

**non-CFLs installed?**

**17. What is your best estimate of the number of bulbs installed in your home that are not CFLs?\***

*Enter -99 for Don't know, Not sure, or Refused*

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**18. How many of these non-CFL bulbs are in sockets that are typically used for more than 2 hours a day?\***

*Enter -99 for Don't know, Not sure, or Refused*

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**Currently, there are a number of types of light bulbs available for purchase in the market, like CFL bulbs, Halogen bulbs, standard incandescent bulbs, and LED bulbs among others.**

**Q19. Thinking about the next ten light bulbs you will purchase... [INTERVIEWER NOTE: PLEASE REMINDER PROMPT BEFORE EACH OPTION BELOW]**

- a. **Approximately how many will be standard incandescent light bulbs?** [NUMERIC 0-10] [IF NEEDED: Incandescent bulbs are the most common type of light bulb. It features a screw-base and is known for providing bright, warm light instantly.]
- b. **Approximately how many will be Halogen light bulbs?** [NUMERIC 0-10] [IF NEEDED: Halogen light bulbs are similar to incandescent bulbs, but are known to be more energy efficient than standard incandescent bulbs and tend to be used in indoor and outdoor flood lighting, indoor recessed or tracked lighting, and in floor and desk lamps.]
- c. **Approximately how many will be CFL light bulbs?** [NUMERIC 0-10] [IF NEEDED: CFLs, also known as compact fluorescent light bulbs, are energy saving light bulbs that are shaped like a soft-serve ice cream cone.]
- d. **Approximately how many will be LED light bulbs?** [NUMERIC 0-10] [IF NEEDED: LEDs, also known as lighting emitting diodes, are a type of lighting that uses multiple tiny bulbs, or diodes, that are wired together on one lamp.]
- e. **Approximately how many will be "other" bulb types?** [NUMERIC 0-10]
- f. (Don't know/Refused) [if total A-E does not equal 10 (i.e. DK/Ref to some bulb types), enter remaining value here; if all A-E=DK/Ref, enter 10 here]

*[TOTAL FOR ALL Q19 SHOULD EQUAL, AND CANNOT EXCEED, 10]*

**20. Before your landlord installed the new free CFLs from Duke Energy, did you have any LED light bulbs installed in your home?\***



- Yes (ask questions 54c, 54d and 54e)
- No
- DK/NS

**21. How many LEDs were you using in your home when your landlord installed the new CFLs from Duke Energy?\***

- LED Bulbs (record number): \_\_\_\_\_ \*
- DK/NS

**22. Where did you get the LEDs were you using in your home before your landlord installed the new CFLs from Duke Energy? (Do not read list, check all that apply)\***

- Assistance office (CAP Agency)
- Another Duke Energy program *specify:*
- A program from a company other than Duke Energy *specify:*
- Purchased at a store *specify:*
- Some other way *specify:*
- DK/NS

**23. How many years have you been using LEDs?\***

- Have never used LED light bulbs at all
- Never used until recently (first time user)
- 1 year or less (but not first time)
- 1 to 2 years
- 2 to 3 years
- 3 to 4 years
- 4 or more years
- Other *specify:*: \_\_\_\_\_ \*
- DK/NS

**24. Were you planning on buying LEDs for your home before your landlord installed the new CFL bulbs from Duke Energy?\***

- Yes
- No
- No, already have LEDs installed in all available sockets
- Maybe
- DK/NS

**25. Do you have any LED bulbs in storage to replace bulbs that burn out?\***

- None
- One or more (RECORD NUMBER): \_\_\_\_\_ \*
- DK/NS

**26. Did your experience with the CFLs provided by this program make it more or less likely that you would purchase and install LEDs in the future?\***

- More likely
- Less likely

Neither more or less likely

**26a Why are you more likely to use LEDs in the future?\***

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**26b Why are you less likely to use LEDs in the future?\***

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**27. Have you purchased any LEDs since your landlord installed the new CFLs from Duke Energy?\***

- Yes
- No
- DK/NS

**If yes to 27, \***

27a. How many did you purchase? : \_\_\_\_\_

27b. How many of those are you currently using?: \_\_\_\_\_

*If yes to 27,*

**27c. Using a 1 to 10 scale, with 1 meaning that the Duke program had no influence, and a 10 to mean that the Duke program was very influential, please rate the influence of this program on your decision to purchase LEDs.\***

Not at all influential

1

...

10

Very influential

DK/NS

**28. On a 1-to-10 scale with 1 being very unlikely and 10 being very likely, please rate your likelihood of buying and using LEDs in the future:\***

very unlikely

1

...

10

very likely

DK/NS

**29. On a scale from 1-10, with 1 indicating not at all interested and 10 indicating very interested, please rate your interest in Duke Energy providing a direct mail service that ships discounted LED light bulbs to your home.\***

Not at all interested

1

...

10

very interested



( ) DK/NS

Specialty Bulbs

**I'm now going to ask you about the number of bulbs currently installed in your home that are specialty bulbs such as dimmable bulbs, three-way bulbs, recessed, flood or directional lights, candelabra lights or other non-standard bulbs...**

*Please list the number of bulbs currently installed in your home that are specialty bulbs such as dimmable bulbs, three-way bulbs, recessed, flood or directional lights, candelabra lights or other non-standard bulbs...*

**s1. How many Dimmable bulbs do you have in your home?... how many Outdoor flood bulbs... etc...\***

Dimmable bulbs: \_\_\_\_\_

Outdoor flood bulbs: \_\_\_\_\_

Three-way bulbs: \_\_\_\_\_

Spotlight bulbs: \_\_\_\_\_

Recessed bulbs: \_\_\_\_\_

Candelabra bulbs: \_\_\_\_\_

Other: \_\_\_\_\_

**s2. For each of these specialty bulbs installed, how many are CFLs?\***

Dimmable bulbs: \_\_\_\_\_

Outdoor flood bulbs: \_\_\_\_\_

Three-way bulbs: \_\_\_\_\_

Spotlight bulbs: \_\_\_\_\_

Recessed bulbs: \_\_\_\_\_

Candelabra bulbs: \_\_\_\_\_

Other: \_\_\_\_\_

**s2b. For each of these specialty bulbs installed, how many are LEDs?\***

Dimmable bulbs: \_\_\_\_\_

Outdoor flood bulbs: \_\_\_\_\_

Three-way bulbs: \_\_\_\_\_

Spotlight bulbs: \_\_\_\_\_

Recessed bulbs: \_\_\_\_\_

Candelabra bulbs: \_\_\_\_\_

Other: \_\_\_\_\_

**s3. On a scale from 1-10, with 1 indicating not at all interested and 10 indicating very interested, please rate your interest in Duke Energy providing a direct mail specialty CFL program that shipped discounted specialty bulbs directly to your home:\***

Not at all interested

( ) 1

...

( ) 10

very interested



DK/NS

**Please tell me if you would be interested in receiving the following types of CFLs if they were to be offered in the future...**

**s4. Dimmable CFLs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_  
 No  
 DK/NS

**s5. Outdoor flood CFLs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_  
 No  
 DK/NS

**s6. Three-way CFLs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_  
 No  
 DK/NS

**s7. Spotlight CFLs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_  
 No  
 DK/NS

**s7a. Recessed CFLs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_  
 No  
 DK/NS

**s8. Candelabra CFLs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_  
 No  
 DK/NS



*(If responder indicated a different specialty bulb)*

**s9. {Other bulb}**

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_

No

DK/NS

**s10. On a scale from 1-10, with 1 indicating not at all interested and 10 indicating very interested, please rate your interest in Duke Energy providing a direct mail specialty LED program that shipped discounted specialty bulbs directly to your home:\***

Not at all interested

1

...

10

very interested

DK/NS

**Please tell me if you would be interested in receiving the following types of LEDs if they were to be offered in the future...**

**s11. Dimmable LEDs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_

No

DK/NS

**s12. Outdoor flood LEDs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_

No

DK/NS

**s13. Three-way LEDs\***

Yes

*If YES, ask: About how many hours per day would these bulbs be used?:*

\_\_\_\_\_

No

DK/NS

**s14. Spotlight LEDs\***

Yes







- 
- h. Energy savings
- 
- i. Attractiveness or appearance of the bulb
- 
- j. Recommendations from family and friends
- 
- k. Recommendations from the utility company
- 
- l. Availability of utility programs or services that offer the bulbs to you directly
- 
- m. Ease of bulb disposal
- 

**31. Since you received the free CFLs from Duke Energy, have you made energy efficiency improvements in your home, such as...?\***

*(read all choices)*

- Wall or ceiling insulation**
- Caulking**
- Faucet aerators**
- Outlet or switch gaskets**
- Low flow showerhead**
- Programmable thermostat**
- Weatherstripping**
- None of these**

**32. Since you received the free CFLs from Duke Energy, have you changed any of your habits related to energy use?\***

- Yes
- No
- DK/NS

*If YES to question 25, ask:*

**32a. What have you changed?**

**33. Why do you believe that Duke Energy is providing free CFLs to their customers?\***

- Duke Energy wants to save their customers money
- Duke Energy wants to save energy for environmental reasons
- Duke Energy wants to save energy for economic reasons
- Duke Energy wants to look good (PR)
- The government is forcing Duke Energy to do it
- Other *(specify)*

Demographics

Finally, we have some general information questions...

**D1. In what type of building do you live?\***

- Two or Three family attached residence-traditional structure
- Apartment (4 + families)---traditional structure
- Condominium---traditional structure
- Other
- Refused
- Don't Know

**D2. Does your home have cold drafts in the winter?\***

- Yes
- No

**D3. Does your home have sweaty windows in the winter?\***

- Yes
- No

**D4. Do you notice uneven temperatures between the rooms in your home?\***

- Yes
- No

**D5. Does your heating system keep your home comfortable in winter?\***

- Yes
- No

**D6. Does your cooling system keep your home comfortable in summer?\***

- Yes
- No

**D7. Do you have a programmable thermostat?\***

- Yes
- No
- Don't know

**D8. What temperature is your thermostat set to on a typical summer weekday afternoon?\***

- Less than 69 degrees
- 69-72 degrees
- 73-78 degrees
- Higher than 78 degrees
- Off
- DK/NS

**D9. What temperature is your thermostat set to on a typical winter weekday afternoon?\***

- Less than 67 degrees



- 67-70 degrees
- 71-73 degrees
- 74-77 degrees
- Higher than 78 degrees
- Off
- DK/NS

**D10. Would a two-degree increase in the summer afternoon temperature in your home affect your comfort....\***

- Not at all
- Slightly
- Moderately
- Greatly

**D11. How many people live in this home?\***

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more
- Prefer Not to Answer

**D12. How many people are usually home on a weekday afternoon?\***

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 or more
- Prefer Not to Answer

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

*Reading the answers is not necessary, but you may read them if they hesitate or seem unsure. Ranges are easier to identify with than specific numbers.*

**D13. What is your age group?\***

- 18-34
- 35-49

- 50-59
- 60-64
- 65-74
- Over 74
- Prefer Not to Answer

**D14. Please indicate your annual household income.\***

- Under \$15,000
- \$15,000-\$29,999
- \$30,000-\$49,999
- \$50,000-\$74,999
- \$75,000-\$100,000
- Over \$100,000
- Prefer Not to Answer

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

Survey ID\*

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**Do you have any comments that you would like to pass on to your supervisor about this survey?**

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**Thank You!**

**Thank you for your time and feedback today!**  
*(Politely end call)*



## Appendix D: Surveyed Customer Demographics

Surveyed customers were asked a series of demographic and household questions at the end of the survey. All 82 survey respondents answered the following questions. The results are for internal Duke Energy use only.

<b>In what type of building do you live?</b>				
	N	%	Cumulative %	Valid %
Apartment (4 + families)--- traditional structure	73	89.0%	89.0%	89.0%
Condominium--- traditional structure	5	6.1%	95.1%	6.1%
Two or Three family attached residence- traditional structure	2	2.4%	97.6%	2.4%
Other	2	2.4%	100.0%	2.4%
<b>Total</b>	<b>82</b>	<b>100.0%</b>	<b>100.0%</b>	<b>82</b>

<b>Does your home have cold drafts in the winter?</b>				
	N	%	Cumulative %	Valid %
Yes	48	58.5%	58.5%	59.3%
No	33	40.2%	98.8%	40.7%
DK/NS	1	1.2%	100.0%	NA
<b>Total</b>	<b>82</b>	<b>100.0%</b>	<b>100.0%</b>	<b>81</b>

<b>Does your home have sweaty windows in the winter?</b>				
	N	%	Cumulative %	Valid %
Yes	37	45%	45%	46%
No	43	52%	98%	54%
DK/NS	2	2%	100%	NA
<b>Total</b>	<b>82</b>	<b>100%</b>	<b>100.0%</b>	<b>80</b>

<b>Do you notice uneven temperatures between the rooms in your home?</b>				
	N	%	Cumulative %	Valid %
Yes	52	63.4%	63.4%	64.2%

No	29	35.4%	98.8%	35.8%
DK/NS	1	1.2%	100.0%	NA
Total	82	100%	100.0%	81

<b>Does your heating system keep your home comfortable in winter?</b>				
	N	%	Cumulative %	Valid %
Yes	60	73.2%	73.2%	75.9%
No	19	23.2%	96.3%	24.1%
DK/NS	3	3.7%	100.0%	NA
Total	82	100.0%	100.0%	79

<b>Does your cooling system keep your home comfortable in summer?</b>				
	N	%	Cumulative %	Valid %
Yes	70	85.4%	85.4%	88.6%
No	9	11.0%	96.3%	11.4%
DK/NS	3	3.7%	100.0%	NA
Total	82	100.0%	100.0%	79

<b>Do you have a programmable thermostat?</b>				
	N	%	Cumulative %	Valid %
Yes	29	35.4%	35.4%	36.7%
No	50	61.0%	96.3%	63.3%
DK/NS	3	3.7%	100.0%	NA
Total	82	100.0%	100.0%	79

<b>How many thermostats are there in your home?*</b>				
	N	%	Cumulative %	Valid %
0	3	3.7%	3.7%	3.7%
1	71	86.6%	90.2%	87.7%
2	0	0.0%	90.2%	0.0%
3	6	7.3%	97.6%	7.4%
4 or more	1	1.2%	98.8%	1.2%
DK/NS	1	1.2%	100.0%	NA
Total	82	100.0%	100.0%	81



<b>What temperature is your thermostat set to on a typical summer weekday afternoon?</b>				
	N	%	Cumulative %	Valid %
Higher than 78 degrees	2	2.4%	2.4%	2.8%
69-72 degrees	28	34.1%	36.6%	38.9%
73-78 degrees	15	18.3%	54.9%	20.8%
Less than 69 degrees	16	19.5%	74.4%	22.2%
Off	11	13.4%	87.8%	15.3%
DK/NS	10	12.2%	100.0%	NA
Total	82	100.0%	100.0%	72

<b>What temperature is your thermostat set to on a typical winter weekday afternoon?</b>				
	N	%	Cumulative %	Valid %
Higher than 78 degrees	2	2.4%	2.4%	2.8%
74-77 degrees	15	18.3%	20.7%	21.1%
71-73 degrees	11	13.4%	34.1%	15.5%
67-70 degrees	24	29.3%	63.4%	33.8%
Less than 67 degrees	16	19.5%	82.9%	22.5%
Off	3	3.7%	86.6%	4.2%
DK/NS	11	13.4%	100.0%	NA
Total	82	100.0%	100.0%	71

<b>Would a two-degree increase in the summer afternoon temperature in your home affect your comfort?</b>				
	N	%	Cumulative %	Valid %
Greatly	12	14.6%	14.6%	15.6%
Moderately	15	18.3%	32.9%	19.5%
Slightly	19	23.2%	56.1%	24.7%
Not at all	31	37.8%	93.9%	40.3%
DK/NS	5	6.1%	100.0%	NA
Total	82	100.0%	100.0%	77

<b>How many people live in this home?</b>				
	N	%	Cumulative %	Valid %
1	41	50.0%	50.0%	50.0%



2	24	29.3%	79.3%	29.3%
3	11	13.4%	92.7%	13.4%
4	6	7.3%	100.0%	7.3%
5	0	0.0%	100.0%	0.0%
6	0	0.0%	100.0%	0.0%
Prefer Not to Answer	0	0.0%	100.0%	NA
Total	82	100.0%	100.0%	82

<b>How many people are usually home on a weekday afternoon?</b>				
	N	%	Cumulative %	Valid %
0	11	13.4%	13.4%	13.4%
1	42	51.2%	64.6%	51.2%
2	21	25.6%	90.2%	25.6%
3	6	7.3%	97.6%	7.3%
4	2	2.4%	100.0%	2.4%
5	0	0.0%	100.0%	0.0%
6	0	0.0%	100.0%	0.0%
Prefer Not to Answer	0	0.0%	100.0%	NA
Total	82	100.0%	100.0%	82

<b>What is your age group?</b>				
	N	%	Cumulative %	Valid %
18 to 34	17	20.7%	20.7%	21.0%
35 to 49	18	22.0%	42.7%	22.2%
50 to 59	16	19.5%	62.2%	19.8%
60 to 64	8	9.8%	72.0%	9.9%
65 to 74	12	14.6%	86.6%	14.8%
Over 74	10	12.2%	98.8%	12.3%
Prefer Not to Answer	1	1.2%	100.0%	NA
Total	82	100.0%	100.0%	81

<b>Please indicate your annual household income.</b>				
	N	%	Cumulative %	Valid %
Under \$15,000	37	45.1%	45.1%	61.7%
\$15,000-\$29,999	15	18.3%	63.4%	25.0%



\$30,000-\$49,999	7	8.5%	72.0%	11.7%
\$50,000-\$74,999	1	1.2%	73.2%	1.7%
\$75,000-\$100,000	0	0.0%	73.2%	0.0%
Over \$100,000	0	0.0%	73.2%	0.0%
Prefer Not to Answer	16	19.5%	92.7%	NA
DK/NS	6	7.3%	100.0%	NA
Total	82	100.0%	100.0%	60

## Appendix E: Surveyed Property Demographics

Surveyed property managers were asked a series questions regarding their units at the end of the survey. The results are for internal Duke Energy use only.

<b>What year were your units built?</b>				
	N	%	Cumulative %	Valid %
1959 and before	0	0%	0%	0%
1960-1979	5	50%	50%	50%
1980-1989	3	30%	80%	30%
1990-1997	0	0%	80%	0%
1998-2000	1	10%	90%	10%
2001-2007	0	0%	90%	0%
2008-present	1	10%	100%	10%
Don't Know	0	0%	100%	
<b>Total</b>	<b>10</b>	<b>100%</b>		<b>10</b>

<b>Which of the following best describes your units' heating systems</b>				
	N	%	Cumulative %	Valid %
Individual forced air furnace	5	50%	50%	50%
Electric Baseboard	1	10%	60%	10%
Heat Pump	2	20%	80%	20%
Geothermal Heat Pump	0	0%	80%	0%
Shared central heating	0	0%	80%	0%
PTAC Units	1	10%	90%	10%
Other	1	10%	100%	10%
<b>Total</b>	<b>10</b>	<b>100%</b>		<b>10</b>

<b>How old are your heating systems?</b>				
	N	%	Cumulative %	Valid %
0-4 years	3	30%	30%	30%
5-9 years	0	0%	30%	0%
10-14 years	0	0%	30%	0%
15-19 years	0	0%	30%	0%
19 years or older	2	20%	50%	20%
Varying Ages, Replaced as Needed	5	50%	100%	50%



Don't have	0	0%	100%	0%
DK/NS	0	0%	100%	
Total	10	100.0%		10

<b>What is the primary fuel used in your heating systems</b>				
	N	%	Cumulative %	Valid %
Electricity	8	80%	80%	72.7%
Natural Gas	3	30%	110%	27.3%
Oil	0	0%	110%	0.0%
Propane	0	0%	110%	0.0%
Other	0	0%	110%	0.0%
None	0	0%	110%	0.0%
Total	11	110%		11
Totals more than 100% since some people gave multiple answers				

<b>What is the secondary fuel used in the heating system, if applicable?</b>				
	N	%	Cumulative %	Valid %
None	10	100%	100%	100%
Electricity	0	0%	100%	0%
Natural Gas	0	0%	100%	0%
Oil	0	0%	100%	0%
Propane	0	0%	100%	0%
Other	0	0%	100%	0%
Total	10	100%		10

<b>Do you use one or more of the following to cool your units</b>				
	N	%	Cumulative %	Valid %
Through the wall or window air conditioning unit	0	0%	0%	0%
Individual central air conditioning	5	50%	50%	50%
Shared central air conditioning	0	0%	50%	0%
Heat pump for cooling	2	20%	70%	20%
Geothermal Heat pump	0	0%	70%	0%
PTAC Units	1	10%	80%	10%
Other	1	10%	90%	10%
None	1	10%	100%	10%



Total	10	100.0%		10
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<b>What is the fuel used in the cooling systems?</b>				
	N	%	Cumulative %	Valid %
Electricity	9	90%	90%	100%
Natural Gas	0	0%	90%	0%
Oil	0	0%	90%	0%
Propane	0	0%	90%	0%
Other	0	0%	90%	0%
None	0	0%	90%	0%
Total	9	90%		9

<b>How old are your cooling systems</b>				
	N	%	Cumulative %	Valid %
0-4 years	2	20%	20%	20%
5-9 years	0	0%	20%	0%
10-14 years	1	10%	30%	10%
15-19 years	0	0%	30%	0%
19 years or older	1	10%	40%	10%
Varying Ages, Replaced as Needed	6	60%	100%	60%
Don't have	0	0%	100%	0%
DK/NS	0	0%	100%	
Total	10	100%		10

<b>What is the fuel used by your water heaters</b>				
	N	%	Cumulative %	Valid %
Electricity	5	50%	50%	50%
Natural Gas	5	50%	100%	50%
Oil	0	0%	100%	0%
Propane	0	0%	100%	0%
Other	0	0%	100%	0%
None	0	0%	100%	0%
Total	10	100%		10



<b>How old are your water heaters?</b>				
	N	%	Cumulative %	Valid %
0-4 years	1	10%	10%	10%
5-9 years	0	0%	10%	0%
10-14 years	1	10%	20%	10%
15-19 years	0	0%	20%	0%
19 years or older	0	0%	20%	0%
Varying Ages, Replaced as Needed	8	80%	100%	80%
Don't have	0	0%	100%	0%
DK/NS	0	0%	100%	
<b>Total</b>	<b>10</b>	<b>100%</b>		<b>10</b>

<b>Do your units have clothes dryers</b>				
	N	%	Cumulative %	Valid %
Yes, individual dryers in units	2	20%	20%	15.4%
Yes, shared dryers in common areas	10	100%	120%	76.9%
Some units have individual dryers. Others do not	1	10%	130%	7.7%
No, there are no dryers	0	0%	130%	0.0%
No dryers, but hooks ups available	0	0%	130%	0.0%
DK/NS	0	0%	130%	
<b>Total</b>	<b>13</b>	<b>130%</b>		<b>13</b>
Totals more than 100% since some people gave multiple answers				

<b>What type of fuel do you use for clothes drying</b>				
	N	%	Cumulative %	Valid %
Electricity	7	70%	70%	70%
Natural Gas	3	30%	100%	30%
Oil	0	0%	100%	0%
Propane	0	0%	100%	0%
Other	0	0%	100%	0%
None	0	0%	100%	0%
DK/NS	0	0%	100%	
<b>Total</b>	<b>10</b>	<b>100%</b>		<b>10</b>



<b>About how many square feet of living space are in your units?</b>				
	N	%	Cumulative %	Valid %
Less than 500	2	20%	20%	15.4%
500-999	8	80%	100%	61.5%
1000-1499	3	30%	130%	23.1%
1500-1999	0	0%	130%	0.0%
2000-2499	0	0%	130%	0.0%
2500-2999	0	0%	130%	0.0%
3000-3499	0	0%	130%	0.0%
3500-3999	0	0%	130%	0.0%
4000 or more	0	0%	130%	0.0%
DK/NS	1	10%	140%	
Total	14	140%		13
Totals more than 100% since some people gave multiple answers				

<b>Do your units have heated or unheated basements</b>				
	N	%	Cumulative %	Valid %
Heated	1	11.1%	11.1%	12.5%
Unheated	0	0.0%	11.1%	0.0%
No basements	7	77.8%	88.9%	87.5%
DK/NS	1	11.1%	100.0%	
Total	9	100.0%		8



## Appendix F: Impact Algorithms

### CFLs

#### General Algorithm

##### Gross Summer Coincident Demand Savings

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

##### Gross Annual Energy Savings

$$\Delta kWh = \text{ISR} \times \text{units} \times \left[ \frac{(\text{Watts} \times \text{HOU})_{\text{base}} - (\text{Watts} \times \text{HOU})_{\text{ee}}}{1000} \right] \times 365 \times (1 + \text{HVAC}_c)$$

where:

$\Delta kW$	= gross coincident demand savings
$\Delta kWh$	= gross annual energy savings
ISR	= In service rate = 89%
units	= number of units installed under the program
$\text{Watts}_{\text{ee}}$	= connected load of energy-efficient unit = 13
$\text{Watts}_{\text{base}}$	= connected (nameplate) load of baseline unit(s) displaced = 53
HOU	= Average daily hours of use (based on connected load) = 3.42
CF	= coincidence factor = 0.11 (from Draft Ohio TRM)
$\text{HVAC}_c$	= HVAC system interaction factor for annual electricity consumption = -0.0958
$\text{HVAC}_d$	= HVAC system interaction factor for demand = 0.1666

$\text{HVAC}_c$  - 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 a residential prototype building. The weights were determined through appliance saturation data from the Home Profile Database supplied by Duke Energy.

$\text{HVAC}_d$  - 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 a residential prototype building. The weights were determined through appliance saturation data from the Home Profile Database supplied by Duke Energy.

Covington, KY

<b>HVAC System</b>	<b>Weight</b>	<b>HVACc</b>	<b>HVACd</b>
AC with Gas Heat	48.1%	0.079	0.17
Heat Pump	22.9%	-0.16	0.17
AC with Electric Heat	27.0%	-0.36	0.17
Electric Heat Only	0.0%	-0.45	0
Gas Heat Only	2.0%	0	0
<b>Total Weighted Mean</b>		<b>-0.0958</b>	<b>0.1666</b>



## Appendix G: EISA Schedule and CFL Baseline

As stipulated in the Energy Independence and Security Act (EISA) of 2007, manufacturers of standard incandescent screw-based light bulbs must begin producing bulbs which use at least 27% less energy for a similar lumen output. The law is being phased in as seen in Table 34. As a result, it is necessary to adjust the baseline wattage that a CFL should be evaluated against throughout its effective useful life (EUL).

**Table 34. EISA Schedule**

Current Bulb Wattage	New EISA Compliant Wattage	Standard Effective Date
100	72	1/1/2012
75	53	1/1/2013
60	43	1/1/2014
40	29	1/1/2014

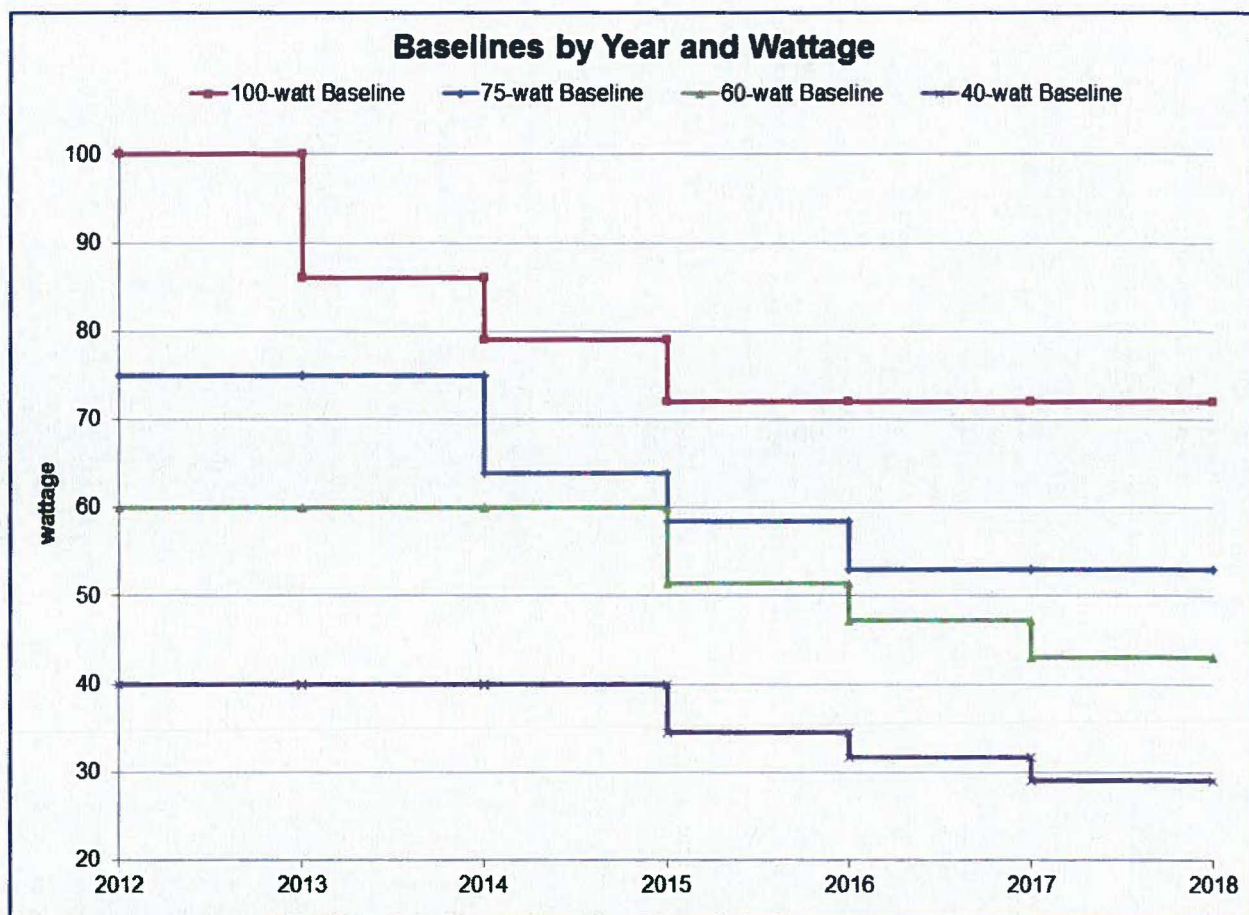
TecMarket Works has developed a dynamic approach to estimating future CFL baseline wattages wherein each year of a CFL's EUL is prescribed a baseline value based on the most current research on the availability of standard incandescent light bulbs in the marketplace. Much of this research, to this point, has focused on 100-watt bulbs as they were the first to phase out and therefore offer the most robust data. The effect of EISA on the availability of other incandescent bulb wattages as they are phased out is expected to be similar.

Such an approach is necessary because of the difference in EUL between the efficient and baseline technologies in question (one year for an incandescent and five years for a CFL). In the absence of the program, it is assumed that each year a new incandescent bulb would have to be purchased. The average wattage of this purchase decreases each year with the eroding availability of the standard incandescent bulbs due to EISA. Table 35 contains the baseline wattages from which savings are estimated. A graphical representation is shown in Figure 42.

**Table 35. Baselines by Year and Wattage**

100-watt			75-watt			60-watt			40-watt		
Year	Phase	Baseline	Year	Phase	Baseline	Year	Phase	Baseline	Year	Phase	Baseline
2012	0%	100	2012	0%	75	2012	0%	60	2012	0%	40
2013	50%	86	2013	0%	75	2013	0%	60	2013	0%	40
2014	75%	79	2014	50%	64	2014	0%	60	2014	0%	40
2015	100%	72	2015	75%	58.5	2015	50%	51.5	2015	50%	34.5
2016	100%	72	2016	100%	53	2016	75%	47.25	2016	75%	31.75
2017	100%	72	2017	100%	53	2017	100%	43	2017	100%	29





**Figure 42. Step Graph of Baselines by Year and Wattage**

A study completed in January of 2013 found that nearly half of retailers surveyed (44.6% or 45 out of 101) still have a supply of 100-watt incandescent light bulbs in stock<sup>4</sup>. The primary conclusion of this study was that 100-watt bulb availability for 2012 was not substantially impacted by EISA to the degree that energy impact baseline calculations should be adjusted for savings estimations in 2012, but that a phased-in calculation approach for 2013 and beyond is warranted. Accordingly, baselines are discounted starting in the year following the standard effective date of the respective wattage's phase out per EISA, not in the same year.

An additional adjustment was considered that would further delay the effects of EISA to account for standard wattage incandescent bulbs that remain in storage beyond the time that they are no longer available for purchase. A review of Duke Energy's residential efficiency program evaluations for 2012 and 2013 revealed that the number of incandescent bulbs stored in a typical home is insufficient to justify the use of such an adjustment.

<sup>4</sup> Indiana Statewide Core Program Evaluation Team. "Indiana 2012 EISA Bulb Availability Study." June 20, 2013. Pg. 3.



A more recent study has found that 100-watt bulbs reached 24% availability seven quarters after the EISA standard took effect<sup>5</sup>. This approach assumes, for year three, that 75% of all retailers no longer have 100-watt bulbs available for purchase. For all years past the third, the baseline wattage is set at EISA’s minimally compliant wattage, taken from Table 34.

Impacts can then be calculated using this dynamic baseline approach to estimate kWh savings for CFLs at each year of its EUL separately. Figure 43 offers a graphical representation of the effect of the shifting baseline on CFL impact calculations. Note that these are purely hypothetical examples not based on a specific population and are exclusive of variables accounting for an in-service rate and any HVAC interaction.

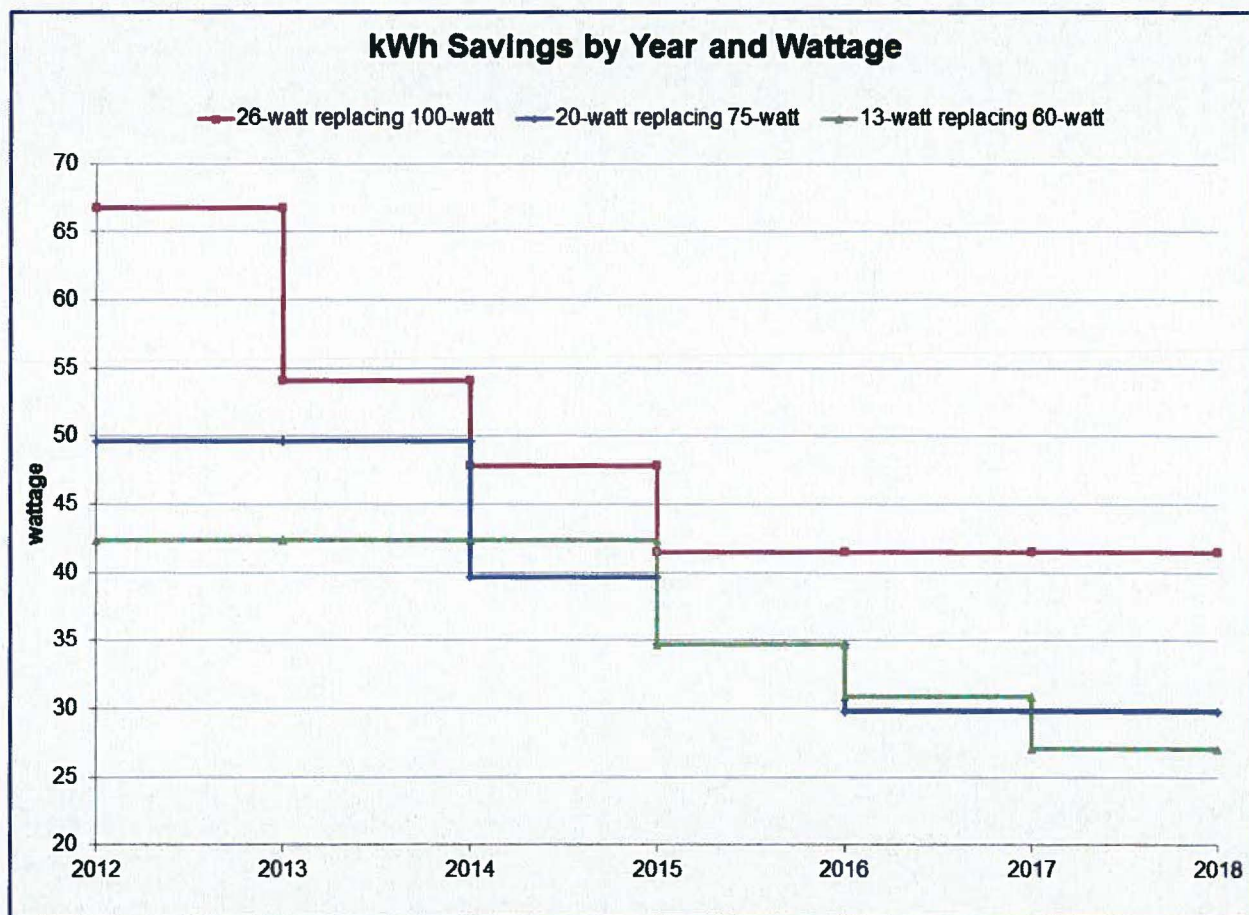


Figure 43. Step Graph of kWh Savings by Year and Wattage

<sup>5</sup> Cadmus Group. “Summary of EISA2007 Lighting Survey Results for DP&L Q1, Q2, &Q3 2013.” Memorandum. October 11, 2013. Pg. 2.



## Appendix H: DSMore Table

Technology ↓	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)
CFLs			Kentucky	39.8	0.0045	0.0409	bulb	2.7%	38.7	0.0044	0.0398	no	5
<b>Program wide</b>				<b>39.8</b>	<b>0.0045</b>	<b>0.0409</b>	<b>bulb</b>	<b>2.70%</b>	<b>38.7</b>	<b>0.0044</b>	<b>0.0398</b>		<b>5</b>



Final

**Process and Impact Evaluation of the  
Residential Energy Efficient Appliance and Devices:  
Lighting - Specialty Bulbs Program  
in Kentucky and Ohio**

**Prepared for  
Duke Energy**

139 East Fourth Street  
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## Executive Summary

Duke Energy's Specialty Bulb Program sells discounted specialty CFLs and LEDs to qualifying residential customers in Kentucky via an online store. These include three-way bulbs, dimmable bulbs, outdoor bulbs, reflectors (recessed), candelabras<sup>1</sup>, capsules (A-Line), and globes in both CFL and LED varieties. Adoption is encouraged through discount pricing, the convenience of online ordering and home delivery. The online store also has lighting-associated educational elements.

Duke Energy effectively combines low cost marketing vehicles such as email, website promotions, and direct mail with sophisticated targeting techniques to ensure high conversion rates at low acquisition costs. Participants are very satisfied with their experience purchasing light bulbs at the Savings Store, giving an average overall program satisfaction rating of 9.22 on a ten-point scale where "10" is most satisfied.

It is our finding based on this evaluation that program participants largely represent households who have already adopted energy efficient lighting technology for standard sockets in their home, and this program has allowed them to extend that decision to specialty bulbs that would not have been replaced with efficient bulbs without the program. Although program participants had an average of 11.7 efficient bulbs apiece installed in their homes before they purchased Savings Store specialty bulbs, most installations of the efficient bulbs provided by the Duke Energy store replaced inefficient bulbs. The key question for these customers when making light bulb purchase decisions is not "should I get efficient bulbs?", but "where can I get the efficient bulbs that will work in my fixtures at an acceptable price?" The participant survey shows that the over-riding reason customers bought energy efficient specialty light bulbs from the Savings Store is the availability of specialty bulbs at reduced prices offered by the store. The cost savings associated with less energy use is a distant secondary concern for these customers.

Reinforcing this hypothesis, participants overwhelmingly express that they would like to install efficient bulbs in their specialty sockets when their program bulbs burn out (at least 92% of installations), even though for 80% of these surveyed installations the efficient program bulb had replaced a previously-installed incandescent or halogen bulb. That is, they wanted to use efficient bulbs, but had not been able to make that switch in their specialty bulb fixtures without the availability of the program. Thus, participation in the Specialty Bulbs program seems to distill down to the customer being able to find the "right bulbs" for special non-standard uses and functions at the "right price." The Duke Energy store enabled these customers to make the switch in their specialty bulb sockets.

These findings support our conclusion that this program is performing as intended: by delivering efficient light bulbs to customers who will use them, but who largely would not have done so in the absence of the program.

<sup>1</sup> Also known as decorative lamps, candles, flame tips, blunt tips, and torpedoes. Manufacturers are not consistent with how they label/group products. For this report, these are referred to as candelabras for consistency.



This report utilizes data from both Duke Energy Kentucky and Duke Energy Ohio customers as a cost-saving measure. Each section indicates which state the data is from. However, both TecMarket Works and Duke Energy agree that findings from Duke Energy Ohio apply to Duke Energy Kentucky given the identical program operations, close proximity, and customer demographics.

## Key Findings and Recommendations

This section presents the key findings and recommendations identified through this evaluation.

### Significant Process Evaluation Findings

Significant Process Evaluation Findings from the Management Section can be found in the section titled *Key Findings* on page 56.

Significant Process Evaluation Findings from the Participant Surveys can be found in the section titled *Key Findings* on page 141.

Significant Process Evaluation Findings from the Non-Participant Surveys can be found in the section titled *Key Findings* on page 191.

### Significant Impact Evaluation Findings

- From the logger study, the average daily hours of use across all bulb and room types and adjusted for day length is estimated to be 2.53 hours/day.
  - See Table 118 on page 222.
- The average wattage of a bulb replaced by a program bulb is 49.72 watts.
  - See Table 120 on page 223.
- From the logger study, the coincidence factor for demand is estimated to be 9.14%.
  - See Figure 51 on page 220.
- The power fractions for estimating the average percent of maximum power used by dimmable and 3-way bulbs are 54.8% and 75.1% respectively.
  - See Table 117 on page 221.
- The average gross savings per bulb shipped are 25.11 kWh; the average coincident peak kW savings per bulb shipped are 0.0028 kW.
  - See Table 135 on page 215.
- Effective useful life of program savings is estimated to be eight years.
  - See *Effective Useful Life* on page 226.
- Freeridership is estimated at 23.3% and spillover is estimated at 1.3%, for a NTGR of 77.7%.
  - See *Net to Gross Ratio Calculation* on page 213.

Table 1 presents the gross unit kWh and kW savings per bulb associated with the Specialty Bulbs program in Kentucky and Ohio.

**Table 1. Summary of Program Savings by Measure**

<b>Measure</b>	<b>Participation Count (Bulbs)</b>	<b>Ex Post (Adjusted) Per unit kWh impact</b>	<b>Ex Post (Adjusted) Per unit CP kW impact</b>	<b>Gross Ex Post (Adjusted) kWh Savings</b>	<b>Gross Ex Post (Adjusted) CP kW Savings</b>
CFL Indoor Reflector (Recessed)	31,877	24.7	0.0029	788,925	92.2
CFL Dimmable Reflector (Recessed Dimmable)	3,491	41.6	0.0048	145,119	16.9
CFL Outdoor Reflector (Recessed Outdoor)	7,785	64.0	0.0038	498,572	29.9
LED Reflector (Recessed LED)	7,736	43.1	0.0039	333,280	29.8
CFL Globe	25,056	14.3	0.0021	358,210	53.7
CFL Candelabra	21,828	12.0	0.0014	261,667	30.4
CFL Three-Way Spiral	7,898	33.9	0.0039	267,619	30.9
CFL Dimmable Spiral	5,624	37.7	0.0044	211,849	24.8
CFL Capsule (A Line)	17,928	21.9	0.0026	393,358	46.2
LED Capsule (A Line LED)	16,384	24.3	0.0028	398,052	46.3



**Table 2. Summary of Gross and Net Program Savings by Measure**

Measure	Participation Count (Bulbs)	Gross Ex Post kWh Savings	Gross Ex Post NCP kW Savings	Gross Ex Post CP kW Savings	Net Ex Post kWh Savings	Net Ex Post NCP kW Savings	Net Ex Post CP kW Savings
CFL Indoor Reflector (Recessed)	31,877	788,925	1,009	92.2	612,804	783	71.6
CFL Dimmable Reflector (Recessed Dimmable)	3,491	145,119	185	16.9	112,722	144	13.1
CFL Outdoor Reflector (Recessed Outdoor)	7,785	498,572	328	29.9	387,270	254	23.3
LED Reflector (Recessed LED)	7,736	333,280	326	29.8	258,878	253	23.2
CFL Globe	25,056	358,210	587	53.7	278,243	456	41.7
CFL Candelabra	21,828	261,667	332	30.4	203,252	258	23.6
CFL Three-Way Spiral	7,898	267,619	339	30.9	207,875	263	24.0
CFL Dimmable Spiral	5,624	211,849	272	24.8	164,555	211	19.3
CFL Capsule (A Line)	17,928	393,358	505	46.2	305,544	393	35.9
LED Capsule (A Line LED)	16,384	398,052	506	46.3	309,190	393	35.9

## Process Evaluation Recommendations

### From the Management Section

Below is a brief list of top level recommendations for program improvement. For the complete set of recommendations see section titled *Recommendations* beginning on page 58.

- **Consider upgrading the energy savings calculator on the Duke Energy public website** at <http://www.duke-energy.com/residential-savings-store/> so that the public version of the calculator features the same interactive functionality as the version installed on the Savings Store website. If this is feasible with Duke Energy website technology and policy, making this upgrade will enable more customers to see how much they can save with specialty bulbs prior to requiring them to log on to the Savings Store itself.
- **Test and improve the Savings Store's search features.** Because web search functionality yielded inconsistent results or failed to find items using key words

commonly found on the website, the Savings Store's search features should be tested and improved to accurately reflect store inventories using the Savings Store's names for bulb types and application types, as well as for entries with singular and plural spelling and associated terms such as lighting, bulb, and other common words and phrases.

- **Test the suggested website usability improvements.** TecMarket Works recommends that, wherever feasible with EFI's online website platform, the various website usability improvements suggested on page 58 and throughout the management section be implemented and tested using what is known as split testing; that is a system whereby one portion of website visitors are presented one version of a web page, while another portion are presented an alternative version of the same page. Such a system will enable Duke Energy to determine whether more customers take action with or without the suggested changes. The Content Experiment feature of Google Analytics can be used for this purpose.
- **Consider curtailing customer ability to ship purchases to addresses located outside of Duke Energy's service territory.**
- **Consider expanding program offerings** to include additional specialty bulb types, as well as smart devices for home automation, and other efficiency measures.

## From the Participant Surveys

- **Consider routinely monitoring competitors' pricing on bulbs and shipping.** Most customers are aware of the price of energy-efficient light bulbs at local retailers and through other online stores, and many of them are directly comparing Savings Store prices to the competition. Price is perhaps the most important driver of Savings Store purchases. This does not mean having the lowest price for every bulb (which may increase freeridership), however many customers will only pay a small premium for the convenience of online ordering if they can find equivalent bulbs available at a lower price elsewhere.
  - Shipping costs should also be noted when monitoring competitors' pricing. Most Savings Store customers are experienced online shoppers and have had their expectations for what shipping should cost set from their experience with other retailers (such as offering free shipping on orders over a certain amount).
  - Price comparisons can be an effective marketing tool. Duke Energy should consider including favorable comparisons to competitors' pricing in advertising for the Savings Store. These comparisons could also include shipping price and policy comparisons.
- **Consider the effects of multi-pack pricing.** Multi-packs of light bulbs that offer increased savings on the per-bulb price drive a significant number of customers to purchase additional bulbs so that they can get "the best deal"; this often results in the purchase of more bulbs than will be immediately installed, with the extra bulbs stored for future use. Duke Energy should consider the positive effects of multi-pack pricing (to drive additional sales), and also the effect this may have on program impacts (distributing bulbs that will not be installed immediately will dilute the savings per bulb, a corollary effect of selling additional "spare bulbs" that customers do not need immediately).
- **Explain the Savings Store limits are on price, not on quantity of bulbs.** Most customers who are aware of the limit on incandescent light bulbs did not realize that they could purchase more bulbs of the same type beyond these limits, albeit at a higher price



without the incentive and from a different section of the site. Duke Energy should also consider streamlining the order process and/or the display of bulbs on the site in a way that does not involve customers having to go to a different page to order additional non-incandescent bulbs.

- **More prominently display information on bulb physical dimensions and threading.** One of the more common issues reported by customers regarding the bulb information presented at the Savings Store, and related requests for more information, involves the physical dimensions of bulbs and their socket threading; this is because some customers are seeking energy-efficient bulbs for unusual and difficult-to-fit sockets in their home. This information is included on the “product specifications” tab for each bulb, but some customers who are seeking this information are not finding it; perhaps a more prominent link labeled “product dimensions” or “socket size/type” could help. In addition to including this information for all bulbs sold at the Savings Store, Duke Energy should also consider the variety of bulb dimensions and threading available when deciding on additions to or subtractions from the Savings Store’s offerings.
- **Continue efforts to market the Savings Store to customers who have already shopped at the Store.** Customers who purchased bulbs from the Savings Store still have a significant number of incandescent specialty bulbs in their homes, and a large majority of them say they intend to shop the Store again in the future.

## From the Non-Participant Surveys

Duke Energy’s non-participant customers made the following requests for program and website improvement. TecMarket Works concurs with these suggestions.

- Expand inventory to include brighter LEDs to enable displacement of higher wattage incandescent and halogen bulbs.
- Create an interactive way to compare CFLs and LEDs to incandescent equivalents, including wattage, brightness, color, price, energy savings, bulb life, etc.
- Enable Store visitors to search and sort by wattage equivalents. Such a feature would be helpful to those potential bulb buyers who are more familiar with buying bulbs based upon wattage numbers as they have done in years past.
- Increase customer confidence in purchases by expanding the product descriptions to more clearly denote bulb shapes and bases and to better explain which bulbs are best used for which applications.
- Review website language and simplify potentially confusing technical language to more layman’s terms.
- Provide more prominent explanations regarding bulb warranties.
- Consider an option for customers to make payments via PayPal.
- Respondents offered a number of suggestions for expanding the Store’s inventory of energy efficient items, including: a greater variety of LEDs and other kinds of CFL bulbs for currently unaddressed specialty applications such as bright/higher wattage equivalents and more outdoor and landscape lighting. They also suggested non-lighting energy efficiency devices including “smart home” devices, weatherization items, and other devices to control lighting, such as timers and motion detectors.

## Introduction and Purpose of Study

### Summary Overview

This document presents the evaluation report for Duke Energy’s Residential Specialty Bulb Program as it was administered in Kentucky. The evaluation was conducted by TecMarket Works, Matthew Joyce, and BuildingMetrics, Inc.

### Summary of the Evaluation

The findings presented in this report were calculated using survey data from program participants and non-participants as shown in Table 3.

**Table 3. Evaluation Date Ranges and Data Source**

Evaluation Component	Data Source	Sample Pull: Start Date of Participation	Sample Pull: End Date of EMV Sample	Dates of Analysis
Participant Surveys	Participant survey data is from both Ohio and Kentucky customers	May 17, 2013 <sup>2</sup>	June 23, 2014	Surveys conducted from July 15, 2014 through October 5, 2014
Non-participant Surveys	Non-participant survey data is from both Ohio and Kentucky customers	May 1, 2013 <sup>3</sup>	June 23, 2014	Surveys conducted from October 6, 2014 through November 20, 2014
Management Interviews	Findings apply to Kentucky customers	February 27, 2014	Dec 16, 2014	Interviews conducted and analyzed from February 27, 2014 to Dec 16, 2014
Engineering Estimates	Estimates are applied to all participants in Ohio and Kentucky	May 17, 2013	June 23, 2014	October 2014 through January 2015
Lighting Logger Study	Lighting logger data is from Ohio customers only	August 14, 2014	November 24, 2014	October 2014 through January 2015

Surveyed participants were asked how many program-provided CFLs and LEDs are currently installed in light fixtures. Additional, more specific information was collected for at least one installation from each specialty bulb category purchased (indoor reflector, outdoor reflector,

<sup>2</sup> These are the start and end purchase dates from EFI store data among the population of participants. Actual range of surveyed purchase dates is May 18 to June 23. Start dates are the earliest records of purchases after program launch.

<sup>3</sup> Start date for non-participants is the earliest “date established” in EFI customer data (i.e., date when someone first logged on to the Store website using their Duke Energy account. We also surveyed non-participants who were aware of the program but did not visit the Store. While these customers don’t technically have specific “established” dates, they all received marketing messages at least once between June 15, 2013 and May 19, 2014.



globe, candelabra, three-way spiral, dimmable spiral, efficient capsule, and standard spiral bulbs) or a minimum of three installations if a customer purchased fewer than three types of specialty bulb (customers with fewer than three installations overall were asked about all of their program bulb installations). The information collected includes the location of the installed program bulbs, the type and wattage of the bulbs that they replaced, and the average hours per day that they are in use. The decision to limit the number of installations about which to collect detailed information to a maximum of three total or one per bulb category (whichever is greater) was made in the interest of time and evaluation cost, as the surveys are lengthy. The information gathered about program bulb installations covered a majority of the program bulbs installed by surveyed participants and provides sufficiently robust data about all of the incandescent specialty bulb categories. Data was also collected about non-program bulbs installed in specialty sockets and specialty bulbs in storage. Results of this survey of 206 customers in Ohio and Kentucky who purchased program bulbs during the evaluation period are presented in the *Participant Surveys* section of this report.

To assess barriers to, and interest in, program participation, TecMarket Works conducted phone surveys with a random sample of 96 non-participants, including 16 respondents from Kentucky and 80 respondents from Ohio. Of these, 56 people visited the Savings Store website but did not make a purchase and 40 received marketing materials from Duke Energy but did not visit the website or make a purchase. Results of the non-participant survey are presented in the *Non-Participant Surveys* section of this report, and some key differences and similarities between survey groups are highlighted in the *Participant and Non-Participant Survey Comparisons* section.

An impact analysis was performed for all specialty bulbs by room type and can be seen in Table 121. However, it should be noted that individual room type samples are of insignificant size to achieve statistical relevance and are presented as anecdotal evidence. The impacts are based on an engineering analysis of the impacts associated with the self-reported installs identified through the participant surveys. The hours of use were determined through a logger study and are adjusted to reflect yearly averages using the daylength algorithm developed via a larger logger study conducted in California that documented the monthly change in lighting usage due to seasonal variances in day length. This approach is explained in detail in the *Daylength Adjustment* section.

This report is structured to provide program impact estimations per bulb purchased from the online store as well as overall program savings based on an extrapolation of these results to the full participant population, which includes participants who purchased bulbs from May 17, 2013 (the earliest recorded purchase after program launch) through June 30, 2014 (n=9,215 customers).

## Description of Program

Duke Energy's Specialty Bulb Program sells discounted CFLs and LEDs to qualifying residential customers in Kentucky via an online store. The program website, called the Duke Energy Savings Store, was launched in April of 2013. The Specialty Bulb program is designed to extend the market penetration of energy efficient lighting beyond the replacement of conventional incandescent bulbs to specialty applications including: dimmables, three-ways, reflectors (recessed), capsules (A Line), candelabras, and globes. Adoption is encouraged through incentive pricing, the convenience of online ordering and home delivery, and educational elements that break down barriers by explaining the differences between buying lighting based upon lumens instead of watts, and by helping customers to choose the most appropriate bulbs for different applications. The educational aspects of the Savings Store are also intended to encourage spillover demand for energy efficient specialty bulbs that are sold through conventional retail channels.

The Duke Energy Savings Store website can only be accessed by verified Duke Energy customers whose bulb purchases are individually tracked so that personal incentive limits can be enforced. Customers who desire to buy more bulbs than allowed by the program's incentive limits can do so, but the additional bulbs must be purchased without Duke Energy discounts.

## Program Eligibility

To be eligible for the program, participants must be customers with active residential electric accounts in Duke Energy's Kentucky service territory. Both property owners and renters are eligible.

## Program Participation

Program participation is primarily tracked based upon customer purchases of specialty bulbs. According to Duke Energy's tracking of unique account numbers associated with bulb purchases, 670 Kentucky customers purchased a total of 10,158 specialty bulbs between program inception on April 26, 2013 and December 31, 2013 (Table 4). An additional 1,701 customers purchased 26,681 bulbs between January 1, 2014 and November 15, 2014. Combined program participation shows a total of 2,312 unique Kentucky customers who purchased at total of 36,839 specialty bulbs over the 19 month period.

**Table 4. Program Participation in Kentucky**

Time Period	Number of Unique Purchasing Customers	Number of Specialty Bulbs Purchased
Apr 26 to Dec 31, 2013	670	10,158
Jan 1 to Nov 15, 2014	1,701	26,681
<b>Total</b>	<b>2,312<sup>4</sup></b>	<b>36,839</b>

Note that for the purposes of this evaluation, we present the above mentioned participation numbers as the most recently available data at the time of drafting this report. However, for the

<sup>4</sup> The total number of customers shown here is 2,312 and not 2,371 because while each year's tally counts unique customers, some customers made purchases in both years. Those duplicates have been removed from the total shown.



purposes of participant survey data collection and analysis, as well as for impact calculations, we necessarily used the data that was available through the start of those efforts which began on June 30, 2014. As a result, this shorter time period yields the following numbers as shown in Table 5.

**Table 5. Program Participation through June 30, 2014**

<b>Time Period</b>	<b>Number of Unique Purchasing Customers</b>	<b>Number of Specialty Bulbs Purchased</b>
Apr 26 to Dec 31, 2013	670	10,158
Jan 1 to June 30, 2014	861	13,407
<b>Total</b>	<b>1,496<sup>5</sup></b>	<b>23,565</b>

<sup>5</sup> The total number of customers shown here is 1,496 and not 1,531 because while each year's tally counts unique customers, some customers made purchases in both years. Those duplicates have been removed from the total shown.

# Methodology

## Overview of the Evaluation Approach

This evaluation had four components: management interviews, participant surveys, non-participant surveys, and an impact analysis based on engineering algorithms and data collected from loggers in a sample of participants' homes.

## Study Methodology

### Management Interviews

TecMarket Works conducted interviews with Duke Energy's product manager, marketing communications manager, and senior market research analyst. We also spoke with four representatives from Energy Federation Incorporated (EFI), including the vice president of sales, vice president of strategic development, program manager, and call center manager.

The interviews considered program design, execution, operations, staff and customer interactions, data tracking and transfer methods, and personal experiences in order to identify any implementation issues and discuss opportunities for improvement. Interview guides were used to ensure a full and complete battery of questions were addressed to the interview subjects. Sample guides are shown in *Appendix A: Management Interview Instrument* and *Appendix B: Vendor Interview Instrument*.

### Participant Surveys

TecMarket Works fielded a phone survey with randomly selected participants in order to measure satisfaction and to identify areas for program improvement. Two-hundred and six (206) interviews were completed with customers in Ohio (192 surveys) and Kentucky (14 surveys) who purchased bulbs from the Savings Store between April 26, 2013 and June 30, 2014 according to program records.

### Non-Participant Surveys

TecMarket Works fielded a phone survey with randomly selected non-participants in order to identify barriers to program participation. Ninety-seven (96) interviews were completed in Ohio and Kentucky with customers who received marketing materials and/or who visited the Savings Store website between May 1, 2013 and June 23, 2014 but who had not made any purchases as of the date the data was pulled on September 24, 2014. Eighty surveys (83.3% of 96) were completed with non-participants in Ohio and 16 surveys (16.7%) were completed with non-participants in Kentucky. Of these, 96 survey respondents, 56 non-participants visited the Savings Store website and did not make a purchase, and 40 non-participants opted not to visit the Savings Store despite the receipt of marketing materials encouraging them to do so. Those who visited the Store are deemed to be website-visiting non-participants and while those did not are considered to be non-visiting non-participants.

### Impact Analysis

Engineering algorithms taken from the Draft Ohio Technical Resource Manual (TRM) were used to estimate savings. Data inputs to the algorithm were determined through the logger study (hours of use, coincidence factor, power fractions), the participant survey (baseline wattage),



program tracking data (energy efficient wattage), and an appliance saturation study (HVAC interaction factors). These unit energy savings values were applied to customers in the engineering analysis sample.

## **Data collection methods, sample sizes, and sampling methodology**

### **Management Interviews**

Interviews and follow up exchanges were conducted by phone with seven staff members from Duke Energy and EFI. Conversations ranged from half an hour to two and half hours. The interview instruments can be seen in *Appendix A: Management Interview Instrument* and *Appendix B: Vendor Interview Instrument*.

### **Participant Surveys**

Duke Energy provided TecMarket Works with a list of 8,784 records of program participants in Ohio (7,350 participants) and Kentucky (1,434 participants). After removing records with missing contact information, duplicate records, "do not contact" numbers and customers who have recently been surveyed about other programs, the sample list consisted of 6,567 contactable customers. The survey was conducted by telephone by TecMarket Works staff from the list of 6,567 participant customers, and 206 respondents completed the survey. The survey instrument can be found in *Appendix C: Participant Survey Instrument*.

### **Non-Participant Surveys**

Duke Energy provided TecMarket Works with a list of 100,000 records of non-participants in the Midwest (86,599 from Ohio and 13,401 from Kentucky). After removing records with missing contact information, duplicate records, "do not contact" numbers and customers who have recently been surveyed about other programs, as well as removing customers who did not receive marketing communications about the program during the evaluation period and customers who have made purchases from the Savings Store, the sample list consisted of 81,621 contactable non-participants (OH = 70,991, KY = 10,630). The contact list was further subdivided into 10,074 customers (OH = 8,302, KY = 1,772) who visited the Savings Store site without making a purchase and 71,547 customers (OH = 62,689, KY = 8,858) who received marketing materials but who did not visit the Savings Store site. The survey was conducted by telephone by TecMarket Works staff from the list of 81,621 non-participant customers and 96 respondents completed the survey (80 from Ohio and 16 from Kentucky).

### **Lighting Loggers**

The impact analysis uses a combination of the participant survey (n= 206 respondents) and the lighting logger study (n= 192 loggers) to estimate program savings. Logger study participants were recruited as part of the participant survey.

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

### **Management Interviews**

Seven out of seven management representatives were contacted in 2014 for a 100% response rate.

### Participant Surveys

From the sample list of 6,567 customers, 2,706 participants in Ohio and Kentucky were called between July 15, 2014 and October 5, 2014, and a total of 206 usable telephone surveys were completed yielding a response rate of 7.6% (206 out of 2,706).

### Non-Participant Surveys

From the sample list of 81,621 customers, 1,356 non-participants in Ohio and 259 in Kentucky were called between October 6, 2014 and November 20, 2014, and a total of 96 usable telephone surveys were completed (80 from Ohio and 16 from Kentucky) yielding a response rate of 5.9% (96 out of 1,615).

### Lighting Loggers

From the 206 participant survey respondents, 79 were recruited to participate in the logger study, a recruitment rate of 41.1%. Into these 79 households, 211 loggers were installed. Nineteen loggers were thrown out of the sample for bad or corrupted data, leaving a total of 192 loggers used to estimate impacts.

**Table 6. Summary of Data Collection Efforts**

Specialty Bulbs Program			
Data Collection Effort	Size of Population in Sample	# of Successful Contacts	Sample Rate
Management Interviews	7	7	100%
Participant Surveys	6,567	206	3.1%
Non-Participant Surveys	81,621	96	0.1%
Lighting Loggers	206	79	38.3%

## Expected and achieved precision

### Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 9.1% and an achieved precision of 90% +/- 5.6%.

### Non-Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 9.2% and an achieved precision of 90% +/- 8.4%.

### Lighting Loggers

The expected precision of the average daily hours of use and coincidence factor was +/- 10% at 90% confidence. The achieved precision was +/-16.2% at 90% confidence for the hours of use and +/-20.8% at 90% confidence for the coincidence factor. This is based on the mean overall values and the standard deviation of the individual estimates compared to the mean. Achieved precision is less than planned as a result of the much wider than expected range of bulb hours of use observed in the metering study. This is attributable to the numerous different bulb types included in the study, each with a different usage pattern, resulting in a higher than expected coefficient of variation.



### **Description of baseline assumptions, methods and data sources**

Baseline assumptions were determined through a combination of phone surveys and onsite surveys with customers providing self-reported values of baseline lamp watts and operating hours. Lighting loggers were used to measure actual lamp operating hours. Robust data concerning HVAC system fuel and type was available from Duke Energy's Home Profile Database (appliance saturation survey type data) in Ohio and Kentucky. Interaction factors derived from this data were used in favor of deemed values from secondary sources as they recognize only Duke Energy customers and, therefore, more accurately represent the participant population. A breakdown of these factors by system and fuel type can be seen in *Appendix J: Impact Algorithms*.

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

A mixture of CFL and LED bulbs of different types were offered through the online store:

- CFL - Indoor Reflector (Recessed)
- CFL - Outdoor Reflector (Recessed Outdoor)
- CFL - Dimmable Reflector (Recessed Dimmable)
- CFL - Globe
- CFL - Candelabra
- CFL - Three-way spiral
- CFL - Dimmable Spiral
- CFL - Capsule (A Line)
- LED - Indoor Reflector (Recessed LED)
- LED - Capsule (A Line LED)

The Draft Ohio TRM's impact algorithms were enhanced with primary data, specifically appropriate waste heat factors were used that are indicative of climate characteristics similar to those observed in Ohio and used to calculate energy savings along with the results of the participant survey and lighting logger study. All customers are in the residential market.

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

Bulb installations and baseline wattage were self-reported by the surveyed participants. There is a potential for social desirability bias<sup>6</sup> but the customer has no vested interest in their reported measure adoptions, therefore this bias is expected to be minimal. There is a potential for bias in the engineering algorithms, which was minimized through the use the lighting logger study to determine actual average daily hours of use values and of building energy simulation models, which are considered to be state of the art for building shell and HVAC system analysis.

<sup>6</sup> Social desirability bias occurs when a respondent gives a false answer due to perceived social pressure to "do the right thing."

## Management Interviews

This section of the report applies to Kentucky program.

### Program History and Development

The Specialty Bulb program is a recent addition to Duke Energy's Energy Efficiency Portfolio. The program was officially opened to qualifying residential customers in Kentucky on April 26, 2013, but the concept was conceived two years prior in 2011. The impetus for the program arose from the success of Duke Energy's Residential Smart \$aver Energy Efficiency Products Program, which bypasses the need for customers to visit brick and mortar stores by directly mailing up to 15 free CFLs to customer homes. As increasing numbers of customers ordered these standard 13 and 18 Watt CFLs, Duke Energy recognized the opportunity to encourage their customers to adopt energy efficient specialty bulbs as well.

The procedures and platforms developed for the free CFL program—including marketing methods, account verification procedures, ordering tools, and a database for tracking how many free CFLs each customer received—served as foundational elements for building the Specialty Bulb program. However, because Duke Energy did not intend to fully subsidize the costs of the specialty bulbs, significant upgrades and entirely new systems were required; most notably an e-commerce platform for selling and distributing discounted specialty bulbs to qualifying customers.

Duke Energy requested proposals from third party vendors and in the spring of 2012 the utility selected Energy Federation Incorporated (EFI) of Southborough, Massachusetts. EFI is a non-profit organization that specializes in helping utilities to promote and deliver energy efficient lighting and other items via utility-branded e-commerce solutions.

### Program Goals and Performance

The primary goal of the program is to increase household energy savings by advancing customer adoption of energy efficient lighting from the replacement of incandescent bulbs with standard spiral CFLs to also include specialty CFLs and LEDs, such as three-way bulbs, dimmable bulbs, outdoor bulbs, reflectors (recessed), candelabras, efficient capsules (A-Line), and globes. The program achieves its goals through customer education and the use of financial incentives that reduce the final purchase price of the bulbs for the customer.

To set budgets and measure program performance, Duke Energy established overall goals for specialty bulb sales on the website, as well as for individual bulb types. During 2013, Duke Energy expected to sell 5,595 specialty bulbs. The program actually sold 10,158 bulbs, which represents 182% of the 2013 goal. For 2014 the goal was set for 15,143 bulbs. The program had sold 26,681 through November 15, 2014. This represents 176% of the 2014 goal with seven weeks remaining in the year. Table 7 presents bulb purchases sorted by bulb type and year. It shows that indoor CFL reflectors and CFL globes were the most popular bulb types, followed by CFL candelabras and LED A-Line capsules.



**Table 7. Program Goals vs. Actual Performance**

Bulb Type	Number of Incented Bulb Purchases <sup>7*</sup>								
	April 26 – Dec 31, 2013			Jan 1 – Nov 15, 2014			Combined		
	Goal	Actual	% Goal	Goal	Actual	% Goal	Goal	Actual	% Goal
CFL Three-Way Spiral	210	565	269%	568	1,012	178%	778	1,577	203%
CFL Capsule (A Line)	421	1,480	352%	1,137	2,831	249%	1,558	4,311	277%
CFL Dimmable Capsule (A Line)	280	349	125%	757	891	118%	1,037	1,240	120%
CFL Candelabra	838	1,512	180%	2,270	3,733	164%	3,108	5,245	169%
CFL Globe	1,121	2,037	182%	3,030	4,285	141%	4,151	6,322	152%
CFL Indoor Reflector (Recessed)	1,713	2,811	164%	4,635	4,627	100%	6,348	7,438	117%
CFL Dimmable Reflector (Recessed Dimmable)	190	244	128%	514	380	74%	704	624	89%
LED Reflector (Recessed LED)	55	58	105%	151	2,706	1792%	206	2,764	1342%
CFL Outdoor Reflector (Recessed Outdoor)	558	605	108%	1,514	1,383	91%	2,072	1,988	96%
LED Capsule (A Line LED)	209	497	238%	568	4,833	851%	777	5,330	686%
<b>Total</b>	<b>5,595</b>	<b>10,158</b>	<b>182%</b>	<b>15,143</b>	<b>26,681</b>	<b>176%</b>	<b>20,738</b>	<b>36,839</b>	<b>178%</b>

EFI's online reporting tools also provided the following customer data regarding customer orders. Table 8 shows that between program launch on April 26, 2013 and November 15, 2014, the Duke Energy Savings Store for Kentucky served 2,312 unique customers who placed a combined total of 2,582 orders for 36,839 bulbs. This equates to an average of 15.5 bulbs per customer, 14.3 bulbs per order, and an average of 4.5 orders per day. When year to year comparisons are made, the program's growth appears quite robust with a 254% increase in unique customers placing orders.

<sup>7</sup> As noted in Table 4 and Table 5 on page 12, although impact evaluation totals end during June of 2014, we have extended the time period for describing program performance to the latest date that data was available in November of 2014.



**Table 8. Yearly Order Tracking**

	<b>Apr 26- Dec 31, 2013</b>	<b>Jan 1 – Nov 15, 2014</b>	<b>Total</b>	<b>Year to Year % Increase</b>
Unique customers	670	1,701	2,371	254%
Unique orders	700	1,882	2,582	269%
Total bulbs	10,158	26,681	36,839	263%
Average bulbs per customer	15.2	15.7	15.5	103%
Average bulbs per order	14.5	14.2	14.3	98%
Average bulbs per day	40.6	83.6	64.7	206%
Average orders per day	2.8	5.9	4.5	211%
Average orders per customer	1.0	1.1	1.1	106%

### **Program Products and Incentive Levels**

When it came to product selection, Duke Energy decided to offer its customers a variety of the most commonly used specialty bulbs to replace conventional incandescent bulbs. “There are thousands of bulbs on the market. We did not want to try to replicate the number of choices available in a big box store, but we did want to ensure that people have a positive experience,” said the Duke Energy Product Manager. “So we looked at types of bulbs, different technologies, efficiency levels, bulb life, and other lighting factors like lumens. Then we worked with EFI to select the brands and bulbs that would cover the most common applications and deliver the most value for the lowest price.” While the Energy Store’s product inventory has continued to evolve over time, for its initial 2013 offerings Duke Energy chose to provide: CFL and LED capsules (A Line), CFL and LED reflectors, CFL globes, CFL candelabras, and CFL standard, dimmable, and three-way spirals. Each of these bulb categories has been consistently represented since the program’s launch, but the mix of individual bulbs has shifted slightly over time as the Store’s inventory has evolved to adjust to changing prices, new technologies, and manufacturer capabilities. All bulbs sold via the program are Energy Star qualified and most are offered in a variety of wattages as shown in Table 9.



**Table 9. 2014 Products and Incentive Levels**

Product List			EFI Store	Duke Energy	Customer	
Bulb Type	Category	Watt	Base Item Cost	Incentive Amount	Final Purchase Price	Maximum Purchase Limit
CFL Reflector (Recessed)	Indoor Reflector	14	\$3.00	\$2.52	\$0.48	15
		14	\$3.35	\$2.52	\$0.83	
		23	\$6.75	\$2.52	\$4.23	
	Outdoor Reflector	23	\$4.95	\$3.34	\$1.61	6
		Dimmable Reflector	15	\$12.95	\$5.00	\$7.95
LED Reflector (Recessed)	Reflector	7	\$14.50	\$7.00	\$7.50	15
		8	\$17.95	\$7.00	\$10.95	
		9.5	\$36.25	\$7.00	\$29.25	
		9.5	\$12.95	\$7.00	\$5.95	
		10	\$12.75	\$7.00	\$5.75	
CFL Globe	Globe	9	\$3.00	\$1.70	\$1.30	12
		14	\$3.00	\$1.70	\$1.30	
CFL Candelabra	Candelabra	5	\$4.50	\$2.11	\$2.39	12
		7	\$3.95	\$2.11	\$1.84	
		9	\$3.65	\$2.11	\$1.54	
CFL Spiral	Three-Way	12.22.33	\$7.45	\$3.67	\$3.78	6
	Dimmable	23	\$6.75	\$4.40	\$2.35	6
CFL (Capsule)	A Line	14	\$3.35	\$1.94	\$1.41	15
		18	\$4.95	\$1.94	\$3.01	
LED (Capsules)	A-Line	6	\$9.97	\$7.00	\$2.97	15
		7	\$11.95	\$7.00	\$4.95	
		9.5	\$9.97	\$7.00	\$2.97	
		10	\$10.95	\$7.00	\$3.95	
		11	\$11.95	\$7.00	\$4.95	
CFL Spiral	Standard Spiral	13	\$1.80	\$0.00	\$1.80	N/A
		20	\$1.85	\$0.00	\$1.85	N/A

As shown in the table above, incentive levels are specific to each bulb type and wattage, so final purchase prices for the customer can vary for bulbs within the same product family. For instance, CFL reflectors have a common incentive amount of \$2.52 per bulb, yet the bulbs' base item costs range from \$3 each for a 12 Watt reflector to \$6.75 for a 23 Watt reflector. As a result, after the incentive is applied, these bulbs will cost customers \$0.48 for a 12 Watt and \$4.23 for a 23 Watt, respectively.

Incentive levels were determined by assessing specialty bulb prices in the retail marketplace and then considering the full range of costs to customers who make online purchases from the Duke Energy Savings Store, including product cost, any applicable sales tax, plus shipping expenses. These retail factors were weighed against program budget, wholesale costs and discounts

obtained by EFI, and other factors such as retaining the ability for Duke Energy to offer its customers extra incentives to purchase larger quantities of bulbs or to reduce shipping costs.

When setting bulb incentive levels, Duke Energy also considered other issues such as the differences between shopping online and in stores. For example, in-store shopping allows customers to examine and compare physical products; it encourages impulse buying through product placements at registers and end caps; and it provides the opportunity for same day purchase and installation. But in retail stores product information is often scarce. So customers must depend on the knowledge of sales associates or do their research in advance. Online shopping allows customers to shop when it is convenient for them, including when stores are not typically open for business; it delivers products by mail directly to the home, and it can offer customers a variety of educational and product information in advance of their making the purchase decision. Because these non-financial attributes can have an influence on sales, Duke Energy factored them into its overall pricing calculus in order to ensure that the Duke Energy Savings Store fit appropriately in its e-commerce niche.

## **Operational Roles**

Program operational roles are assigned as follows: Duke Energy provides overall program oversight and quality assurance, marketing, and customer authentication. EFI provides the e-commerce platform for the Duke Energy Savings store, including the online storefront, shopping cart, and secure credit card processing. EFI also manages purchase limits for each account, bulb inventory, fulfills orders, arranges shipping (through the U.S. Post Office and United Parcel Service), handles customer service, and deals with returns and warranty replacements. These roles are discussed in more detail under the relevant sections below.

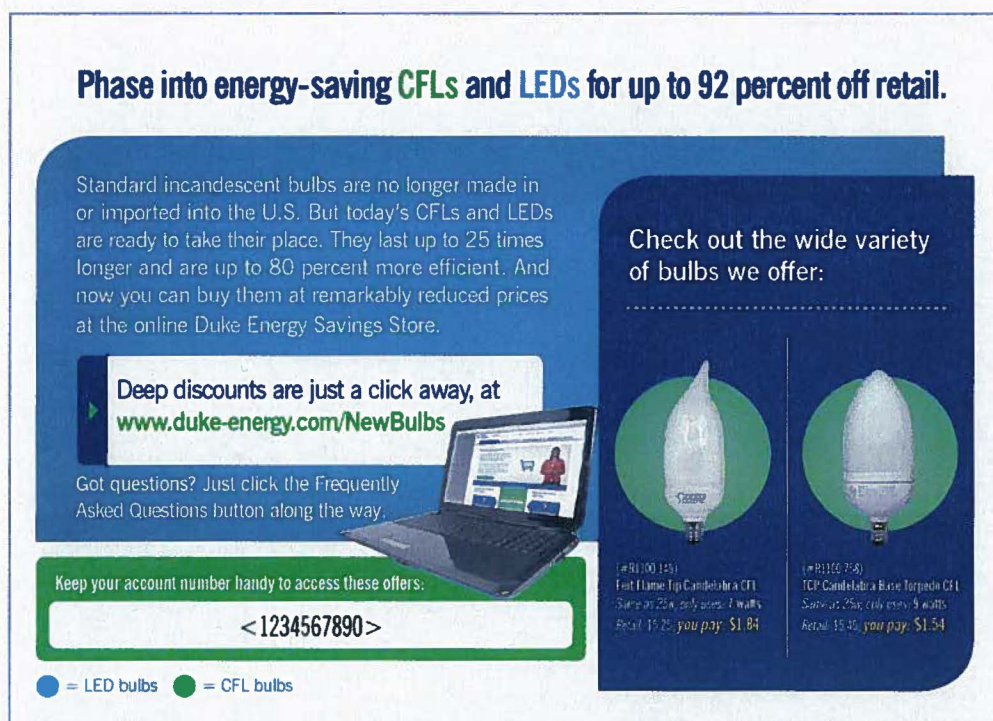
## **Program Marketing**

Duke Energy promotes awareness of its Specialty Bulb program through a combination of general and targeted marketing efforts. General marketing efforts began with program webpages and links on the Duke Energy website, bill inserts, and a press release to coincide with the public launch of the program. Electronic marketing began with pop-up messaging appearing on the Duke Energy My Account Online System (OLS) that encouraged customers to click through to visit the new store. These efforts were followed by a direct mail campaign that targeted three subsets of Duke Energy customers: 1) those who had previously purchased CFLs at retailers using Duke Energy's discount coupons, 2) those who had ordered free CFLs; and 3) OLS account users, since they are known to be savvy web users. An email campaign followed the direct mail campaign. Initially these efforts were rolled out in sequence in the months following the program launch to give Duke Energy and EFI time to fine tune the systems for customer authentication and data transfer (see *Customer Authentication* below). Then in the fall of 2013 the program team stepped up its efforts with a combined campaign that incorporated all of the above-mentioned elements in the same month, as well as mentions on the Duke Energy online employee portal to promote greater awareness of the program within the company. No paid advertising was used during 2013, but Duke Energy initiated paid advertising in newspapers during 2014. Otherwise, marketing efforts in 2014 continued in a comparable manner with a similar combination of tactics, including website banners, OLS pop-up messages, bill inserts, targeted direct mail, and email campaigns.



In addition to the marketing activities mentioned above, Duke Energy sends direct mail letters to new customers to prompt them to visit the Store. Those letters also mention Duke Energy's separate free CFL program, which provides free standard spiral CFLs via mail. Moreover, every customer who orders free CFLs automatically receives a printed flier advertising the Store in their shipment. As of July 2014 those fliers specifically included a toll free phone number that enables customers to place orders for specialty bulbs by phone rather than using the online web platform. This ability to take phone orders is discussed in more detail in the *Call Center* section of this evaluation on page 48.

As the Duke Energy Product Manager explained, "Marketing the free CFL program was fairly straightforward since 'free' is a no-brainer motivational tool for a lot of people. But now we're asking customers to actually pay for a portion of the bulbs." This presents more of a challenge in terms of refining the program's offer (including which bulbs get promoted in the marketing materials and the level of discounts for bulbs and shipping) and the creative (which messages resonate best with different customer groups). For this reason, Duke Energy has experimented with different marketing pieces. Some pieces feature selected bulbs, while others show the entire product line in the Savings Store. Still other marketing pieces have experimented with different discount offers to reduce the cost of shipping. Figure 1 below provides a sample excerpt from one such promotion. Other marketing samples can be found in *Appendix E: Marketing Examples*.



**Phase into energy-saving CFLs and LEDs for up to 92 percent off retail.**

Standard incandescent bulbs are no longer made in or imported into the U.S. But today's CFLs and LEDs are ready to take their place. They last up to 25 times longer and are up to 80 percent more efficient. And now you can buy them at remarkably reduced prices at the online Duke Energy Savings Store.

Deep discounts are just a click away, at [www.duke-energy.com/NewBulbs](http://www.duke-energy.com/NewBulbs)

Got questions? Just click the Frequently Asked Questions button along the way.

Keep your account number handy to access these offers:

<1234567890>

● = LED bulbs ● = CFL bulbs

Check out the wide variety of bulbs we offer:

(#B1100 145) Fast Flame Top Candleabra CFL Same as 25w, only uses 7 watts Retail: 19.99, you pay: \$1.84	(#B1100 7-8) TCP Candleabra Base Torpedo CFL Same as 25w, only uses 9 watts Retail: 15.45, you pay: \$1.54
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**Figure 1. Sample Excerpt from a Direct Mail Promotion**

The utility also employs an array of tools and techniques to track and improve the effectiveness of its marketing efforts: Mailing lists are compared against authentication records to determine which customers responded to direct mail campaigns. Separate and campaign-specific URLs are used for bill inserts, while click-through rates are tracked for email messages and OLS pop-up intercepts are tracked with weekly reports designed to capture response rates. Duke Energy's



Google Analytics account is used to track web traffic on the public website, as well as follow through traffic to the EFI Duke Energy store landing page. EFI's Google Analytics and other e-commerce measurement systems track customer activities on the Savings Store itself.

To further enhance the program's marketing, the many digital data points collected from the various tracking systems are subsequently fed into propensity modeling tools from Duke Energy's Market Analytics group. These modules crunch external data such as Experian and PRIZM segmentation data and then combine it with Duke Energy program participation records to identify the common attributes shared by customers who have responded to previous efficiency offers. The most significant characteristics are then fed back into the models so that millions of Duke Energy customers can be sifted for those who are most likely to respond to the program's next marketing effort.

In 2014 Duke Energy also sought to scientifically test the effectiveness of different offers using A/B split testing. For the test, 400,000 customers were divided into two groups with half receiving an offer for \$5 flat rate shipping and equal number of recipients seeing an offer for free shipping on orders over \$25. Other elements of the offer remained identical so only the shipping options were being tested. The primary objective was to determine which shipping offer drew more responses. However, once respondents actually reached the online store, customers from both groups could participate in either offer. Results of the tests showed little difference in response rates between groups. Nonetheless, TecMarket Works applauds Duke Energy for using controlled testing to determine the most effective ways to reach customers and prompt them to take action.

TecMarket Works also notes techniques such as sequential and combined marketing campaigns, the use of unique URLs, customer-specific response tracking, propensity modeling, and split testing to constitute best practices in program marketing.

## **Customer Authentication**

Numerous utilities employ online stores to sell their customers discounted light bulbs. The most common methods they use to confirm that online store visitors actually live within a utility's service territory are to either validate by checking the customer's residential address zip codes or for the vendor to compare account numbers entered by the website visitor with account numbers provided by the utility. While these methods suffice, neither method provides the online store vendor with up-to-date records regarding previous customer participation in energy efficiency programs. Duke Energy already possessed a more sophisticated system than this, and the utility wanted to use it for this program.

Duke Energy's previously established CFL distribution systems enable the utility to identify customers at the household level and track their participation down to the demand side management program that was responsible for providing a specific number of CFLs. "We wanted a vendor who would allow us to use our existing systems to authenticate customers before they accessed the vendor's e-commerce platform. That way we could confirm eligibility and track customer participation at the individual account level ourselves, and then redirect the customers to the vendor's online store to make their purchases," explained the Duke Energy Product Manager. With a data push from Duke Energy's computer system to the vendor's



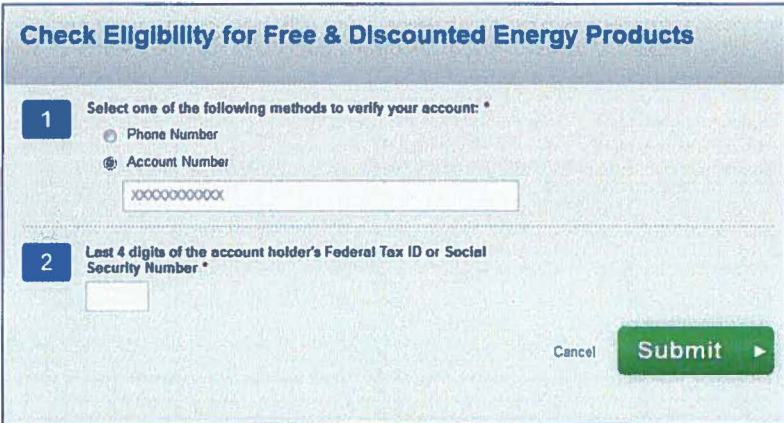
website, the vendor would have all the customer information needed to confirm eligibility for making purchases, as well as confirming the customer's account status as a residential customer (as opposed to being an eligible business customer who can buy discounted bulbs via a separate energy efficiency program for commercial customers).

This concept necessitated significant planning and technical adaption on the parts of Duke Energy and EFI. In the end, the complete process—from initially building the online website to finally testing that all data exchange procedures were working correctly—took the better part of a year before the Savings Store was ready to launch. However, once the system was ready, customers could access Duke Energy's authentication systems to verify their eligibility. Then the utility's computer systems would push the relevant customer data to EFI so that the vendor would have the customer's account information, including real-time eligibility for incentive discounts on light bulbs.

Because each of Duke Energy's state service territories are served by their own online storefront, one part of the authentication process also ensures that customers are automatically directed to their state-appropriate Store. As of the time of this evaluation, the Kentucky website appears to be identical with those of other states, but by maintaining different online storefronts the system can readily accommodate state-specific changes as necessary.

## Login Process

There are two ways to access the Duke Energy Savings Store: via the webpage for the program on the Duke Energy public website at <http://www.duke-energy.com/residential-savings-store/> or via a link from within Duke Energy's OLS. If customers enter via the public website they must first enter either their account number or the phone number associated with the account (Figure 2). They must also enter the last four digits of the social security number associated with the account. If customers access the Savings Store via the OLS they will have been through the authentication and thus they can go directly to the Savings Store.



The screenshot shows a web form titled "Check Eligibility for Free & Discounted Energy Products". It contains two main steps for authentication:

- Step 1:** "Select one of the following methods to verify your account: \*". It has two radio button options: "Phone Number" and "Account Number". The "Account Number" option is selected. Below this is a text input field containing "XXXXXXXXXXXX".
- Step 2:** "Last 4 digits of the account holder's Federal Tax ID or Social Security Number \*". It has a text input field.

At the bottom right of the form, there are two buttons: "Cancel" and "Submit" (with a right-pointing arrow).

**Figure 2. Login Screen for Authentication**

By design, customers cannot access the Duke Energy Savings Store without first going through Duke Energy's authentication process. If someone tries to visit the site directly whether that's via a bookmark/favorite or via a link from another website, their web browser will display an error message that points them back to the public webpage for the program for verification.



After authentication, customers are shown a Bulb Order pop-up screen that displays the number of free CFLs that they have requested and allows the customer to obtain more free CFLs if they are still eligible. It also displays a section showing their eligibility to shop for discounted specialty bulbs (Figure 3). Clicking the “Shop Now” button on the Bulb Order pop-up screen automatically redirects customers to the Duke Energy Saving Store website, which is hosted by EFI.

Our records indicate you have ordered your free CFLs.							
Thank you for participating in our energy efficiency programs							
Item/Qty	Reason/Status	Account	Mailing Address				
6 CFLs Requested	Requested Date: 04-27-2013 Shipped Date: 04-30-2013 FEDEX® Tracking	[REDACTED]	[REDACTED] 22ND AVE NE APT C				
6 CFLs Requested	Requested Date: 04-27-2013 Shipped Date: 04-30-2013 FEDEX® Tracking	[REDACTED]	[REDACTED] 22ND AVE NE APT C				
3 CFLs Requested	Requested Date: 04-27-2013 Shipped Date: 04-30-2013 FEDEX® Tracking	[REDACTED]	[REDACTED] 22ND AVE NE APT C				
You are eligible to shop for discounted light bulbs and other products.							
Account	Reason/Status	Type	Physical Address	State	Zip		
[REDACTED]	Eligible	Residential	[REDACTED] 22ND AVE NE APT C	[REDACTED]	[REDACTED]	[REDACTED]	<a href="#">Shop Now</a>

**Figure 3. Bulb Count and Eligibility Screen**

Prior to August of 2013, the login process involved an additional step after customers clicked the “Shop Now” button. Originally they were redirected to the pop-up screen that displayed their customer profile information, as well as the terms and conditions for website use. Customers were required to read the page and click the submit button before being transferred to the Savings Store (Figure 4).