.171 |
| Asheville | Basement | Heat Pump | 19 | 30 | 184.3 | 0.034 |
| Asheville | Basement | Heat Pump | 19 | 38 | 254.3 | 0.051 |
| Asheville | Basement | Heat Pump | 19 | 49 | 315.4 | 0.068 |
| Asheville | Basement | Heat Pump | 19 | 60 | 355.6 | 0.085 |
| Asheville | Basement | Heat Pump | 30 | 38 | 70.0 | 0.000 |
| Asheville | Basement | Heat Pump | 30 | 49 | 131.1 | 0.000 |
| Asheville | Basement | Heat Pump | 30 | 60 | 171.3 | 0.000 |
| Asheville | Basement | Heat Pump | 38 | 49 | 61.1 | 0.017 |
| Asheville | Basement | Heat Pump | 38 | 60 | 101.4 | 0.034 |
| Charlotte | Attic | AC Gas Heat | 0 | 11 | 497.3 | 0.137 |

| City | Duct location | HVAC System | Rbase | Rmeasure | kWh/kSF | kW/kSF |
|-----------|---------------|-------------|-------|----------|---------|--------|
| Charlotte | Attic | AC Gas Heat | 0 | 19 | 557.0 | 0.154 |
| Charlotte | Attic | AC Gas Heat | 0 | 30 | 590.1 | 0.171 |
| Charlotte | Attic | AC Gas Heat | 0 | 38 | 603.8 | 0.171 |
| Charlotte | Attic | AC Gas Heat | 0 | 49 | 612.8 | 0.171 |
| Charlotte | Attic | AC Gas Heat | 0 | 60 | 622.9 | 0.171 |
| Charlotte | Attic | AC Gas Heat | 11 | 19 | 59.7 | 0.017 |
| Charlotte | Attic | AC Gas Heat | 11 | 30 | 92.8 | 0.034 |
| Charlotte | Attic | AC Gas Heat | 11 | 38 | 106.5 | 0.034 |
| Charlotte | Attic | AC Gas Heat | 11 | 49 | 115.5 | 0.034 |
| Charlotte | Attic | AC Gas Heat | 11 | 60 | 125.6 | 0.034 |
| Charlotte | Attic | AC Gas Heat | 19 | 30 | 33.1 | 0.017 |
| Charlotte | Attic | AC Gas Heat | 19 | 38 | 46.8 | 0.017 |
| Charlotte | Attic | AC Gas Heat | 19 | 49 | 55.8 | 0.017 |
| Charlotte | Attic | AC Gas Heat | 19 | 60 | 65.9 | 0.017 |
| Charlotte | Attic | AC Gas Heat | 30 | 38 | 13.7 | 0.000 |
| Charlotte | Attic | AC Gas Heat | 30 | 49 | 22.7 | 0.000 |
| Charlotte | Attic | AC Gas Heat | 30 | 60 | 32.8 | 0.000 |
| Charlotte | Attic | AC Gas Heat | 38 | 49 | 9.0 | 0.000 |
| Charlotte | Attic | AC Gas Heat | 38 | 60 | 19.1 | 0.000 |
| Charlotte | Basement | AC Gas Heat | 0 | 11 | 499.1 | 0.239 |
| Charlotte | Basement | AC Gas Heat | 0 | 19 | 556.3 | 0.290 |
| Charlotte | Basement | AC Gas Heat | 0 | 30 | 588.9 | 0.341 |
| Charlotte | Basement | AC Gas Heat | 0 | 38 | 600.0 | 0.358 |
| Charlotte | Basement | AC Gas Heat | 0 | 49 | 612.8 | 0.375 |
| Charlotte | Basement | AC Gas Heat | 0 | 60 | 620.8 | 0.375 |
| Charlotte | Basement | AC Gas Heat | 11 | 19 | 57.2 | 0.051 |
| Charlotte | Basement | AC Gas Heat | 11 | 30 | 89.8 | 0.102 |
| Charlotte | Basement | AC Gas Heat | 11 | 38 | 100.9 | 0.119 |
| Charlotte | Basement | AC Gas Heat | 11 | 49 | 113.7 | 0.137 |
| Charlotte | Basement | AC Gas Heat | 11 | 60 | 121.7 | 0.137 |
| Charlotte | Basement | AC Gas Heat | 19 | 30 | 32.6 | 0.051 |
| Charlotte | Basement | AC Gas Heat | 19 | 38 | 43.7 | 0.068 |
| Charlotte | Basement | AC Gas Heat | 19 | 49 | 56.5 | 0.085 |
| Charlotte | Basement | AC Gas Heat | 19 | 60 | 64.5 | 0.085 |
| Charlotte | Basement | AC Gas Heat | 30 | 38 | 11.1 | 0.017 |
| Charlotte | Basement | AC Gas Heat | 30 | 49 | 23.9 | 0.034 |
| Charlotte | Basement | AC Gas Heat | 30 | 60 | 31.9 | 0.034 |
| Charlotte | Basement | AC Gas Heat | 38 | 49 | 12.8 | 0.017 |
| Charlotte | Basement | AC Gas Heat | 38 | 60 | 20.8 | 0.017 |
| Charlotte | Attic | Heat Pump | 0 | 11 | 2229.9 | 0.529 |
| Charlotte | Attic | Heat Pump | 0 | 19 | 2491.8 | 0.614 |

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Appendices

| City | Duct location | HVAC System | Rbase | Rmeasure | kWh/kSF | kW/kSF |
|------------|---------------|-------------|-------|----------|---------|--------|
| Charlotte | Attic | Heat Pump | 0 | 30 | 2646.4 | 0.666 |
| Charlotte | Attic | Heat Pump | 0 | 38 | 2703.9 | 0.683 |
| Charlotte | Attic | Heat Pump | 0 | 49 | 2755.1 | 0.700 |
| Charlotte | Attic | Heat Pump | 0 | 60 | 2788.7 | 0.717 |
| Charlotte | Attic | Heat Pump | 11 | 19 | 261.9 | 0.085 |
| Charlotte | Attic | Heat Pump | 11 | 30 | 416.6 | 0.137 |
| Charlotte | Attic | Heat Pump | 11 | 38 | 474.1 | 0.154 |
| Charlotte | Attic | Heat Pump | 11 | 49 | 525.3 | 0.171 |
| Charlotte | Attic | Heat Pump | 11 | 60 | 558.9 | 0.188 |
| Charlotte | Attic | Heat Pump | 19 | 30 | 154.6 | 0.051 |
| Charlotte | Attic | Heat Pump | 19 | 38 | 212.1 | 0.068 |
| Charlotte | Attic | Heat Pump | 19 | 49 | 263.3 | 0.085 |
| Charlotte | Attic | Heat Pump | 19 | 60 | 296.9 | 0.102 |
| Charlotte | Attic | Heat Pump | 30 | 38 | 57.5 | 0.000 |
| Charlotte | Attic | Heat Pump | 30 | 49 | 108.7 | 0.000 |
| Charlotte | Attic | Heat Pump | 30 | 60 | 142.3 | 0.000 |
| Charlotte | Attic | Heat Pump | 38 | 49 | 51.2 | 0.017 |
| Charlotte | Attic | Heat Pump | 38 | 60 | 84.8 | 0.034 |
| Charlotte | Basement | Heat Pump | 0 | 11 | 2044.4 | 0.427 |
| Charlotte | Basement | Heat Pump | 0 | 19 | 2283.3 | 0.495 |
| Charlotte | Basement | Heat Pump | 0 | 30 | 2420.6 | 0.546 |
| Charlotte | Basement | Heat Pump | 0 | 38 | 2474.4 | 0.563 |
| Charlotte | Basement | Heat Pump | 0 | 49 | 2521.0 | 0.580 |
| Charlotte | Basement | Heat Pump | 0 | 60 | 2551.5 | 0.597 |
| Charlotte | Basement | Heat Pump | 11 | 19 | 238.9 | 0.068 |
| Charlotte | Basement | Heat Pump | 11 | 30 | 376.3 | 0.119 |
| Charlotte | Basement | Heat Pump | 11 | 38 | 430.0 | 0.137 |
| Charlotte | Basement | Heat Pump | 11 | 49 | 476.6 | 0.154 |
| Charlotte | Basement | Heat Pump | 11 | 60 | 507.2 | 0.171 |
| Charlotte | Basement | Heat Pump | 19 | 30 | 137.4 | 0.051 |
| Charlotte | Basement | Heat Pump | 19 | 38 | 191.1 | 0.068 |
| Charlotte | Basement | Heat Pump | 19 | 49 | 237.7 | 0.085 |
| Charlotte | Basement | Heat Pump | 19 | 60 | 268.3 | 0.102 |
| Charlotte | Basement | Heat Pump | 30 | 38 | 53.8 | 0.000 |
| Charlotte | Basement | Heat Pump | 30 | 49 | 100.3 | 0.000 |
| Charlotte | Basement | Heat Pump | 30 | 60 | 130.9 | 0.000 |
| Charlotte | Basement | Heat Pump | 38 | 49 | 46.6 | 0.017 |
| Charlotte | Basement | Heat Pump | 38 | 60 | 77.1 | 0.034 |
| Greenville | Attic | AC Gas Heat | 0 | 11 | 380.4 | 0.034 |
| Greenville | Attic | AC Gas Heat | 0 | 19 | 429.7 | 0.034 |
| Greenville | Attic | AC Gas Heat | 0 | 30 | 456.3 | 0.051 |

| City | Duct location | HVAC System | Rbase | Rmeasure | kWh/kSF | kW/kSF |
|------------|---------------|-------------|-------|----------|---------|--------|
| Greenville | Attic | AC Gas Heat | 0 | 38 | 470.8 | 0.051 |
| Greenville | Attic | AC Gas Heat | 0 | 49 | 480.5 | 0.051 |
| Greenville | Attic | AC Gas Heat | 0 | 60 | 486.5 | 0.051 |
| Greenville | Attic | AC Gas Heat | 11 | 19 | 49.3 | 0.000 |
| Greenville | Attic | AC Gas Heat | 11 | 30 | 75.9 | 0.017 |
| Greenville | Attic | AC Gas Heat | 11 | 38 | 90.4 | 0.017 |
| Greenville | Attic | AC Gas Heat | 11 | 49 | 100.2 | 0.017 |
| Greenville | Attic | AC Gas Heat | 11 | 60 | 106.1 | 0.017 |
| Greenville | Attic | AC Gas Heat | 19 | 30 | 26.6 | 0.017 |
| Greenville | Attic | AC Gas Heat | 19 | 38 | 41.1 | 0.017 |
| Greenville | Attic | AC Gas Heat | 19 | 49 | 50.9 | 0.017 |
| Greenville | Attic | AC Gas Heat | 19 | 60 | 56.8 | 0.017 |
| Greenville | Attic | AC Gas Heat | 30 | 38 | 14.5 | 0.000 |
| Greenville | Attic | AC Gas Heat | 30 | 49 | 24.2 | 0.000 |
| Greenville | Attic | AC Gas Heat | 30 | 60 | 30.2 | 0.000 |
| Greenville | Attic | AC Gas Heat | 38 | 49 | 9.7 | 0.000 |
| Greenville | Attic | AC Gas Heat | 38 | 60 | 15.7 | 0.000 |
| Greenville | Basement | AC Gas Heat | 0 | 11 | 386.7 | 0.068 |
| Greenville | Basement | AC Gas Heat | 0 | 19 | 438.4 | 0.102 |
| Greenville | Basement | AC Gas Heat | 0 | 30 | 461.4 | 0.119 |
| Greenville | Basement | AC Gas Heat | 0 | 38 | 473.4 | 0.137 |
| Greenville | Basement | AC Gas Heat | 0 | 49 | 481.9 | 0.137 |
| Greenville | Basement | AC Gas Heat | 0 | 60 | 488.1 | 0.137 |
| Greenville | Basement | AC Gas Heat | 11 | 19 | 51.7 | 0.034 |
| Greenville | Basement | AC Gas Heat | 11 | 30 | 74.7 | 0.051 |
| Greenville | Basement | AC Gas Heat | 11 | 38 | 86.7 | 0.068 |
| Greenville | Basement | AC Gas Heat | 11 | 49 | 95.2 | 0.068 |
| Greenville | Basement | AC Gas Heat | 11 | 60 | 101.4 | 0.068 |
| Greenville | Basement | AC Gas Heat | 19 | 30 | 23.0 | 0.017 |
| Greenville | Basement | AC Gas Heat | 19 | 38 | 35.0 | 0.034 |
| Greenville | Basement | AC Gas Heat | 19 | 49 | 43.5 | 0.034 |
| Greenville | Basement | AC Gas Heat | 19 | 60 | 49.7 | 0.034 |
| Greenville | Basement | AC Gas Heat | 30 | 38 | 11.9 | 0.017 |
| Greenville | Basement | AC Gas Heat | 30 | 49 | 20.5 | 0.017 |
| Greenville | Basement | AC Gas Heat | 30 | 60 | 26.6 | 0.017 |
| Greenville | Basement | AC Gas Heat | 38 | 49 | 8.5 | 0.000 |
| Greenville | Basement | AC Gas Heat | 38 | 60 | 14.7 | 0.000 |
| Greenville | Attic | Heat Pump | 0 | 11 | 2459.0 | 0.324 |
| Greenville | Attic | Heat Pump | 0 | 19 | 2748.8 | 0.375 |
| Greenville | Attic | Heat Pump | 0 | 30 | 2924.1 | 0.427 |
| Greenville | Attic | Heat Pump | 0 | 38 | 2993.0 | 0.427 |

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Appendices

| City | Duct location | HVAC System | Rbase | Rmeasure | kWh/kSF | kW/kSF |
|------------|---------------|-------------|-------|----------|---------|--------|
| Greenville | Attic | Heat Pump | 0 | 49 | 3052.2 | 0.444 |
| Greenville | Attic | Heat Pump | 0 | 60 | 3091.0 | 0.461 |
| Greenville | Attic | Heat Pump | 11 | 19 | 289.8 | 0.051 |
| Greenville | Attic | Heat Pump | 11 | 30 | 465.0 | 0.102 |
| Greenville | Attic | Heat Pump | 11 | 38 | 534.0 | 0.102 |
| Greenville | Attic | Heat Pump | 11 | 49 | 593.2 | 0.119 |
| Greenville | Attic | Heat Pump | 11 | 60 | 631.9 | 0.137 |
| Greenville | Attic | Heat Pump | 19 | 30 | 175.3 | 0.051 |
| Greenville | Attic | Heat Pump | 19 | 38 | 244.2 | 0.051 |
| Greenville | Attic | Heat Pump | 19 | 49 | 303.4 | 0.068 |
| Greenville | Attic | Heat Pump | 19 | 60 | 342.2 | 0.085 |
| Greenville | Attic | Heat Pump | 30 | 38 | 68.9 | 0.000 |
| Greenville | Attic | Heat Pump | 30 | 49 | 128.2 | 0.000 |
| Greenville | Attic | Heat Pump | 30 | 60 | 166.9 | 0.000 |
| Greenville | Attic | Heat Pump | 38 | 49 | 59.2 | 0.017 |
| Greenville | Attic | Heat Pump | 38 | 60 | 98.0 | 0.034 |
| Greenville | Basement | Heat Pump | 0 | 11 | 2255.3 | 0.239 |
| Greenville | Basement | Heat Pump | 0 | 19 | 2519.1 | 0.290 |
| Greenville | Basement | Heat Pump | 0 | 30 | 2676.3 | 0.324 |
| Greenville | Basement | Heat Pump | 0 | 38 | 2738.1 | 0.341 |
| Greenville | Basement | Heat Pump | 0 | 49 | 2790.3 | 0.358 |
| Greenville | Basement | Heat Pump | 0 | 60 | 2825.1 | 0.358 |
| Greenville | Basement | Heat Pump | 11 | 19 | 263.8 | 0.051 |
| Greenville | Basement | Heat Pump | 11 | 30 | 421.0 | 0.085 |
| Greenville | Basement | Heat Pump | 11 | 38 | 482.8 | 0.102 |
| Greenville | Basement | Heat Pump | 11 | 49 | 535.0 | 0.119 |
| Greenville | Basement | Heat Pump | 11 | 60 | 569.8 | 0.119 |
| Greenville | Basement | Heat Pump | 19 | 30 | 157.2 | 0.034 |
| Greenville | Basement | Heat Pump | 19 | 38 | 218.9 | 0.051 |
| Greenville | Basement | Heat Pump | 19 | 49 | 271.2 | 0.068 |
| Greenville | Basement | Heat Pump | 19 | 60 | 306.0 | 0.068 |
| Greenville | Basement | Heat Pump | 30 | 38 | 61.8 | 0.000 |
| Greenville | Basement | Heat Pump | 30 | 49 | 114.0 | 0.000 |
| Greenville | Basement | Heat Pump | 30 | 60 | 148.8 | 0.000 |
| Greenville | Basement | Heat Pump | 38 | 49 | 52.2 | 0.017 |
| Greenville | Basement | Heat Pump | 38 | 60 | 87.0 | 0.017 |

Table 51. Duct Insulation and Sealing Measure Unit Energy Savings

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | AC Gas Heat | 0 | 0 | 8 | 5 | 12 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 8 | 5 | 497 | 0.186 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 8 | 8 | 483 | 0.171 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 8 | 5 | 522 | 0.209 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 8 | 8 | 506 | 0.202 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 8 | 5 | 561 | 0.279 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 8 | 8 | 546 | 0.264 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 10 | 5 | 19 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 10 | 8 | 8 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 10 | 5 | 505 | 0.186 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 10 | 8 | 490 | 0.171 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 10 | 10 | 481 | 0.163 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 10 | 5 | 529 | 0.209 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 10 | 8 | 513 | 0.202 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 10 | 10 | 503 | 0.194 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 10 | 5 | 568 | 0.279 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 10 | 8 | 554 | 0.264 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 10 | 10 | 544 | 0.248 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 20 | 5 | 57 | 0.016 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 20 | 8 | 45 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 20 | 10 | 37 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 20 | 5 | 542 | 0.194 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 20 | 8 | 527 | 0.178 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 20 | 10 | 518 | 0.171 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 20 | 20 | 465 | 0.109 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 20 | 5 | 567 | 0.217 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 20 | 8 | 551 | 0.209 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 20 | 10 | 541 | 0.202 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 20 | 20 | 488 | 0.132 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 20 | 5 | 606 | 0.287 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 20 | 8 | 591 | 0.271 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 20 | 10 | 581 | 0.256 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 20 | 20 | 527 | 0.178 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 23 | 5 | 64 | 0.016 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 23 | 8 | 53 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 23 | 10 | 45 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 23 | 20 | 8 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 23 | 5 | 550 | 0.194 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 23 | 8 | 535 | 0.178 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 23 | 10 | 526 | 0.171 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 23 | 20 | 472 | 0.109 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 23 | 23 | 454 | 0.093 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 23 | 5 | 574 | 0.217 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 23 | 8 | 559 | 0.209 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 23 | 10 | 548 | 0.202 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 23 | 20 | 496 | 0.132 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 23 | 23 | 478 | 0.109 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 23 | 5 | 613 | 0.287 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 23 | 8 | 599 | 0.271 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 23 | 10 | 589 | 0.256 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 23 | 20 | 535 | 0.178 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | AC Gas Heat | 0 | 19 | 23 | 23 | 518 | 0.155 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 25 | 5 | 73 | 0.016 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 25 | 8 | 62 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 25 | 10 | 54 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 25 | 20 | 17 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 25 | 23 | 9 | 0.000 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 25 | 5 | 559 | 0.194 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 25 | 8 | 544 | 0.178 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 25 | 10 | 535 | 0.171 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 25 | 20 | 481 | 0.109 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 25 | 23 | 463 | 0.093 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 25 | 25 | 452 | 0.078 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 25 | 5 | 583 | 0.217 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 25 | 8 | 568 | 0.209 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 25 | 10 | 557 | 0.202 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 25 | 20 | 505 | 0.132 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 25 | 23 | 487 | 0.109 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 25 | 25 | 475 | 0.101 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 25 | 5 | 622 | 0.287 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 25 | 8 | 608 | 0.271 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 25 | 10 | 598 | 0.256 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 25 | 20 | 544 | 0.178 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 25 | 23 | 527 | 0.155 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 25 | 25 | 516 | 0.140 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 35 | 5 | 113 | 0.023 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 35 | 8 | 101 | 0.016 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 35 | 10 | 93 | 0.016 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 35 | 20 | 56 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 35 | 23 | 48 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 0 | 35 | 25 | 39 | 0.008 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 5 | 598 | 0.202 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 8 | 583 | 0.186 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 10 | 574 | 0.178 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 20 | 521 | 0.116 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 23 | 503 | 0.101 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 25 | 491 | 0.085 |
| Asheville | Attic | AC Gas Heat | 0 | 4 | 35 | 35 | 433 | 0.031 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 5 | 622 | 0.225 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 8 | 607 | 0.217 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 10 | 596 | 0.209 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 20 | 544 | 0.140 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 23 | 527 | 0.116 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 25 | 514 | 0.109 |
| Asheville | Attic | AC Gas Heat | 0 | 6 | 35 | 35 | 455 | 0.047 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 5 | 647 | 0.279 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 8 | 637 | 0.264 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 10 | 583 | 0.186 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 20 | 566 | 0.163 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 23 | 555 | 0.147 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 25 | 493 | 0.078 |
| Asheville | Attic | AC Gas Heat | 0 | 19 | 35 | 35 | 622 | 0.225 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 8 | 5 | 15 | 0.016 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 8 | 5 | 39 | 0.039 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | AC Gas Heat | 4 | 6 | 8 | 8 | 23 | 0.031 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 8 | 5 | 78 | 0.109 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 8 | 8 | 64 | 0.093 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 10 | 5 | 24 | 0.023 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 10 | 8 | 9 | 0.008 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 10 | 5 | 48 | 0.047 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 10 | 8 | 33 | 0.039 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 10 | 10 | 22 | 0.031 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 10 | 5 | 87 | 0.116 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 10 | 8 | 73 | 0.101 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 10 | 10 | 63 | 0.085 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 20 | 5 | 77 | 0.085 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 20 | 8 | 63 | 0.070 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 20 | 10 | 53 | 0.062 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 20 | 5 | 102 | 0.109 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 20 | 8 | 86 | 0.101 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 20 | 10 | 76 | 0.093 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 20 | 20 | 23 | 0.023 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 20 | 5 | 141 | 0.178 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 20 | 8 | 126 | 0.163 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 20 | 10 | 116 | 0.147 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 20 | 20 | 63 | 0.070 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 23 | 5 | 96 | 0.101 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 23 | 8 | 81 | 0.085 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 23 | 10 | 71 | 0.078 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 23 | 20 | 18 | 0.016 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 23 | 5 | 120 | 0.124 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 23 | 8 | 104 | 0.116 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 23 | 10 | 94 | 0.109 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 23 | 20 | 41 | 0.039 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 23 | 23 | 24 | 0.016 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 23 | 5 | 159 | 0.194 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 23 | 8 | 144 | 0.178 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 23 | 10 | 134 | 0.163 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 23 | 20 | 81 | 0.085 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 23 | 23 | 64 | 0.062 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 25 | 5 | 107 | 0.116 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 25 | 8 | 92 | 0.101 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 25 | 10 | 83 | 0.093 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 25 | 20 | 30 | 0.031 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 25 | 23 | 12 | 0.016 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 25 | 5 | 131 | 0.140 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 25 | 8 | 116 | 0.132 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 25 | 10 | 105 | 0.124 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 25 | 20 | 53 | 0.054 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 25 | 23 | 36 | 0.031 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 25 | 25 | 23 | 0.023 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 25 | 5 | 171 | 0.209 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 25 | 8 | 156 | 0.194 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 25 | 10 | 146 | 0.178 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 25 | 20 | 92 | 0.101 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 25 | 23 | 75 | 0.078 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 25 | 25 | 64 | 0.062 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | AC Gas Heat | 4 | 4 | 35 | 5 | 165 | 0.171 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 35 | 8 | 151 | 0.155 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 35 | 10 | 141 | 0.147 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 35 | 20 | 88 | 0.085 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 35 | 23 | 70 | 0.070 |
| Asheville | Attic | AC Gas Heat | 4 | 4 | 35 | 25 | 58 | 0.054 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 5 | 190 | 0.194 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 8 | 174 | 0.186 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 10 | 164 | 0.178 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 20 | 111 | 0.109 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 23 | 94 | 0.085 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 25 | 81 | 0.078 |
| Asheville | Attic | AC Gas Heat | 4 | 6 | 35 | 35 | 22 | 0.016 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 5 | 229 | 0.264 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 8 | 214 | 0.248 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 10 | 204 | 0.233 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 20 | 150 | 0.155 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 23 | 133 | 0.132 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 25 | 122 | 0.116 |
| Asheville | Attic | AC Gas Heat | 4 | 19 | 35 | 35 | 60 | 0.047 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 8 | 5 | 16 | 0.008 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 8 | 5 | 55 | 0.078 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 8 | 8 | 40 | 0.062 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 10 | 5 | 26 | 0.016 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 10 | 8 | 10 | 0.008 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 10 | 5 | 65 | 0.085 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 10 | 8 | 50 | 0.070 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 10 | 10 | 40 | 0.054 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 20 | 5 | 78 | 0.085 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 20 | 8 | 63 | 0.078 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 20 | 10 | 52 | 0.070 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 20 | 5 | 118 | 0.155 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 20 | 8 | 103 | 0.140 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 20 | 10 | 93 | 0.124 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 20 | 20 | 39 | 0.047 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 23 | 5 | 96 | 0.109 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 23 | 8 | 80 | 0.101 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 23 | 10 | 70 | 0.093 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 23 | 20 | 17 | 0.023 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 23 | 5 | 135 | 0.178 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 23 | 8 | 120 | 0.163 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 23 | 10 | 110 | 0.147 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 23 | 20 | 57 | 0.070 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 23 | 23 | 40 | 0.047 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 25 | 5 | 108 | 0.116 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 25 | 8 | 92 | 0.109 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 25 | 10 | 82 | 0.101 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 25 | 20 | 30 | 0.031 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 25 | 23 | 12 | 0.008 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 25 | 5 | 147 | 0.186 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 25 | 8 | 133 | 0.171 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 25 | 10 | 123 | 0.155 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 25 | 20 | 69 | 0.078 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | AC Gas Heat | 6 | 19 | 25 | 23 | 52 | 0.054 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 25 | 25 | 41 | 0.039 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 35 | 5 | 167 | 0.178 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 35 | 8 | 152 | 0.171 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 35 | 10 | 141 | 0.163 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 35 | 20 | 89 | 0.093 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 35 | 23 | 71 | 0.070 |
| Asheville | Attic | AC Gas Heat | 6 | 6 | 35 | 25 | 59 | 0.062 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 5 | 206 | 0.248 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 8 | 192 | 0.233 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 10 | 182 | 0.217 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 20 | 128 | 0.140 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 23 | 111 | 0.116 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 25 | 100 | 0.101 |
| Asheville | Attic | AC Gas Heat | 6 | 19 | 35 | 35 | 38 | 0.031 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 8 | 5 | 15 | 0.016 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 10 | 5 | 25 | 0.031 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 10 | 8 | 10 | 0.016 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 20 | 5 | 78 | 0.109 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 20 | 8 | 64 | 0.093 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 20 | 10 | 54 | 0.078 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 23 | 5 | 95 | 0.132 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 23 | 8 | 81 | 0.116 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 23 | 10 | 71 | 0.101 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 23 | 20 | 17 | 0.023 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 25 | 5 | 106 | 0.147 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 25 | 8 | 92 | 0.132 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 25 | 10 | 82 | 0.116 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 25 | 20 | 28 | 0.039 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 25 | 23 | 11 | 0.016 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 35 | 5 | 169 | 0.217 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 35 | 8 | 154 | 0.202 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 35 | 10 | 144 | 0.186 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 35 | 20 | 90 | 0.109 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 35 | 23 | 73 | 0.085 |
| Asheville | Attic | AC Gas Heat | 19 | 19 | 35 | 25 | 62 | 0.070 |
| Asheville | Attic | Heat Pump | 0 | 0 | 8 | 5 | 89 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 4 | 8 | 5 | 3800 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 4 | 8 | 8 | 3706 | 0.163 |
| Asheville | Attic | Heat Pump | 0 | 6 | 8 | 5 | 3945 | 0.202 |
| Asheville | Attic | Heat Pump | 0 | 6 | 8 | 8 | 3851 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 19 | 8 | 5 | 4190 | 0.248 |
| Asheville | Attic | Heat Pump | 0 | 19 | 8 | 8 | 4102 | 0.240 |
| Asheville | Attic | Heat Pump | 0 | 0 | 10 | 5 | 150 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 10 | 8 | 60 | 0.000 |
| Asheville | Attic | Heat Pump | 0 | 4 | 10 | 5 | 3860 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 4 | 10 | 8 | 3766 | 0.163 |
| Asheville | Attic | Heat Pump | 0 | 4 | 10 | 10 | 3702 | 0.155 |
| Asheville | Attic | Heat Pump | 0 | 6 | 10 | 5 | 4005 | 0.202 |
| Asheville | Attic | Heat Pump | 0 | 6 | 10 | 8 | 3911 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 6 | 10 | 10 | 3848 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 19 | 10 | 5 | 4250 | 0.248 |
| Asheville | Attic | Heat Pump | 0 | 19 | 10 | 8 | 4162 | 0.240 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | Heat Pump | 0 | 19 | 10 | 10 | 4101 | 0.233 |
| Asheville | Attic | Heat Pump | 0 | 0 | 20 | 5 | 452 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 20 | 8 | 362 | 0.000 |
| Asheville | Attic | Heat Pump | 0 | 0 | 20 | 10 | 302 | 0.000 |
| Asheville | Attic | Heat Pump | 0 | 4 | 20 | 5 | 4162 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 4 | 20 | 8 | 4068 | 0.163 |
| Asheville | Attic | Heat Pump | 0 | 4 | 20 | 10 | 4004 | 0.155 |
| Asheville | Attic | Heat Pump | 0 | 4 | 20 | 20 | 3670 | 0.116 |
| Asheville | Attic | Heat Pump | 0 | 6 | 20 | 5 | 4307 | 0.202 |
| Asheville | Attic | Heat Pump | 0 | 6 | 20 | 8 | 4214 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 6 | 20 | 10 | 4151 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 6 | 20 | 20 | 3822 | 0.140 |
| Asheville | Attic | Heat Pump | 0 | 19 | 20 | 5 | 4553 | 0.248 |
| Asheville | Attic | Heat Pump | 0 | 19 | 20 | 8 | 4464 | 0.240 |
| Asheville | Attic | Heat Pump | 0 | 19 | 20 | 10 | 4404 | 0.233 |
| Asheville | Attic | Heat Pump | 0 | 19 | 20 | 20 | 4085 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 0 | 23 | 5 | 544 | 0.016 |
| Asheville | Attic | Heat Pump | 0 | 0 | 23 | 8 | 455 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 23 | 10 | 395 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 23 | 20 | 93 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 4 | 23 | 5 | 4255 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 4 | 23 | 8 | 4161 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 4 | 23 | 10 | 4097 | 0.163 |
| Asheville | Attic | Heat Pump | 0 | 4 | 23 | 20 | 3763 | 0.124 |
| Asheville | Attic | Heat Pump | 0 | 4 | 23 | 23 | 3657 | 0.116 |
| Asheville | Attic | Heat Pump | 0 | 6 | 23 | 5 | 4399 | 0.209 |
| Asheville | Attic | Heat Pump | 0 | 6 | 23 | 8 | 4306 | 0.194 |
| Asheville | Attic | Heat Pump | 0 | 6 | 23 | 10 | 4243 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 6 | 23 | 20 | 3915 | 0.147 |
| Asheville | Attic | Heat Pump | 0 | 6 | 23 | 23 | 3811 | 0.140 |
| Asheville | Attic | Heat Pump | 0 | 19 | 23 | 5 | 4645 | 0.256 |
| Asheville | Attic | Heat Pump | 0 | 19 | 23 | 8 | 4557 | 0.248 |
| Asheville | Attic | Heat Pump | 0 | 19 | 23 | 10 | 4496 | 0.240 |
| Asheville | Attic | Heat Pump | 0 | 19 | 23 | 20 | 4178 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 19 | 23 | 23 | 4078 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 0 | 25 | 5 | 606 | 0.016 |
| Asheville | Attic | Heat Pump | 0 | 0 | 25 | 8 | 516 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 25 | 10 | 456 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 25 | 20 | 154 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 25 | 23 | 61 | 0.000 |
| Asheville | Attic | Heat Pump | 0 | 4 | 25 | 5 | 4316 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 4 | 25 | 8 | 4222 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 4 | 25 | 10 | 4158 | 0.163 |
| Asheville | Attic | Heat Pump | 0 | 4 | 25 | 20 | 3824 | 0.124 |
| Asheville | Attic | Heat Pump | 0 | 4 | 25 | 23 | 3719 | 0.116 |
| Asheville | Attic | Heat Pump | 0 | 4 | 25 | 25 | 3647 | 0.109 |
| Asheville | Attic | Heat Pump | 0 | 6 | 25 | 5 | 4461 | 0.209 |
| Asheville | Attic | Heat Pump | 0 | 6 | 25 | 8 | 4367 | 0.194 |
| Asheville | Attic | Heat Pump | 0 | 6 | 25 | 10 | 4304 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 6 | 25 | 20 | 3976 | 0.147 |
| Asheville | Attic | Heat Pump | 0 | 6 | 25 | 23 | 3873 | 0.140 |
| Asheville | Attic | Heat Pump | 0 | 6 | 25 | 25 | 3802 | 0.124 |
| Asheville | Attic | Heat Pump | 0 | 19 | 25 | 5 | 4706 | 0.256 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | Heat Pump | 0 | 19 | 25 | 8 | 4618 | 0.248 |
| Asheville | Attic | Heat Pump | 0 | 19 | 25 | 10 | 4557 | 0.240 |
| Asheville | Attic | Heat Pump | 0 | 19 | 25 | 20 | 4239 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 19 | 25 | 23 | 4139 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 19 | 25 | 25 | 4070 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 0 | 35 | 5 | 919 | 0.016 |
| Asheville | Attic | Heat Pump | 0 | 0 | 35 | 8 | 830 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 35 | 10 | 770 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 35 | 20 | 467 | 0.008 |
| Asheville | Attic | Heat Pump | 0 | 0 | 35 | 23 | 375 | 0.000 |
| Asheville | Attic | Heat Pump | 0 | 0 | 35 | 25 | 314 | 0.000 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 5 | 4630 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 8 | 4536 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 10 | 4472 | 0.163 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 20 | 4138 | 0.124 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 23 | 4032 | 0.116 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 25 | 3961 | 0.109 |
| Asheville | Attic | Heat Pump | 0 | 4 | 35 | 35 | 3593 | 0.070 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 5 | 4774 | 0.209 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 8 | 4681 | 0.194 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 10 | 4618 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 20 | 4290 | 0.147 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 23 | 4186 | 0.140 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 25 | 4115 | 0.124 |
| Asheville | Attic | Heat Pump | 0 | 6 | 35 | 35 | 3748 | 0.085 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 5 | 4932 | 0.248 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 8 | 4871 | 0.240 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 10 | 4553 | 0.186 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 20 | 4452 | 0.178 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 23 | 4384 | 0.171 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 25 | 4026 | 0.116 |
| Asheville | Attic | Heat Pump | 0 | 19 | 35 | 35 | 4774 | 0.209 |
| Asheville | Attic | Heat Pump | 4 | 4 | 8 | 5 | 94 | 0.008 |
| Asheville | Attic | Heat Pump | 4 | 6 | 8 | 5 | 239 | 0.039 |
| Asheville | Attic | Heat Pump | 4 | 6 | 8 | 8 | 145 | 0.023 |
| Asheville | Attic | Heat Pump | 4 | 19 | 8 | 5 | 484 | 0.085 |
| Asheville | Attic | Heat Pump | 4 | 19 | 8 | 8 | 396 | 0.078 |
| Asheville | Attic | Heat Pump | 4 | 4 | 10 | 5 | 158 | 0.016 |
| Asheville | Attic | Heat Pump | 4 | 4 | 10 | 8 | 64 | 0.008 |
| Asheville | Attic | Heat Pump | 4 | 6 | 10 | 5 | 302 | 0.047 |
| Asheville | Attic | Heat Pump | 4 | 6 | 10 | 8 | 209 | 0.031 |
| Asheville | Attic | Heat Pump | 4 | 6 | 10 | 10 | 146 | 0.023 |
| Asheville | Attic | Heat Pump | 4 | 19 | 10 | 5 | 548 | 0.093 |
| Asheville | Attic | Heat Pump | 4 | 19 | 10 | 8 | 460 | 0.085 |
| Asheville | Attic | Heat Pump | 4 | 19 | 10 | 10 | 399 | 0.078 |
| Asheville | Attic | Heat Pump | 4 | 4 | 20 | 5 | 492 | 0.054 |
| Asheville | Attic | Heat Pump | 4 | 4 | 20 | 8 | 398 | 0.047 |
| Asheville | Attic | Heat Pump | 4 | 4 | 20 | 10 | 334 | 0.039 |
| Asheville | Attic | Heat Pump | 4 | 6 | 20 | 5 | 637 | 0.085 |
| Asheville | Attic | Heat Pump | 4 | 6 | 20 | 8 | 543 | 0.070 |
| Asheville | Attic | Heat Pump | 4 | 6 | 20 | 10 | 480 | 0.062 |
| Asheville | Attic | Heat Pump | 4 | 6 | 20 | 20 | 152 | 0.023 |
| Asheville | Attic | Heat Pump | 4 | 19 | 20 | 5 | 882 | 0.132 |

TecMarket Works

Appendices

| City | Duct Location | HVAC System | Rvalue pre | Rvalue post | Leak pre | Leak post | kwh /ton | Summer kw/ton |
|-----------|---------------|-------------|------------|-------------|----------|-----------|----------|---------------|
| Asheville | Attic | Heat Pump | 4 | 19 | 20 | 8 | 794 | 0.124 |
| Asheville | Attic | Heat Pump | 4 | 19 | 20 | 10 | 733 | 0.116 |
| Asheville | Attic | Heat Pump | 4 | 19 | 20 | 20 | 415 | 0.062 |
| Asheville | Attic | Heat Pump | 4 | 4 | 23 | 5 | 598 | 0.062 |
| Asheville | Attic | Heat Pump | 4 | 4 | 23 | 8 | 503 | 0.054 |
| Asheville | Attic | Heat Pump | 4 | 4 | 23 | 10 | 440 | 0.047 |
| Asheville | Attic | Heat Pump | 4 | 4 | 23 | 20 | 105 | 0.008 |
| Asheville | Attic | Heat Pump | 4 | 6 | 23 | 5 | 742 | 0.093 |
| Asheville | Attic | Heat Pump | 4 | 6 | 23 | 8 | 649 | 0.078 |
| Asheville | Attic | Heat Pump | 4 | 6 | 23 | 10 | 586 | 0.070 |
| Asheville | Attic | Heat Pump | 4 | 6 | 23 | 20 | 258 | 0.031 |
| Asheville | Attic | Heat Pump | 4 | 6 | 23 | 23 | 154 | 0.023 |
| Asheville | Attic | Heat Pump | 4 | 19 | 23 | 5 | 988 | 0.140 |
| Asheville | Attic | Heat Pump | 4 | 19 | 23 | 8 | 899 | 0.132 |
| Asheville | Attic | Heat Pump | 4 | 19 | 23 | 10 | 839 | 0.124 |
| Asheville | Attic | Heat Pump | 4 | 19 | 23 | 20 | 521 | 0.070 |
| Asheville | Attic | Heat Pump | 4 | 19 | 23 | 23 | 420 | 0.062 |
| Asheville | Attic | Heat Pump | 4 | 4 | 25 | 5 | 669 | 0.070 |
| Asheville | Attic | Heat Pump | 4 | 4 | 25 | 8 | 575 | 0.062 |
| Asheville | Attic | Heat Pump | 4 | 4 | 25 | 10 | 511 | 0.054 |
| Asheville | Attic | Heat Pump | 4 | 4 | 25 | 20 | 177 | 0.016 |
| Asheville | Attic | Heat Pump | 4 | 4 | 25 | 23 | 71 | 0.008 |
| Asheville | Attic | Heat Pump | 4 | 6 | 25 | 5 | 813 | 0.101 |
| Asheville | Attic | Heat Pump | 4 | 6 | 25 | 8 | 720 | 0.085 |
| Asheville | Attic | Heat Pump | 4 | 6 | 25 | 10 | 657 | 0.078 |
| Asheville | Attic | Heat Pump | 4 | 6 | 25 | 20 | 329 | 0.039 |
| Asheville | Attic | Heat Pump | 4 | 6 | 25 | 23 | 225 | 0.031 |
| Asheville | Attic | Heat Pump | 4 | 6 | 25 | 25 | 155 | 0.016 |
| Asheville | Attic | Heat Pump | 4 | 19 | 25 | 5 | 1059 | 0.147 |
| Asheville | Attic | Heat Pump | 4 | 19 | 25 | 8 | 971 | 0.140 |
| Asheville | Attic | Heat Pump | 4 | 19 | 25 | 10 | 910 | 0.132 |
| Asheville | Attic | Heat Pump | 4 | 19 | 25 | 20 | 592 | 0.078 |
| Asheville | Attic | Heat Pump | 4 | 19 | 25 | 23 | 492 | 0.070 |
| Asheville | Attic | Heat Pump | 4 | 19 | 25 | 25 | 423 | 0.062 |
| Asheville | Attic | Heat Pump | 4 | 4 | 35 | 5 | 1037 | 0.109 |
| Asheville | Attic | Heat Pump | 4 | 4 | 35 | 8 | 943 | 0.101 |
| Asheville | Attic | Heat Pump | 4 | 4 | 35 | 10 | 879 | 0.093 |
| Asheville | Attic | Heat Pump | 4 | 4 | 35 | 20 | 545 | 0.054 |
| Asheville | Attic | Heat Pump | 4 | 4 | 35 | 23 | 440 | 0.047 |
| Asheville | Attic | Heat Pump | 4 | 4 | 35 | 25 | 368 | 0.039 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 5 | 1182 | 0.140 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 8 | 1088 | 0.124 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 10 | 1026 | 0.116 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 20 | 697 | 0.078 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 23 | 594 | 0.070 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 25 | 523 | 0.054 |
| Asheville | Attic | Heat Pump | 4 | 6 | 35 | 35 | 155 | 0.016 |
| Asheville | Attic | Heat Pump | 4 | 19 | 35 | 5 | 1427 | 0.186 |
| Asheville | Attic | Heat Pump | 4 | 19 | 35 | 8 | 1339 | 0.178 |
| Asheville | Attic | Heat Pump | 4 | 19 | 35 | 10 | 1278 | 0.171 |
| Asheville | Attic | Heat Pump | 4 | 19 | 35 | 20 | 960 | 0.116 |
| Asheville | Attic | Heat Pump | 4 | 19 | 35 | 23 | 860 | 0.109 |
| Asheville | Attic | Heat Pump | 4 | 19 | 35 | 25 | 791 | 0.101 |