Large Filing Separator Sheet

Case Number: 13-431-EL-POR

File Date: 4/15/2013

Section: 2 of 3

Number of Pages: 200

Description of Document: Testimony

- I close off unused rooms. (N=1)
- I installed an attic fan. (N=1)
- I installed an energy barrier in the attic. (N=1)
- I installed new siding. (N=1)
- I installed shrink wrap over some windows. (N=1)
- I maintain zone heating within house. (N=1)
- I planted trees for shade in the future. (N=1)
- I use window units instead of a broken central air system. (N=1)

19. Have you done anything that affected the heating of your home?
If yes, 19a. What have you done? Anything else?

- I have adjusted the thermostat. (N=25)
- I have been reducing drafts. (N=16)
- I installed a new furnace. (N=13)
- I added insulation to the attic. (N=11)
- I replaced doors. (N=10)
- I replaced windows. (N=9)
- I had my HVAC serviced. (N=7)
- I added insulation to the walls. (N=6)
- I had the furnace serviced. (N=6)
- I installed shrink wrap over some windows. (N=6)
- I installed a new heat pump. (N=5)
- I replace furnace filters regularly. (N=5)
- I use space heaters. (N=5)
- I installed a programmable thermostat. (N=4)
- I added insulation. (N=3)
- I installed a ceiling fan. (N=1)
- I installed a new air cleaner in the furnace. (N=1)
- I installed a new HVAC. (N=1)
- I installed a new roof. (N=1)
- I installed a pellet stove. (N=1)
- I installed a wood-burning fireplace. (N=1)
- I installed an energy barrier in the attic. (N=1)
- I installed new siding. (N=1)
- I keep the drapes from blocking the vents. (N=1)
- I modified the ductwork to make heating more effective. (N=1)
- I replaced a log fireplace with a gas unit. (N=1)
- I replaced all of the ducts. (N=1)

20. Have you done anything that affected the lighting in your home?
If yes, 20a. What have you done? Anything else?

- I installed CFLs in some of my lights. (N=115)
- I installed CFLs in most of my lights. (N=24)
- I installed CFLs in all of my lights. (N=23)
- I turn off unused lights. (N=16)
- I installed CFLs using a coupon from Duke. (N=4)
- I eliminated unnecessary lights. (N=1)
- Daylighting (N=1)
- I installed dimmable recessed lights. (N=1)
- I installed halogen fixtures. (N=1)
- I installed LED light bulbs. (N=1)
- Solar lights outdoors (N=1)

21. Have you done anything with home computers or electronics?
If yes, 21a. What have you done? Anything else?

- I unplug electronics. (N=30)
- I turn off electronics. (N=15)
- I use power strips. (N=9)
- I switched to a laptop. (N=5)
- I upgraded to a more energy efficient home computer. (N=3)
- I use the power saver on my computer. (N=2)
- I bought a flat screen television. (N=1)
- I bought an Energy Star television. (N=1)
- I replaced monitors with LED displays. (N=1)

22. Have you done anything to affect hot water heating in your home?
If yes, 22a. What have you done? Anything else?

- I bought an EE water heater. (N=24)
- I lowered the water heater temperature. (N=23)
- I use less hot water. (N=7)
- Water heater blanket (N=7)
- I repaired my water heater (N=3)
- I drained my water heater. (N=3)
- I turn my water heater off when away from home. (N=1)

23a. Did you make any changes to your hot tub or pool's heating or filtering systems to make it more efficient?
If yes, 23b. What have you done? Anything else?

- I had it repaired. (N=2)

- I installed a new pump. (N=2)
- I installed a timer on the pump. (N=2)
- I shut down hot tub. (N=2)
- I change the filters every 3 weeks. (N=1)
- I installed a new filter. (N=1)
- I installed a new filtering system to reduce energy needed. (N=1)
- I installed a new insulated cover. (N=1)
- I installed a timer on the heater. (N=1)
- I turned off the filtering system. (N=1)
- I turned off the heater. (N=1)

Appendix M: Estimated Billing Data Models

Overall

kwhd	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
part	-.4799134	.113393	-4.23	0.000	-.7021597	-.2576672
tme#c.hdd						
200901	.0192862	.0015352	12.56	0.000	.0162773	.0222952
200902	.0392942	.0010194	38.54	0.000	.0372962	.0412923
200903	.0374197	.0012731	29.39	0.000	.0349245	.0399149
200904	-.0031186	.0042878	-0.73	0.467	-.0115225	.0052853
200905	.0251567	.0020433	12.31	0.000	.0211518	.0291615
200906	-.0727455	.0118849	-6.12	0.000	-.0960394	-.0494516
200907	.1092014	.0287254	3.80	0.000	.0529006	.1655022
200908	-.339489	.0381538	-8.90	0.000	-.4142692	-.2647089
200909	-.316898	.0286695	-11.05	0.000	-.3730893	-.2607067
200910	.0376492	.0040912	9.20	0.000	.0296305	.0456679
200911	.0076643	.00406	1.89	0.059	-.0002931	.0156217
200912	.0280463	.0010567	26.54	0.000	.0259752	.0301173
201001	.0364919	.0019717	18.51	0.000	.0326274	.0403564
201002	.0427612	.0023245	18.40	0.000	.0382054	.0473171
201003	.032146	.0006767	47.50	0.000	.0308196	.0334724
201004	.0058214	.0033991	1.71	0.087	-.0008406	.0124835
201005	.0125909	.0050553	2.49	0.013	.0026828	.0224991
201006	.0083108	.006373	1.30	0.192	-.0041801	.0208016
201007	.0405023	.0200202	2.02	0.043	.0012635	.0797411
201008	-.0146923	.0164461	-0.89	0.372	-.0469261	.0175415
201009	.0305319	.0016015	19.06	0.000	.027393	.0336708
201010	.0106673	.0016867	6.32	0.000	.0073614	.0139732
201011	.0111852	.0012357	9.05	0.000	.0087633	.0136072
201012	.0276645	.0007518	36.80	0.000	.026191	.029138
201101	.0331045	.0017004	19.47	0.000	.0297717	.0364373
201102	.0346774	.00099	35.03	0.000	.0327371	.0366178
tme#c.cdd						
200901	.0328109	.01375	2.39	0.017	.0058614	.0597604
200902	.1313367	.0125612	10.46	0.000	.1067171	.1559563
200903	.0772519	.0119908	6.44	0.000	.0537503	.1007534
200904	-.0112055	.0105741	-1.06	0.289	-.0319302	.0095193
200905	.0478126	.0083816	5.70	0.000	.031385	.0642403
200906	.0278484	.0079753	3.49	0.000	.0122171	.0434797
200907	.066783	.0054823	12.18	0.000	.0560379	.0775282
200908	.0450725	.0061704	7.30	0.000	.0329787	.0571664
200909	.0348145	.0058552	5.95	0.000	.0233386	.0462904
200910	.108672	.0104762	10.37	0.000	.0881391	.1292049
200911	-.0738078	.0572742	-1.29	0.198	-.1860633	.0384476
200912	.0177589	.0784023	0.23	0.821	-.1359069	.1714246
201001	1.646656	1.23753	1.33	0.183	-.7788587	4.07217
201002	1.539532	1.017199	1.51	0.130	-.454142	3.533206
201003	.8490759	.2456319	3.46	0.001	.3676463	1.330506
201004	-.1508513	.0160295	-9.41	0.000	-.1822685	-.119434
201005	.0714706	.0108288	6.60	0.000	.0502466	.0926946
201006	.0890522	.0038793	22.96	0.000	.0814489	.0966555
201007	.0711165	.0039405	18.05	0.000	.0633934	.0788397
201008	-.057653	.0045553	-12.66	0.000	-.0665813	-.0487247
201009	.0847212	.0021408	39.57	0.000	.0805253	.0889172
201010	.0709748	.0035484	20.00	0.000	.0640201	.0779296
201011	.0136954	.0482189	0.28	0.776	-.0808118	.1082027
201012	-.534134	.1242445	-4.30	0.000	-.7776487	-.2906193
tme						

200902	-18.73306	2.088567	-8.97	0.000	-22.82657	-14.63954
200903	-17.91744	2.02182	-8.86	0.000	-21.88013	-13.95474
200904	-.0068828	2.710226	-0.00	0.998	-5.318827	5.305062
200905	-13.50576	1.939117	-6.96	0.000	-17.30636	-9.705158
200906	.2440958	2.697849	0.09	0.928	-5.043591	5.531783
200907	-9.49607	2.410296	-3.94	0.000	-14.22016	-4.771977
200908	3.036196	2.405423	1.26	0.207	-1.678346	7.750738
200909	7.183451	2.624034	2.74	0.006	2.040438	12.32646
200910	-18.3412	2.265302	-8.10	0.000	-22.78111	-13.90129
200911	-5.770503	2.395105	-2.41	0.016	-10.46482	-1.076184
200912	-15.06848	1.906622	-7.90	0.000	-18.80539	-11.33157
201001	-21.75338	2.968846	-7.33	0.000	-27.57221	-15.93454
201002	-22.45763	2.965827	-7.57	0.000	-28.27055	-16.64472
201003	-14.66285	1.851002	-7.92	0.000	-18.29075	-11.03496
201004	.6858798	2.579637	0.27	0.790	-4.370115	5.741875
201005	-13.53968	2.407236	-5.62	0.000	-18.25778	-8.821584
201006	-16.81547	2.059631	-8.16	0.000	-20.85228	-12.77867
201007	-9.123746	2.173302	-4.20	0.000	-13.38334	-4.864152
201008	43.60984	2.545648	17.13	0.000	38.62046	48.59922
201009	-12.28083	1.838627	-6.68	0.000	-15.88447	-8.677187
201010	-10.86528	1.80744	-6.01	0.000	-14.4078	-7.32276
201011	-9.820185	1.838318	-5.34	0.000	-13.42322	-6.217148
201012	-17.07246	1.880336	-9.08	0.000	-20.75785	-13.38707
201101	-20.80151	2.803991	-7.42	0.000	-26.29723	-15.30579
201102	-17.69464	2.075499	-8.53	0.000	-21.76255	-13.62674

daily use <20 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.2582221	.0823451	-3.14	0.002	-.4196173	-.096827
tme#c.hdd						
200901	.0031535	.0010219	3.09	0.002	.0011505	.0051565
200902	.0065566	.0006828	9.60	0.000	.0052183	.0078949
200903	.0065841	.0008575	7.68	0.000	.0049034	.0082647
200904	-.0045518	.0029816	-1.53	0.127	-.0103957	.0012921
200905	.0039896	.0013949	2.86	0.004	.0012556	.0067236
200906	.0186915	.0084859	2.20	0.028	.0020592	.0353237
200907	-.0248309	.0202108	-1.23	0.219	-.0644438	.0147819
200908	-.0988225	.0268798	-3.68	0.000	-.1515065	-.0461384
200909	-.0523655	.0210627	-2.49	0.013	-.093648	-.0110829
200910	-.0008977	.0027385	-0.33	0.743	-.0062651	.0044697
200911	-.0009491	.0027774	-0.34	0.733	-.0063927	.0044945
200912	.0060048	.0007098	8.46	0.000	.0046136	.007396
201001	.0041751	.001323	3.16	0.002	.0015821	.0067682
201002	.0019549	.0016578	1.18	0.238	-.0012944	.0052041
201003	.005161	.0004679	11.03	0.000	.004244	.006078
201004	.0017797	.002308	0.77	0.441	-.002744	.0063033
201005	-.0038023	.0033689	-1.13	0.259	-.0104052	.0028006
201006	-.0170685	.0037278	-4.58	0.000	-.0243749	-.0097621
201007	-.2839879	.0499028	-5.69	0.000	-.3817967	-.1861791
201008	-1.100734	.1236067	-8.91	0.000	-1.343002	-.8584669
201009	.014753	.0008972	16.44	0.000	.0129944	.0165116
201010	.0059122	.0009238	6.40	0.000	.0041016	.0077227
201011	.0032608	.0008266	3.95	0.000	.0016407	.0048808
201012	.005055	.0005242	9.64	0.000	.0040276	.0060825
201101	.001974	.0012134	1.63	0.104	-.0004042	.0043522
201102	.0032828	.0007003	4.69	0.000	.0019102	.0046554
tme#c.cdd						
200901	.0144123	.0079124	1.82	0.069	-.0010959	.0299205
200902	.0257146	.0068568	3.75	0.000	.0122754	.0391539
200903	.0171309	.006964	2.46	0.014	.0034816	.0307801
200904	-.0134892	.0072027	-1.87	0.061	-.0276064	.0006281

200905	.0121734	.005542	2.20	0.028	.0013111	.0230356
200906	.0534971	.0056464	9.47	0.000	.0424302	.064564
200907	.0298399	.0039001	7.65	0.000	.0221958	.0374841
200908	.0429409	.0043649	9.84	0.000	.0343858	.051496
200909	.0477046	.0041061	11.62	0.000	.0396567	.0557524
200910	.00563	.0071364	0.79	0.430	-.0083572	.0196172
200911	.0270916	.0380029	0.71	0.476	-.0473935	.1015768
200912	.0170189	.0518425	0.33	0.743	-.0845916	.1186294
201001	.1057407	.3903012	0.27	0.786	-.6592437	.8707252
201002	-.0221871	.3923994	-0.06	0.955	-.791284	.7469098
201003	.0927939	.113032	0.82	0.412	-.1287471	.3143349
201004	-.0275741	.0104433	-2.64	0.008	-.0480428	-.0071053
201005	.0082126	.0071247	1.15	0.249	-.0057517	.0221769
201006	.0409079	.002352	17.39	0.000	.036298	.0455179
201007	.0497954	.0028967	17.19	0.000	.044118	.0554729
201008	-.0074398	.0034928	-2.13	0.033	-.0142857	-.0005939
201009	.0436344	.0014817	29.45	0.000	.0407304	.0465384
201010	.0316466	.0022343	14.16	0.000	.0272674	.0360257
201011	.0067919	.0352094	0.19	0.847	-.0622179	.0758017
201012	-.0970938	.0964091	-1.01	0.314	-.2860541	.0918665
tme						
200902	-4.071038	1.392666	-2.92	0.003	-6.800643	-1.341434
200903	-4.393015	1.349866	-3.25	0.001	-7.038732	-1.747298
200904	.8823986	1.849057	0.48	0.633	-2.741725	4.506522
200905	-3.432015	1.298081	-2.64	0.008	-5.976234	-.8877948
200906	-8.964754	1.868164	-4.80	0.000	-12.62633	-5.303181
200907	-.64439	1.663164	-0.39	0.698	-3.904167	2.615387
200908	-2.391369	1.653053	-1.45	0.148	-5.631328	.8485903
200909	-4.125929	1.820139	-2.27	0.023	-7.693374	-.5584825
200910	-.9116098	1.524373	-0.60	0.550	-3.899359	2.076139
200911	-.8656398	1.610779	-0.54	0.591	-4.022743	2.291463
200912	-3.948022	1.272807	-3.10	0.002	-6.442705	-1.453339
201001	-1.758141	1.984534	-0.89	0.376	-5.647799	2.131516
201002	.4918474	2.067609	0.24	0.812	-3.560635	4.54433
201003	-3.432397	1.240183	-2.77	0.006	-5.863137	-1.001658
201004	-1.210685	1.718312	-0.70	0.481	-4.578552	2.157181
201005	-1.817971	1.604065	-1.13	0.257	-4.961915	1.325973
201006	-4.862142	1.327505	-3.66	0.000	-7.464031	-2.260253
201007	-4.347535	1.598879	-2.72	0.007	-7.481314	-1.213756
201008	18.34985	1.836457	9.99	0.000	14.75042	21.94928
201009	-3.378956	1.233512	-2.74	0.006	-5.796621	-.9612916
201010	-3.231728	1.195207	-2.70	0.007	-5.574315	-.8891412
201011	-2.956951	1.235847	-2.39	0.017	-5.379193	-.5347083
201012	-3.519991	1.262278	-2.79	0.005	-5.994037	-1.045945
201101	.5151645	1.942975	0.27	0.791	-3.293037	4.323366
201102	-1.154074	1.407107	-0.82	0.412	-3.911983	1.603834

daily use >=20 but <30 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.1021523	.1022921	-1.00	0.318	-.3026428	.0983382
tme#c.hdd						
200901	.0069238	.0013249	5.23	0.000	.004327	.0095205
200902	.0097447	.0008965	10.87	0.000	.0079875	.0115019
200903	.0092383	.0011152	8.28	0.000	.0070525	.0114241
200904	-.0028713	.0037916	-0.76	0.449	-.0103029	.0045602
200905	.0071807	.0018079	3.97	0.000	.0036372	.0107241
200906	-.0193554	.0105223	-1.84	0.066	-.0399788	.0012681
200907	-.0363033	.0262765	-1.38	0.167	-.0878048	.0151982
200908	-.1115814	.0337685	-3.30	0.001	-.177767	-.0453958
200909	-.1739674	.0264003	-6.59	0.000	-.2257114	-.1222233
200910	.0016069	.0034135	0.47	0.638	-.0050835	.0082972

200911	.0059709	.0034138	1.75	0.080	-.0007201	.012662
200912	.0112916	.0009501	11.88	0.000	.0094294	.0131538
201001	.0021988	.0017541	1.25	0.210	-.0012392	.0056369
201002	.0040706	.0021059	1.93	0.053	-.0000569	.0081981
201003	.0076336	.0006127	12.46	0.000	.0064327	.0088346
201004	.0052847	.0031349	1.69	0.092	-.0008596	.011429
201005	-.0045441	.004534	-1.00	0.316	-.0134306	.0043423
201006	.0184834	.0073032	2.53	0.011	.0041693	.0327975
201007	.0583299	.0150602	3.87	0.000	.0288123	.0878476
201008	.0221064	.016064	1.38	0.169	-.0093788	.0535916
201009	.0184185	.0012364	14.90	0.000	.0159952	.0208418
201010	.0036897	.0012895	2.86	0.004	.0011623	.006217
201011	.003425	.0010994	3.12	0.002	.0012702	.0055798
201012	.008798	.0006819	12.90	0.000	.0074614	.0101346
201101	.0009949	.0015855	0.63	0.530	-.0021126	.0041025
201102	.005403	.000906	5.96	0.000	.0036272	.0071787
tme#c.cdd						
200901	.0243901	.0097211	2.51	0.012	.0053369	.0434434
200902	.0432409	.0090158	4.80	0.000	.0255701	.0609117
200903	.0285064	.008458	3.37	0.001	.0119289	.0450839
200904	-.0041429	.0090122	-0.46	0.646	-.0218065	.0135208
200905	.0304166	.007136	4.26	0.000	.0164302	.0444029
200906	.0513945	.0070464	7.29	0.000	.0375837	.0652053
200907	.0513625	.0050125	10.25	0.000	.0415382	.0611869
200908	.0485744	.0057081	8.51	0.000	.0373866	.0597621
200909	.0655555	.0053307	12.30	0.000	.0551075	.0760036
200910	.0297514	.0088964	3.34	0.001	.0123147	.0471881
200911	.0064796	.0506239	0.13	0.898	-.0927422	.1057015
200912	.1170888	.0704731	1.66	0.097	-.0210372	.2552147
201001	4.132828	1.984161	2.08	0.037	.2439124	8.021743
201002	.8227588	.6888241	1.19	0.232	-.5273225	2.17284
201003	.2698708	.1847461	1.46	0.144	-.0922278	.6319694
201004	-.0199899	.014485	-1.38	0.168	-.0483803	.0084004
201005	.0282381	.0096686	2.92	0.003	.0092878	.0471885
201006	.0822494	.0042315	19.44	0.000	.0739557	.0905432
201007	.0550949	.0035272	15.62	0.000	.0481816	.0620083
201008	-.0024093	.0047076	-0.51	0.609	-.0116361	.0068174
201009	.0710128	.0019037	37.30	0.000	.0672815	.0747441
201010	.0535441	.0030139	17.77	0.000	.0476369	.0594513
201011	.000034	.0448537	0.00	0.999	-.0878784	.0879464
201012	-.1729382	.1198035	-1.44	0.149	-.4077507	.0618744
tme						
200902	-3.905699	1.808757	-2.16	0.031	-7.450826	-.3605712
200903	-4.347151	1.747197	-2.49	0.013	-7.771622	-.9226794
200904	1.034193	2.368569	0.44	0.662	-3.608154	5.67654
200905	-4.183963	1.677433	-2.49	0.013	-7.471698	-.8962287
200906	-2.543687	2.360903	-1.08	0.281	-7.171009	2.083635
200907	.8216413	2.14119	0.38	0.701	-3.375049	5.018331
200908	3.00648	2.145546	1.40	0.161	-1.198746	7.211706
200909	1.488362	2.343312	0.64	0.525	-3.104482	6.081206
200910	-.6223422	1.937884	-0.32	0.748	-4.420555	3.17587
200911	-2.470556	2.048983	-1.21	0.228	-6.486521	1.54541
200912	-5.576168	1.663205	-3.35	0.001	-8.836017	-2.31632
201001	4.786289	2.612972	1.83	0.067	-.3350834	9.907662
201002	1.854577	2.6487	0.70	0.484	-3.33682	7.045975
201003	-3.052221	1.607191	-1.90	0.058	-6.202282	.0978403
201004	-1.92493	2.302555	-0.84	0.403	-6.437891	2.588031
201005	-1.96286	2.118385	-0.93	0.354	-6.114852	2.189132
201006	-11.00184	1.960949	-5.61	0.000	-14.84526	-7.158422
201007	.8478202	1.904988	0.45	0.656	-2.885918	4.581558
201008	25.83194	2.441641	10.58	0.000	21.04637	30.6175
201009	-3.377608	1.594407	-2.12	0.034	-6.502613	-.2526025
201010	-2.129321	1.554482	-1.37	0.171	-5.176074	.9174316

201011	-2.119549	1.602801	-1.32	0.186	-5.261007	1.021909
201012	-4.471515	1.640158	-2.73	0.006	-7.686191	-1.256839
201101	5.419075	2.534543	2.14	0.033	.4514218	10.38673
201102	-.4800925	1.820436	-0.26	0.792	-4.04811	3.087925

daily use >=30 but <40 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.147533	.1588607	-0.93	0.353	-.458897	.163831
tme#c.hdd						
200901	.0076927	.0021302	3.61	0.000	.0035176	.0118678
200902	.0201281	.0014252	14.12	0.000	.0173348	.0229215
200903	.0160353	.0017875	8.97	0.000	.0125318	.0195389
200904	.0025023	.005971	0.42	0.675	-.0092008	.0142054
200905	.0084489	.0028596	2.95	0.003	.0028442	.0140536
200906	-.0667249	.0167422	-3.99	0.000	-.0995393	-.0339106
200907	-.0413668	.0403031	-1.03	0.305	-.12036	.0376264
200908	-.1151847	.0533326	-2.16	0.031	-.2197156	-.0106538
200909	-.1589163	.0401591	-3.96	0.000	-.2376273	-.0802053
200910	-.001421	.0053862	-0.26	0.792	-.0119779	.0091359
200911	.0034295	.0055965	0.61	0.540	-.0075395	.0143985
200912	.0165352	.001483	11.15	0.000	.0136286	.0194419
201001	.0111128	.0027405	4.06	0.000	.0057414	.0164841
201002	.0110812	.0032953	3.36	0.001	.0046224	.0175401
201003	.0145373	.0009462	15.36	0.000	.0126828	.0163919
201004	.0144634	.00475	3.04	0.002	.0051535	.0237733
201005	-.0078235	.0071547	-1.09	0.274	-.0218466	.0061997
201006	-.0356739	.0075773	-4.71	0.000	-.0505252	-.0208226
201007	-.408708	.1601655	-2.55	0.011	-.7226294	-.0947866
201008	-1.114197	.2803645	-3.97	0.000	-1.663706	-.5646878
201009	.028499	.0022744	12.53	0.000	.0240413	.0329567
201010	.0070856	.0023645	3.00	0.003	.0024511	.01172
201011	.0056466	.0017103	3.30	0.001	.0022945	.0089986
201012	.0146716	.001064	13.79	0.000	.0125861	.0167571
201101	.0123206	.0023558	5.23	0.000	.0077033	.016938
201102	.0112019	.0013827	8.10	0.000	.0084918	.013912
tme#c.cdd						
200901	.0139649	.0202424	0.69	0.490	-.0257098	.0536397
200902	.0924779	.0190445	4.86	0.000	.0551509	.1298048
200903	.0373956	.0173719	2.15	0.031	.0033469	.0714443
200904	-.002908	.0149076	-0.20	0.845	-.0321266	.0263107
200905	.0232037	.0113273	2.05	0.041	.0010024	.045405
200906	.0361714	.0112142	3.23	0.001	.0141917	.0581512
200907	.066254	.0076473	8.66	0.000	.0512653	.0812426
200908	.0661979	.0086548	7.65	0.000	.0492347	.083161
200909	.0734157	.0082118	8.94	0.000	.0573206	.0895107
200910	.0263758	.0139002	1.90	0.058	-.0008683	.05362
200911	.0211955	.0807107	0.26	0.793	-.136996	.179387
200912	.0579454	.1104837	0.52	0.600	-.1586005	.2744913
201001	1.375737	1.975487	0.70	0.486	-2.496181	5.247655
201002	1.560899	1.987165	0.79	0.432	-2.333906	5.455705
201003	.5687452	.5034594	1.13	0.259	-.4180258	1.555516
201004	-.0067533	.022368	-0.30	0.763	-.0505941	.0370874
201005	.0245006	.0151941	1.61	0.107	-.0052795	.0542807
201006	.0672872	.0047677	14.11	0.000	.0579426	.0766318
201007	.0523158	.0071586	7.31	0.000	.0382851	.0663465
201008	-.0540359	.0062536	-8.64	0.000	-.0662929	-.0417789
201009	.0872134	.003019	28.89	0.000	.0812963	.0931305
201010	.0699472	.0048899	14.30	0.000	.060363	.0795314
201011	-.014064	.069098	-0.20	0.839	-.1494949	.1213668
201012	-.5649112	.1777021	-3.18	0.001	-.9132039	-.2166184
tme						

200902	-14.14786	2.909643	-4.86	0.000	-19.85071	-8.445013
200903	-11.17509	2.819825	-3.96	0.000	-16.70189	-5.648283
200904	-5.885255	3.770008	-1.56	0.119	-13.2744	1.50389
200905	-9.086813	2.687802	-3.38	0.001	-14.35486	-3.818772
200906	-.7483079	3.775904	-0.20	0.843	-8.14901	6.652394
200907	-5.294634	3.353934	-1.58	0.114	-11.86828	1.279013
200908	-3.413412	3.348146	-1.02	0.308	-9.975716	3.148892
200909	-3.726978	3.662446	-1.02	0.309	-10.9053	3.451349
200910	-4.760227	3.085082	-1.54	0.123	-10.80693	1.286476
200911	-6.308182	3.310286	-1.91	0.057	-12.79628	.1799167
200912	-12.14633	2.650238	-4.58	0.000	-17.34074	-6.95191
201001	-5.318619	4.123062	-1.29	0.197	-13.39974	2.762506
201002	-4.944945	4.173174	-1.18	0.236	-13.12429	3.234398
201003	-10.57763	2.574528	-4.11	0.000	-15.62366	-5.531605
201004	-10.95185	3.586951	-3.05	0.002	-17.98221	-3.921496
201005	-6.569821	3.377383	-1.95	0.052	-13.18943	.0497867
201006	-8.219662	2.74408	-3.00	0.003	-13.59801	-2.841317
201007	2.112813	3.900539	0.54	0.588	-5.532172	9.757797
201008	45.18117	3.510334	12.87	0.000	38.30098	52.06136
201009	-10.65297	2.56116	-4.16	0.000	-15.67279	-5.63314
201010	-8.888349	2.50909	-3.54	0.000	-13.80612	-3.97058
201011	-8.255589	2.554465	-3.23	0.001	-13.26229	-3.248885
201012	-11.85888	2.617965	-4.53	0.000	-16.99004	-6.727715
201101	-8.651475	3.888099	-2.23	0.026	-16.27208	-1.030874
201102	-6.765086	2.890109	-2.34	0.019	-12.42965	-1.100526

daily use >=40 but <50 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.127578	.2435258	-0.52	0.600	-.6048853	.3497293
tme#c.hdd						
200901	.0185523	.0033566	5.53	0.000	.0119733	.0251312
200902	.0357923	.0021765	16.45	0.000	.0315265	.0400581
200903	.0336483	.0028064	11.99	0.000	.0281477	.0391488
200904	.0039212	.0091653	0.43	0.669	-.0140427	.0218851
200905	.015558	.0044619	3.49	0.000	.0068127	.0243034
200906	-.0313595	.0252001	-1.24	0.213	-.0807513	.0180323
200907	-.1457333	.0601011	-2.42	0.015	-.2635307	-.0279359
200908	-.3204807	.0827766	-3.87	0.000	-.4827217	-.1582397
200909	-.3027006	.0608151	-4.98	0.000	-.4218975	-.1835038
200910	.0098707	.0091017	1.08	0.278	-.0079685	.0277098
200911	.0154596	.0084233	1.84	0.066	-.00105	.0319692
200912	.029398	.0022695	12.95	0.000	.0249499	.0338462
201001	.0213058	.0042748	4.98	0.000	.0129273	.0296843
201002	.0207789	.0048263	4.31	0.000	.0113194	.0302385
201003	.0325873	.0014399	22.63	0.000	.0297652	.0354095
201004	.0115779	.0071062	1.63	0.103	-.0023501	.0255059
201005	.0000595	.0108271	0.01	0.996	-.0211614	.0212804
201006	-.0116203	.0128995	-0.90	0.368	-.0369032	.0136626
201007	-1.227732	.242536	-5.06	0.000	-1.703099	-.7523647
201008	-.3067698	.1634751	-1.88	0.061	-.6271788	.0136392
201009	.030922	.0043274	7.15	0.000	.0224403	.0394038
201010	.0075621	.0044644	1.69	0.090	-.0011881	.0163124
201011	.012714	.0026878	4.73	0.000	.0074458	.0179821
201012	.0264202	.0016046	16.47	0.000	.0232752	.0295652
201101	.0254872	.0036035	7.07	0.000	.0184244	.0325499
201102	.0331129	.0020774	15.94	0.000	.0290412	.0371846
tme#c.cdd						
200901	-.0024207	.0455939	-0.05	0.958	-.091784	.0869426
200902	.1174682	.0345324	3.40	0.001	.0497852	.1851512
200903	.0039174	.0313189	0.13	0.900	-.0574672	.0653021
200904	-.0210103	.0233278	-0.90	0.368	-.0667325	.0247119

200905	.0196248	.0192798	1.02	0.309	-.0181634	.057413
200906	.0646653	.01711	3.78	0.000	.0311299	.0982008
200907	.0559819	.0115682	4.84	0.000	.0333084	.0786554
200908	.0568613	.0129465	4.39	0.000	.0314864	.0822363
200909	.0512831	.0125788	4.08	0.000	.0266288	.0759373
200910	.038773	.0231037	1.68	0.093	-.0065098	.0840559
200911	.1779195	.1225747	1.45	0.147	-.0623252	.4181642
200912	.0888702	.1673125	0.53	0.595	-.2390599	.4168004
201003	1.09806	.5946768	1.85	0.065	-.067498	2.263619
201004	-.1081169	.0339176	-3.19	0.001	-.1745949	-.0416389
201005	.0475058	.0234643	2.02	0.043	.0015161	.0934955
201006	.0885804	.0080242	11.04	0.000	.0728529	.1043078
201007	.0492553	.0111273	4.43	0.000	.0274459	.0710648
201008	-.0347803	.0097141	-3.58	0.000	-.0538197	-.0157409
201009	.0815495	.0045584	17.89	0.000	.072615	.090484
201010	.0650831	.0082903	7.85	0.000	.0488341	.0813321
201011	-.0085895	.1009977	-0.09	0.932	-.2065436	.1893646
201012	-.4697485	.260106	-1.81	0.071	-.9795526	.0400556
tme						
200902	-17.0097	4.559742	-3.73	0.000	-25.94673	-8.072663
200903	-15.02247	4.447274	-3.38	0.001	-23.73906	-6.305872
200904	-2.497928	5.865055	-0.43	0.670	-13.99336	8.9975
200905	-8.620371	4.261104	-2.02	0.043	-16.97208	-.2686659
200906	-6.419952	5.820968	-1.10	0.270	-17.82897	4.989065
200907	.0831626	5.181444	0.02	0.987	-10.0724	10.23872
200908	3.344436	5.150498	0.65	0.516	-6.75047	13.43934
200909	6.221042	5.676179	1.10	0.273	-4.904192	17.34628
200910	-6.612631	4.973988	-1.33	0.184	-16.36158	3.136317
200911	-9.793406	5.120691	-1.91	0.056	-19.82989	.243079
200912	-16.0114	4.138361	-3.87	0.000	-24.12253	-7.90027
201001	-4.797608	6.464002	-0.74	0.458	-17.46696	7.871748
201002	-1.406308	6.233244	-0.23	0.822	-13.62338	10.81076
201003	-15.77753	4.045057	-3.90	0.000	-23.70579	-7.849277
201004	-2.514194	5.513865	-0.46	0.648	-13.32129	8.292906
201005	-8.360584	5.232288	-1.60	0.110	-18.6158	1.894629
201006	-13.22667	4.404768	-3.00	0.003	-21.85995	-4.593381
201007	8.598958	6.077239	1.41	0.157	-3.312347	20.51026
201008	38.42568	5.497735	6.99	0.000	27.6502	49.20117
201009	-8.44402	4.01762	-2.10	0.036	-16.3185	-.5695397
201010	-8.299261	4.001192	-2.07	0.038	-16.14154	-.4569794
201011	-9.614831	3.992705	-2.41	0.016	-17.44048	-1.789185
201012	-16.49122	4.078834	-4.04	0.000	-24.48567	-8.496759
201101	-12.79098	6.030111	-2.12	0.034	-24.60992	-.9720493
201102	-18.06889	4.500285	-4.02	0.000	-26.88939	-9.248393

daily use >=50 but <60 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-1.060065	.3392042	-3.13	0.002	-1.724903	-.3952273
tme#c.hdd						
200901	.0339115	.0047772	7.10	0.000	.0245482	.0432748
200902	.0554405	.0030863	17.96	0.000	.0493913	.0614897
200903	.0563419	.0038642	14.58	0.000	.0487681	.0639158
200904	-.0201123	.0132609	-1.52	0.129	-.0461035	.0058789
200905	.0363377	.0059438	6.11	0.000	.0246879	.0479876
200906	-.0257532	.0351068	-0.73	0.463	-.0945623	.0430559
200907	.1732911	.0819454	2.11	0.034	.0126786	.3339035
200908	-.4475658	.1132399	-3.95	0.000	-.6695153	-.2256162
200909	-.3140371	.0834117	-3.76	0.000	-.4775235	-.1505507
200910	.0459473	.0128877	3.57	0.000	.0206875	.0712071
200911	-.0806565	.0124875	-6.46	0.000	-.1051318	-.0561811
200912	.045882	.0031504	14.56	0.000	.0397071	.0520568

201001	.0391574	.0059639	6.57	0.000	.0274682	.0508467
201002	.0746738	.0069453	10.75	0.000	.0610612	.0882865
201003	.049131	.0019697	24.94	0.000	.0452704	.0529916
201004	.0051219	.0100123	0.51	0.609	-.0145022	.0247459
201005	.0137485	.0140416	0.98	0.328	-.013773	.0412699
201006	.0367801	.017767	2.07	0.038	.0019568	.0716034
201007	.0637403	.0237978	2.68	0.007	.0170968	.1103837
201008	.0074933	.0174901	0.43	0.668	-.0267871	.0417737
201009	.0325635	.0060058	5.42	0.000	.0207921	.0443349
201010	.0149791	.0064661	2.32	0.021	.0023055	.0276527
201011	.0225502	.0036816	6.13	0.000	.0153343	.0297662
201012	.0408859	.0021884	18.68	0.000	.0365967	.0451751
201101	.0313939	.004912	6.39	0.000	.0217663	.0410214
201102	.0460747	.0028672	16.07	0.000	.0404551	.0516944
tme#c.cdd						
200901	.1574382	.0636545	2.47	0.013	.0326758	.2822007
200902	.2818231	.0527024	5.35	0.000	.1785268	.3851195
200903	.1182566	.0453228	2.61	0.009	.0294242	.2070889
200904	-.0462027	.0322917	-1.43	0.152	-.1094943	.0170888
200905	.0855387	.025226	3.39	0.001	.0360959	.1349816
200906	.0764217	.0237805	3.21	0.001	.0298121	.1230314
200907	.0562928	.0159078	3.54	0.000	.0251137	.087472
200908	.0646247	.0179755	3.60	0.000	.0293928	.0998566
200909	.0310832	.0173761	1.79	0.074	-.0029738	.0651402
200910	.1109364	.0323173	3.43	0.001	.0475946	.1742781
200911	.2108431	.1687477	1.25	0.212	-.1199012	.5415875
200912	.0139954	.2287871	0.06	0.951	-.4344259	.4624167
201003	2.076962	.8233334	2.52	0.012	.463234	3.690691
201004	-.2101985	.0482261	-4.36	0.000	-.3047214	-.1156757
201005	.1039486	.0308788	3.37	0.001	.0434264	.1644708
201006	.1163775	.0114035	10.21	0.000	.0940268	.1387283
201007	.0837088	.0115937	7.22	0.000	.0609851	.1064325
201008	-.1822118	.0112457	-16.20	0.000	-.2042532	-.1601703
201009	.0733169	.0063124	11.61	0.000	.0609446	.0856892
201010	.0604568	.0119284	5.07	0.000	.0370772	.0838365
201011	.0261977	.1355857	0.19	0.847	-.2395493	.2919448
201012	-.90174	.334747	-2.69	0.007	-1.557842	-.2456379
tme						
200902	-17.889	6.500871	-2.75	0.006	-30.63067	-5.147335
200903	-19.77195	6.298003	-3.14	0.002	-32.116	-7.427908
200904	14.78273	8.397439	1.76	0.078	-1.676196	31.24166
200905	-14.05183	5.963942	-2.36	0.018	-25.74112	-2.362546
200906	-7.193802	8.168463	-0.88	0.378	-23.20394	8.816335
200907	-3.708245	7.245364	-0.51	0.609	-17.90911	10.49262
200908	4.773592	7.216639	0.66	0.508	-9.370975	18.91816
200909	11.74118	7.938153	1.48	0.139	-3.817547	27.29991
200910	-16.6632	7.030534	-2.37	0.018	-30.443	-2.883394
200911	34.88231	7.348122	4.75	0.000	20.48004	49.28458
200912	-18.70127	5.844207	-3.20	0.001	-30.15588	-7.246666
201001	-7.189306	9.071113	-0.79	0.428	-24.96863	10.59002
201002	-37.62821	8.911521	-4.22	0.000	-55.09474	-20.16168
201003	-15.01384	5.73353	-2.62	0.009	-26.25152	-3.776155
201004	9.424238	7.830927	1.20	0.229	-5.924329	24.77281
201005	-11.97739	7.12975	-1.68	0.093	-25.95166	1.99687
201006	-20.34867	6.23228	-3.27	0.001	-32.56389	-8.133436
201007	-9.896662	6.518737	-1.52	0.129	-22.67335	2.880023
201008	98.40644	7.095881	13.87	0.000	84.49856	112.3143
201009	-5.556075	5.693301	-0.98	0.329	-16.71491	5.602759
201010	-7.674509	5.693144	-1.35	0.178	-18.83304	3.484016
201011	-10.58005	5.622952	-1.88	0.060	-21.601	.4409044
201012	-18.26025	5.7456	-3.18	0.001	-29.52159	-6.998905
201101	-.9313857	8.397416	-0.11	0.912	-17.39027	15.5275
201102	-12.69054	6.373219	-1.99	0.046	-25.182	-.1990676

daily use >=60 but <70 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.6743034	.4079416	-1.65	0.098	-1.473871	.1252638
tme#c.hdd						
200901	.050692	.0058661	8.64	0.000	.0391945	.0621895
200902	.0705968	.0038141	18.51	0.000	.0631211	.0780725
200903	.0710278	.0050276	14.13	0.000	.0611737	.0808819
200904	-.0141059	.0158689	-0.89	0.374	-.045209	.0169971
200905	.034092	.0075481	4.52	0.000	.0192977	.0488862
200906	.0147246	.0446776	0.33	0.742	-.0728436	.1022929
200907	.0971316	.1029937	0.94	0.346	-.1047364	.2989996
200908	-.1947332	.1379823	-1.41	0.158	-.4651791	.0757127
200909	-.228369	.1005074	-2.27	0.023	-.4253639	-.031374
200910	.059192	.0177504	3.33	0.001	.0244011	.0939828
200911	.0201952	.0168559	1.20	0.231	-.0128424	.0532329
200912	.0588511	.0038917	15.12	0.000	.0512233	.0664789
201001	.0430965	.0073593	5.86	0.000	.0286721	.0575208
201002	.103826	.0085259	12.18	0.000	.0871151	.1205369
201003	.0618665	.0024559	25.19	0.000	.057053	.06668
201004	.0156722	.0121606	1.29	0.197	-.0081626	.039507
201005	.0117301	.0187868	0.62	0.532	-.0250921	.0485523
201006	.0154734	.0292484	0.53	0.597	-.0418535	.0728004
201007	-.3756429	.416202	-0.90	0.367	-1.1914	.4401147
201008	-.0521178	.6967788	-0.07	0.940	-1.417807	1.313571
201009	.030328	.0077555	3.91	0.000	.0151273	.0455288
201010	.0024935	.0081734	0.31	0.760	-.0135264	.0185134
201011	.0315859	.0046997	6.72	0.000	.0223744	.0407973
201012	.0583332	.0026994	21.61	0.000	.0530424	.0636241
201101	.0103734	.0059623	1.74	0.082	-.0013127	.0220596
201102	.0551488	.0035502	15.53	0.000	.0481903	.0621073
tme#c.cdd						
200901	.0214836	.1823632	0.12	0.906	-.335949	.3789162
200902	.2766123	.0737848	3.75	0.000	.1319937	.4212308
200903	.0154988	.0762465	0.20	0.839	-.1339447	.1649423
200904	-.053598	.0413066	-1.30	0.194	-.134559	.027363
200905	.0003432	.0330945	0.01	0.992	-.0645222	.0652086
200906	.0976878	.030205	3.23	0.001	.0384859	.1568897
200907	.0615812	.0196258	3.14	0.002	.0231145	.1000479
200908	.0543832	.0218605	2.49	0.013	.0115365	.0972299
200909	.0720685	.0210631	3.42	0.001	.0307847	.1133523
200910	.1401586	.044117	3.18	0.001	.0536891	.2266281
200911	.2499571	.2106777	1.19	0.235	-.162972	.6628862
200912	.0110558	.2798992	0.04	0.968	-.5375477	.5596593
201004	-.2620825	.0585867	-4.47	0.000	-.3769128	-.1472523
201005	.0438619	.040106	1.09	0.274	-.034746	.1224699
201006	.095863	.0168956	5.67	0.000	.0627476	.1289784
201007	.0552836	.0186208	2.97	0.003	.0187867	.0917805
201008	-.056803	.0154169	-3.68	0.000	-.0870201	-.0265858
201009	.0922818	.0078455	11.76	0.000	.0769047	.1076589
201010	.0610454	.0150044	4.07	0.000	.0316368	.090454
201011	.1422997	.1665776	0.85	0.393	-.1841931	.4687925
201012	-1.720729	.4093098	-4.20	0.000	-2.522978	-.9184804
tme						
200902	-13.26549	8.014547	-1.66	0.098	-28.97403	2.443054
200903	-16.6481	7.91629	-2.10	0.035	-32.16407	-1.132144
200904	19.30191	10.18483	1.90	0.058	-.6604091	39.26422
200905	-3.81349	7.423775	-0.51	0.607	-18.36412	10.73714
200906	-10.15803	10.25612	-0.99	0.322	-30.26006	9.944008
200907	-1.104078	9.005213	-0.12	0.902	-18.75433	16.54618
200908	5.881748	8.847631	0.66	0.506	-11.45965	23.22314

200909	3.574716	9.685173	0.37	0.712	-15.40826	22.5577
200910	-17.79033	9.094079	-1.96	0.050	-35.61476	.0341035
200911	-2.587197	9.504988	-0.27	0.785	-21.21701	16.04262
200912	-19.33531	7.220936	-2.68	0.007	-33.48838	-5.182246
201001	6.300443	11.20635	0.56	0.574	-15.66405	28.26493
201002	-48.1636	10.98761	-4.38	0.000	-69.69935	-26.62785
201003	-11.69251	7.08716	-1.65	0.099	-25.58337	2.198352
201004	12.56505	9.573825	1.31	0.189	-6.199686	31.32979
201005	-4.909698	9.107881	-0.54	0.590	-22.76118	12.94179
201006	-12.18494	8.329332	-1.46	0.144	-28.51047	4.140582
201007	4.677126	10.3894	0.45	0.653	-15.68613	25.04039
201008	49.09365	9.141459	5.37	0.000	31.17635	67.01095
201009	-8.103282	7.03355	-1.15	0.249	-21.88907	5.682504
201010	-3.263464	7.058946	-0.46	0.644	-17.09903	10.5721
201011	-10.4523	6.951944	-1.50	0.133	-24.07814	3.173533
201012	-22.57713	7.109014	-3.18	0.001	-36.51083	-8.643433
201101	43.21841	10.27407	4.21	0.000	23.08118	63.35563
201102	-5.03063	7.877714	-0.64	0.523	-20.47098	10.40972

daily use >=70 but <80 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.8262222	.5365381	-1.54	0.124	-1.877848	.2254032
tme#c.hdd						
200901	.0684709	.0078834	8.69	0.000	.0530193	.0839225
200902	.07728	.0051859	14.90	0.000	.0671156	.0874445
200903	.0793945	.0070049	11.33	0.000	.0656647	.0931244
200904	-.0033097	.0193399	-0.17	0.864	-.0412163	.034597
200905	.0586185	.0099888	5.87	0.000	.0390402	.0781968
200906	-.0712753	.0555741	-1.28	0.200	-.1802017	.037651
200907	.1061345	.1359056	0.78	0.435	-.1602432	.3725122
200908	-.6658965	.1784075	-3.73	0.000	-1.015579	-.3162143
200909	-.354641	.1308306	-2.71	0.007	-.6110716	-.0982104
200910	.1083489	.0231325	4.68	0.000	.0630088	.153689
200911	.0333963	.0210605	1.59	0.113	-.0078827	.0746753
200912	.0732491	.0050078	14.63	0.000	.0634338	.0830644
201001	.0327537	.0096752	3.39	0.001	.0137902	.0517172
201002	.1559792	.0107447	14.52	0.000	.1349194	.1770391
201003	.0729188	.0032638	22.34	0.000	.0665216	.079316
201004	.0078796	.0171983	0.46	0.647	-.0258294	.0415886
201005	.0298851	.0259745	1.15	0.250	-.0210254	.0807955
201006	.070382	.0397286	1.77	0.076	-.0074868	.1482508
201007	-.7282209	.5390732	-1.35	0.177	-1.784815	.3283733
201008	-1.461122	1.029018	-1.42	0.156	-3.478018	.5557749
201009	.0437385	.0113085	3.87	0.000	.0215736	.0659033
201010	.0088522	.0103664	0.85	0.393	-.0114661	.0291705
201011	.0394827	.006045	6.53	0.000	.0276344	.0513311
201012	.0671637	.0035393	18.98	0.000	.0602266	.0741008
201101	.0055305	.0079517	0.70	0.487	-.010055	.021116
201102	.0620604	.0047478	13.07	0.000	.0527547	.0713661
tme#c.cdd						
200901	.2264483	.1624254	1.39	0.163	-.0919088	.5448053
200902	.2199562	.1581608	1.39	0.164	-.0900421	.5299546
200903	.118463	.1067193	1.11	0.267	-.0907089	.3276349
200904	-.0465213	.0552042	-0.84	0.399	-.1547227	.06168
200905	.1084793	.0430501	2.52	0.012	.0241002	.1928583
200906	.0451018	.037209	1.21	0.225	-.0278286	.1180322
200907	.0543612	.025631	2.12	0.034	.004124	.1045985
200908	.0224376	.0282519	0.79	0.427	-.0329366	.0778118
200909	.0539959	.0276574	1.95	0.051	-.0002131	.108205
200910	.2496176	.0576566	4.33	0.000	.1366095	.3626256
200911	.4227199	.297955	1.42	0.156	-.1612778	1.006718

200912	-.0331841	.3936519	-0.08	0.933	-.8047496	.7383815
201004	-.334999	.0859219	-3.90	0.000	-.5034076	-.1665905
201005	.1097998	.0562719	1.95	0.051	-.0004942	.2200938
201006	.1351399	.0227829	5.93	0.000	.090485	.1797949
201007	.0564674	.0242304	2.33	0.020	.0089754	.1039595
201008	-.0529738	.0228698	-2.32	0.021	-.0977989	-.0081486
201009	.1016697	.0103821	9.79	0.000	.0813206	.1220188
201010	.0656487	.0194857	3.37	0.001	.0274564	.1038411
201011	.0516744	.2161376	0.24	0.811	-.3719595	.4753083
201012	-1.892563	.5345907	-3.54	0.000	-2.940372	-.8447551
tme						
200902	2.243933	10.80919	0.21	0.836	-18.9423	23.43017
200903	-7.424959	10.79187	-0.69	0.491	-28.57724	13.72732
200904	25.57555	12.96479	1.97	0.049	.1643059	50.9868
200905	-6.605655	9.927336	-0.67	0.506	-26.06343	12.85212
200906	14.42309	13.13707	1.10	0.272	-11.32584	40.17201
200907	11.38389	11.90136	0.96	0.339	-11.94302	34.7108
200908	31.05056	11.67906	2.66	0.008	8.159374	53.94175
200909	21.04746	12.8095	1.64	0.100	-4.059418	46.15434
200910	-24.88081	12.02779	-2.07	0.039	-48.45551	-1.306117
200911	.8434788	12.40482	0.07	0.946	-23.47021	25.15716
200912	-16.30202	9.612905	-1.70	0.090	-35.14351	2.539463
201001	40.77782	14.88954	2.74	0.006	11.59403	69.9616
201002	-80.3477	14.13323	-5.69	0.000	-108.0491	-52.64628
201003	-3.583875	9.503753	-0.38	0.706	-22.21142	15.04367
201004	29.29956	13.3893	2.19	0.029	3.056275	55.54285
201005	-3.296198	12.43173	-0.27	0.791	-27.66264	21.07024
201006	-13.7337	11.17715	-1.23	0.219	-35.64113	8.17373
201007	17.07007	13.69709	1.25	0.213	-9.776505	43.91665
201008	58.99838	12.98673	4.54	0.000	33.54413	84.45263
201009	-.9075262	9.425472	-0.10	0.923	-19.38164	17.56659
201010	4.129092	9.424811	0.44	0.661	-14.34372	22.60191
201011	-4.215059	9.315434	-0.45	0.651	-22.47349	14.04338
201012	-16.49946	9.506359	-1.74	0.083	-35.13211	2.133192
201101	70.52619	13.75558	5.13	0.000	43.56497	97.4874
201102	7.821021	10.56367	0.74	0.459	-12.88399	28.52603

daily use >=80 but <90 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-.9541315	.7775961	-1.23	0.220	-2.47827	.5700068
tme#c.hdd						
200901	.084567	.0117981	7.17	0.000	.0614419	.1076922
200902	.078803	.00761	10.36	0.000	.0638869	.0937192
200903	.0851008	.0093014	9.15	0.000	.0668694	.1033322
200904	-.1488198	.0293863	-5.06	0.000	-.2064188	-.0912208
200905	.0656042	.0146598	4.48	0.000	.0368701	.0943384
200906	-.0426629	.0850642	-0.50	0.616	-.2093941	.1240684
200907	.2437077	.1980269	1.23	0.218	-.1444377	.631853
200908	-.4879962	.2739477	-1.78	0.075	-1.024951	.0489588
200909	-1.21375	.1776564	-6.83	0.000	-1.561968	-.8655323
200910	.1377936	.0341388	4.04	0.000	.0708794	.2047079
200911	.0138163	.0352917	0.39	0.695	-.0553576	.0829903
200912	.0959266	.0076204	12.59	0.000	.0809902	.110863
201001	.0125851	.0141426	0.89	0.374	-.0151353	.0403055
201002	.2031481	.0166785	12.18	0.000	.1704572	.235839
201003	.0783177	.0048926	16.01	0.000	.068728	.0879075
201004	.0144019	.0235664	0.61	0.541	-.0317899	.0605936
201005	-.0056555	.0378632	-0.15	0.881	-.0798698	.0685587
201006	.0158935	.0565428	0.28	0.779	-.094934	.1267209
201007	-.2111686	.708785	-0.30	0.766	-1.600433	1.178096
201008	-2.533391	1.475591	-1.72	0.086	-5.425643	.3588621

201009	.0524962	.0195851	2.68	0.007	.0141081	.0908843
201010	.0039798	.0190035	0.21	0.834	-.0332684	.0412279
201011	.0553449	.0095673	5.78	0.000	.0365924	.0740973
201012	.0817908	.005135	15.93	0.000	.0717259	.0918556
201101	.0073242	.012139	0.60	0.546	-.0164689	.0311173
201102	.0658537	.0072902	9.03	0.000	.0515645	.080143
tme#c.cdd						
200901	.367003	.0996139	3.68	0.000	.1717534	.5622526
200902	.2863662	.1008397	2.84	0.005	.0887139	.4840184
200903	.1096192	.1068283	1.03	0.305	-.0997711	.3190095
200904	-.2786474	.0741166	-3.76	0.000	-.4239208	-.133374
200905	.1375243	.062746	2.19	0.028	.0145381	.2605105
200906	.0628996	.0565404	1.11	0.266	-.0479232	.1737223
200907	.080214	.0373648	2.15	0.032	.0069767	.1534514
200908	.0486281	.042012	1.16	0.247	-.033718	.1309743
200909	-.1061286	.0366999	-2.89	0.004	-.1780628	-.0341944
200910	.3143938	.0846017	3.72	0.000	.148569	.4802186
200911	.582098	.4203497	1.38	0.166	-.2418144	1.40601
200912	.6021013	.5697138	1.06	0.291	-.5145743	1.718777
201004	-.3192213	.1156264	-2.76	0.006	-.5458565	-.092586
201005	.0478891	.0787312	0.61	0.543	-.1064291	.2022073
201006	.1129297	.0329211	3.43	0.001	.0484022	.1774572
201007	.0166665	.0292574	0.57	0.569	-.0406799	.0740129
201008	-.0790145	.0289856	-2.73	0.006	-.1358282	-.0222008
201009	.1026435	.0152788	6.72	0.000	.072696	.132591
201010	.0538258	.0318043	1.69	0.091	-.0085126	.1161643
201011	.2570148	.3155302	0.81	0.415	-.3614445	.8754742
201012	-2.506518	.7849588	-3.19	0.001	-4.045088	-.9679483
tme						
200902	20.18919	16.02479	1.26	0.208	-11.22043	51.5988
200903	4.176629	15.41126	0.27	0.786	-26.03042	34.38368
200904	106.8043	19.51021	5.47	0.000	68.56302	145.0455
200905	-1.511147	14.67262	-0.10	0.918	-30.27043	27.24813
200906	18.11455	19.80633	0.91	0.360	-20.70713	56.93623
200907	12.67033	17.58823	0.72	0.471	-21.80374	47.14439
200908	31.62384	17.35177	1.82	0.068	-2.386748	65.63442
200909	89.16526	17.98984	4.96	0.000	53.90402	124.4265
200910	-25.79867	17.79077	-1.45	0.147	-60.66971	9.072376
200911	17.48299	19.42969	0.90	0.368	-20.60044	55.56643
200912	-22.31492	14.34787	-1.56	0.120	-50.43767	5.807824
201001	85.34219	21.88084	3.90	0.000	42.45434	128.23
201002	-108.875	21.59027	-5.04	0.000	-151.1933	-66.55666
201003	9.28135	14.15035	0.66	0.512	-18.45424	37.01694
201004	35.25703	18.94697	1.86	0.063	-1.880245	72.3943
201005	15.87023	18.22409	0.87	0.384	-19.85015	51.5906
201006	3.058035	16.42405	0.19	0.852	-29.13415	35.25022
201007	38.71859	18.12619	2.14	0.033	3.190095	74.24708
201008	80.29177	17.82786	4.50	0.000	45.34803	115.2355
201009	8.915523	13.99772	0.64	0.524	-18.52091	36.35196
201010	13.92625	14.27761	0.98	0.329	-14.05877	41.91128
201011	-2.599286	13.94664	-0.19	0.852	-29.93559	24.73702
201012	-16.14381	14.01016	-1.15	0.249	-43.60463	11.31701
201101	87.11359	20.75887	4.20	0.000	46.42488	127.8023
201102	23.33655	15.84685	1.47	0.141	-7.724281	54.39739

daily use >=90 kWh

kwhd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
part	-2.298924	1.11875	-2.05	0.040	-4.491726	-.1061226
tme#c.hdd						
200901	.0450476	.017329	2.60	0.009	.0110821	.0790132
200902	.1545176	.0114257	13.52	0.000	.1321227	.1769125

200903	.1389621	.0146665	9.47	0.000	.1102151	.1677092
200904	.0356199	.0450768	0.79	0.429	-.0527327	.1239726
200905	.0534514	.0221443	2.41	0.016	.0100475	.0968554
200906	-1.0427	.1074721	-9.70	0.000	-1.25335	-.8320495
200907	.7017528	.3072436	2.28	0.022	.0995413	1.303964
200908	-1.484474	.3744571	-3.96	0.000	-2.218427	-.7505211
200909	-.1760566	.2794937	-0.63	0.529	-.7238769	.3717637
200910	.07999	.0420909	1.90	0.057	-.0025102	.1624901
200911	.0560051	.041353	1.35	0.176	-.0250486	.1370589
200912	.0885689	.0113528	7.80	0.000	.066317	.1108209
201001	.0324434	.0217353	1.49	0.136	-.0101587	.0750455
201002	.0573268	.0221444	2.59	0.010	.0139227	.1007309
201003	.1361271	.0072608	18.75	0.000	.1218955	.1503587
201004	.0329387	.0361205	0.91	0.362	-.0378591	.1037366
201005	-.0516502	.0571006	-0.90	0.366	-.1635699	.0602696
201006	.1594716	.0906819	1.76	0.079	-.0182691	.3372123
201007	-3.43732	1.002514	-3.43	0.001	-5.402293	-1.472348
201008	-5.006274	2.579219	-1.94	0.052	-10.06166	.0491122
201009	.0301057	.0172404	1.75	0.081	-.0036862	.0638976
201010	.0167959	.0188872	0.89	0.374	-.0202239	.0538157
201011	.0578777	.0137118	4.22	0.000	.031002	.0847533
201012	.0963763	.0080585	11.96	0.000	.0805812	.1121714
201101	.0133027	.0171462	0.78	0.438	-.0203046	.04691
201102	.1015062	.0101756	9.98	0.000	.0815615	.1214509
tme#c.cdd						
200901	-.0270766	.1834036	-0.15	0.883	-.386556	.3324028
200902	.5002435	.2357703	2.12	0.034	.038123	.9623639
200903	.0023316	.1831245	0.01	0.990	-.3566007	.3612638
200904	.0638715	.1174546	0.54	0.587	-.1663449	.2940878
200905	.088108	.0901962	0.98	0.329	-.0886806	.2648965
200906	-.4440747	.0709818	-6.26	0.000	-.5832022	-.3049473
200907	-.0150144	.0557105	-0.27	0.788	-.1242095	.0941806
200908	.2127787	.0630488	3.37	0.001	.0892002	.3363571
200909	-.0768505	.0609984	-1.26	0.208	-.1964101	.0427092
200910	.1354631	.1074161	1.26	0.207	-.0750773	.3460034
200911	.3254266	.6743791	0.48	0.629	-.9963871	1.64724
200912	-1.093375	.9240747	-1.18	0.237	-2.904604	.717853
201003	6.019505	1.916733	3.14	0.002	2.262621	9.776389
201004	-.4287167	.1754319	-2.44	0.015	-.7725711	-.0848622
201005	.0159874	.1220059	0.13	0.896	-.2231497	.2551246
201006	.3384805	.0510512	6.63	0.000	.2384178	.4385433
201007	.2434522	.0420493	5.79	0.000	.1610337	.3258707
201008	-.0097266	.047139	-0.21	0.837	-.1021213	.082668
201009	.0468545	.0234293	2.00	0.046	.000932	.092777
201010	.0510547	.0389454	1.31	0.190	-.02528	.1273895
201011	.1477819	.462001	0.32	0.749	-.7577611	1.053325
201012	-.855651	1.23392	-0.69	0.488	-3.27419	1.562888
tme						
200902	-103.5557	23.77495	-4.36	0.000	-150.1557	-56.95572
200903	-85.18252	23.19917	-3.67	0.000	-130.6539	-39.71109
200904	-44.16128	29.60595	-1.49	0.136	-102.1903	13.86773
200905	-56.12047	21.71466	-2.58	0.010	-98.68219	-13.55875
200906	111.5947	26.96073	4.14	0.000	58.75048	164.439
200907	-24.89658	26.15643	-0.95	0.341	-76.16438	26.37121
200908	-42.17024	25.77449	-1.64	0.102	-92.68941	8.348933
200909	-4.557239	28.15195	-0.16	0.871	-59.73635	50.62187
200910	-64.95493	24.60633	-2.64	0.008	-113.1845	-16.7254
200911	-59.32585	26.21105	-2.26	0.024	-110.7007	-7.950992
200912	-67.36104	21.35191	-3.15	0.002	-109.2117	-25.51034
201001	16.78158	33.2758	0.50	0.614	-48.44049	82.00366
201002	4.646106	29.98528	0.15	0.877	-54.12641	63.41862
201003	-89.54542	20.92695	-4.28	0.000	-130.5632	-48.52765
201004	-26.87792	28.50431	-0.94	0.346	-82.74767	28.99183

201005	-34.35889	27.22976	-1.26	0.207	-87.73045	19.01267
201006	-112.7722	24.89639	-4.53	0.000	-161.5703	-63.97418
201007	-72.78747	26.24689	-2.77	0.006	-124.2326	-21.34238
201008	2.284615	27.59195	0.08	0.934	-51.79685	56.36608
201009	-31.87132	20.78823	-1.53	0.125	-72.61719	8.874556
201010	-48.17256	20.47489	-2.35	0.019	-88.30428	-8.040838
201011	-64.61779	20.64232	-3.13	0.002	-105.0777	-24.15792
201012	-83.63137	21.06506	-3.97	0.000	-124.9198	-42.3429
201101	35.7652	29.91031	1.20	0.232	-22.86037	94.39077
201102	-58.81164	23.03232	-2.55	0.011	-103.956	-13.66725

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Memorandum

To: Ashlie Ossege, Duke Energy
From: Michael Ozog, Integral Analytics
Date: December 8, 2011
Subject: HECR in Ohio – impacts by report type and frequency

This memo presents the impacts of the HECR program in Ohio broken down by report type (line versus bar) and frequency of the report (monthly versus quarterly). The data that was used to generate these estimates corresponds to the data that was used to estimate the overall HECR impacts in Ohio, as reported in TecMarket Works report of the evaluation of this program, dated September 9, 2011.

Table 1 presents the impacts of the report type (line versus bar graphs), without distinction for the frequency of the reports.

Table 1: HECR Ohio impacts by report type

Type	Savings		t-value
	kWh/day	% of use	
Line	0.50	1.18%	4.37
Bar	0.24	0.57%	2.08

Table 2 presents the impacts of HECR in Ohio broken out by both report type and frequency.

Table 2: HECR Ohio impacts by report type and frequency

Freq	Type	Savings		t-value
		kWh/day	% of use	
Monthly	Line	0.60	1.42%	3.92
	Bar	0.30	0.70%	1.89
Quarterly	Line	0.40	0.91%	2.52
	Bar	0.19	0.44%	1.18

These results show:

- The reports using the bar graphs resulted in a far lower level of savings relative to reports using the line graphs (approximately half as much). This is probably due to the potentially confusing nature of the "ranking" in those reports, where high scores indicated the customer was relatively less efficient than comparable households.
- Monthly reports produced a higher level of savings relative to quarterly reports, irrespective of the type of report.

Note however that while some of the differences are rather large, none of the differences presented in these tables are statistically significant.

Final Report

Evaluation of the Non-Residential Smart $aver® Prescriptive Program in Ohio

Results of a Process and Impact Evaluation

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

August 29, 2010

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Executive Summary

Summary of Findings

This Executive Summary provides an overview of the key findings identified through this evaluation.

Significant Process Evaluation Findings

- The trade allies and commercial customers would like to have the prescriptive program application process available online. This would make the program operate more smoothly for both Duke Energy staff and the Smart $aver® partnering trade allies and would speed accessibility to the participation process and eliminate problems with obtaining hard-copy application forms and transmitting them via fax.

- The trade allies are disappointed that Duke Energy's bonus incentive was eliminated as a benefit to these customers because they said that it was an effective selling point for them to use with their customers in terms of return on investment. Trade allies suggest that more net savings can be acquired with the bonus incentive than without it.

- The trade allies would like an increase in collaborative marketing between Duke Energy and the trade allies to raise awareness of the program. To achieve this they suggested that Duke Energy provide more literature on the program to the trade allies and to a list of targeted contacts supplied by trade allies. Several trade allies also would like to see Duke Energy initiate a preferred vendor program for the Non-Residential Smart $aver® Program.

Significant Impact Evaluation Findings

- Even though these algorithms are not the source of record for program impact calculations, the measure savings algorithms in the third-party program tracking database contain errors. Program accomplishments should be tracked using measure counts from the program tracking database and unit energy savings from program design calculations contained within DSMore until the errors can be corrected. Duke Energy was aware of this problem, and steps will be taken to correct this issue.

- Customer self-reported fixture watts for new and replaced fixtures are inconsistently reported and proving to be unreliable. We suggest removing this information from the applications to reduce customer burden.

- Energy and demand savings realization rates for kWh and kW for high bay lighting were very close to 1.0, indicating the program planning estimates provide a good indication of average high bay lighting participant savings.

A summary of the impact findings is presented in the standardized Duke Energy Program Impact Metrics Table below:

Table ES-1 Program Impact Metrics Summary

Metric	Result
Number of Program Participants from 11-1-2008 to 11-30-2009	18,380 fixtures
Gross kW per fixture	kW/fixture
High Bay 2L T-5 High Output	0.089
High Bay 3L T-5 High Output	0.104
High Bay 4L T-5 High Output	0.204
High Bay 6L T-5 High Output	0.086
High Bay 8L T-5 High Output	0.605
High Bay Fluorescent 4 Lamp (F32 Watt T8)	0.142
High Bay Fluorescent 6 Lamp (F32 Watt T8)	0.222
High Bay Fluorescent 8 Lamp (F32 Watt T8)	0.150
Gross kWh per fixture	kWh/fixture
High Bay 2L T-5 High Output	385
High Bay 3L T-5 High Output	449
High Bay 4L T-5 High Output	882
High Bay 6L T-5 High Output	374
High Bay 8L T-5 High Output	2,621
High Bay Fluorescent 4 Lamp (F32 Watt T8)	616
High Bay Fluorescent 6 Lamp (F32 Watt T8)	961
High Bay Fluorescent 8 Lamp (F32 Watt T8)	649
Gross therms per fixture	N/A
Freeridership rate	28%
Spillover rate	
Self Selection and False Response rate	
Total Discounting to be applied to Gross values	28%
Net kW per fixture	kW/fixture
High Bay 2L T-5 High Output	0.064
High Bay 3L T-5 High Output	0.075
High Bay 4L T-5 High Output	0.147
High Bay 6L T-5 High Output	0.062
High Bay 8L T-5 High Output	0.435
High Bay Fluorescent 4 Lamp (F32 Watt T8)	0.102
High Bay Fluorescent 6 Lamp (F32 Watt T8)	0.160
High Bay Fluorescent 8 Lamp (F32 Watt T8)	0.108
Net kWh per fixture	kWh/fixture
High Bay 2L T-5 High Output	277
High Bay 3L T-5 High Output	323
High Bay 4L T-5 High Output	635
High Bay 6L T-5 High Output	269
High Bay 8L T-5 High Output	1,887
High Bay Fluorescent 4 Lamp (F32 Watt T8)	444
High Bay Fluorescent 6 Lamp (F32 Watt T8)	692
High Bay Fluorescent 8 Lamp (F32 Watt T8)	467
Net therms per fixture	N/A
Measure Life	10

Recommendations

1. Evaluate the usefulness of a possible training webinar. Consider recording a webinar for future web access. A webinar may prove to be a benefit only if it is offered live, with a live question and answer period.

2. Explore the effectiveness of email and electronic campaigns and survey trade allies to determine the frequency with which they prefer to be contacted. Reports from the field suggest that trade allies may prefer the less-expensive email campaigns over mailed materials. This may allow the Non Res Smart $aver® to have a broader reach at a lower cost.

3. Duke Energy should consider the feasibility of providing more case studies on customers who have implemented energy efficiency projects using high-priority high-impact measures in program materials provided to trade allies for them to share with their customers. Duke Energy may wish to include case studies on customers from several market segments. If built correctly, such case studies would increase the understanding of the Smart $aver® program by customers in different market segments because they would have examples to which they can relate, lowering the perceived risk and uncertainty for new participants.

4. Duke Energy should explore the feasibility of developing a coordinated marketing campaign for one market segment, implementing it as a pilot, and evaluating its effectiveness. A small pilot would allow Duke Energy to assess whether targeting marketing to one segment would be a more effective approach for future program efforts.

5. Duke Energy and WECC should jointly share and discuss their technology selection processes. This would allow both parties to better provide feedback in order to make accurate estimates of market activity. This would also allow both Duke Energy and WECC to explain, if the trade allies ask, why certain technologies are not included.

6. WECC should provide timely feedback to Duke Energy about whether they believe the projected market activity levels provided by Duke Energy are realistic, based upon WECC's experience in the field. This would allow Duke Energy to use WECC's direct experience in the field to relay any upcoming customer purchasing trends.

7. If poor economic conditions are expected to impact customers' ability to take on retrofit projects, and if there is enough spread among the energy efficiency levels of equipment available to make offering multiple levels of efficiency a viable option, Duke Energy should assess whether it is feasible to test a tiered prescriptive program that would allow customers to still install energy efficient technologies when the highest efficiency models are priced out of their current means. However, Duke Energy should not trade off higher levels of free ridership in exchange for increased participation in a program that achieves lower levels of

energy savings. It is possible that cost per achieved net kWh would be increased under such an offer depending on how the market would respond.

8. Explore whether it is feasible to create marketing and outreach campaigns that focus on lifecycle costs. This may allow customers to look beyond consideration about a measure's capital cost and its incentive, and understand the energy savings that would be delivered over the measure's effective useful life.

9. Make the template for itemizing invoices available online. This guidance would allow trade allies and customers to send in more accurate applications that would be rejected less frequently and could be processed more quickly and cost effectively, without WECC needing to contact applicants for missing information.

10. Duke Energy should consider conducting usability studies and satisfaction surveys of the online application process. This may allow Duke Energy to quantify any reduction in application speed and any increase in customer satisfaction with the application process.

11. Duke Energy should consider the feasibility of designing, implementing, and evaluating a pilot program to help <500 kW customers to prioritize energy efficient projects. This may allow more Duke Energy customers to achieve greater savings by providing them with a more complete picture of their energy efficiency options.

12. Duke Energy should consider the potential benefits of increased market segment penetration if marketing were structured to specifically focus on barriers for a particular key market segment. Duke Energy may want to do this by identifying one high priority market and conducting a characterization study about that market. Duke Energy might then identify that market's specific barriers to participation and develop a logic model that specifies a strategic approach toward overcoming those barriers. Duke Energy can then evaluate the effectiveness of the approach at the end of the program cycle. This would allow Duke Energy to see if they would be able to successfully drive greater activity in a particular segment if there arose a need for doing so in the future.

Introduction

This report presents the results of a process evaluation of the Non-Residential Prescriptive Smart $aver® Program in Ohio.

Program Description

The Non-Residential Smart $aver® Prescriptive program seeks to reward businesses for saving energy by providing rebate incentives to install qualifying high-efficiency lighting, cooling or motors/pumps. Duke Energy's commercial and industrial customers fund this program by paying an energy efficiency rider based upon their kWh usage. The program has a custom component as well as the prescriptive component. This process evaluation study looks at the prescriptive program only. The custom program will not be evaluated here, but it works hand in hand with the prescriptive program. In the prescriptive program, customers may install selected energy efficient measures and then send in an application for rebates, up to 60 days after the installation. Energy efficiency measures that are not part of the prescriptive program may still earn a rebate, but the installation of these custom measures must first be approved by Duke Energy through an application process. Along with the Non Res Smart $aver® program, there is also a Residential Smart $aver® program that mainly involves prescriptive lighting and HVAC measures.

The prescriptive Non Res Smart $aver® program was initially started as a limited-funds program that used ratepayer money. When the funds were depleted, the program ended. That has now been changed to an unlimited funds program because Duke Energy is allowed to reclaim program costs.

About This Report

This report presents the results of a process evaluation of Duke Energy's Non-Residential Smart $aver® Program in Ohio. The Smart $aver® Program provides incentives to customers to upgrade to energy efficient lighting and commercial equipment. The study focuses on participants from program year 2009 through March of 2010.

In order to better understand the program's operations and to identify possible areas of improvement, the evaluation team conducted nine in depth interviews with staff from Duke Energy, the Wisconsin Energy Conservation Corporation (WECC), and a technical consulting team.

This effort employed interviews with program trade allies and a survey of commercial customers using the program. To conduct the process evaluation we interviewed five trade allies and surveyed twenty-five program participants. Contacts were selected randomly from the full population of trade allies and participants.

The second section provides findings from the impact evaluation efforts. The impact evaluation employed a tracking system review, onsite surveys and short term Measurement and Verification (M&V) of selected lighting fixtures using light loggers.

Process Evaluation

In order to better understand the program's operations and to identify possible areas of improvement, the evaluation team conducted nine in depth interviews with staff from Duke Energy, the Wisconsin Energy Conservation Corporation (WECC), and a technical consulting team. The results of these interviews follow.

Program Objectives

The program staff who were interviewed all were able to describe some of the multiple goals of the program.

- "Get as much participation as possible...get impacts so Duke will not have to build more power plants"
- "Drive the market toward more efficient solutions and applications"
- "Help through incentives to bring different and newer technologies to the market place.
- "To create sustainable energy savings within customer's facilities."
- "Lower the kW demand on their system."

Roles

Duke Energy
Duke Energy serves as the administrator of this program with WECC playing a key role in implementation. WECC processes applications, issues incentive checks, conducts installation verifications, and grows a network of vendors and trade allies who implement energy efficiency projects for the commercial and industrial customers. Duke Energy guides the strategic direction of the program using internal research as well as feedback from WECC. A technical consulting firm is brought into calculate program cost effectiveness, incentive levels, and projected market penetration.

WECC
WECC's development of a trade ally network relies upon the efforts of WECC's trade ally representatives. These WECC employees have program responsibilities in four areas: 1) physical meetings and outreach with vendors and trade allies, 2) recruitment of trade allies and vendors, 3) work with participating vendors to figure out the best energy efficiency project for specific customers, and 4) conduct physical verifications of measure installations[1].

[1] There is some discrepancy in the use of the term "trade ally". Duke Energy uses "trade ally" to refer to WECC and "vendor" to refer to the distributors and sales people. WECC uses "trade ally" to refer to the distributors and vendors, and refer to themselves as trade ally representatives.

WECC's Outreach Process

The WECC trade ally reps use a variety of tactics to conduct outreach. They look for opportunities in which they can actively promote the Smart $aver® program. For example, one tactic some trade ally reps use is to try to meet with a distributor's sales force, in order to speak to as many people as possible at once. Another rep mentioned that he would like to take advantage of more speaking opportunities such as the ones that are available at the chamber of commerce meetings.

> *"I look for opportunities to speak, see who is currently participating in the program and make sure they have a good experience and continue"*
>
> *"[I] touch base with new trade allies and see if they want me to come by and see them or if they have it under control."*

They see their responsibility as being able to provide any help necessary to trade allies who are filling out applications. *"When a trade ally is filling out an application, or has general questions, or wants to sign up, we drop what we're doing. The trade allies are our first and foremost priority."* Common questions from TAs include asking whether a particular customer or project is eligible and asking about the status of a check. WECC believes that the quickest and most cost effective way to get applications is to have the trade allies engaged. *"If your trades are not promoting the program, it's not on the mind of the customers.*

WECC recruits trade allies in a targeted approach: Duke Energy provides a list of trade ally prospects and the WECC trade ally reps' goals are based on the number of vendors they can recruit off that list. Recently, WECC was directed to place a higher priority on recruiting trade allies who have higher impact technologies such as HVAC and motors. This new focus will be discussed in detail later in this report. WECC keeps a scorecard on trade ally communications, applications, and recruitments. This is shared at the weekly conference call between Duke Energy and WECC. WECC management also conducts quarterly reviews with the trade ally reps. WECC management does "ride alongs" with the trade ally reps in order to provide feedback on issues such as the quality of their presentation, their product knowledge, and the number and quality of the calls they are making.

Trade Allies

A trade ally rep reported that there is currently no formal training for the trade allies. There previously was a training program but it was cancelled for reasons unknown to the rep. The rep would prefer to have a formal training program. *"We spend so much time reinventing the wheel with new trade allies"* The current informal process uses PowerPoint presentations that were developed by Duke Energy, and WECC only uses materials that have been approved by Duke.

Duke Energy has also designed brochures to promote the program, and WECC provided input to the design. One brochure is shared by Ohio and the Carolinas. WECC reported that the brochure and PowerPoint presentations are well received by the trade allies: *"The*

materials are great". The WECC trade ally reps have also trained the vendors to go to the Non Res Smart $aver® website as the number one source of updated information. "*They know to go there and look for information.*" WECC also promotes a "1-800" number to a call center that handles program questions.

Duke Energy also facilitated a series of trade ally roundtables in both Ohio and the Carolinas in order to obtain feedback about the Non Res Smart $aver® program. The number one request made by the trade allies was to receive more help understanding how Duke Energy's rates are applied and how to calculate impacts and payback periods for the customers. In response to this feedback, Duke Energy is developing a series of webinars to train trade allies to be able to demonstrate the value proposition of energy efficiency measures in project proposals for the customers. The trade allies had been using an average rate to calculate payback, and the customers hold the trade allies responsible for any incorrect estimates.

RECOMMENDATION: Evaluate the usefulness of a possible training webinar. Consider recording a webinar for future web access. A webinar may prove to be a benefit only if it is offered live, with a live question and answer period.

The trade allies for the Non Res Smart $aver® program currently receive no incentives from participation "*There is no incentive for the trade ally to help a customer fill out an application or pull up an invoice, pull a specification sheet and submit an application.*" In many cases, the trade ally representatives must spend a significant amount of time helping customers with application paperwork. They are motivated to participate when the proposal represents a large job and the sales contract relies upon the Smart $aver® incentive being factored into the proposal. The trade ally representatives try to convey to the TAs that the more projects they are involved with, the higher chance they will have for up-selling customers to higher premium energy efficient equipment. Duke Energy believes that once the vendors are educated, they do understand the value proposition that the Non Res Smart $aver® incentives represent, particularly since energy efficiency products tend to have higher profit margins "*so it's win-win all the way around*".

So far, this is enough motivation to have driven the Non Res Smart $aver® program's current level of success. However, the issue of trade ally incentives was frequently mentioned by WECC's trade ally representatives because they also serve the trade allies for the Residential Smart $aver® program. WECC's trade ally reps believe that the Res Smart $aver® program is *"wildly exceeding application goals"* because the residential trade allies are given incentives for each application, whereas the non-residential trade allies are not. This discrepancy does have implications for the Non Res Smart $aver® program, and the issue of paying trade allies incentives will be discussed in detail later in the report.

Technical consultant team

Duke Energy uses a team of technical consultants including Morgan Marketing Partners that handles the DSMore analyses that provides incentive levels and estimates cost

effectiveness, Architectural Energy Corporation that handles DOE2 modeling, and Franklin Energy, that does engineering calculations for non-weather sensitive measures.

Call Center

Duke Energy provides a 1-800 number for the Non Res Smart $aver® program. The call center is operated by CustomerLink, a third party company. They answer general program questions while technical questions are directed to WECC.

Collaboration and Communications

Duke Energy and WECC collaborate well and communicate frequently about the program. Duke Energy, WECC, and CustomerLink formally hold weekly conference calls to discuss feedback from the customers, and informally have more frequent calls to address specific issues as they arise. "*We have very frequent communication, it's very open*" stated a WECC manager.

One issue that interviewees frequently raised is fact that WECC and Duke Energy have different performance objectives. WECC's objectives are determined by their contract with Duke Energy and in that contract, WECC is currently paid per application. Duke Energy, however, is compensated on the basis of kW and kWh saved and avoided costs. This has been acknowledged as a problem by both sides, particularly as Duke Energy wishes to achieve deeper energy savings with higher impact measures that require more of a sell to customers because of their greater expense. Duke and WECC have already started discussions about changing the contract so that WECC's performance objectives are aligned with those of Duke Energy, and they hope to resolve this issue soon.

Currently, when WECC identifies an issue that needs improvement, they believe that Duke Energy calls on a third party consultant, Franklin Energy, for strategic input before making a decision[2]. WECC implements turnkey energy efficiency programs for other utility clients and they are accustomed to providing advice on strategic planning and program design. WECC believes that they have the expertise to help with the Non Res Smart $aver®, but the current contract prohibits them from doing so. The working relationship between Duke Energy and WECC is operating well, and both parties actively work to address any issues that affect the efficiency of the program's operations. However, WECC seems uncertain about how much ownership Duke Energy wants them to have over the work they do. One WECC trade ally rep mentioned that Duke Energy is very quick to point out that Duke Energy runs the program, and "*there is very little mention of WECC when I go out with Duke*". The same trade ally said that it doesn't stop WECC from trying to provide value. "*I don't know how Duke values WECC. My thought has been, that the more you do, the more value you're getting to Duke...I'm always analyzing what we could be doing better.*" There may be regulatory accountability reasons for needing to make clear that Duke Energy runs the program, but in front of customers, it would be very important to make clear that WECC is a trusted partner in

[2] In actuality, Franklin Energy is part of a team of technical consultants and they do not provide advice on program strategy or communications strategy

this effort, particularly if WECC has responsibility for helping to provide estimates of energy savings.

Communications to Program Participants

The Non Res Smart $aver® program has two categories of participants: the vendors or "trade allies", and the end use customer. One WECC trade ally rep stated that the program was initially designed so that WECC talks to the vendors while Duke Energy talks to their customers. WECC trade ally reps have been told that talking directly to the customers is outside WECC's scope of work. Duke Energy has since relaxed the restriction keeping WECC from talking with customers, but WECC believes that they could be much stronger advocates for Duke Energy if WECC is formally allowed to work closely with both vendors and customers. WECC believes they have the expertise and interest in working more closely with Duke Energy on this program than they are currently asked to. Duke Energy in the past has been reticent about using WECC for customer visits. If a business relationship manager (BRM) is available, then that person accompanies the contractor on the call. WECC is only asked to accompany the contractor if the BRM is not available.

WECC also reported that they are sometimes in the right place at the right time to help, but are not able to do so because of contractual boundaries. For example, Duke Energy's business relationship managers have called on WECC to ask the trade ally representatives to speak directly to customers about the program. WECC thinks the program would be more effective if they were able to work directly with the customer. WECC suggested that there may be a gap that they can fill for Duke Energy: There is a large faction of customers that don't have assigned Business Relationship Managers from Duke Energy because they are too small. WECC suggested during these interviews that they could represent these smaller customers, making sure that the customer understands that they are working on behalf of Duke Energy, but at this point WECC is not sure whether Duke Energy is receptive to this idea. One trade ally rep said that there already was "*some kind of effort*" to reach that mass market group but he was not sure what those plans are. Because these customers are not large enough to have the choice of opting out of paying the energy efficiency rider, "*they're underrepresented, there's great potential there*".

Market Research

The Non Res Smart $aver® has two types of participants, the vendors and the end use customers, and some market research is conducted on those two groups. WECC reported that they do not do any market research for this program; rather, they have to rely on Duke Energy to provide that information. In some cases, WECC trade ally representatives reported that "*Duke does not share all market research results*", or that results might have only been shared with WECC management and not with the trade ally reps. In particular, findings from market potential studies are considered proprietary. Duke Energy incorporates the market potential and market research results into their program design considerations and WECC is informed of any necessary changes to program design. One WECC manager said that this impacts WECC directly because WECC's first year performance goals were based on the results from the market potential study. Without knowing the findings from the market potential study, WECC felt they

could only give blind agreement to the performance goals. WECC feels they may even be able to provide a reality check on market activity estimates that arise from the market potential studies if they had access to the research findings.

These opinions from WECC may largely reflect WECC's internal communications style and not a lack of communication by Duke Energy, since some WECC interviewees do acknowledge that the market research information may have been shared, but not with them. Duke Energy reports that they do share with WECC the market research that would help trade ally recruitment and support, in particular feedback that can help WECC identify any misconceptions about the program, or inaccuracies in the use of the program. Duke Energy and WECC collaborate on the list of trade ally prospects. They use listings purchased from Dun & Bradstreet to identify large manufacturers and high volume producers. WECC's performance objectives are based on number of recruitments off that target list. Duke Energy also conducted the trade ally round tables mentioned earlier. WECC may need to clarify who within WECC needs market research information and WECC may need to review their internal process to see if market information is shared with appropriate individuals in a timely manner.

There is less research available on the end use customers. A Duke Energy manager reported that they currently do not have the ability to capture market segment data effectively, in terms of targeting marketing towards customer preferences; "*We don't have good* [segmentation] *data on customers*"

Marketing

WECC markets to the trade allies and vendors using a combination of brochures, website resources, cold calls, and speaking engagements. Market segmentation studies have not been conducted on the Duke Energy commercial and industrial customers, and the program currently does not formally use targeted messaging. Program staff expressed a need for this kind of research. One WECC trade ally rep mentioned that the lighting brochure that "*lists a million lighting technologies*" that is used for all trades, and suggests that brochures on lighting by specific industries would be more useful. The WECC trade allies also reported that their trade allies and vendors prefer that marketing be conducted through emails. It's difficult for vendors to find the time to travel long distances to attend meetings with the WECC trade ally representatives. Even when smaller local training workshops are held, WECC hears "*'you could have just emailed me that information, or held a webinar'...They're much more savvy with technology than we give them credit for.*"

RECOMMENDATION: Explore the effectiveness of email and electronic campaigns and survey trade allies to determine the frequency with which they prefer to be contacted. Reports from the field suggest that trade allies may prefer the less-expensive email campaigns over mailed materials. This may allow the Non Res Smart $aver® to have a broader reach at a lower cost.

Duke Energy markets to the end use customer by two different channels. Brochures are distributed at trade shows and designed to raise customer awareness of the program. Duke Energy reported that this is marginally effective. Duke Energy has email marketing campaigns that are also marginally effective. "*The most effective [channel] is really the trade ally network.*" WECC stated, "*The most valuable marketing tool* [we] *have is the trade allies and* [we] *know that.* [We] *put a lot of time and energy into* [our] *trade ally network.*"

Duke Energy program manager agreed: "*In the end it comes to the effectiveness of the vendor network...this is where you're going to drive* [customer] *behavior.*"

The trade allies also need to market to the end use customer. One of the findings from the focus groups in the Carolinas is that the TAs in the HVAC, chillers and lighting industries were looking for calculators and case studies on end users in different market segments, to help communicate potential savings to customers. Other customer segments that trade allies were interested in include manufacturers, hospitals, and community colleges. "*We do need case studies*" for the Carolinas.

RECOMMENDATION: Duke Energy should consider the feasibility of providing more case studies on customers who have implemented energy efficiency projects using high-priority high-impact measures in program materials provided to trade allies for them to share with their customers. Duke Energy may wish to include case studies on customers from several market segments. If built correctly, such case studies would increase the understanding of the Smart $aver® program by customers in different market segments because they would have examples to which they can relate, lowering the perceived risk and uncertainty for new participants.

Coordinated marketing by WECC and Duke

A WECC trade ally representatives suggested that there has been a disconnect in trying to draw distinctions between WECC's marketing efforts to vendors and Duke Energy's marketing efforts to the end use customer. He suggested that the market should be approached on both the trade ally front and the end use customer front. "*WECC can be doing all the right things with the trade allies but can talk until they're blue in the face if* [end use customers] *are unaware of the program or if they can't buy anything due to the economy.*" He suggested that Duke Energy needs to build more demand and awareness for energy efficient products with their customers. This is an oft-mentioned suggestion from WECC trade allies, and demonstrates a need either for Duke Energy to market the program more visibly to the customers, or for Duke Energy to share the effectiveness of their marketing with WECC. It is ultimately up to Duke Energy to decide how much marketing to do, and whether this program is a "demand pull" program, a "supply push" program, or a combination of both. But if Duke intends this program to be driven largely by supply push, with a greater marketing effort by the trade allies than by Duke, the program would require a different strategy in order to achieve success. We realize that this program must be cost effective and that Duke Energy prices are low compared to the rest of the country. This low avoided cost limits program expenditures and limits what can be cost effectively accomplished. However there is a need for more effective

marketing. Duke will need to determine the available additional funding margin that can be allocated to marketing, if any.

A WECC program manager reported that in his experience, the greatest chance of an energy efficient project going through is when the costumer sees both WECC and the trade ally or utility at the table. "*Greater success when that happened, than when trade ally or utility were by themselves...Customer could look at all three of these independent groups* [working together], *the trade ally who performs the work, WECC who cuts the check, and the IOU representative who knows my business and load shape and can tell me how rates will be affected.*"

There is some occasional effort to coordinate marketing right now, but it needs to be part of the program design and strategically coordinated. WECC suggested that if a particular measure, such as VFDs, is targeted as a high impact objective, then WECC's efforts should be emphasizing VFD distributors with customized seminars and training sessions. At the same time, Duke Energy should be launching a marketing effort to their customers explaining payback periods and typical costs, to build excitement and demand pull from the customers.

RECOMMENDATION: Duke Energy should explore the feasibility of developing a coordinated marketing campaign for one market segment, implementing it as a pilot, and evaluating its effectiveness. A small pilot would allow Duke Energy to assess whether targeting marketing to one segment would be a more effective approach for future program efforts.

Applications

Every application for the Non Res Smart $aver® incentive program must be accompanied by a copy of the invoice and the spec sheet. The applications are processed by WECC's data processing center in Madison, WI, where it undergoes a review for errors.
If an error is detected on an application, either the entire application is rejected or WECC contacts the trade allies to ask them to help resolve the error. An example of an error is a missing tax ID number or a missing specifications sheet for a measure. WECC is rejecting a lot of applications due to Duke Energy's stringent requirements. One WECC trade ally rep has heard that an application error could be something "as minor as they didn't check a box".

Site Verifications and Quality Control

One of WECC's responsibilities is to verify measure installations at customer sites. The verification rate was recently changed. Initially, WECC was required to verify a random 5% of installations under $10,000, all customer self-installations over $1,000, and 100% of anything over $10,000. However, so many projects fit those criteria that the trade ally reps were effectively inspecting 8-9% of installations. This prevented the trade ally reps from spending time on outreach to prospective trade allies. Discussions are currently under way to change those inspection rates.

After the inspections are conducted, WECC enters the verification data into a database. Duke Energy requires that the original documents be kept so after entering verification data into the database, the verification worksheet is sent to storage. Spreadsheets are kept in a paper file then destroyed after one year.

In a few cases, WECC found that measures listed on the applications had not been installed. In these cases, Duke Energy went back to the trade ally and recovered the incentive payment. Duke also put the vendors on notice for future exclusion. The impacts from those installations were adjusted to account for the uninstalled measures. The Ohio trade ally rep reported that if he finds that a measure is missing, he tries to inform the customer what should be installed, and he does not note a pass or fail at that point but returns in three weeks time to verify the installs at the site again.

The trade ally reps use their discretion to determine how to verify a site at which there are too many installations to verify individually. At a site with, for example, 5,000 CFL installations, one rep reported that he would visit the site unannounced and visit various wings of the building. Duke Energy also places an emphasis on safety so verifications that would pose a physical risk to the trade alley reps are not performed. In cases where installations cannot be verified because they are in an inaccessible spot, the trade ally reps must rely upon the honesty of the trade ally.

Because the WECC trade ally reps are responsible for verification of the Residential Smart $aver® installations as well as the Non Res Smart $aver® program, the high volume of activity in the Residential program also takes up verification time so that less time is available for the Non Res Smart $aver® verifications.

Rebate processing operation

WECC reported that their rebate processing operation receives a lot of compliments for its speed and accuracy. Incentive checks are sent out in 2 weeks or less, and one trade ally rep reports "Customers love it when they get a check within 10 days." WECC is required to process the applications within 3 days and has been successful in meeting this very short turnaround time. This is a high performance turn-around rate.

Quality Control

Duke Energy is extremely concerned about data integrity in the application and check disbursement process, and requires a 100% accuracy level. In order to meet that requirement, WECC's quality assurance process goes through three iterations of quality control checks, then is checked by customer account, then is sent for another round of invoice-related checks by three more staff members.

Data entry staffs' performance is tracked and reviewed for both accuracy and speed of processing. Every error is recorded, and data entry staffs undergo a quarterly review about their productivity. Quality control checks are performed every other day. If the same types of errors come up, the managers try to determine whether it's a technology

issue or a training issue and rectify the situation. A WECC program manager mentioned that this requirement for 100% accuracy is extremely expensive.

Typical errors may include incorrect information on the application, mistakes in data entry, or a problem with the data upload from WECC to Duke Energy. If an error is detected, a correction measure with a negative count must be entered into the database. This provides a separate entry for the adjustment so that the original data is kept intact. The WECC data processing manager reported that errors occur infrequently, approximately 1-2 times a month.

Once an application is processed, WECC must upload the payment amount and what measures were on the application. Duke Energy has asked that the updates be as "real time" as possible, so that the records would be updated as soon as a payment is made. This rapid update makes it possible for Duke Energy's Business Relationship Managers to provide up to date information to any customers who ask about their check status. This synchronization of databases is perhaps the only difficulty for the rebate processing operation, but they report that they are in the process of coming up with a solution.

Data uploads occasionally fail due to a lost connection or timeout error but in the past there was no way to determine how much data was transmitted prior to the upload failure. The old solution was to upload the entire set of data again, check for duplicates, and then create the correction measures if there were duplicates. This was a costly time consuming process when this occurred. WECC has worked with Duke Energy to develop unique ID codes for each upload that the data processing manager believes will solve this problem in the future.

The process of transferring customer data from Duke Energy to WECC is currently a cumbersome process but the data manager did not know if any improvements were possible. Customer data is transferred using two different websites. One website is used to search for a customer by name and address, and another website is used to obtain account information. Often the data needs to be "cleaned" so that records are correctly matched, and in some cases the Duke Energy business account managers need to be involved in order to match large business customers with their multiple accounts for different buildings. However, this has not affected WECC's ability to process rebate checks to the customer in a timely manner.

During the early phases of the program, tweaks were needed to make sure that all the data needed for reporting requirements were being stored, and to make sure that data could be pulled in compliance with all the timeframes Duke Energy needed. Currently, other than the two issues mentioned earlier, the continuing need to improve near-real-time updates to Duke Energy's database and the difficulty in getting customer data from Duke, the application processing software is working successfully and rebates are being paid on time.

This level of service comes at a cost. One WECC program manager suggested that if the 3 day requirement to process incentive applications were lengthened, there would likely

be a significant reduction in administrative costs. Currently, WECC needs to maintain staffing levels large enough to handle applications as if there were a spike in application volume. *"We don't have other clients for which we maintain this level of service."*

Technology Selection

The Non Res Smart $aver® program offers numerous technologies across five core technologies: 1) lighting, 2) HVAC, 3) motors, 4) food service, and 5) process-related equipment. Duke Energy's program manager reported that this covers about 80-90% of the activity in the marketplace. The process for selecting new technologies for the prescriptive Non Res Smart $aver® occurs once or twice a year. New measures are usually added one of two ways. The first way is if the measure is appearing frequently in the applications for the custom Non Res Smart $aver® program. The decision to roll a measure over to the prescriptive program is largely a judgment call by the Duke Energy program management. The second way is through the annual review of portfolio, conducted with the expert input of a third party technical consultant (Morgan Marketing Partners, who also generates the inputs for DSMore to determine cost effectiveness). Newly selected technologies are assimilated into the program throughout the year. Duke Energy has a lot of new technology on their radar and are thinking of doing pilots on new technologies to see how well the market accepts them.

Duke Energy explained that another factor affecting the selection of new technologies is the differing regulations regarding whether and when new technologies can be introduced. Ohio has more flexibility and will allow changes to the portfolio and to measures. Ohio is comfortable with the decisions in these areas. North Carolina, on the other hand, has very strict rules and is more restrictive in the kinds of changes that are permissible. This makes it difficult to adapt the program to reflect changes in the market.

This technology selection process is not well understood by WECC. Across the interviews, most trade ally reps have reported their various beliefs that Franklin Energy selects the technologies, tests the technologies, designs the program, and sets the incentive levels[3]. They also seem to believe that there is no process for moving custom measures over to the prescriptive program. All of these beliefs are incorrect, and suggests that Duke Energy should be more transparent about their technology selection process with their program implementer.

RECOMMENDATION: Duke Energy and WECC should jointly share and discuss their technology selection processes. This would allow both parties to better provide feedback in order to make accurate estimates of market activity. This would also allow both Duke Energy and WECC to explain, if the trade allies ask, why certain technologies are not included.

The WECC trade ally representatives receive direct feedback from the vendors and trade allies about technology opportunities. One frequent suggestion from the trade allies is

[3] Franklin Energy is a subcontractor that performs engineering calculations for non-weather sensitive measures. The prime contractor for the technical consulting team is Morgan Marketing Partners.

that common delamping measures should be added to the prescriptive Smart $aver® program. "*We hear a lot from our trades, it's a common measure that's missing.*" WECC trade ally reps also mentioned air compressors, more prescriptive lighting, inductive lighting, more VFDs, prescriptive building controls measures...As one WECC trade ally rep said, "*I can sit here for an hour...there's lots of little stuff.*"

While there are some recurring suggestions for technologies that should be added to the prescriptive program, most interviewees agreed that the Non Res Smart $aver® currently offers a good mix of measures. As one WECC trade ally rep said, "*It is hard to imagine that a Duke Energy customer can't find some energy efficiency measure they can use.*"

Incentives

Duke Energy reported that they determine incentive levels using feedback from trade allies, Duke's business relationship managers, and calculations from the technical consulting team.

The technical consultants calculate incentive levels using information gathered across a variety of sources. The technical consultant team looks at what kinds of incentives other utilities' programs are providing and try to determine if those programs have had traction with their incentive levels. They start out with an effort to have the rebate pay up to 50% of the incremental cost, and make adjustments using DSMore, a financial analysis tool for calculating impacts and cost effectiveness. The technical consultants also provide estimates of market activity and penetration at different incentive levels.

The measures that are recommended for inclusion in the prescriptive program are ones that have a standard application and ones for which there are established track records of energy savings. In cases where the energy savings show wide variability, conservative numbers are used in the model. Duke Energy's program managers make the final determination from a list that the consultants provide.

The technical consultant who was interviewed reported that they currently have very little direct interaction with WECC. He also reported that it would be useful to have WECC, as the implementer, review the projections of activity and energy savings to see whether they agree with the projections and levels of activity, and to answer the question, "*Can you deliver on it?*"

RECOMMENDATION: WECC should provide timely feedback to Duke Energy about whether they believe the projected market activity levels provided by Duke Energy are realistic, based upon WECC's experience in the field. This would allow Duke Energy to use WECC's direct experience in the field to relay any upcoming customer purchasing trends.

Feedback on incentives from the field

WECC shares a lot of feedback from trade allies about incentives that are not appropriate, and about technologies the trade allies think should be added or deleted. One rep for the

Carolinas stated that "*HVAC incentives are not high enough to incentivize customers*". However, a rep for Ohio believed the current incentives are appropriate.

One WECC trade ally rep suggested that measures that do not meet the absolute energy efficiency threshold for inclusion in the prescriptive program might instead be assigned a partial incentive that is proportionate to its energy savings. For example, a smaller incentive could be given for high bay lighting measure that is 88.7% efficient instead of the required 90% efficient. "*You could make a tiered approach. Right now, prescriptive is all or nothing, and if it's nothing it goes into custom.*" This may be a method of including more measures in the prescriptive program. The custom Non Res Smart $aver® is not within the scope of this evaluation but many trade ally reps have mentioned that there are large barriers relating to the difficulty and length of the custom application approval process as well as uncertainty about the incentives. These barriers prevent customers from participating in the custom Smart $aver® program. If the prescriptive program has more flexibility on the energy efficiency of the included measures, it may be able to capture those energy savings that are disappearing in the crack between the current prescriptive and custom programs. The recent economic downturn has decreased customers' ability to make capital purchases, so the Duke Energy incentive is particularly important in determining whether a retrofit project is financially feasible or not.

RECOMMENDATION: If poor economic conditions are expected to impact customers' ability to take on retrofit projects, and if there is enough spread among the energy efficiency levels of equipment available to make offering multiple levels of efficiency a viable option, Duke Energy should assess whether it is feasible to test a tiered prescriptive program that would allow customers to still install energy efficient technologies when the highest efficiency models are priced out of their current means. However, Duke Energy should not trade off higher levels of free ridership in exchange for increased participation in a program that achieves lower levels of energy savings. It is possible that cost per achieved net kWh would be increased under such an offer depending on how the market would respond.

Barriers

Economic

Several reps mentioned the economic climate as being a major barrier to participation. One rep reported that while WECC was meeting their objectives, the poor economic conditions were having a noticeable effect. One rep mentioned that while some customers were able to afford $100,000 projects, they would decide only to implement a $70,000-80,000 project because of concerns about their economic future. Below, trade ally reps described in their own words the effects the poor economy is having on applications.

> *WECC is "working with vendors proposing [energy efficiency] projects based on good ROIs, and even good ROIs are being pushed off because [customers] are kind of afraid of what's going to happen with the economy and what they're going to do with their money."*
>
> *"Customers are looking for a less-than-2-yr payback period"*

"Customers are saying, 'We're never going to get this project forward without upper management seeing a one year or 1.5 year payback.' So we'll roll lighting in with the HVAC project."

Energy costs are very low in the Carolinas and a rep states, "Energy efficiency is not first and foremost in minds of folks".

"I'm honestly surprised that we have as much participation as we do in light of the economy...Most would not do it in this economy if not for the rebates."

"With lighting measures, you can phase it in with a maintenance program. You need to be in a budget for 5 yrs before a chiller gets approved."

Duke Energy program manager suggested as one solution that customers could be made more aware of lifecycle costs. "*What I see here are [people] focusing on: Here is the incentive, here is the capital cost, but not bringing into account the lifecycle costs of the measure.*"

RECOMMENDATION: Explore whether it is feasible to create marketing and outreach campaigns that focus on lifecycle costs. This may allow customers to look beyond consideration about a measure's capital cost and its incentive, and understand the energy savings that would be delivered over the measure's effective useful life.

Paperwork

Another barrier is the amount of paperwork required in the application. Trade allies reported that they are spending a lot of time on the application and in many cases it is they who are filling out the applications on behalf of the customers. One trade ally rep said it was not unusual to spend 20 hours on an application. He recently helped a customer with a prescriptive application that was "*one inch thick*". Another trade ally rep agreed that customers are being deterred by the amount of paperwork for the incentives, and also points that this results in lost incentive money. The application can be submitted up to 60 days after the measures are installed, but because there is no motivation to fill out the paperwork immediately sometimes dollars are left on the table. "*It relies on customers' motivation to get money back*". The rep stated that the customers need to remember that they're paying into the rider.

WECC spends a lot of time itemizing measures on invoices submitted with the applications. Itemizations need to be provided on specifications sheets with exact model numbers so the correct incentive can be paid, but the model numbers are not always on the invoices. WECC does use a template for itemized invoices, and one trade ally rep suggests that this template should be widely distributed. Currently, the invoice itemization template is only given to WECC, but it is not officially distributed and it is not on the Non Res Smart $aver® website.

RECOMMENDATION: Make the template for itemizing invoices available online. This guidance would allow trade allies and customers to send in more accurate applications that would be rejected less frequently and could be processed more quickly and cost effectively, without WECC needing to contact applicants for missing information.

Duke Energy has stated that they would like to provide more online tools, and this is supported by several trade ally reps. Currently, applications can be downloaded from the Non Res Smart $aver® website but they still need to be faxed in. If the online application is well-received, Duke should see three signs of success: 1) the application process has shifted to the customer and 2) the amount of time spent filling out the application is shorter, and 3) WECC spend less time shortening the amount of time processing the application.

RECOMMENDATION: Duke Energy should consider conducting usability studies and satisfaction surveys of online application process. This may allow Duke Energy to quantify any reduction in application speed and any increase in customer satisfaction with the application process.

Increasing participation from end user customers

One trade ally rep suggested that customers might achieve broader and deeper energy savings if they had more assistance ranking energy efficiency projects in terms of cost effectiveness. This rep mentioned Duke Energy's existing assessment program that provides a project assessment report tailored to a customer's facility, but explained that this program is only available for customers that use 500 kW or greater. "*A lot of customers are not getting a whole lot of assistance in ranking energy efficient projects. It's customers who have a more comprehensive plan, almost a prescription, on how to go about their energy efficiency projects*" that achieve the deeper savings.

RECOMMENDATION: Duke Energy should consider the feasibility of designing, implementing and evaluating a pilot program to help <500 kW customers to prioritize energy efficient projects. This may allow more Duke Energy customers to achieve greater savings by providing them with a more complete picture of their energy efficiency options.

Increasing participation from trade allies

When asked how they might increase participation rates from trade allies, the WECC staff members almost unanimously mentioned the issue of paying incentives to the Non Res trade allies. As one rep said, "*I'm a big believer that compensation drives behavior.*" As mentioned earlier, one reason for this fixation is the fact that incentives are given to the trade allies and vendors for the Residential program, and the same trade ally reps support both Res and Non Res vendors. One trade ally stated that the "*achievements of the Residential Smart $aver® may be as high as 150% above goal*, and attributed that achievement to "*the incentives that were given to the trade allies*". He suggested that perhaps trade allies might be "*given incentives for higher impact Non Res* projects".

One WECC trade ally rep reported that there are vendors who do realize the value of the Non Res Smart $aver® without needing additional incentive. These vendors complete applications as a value added service for their clients, and they have been successfully using the Non Res Smart $aver® program to market their own services

Most other reps supported the idea of paying the trade allies. "*Trades would love to get paid. A lot of them will do a free lighting audit in order to get the project.*" One suggestion made was that Duke Energy might compensate trade allies for performance, perhaps by giving them part of the available incentive.

There may be good reasons for considering an incentive. One WECC program manager pointed out trade allies spend an "exorbitant" amount of time filling out proposals. If it were cost effective, this program manager believes Duke Energy may be willing to allow trade allies to receive some of the incentive funds, even if it means less for the customers.

Another option is to consider non-financial incentives. Recent focus groups with trade allies provided feedback that other utilities in the area offer the trade allies different kinds of non-financial incentives. As an example, one utility ranks trade allies with CFL icons after their names. One trade ally rep suggested "*it doesn't have to be a financial incentive, it could be a lead generation incentive*".

One trade ally rep for the Carolinas acknowledged that Duke Energy's regulatory constraints prevent them from changing the program to pay trade allies, and that a change to the program would mean a long process of refiling the program. This rep suggested a "stepwise" approach where non-financial incentives could be given, such as listing them higher on a directory, or on the Non Res Smart $aver® website, or acknowledging the particular trade allies that are driving projects. Objectives could also be tied to the non-financial incentives, so that Duke Energy give trade allies more leads or marketing resources if they reach 25 projects.

In response, Duke Energy reported that they have considered these options, but have not yet acted on these options because "*the program is running well as it is*" in terms of cost effectiveness. Duke Energy should decide upon an action sooner rather than later. The Residential program's high participation rates contrast sharply against the participation rates in the Non Res program.

Whether warranted or not, WECC trade ally reps attribute this participation disparity to the fact that incentives are awarded in one program and not the other. Duke Energy's management, however, attribute the high level of activity in the Residential Smart $aver® program to multiple factors of which the residential trade ally incentives is only one. Duke Energy also attributes customer interest to concurrent manufacturer rebates and federal incentives.

Duke Energy should communicate with WECC on ways to resolve the perceived effects of the discrepancy in incentives provided to Res and Non Res trade allies. As reported above, the different levels of program activity are negatively impacting the trade ally

reps' ability to devote enough time to outreach and verification activities This may require better understanding by the trade ally reps of the root causes of high Res participation. For example, the higher participation may be due to other incentives outside of Duke Energy that have influenced participation rates.

There also needs to be a separate discussion about how to address the imbalance in work load between the two programs. Trade ally reps must verify installations in both the Res and Non Res programs, and the high level of activity in the Res program takes time away from their verifications to the Non Res program and to the recruitment of Non Res trade allies. The solution may be to provide more time for WECC to increase staffing that would allow them to handle higher responses. Some of these work load issues can be resolved through contractual negotiations between Duke Energy and WECC.

Increasing Participation from End Use Customers

When asked what might be done to increase participation from the end use customers, most of the WECC staff suggested more marketing to the customers. One rep said, "*I'd like to be able to prime the pump*" with more advertising such as public service announcements, billboards, radio and TV ads. Another rep agreed that Duke Energy should do more marketing: "*They're a large organization and should use everything at their disposal to get the word out*".

One WECC program manager observed that most markets respond to a combination of supply push and demand pull. He believes there are more unrealized opportunities to increase demand pull for the Non Res Smart $aver® program. He suggested that the program might target property management firms. He also suggested that the program could provide more outreach to large industrial customers on a one-to-one basis with an energy advisor relationship, which he acknowledged Duke Energy is already doing to some extent.

The WECC program manager suggested that the marketing efforts be supported by data from market segmentation studies. This would allow the program to identify barriers that might be different for each sector, as well as to target messaging by sector. WECC suggested that the program should develop logic models at the segment level in order to specify what strategies should be employed against the different barriers. Another WECC program manager agreed and suggested that the program needed to provide consistent messaging and communication out to the marketplace. WECC knows there is some targeted marketing going on at Duke but no one really knows how the Smart $aver® brand ties into it.

RECOMMENDATION: Duke Energy should consider the potential benefits of increased market segment penetration if marketing were structured to specifically focus on barriers for a particular key market segment. Duke Energy may want to do this by identifying one high priority market and conducting a characterization study about that market. Duke Energy might then identify that market's specific barriers to participation and develop a logic model that specifies a strategic approach toward overcoming those barriers. Duke Energy can then evaluate the effectiveness of the approach at the end of the program

cycle. This would allow Duke Energy to see if they would be able to successfully drive greater activity in a particular segment if there arose a need for doing so in the future.

Perceived Free Ridership

When asked about their perceptions of the level of free ridership, most trade ally reps said they believe it is very low because of poor economic conditions. These trade allies reported,

> *"In today's economy it's low...people are not spending money. The [desired] paybacks have changed dramatically from what companies were willing to invest before."*
>
> *"I think they're looking to the utility and trade allies to tell them how to cut their costs."*
>
> *"Not a problem until the economy recovers."*

One trade ally rep believed that about 15% of the lighting retrofits would be done without the Smart $aver® program. However, the trade allies try to leverage any lighting-related free ridership by bundling the lighting measures with high impact measures such as chillers, which has a "huge" incentive but also requires a great capital expenditure. The bundling of high impact measures with lighting measures allows the overall project to be cost effective for the customer. Accordingly, another trade rep suggested that free ridership could be decreased by doing the converse and focusing on higher impact end uses when targeting the trade allies.

Two of the trade ally reps raised an interesting issue with regards to free ridership and the Non Res Smart $aver® program. One rep said, "*Many customers don't realize the impact of free ridership. They feel it's their money, they feel they're owed that incentive.*" This concept of an incentive as an entitlement is something that another rep also spoke about. This other rep suggested that the concept of free ridership may not be applicable for the Non Res Smart $aver® program because the companies are already paying a hefty energy efficiency rider. "*They have to use the program. They're paying for it and pretty heavily for it.*" In that sense, the companies are *paid* riders, not free riders. In many cases, the large Commercial and Industrial customers are very aware they have paid into this program and they already pay close attention to the program. Other customers report that they only started considering the program when a vendor tells them that they are already paying into the program and they ought to look into it. If Duke Energy is exploring marketing campaigns that focus on lifecycle costs (see prior recommendation), the energy efficiency rider could be factored in to lifecycle cost calculations as a sunk cost.

Duke Energy may also wish to consider whether it would be effective to market Smart $aver® participation as an entitlement that customers already paid for. This approach may resonate with those customers who are averse to losses (i.e. loss of benefits from the

energy efficiency rider), and thus motivate actions that would yield long-term energy savings.

Perceived Spillover

One WECC trade ally rep reported that there may be up to 15% spillover, just based upon anecdotal evidence. In some cases, the spillover is unintentional, and occurs when a customer intends to apply for an incentive but "*missed the mark*" with regards to the application deadline. To increase spillover, a WECC program manager suggested that if end users can be educated about the benefits of energy efficiency, it can become a competitive issue. Spillover would increase because dealers offering energy efficient equipment would have a competitive edge over other dealers, which would encourage those other dealers to also offer energy efficient equipment. A WECC trade ally rep reported that there is definitely spillover to gas measures because vendors do not want to leave it out of an application. They know they're not getting incentives, but they can demonstrate savings for those gas upgrades for the customer.

Areas That Are Being Improved

Automation

A Duke Energy program manager believed that automating processes to capture program data would be the biggest improvement that the program needs. Currently, the program data is recorded across several different sources and must be integrated manually before it can be used to inform decision-making. Duke Energy is currently reviewing the information technology infrastructure of several of their energy efficiency programs with the goal of automation in mind. *"[We need to get] away from manual capture, [it's taking] people away from being able to think strategically when they are working on dumping data into a spreadsheet."*

Co-Branding

Duke is aware that the trade allies would like to co-brand with Duke Energy in order for them to get credibility with prospective customers. Duke Energy hopes to have a co-branding arrangement worked out by the end of the year.

New Service Contract

At the time of the evaluation, Duke Energy and WECC were discussing changes to the existing service contract, in order to align WECC's program objectives with Duke's. As part of this alignment, both sides agreed that in order to achieve higher impacts by focusing on large commercial and industrial customers and by pushing high impact technologies such as chillers and VFDs. At this time the new contract has not been negotiated, but as a good faith gesture, WECC has already adopted this new focus on larger customers and higher impact measures. Accordingly, WECC will now only respond reactively to trade allies' requests for information as opposed to the previous approach of actively seeking out opportunities to provide information. They will also only provide support to the Residential program trade allies and vendors when they are asked to. This new direction was initiated in mid-summer of 2010, but both Duke Energy and WECC expect to see these efforts start paying off over the course of the next program year.

Trade Ally Interview Results

The five Smart $aver® trade allies were interviewed in March 2010. All of the interviews were conducted with a sales manager within the firm or an equivalent representative. Each of the respondents indicated that they are the individual within their company who has the most experience and is the most acquainted with the program. The interview protocol used during these interviews can be found in Appendix A: Vendor Interview Instrument.

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

Program Materials

We asked the trade allies if they had enough program materials such as brochures, applications, and program documentation to effectively sell the program to their customers. All five trade allies indicated that they had enough program forms and applications but thought that Duke Energy needed to provide more marketing materials to improve their marketing and outreach effectiveness. Three of the five trade allies said that they had never seen any marketing material from Duke Energy about the Smart $aver® program.

Problems That Have Come Up

All trade allies interviewed said that their experiences with the program were free of any problems and that they were pleased with the program.

When we asked about customer complaints from the trade allies' perspective; in response to our question, trade allies reported that there have been very few customer complaints. Only one trade ally could recall one customer complaint about the program. The customer was surprised to receive a 1099 tax form, however the trade ally said he had previously informed the customer that this would be the case.

Effect of Program Changes

The changes that Duke Energy has recently put into effect – specifically the end of the bonus incentives – may reduce both trade ally and customer interests, and program participation, according to the interviewed trade allies. The specific comments received include:

- "The only objection I have is taking away the bonus incentive."
- "The bonus rebate was very helpful in getting a couple projects closed."
- "When the bonus is on it, it's a very good incentive."

Wait Time for Incentive

The length of time that passes from when the application forms are submitted, to the arrival of the rebate check are described as reasonable by all five trade allies. The stated average length of time to wait for a rebate check varied very little from 2 to 3 weeks. While this evaluation did not confirm the wait times by reviewing the application dates and the date of the rebate distributions, past experience in these types of studies indicate that contractors and customers expect rebates to be promptly processed and paid. A 2 to 3 week period is not only reasonable, it is faster than other programs offered by other utilities we have evaluated in the past which have taken in excess of 4 to 6 weeks.

What About Smart $aver® Works Well

Each interviewed trade ally was asked what they think works well about the program. This question was then followed with a question about what changes should be made to the progam. The trade allies responded to the question of what works well about the program with a variety of responses. Three out of five trade allies mentioned ease of use and ease of forms as an aspect of Smart $aver® that works well. Further, two trade allies noted that the ease of forms allowed them to offer to fill out the forms for their customers and provide that as a free value-added service rather than a paid service. Specific responses include:

- "The ease of use. I've looked at other utilities lighting incentive programs and by far Duke Energy's is the easiest one to use."
- "The rebate checks are cut fairly quickly."
- "If there is a problem or a question it's usually something quick and easy."
- "It's easy to do, cut and dry, money gets to customers quickly. WECC[4] does a great job administrating the program."

While all trade allies interviewed see the program as a way to encourage customers to upgrade their lighting equipment to a higher efficiency level, many feel that the loss of the bonus incentive will be damaging to the number of customers that will choose to purchase the higher efficiency equipment. However, these trade allies noted that the current rebates do provide an incentive for their customers to buy the more efficient product.

What Should Change About Smart $aver®

The responses to the question of what should be changed varied among the trade allies, with some vendors providing multiple responses. One of the common responses received is that trade allies would like to see the bonus incentive brought back into the program to help their customers achieve a faster return on investment and increase the trade allies'

[4] Wisconsin Energy Conservation Corporation

sales rates for high efficiency products. Trade allies also want to submit online applications, although it was noted that the form process currently works well. Other comments received include:

- "There are some products listed on the WECC Web Site that are "second market" (would not be their first product choice)."
- We've had it happen where the energy efficiency of high-bay lighting from our preferred manufacturer misses by 0.2 or 0.1 percent. The wattage savings is still there, but we've had to change the product offered midstream, during the application process (when savings were too low with the specified product).

Communications with Duke Energy Staff

All of the trade allies interviewed said that communication with Duke Energy staff was fine, though limited. All trade allies said that Rob Jung was their contact person at Duke Energy and they were very satisfied with his responses to their questions. No communication issues were identified by the interviewed allies.

Customer Awareness of Smart $aver®

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

All of the trade allies said they tell their customers about the program during normal sales communications and present it as a way to achieve a faster return on investment for the incented high efficiency technology. All trade allies said that customers respond positively to the idea of the incentive and the savings.

Three of the five trade allies said that the majority of their customers were not aware of the Smart $aver® program before it was presented to them (by the trade ally). Furthermore, two of those three trade allies said that their customers often do not initially believe that the rebates are real and need to be convinced of the rebate and estimated ROI (Return On Investment) either by visiting the Duke Energy Web site or talking to a Duke Energy representative. One trade ally felt that his customers' skepticism over savings was a result of difficulty in understanding the Duke Energy billing system. These comments indicate that program brochures and informational materials may be helpful in convincing customers that the offer is legitimate and it can help convince customer to take advantage of the offer.

Market Transformation

Trade allies were asked what the incentive level would have to be for more than 80 percent of the market to elect to up-grade to the energy efficient model. Three trade allies mentioned bringing back the bonus incentive as a step to achieving this goal. One trade ally responded that because of the current economic conditions most customers were looking for a maximum of a one-year return on investment and a six-month ROI would achieve 80 percent of the market going to the more efficient unit. The most specific reply from a trade ally was that an incentive at 75 percent of the material cost of the equipment

would achieve this goal. These comments suggest that the market has tightened as a result of the economic slow-down and that it may be getting harder to move customers to the up-graded choice. This also argues for building supportive materials for the allies to help "up-sell" to the energy efficiency choice. It also suggests that the importance of the incentive and its impact on speed of the investment recovery is taking a higher place of importance in the decision framework. In these conditions we would expect to see a decrease in the number of freeriders as customer move toward the lower cost options as a result of increased economic pressures to minimize first costs. This condition also opens an opportunity for the allies to be more effective in helping the customers who can upgrade to the energy efficient choice, if the return can be clearly demonstrated to the customer and if the incentives are set at a point to be both cost effective and act as an effective change inducement.

Why Trade Allies Participate

Why trade allies participate varies from the basics (increased sales/profit) to the altruistic (doing the right thing for their customers).

Program Technologies and Incentives

We also talked to the trade allies about the technologies offered in the program, and the incentives that are provided. The technologies covered are supported by almost everyone we spoke with.

Technologies and Equipment Covered

Four of the five trade allies interviewed thought that no technologies currently covered by the program should be removed. One trade ally mentioned that he would consider some lamp and ballast combinations on the WECC Web site as "second market" choices (not the first choice product lines). The trade ally would not specify the products but also added that he thought in some cases quality was being sacrificed for price and energy efficiency.

Incentive Levels

All trade allies interviewed indicated that they were very satisfied with the bonus incentive that has now been discontinued, but less satisfied with the current incentive levels. One trade ally noted that in a down economy a higher rebate level is much more important than it is in a strong economy since the window for a return on investment is smaller. Another trade ally noted that the ending of the bonus incentive created some urgency for customers to complete sales, but he felt that his customers did not get word of the program soon enough to make it fully effective. A third trade ally felt sales could have been doubled with two more months of bonus incentives.

Other Technologies That Should Be Included

Trade allies mentioned six technologies that they thought should be considered for the program. The most often mentioned technologies were LED and induction lighting. Two trade allies also expressed a desire to see non-peak technologies such as parking lot lights covered. Other suggestions included:

- "Need to look at reducing lamps and adding reflectors, but that may be a little complicated for prescriptive."
- "Watt-stopper Isolé[5]. It's a personal occupancy sensor at your desk."
- "There are some really cool devices out that change the operational function of compressors. Cuts back the number of times the compressor runs, runs for longer but with fewer start-ups. It gives about 15 percent savings."
- "KVAR[6] units are a really hot thing right now. Controversial in some places."

How the Program Changes Business

Overall, the trade allies report that the program has changed their business by increasing their sales, increasing the size of their customer base, and providing high levels of customer satisfaction. The comments received from the interviewed contractors include:

- "We're becoming lighting consultants now instead of just vendors."
- "The lighting contingency of this business was virtually non-existent before the incentives and is now 1/3 of our business. It's not 100 percent Duke, but is a large percentage. "
- "Being the point man on the rebate allows us to be more profitable."

Suggestions for Streamlining Participation Process

The only suggestion offered by the trade allies was to streamline the process came from contractors who suggested that the program applications be available via an online process. Three out of five trade allies said that this would improve their participation experience.

Program Results

We asked the trade allies about the benefits of their participation in the program to them and to their customers, and how the program has altered their business by changing what equipment they offer. But several noted the need for supportive marketing materials from Duke Energy. None of the contractors have made significant changes to their marketing strategies because of the program. Their goal is to obtain the best return on investment for their customers. The incentives mean that they can push the energy efficient units at a reduced price allowing more customers to obtain a faster return on investment. These findings are consistent with the program theory to increase market penetration via rebates and incentives.

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

[5] http://www.wattstopper.com/products/details.html?id=74
[6] http://www.kvar.com/1000/home

Two of the five trade allies said that the program has resulted in their businesses carrying other energy efficient equipment not covered by the program. One trade ally now carries LEDs, while another carries solar devices, LEDs and power factor correction devices. We note that the addition of additional product lines is a metric associated with market transformation impacts above and beyond direct program impacts. One trade ally also reported that he sold $3.3 million in non-program energy efficient units in the last year indicating a move to less expensive equipment. The sales amount was described as "very substantial in a down market."

Program's Effect On Manufacturing Practices

Three of the five trade allies thought that the program has increased the numbers of energy efficient technologies being manufactured (an indication of possible market effects above and beyond the program). Furthermore, one trade ally said that less efficient products are being pushed out of the available technology market because of the specifications required for the rebates. Two trade allies were unsure of the program's effect on manufacturing. These responses provide an indication of possible market effect savings that can occur as programs influence the operations of a technology market.

Program's Influence on Business Practices

We asked the contractors if their business would change if the Smart $aver® program were no longer offered. We posed the question: *"If the program were to be discontinued, what would happen to the volume of sales of the high efficiency models?"* All five trade allies indicated that sales would decline "on the edge" to "dramatically" decline. This response indicates that these allies think that a substantial part of their sales are program induced, suggesting low freerider levels. Specific responses include:

- "The projects that are going to happen are going to happen. Projects on the edge will stop."
- "Sales would drop off dramatically"
- "It's hard to put a number on it, but our ordering and stocking practices would change."
- "It would cut sales by 50 percent if we didn't have the program."

None of the trade allies said they would change their high efficiency model pricing structure if the program were no longer available, suggesting that the program has not had an impact on product pricing.

We also asked the contractors what percent of their total measure sales were high efficiency and what percent were rebated through the Duke Energy program. Only two trade allies were able to provide percentages. One trade ally reported 100 percent high efficiency and 100 percent receiving Duke Energy rebates. The other trade ally also reported 100 percent high efficiency with 75 percent receiving the Duke Energy rebate.

Continuing Need For The Program

We asked the trade allies if they thought that the program was still needed. All of the interviewed trade allies said yes the program should continue. All trade allies considered the Smart $aver® program an essential sales tool for energy efficient equipment and indicated that sales of energy efficiency models would fall to dramatically fall.

Freeriders

We also asked the trade allies to estimate the level of freeriders. Only two trade allies felt qualified to answer questions about their customers' level of freeridership. One trade ally reported that the rebate makes a great difference to 75 percent of customers and at least somewhat of a difference to 25 percent. The other trade ally stated that the rebate makes a great difference to 30 percent, somewhat of a difference to 60 percent and little or no difference to 10 percent of customers. These estimates, while not reliable indicate that the trade allies think freeridership would be in the 15% to 40% range.

Participant Survey Results

We interviewed 25 out of a possible 88 Smart $aver® participants for which we were provided contact data and measure description. One participant was surveyed on two different energy efficient measures.

Overall Satisfaction

Participants were asked about their overall satisfaction on a one-to-ten scale with one indicating they were completely unsatisfied and ten indicating that they were completely satisfied with the Smart $aver® program as well as the satisfaction with Program Understandability, Duke Energy Staff, Rebate Levels, Rebate Time, Technologies Covered, and Information Materials. As shown in Figure 1 participants have a high satisfaction rate with the Smart $aver® Program. Only three categories received any ratings from customers less than 7: Technologies Covered, Rebate Levels, and Communication with Duke Energy Staff. Those participants noted that the rebate levels could be higher, and that Duke Energy was often unclear when requesting more information for applications.

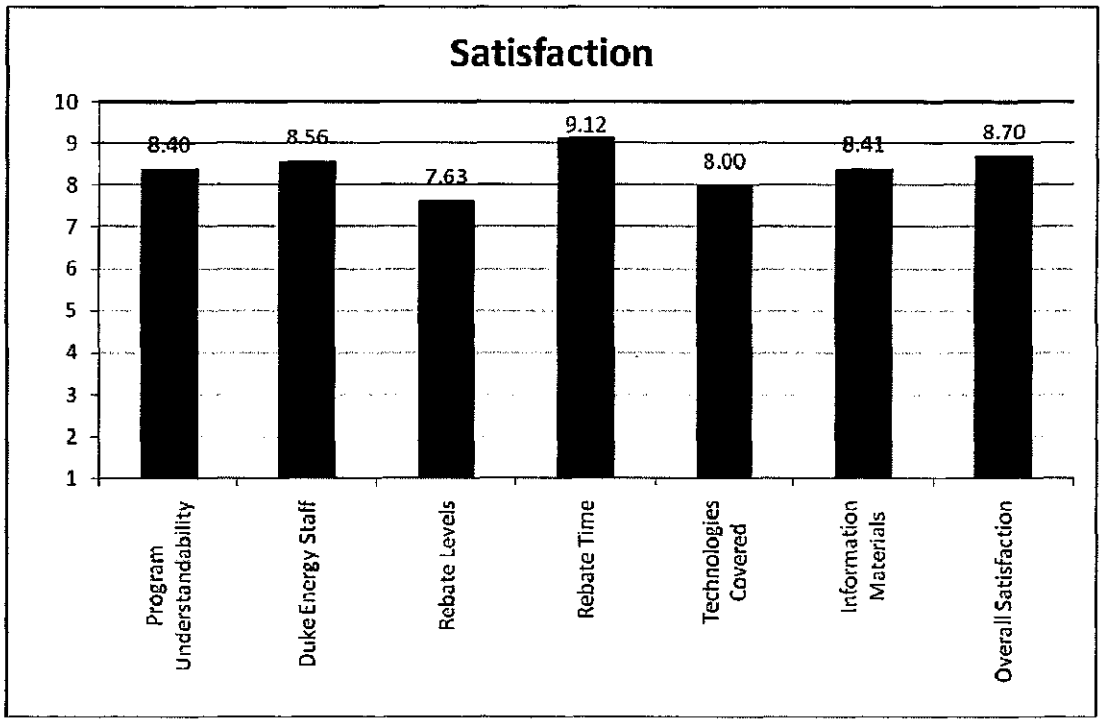

Figure 1. Overall Satisfaction with Duke Energy

Motivating Factors

Participants were asked an unprompted question for the all the factors that motivated them to purchase the energy saving device. Figure 2 shows the factors mentioned as well as the percentage of participants surveyed who mentioned each factor. 58 percent of

participants cited the program incentive as a motivating factor while 96 percent cited the desire to reduce energy usage.

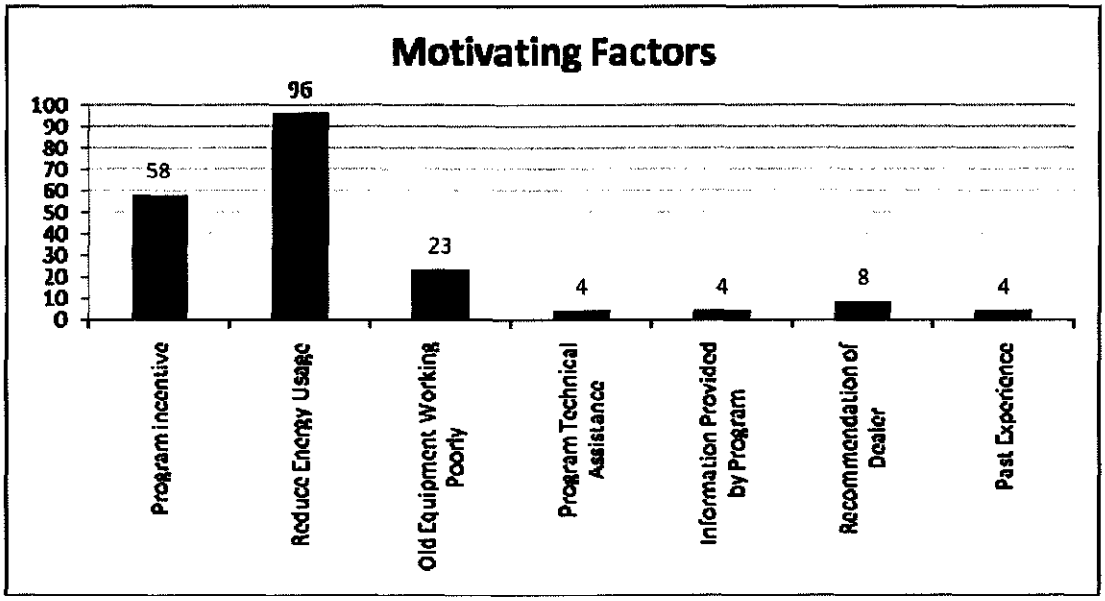

Figure 2. Factors that motivated participants to purchase an energy saving device

Technology Being Replaced

All of the surveyed participants indicated that none of the nine measures installed replaced a similar energy efficient measure. Three participants (12%) indicated that this was their first purchase of the particular energy efficient measure that they installed and had rebated through the Smart $aver® program.

Incentive Forms

Sixteen of the 25 participants (64%) surveyed said that they personally filled out the incentive forms. Of those 16, 15 (94%) cited no problems in understanding and completing the forms. One participant noted that the maximum allowance for the use of motion sensing occupancy sensors was unclear.

Wait Time for Incentive

The length of time that passes from when the application forms are submitted, to the arrival of the rebate check are described as reasonable and free of problems by all 25 participants.

Free Ridership

Participants were asked if they had been thinking about the particular measure installed, had begun collecting information on the measure, or had decided to buy the measure when they learned about the program. Participants had begun collecting information on

16 of the 26 measures when they learned about the program, 9 participants had begun thinking about the measure. Two participants said that they had specific plans to purchase the measure before learning of the program. Four participants (16 percent) indicated that they had changed their existing replacement plans in order to receive the Smart $aver® rebate.

Participants were asked if the rebate had not been available whether they would have purchased the same the same measure or an equally energy efficient one in the same time period. Eighteen of the participants were able to answer these questions. Responses included:

- Four participants (16%) indicated that they would have still purchased the same measures, but later. The time frame for these later purchases was 1 and 2 years.
- Three out of 25 participants (12%) said they would have installed the same energy efficient measure in the same time period without the rebate.
- Eleven of 25 participants (44%) stated that they would not have bought the energy efficient measure without the rebate.
- Seven participants (28%) were unsure what their buying behavior would have been had the rebate not been available.

While these responses are not definitive, they suggest that the freerider rate is about 28%. This scoring sets the responses counted in this analysis at 18 participants (7 could not answer the question) and provides half credit to the 4 participants who would have installed the same measures but from 1 to 2 years later. It provides full credit to the 11 who said that they would not have purchased the same energy efficient equipment. Because these responses are self-reports and do not adjust for self-selection bias, false response bias or positive result bias, the score should be considered somewhat conservative. However, we think that as a result of these responses that the net to gross value should be set at about 70% to 75% percent until more aggressive approaches can be applied.

Participants were asked to rank the influence of the program on their purchasing decision in five areas. The ranking uses a one-to-ten scale with one meaning strongly disagree and ten meaning strongly agree. As seen in Figure 3, participants agreed that the rebate was a critical factor in their purchasing decision. However, participants were not sure whether or not they would have purchased a less efficient measure or paid the additional money for the more efficient product.

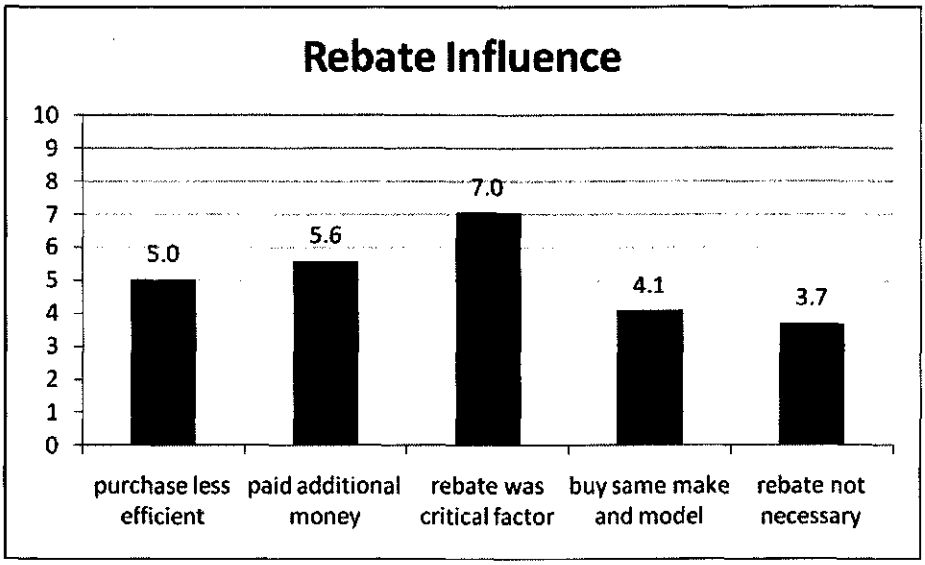

Figure 3. Rebate influence on purchasing decision

What About Smart $aver® Works Well

Each participant was asked what they think works well about the program. Sixteen participants (64%) cited the incentive as what they liked the most. Two participants (8 %) also cited the simplicity and understandibiltiy of the program.

Increasing Participation

Participants were asked what they thought would increase participation in Smart $aver®. Five participants suggested increasing the rebate levels while seven participants thought that awareness for the program was very low and that Duke Energy should advertise the program more aggressively. One participant recommended making technologies that are currently only available in custom options, such as LEDs, available for the prescriptive program.

What Should Change About Smart $aver®

Four participants (16%) offered examples of what they thought could be changed in the program:

- "The lack of options"
- "Filling out the paperwork, but I didn't find it unreasonable."
- "People just need to take more advantage of it."
- "Rebate levels."

Impact Analysis

The impact evaluation employed a tracking system review, an engineering review of the lighting measure savings calculations, and field measurement and verification (M&V) of selected lighting measures. The tracking system review revealed that a few measures were responsible for the majority of the savings. Tracking data obtained from Duke Energy from November 2008 through November, 2009 shows that following breakdown of energy savings by measure:

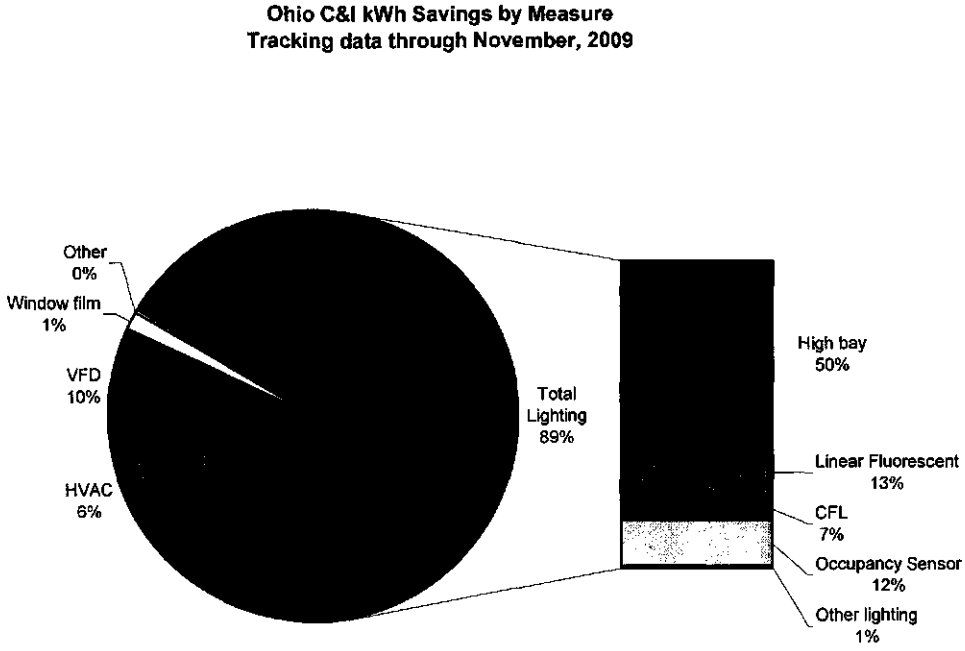

Figure 4. Measure Contribution to Ohio C&I Program Savings.

Note, lighting, variable frequency drives (VFDs) and HVAC measures made up 99% of the total reported savings. Lighting was dominated by high-bay applications, making up 61% of the total lighting savings, and 50% of the total program savings. Based on this analysis, the impact evaluation was conducted as follows:

Lighting measures. We focused on the high bay applications, since these made up 50% of the total lighting savings[7]. Engineering review of the lighting program savings

[7] Note, an initial tracking system analysis based on tracking system energy savings showed high bay fixtures comprised a much larger fraction of the total lighting savings. During a more detailed review, the tracking system energy savings were found to be in error. Program planning estimates were substituted for the tracking system estimates, resulting in the measure breakdown shown in Figure 4.

involved a comparison of the measure savings recorded in the program tracking database to the savings estimates used in program design. This comparison revealed a problem with the tracking system savings estimates. The savings for each measure were recalculated using the fixture kWh and kW savings estimates developed during program planning and entered into DSMore; and measure counts as recorded in the tracking system

The evaluation team conducted field M&V of a sample of high bay lighting participants to estimate savings for this measure. The field M&V consisted of a site visit, verification of the quantity and type of incented lighting fixtures, verification of fixture wattage assumptions against manufacturer's catalog data, interviews with customers to identify the type and quantity of the replaced fixtures, and short-term monitoring of lighting system operation using light loggers to verify operating hours. The field M&V activities were conducted by Duke Energy contractors and the results were forwarded to Architectural Energy Corporation for analysis. The field M&V activities were compliant with the International Performance Measurement and Verification Protocols (IPMVP) Option A – Partially measured, retrofit isolation protocol.

A sample frame of high bay lighting participants was developed by TecMarket Works and a random sample of 20 sites was selected. Each site was recruited for the M&V study by the Duke Energy M&V contractors. The contractors were successful in recruiting and installing instrumentation at all 20 sites.

HVAC. HVAC made up an additional 6% of the claimed savings. The distribution of the HVAC savings by measure type is shown in Figure 5.

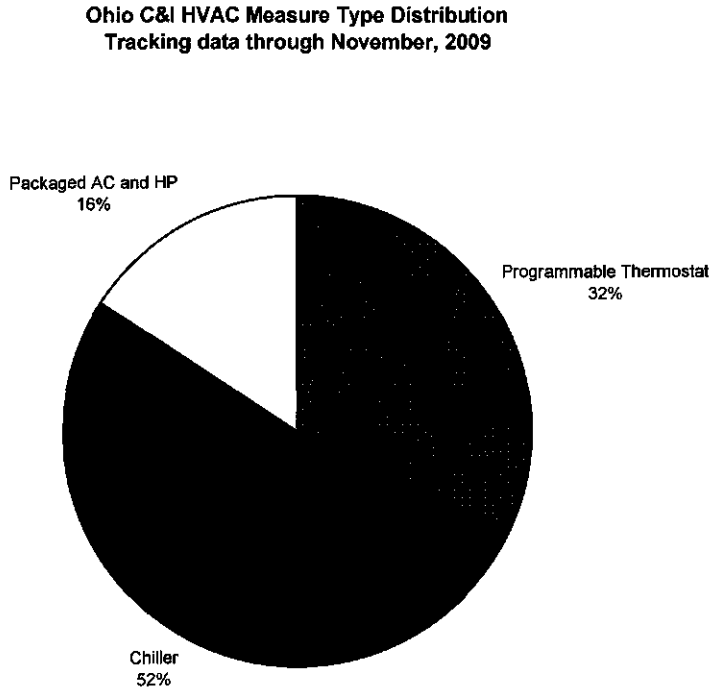

Figure 5. Measure Contribution to Ohio C&I Program HVAC Savings.

HVAC measures will be evaluated during the 2010 cooling season and the results will be reported in the Ohio C&I Prescriptive Smart $aver® Update report.

VFDs. Measurement and verification activities will be conducted at a sample of VFD participants during the 2010 cooling season and the results will be reported in the Ohio C&I Prescriptive Smart $aver® Update report.

Lighting Analysis

Lighting program participation records covering the period from November, 2008 through the end of November, 2009 were obtained from Duke Energy. The data, delivered as an Access database, contained customer name and address, installing vendor contact information, measure descriptions, unit energy savings estimates, number of measures installed, lighting operating hours, installed fixture watts, rebate amounts, and so on. These data were examined to identify which of the measures promoted by the program were adopted by program participants and in what numbers, how the energy savings in the tracking system compared to the program savings estimates, and the availability of any customer description data that could be used in the analysis.

The lighting program tracking system showed lighting measures installed in sites representing a total of 412 participating customers. The types and quantity of measures installed are shown in Table 1.

Table 1. Lighting Measures Installed Under Program

Measure Group	Quantity	kWh
CFL hard-wire	2,304	678,298
CFL screw in	9,010	1,326,272
Exit signs	622	98,077
HID	48	20,767
High bay fluorescent	6,877	15,394,579
Lighting controls	6,634	3,802,389
Linear fluorescent	56,710	3,994,455

The distribution of measure installations and savings by the measure groups defined above are shown in Figure 6 and in Figure 7.

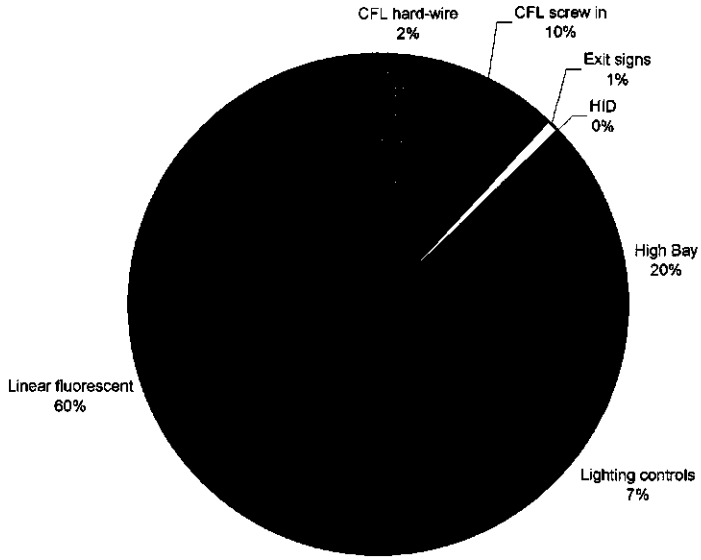

Figure 6. Distribution of Lighting Measure Installation Counts by Measure Group

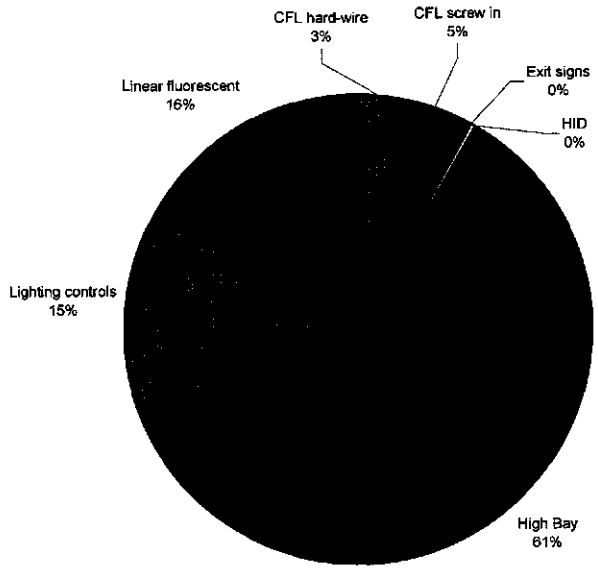

Figure 7. Distribution of Lighting Measure kWh Savings by Measure Group

Note, while high bay fixtures only accounted for 20% of the measure count, they accounted for 61% of the total lighting kWh savings, due to higher energy savings per measure.

Revised Tracking System Gross Energy and Demand Savings.

As mentioned above, the algorithms used by the program tracking database to record energy and demand savings were found to be in error. A set of revised energy and demand savings estimates was developed for each measure in the program tracking database using the unit savings estimates used during program planning. The unit kW and kWh savings[8] assigned to each lighting measure are shown in Table 2.

Table 2. Lighting Fixture Savings Assumptions

Fixture type	Standard Fixture Watts	Efficient fixture watts	kW savings per fixture	Assumed operating hours	kWh savings per fixture
CFL					
Compact Fluorescent Fixture	120	40	0.080	3680	294
Compact Fluorescent Screw in	60	20	0.040	3680	147
High Bay Lighting					
High Bay 2L T-5 High Output	215	122.5	0.093	4160	385
High Bay 3L T-5 High Output	290	182	0.108	4160	449

[8] Based on lighting fixture wattage data developed by Franklin Energy Services (FES) for Duke Energy

Fixture type	Standard Fixture Watts	Efficient fixture watts	kW savings per fixture	Assumed operating hours	kWh savings per fixture
High Bay 4L T-5 High Output	455	243	0.212	4160	882
High Bay 6L T-5 High Output	455	365	0.090	4160	374
High Bay 8L T-5 High Output	1080	450	0.630	4160	2,621
High Bay Fluorescent 3 Lamp (F32 Watt T8)	215	133	0.082	4160	341
High Bay Fluorescent 4 Lamp (F32 Watt T8)	290	142	0.148	4160	616
High Bay Fluorescent 6 Lamp (F32 Watt T8)	455	224	0.231	4160	961
High Bay Fluorescent 8 Lamp (F32 Watt T8)	455	299	0.156	4160	649
2 High Bay 6L T-5 High Output replacing 1000W HID	1080	730	0.350	4160	1,456
2 High Bay Fluorescent 8LF32T8 - Replacing 1000W HID	1080	598	0.482	4160	2,005
42W 8 Lamp High Bay Compact Fluorescent	455	372	0.083	4160	345
Pulse Start Metal Halide	455	351	0.104	4160	433
High Performance T8					
High Performance T8 4ft 1 lamp, replacing standard T8	31	26	0.005	3680	18
High Performance T8 4ft 1 lamp, replacing T12-HPT8	43	26	0.017	3680	63
High Performance T-8 4ft 2 lamp replacing T-12 8ft 1 lamp	75	57	0.018	3680	66
High Performance T-8 4ft 2 lamp replacing T-12 High Output 8ft 1 lamp	113	66	0.047	3680	173
High Performance T8 4ft 2 lamp, replacing standard T8	58	50	0.008	3680	29
High Performance T8 4ft 2 lamp, replacing T12-HPT8	72	50	0.022	3680	81
High Performance T8 4ft 3 lamp, replacing standard T8	85	76	0.009	3680	33
High Performance T8 4ft 3 lamp, replacing T12-HPT8	115	76	0.039	3680	144
High Performance T-8 4ft 4 lamp replacing T-12 8ft 2 lamp	123	110	0.013	3680	48
High Performance T-8 4ft 4 lamp replacing T-12 High Output 8ft 2 lamp	207	127	0.080	3680	294
High Performance T8 4ft 4 lamp, replacing standard T8	112	98	0.014	3680	52
High Performance T8 4ft 4 lamp, replacing T12-HPT8	144	98	0.046	3680	169
Standard T-8					
T-8 2ft 1 lamp	27.5	20	0.008	3680	28
T-8 2ft 2 lamp	43	33	0.010	3680	35
T-8 2ft 3 lamp	68	48	0.020	3680	74
T-8 2ft 4 lamp	85	63	0.022	3680	81

Fixture type	Standard Fixture Watts	Efficient fixture watts	kW savings per fixture	Assumed operating hours	kWh savings per fixture
T-8 3ft 1 lamp	37	26	0.011	3680	40
T-8 3ft 2 lamp	53	43	0.010	3680	37
T-8 3ft 3 lamp	90	78	0.012	3680	44
T-8 3ft 4 lamp	106	86	0.020	3680	74
T-8 4ft 1 lamp	44	30	0.014	3680	52
T-8 4ft 2 lamp	77	60	0.017	3680	63
T-8 4ft 3 lamp	120	88	0.032	3680	118
T-8 4ft 4 lamp	150	112	0.038	3680	140
T-8 8ft 1 lamp	69	58	0.011	3680	40
T-8 8ft 2 lamp	132	112	0.020	3680	74
T-8 High Output 8 ft 1 Lamp	105	80	0.025	3680	92
T-8 High Output 8 ft 2 Lamp	210	160	0.050	3680	184
Low Watt T8					
High Performance Low Watt T8 4ft 1 lamp, replacing standard T8	31	23	0.008	3680	29
High Performance Low Watt T8 4ft 2 lamp, replacing standard T8	58	45	0.013	3680	48
High Performance Low Watt T8 4ft 3 lamp, replacing standard T8	85	68	0.017	3680	62
High Performance Low Watt T8 4ft 4 lamp, replacing standard T8	112	87	0.025	3680	92
Low Watt T8 lamps replacing standard 32 Watt T-8's	32	28	0.004	3680	15
T-5 and HO T-5					
T-5 1 Lamp with Electronic Ballast (replacing T-12 fixture)	44	32	0.012	3680	44
T-5 2 Lamp with Electronic Ballast (replacing T-12 fixture)	77	65	0.012	3680	44
T-5 3 Lamp with Electronic Ballast (replacing T-12 fixture)	120	93	0.027	3680	99
T-5 4 Lamp with Electronic Ballast (replacing T-12 fixture)	150	126	0.024	3680	88
T-5 High Output 1 Lamp with Electronic Ballast (replacing T-12 fixture)	77	62	0.015	3680	55
T-5 High Output 2 Lamp with Electronic Ballast (replacing T-12 fixture)	141	122	0.019	3680	70
T-5 High Output 3 Lamp with Electronic Ballast (replacing T-12 fixture)	210	185	0.025	3680	92
T-5 High Output 4 Lamp with Electronic Ballast (replacing T-12 fixture)	295	243	0.052	3680	191
Exit Signs					
LED Exit Signs Electronic Fixtures (Retrofit Only)	22	4	0.018	8760	158

Unit demand and energy savings assumptions for LED fixtures and lighting controls[9] are shown in Table 3.

Table 3. Unit Demand and Energy Savings for LED and Lighting Control Measures

Fixture	KW/unit	KWh/unit
LED Auto Traffic Signals	0.085	275
LED Pedestrian Signals	0.044	150
Occupancy Sensors over 500 Watts	0.290	1068
Occupancy Sensors under 500 Watts	0.120	427

Customers indicated the annual operating hours of their lighting systems on the incentive applications. These self-reported lighting system hours of operation are entered into the program tracking database. A tabulation of the average self reported operating hours by building type are shown below.

[9] Based on lighting fixture energy and demand savings data developed by Franklin Energy Services (FES) for Duke Energy

Table 4. Self-Reported Lighting Operating Hours by Building Type

Building Description	Operating hour report frequency by building type	Average self-reported operating hours from program application
Data Centers	5	5,699
Education K-12	56	3,118
Education other	10	3,660
Elder Care/Nursing home	7	7,794
Fast Food	4	3,434
Food Sales/Grocery	9	5,616
Full Service Restaurant	12	5,271
Healthcare	35	4,566
Industrial	162	5,012
Lodging	15	6,495
Manufacturing	1	8,736
Office	68	3,253
other-institutional	6	1,800
other-mass	40	3,149
Public Assembly/Church	35	3,006
Public Order Safety	16	5,412
Religious Worship	1	3,130
Retail (Mall)	9	3,719
Retail (non-mall)	64	4,185
Service	91	2,928
Warehouse	65	4,345

The distribution of the self-reported operating hours by building type and fixture type is shown in Table 4:

Table 5. Self-Reported Lighting Operating Hours by Building and Fixture Type

	CFL	Linear fluorescent	High Bay
Data Centers		6,282	6,574
Education K-12	2,694	2,460	3,411
Education other	2,960	3,120	4,172
Elder Care/Nursing home	8,760	6,075	
Fast Food	2,998	5,000	
Food Sales/Grocery		4,883	7,919
Full Service Restaurant	5,617	4,002	2,184
Healthcare	5,167	3,448	
Industrial	8,470	5,115	5,583
Lodging	6,058	2,968	
Manufacturing			8,736
Office	3,918	3,616	4,243
other-institutional	1,800		
other-mass	3,319	4,327	3,181
Public	2,728	1,919	2,500

	CFL	Linear fluorescent	High Bay
Assembly/Church			
Public Order Safety	0	4,878	2,080
Religious Worship	3,130		
Retail (Mall)	4,200	2,691	2,900
Retail (non-mall)	3,725	4,592	3,199
Service	2,304	2,557	3,221
Warehouse	3,131	4,034	5,313
Total	4,650	3,997	5,053

High Bay Lighting M&V Study

A sample of 20 customers installing High Bay Lighting fixtures was selected. A summary of the characteristics of the customers that participated for the High Bay Lighting Study is shown in Table 6.

Table 6. High Bay Lighting M&V Study Participants

Site	Business Type	Total fixtures rebated	Installed Fixture(s)	Baseline Fixture(s)
1	Industrial	14	T8 High-bay- 4 ft 6 lamp	400W MV T12 8 ft 2L
2	Industrial	172	T8 High-bay- 4 ft 8 lamp	400 W MH
3	Industrial	655	T5 HO High Bay 4L T5 HO High Bay 8L	400 W MH 1000 W MH
4	other-mass	37	T5 HO High Bay 4L	400 W MH
5	other-mass	16	T8 High-bay- 4 ft 6 lamp	400 W MH
6	Industrial	32	T8 High-bay- 4 ft 6 lamp	400 W HPS 8 ft 1 L T-12
7	Education K-12	28	T8 High-bay- 4 ft 6 lamp	250 W MH
8	Warehouse	64	T5 HO High Bay 6L	400 W MH
9	Education other	28	T5 HO High Bay 6L	250 W MH
10	Education K-12	56	T8 High-bay- 4 ft 4 lamp T5 HO High Bay 3L T5 HO High Bay 4L	400 W MH
11	Education K-12	56	T8 High-bay- 4 ft 4 lamp T5 HO High Bay 3L T5 HO High Bay 4L	400 W MH
12	Industrial	41	T8 High-bay- 4 ft 6 lamp	400 W MH
13	Industrial	101	T8 High-bay- 4 ft 6 lamp T8 High-bay- 4 ft 8 lamp T5 HO High Bay 8L	400 W MH 1000 W HPS
14	Industrial	132	T5 HO High Bay 2L T5 HO High Bay 3L T5 HO High Bay 4L	400 W MH
15	Industrial	91	T8 High-bay- 4 ft 6 lamp	400 W MH
16	Warehouse	208	T8 High-bay- 4 ft 4 lamp T8 High-bay- 4 ft 6 lamp	400 W MH

Site	Business Type	Total fixtures rebated	Installed Fixture(s)	Baseline Fixture(s)
17	Public Assembly/Church	25	T8 High-bay- 4 ft 5 lamp	400 W MH
18	Warehouse	30	T8 High-bay- 4 ft 4 lamp T8 High-bay- 4 ft 6 lamp	400 W MH
19	Retail (non-mall)	20	T5 HO High Bay 4L	400 W MH
20	Service	171	T8 High-bay- 4 ft 6 lamp	400 W MV 400 W MH

Paper file applications and supporting documentation were obtained for each site. The data in the application files were reviewed and compared to the program tracking database and onsite survey observations. Discrepancies were noted and corrected for the impact evaluation. These discrepancies are reported in Table 7. Note: Two of the projects in the sample were ineligible for the program, since they did not replace HID lighting systems.

Table 7. Tracking System and Paper File Discrepancies

Site	Discrepancy
Site 1	Ineligible baseline fixture, must be HID, fixture efficacy does not meet program specs
Site 5	Does not meet program minimum of 1800 hours
Site 6	Ineligible baseline fixture, must be HID
Site 7	Cut sheet does not match fixtures in application. 2 for 1 replacement
Site 10	Rebated fixture count > original fixture count
Site 11	Rebated fixture count > original fixture count
Site 12	Rebated fixture count > original fixture count
Site 14	Fixture type not covered by program
Site 18	Rebated fixture count < original fixture count
Site 20	Fixture count mismatch between application and onsite survey

Fixture watts reported in the manufacturer's catalogs (where available) were averaged and compared to the standard assumptions used in program design for several popular fixture types. This comparison is shown in Figure 8.

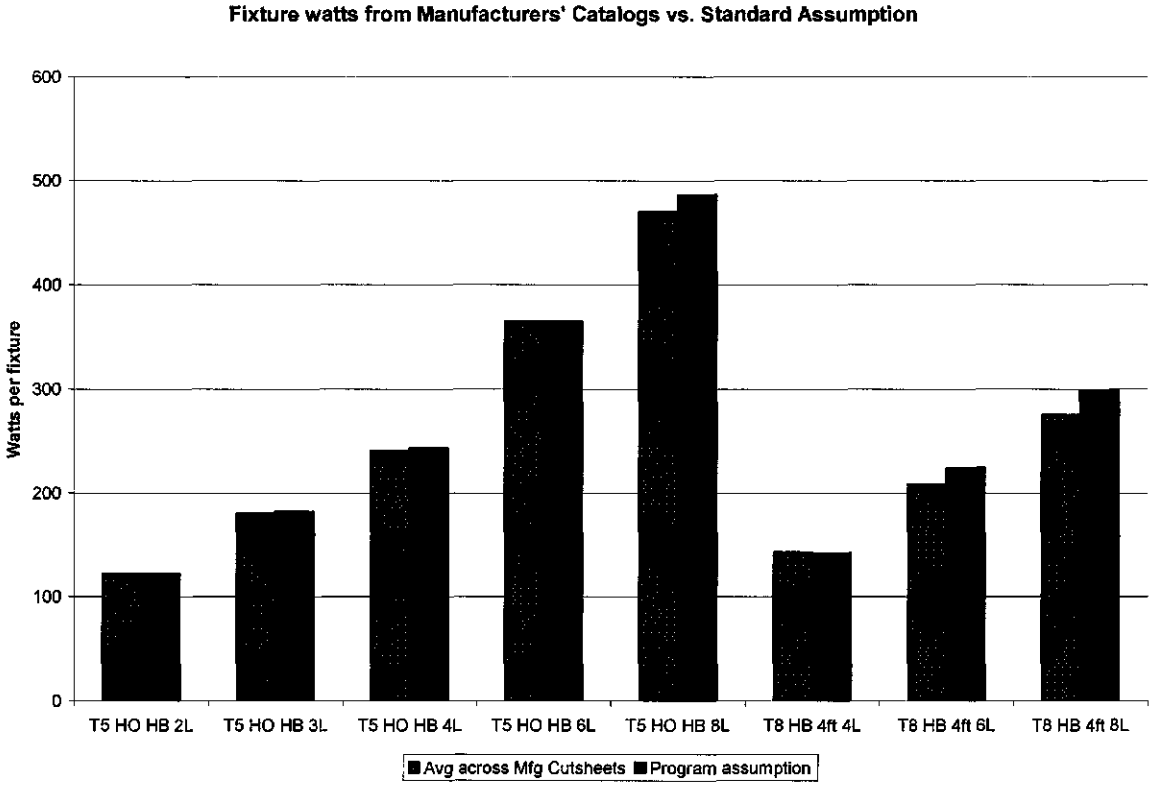

Figure 8. Comparison of Installed Fixture Watts from Manufacturers vs. Standard Assumptions

These data are also shown in Table 8.

Table 8. Comparison of Manufacturer's Fixture Watts with Standard Program Assumptions for High Bay Fixtures

Fixture	n	Program Assumption	Avg across Mfg Cutsheets
T5 HO HB 2L	1	122.5	122.0
T5 HO HB 3L	3	182.0	180.0
T5 HO HB 4L	6	243.0	238.9
T5 HO HB 6L	2	365.0	365.0
T5 HO HB 8L	2	450.0	470.0
T8 HB 4ft 4L	5	142.0	142.8
T8 HB 4ft 6L	8	224.0	215.9
T8 HB 4ft 8L	2	299.0	275.0

The average fixture watts from the manufacturer's catalogs matched the program design assumptions fairly well for T5 HO 2 lamp to 6 lamp fixtures and the 4 lamp t-8 fixture. The program design used a higher (more conservative) assumption for fixture watts for the T5 HO 8 lamp and the T8 4 ft 6 and 8 lamp fixtures.

The ability of the program applicants to accurately report the fixture watts on the program application was investigated. A comparison of the fixture watts on the application vs. the manufacturer's catalog data is shown in Figure 9 and Figure 10.

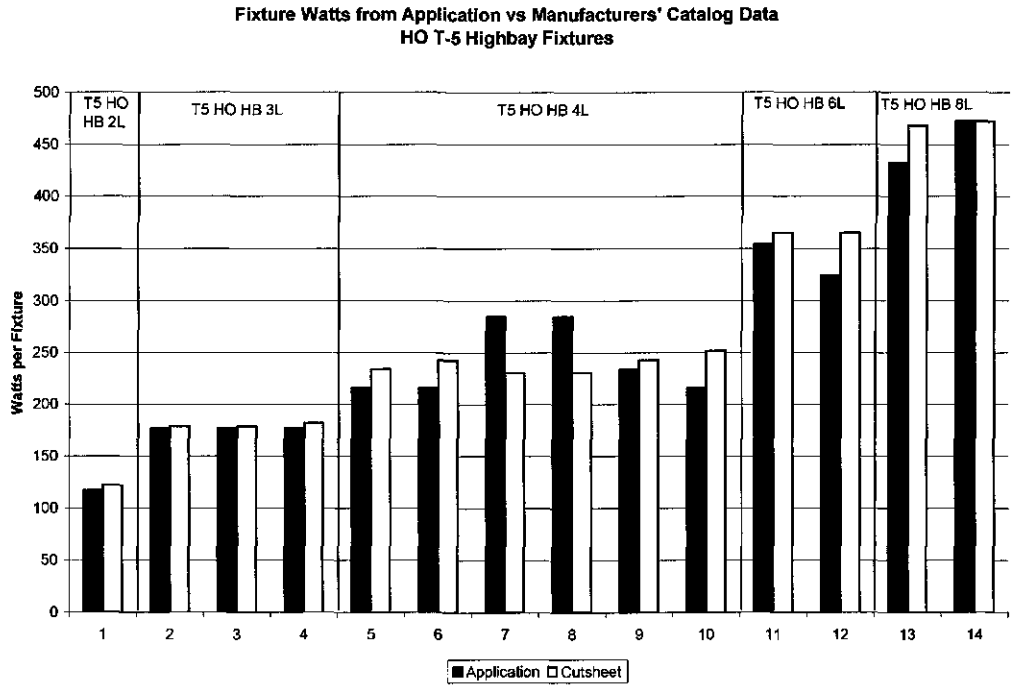

Figure 9. Comparison of Fixture Watts from Applications vs. Manufacturers' Catalog Data

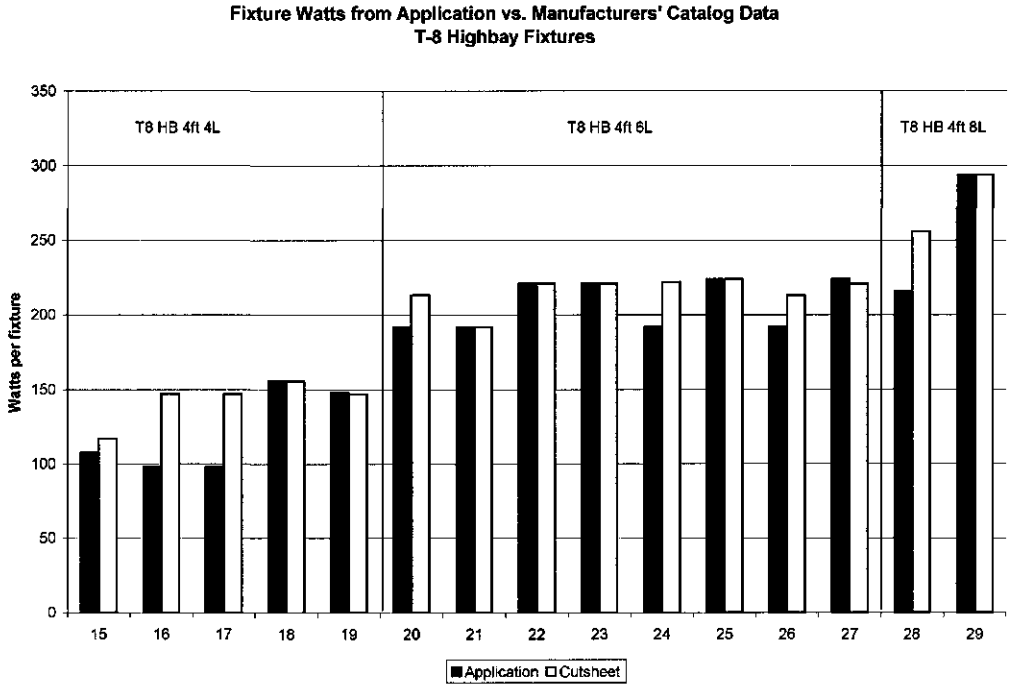

Figure 10. Comparison of Fixture Watts from Applications vs. Manufacturers' Catalog Data

Customer self reports of installed fixture watts varied widely from the data reported in the manufacturer's catalogs.

The fixture quantities installed at the sampled sites along with the number of light loggers deployed are shown in Table 9. Light loggers were deployed to monitor the on/off behavior of the lighting systems based on the circuiting and switching of the lighting systems. Due to group switching of multiple high bay fixtures, it was possible to monitor the on/off behavior of many fixtures with each light logger.

Table 9. Logger Installations at M&V Study Sites

Site	Business Type	Total fixtures rebated	Loggers installed
1	Industrial	14	1
2	Industrial	172	5
3	Industrial	655	5
4	other-mass	37	4
5	other-mass	16	1
6	Industrial	32	2
7	Education K-12	28	2
8	Warehouse	64	3
9	Education other	28	6
10	Education K-12	56	13

Site	Business Type	Total fixtures rebated	Loggers installed
11	Education K-12	56	11
12	Industrial	41	2
13	Industrial	101	4
14	Industrial	132	7
15	Industrial	91	2
16	Warehouse	208	4
17	Public Assembly/Church	25	3
18	Warehouse	30	12
19	Retail (non-mall)	20	4
20	Service	171	6

The light logger data were downloaded by the Duke Energy contractors, with assistance from Duke Energy evaluation staff. These data were processed by engineers from Architectural Energy Corporation. The results are shown in Table 10.

Table 10. Lighting Logger Study Results

Site	Business Type	Application self reported annual operating hours	Logger study annual operating hours	Ratio self report / logged	Coincident demand factor
1	Industrial	2,808	2,435	87%	0.90
2	Industrial	2,609	3,319	127%	0.90
3	Industrial	6,240	5,478	88%	0.91
4	other-mass	2,900	3,908	135%	0.92
5	other-mass	1,960	616	31%	0.18
6	Industrial	2,340	2,279	97%	0.90
7	Education K-12	2,150	2,482	115%	0.58
8	Warehouse	2,000	2,323	116%	0.70
9	Education other	3,120	2,557	82%	0.72
10	Education K-12	3,587	3,714	104%	0.74
11	Education K-12	3,587	3,214	90%	0.80
12	Industrial	2,900	2,402	83%	0.92
13	Industrial	6,240	3,567	57%	0.92
14	Industrial	8,760	8,442	96%	1.00
15	Industrial	5,616	4,842	86%	0.72
16	Warehouse	2,860	2,135	75%	0.90
17	Public Assembly/Church	2,500	1,171	47%	0.08
18	Warehouse	7,488	4,605	62%	0.50
19	Retail (non-mall)	2,250	486	22%	0.20
20	Service	2,340	1,163	50%	0.86
	Average ratio			**82%**	

On average, the light logger study predicted about 18% fewer operating hours than the customer self reports.

The light logger results were combined with the verified fixture counts and verified installed fixture watts to estimate the actual energy and peak demand savings. These results are shown in Table 11 as Eval kWh and Eval kW. These results were compared to the tracked savings based on the fixture counts and standard per fixture kW and kWh savings estimates from DSMore[10]. The ratio of the evaluated savings to the program planning estimated savings is expressed as a realization rate (RR) for both kWh and kW.

Table 11. Results of High Bay Lighting M&V Study

Site	Business Type	Eval kWh	DSMore kWh	RR (kWh)	Eval kW	DSMore kW	RR (kW)
1	Industrial	7,510	13,454	0.56	3.1	3.2	0.95
2	Industrial	113,603	111,628	1.02	34.2	26.8	1.28
3	Industrial	912,914	675,094	1.35	166.7	162.3	1.03
4	other-mass	30,654	32,634	0.94	7.8	7.8	1.00
5	other-mass	2,383	15,376	0.15	3.9	3.7	1.05
6	Industrial	19,180	30,752	0.62	8.4	7.4	1.14
7	Education K-12	12,023	17,248	0.70	4.8	4.1	1.17
8	Warehouse	-20,442	23,936	-0.85	-8.8	5.8	-1.53
9	Education other	3,913	10,472	0.37	1.5	2.5	0.61
10	Education K-12	35,047	37,874	0.93	9.4	9.1	1.04
11	Education K-12	30,326	37,874	0.80	9.4	9.1	1.04
12	Industrial	19,767	39,401	0.50	8.2	9.5	0.87
13	Industrial	110,162	115,421	0.95	30.9	27.7	1.11
14	Industrial	137,166	66,934	2.05	16.2	16.1	1.01
15	Industrial	102,656	87,451	1.17	21.2	21.0	1.01
16	Warehouse	59,922	128,818	0.47	28.1	31.0	0.91
17	Public Assembly/Church	7,078	24,025	0.29	6.0	5.8	1.05
18	Warehouse	284,591	233,498	1.22	61.8	56.1	1.10
19	Retail (non-mall)	1,973	17,640	0.11	4.1	4.2	0.96
20	Service	1,716	23,064	0.07	1.5	5.5	0.27
	Total	**1,872,142**	**1,742,594**	**1.07**	**418.5**	**418.9**	**1.00**

The average realization rates for kWh and kW for the sample are 1.07 and 1.00 respectively. Thus, the evaluation study estimated about 7% more kWh savings than the program planning assumptions. Non-coincident demand savings matched the program planning estimates very closely.

[10] DSMore inputs accept non-coincident kW savings. Coincidence factors are applied during the DSMore run. Demand savings are show as non-coincident kW for consistency.

Table 12. Results of High Bay Lighting M&V Study – Eligible Fixtures Only

Site	Business Type	Eval kWh	DSMore kWh	RR (kWh)	Eval kW	DSMore kW	RR (kW)
1	Industrial	2,230	13,454	0.17	0.9	3.2	0.28
2	Industrial	113,603	111,628	1.02	34.2	26.8	1.28
3	Industrial	912,914	675,094	1.35	166.7	162.3	1.03
4	other-mass	30,654	32,634	0.94	7.8	7.8	1.00
5	other-mass	2,383	15,376	0.15	3.9	3.7	1.05
6	Industrial	0	30,752	0.00	0.0	7.4	0.00
7	Education K-12	12,023	17,248	0.70	4.8	4.1	1.17
8	Warehouse	6,690	23,936	0.28	2.9	5.8	0.50
9	Education other	3,913	10,472	0.37	1.5	2.5	0.61
10	Education K-12	27,404	37,874	0.72	7.4	9.1	0.81
11	Education K-12	23,712	37,874	0.63	7.4	9.1	0.81
12	Industrial	21,360	39,401	0.54	8.9	9.5	0.94
13	Industrial	110,162	115,421	0.95	30.9	27.7	1.11
14	Industrial	36,469	66,934	0.54	4.3	16.1	0.27
15	Industrial	102,656	87,451	1.17	21.2	21.0	1.01
16	Warehouse	59,922	128,818	0.47	28.1	31.0	0.91
17	Public Assembly/Church	7,078	24,025	0.29	6.0	5.8	1.05
18	Warehouse	272,019	233,498	1.16	59.1	56.1	1.05
19	Retail (non-mall)	1,973	17,640	0.11	4.1	4.2	0.96
20	Service	2,313	23,064	0.10	2.0	5.5	0.36
	Total	**1,749,480**	**1,742,594**	**1.00**	**402.0**	**418.9**	**0.96**

When ineligible fixtures are removed, the total realization rates for kWh and kW for the sample drop slightly to 1.00 and 0.96 respectively. Thus, the evaluation study estimated about 4% less kW savings than the program planning assumptions when only eligible fixtures are considered.

The revised savings estimates for the studied fixtures are summarized in the Program Impacts Metrics Summary Table 13.

Table 13. Program Impact Metrics Summary

Metric	Result
Number of Program Participants from DATE RANGE	18,380 fixtures
Gross kW per fixture	kW/fixture
High Bay 2L T-5 High Output	0.089
High Bay 3L T-5 High Output	0.104
High Bay 4L T-5 High Output	0.204
High Bay 6L T-5 High Output	0.086
High Bay 8L T-5 High Output	0.605
High Bay Fluorescent 4 Lamp (F32 Watt T8)	0.142
High Bay Fluorescent 6 Lamp (F32 Watt T8)	0.222
High Bay Fluorescent 8 Lamp (F32 Watt T8)	0.150
Gross kWh per fixture	kWh/fixture

Metric	Result
High Bay 2L T-5 High Output	385
High Bay 3L T-5 High Output	449
High Bay 4L T-5 High Output	882
High Bay 6L T-5 High Output	374
High Bay 8L T-5 High Output	2,621
High Bay Fluorescent 4 Lamp (F32 Watt T8)	616
High Bay Fluorescent 6 Lamp (F32 Watt T8)	961
High Bay Fluorescent 8 Lamp (F32 Watt T8)	649
Gross therms per fixture	N/A
Freeridership rate	28%
Spillover rate	
Self Selection and False Response rate	
Total Discounting to be applied to Gross values	28%
Net kW per fixture	kW/fixture
High Bay 2L T-5 High Output	0.064
High Bay 3L T-5 High Output	0.075
High Bay 4L T-5 High Output	0.147
High Bay 6L T-5 High Output	0.062
High Bay 8L T-5 High Output	0.435
High Bay Fluorescent 4 Lamp (F32 Watt T8)	0.102
High Bay Fluorescent 6 Lamp (F32 Watt T8)	0.160
High Bay Fluorescent 8 Lamp (F32 Watt T8)	0.108
Net kWh per fixture	kWh/fixture
High Bay 2L T-5 High Output	277
High Bay 3L T-5 High Output	323
High Bay 4L T-5 High Output	635
High Bay 6L T-5 High Output	269
High Bay 8L T-5 High Output	1,887
High Bay Fluorescent 4 Lamp (F32 Watt T8)	444
High Bay Fluorescent 6 Lamp (F32 Watt T8)	692
High Bay Fluorescent 8 Lamp (F32 Watt T8)	467
Net therms per fixture	N/A
Measure Life	10

Total Gross and Net Impacts

The total first year gross savings are tabulated by measure type in Table 14. Note, only high bay lighting measures were adjusted at this time. M&V conducted on HVAC and VFD measures will reported in the next update.

Table 14. Total First Year Gross Energy Savings for Lighting Measures

Measure type	Program Tracking kW	Program Tracking kWh	kW realization Rate	kWh realization Rate	Evaluated Gross kW	Evaluated Gross kWh
High bay	3,424	15,415,346	0.96	1	3,287	15,415,346
Linear Fluorescent	1,084	3,994,455	1	1	1,084	3,994,455
CFL	545	2,004,570	1	1	545	2,004,570
Occupancy	1,036	3,735,889	1	1	1,036	3,735,889

Measure type	Program Tracking kW	Program Tracking kWh	kW realization Rate	kWh realization Rate	Evaluated Gross kW	Evaluated Gross kWh
Sensor						
Other lighting	29	164,577	1	1	29	164,577
Total	**6,118**	**25,314,837**			**5,981**	**25,314,837**

The first year net savings are calculated assuming a freeridership level of 28% as described in the Free-ridership Section above.

Table 15. Total First Year Net Energy Savings for Lighting Measures

Measure type	Evaluated Gross kW	Evaluated Gross kWh	Net to Gross Ratio	Evaluated Net kW	Evaluated Net kWh
High bay	3,287	15,415,346	0.72	2,367	11,099,049
Linear Fluorescent	1,084	3,994,455	0.72	780	2,876,008
CFL	545	2,004,570	0.72	392	1,443,290
Occupancy Sensor	1,036	3,735,889	0.72	746	2,689,840
Other lighting	29	164,577	0.72	21	118,495
Total	**5,981**	**25,314,837**		**4,306**	**18,226,682**

Lifecycle savings were estimated by applying the following effective useful life (EUL) assumptions[11] to each measure.

Table 16. Effective Useful Life for Lighting Measures

Measure Type	Measure	EUL (years)
Lighting	CFL	12
	Exit sign	15
	HiBay Lighting	10
	Linear Fluorescent	10
	Occupancy Sensor	8
	Other lighting controls	12

Applying the EUL estimates listed above to each measure, the lifecycle gross and net kWh savings are shown below:

Table 17. Lifecycle Gross and Net Savings for the Lighting Component of Ohio Commercial Smart $aver® Prescriptive Program for 12 months of Program Operation Ending November, 2009

Result	Value
Tracking System Lifecycle Savings	250,014,886

[11] EUL data supplied by FES

Evaluated Lifecycle Gross kWh savings	250,014,875
Evaluated Lifecycle Net kWh savings	180,010,710

Appendix A: Vendor Interview Instrument

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the Smart $aver® Prescriptive Program. We'll talk about your understanding of the Smart $aver® Program and its objectives, your thoughts on improving the program, and the technologies the program covers. The interview will take about an hour to complete.

Understanding the Program

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

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

2. What is your overall opinion of the program?

3. What specifically do you like about the program or the way it operates?

4. What do you dislike about the program, or what is it that you would like to see changed and why is that change needed?

5. What kinds of issues have come up in the Smart $aver® program?

6. What are the different types of reactions you see from customers when you tell them about the program?

7. Have you heard of any customer complaints that are in any way associated with this program?

8. Have callbacks increased due to the program technologies?

Program Design and Design Assistance

9. Do you feel that the right mix and types of technologies and equipment are covered by the program?

10. Tell me about how the customers react to the incentive levels.

11. Are the incentive levels appropriate?

12. What would the incentive need to be in order to have more than 80 percent of the market go with the energy efficient model?

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

14. Are there components that are now included that you feel should not be included in the prescriptive program? What are they and why should they not be included?

Reasons for Participation in the Program

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

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

16. What are your primary reasons for participating in the program? Why do you continue to be a partner? If prompts are needed… Is this a wise business move for you, is it something you believe in professionally, is it that it provides a service to your customers, or other reasons?

17. Why do you think other trade allies become partners in the program?

18. What are the reasons why trade allies like yourself would not want to become partners in the program?

19. Has this program made a difference in your business? How? Be as specific as you can and talk sales volumes, profits, customer relationships and any other aspect that you think is important.

20. What does Duke Energy need to do to get more contractors and trade allies to participate in this program?

Program Participation Experiences

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

21. Let's start with Marketing. How can marketing be improved?

22. And what about the application and processing aspects?

23. How about the payment and incentive processing aspects?

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

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

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

27. What do you think are the primary benefits to the people who buy Smart $aver®-eligible measures? Are there other benefits that are important to a potential customer?

Market Impacts and Effects

28. How do you make your customers aware of the Program? (if not covered earlier)

29. Are your customers more satisfied with the higher efficiency equipment? Why or why not?

30. Do you have fewer calls or more calls to correct problems with the Smart $aver® technologies?

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

32. Has the program influenced you to carry other energy efficient equipment that is not rebated through the program?

33. If yes, what do you now carry?

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

35. Do you think the program is making more people aware of the benefits of being more energy efficient?

36. Have you not iced changes in your sales patterns where you think customers are asking for more energy efficient equipment? If yes… Why do you think this is / or is not happening?

37. Are programs like Smart $aver® having an impact on what models of products are being manufactured and distributed to distributors, dealers, retailers and contactors?

Net to Gross Questions

38. Has the program influenced your decision to market or sell more high efficiency measures than you would have without the program? If yes, to what extent?

39. How much difference does the program make to the customer's decision to move up to the more energy efficient model?

40. What percent of your customers fall in to the each of these groups,
    a. Makes a great difference and allows them to obtain the more efficient model;
    b. Makes somewhat of a difference in their choice;
    c. Makes little or no difference and does not affect their choice?

41. Can you tell me why this occurs for each of the three groups above?

42. We would like to obtain an understanding of the program's effects on sales of high efficiency models. We would like your best estimate of the number of units your company sold over the last 12 months; the percent of sales that were high efficiency units, and the percent of the high efficiency models that got a Duke rebate. Estimates are fine, we are not looking for exact numbers, but good estimates will help us understand the impacts of the program and the potential for additional sales.

I would like to start with *<<Technology 1>>*

a. Total units sold: ___ Percent high EE: ___% Percent getting a Duke rebate: ___

Now let's go to *<<Technology 2>>*

b. Total units sold: ___ Percent high EE: ___% Percent getting a Duke rebate: ___

And for *<<Technology 3>>*

c. Total units sold: ___ Percent high EE: ___% Percent getting a Duke rebate: ___

And for *<<Technology 4>>*

d. Total units sold: ___ Percent high EE: ___% Percent getting a Duke rebate: ___

43. Programs such as these might have the potential to increase sales of high efficiency products in two ways. One is through rebates and incentives that reduce the cost barrier. The other is via market effects in which programs can impact customer demand as well as the manufacturing and distribution process. To help us understand these potential changes we would like to know if the program may have influenced your overall ordering, stocking and sales practices. Were you selling the same number of high efficiency models before you became a Duke partner, or has the program influenced the total number of high efficiency units you sell?

44. *If influenced:* How as the Duke program changed the number of units you sell?

45. What was your total volume of high efficiency *<technology a>* unit sales before the program and what is it now? Before _____ After _____

46. What was your total volume of high efficiency *<technology b>* unit sales before the program and what is it now? Before _____ After _____

47. What was your total volume of high efficiency *<technology c>* unit sales before the program and what is it now? Before _____ After _____

48. There are no plans to terminate the program, but we would like to know how the program affects contractors. If the program were to be discontinued, what would happen to the volume of sales of the high efficiency models?
49. How would this change your ordering and stocking practices?

50. If the program were not offered, would you need to structure pricing differently to make up for the program loss? If so, how?

51. In your opinion is the Smart $aver® program still needed? Why?

Recommended Changes from the Participating Contractors

52. Are there any other changes that you would recommend to Duke Energy for the Smart $aver® Program that we have not already discussed?

53. If you could make any changes to this program, what changes would you make to this program?

Appendix B: Participant Survey Instrument

Name: _____

Title: _____

Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer survey about the Smart $aver® Incentive Program. 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:

Call back 1:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 2:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 3:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 4:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 5:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 6:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 7:	Date: _____,	Time: _____	❑AM or ❑PM

❑ Contact dropped after seventh attempt.

We are conducting this survey to obtain your opinions about the Smart $aver® Incentive Program in which you participated. We are not selling anything. The survey will take about 10-15 minutes and your answers will be confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?

Note: If this is not a good time, ask if there is a better time to schedule a callback.

1. **Do you recall participating in the Smart $aver® Program?**

1. ❑ Yes, *begin* → *Skip to Q3.*
2. ❑ No,
99. ❑ DK/NS

This program was provided through Duke Energy. In this program, your company purchased a new energy efficient motor, pump, HVAC system or component, or lighting system. Duke Energy provided an incentive of <$xxx> for purchasing the qualifying item.

Do you remember participating in this program?

1. ❑ Yes, *begin* → *Go to Q2.*
2. ❑ No,
99. ❑ DK/NS

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

2. **Our records indicate that you purchased a** <incented item> **Is this correct? If not, what was the rebated technology that you purchased?**

1. ❑ Correct
2. ❑ Pump
3. ❑ Motor
4. ❑ HVAC
5. ❑ Lighting
6. ❑ Refrigeration
7. ❑ Other specify:

_____

3. **Please think back to the time when you were deciding to buy the energy saving** <incented item>**, perhaps recalling things that occurred in your company shortly before and after your purchase. What kinds of factors motivated you to purchase energy saving** < incented item>? *(do not read list, place a "1" next to the response that matches best)*

1. ____ Old equipment didn't work
2. ____ Old equipment working poorly
3. ____ The program incentive
4. ____ The program technical assistance
5. ____ Recommendation of someone else (*Probe*: **Who?**_____)
6. ____ Wanted to reduce energy costs
7. ____ The information provided by the Program
8. ____ Past experience with this program
9. ____ Because of past experience with another Duke Energy program
10. ____ Recommendation from other utility program
    i. (*Probe*: **What program?** _____)
11. ____ Recommendation of dealer/contractor
12. ____ Advertisement in newspaper (*Probe:* **For what program?** _____)
13. ____ Radio advertisement (*Probe:* **For what program?** _____)
14. ____ Other (SPECIFY)

_____

15. ____ Don't know/don't remember/not sure (DK/NS)

If multiple responses: 2.a. **Were there any other reasons?** *(number responses above in the order they are provided - Repeat until 'no' response.)*

4. **Did you get this** < incented item> **to replace an existing** < incented item>**?**

1. ❑ Yes – *skip to question 8*
2. ❑ No
3. ❑ DK/NS – *skip to question 11*

5. **Is this** < incented item> **the first you have ever purchased for your company?**

1. ❑ Yes – *skip to question 11*
2. ❑ No
3. ❑ DK/NS – *skip to question 11*

6. **Did you get this** < incented item> **because you wanted to add another/more** < incented item> **to your facility?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know – *skip to question 11*

7. **About how old was the** < incented item> **you replaced?**

1. ❑ Less than 5 years old
2. ❑ 5 to less than 10 years old
3. ❑ 10 to less than 20 years old
4. ❑ 20 years to less than 30 years old
5. ❑ 30 or more years old
99. ❑ Don't Know

8. **Was the old** < incented item> **working or not working?**

1. ❑ Yes, working
2. ❑ No, not working – *skip to question 11*
3. ❑ Don't Know

9. **Was the old** < incented item> **in good, fair, or poor working condition?**

1. ❑ Good
2. ❑ Fair
3. ❑ Poor
4. ❑ Don't Know

10. Who filled out the program incentive forms for your company?

a. ❑ I did
b. ❑ Someone from my company did
c. ❑ The contractor
d. ❑ The salesperson
e. ❑ Someone from Duke Energy

11. Who submitted the forms to Duke Energy?

a. ❑ I did (customer)
b. ❑ Someone from my company did
c. ❑ The contractor
d. ❑ The salesperson
e. ❑ Someone from Duke Energy

11a. If they filled it out. **Was the incentive form easy to understand?**

1. ❑ Yes
2. ❑ No
3. ❑ Some of it
99. ❑ DK/NS

If no or some of it, 8b. **Do you remember what it was that was not clear or which part of it was difficult?**

_____

_____

12. **Did you have any problems receiving the incentives?**

1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

If yes, 9b. **Please explain the problem and how it was resolved. Was it resolved to your satisfaction?**

_____

_____

Free-Ridership Questions

13. **At the time that you first heard about the Smart $aver® Program from Duke Energy, had you…?**

1. ❑ **Already been thinking about purchasing** < incented item>
2. ❑ **Already begun collecting information about** < incented item> **or**
3. ❑ **Already decided to buy the** < incented item>**?**
4. ❑ Don't Know

14. Just to be sure I understand, did you have specific plans to install the high efficiency < incented item> **before you heard about the program?**

1. ❑ Yes
2. ❑ No – *skip to question 14*
3. ❑ Don't Know – *skip to question 14*

15. **Did you have to make any changes to your existing equipment replacement plans in order to receive this rebate through the Smart $aver® Program?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

16. **If the rebate from Duke Energy's Smart $aver® Program had not been available, would you still have:**

16a. **Purchased the same type of** < incented item>**?**

1. ❑ Yes
2. ❑ No – *skip to question 16*
3. ❑ Don't Know – *skip to question 16*

16b. **Purchased the same energy efficiency of** < incented item>?

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

16c. **Purchased the** < incented item> **at the same time that you did?**

1. ❑ Yes – *skip to question 15*
2. ❑ No
3. ❑ Don't Know – *skip to question 15*

16d. **Purchased the** < incented item> **earlier than you did, or later?**

1. ❑ Earlier
2. ❑ Same Time
3. ❑ Later
4. ❑ Don't Know – *skip to question 15*

16e. **How much <earlier/later>?**

1. _____ years and/or _____months
2. ❑ Don't Know

17. **If the rebate from the Smart $aver® Program had not been available, would you have done anything else differently?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

17a. **What would you have done differently?**

_____

_____

18. **On a 0 to 10 scale, with 0 being not at all likely and 10 being very likely, how likely is it that you would have bought a less efficient** < incented item> **if you had not received any rebate from the program?**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

I'm going to read several statements about how you came to choose your < incented item>**. On a scale of 0 to 10, where 0 is strongly disagree and 10 is strongly agree, how much do you agree with this statement?**

19. **If I had not had any assistance from the program, I would have paid the additional <$xxx> to buy the energy efficient** < incented item> **on my own?**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

20. **The rebate from the Duke Energy Smart $aver® Program was a critical factor in my decision to purchase the high efficiency/energy efficient product.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

21. **I would have bought the same make and model of the** < incented item> **within one year of when I did even without the rebate from the Duke Energy Smart $aver® Program.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

22. **The rebate from the Duke Energy Smart $aver® Program was not necessary to cause me to purchase the higher efficiency product when your company bought the new** < incented item>**.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

Consistency Check & Resolution

23 will be asked only for those respondents who have a clear inconsistency between responses (i.e., all but one of the questions are at one end of the spectrum for free ridership while one question is at the other spectrum.) An algorithm will be provided after pretesting. The question responses that will be used to trigger 21 are:

- 14a (only for efficiency enhancement measures)
- 14b (only for incremental efficiency measures)
- 16 depending upon which version of the question they received
- 18
- 19
- 20

23. **Let me make sure I understand you. Earlier, you said** <inconsistency prompted by excel function>**, but that differs from some of your other responses. Please tell me in your own words what influence, if any, the program had on your decision to purchase and install the** < incented item> **at the time you did?**

_____
_____
_____
_____

Based on response, correct any above entries.

Spillover Questions

24. **Since you participated in the Smart $aver® Program, have you purchased and installed any other type of high efficiency equipment or made energy efficiency improvements at your company or at any other locations?**

1. ❑ Yes, only at this company
2. ❑ Yes, only at other locations
3. ❑ Yes, at both company and other locations
4. ❑ No
5. ❑ Don't Know

25. **What type and quantity of high efficiency equipment did you install on your own?** *PROBE TO GET EXACT TYPE AND QUANTITY AND LOCATION*

Type 1: _____	Quantity 1: _____	Location 1: _____
Type 2: _____	Quantity 2: _____	Location 2: _____
Type 3: _____	Quantity 3: _____	Location 3: _____
Type 4: _____	Quantity 4: _____	Location 4: _____

26. *For each type listed in 23 above,* **How do you know that this equipment is high efficiency? For example, was it Energy Star rated?**

Type 1: _____
Type 2: _____
Type 3: _____
Type 4: _____

I'm going to read a statement about this equipment that you purchased on your own. On a scale from 1-10, with 0 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statement.

27. **My experience with the Smart $aver® Program in** <2008, 2009> **influenced my decision to install different types of high efficiency equipment on my own.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

28. **What other actions, if any, have you taken in your company to save energy and reduce utility bills as a result of what you learned in this program?**
Response:1 _____

Response:2 _____

Response:3 _____

Response:4 _____

Now I am going to ask you some general satisfaction statements. On a scale from 1-10, with 0 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statements.

29. The rebate form was easy to understand and complete.

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

30. The interactions and communications I had with Duke Energy staff was satisfactory.

1 2 3 4 5 6 7 8 9 10

❑ Not applicable

If 7 or less, **How could this be improved?**_____

_____

31. The rebate levels provided by the program

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

32. The time it took for you to receive your rebate

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

33. The number and kind of technologies covered in the program

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

34. The information you were provided explaining the program

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

35. **Overall I am satisfied with the program.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

36. **What additional services would you like the program to provide that it does not now provide?**

Response: _____

_____

37. **Are there any other things that you would like to see changed about the program?**

Response: _____

38. **What do you think can be done to increase people's interest in participating in the Smart $aver® Program?**

Response:1 _____
Response:2 _____
Response:3 _____
Response:4 _____

39. **What do you like most about this program?**

Response: _____

40. **What do you like least about this program?**

Response: _____

Appendix C: Program Manager Interview Protocol

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the Smart $aver® Prescriptive program. We'll talk about the Smart $aver® Program and its objectives, your thoughts on improving the program, and the technologies the program covers. The interview will take about one to two hours to complete. May we begin?

Program Objectives

1. In your own words, please describe the Smart $aver® Program's current objectives. How have these changed over time?

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

3. Are there any program objectives that are not being addressed or not being addressed as well as possible or that you think should have more attention focused on them? If yes, which ones? How should these objectives be addressed? What should be changed?

4. What market information, research or market assessments are you using to determine the best target markets and program opportunities, market barriers, delivery mechanisms and program approach?

5. In your opinion, should the program objectives be changed in any way due to technology-based, market-based, or management based conditions? What objectives would you change? What operational changes would you put into place, and how would it affect the results of the program?

Operational Efficiency

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

7. Please review with us how the Smart $aver® operates relative to your duties, that is, please walk us through the processes and procedures and key events that allow you to currently fulfill your duties.

8. Have any recent changes been made to your duties? If so, please tell us what changes were made and why they were made. What are the results of the change? Do you feel that you were adequately prepared for these changes?

9. Describe the evolution of the Smart $aver® Program. How has the program changed since it was it first started?

10. Describe your participant tracking and data quality control process.

11. Do you have suggestions for improvements to the program that would increase participation rates or interest levels?

12. Do you have suggestions for improving or increasing energy impacts?

13. Thinking about how your program enrolls participants, what do you think is the level of freeridership for the Smart $aver® Prescriptive Program? (*That is, what percent of the measures rebated through the program would have been purchased and installed without the program's incentive?*)

14. What do you think can be done to lower the level of freeridership?

15. What do you think the level of spillover is for the Smart $aver® Program? *(That is, what percent of the high efficiency measures that are installed are, in some way, a result of the program's influence other than direct program participation?)*

16. What do you think can be done to increase the level of spillover?

17. Are you aware of projects moving forward with incentives when they shouldn't be eligible? (If yes…) Why were these projects approved? What can be done to stop this from happening?

18. Do you have suggestion for the making the program operate more smoothly or effectively?

Program Design & Implementation

19. *(If not captured earlier)* Please explain how the interactions between the contractors, customers, and Smart $aver's® management team work. Do you think these interactions or means of communication should be changed in any way? If so, how and why?

20. How do you determine what measures to include in the program and what levels of energy efficiency should be covered?

21. Should this be changed in any way?

22. How do you determine what the technology incentive levels should be?

23. Should this be changed in any way?

24. Are there things that you think can be done to make more trade allies interested in participating in the program and focus more on pushing high efficiency products to their customers?

25. Are key industry experts, trade professionals or peers used for assessing what the technologies or models should be included in the program? If so, how does this work?

26. Are key industry experts and trade professionals used in other advisory roles? If so how does this work and what kinds of support is obtained?

27. Describe Smart $aver's® contractor program orientation training and development approach. Are contractors getting adequate program training and program information? What can be done that could help improve contractor effectiveness? Can we obtain training materials that are being used?

28. In your opinion, did the incentives cover enough different kinds of energy efficient products?

1. ❑ Yes 2. ❑ No 99. ❑ DK/NS

If no, 20b. What other products or equipment should be included?

29. How do you make sure that the best information and practices are being used in Smart $aver® operations?

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

31. What market information, research or market assessments are you using to identify market barriers, and develop more effective delivery mechanisms?

32. Overall, what about the Smart $aver® program works well and why?

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

34. Can you identify any market, operational or technical barriers that impede a more efficient program operation?

35. In what ways can these operations or operational efficiencies be improved?

36. In what ways can the program attract more participants?

37. *(If not collected above)* What market information, research or market assessments are you using to determine the best target markets and program opportunities, market barriers, delivery mechanisms and program approach?

38. If you could change anything about the Smart $aver® Program, what would you change and why?

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

Process and Energy Impact Evaluation of the Home Energy House Call Program in Ohio

Final Report

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

May 16, 2011

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Table of Contents

May 6, 2011: *This report has been revised. The original version of this report presented discounted energy savings including self-selection and false responses biases. On-site verification has since been completed, taking these two biases out of the equation and introducing the "on-site inspection adjustment". The updated impact estimates as well as all adjustment factors are laid out in the Impact Summary Table found on page 5. The reworked freeridership and spillover rates can be seen in Table 3 in the Freeridership and Spillover section on page 11. An explanation of the new "on-site inspection adjustment" can be seen in the Savings Distributions section on page 28. Table 13 shows the on-site inspection adjustments by measure.*

In addition, the following paragraph in the Introduction on page 9 was changed to reflect the current evaluation:

> "This report is structured to provide program savings based on a billing analysis results. The study includes participants from January 2006 through September of 2007 (n=1,680)."

It now correctly reads:

> This report is structured to provide program savings based on a billing analysis results. The study includes participants from January 2009 through January of 2010 (n=4,568).

May 16, 2011: *A single weighted value for the measure life of the energy efficiency kit items was requested. This is now present in the measure life section of the Impact Summary Table found on page 5. The measure weights are derived from the gross kWh savings ratios and are exclusive of recommendations.*

Summary of Findings

Energy Savings

A billing analysis was conducted to estimate the energy savings from the program. The billing analysis relies upon a statistical analysis of actual customer-billed electricity consumption before and after participation in the Home Energy House Call (HEHC) program to estimate the impact for kit and recommended measures from the audit. The billing analysis used consumption data from all HEHC participants in Ohio (6,821 customers), North Carolina (5,321 customers), and South Carolina (1,859 customers). A panel model specification was used that used the monthly billed energy use across time and participants. The model included terms to control for the effect of weather on usage, as well as a complete set of monthly indicator variables to capture the effects of non-measureable factors that vary over time (such as economic conditions and season loads). The estimated models (audit and kit and overall impacts) included in Appendix C: Estimated Statistical Model, and a summary of the results is shown below:

	Audit Only	Kit	Total
Coefficient (savings)	1,238	920	2,009
T-value	8.08	6.02	23.61
R-Square	61%		61%
Sample Size (overall model)	293,338 obs (14,001 homes)		

The kW and therm savings were estimated based on the responses to the customer survey, scaled by the overall population estimate of kWh presented above. Estimates for the free-ridership and spillover were also based on the customer survey, and are discussed in detail later in the report.

Metric	Result
Number of Program Participants	4,568 from Jan. 2009 to Jan. 2010
Gross kW per participant	0.283
Gross kWh per participant	2,009
Gross therms per participant	79.5
Freeridership rate	*CFLs: 49.8%* *Showerheads: 4.4%* *Faucet Aerators: 5.4%* *Weather Stripping: 27.5%* *Outlet Gaskets: 6.5%*
Spillover rate	*CFLs: 11.9%* *Showerheads: 2.8%* *Faucet Aerators: 3.0%* *Weather Stripping: 3.9%* *Outlet Gaskets: 6.3%*
On-site inspection adjustment	*CFLs: 20.7%* *Showerheads: 3.0%* *Faucet Aerators: 1.0%* *Weather Stripping: 7.0%* *Outlet Gaskets: 4.0%*
Net adjustments to be applied to gross values	*kW: 77.4%* *kWh: 65.5%* *therms:98.7%*
Net kW per participant	*0.219*
Net kWh per participant[1]	*1,316*
Net therms per participant	*78.5*
Measure Life	CFLs: 5 years Showerheads: 10 years Faucet Aerators: 10 years Weather Stripping: 5 years Outlet Gaskets: 20 years *Overall Measure Life: 6 years*
Cost-effectiveness for DSMore	

Customer Satisfaction

Based on 111 surveys done of a random sample of the 4,568 participants in Ohio, the customer's satisfaction with the program is very high with an overall satisfaction score of 9.2 on a 10-point scale. This is a very high level of satisfaction for an energy efficiency program and reflects well on the program and the program's sponsor. They were satisfied with the audit (9.0 out of 10) and with the energy efficiency starter kit (9.3 out of 10).

Motivating Factors

The primary factor was a desire to reduce energy costs with 94 participants (84.5%) indicating it as a factor and 64 (60.4%) indicating it was the most important factor motivating them to participate in the program. Receiving an energy audit was the second-most cited motivating factor.

[1] 2009 – 58.7% = 829

What Customers Like Most and Least

Customers were most pleased with the free audit and energy-saving kits. The most common area noted for improvement was the need for a follow-up audit and more intensive energy-saving options for participants who had already met all recommendations in the Home Energy House Call audit. These results indicate that customers want to go beyond the typical approaches to energy savings and are looking for other options.

Recommendations

- While customer satisfaction for the audit and kit items is high, many customers expressed a desire for more far-reaching energy-saving options than those presented in the audit. A subset of customers (near 10%) wants to further reduce their energy use and is looking for help to identify any and all approaches for accomplishing their objectives. This indicates that there may be a number of customers who want to go to the next level of energy efficiency and move into the more costly and deeper savings options. While one-quarter of the survey participants had already been considering an energy audit before joining the program, and following the audit, 10% requested more information in the form of follow-up services to help identify additional energy saving opportunities, suggesting that the Home Energy House Call program has potential for engaging customers who are interested in saving activities that are beyond the low to no-cost savings of the plan. Duke Energy has an opportunity to capture additional savings from these participants through expanded and coordinated services. In considering these services, Duke Energy should not be limited to only those services that pass a traditional cost effectiveness test, but rather develop services so that the incentives are structured for the individual to make the net savings achieved cost effective. For these additional measures and support needs, the incentives may not need to be as high as 50% of the incremental cost. For example, if customers need new windows, the incentive can be structured so that the savings are cost effective for that measure.

- The reluctance of participants to access Duke Energy's web site material on CFLs and difficulty in finding that material suggests that Duke Energy should either make their web site more user-friendly or use targeted and direct marketing on customers who have shown an interest in saving energy but either have no access to the Duke Energy web site or regard required internet use as a barrier to their further participation. For web site enhancements, customers should be able to click to the appropriate information within 3 to 4 seconds per page along an information path, with as few links as possible. Links should be clear and easily identified. For customers without web access, alternative or more traditional approaches should be considered.

- Information gathered during the Home Energy House Call audit can be used to identify prospective participants who may benefit from Duke Energy's other energy efficiency programs. This would allow Duke Energy to target promotions

and outreach to those who may be more likely to participate in other programs. If the auditors are not currently doing so, the auditors could also present information about other relevant programs during the audit and explain how these could help customers accomplish their energy savings objectives.

- Duke Energy should proactively help customers identify higher-cost measures that would have more impact. Past evaluations of the HEHC that was implemented by Duke Energy in Ohio found that customers do adopt more expensive recommendations such as insulation upgrades. Better promotion of higher-impact measures would allow Duke Energy to contribute to the customer's understanding of energy efficient actions they could take now and later, particularly since customers are not eligible for another Home Energy House Call audit for three years.

- Auditors should inform the customer about other energy efficiency programs offered by Duke Energy while they are on site, especially when they identify a program-covered appliance need. The home audit is an expensive and unique channel for communicating directly with a homeowner who has already identified themselves as being interested in energy efficiency. Asking customers to go on the Duke Energy website to search for information themselves may incur an information cost. Duke Energy should take advantage of this opportunity to remove that cost and make it easier for the customer to plan future energy efficiency steps. Program auditors need to be representatives of not just the audit, but all approaches by which savings can be achieved.

- RECOMMENDATION: With the permission of the customer, auditors should remove the old incandescents from the customer's home and dispose of them. This would decrease any chance that customers might remove the CFLS and put back the old incandescents.

- RECOMMENDATION: Share participant data from other programs that offer free CFLs so that the HEHC participants are not automatically eligible for the additional 12 CFLs if they had previously received a set from another program. This will allow Duke Energy to achieve higher installation rates across their portfolio of programs and achieve greater cost effectiveness from CFL measures.

- RECOMMENDATION: If the regulatory agency allows gas savings to be claimed by the gas utilities, Duke Energy should explore the idea of collaborating with the gas companies to share costs and capture gas savings.

- RECOMMENDATION: Duke Energy should consider tracking customer participation across programs. This would allow Duke Energy to determine whether HEHC might have influenced participants to subsequently participate in other rebate programs. If the referral mechanism is not producing sufficient participation in other Duke Energy energy efficiency programs, consider approaches to increase the effectiveness of the referral mechanism.

- RECOMMENDATION: Duke Energy or its evaluation contractor should schedule an evaluation survey of a sample of HEHC customers to determine their adoption 1 to 2 yrs after participation to identify longer-term savings. This would allow Duke Energy to obtain better longitudinal information about customer actions that might not be captured by annual program evaluations, and better estimate longer-term energy savings.

- RECOMMENDATION: Duke Energy should explore the idea of marketing the HEHC as a limited-time offer within the areas targeted for upcoming service by the auditors. This may increase the perceived scarcity and thus value of the audit, and also would enable audits to be completed within a geographical region before moving operations to another region, increasing cost effectiveness.

- RECOMMENDATION. Duke Energy should help customers prioritize the audit recommendations. Auditors should spend more time finding out what barriers customers might have to the higher savings items so that they might try to address those barriers in a face-to-face conversation with cost effective offers. The HEHC provides a very rare and expensive opportunity for Duke Energy's agents to communicate directly with their customers. Duke Energy should consider using this opportunity to encourage customers to discuss their specific questions and concerns with the auditors with the specific goal of being able to achieve additional savings. Duke Energy should also consider what other unique opportunities might be available through this channel of communication and see how it might best be leveraged. The HEHC should be considered to be much more than just a "live" version of a survey, but should recommend all ways that the customer can save energy and offer incentives on those measures to speed their implementation. For example, if they see that siding or windows are needed, it would be an opportunity to offer underlayment insulation or more efficient windows. Incentives can be calculated to be cost effective.

Introduction

This document presents the evaluation report for Duke Energy's Home Energy House Call (HEHC) Program as it was administered in Ohio. An impact analysis was performed using a billing analysis comparing the pre and post program energy consumption levels of program participants.

This report is structured to provide program savings based on a billing analysis results. The study includes participants from January 2009 through January of 2010 (n=4,568).

The study used on-site verification efforts on 30 homes to confirm if the survey information provided by the customer is accurate or if the measures taken were correctly installed or used.

The evaluation was conducted by TecMarket Works with assistance from Integral Analytics and Yinsight. The survey instruments were developed by TecMarket Works. The survey was administered by TecMarket Works. Integral Analytics performed the billing analysis. Yinsight (a TecMarket Works subcontractor) conducted the in-depth interviews with program management.

Methodology

This section presents the approach for conducting this assessment.

Development of the Surveys

TecMarket Works developed a customer survey for the Home Energy House Call (HEHC) Program participants to be implemented after they have had time to install at least some of the measures in the kit and to follow the recommendations offered during the home energy audit. The survey asked the customer for information specific to each of the measures included in the Energy Efficiency Starter Kit. In addition, the participant was asked to report the actions that they had taken that were caused in whole or in part by the recommendations provided in the HEHC audit report. For each measure that was installed and for each recommendation taken, the participant was asked questions pertaining to their intentions to take that action without the intervention of the program. This information was used to estimate program freeridership for the purpose of informing program managers of the level of freeridership and for the purpose of adjusting gross savings in order to report net impact.

The survey was conducted with a random sample of 111 HEHC participants. These participants were surveyed by TecMarket Works. To help focus the survey, the questions asked were based on key results of an earlier study employing an identical approach for similar measures. The experience from the previous study[2] allowed this study to use those questions that were most informative to the energy impact estimation process and eliminate those questions that were found to have little impact on the results of the energy savings calculations. This allowed the HEHC survey to be shorter and more focused, yet still provide the information needed to estimate savings. The surveys can be found in Appendix A: Participant Survey Instrument.

Installation Rates of Kit Items

The items distributed in the kit include the following measures.

1. Two 13-watt CFLs
2. 20-watt CFL
3. 17' Roll of Closed Cell Foam Weatherstrip
4. 4 Outlet gaskets
5. 2 Switch gaskets
6. Low-flow showerhead
7. Bathroom aerator
8. Kitchen aerator

Participants were asked if they installed each item in the Home Energy House Call kit. The results are summarized in Table 1 below. CFLs had by far the highest installation rate with 86 percent of survey respondents reporting that they had used the 20-watt CFL as well as both 13-watt CFLs. The rest of the kit measures had relatively similar installation rates between 40-50%.

[2] Roth, Johna, Nick Hall, Pete Jacobs. "Energy Impact Evaluation of the Personalized Energy Report Program in Kentucky". TecMarket Works, July 27, 2007.

Table 1. Respondent Installation Rates

Measure	Status	Number of Participants	Percentage
13 watt CFLS	Installed	96	86%
	Planned	12	5%
20 watt CFLs	Installed	97	87%
	Planned	11	5%
Weatherstripping	Installed	45	41%
	Planned	12	11%
Outlet Gaskets	Installed	60	54%
	Planned	23	21%
Switch Gaskets	Installed	58	52%
	Planned	24	22%
Showerheads	Installed	55	49.5%
	Planned	17	15%
Kitchen aerators	Installed	57	51%
	Planned	18	16%
Bathroom aerators	Installed	47	42%
	Planned	21	19%

Freeridership and Spillover

Freeridership and spillover were calculated for each measure in the Energy Efficiency Starter Kit. The level of freeridership was determined by using the responses to three questions in the survey (found in Appendix A: Participant Survey Instrument). The three questions and the level of freeridership and/or spillover that was applied to the energy savings are presented in the table below, using the CFL as an example measure. All other possible combinations of answers to the series of questions resulted in 0% freeridership and 0% spillover.

Table 2. Freeridership and Spillover Factors for Energy Efficiency Kit Measures

6a: Did you have any CFLs installed before you got the kit?	6b:Were you planning on buying <additional> CFLs before you got the kit?	6c: Have you purchased any CFLs since you got the kit?	% Freeridership	% Spillover
Yes	yes	yes	100	
Yes	yes	no	100	
Yes	no	yes		75
No	no	yes		100
No	yes	no	50	
No	yes	yes	50	50
Don't Know	yes	yes	75	25
Don't Know	yes	no	50	
Don't Know	no	yes		100
Yes	already installed in every place	yes	100	
Yes	already installed in	no	100	

	every place			
Don't Know	maybe	yes	25	50
Yes	maybe	yes		25
Yes	maybe	no	25	
No	maybe	yes		50
Yes	don't know	yes		75
No	don't know	yes		100
Yes	yes	don't know	100	
Yes	already installed in every place	don't know	100	
don't know	yes	don't know	50	
No	yes	don't know	50	

Table 3. Measure Freeridership and Spillover

Measure	Number of participants with freeridership	Number of participants with spillover	Freeridership percentage	Spillover Percentage	Mean units per participant with spillover
CFLs	*64*	*25*	*49.8*	*11.9*	*6.3*
Lowflow Showerhead	*6*	*3*	*4.4*	*2.8*	*1*
Aerators	*6*	*3*	*5.4*	*3.0*	*2.33*
Weather stripping	*34*	*6*	*27.5*	*3.9*	*23.8 feet*
Outlet/Switch gaskets	*10*	*9*	*6.5*	*6.3*	*8.3*

Audit Freeridership

Freeridership was also calculated for the home energy audit as an independent analysis to determine the level of participants that would have had their homes audited if the HEHC were not made available.

Twenty-eight (25%) survey participants indicated that they were considering an audit before participating in the Home Energy House Call program. However, only five survey participants indicated that they would have purchased an audit even if it had not been available through the program. Therefore, the Home Energy House Call audit had five (4.6%) participants as freeriders. To calculate freeridership, we used the following table. All other possible combinations of responses to these questions were counted as 0% freeridership.

Table 4. Questions to Determine Audit Freeridership

Considering an audit before the program?	if not available through the program, would you still have purchased an audit?	If yes, would you have purchased it within a year?	% Freeridership
yes	yes	yes	100
yes	yes	no	50

yes	yes	don't know	25

Of these five participants, three had a freeridership level of 100% and two had a freeridership level of 25% for a mean freeridership level of 70%. Over the 111 participants, the overall freeridership level for the program audit is low at 1.9%.

Section 1: Billing Analysis

This analysis presents the results of the billing analysis of Duke Energy's Home Energy House Call (HEHC) Program for Ohio, North Carolina, and South Carolina.[3] This analysis relies upon a statistical analysis of actual customer billed electricity consumption before and after participation in the HEHC program to estimate the impact of the program. Table 5 presents the results of this billing analysis.

Table 5. HEHC Average Annual kWh Savings: Audit and Kit

State	Audit Only	Kit	Total
Ohio	1,238	920	2,009
North Carolina	643	555	883
South Carolina	521	361	941

For this analysis, data are available both across households (i.e., cross-sectional) and over time (i.e., time-series). With this type of data, known as "panel" data, it becomes possible to control, simultaneously, for differences across households as well as differences across periods in time through the use of a "fixed-effects" panel model specification. The fixed-effect refers to the model specification aspect that differences across homes that do not vary over the estimation period (such as square footage, heating system, etc.) can be explained, in large part, by customer-specific intercept terms that capture the net change in consumption due to the program, controlling for other factors that do change with time (e.g., the weather).

Because the consumption data in the panel model includes months before and after the installation of measures through the program, the period of program participation (or the participation window) may be defined specifically for each customer. This feature of the panel model allows for the pre-installation months of consumption to effectively act as controls for post-participation months. In addition, this model specification, unlike annual pre/post-participation models such as annual change models, does not require a full year of post-participation data. Effectively, the participant becomes their own control group, thus eliminating the need for a non-participant group. We know the exact month of participation in the program for each participant, and are able to construct customer specific models that measure the change in usage consumption immediately before and after the date of program participation, controlling for weather and customer characteristics.

The fixed effects model can be viewed as a type of differencing model in which all characteristics of the home, which (1) are independent of time and (2) determine the level of energy consumption, are captured within the customer-specific constant terms. In other words, differences in customer characteristics that cause variation in the level of

[3] Duke Energy requested that the impact results from North and South Carolina to be included here for comparison of results between states. The same program has been deployed in Duke Energy's Carolinas jurisdiction and provided here as supporting information.

energy consumption, such as building size and structure, are captured by constant terms representing each unique household.

Algebraically, the fixed-effect panel data model is described as follows:

$$y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it},$$

where:

y_{it} = energy consumption for home i during month t
α_I = constant term for site i
β = vector of coefficients
x = vector of variables that represent factors causing changes in energy consumption for home i during month t (i.e., weather and participation)
ε = error term for home i during month t.

With this specification, the only information necessary for estimation is those factors that vary month to month for each customer, and that will affect energy use, which effectively are weather conditions and program participation. Other non-measurable factors can be captured through the use of monthly indicator variables (e.g., to capture the effect of potentially seasonal energy loads).

The effect of the program, in the case the HEHC kit as well as recommended measures, is done by including a variable which is equal to one for all months after the customer received the kit and the report. The coefficient on this variable is the savings associated with the kit. In order to account for differences in billing days, the usage was normalized by days in the billing cycle. The estimated electric model is presented in Table 6.[4]

Table 6. Estimated Savings Model – dependent variable is daily kWh usage, Sept 2008 through August 2010 (savings are negative)

Independent Variable	Coefficient (kWh/d)	t-value
HEHC participation – Ohio	-3.39	-8.08
HEHC participation – NC	-1.76	-3.74
HEHC participation – SC	-1.43	-1.76
Received Kit – Ohio	-2.52	-6.02
Received Kit – NC	-1.52	-1.87
Received Kit – SC	-0.99	-2.09
Sample Size	293,388 obs (14,804 homes)[5]	
R-Squared	61%	

In addition to these estimates by audit versus kit, a total program savings model was estimated, which shows that the HEHC program in Ohio (both kits and recommended

[4] The model includes an autocorrelation correction term as well as weather terms and monthly indicator terms in addition to the variables presented in Table 1, which were not included in order make interpretation clearer. The full model is shown in Appendix C: Estimated Statistical Model.
[5] This includes KY homes, where the number of homes listed in the summary table on page 4 does not.

measures) results in an average annual savings of 2,009 kWh. This estimate is fairly well estimated, with all estimates significant at the 90% confidence interval.

Section 2: Participant Survey Results

Motivating Factors

Participants were asked to list all of the factors that motivated them to participate in the program in the order of their importance.

The primary factor was a desire to reduce energy costs with 94 participants (84.5%) indicating it as a factor and 64 (60.4%) indicating it was the most important factor motivating them to participate in the program. Receiving an energy audit was the second-most cited motivating factor. 72 participants (64.8%) indicated the audit itself as a factor and 34 (24%) said it was the most important factor motivating participation. Other motivating factors cited include the energy efficiency kit (32 participants), the technical assistance (24 participants), the program incentives (13 participants), the information provided by the program (6), the recommendation of a third party (6), and past experience with the program (1).

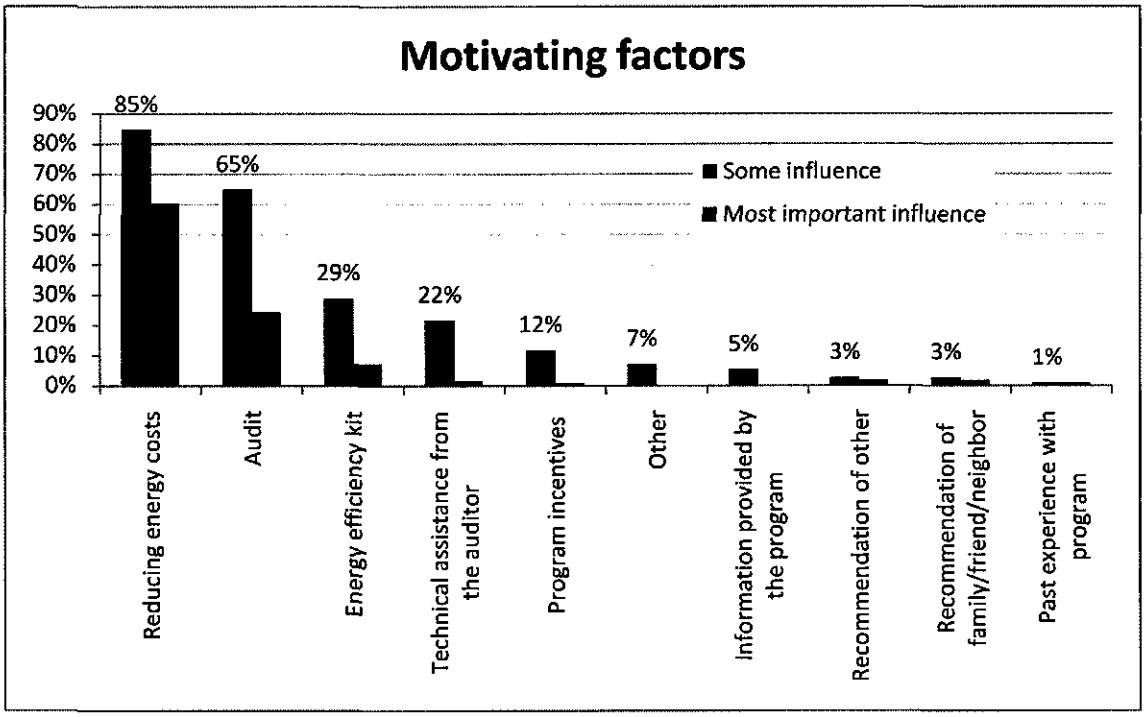

Figure 1. Motivating Factors for HEHC Participants

"Other" described:

- It was a good thing to do
- My neighbor referred me and I saw it on TV
- Wanted to check soundness of house

- My neighbor recommended it
- We wanted to make our home warmer
- I have a new home and wanted to know more about it
- Increase comfort
- Comfort level & reducing drafts

Audit Consideration

More than a quarter (26%) of the surveyed participants were considering an audit of their home before enrolling in the program, but only five participants (4.6%) would have purchased one if they wouldn't have received one from through the program.

Table 7. Audit Consideration

	Yes	No	DK/NS
Considered before HEHC	28	80	0
Purchased without HEHC	5	86	17
Purchased within a year without HEHC	3	0	2

As noted above, only five of these responses resulted in the indication of any freeridership.

Energy Efficiency Purchases Since Enrollment in HEHC

Of the 111 participants surveyed, 45 indicated that they have made additional energy efficient upgrades since their enrollment in the HEHC program. These purchases are summarized in Table 8 below.

The table shows that of the 83 improvements made by these 45 participants, 61 of them were suggested in the home audit report, and 22 were not suggested by the audit report. While the audit helps them make energy efficiency decisions, it is not the source of all of their energy efficiency actions. In order to gauge the influence of the audit in the actions taken by each home, we asked participants to rate the importance of the audit in their decision to take an action. The influence column presents the value associated with HEHC's influence on the decision to install the measure indicated. On a scale of 1 to 10, with 10 indicating that the decision was made with a very strong influence by their participation in the program, the mean response was 8.65, indicating that in most cases the program has a primary influence on the participant's decision to move forward and install energy efficient measures.

Table 8. Actions Taken Since HEHC Enrollment

Respondent	Action Taken	Quantity	Location	Suggested In Audit?			How do you know it's efficient?	Influence
				Yes	No	DK/NS		
1	New furnace	1	Basement	X			95% efficient	8
2	Insulated walls	1	Basement	X			Recommendation of auditor	10
	Replaced windows	3	Home		X		Energy star rated	8
3	Insulation	1	Attic	X			Recommendation of auditor	10
	Pellet stove		Basement		X			10
4	Insulation	1	Attic	X			Recommendation of auditor	10
	Taped ducts	1	Home	X			Recommendation of auditor	10
	Solar fans	1	Attic		X			1
5	Insulation	1	attic	X			Recommendation of auditor	10
6	Insulation	1	foundation	X			Recommendation of auditor	5
	Insulation	1	basement	X			Recommendation of auditor	10
	Triple pane windows	1	Home		X		Energy star rated	5
7	Insulation	1	Attic	X			Recommendation of auditor	10
	Insulation	1	Basement	X			Recommendation of auditor	10
	Solar light tube	1	Home		X		Energy Star	8
8	Insulation	1	Basement	X			Recommendation of auditor	10
	Windows	1	Home		X		Energy star rated	10
9	Attic fan	1	home	X			Recommendation of auditor	10
	Sealed windows	1	home	X			Recommendation of auditor	10
10	Programmable thermostat	1	home	X			Energy star rated	7
11	Insulation	1	Attic	X			Recommendation of auditor	10
12	Insulation	1	Attic	X			Recommendation of auditor	10
	Replaced refrigerator	1	Home		X		Energy star rated	5
	Window film	1	Home	X			Recommendation of auditor	10
	Water heater blanket	1	Basement	X			Energy star rated	10
	Ceiling fan	1	Home		X		Energy star rated	5
13	Insulation	1	Basement	X			Energy star rated	10

Respondent	Action Taken	Quantity	Location	Suggested In Audit?			How do you know it's	Influence
	New roof	1	Home		X			7
14	Adjusted door seal	1	home	X			Recommendation of auditor	10
	Adjusted window seal	1	Home	X			Recommendation of auditor	10
15	Insulation	1	Basement	X			Recommendation of auditor	10
16	Refrigerator	1	Home		X		Energy star rated	7
	Low-flow toilet	1	Home		X			7
17	Refrigerator	1	home		X		Energy star rated	9
	Dishwasher	1	Home		X		Energy star rated	9
18	Insulation	1	basement	X			Recommendation of auditor	10
19	Insulation	1	Attic	X			Recommendation of auditor	10
	Insulation	1	attic	X			Recommendation of auditor	10
	Turned water heater down	1	Basement	X				10
	Sealed windows	1	Home	X			Recommendation of auditor	10
	Thermal curtain	1	Home		X			10
	Wrapped water pipes	1	Home	X				10
20	Water heater	1	Basement	X			Energy star rated	8
21	Insulation	1	Attic	X			Recommendation of auditor	8
	Water heater	1	home	X			Energy star rated	8
	Windows	1	Home	X			Energy star rated	8
22	Stopped using space heater	1	home	X			Recommendation of auditor	10
23	New furnace	1	basement	X			Energy star rated	5
	Insulation	1	basement	X			Recommendation of auditor	10
	Insulation	1	Attic	X			Recommendation of auditor	10
	Sealed ducts	1	Garage	X			Recommendation of auditor	10
24	Insulation	1	basement	X			Recommendation of auditor	10
25	Duct Insulation	1	Attic	X			Recommendation of auditor	10
	Insulation	1	Attic	X			Recommendation of auditor	10
26	Insulation	1	Attic	X			Recommendation of auditor	10
	Insulation	1	Basement	X			Recommendation of auditor	10

Respondent	Action Taken	Quantity	Location	Suggested In Audit?			How do you know it's	Influence
27	Insulation	1	Basement	X			Recommendation of auditor	10
28	Insulation	1	Attic	X			Recommendation of auditor	10
	Replacement windows	1	Basement	X			Recommendation of auditor	10
29	Stopped using space heater	1	home	X			Recommendation of auditor	5
30	Caulking	1	home	X			Recommendation of auditor	10
31	Storm windows	2	home		X		Energy star rated	5
32	Double paned windows	2	Home	X			Energy star rated	7
	Dehumidifier	1	Home		X		Energy star rated	5
33	LED TV	1	Home		X		Energy star rated	1
34	Rain Barrell	1	Outside		X		Energy star rated	8
35	Insulation	1	Attic	X			Recommendation of auditor	8
	New washer and dryer	2	Home		X		Energy star rated	8
36	Insulation	1	Attic	X			Recommendation of auditor	10
37	Solar curtains	2	Home		X			7
38	Lowflow toilet	1	Home		X			5
39	Stopped using space heater	1	Home	X			Recommendation of auditor	10
40	Insulation	1	Attic	X			Recommendation of auditor	10
	Insulation	1	Basement	X			Recommendation of auditor	10
41	Insulation	1	Attic	X			Recommendation of auditor	10
	Water heater blanket	1	Basement	X			Energy star rated	7
	Wrapped water pipes	1	Home		X			7
42	Insulation	1	Attic	X			Recommendation of auditor	10
43	Insulation	1	Basement	X			Recommendation of auditor	10
44	Weather stripping	1	House	X			Recommendation of auditor	10
45	Insulation	1	Attic	X			Recommendation of auditor	10

DOE Energy Savers Booklet

Surveyed participants were asked "Did you read the "DOE Energy Savers" Booklet?" Seventy surveyed participants (63%) answered yes. Surveyed participants were then asked if they shared and discussed the booklet with their family. Forty-six participants (41%) answered yes. Participants were also asked to list any improvements made based on advice in the booklet in 10 areas.

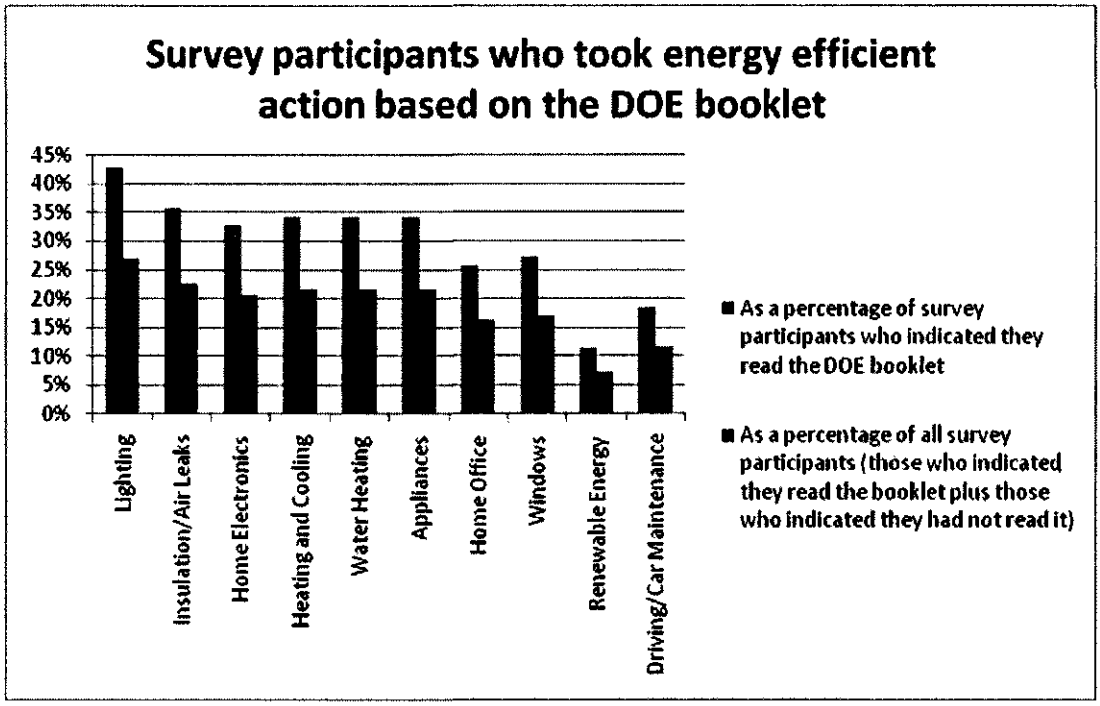

Figure 2. Actions Taken or Planned Based on DOE Booklet

CFL Informational Magnet and Safe Handling Tips

Surveyed participants were asked if they recalled receiving an informational CFL magnet in the Home Energy House Call kit. Thirty (27%) respondents remembered seeing the magnet and fifteen (13.5%) of respondents indicated that they had placed the magnet on their refrigerator. Seven respondents (6.3%) said that the magnet was still in the HEHC box, and eight of the respondents that reported that they remembered seeing the magnet further reported that they either no longer knew of its whereabouts or had thrown it out.

Participants were also asked if they had visited Duke Energy's web site to read the CFL safe handling tips. Twelve participants reported that they had visited Duke Energy's web site and were able to find the CFL safe handling tips. Four respondents reported that they were unable to find the CFL safe handling tips. While this number represents only 3.6% of total survey respondents, it is one-third of all respondents who reported visiting Duke Energy's web site.

Three of the eight respondents who visited Duke Energy's web site said that they learned new information from the content. Two participants said they were previously unaware that CFLs required any safe handling techniques, and one participant said he had a higher opinion of CFLs after visiting Duke Energy's web site.

Participant Satisfaction Survey

Participants were asked for their levels of satisfaction on a 1-to 10 scale (with one being the lowest and ten being the highest) for the kit measures as well as aspects of the program. The survey can be found Appendix A: Participant Survey Instrument and the results of the satisfaction questions are presented below.

Measure Satisfaction

The surveyed participants were satisfied with the measures provided Home Energy House Call kit. Table 9 below shows the respondents' mean satisfaction scores with various measures.

The lowest satisfaction (8.0, which is still a high score) was with the kitchen aerator.

Table 9. Measure Satisfaction

Measure	Average Rating	N	Percentage of ratings at or below 7
13 watt CFL	8.6	94	19.1%
20 watt CFL	8.8	92	14.1%
Lowflow showerhead	8.5	56	23.2%
Bathroom aerator	8.5	47	19.1%
Kitchen aerator	8.0	57	29.8%
Outlet gasket	9.1	61	9.8%
Switch gasket	9.1	61	11.5%

In addition to satisfaction ratings, participants who did not previously have a kit measure installed but still chose not to use a measure were asked why that was the case.

- In describing why they did not install the CFLs, five respondents indicated that they thought the bulbs were either too dim (n=3) or too fragile (n=2).
- The highest cited reason for not installing the low-flow showerhead was a preference for higher pressure (n=10). Other cited reasons were that the showerhead doesn't fit (n=3), the participant needs help installing the showerhead, and the participant didn't like prior one that Duke Energy had sent.
- For aerators the highest cited reason for non-use was that the aerator did not fit in the participants faucet (n=12), reduced flow (n=4) was the other reason listed.

For gaskets, participants' most often cited reason for not installing was that they felt the measure was unnecessary or unneeded (n=8). One participant found that the gaskets didn't fit, and another was concerned about electrical danger in installing and using the gaskets.

Program Satisfaction

The surveyed participants are very satisfied with the Home Energy House Call program. Table 10 shows the ratings for ten aspects of the program

Overall program satisfaction is very high at 9.2. Surveyed participants rated their satisfaction with the auditors who came to their homes and performed the audit. On a 1 to 10 scale, the auditors' friendliness, help and knowledge are rated at 9.35. The lowest satisfaction (8.4) is with the audit report providing new ideas for improving efficiency.

Table 10. Program Satisfaction

Metric	Average Rating	N Responding	Percentage of ratings at or below 7
Web Site usability	9.3	31	6.4%
Scheduling audit	9.3	100	6%
Interactions with auditor	9.4	103	
Knowledge of auditor	9.3	103	
Audit report	9	99	10.1%
New ideas from recommendations	8.4	98	
Likelihood of using recommendations	8.5	98	
Interactions with Duke Energy Staff	9.1	95	
Energy efficiency kit quality	9.3	98	
Overall Satisfaction	9.2	103	8.7%

If a rating at or below a score of 7 was given, participants were asked to list possible improvements to the program. The responses are bulleted below:

- Provide more new information in the audit materials for people who have already done the basics (n=10)
- Make it easier and more convenient to schedule audit (n=5)
- Provide more financial assistance to make changes (n=3)
- Get more durable CFLs (n=2)
- Better quality weather stripping
- CFLs should be brighter
- Larger font on the report would be nice. I had to put my glasses on to read it.
- Increase availability of audits on Saturday
- Eliminate mistakes in report and hire locally

Services and Program Changes Participants Would Like

We asked the 111 surveyed participants what other services they would like to see be a part of the HEHC program. Their responses are bulleted below:

- Follow-up visit to evaluate the results of the changes (n=4)
- Auditor should be able to check appliances and HVAC (n=2)
- A blow test, test equipment's energy use and efficiency.
- More free stuff is always good
- Discount/subsidies on heat and installation for implementing audit recommendations (n=5)
- Offer audits for churches and other non-commercial users (n=2)
- Thermal imaging to detect heat loss in winter (n=2)
- More advanced recommendations (n=6)
- Brighter CFLs
- Coupons for additional bulbs CFL.
- More info on disposal of CFLs.(n=3)
- Would like to see a fuse box that shows amps used per circuit so he could see where most energy is being used and track it down
- Assistance with making home improvements - esp insulation
- Follow-up audit in 2 years
- Help locating reputable insulation contractors (n=2)
- Disclosure of updated efficiency/rates for 220-volt appliances
- Weekend audits
- Provide solar-cell shingles
- More information regarding how to do insulation yourself
- LED lights
- Continue to update the info & equipment
- Shorter survey
- More EE equipment in kit
- Follow up with subsidized renewable energy options.
- Newsletter or periodic correspondence on energy savings, with follow-up tips and information
- Winter audits
- Annual audit and follow-ups

We asked the surveyed participants what could be done to increase interest and participation in the program. Their suggestions are below:

- More advertisement (n=37)
- Continue sending information with the bill (n=5)
- Emphasize the savings on utility bills (n=5)
- Give people good experiences and emphasize word of mouth (n=4)
- Make customers more aware of potential savings (n=4)

- Lower people's rates if they adopt the program (n=2)
- Testimonials
- Offer more info on cutting edge technology

What Participants Liked Most

We asked the participants what they liked most about the program. Their responses are bulleted below.

- The program was free (n=19)
- The energy efficiency kit (n=19)
  - Shower head
  - Lightbulbs
- Aerators and lightbulbs
- The information it provided (n=14)
- Reducing bills (n=2).
- Options with no pressure.
- Confirmed my efficiency and gave some new ideas (n=2)
- Free and easy to schedule
- The auditor was not a Duke Energy employee - unbiased party more reliable
- Awareness of home's strengths, weaknesses.
- Accessible, convenient
- Peace of mind that I'm energy efficient
- The expertise the auditor brought.
- Acted as an advocate for the homeowner, gave impartial advice
- Motivated me to act now
- No pressure
- Auditor called ahead and arrived on time
- Thorough and customized audit

What Participants Liked Least

We also asked the surveyed participants what they liked least about the program. Their responses are below.

- Change is hard sometimes
- Auditor didn't give enough detail/information
- Still had high energy bill last winter – didn't save enough.
- Too superficial/simplistic an audit (n=3)
- Low quality of the CFLs (n=4)
- Caused me to do a lot of work – my wife wanted changes ASAP.
- Scheduling audit
- Audit took a lot of time
- Didn't explain why his bills are so high despite EE measures he's taken

- Not comprehensive enough
- Kitchen faucet aerator malfunctioned once

Onsite Verification and Bias Check

Thirty participants agreed to allow Duke Energy to perform a follow-up audit. During this audit, the auditor verified the installation of measures as well as recommendations and compared the installation rates to those reported by the participants in the phone survey.

Table 11. Follow-up Audit Results with Kit Items

Kit Item N=29 participants that also had onsite verification	Number of Inconsistencies with positive energy savings	Percent of Inconsistencies with positive energy savings	Number of Inconsistencies with negative energy savings	Percent of Inconsistencies with negative energy savings
	For example, participant indicated during the phone survey that the measure was not installed, but it was discovered to be installed at the onsite verification visit.		For example, participant indicated during the phone survey that the measure was installed, but it was discovered to not be installed at the onsite verification visit.	
13-watt CFLs	2	6.9%	4	13.8%
20-watt CFL	2	6.9%	6	20.7%
Low-flow Showerhead	1	3.4%	4	13.8%
Kitchen faucet aerator	1	3.4%	5	17.2%
Bathroom faucet aerator	3	10.3%	0	0%
Outlet gaskets	2	6.9%	3	10.3%
Switch gaskets	1	3.4%	5	17.2%
Weatherstripping	1	3.4%	8	27.6%
Mean	**1.63**	**5.6%**	**4.38**	**15.1%**

Weatherstripping has the highest discrepancy by far with negative energy savings. However, three participants who indicated that they had installed the weather-stripping in the phone survey also said that it was of low quality and quickly fell off.

Table 12. Follow-up Audit Results with Recommendations

Recommendations N=29 participants that also had onsite verification	Number of Inconsistencies with positive energy savings	Percent of Inconsistencies with positive energy savings	Number of Inconsistencies with negative energy savings	Percent of Inconsistencies with negative energy savings
	For example, participant indicated during the phone survey that the recommendation *was not followed, but it was discovered to* be followed at the onsite verification visit.		For example, participant indicated during the phone survey that the recommendation *was followed, but it was discovered to not* be followed at the onsite verification visit.	
Attic Insulation N=11 recommendations	2	18.2%	1	9.1%
Basement Wall Insulation N=9 recommendations	0	0%	2	22.2%
Wall Insulation N=10 recommendations	1	10.0%	0	0%
Attic Duct Insulation N=4 recommendations	0	0%	0	0%
Attic Duct Sealing N=2 recommendations	0	0%	0	0%
Garage Duct Insulation N=1 recommendations	0	0%	0	0%
Garage Duct Sealing N=2 recommendations	0	0%	0	0%
Floor or Perimeter Insulation N=2 recommendations	0	0%	0	0%
Mean	**0.07**	**3.5%**	**0.07**	**3.9%**

Savings Distributions

There are some risks associated with relying on self-reported behavioral changes because the foundation of the savings estimates are based solely on the participant's responses with no means to verify that the respondent has installed the kit's measures and is using them effectively. In the case of this evaluation, it was determined that the engineering estimates derived from this methodology were unreliable and they were not used to estimate impacts in favor of a more reliable billing analysis approach.

These self-reported behaviors concerning what they would have installed without the program were used in the computation of the net to gross ratio. There are two main sources of bias with these types of surveys that directly impact the conclusions drawn from the responses. These sources of bias are Self-Selection Bias and False Response Bias. Instead of adjusting for these biases, on-site verification efforts were employed to establish a more reliable bias factor that resulted in the collapse of these two biases into a single adjustment factor termed the "on-site inspection adjustment".

Baseline Energy Use Assumptions

When a mail survey is used to conduct an evaluation, the evaluation contractors are unsure of the actual conditions in the home that have experienced a change. For example, while a new showerhead may have been installed, it is impossible to estimate precise savings unless the flow rates and use conditions associated with the previous showerhead are well understood. For this study we established our baseline assumptions based on the survey results and our past research and experience with programs and program evaluations that have taken measurements of baseline conditions. We have also used housing-type computer models to estimate baseline conditions and behaviors. As a result, we are not adjusting the baseline conditions applied in this study based on on-site pre-program inspections, but rather we are using the survey results, the literature, our past research and field experience to set what we think are typical baseline conditions. However, because these are not program-participant measured baseline conditions, it is important to let the reader know that the baselines used in this study are estimated.

Level of Discounting for Biases

The net savings estimate from the freeridership and spillover adjustments obtained via the survey, were then further adjusted to account for the results of the on-site verification visits. The level of adjustment for each measure is presented below. There was no discounting applied to savings acquired as a result of audit recommendations.

Table 13. On-site Inspection Adjustments

Measure	On-site Inspection Adjustment
CFLs	20.7%
Weather-stripping	7.0%
Outlet gaskets	4.0%
Showerhead	3.0%
Aerators	1.0%

Section 3: Program Operations

Program Description

The Home Energy House Call (HEHC) is a home audit program where energy specialists visit customers to provide a visual inspection of their house's characteristics and appliances. The specialists provide a customized energy report to educate customers on the low-cost and no-cost actions they could take to lower their energy bills. Customers also receive an energy efficiency starter kit containing CFLs and other low-cost measures that the auditor can install for no charge. In 2009 the energy efficiency starter kit contained one 20 watt and two 13 watt CFLs, one low flow showerhead, one bathroom faucet aerator, one kitchen faucet aerator, one small roll of Teflon tape for plumbing installations, two foam insulation gaskets for light switch plates, 17 inches of closed-cell foam weather stripping, one CFL refrigerator magnet with the Duke Energy logo, a booklet with tips saving energy that is produced by DOE, and a pamphlet with installation instructions for the kit items. The auditors are also able to install some of the measures upon request. Just recently, Duke Energy began emphasizing CFL installations and started asking the auditors to reach an objective of 6 CFLs installations per household.

The HEHC is marketed to Duke Energy customers by direct mail. These mailings target customers within specific regions to minimize the distance the energy specialist auditors need to drive in between house calls. Customers have to meet certain requirements for eligibility. Customers must: 1) be a Duke Energy customer, 2) own their homes, 3) have four months of billing history, and 4) have either electric heat, central air or electric hot water.

For this process evaluation, the evaluation team interviewed:

1. Thermo-Scan Inspections project manager
2. Market analysis consultant for Duke Energy
3. Account manager at Prototype, the mail vendor
4. Two project managers at Customer Link
5. Duke Energy's new HEHC program manager
6. WECC manager, in lieu of departing program manager.

Roles

WECC. Wisconsin Energy Conservation Corp (WECC) holds the contract with Duke Energy and administers the HEHC program through several subcontractors. WECC also developed a computerized scheduling tool that allows the different vendors to access the same database of customer appointment information. This database is verified by WECC on a bi-monthly basis to make sure it matches the Duke Energy participation database.

Customer Link. Customer Link provides the call center and staff that schedules audits using the common scheduling tool developed by WECC. Customer Link staff also explains the benefits of the HEHC program, answers customer questions about the

program, and informs customers about what items the energy efficiency kit contains. Customer Link is responsible for rescheduling customers in the event they wished to cancel. They report the results of their interactions with customers to Duke Energy every week. They also process the business reply cards (BRCs) that survey customers on their audit experience.

Customer Link is contractually obligated to answer 80% of customer calls within 30 seconds or less, and they reported that they consistently have been able to meet that goal. To main that level of service, Customer Link works with the rest of the HEHC management team to track upcoming HEHC mail drops. This allows them to line up enough staff to handle the increases in call volume that follow each mailing.

To maintain high call quality, customer calls are monitored by Customer Link management and by Duke Energy. Once a week, the entire HEHC team listens in on randomly-selected inbound and outbound calls. Every month, Duke Energy scores 50 calls in areas such as the staff's product knowledge, customer service, and customer experience. The Customer Link project managers report that their staff are required to score at least 92% but have consistently scored above 96%. The Customer Link project managers reported that they constantly work with Duke Energy and the auditors to make things easier for the customer including offering evening appointments. *"Our reps enjoy it; we're helping customers save money, we're helping the environment."*

Once Duke Energy began emphasizing CFL direct installations, Customer Link added language to their call center scripts to educate the customers about the additional CFLs that were available to them from the auditors. These additional CFLs are only available if the auditor is able to install them during the visit.

Thermo-Scan Inspections (TSI). TSI conducts the audits for the HEHC program, with 7 auditors for the Carolinas and 9 auditors for Ohio. The TSI project manager takes the lead in scheduling audits in a way that maintains even workflow. The TSI project manager plans the mailings across Duke Energy's service territory by zip codes in order to use the auditors most efficiently. Mailings are sent first to zip codes that have high numbers of potential participants and that could be served in a timely manner by auditors who are available in that geographic region. In the past, the timing of the mailings had not been tightly coordinated with the audit scheduling so that WECC and TSI had difficulty maintaining enough staffing at the right times. Duke Energy has a new program manager whom WECC credits with helping to improve scheduling by providing more accurate forecasting of program participation rates. "She's doing a great job of leading everybody to consensus."

Duke Energy's Market Analytics Department. The company that conducts the audits takes the strategic lead in determining the geographic regions for the next HEHC mailing. Once they determine the regions' zip codes, Duke Energy's Market Analytics Department provides a count of how many eligible participants there are in each zip code. Duke Energy filters customers within a zip code according to the participation requirements: prospective participants must have been a Duke Energy customer for over

4 months, own their single family home, and have at least one of the following three usages: electric heat, electric hot water, or central air conditioning.

ProtoType mail vendor. After Duke Energy pulls the customer information according to zip codes, the data is sent to ProtoType, the mail vendor, to verify the addresses against the National Change of Address (NCOA) database before sending out the mailers. Larger mailings are divided into batches of approximately 1500 mailers and sent out across a few days so that customers do not overwhelm the Customer Link call center. The account manager at the mailing company reported that there are very few returned mailers. After each mail drop, ProtoType sends to Duke Energy the list of customers who received the mailers and the proof of mailing for invoicing purposes. The account manager communicates with the Duke Energy program manager approximately twice or three times a week, with standing meetings on Fridays for regular updates on the mailings.

Thermo-Scan Inspections' auditors. The auditors are all trained to be certified BPI (Building Performance Institute) analysts by WECC, who has certified BPI trainers. The training program consists of one week of classroom and field training. After the coursework and tests, new auditors have to shadow an experienced auditor for a week before they are allowed to conduct audits independently. The TSI project manager accompanies each of the auditors on "ride-alongs" once or twice each quarter. While this is a time-consuming task, it provides an opportunity for the project manager to give feedback and share good practices that she sees being used by other auditors. WECC also conducts their own quality assurance ride-alongs but TSI reported they have not yet received any feedback on the auditors' performance.

Duke Energy also collects customer feedback about their audit experience using business reply cards. Those replies are shared with TSI at regular meetings. The reply cards consist of eight questions in which the customers are asked whether they were contacted in a timely manner by TSI, whether the scheduling was to their convenience, whether the auditors clearly explained the audit process and recommendations, whether the auditors responded to specific customer concerns and whether the report was easy to understand.

Audit Process

Duke Energy reported that each auditor tries to conduct 5-6 audits a day, four days a week. The auditor visits the customer's home and fills out an 80-question survey using a PC laptop. The audit is a visual audit so an auditor will only make a visual inspection of a house's insulation thickness.

The survey questions in the HEHC are very similar to the ones in Duke Energy's Personalized Energy Report (PER) survey, with the addition of 11 on-site questions that are specific to a house's insulation and ductwork. The auditor conducts the visual inspection according to the sequencing of the questions on the survey, and makes recommendations as to how the homeowner could increase their energy efficiency and lower electric bills. The recommendations are recorded on the PC laptop or an onsite paper report. After the audit, the survey responses are uploaded to the WECC database.

WECC reported that the customer's demographic and appliance information were originally intended to be shared with Duke Energy's other energy efficiency programs so that prospective participants could be identified for other programs. For example, customers who had an old appliance might be contacted by a program that rebated appliance upgrades. Currently, the survey responses and participant information are not shared with other programs.

Auditors track the recommendations made to each customer on the survey form. They focus their recommendations on low-cost and no-cost actions. The Duke Energy program manager reported that there is no particular emphasis on larger measures nor on rebates for those larger measures because customers tend not to adopt recommendations that would require more cost. "We hope that [the customer] is self-motivated to go out and take on additional measures...There is information on the website about other programs that they can research."

Operational Efficiency

Duke Energy reported that they have recently had "overwhelming" responses to the program and that the program's popularity through word of mouth has caused some difficulty with scheduling audits. *"They're starting to be aware of the need for energy efficiency."* At the times these interviews were conducted in mid-July, Duke Energy anticipated that the programs goals would have been met by the end of July of 2010. Due to the high demand, the program was trying to meet the audit requests in high density zip codes, and had not yet been able to target the low density zip codes.

The contents of the kit provided during the audit has not been changed since the inception of the program; however, TSI reported that they have attended several meetings with Duke Energy to determine how the kit could be improved. One idea is to move away from the "kit" concept and offer direct installs of the kit's items. Other measures considered by the HEHC team include chimney pillows and radiant barriers for the attic, however, there is no clear consensus by HEHC managers as to whether these are good candidates for the kit. Duke Energy is in the process of considering whether to add specialty fluorescent lamps for candelabras and flood lights. The potential impact and cost effectiveness of these kit candidates are reviewed by Morgan Marketing Partners, using the DSMore modeling tool. Niagara Conservation is the company that provides the energy efficiency kits, and they also monitor new technologies and measures that might be added to the kits.

Direct Installs

When the program first began, auditors offered to install measures for customers but did not have a specific measure installation objective. Duke Energy now emphasizes CFL installations and requires auditors to install six CFLs in each household, if the customers allow it. The energy efficiency starter kits contain 3 CFLs and auditors may install up to 12 more for a total of 15 CFLs per household. However, the TSI project manager reports that the auditors are averaging over two CFL installations from the kit, and 3 to 4 CFL installations from the additional 12 CFLS that were available. This is fewer than targeted.

In addition to the CFLs in the kit, the auditors are allowed to provide up to 12 more CFLs, but only if they can be directly installed during the audit. Auditors install CFLs in high use areas, not in closets or attics. TSI recently began tracking the number of CFL installations as well as the number of CFLs that the auditors checked out from the warehouse. This allows them to monitor stock availability. However, even though the number of CFL installations can be tracked using the survey software, Duke Energy is currently not tracking the wattages of the CFLs that are installed.

TSI reported that customers regularly request other types of CFLs and that Duke Energy is conducting analyses to determine whether it would be cost effective to include some specialty CFLs.

Installations of water measures is low. This is mainly because of liability concerns with old plumbing, and auditors installed showerheads and aerators only when the old fixtures could be removed by hand. The weather stripping is suitable for sealing small areas such as around a ceiling access panel; however it is rarely installed.

Barriers to CFL Installations

WECC is responsible for fulfilling Duke Energy's new CFL installation goal of six CFLs per home, and has produced and shared with Duke Energy a memo on customer barriers to installing more CFLs. They have also started tracking CFL installations by each auditor. Their data show that some auditors were installing more CFLs than others, indicating that some auditors are more effective at overcoming customer barriers. WECC has already started working with TSI to train auditors on ways to address customers' concerns about issues such as the mercury content in CFLs and proper disposal of CFLs. WECC has also encouraged Duke Energy to start offering specialty bulbs, and has provided auditors with a prioritized list of CFL installation locations targeting higher use areas first.

One reason customers do not want CFLs installed in their homes was because they were unwilling to remove incandescent bulbs that are still in good working order. The TSI project manager suggested that perhaps Duke Energy should require customers to install all three CFLs in the kit as a condition of receiving the free home energy audit service. Auditors also do not take away the old incandescent bulbs after putting in new CFLs, and instead leave them with the customer to install.

Duke Energy reported that they have observed an improvement in the number of CFLs installed by auditors since they set the 6 CFL objective. Auditors have been able to install the six CFLs.

Coordinating CFL Programs

The TSI project manager reported that one of the biggest barriers to CFL installation is that many of the customers were found to have a small stock of new CFLs that had not been installed. Duke Energy has been offering several energy efficiency programs that each provide homeowners with free CFLS: the Home Energy House Call, the Personalized Energy Report, and the "Get Energy Smart" grade school education

program. Customers in the PER program receive an energy efficiency starter kit that contains 6 CFLs with a mail-in coupon good for an additional 6 CFLs. Customers in the grade school education program receive 2 CFLs in an energy efficiency starter kit with a coupon to receive 6 more. There may be non-governmental organizations that also give away CFLs.

Program Successes

Most of the people interviewed agree that the teamwork between the implementers at the different organizations is excellent. The scheduling process is a successful collaboration between Duke Energy, WECC, Thermo-Scan Inspections, and Customer Link. These team members meet twice a week in order to coordinate future mailings with auditor availability. The team also shares feedback from customers and takes action as necessary to address problems that arise. As one interviewee said, *"We work through snags as a team."* Another agreed, *"Teamwork makes dreamwork!"*

The Duke Energy Home Energy House Call program is so well run that it has served as a source of best practices for other utilities. The TSI project manager reported that TSI has also implemented house call programs for several other utilities, and that the Duke Energy HEHC was perceived by her peers as an example of an implementation success. *"It's perceived by people here and at WECC that this Duke House Call program is running very smoothly. When something comes up for them, they come ask me how we're handling it."*

Even with the recent management changes at both Duke Energy and WECC, the HEHC is running well and still finds ways to improve. *"I thought things were running fine before, and we've [still] made huge improvements...If you would have [asked] me a year ago, I would have had more [issues] to discuss. Right now things are working really well."*

Program Areas to be Improved

Collaborating with gas utilities. Many homes in Duke Energy's service territory have gas water heaters. For these customers, Duke Energy has considered the idea of not offering measures that only have gas savings, such as the low-flow showerheads and aerators. However, the management team decided to keep the gas measures in the kit because of their low cost. The TSI project manager also suggested to Duke Energy that they might coordinate with the gas companies to conduct a joint House Call.

Capturing energy savings from HEHC recommendations. Duke Energy has only claimed energy savings from the direct installations of CFLs. However, the TSI project manager believed that customers were purchasing and installing large measures on their own as a result of the audit's recommendations, such as upgrading heat pumps. The savings from some of these installations may be captured by Duke Energy's other programs if customers take advantage of rebates given by other Duke Energy energy efficiency programs. Duke Energy would ultimately be able to claim those energy savings that are influenced by HEHC, even if the savings were not attributed to HEHC.

However, other energy savings may slip through the cracks, unless the evaluation effort captures them via customer surveys, if customers upgrade because of an HEHC recommendation and for some reason they did not apply for any rebate.

Even if the evaluation focuses on recommendation savings, the energy savings may not be captured if the HEHC's impact is evaluated too soon after customer participation. Residential customers may need time to budget for the recommended costly upgrade of a major appliance. With these cases, HEHC's influence may be substantial but not measurable until several months or even several years after program participation.

Increasing Participation Rates

Participation in HEHC has averaged 2% of mailers sent out. While the HEHC program has met its audit goals well before the end of the program year, Duke Energy is still interested in improving the response rate in order to lower the program's brochure printing and mailing costs.

The program might also be marketed more efficiently if the HEHC was only offered within a specific period of time. TSI is contractually obligated to audit a customer within 45 days of the customer's response to a mailer. Customers have been known to respond as late as 14-15 weeks after they received the mailers. Because the auditors usually have already moved their activities to another geographic region, serving those customers necessitates a long drive. This decreases cost effectiveness and increases cost per customer served. To motivate customers to respond in a more timely manner, TSI has recommended to Duke Energy that HEHC be marketed as a limited time offer (e.g. good for 4 weeks) but to also let the customer know that the audit would be available again at another specified time in the future.

Related to the limited-time offer idea is the idea of seasonal marketing. The TSI project manager suggested that another tactic to make the HEHC more appealing might be to make it seasonally appropriate, focusing on cooling costs in the summer and heating costs in the winter. However, TecMarket Works does not support this opinion because the audit would not be comprehensive.

Duke Energy is in the process of developing a probability model to predict likely participants based upon demographic information such as the square footage of the home, customer energy usage, the age of the home, and customer income bracket. Duke Energy plans to test the model by comparing the predicted participation rates against actual participation rates. Duke Energy has already confirmed that there were seasonal fluctuations in program participation that correspond to the summer heating and winter cooling seasons. This supports the suggestion of targeting the mailers' message to emphasize the seasonal importance of the audit.

Improving Audit Presentation

The WECC manager believes that the survey around which the audits are conducted could be improved greatly. He reported that the survey tool was originally designed as an interim tool, but was never updated. He believes that the survey questions could be re-

ordered so that the customer could better understand what the auditors are recommending. WECC staff members who have participated on audit "ride alongs" have reported to him that the audit presentations are a little "choppy" from the customer's perspective. The presentation also does not focus on recommendations that are most important for saving energy or actions that can provide deep lasting savings. He suggests that more of the auditors' time should be sent discussing higher-impact recommendations and explaining their benefits to the customer. The WECC manager said that Duke Energy has been informed of this and Duke Energy has begun observing audits more carefully to see if they could be improved from the customer's perspective.

Appendix A: Participant Survey Instrument

The questions below require mostly short, scaled replies from the interviewee, and not all questions will be asked of all participants. This interview should take approximately 10 to 15 minutes.

Home Energy House Call Program

Participant Survey

Contact Module
SURVEY INTRODUCTION

If Home Energy House Call participant, then contact for survey. Use five attempts at different times of the day and different days before dropping from contact list. Call times are from 10:00 a.m. to 8:00 p.m. EST or 9-7 CST Monday through Saturday. No calls on Sunday. (Sample size N =100)

SURVEY

Introduction

Note: Only read words in bold type.

Hello, my name is _____. I am calling on behalf of Duke Energy to conduct a customer survey about the Home Energy House Call Program. 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:

Call back 1:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 2:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 3:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 4:	Date: _____,	Time: _____	❑AM or ❑PM
Call back 5:	Date: _____,	Time: _____	❑AM or ❑PM

❑ Contact dropped after fifth attempt.

We are conducting this survey to obtain your opinions about the Home Energy House Call Program. Duke Energy's records indicate that you participated in the Home Energy House Call Program. We are not selling anything. The survey will take about 10 minutes and your answers will be confidential, and will help us to make improvements to the program to better serve others. May we begin the survey?

Note: If this is not a good time, ask if there is a better time to schedule a callback.

1. **Do you recall participating in the Home Energy House Call Program?**

1. ❑ Yes, *begin* → *Skip to Q3.*
2. ❑ No,
99. ❑ DK/NS

This program was provided through Duke Energy. In this program, you registered to receive a home energy audit. In return, the auditors provided you with custom energy-saving recommendations for you and your home, and you were provided with a free energy efficiency kit with 10 measures, such as a low-flow showerhead, CFLs, and outlet gaskets.

Do you remember participating in this program?

1. ❑ Yes, *begin* → *Go to Q2.*
2. ❑ No,
99. ❑ DK/NS

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

2. Please think back to the time when you were deciding to participate in the Home Energy House Call program. What factors motivated you to participate? ***(do not read list, place a "1" next to the response that matches best)***

1. ____ The audit
2. ____ The energy efficiency kit
3. ____ The program incentives
4. ____ The technical assistance from the auditor
5. ____ Recommendation of someone else (*Probe*: **Who?**_____)
6. ____ Wanted to reduce energy costs
7. ____ The information provided by the Program
8. ____ Past experience with this program
9. ____ Because of past experience with another Duke Energy program
10. ____ Recommendation from other utility program
    i. (*Probe*: **What program?** _____)
11. ____ Recommendation of family/friend/neighbor

12. ____ Advertisement in newspaper (*Probe:* **For what program?** _____)
13. ____ Radio advertisement (*Probe:* **For what program?** _____)
14. ____ Other (SPECIFY)

_____

15. ____ Don't know/don't remember/not sure (DK/NS)

If multiple responses: 2.a. **Were there any other reasons?** *(number responses above in the order they are provided - Repeat until 'no' response.)*

Free-Ridership Questions

3. Before you heard about the Home Energy House Call from Duke Energy, had you already been considering getting a home energy audit?

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

4. If the audit from Duke Energy's Home Energy House Call Program had not been available, would you still have:

4a. **Purchased an audit?**

1. ❑ Yes
2. ❑ No – *skip to question 5*
3. ❑ Don't Know – *skip to question 5*

4b. **Would you have purchased the audit within the next year?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

If the auditor installed CFLs during the home audit, ask questions 5-8. If no bulbs were installed, skip to question X:

5. Did you remove any of the <# of installed CFLs> **CFLs that the auditor installed when visiting your home?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

If yes, 5a and 5b. **How many did you remove?** _____

5b. Why did you remove them?

a. Not bright enough
b. too bright
c. did not like the light
d. too slow to start
e. mercury concerns
f. burned out
g. not working properly
h. other: _____

Did you have any CFLs installed in your home before you requested the HEHC audit or received the kit from the program?

❑ Yes ❑ No ❑ DK

6. **Now I'd like to talk about the energy efficiency kit that you received for participating in the Home Energy House Call program. I'm going to read a list of the items included in the kit, and for each one, please tell me if you have installed the item. Are you using the…**

6a. **Both 13-watt CFLs** ❑ Yes – *triggers follow up questions CFL a-CFL g.*
❑ Yes, but just one – *triggers follow up questions CFL a-CFL g.*

❑ No **Do you plan on using these CFLs?** ❑ Yes – *triggers CFL e – CFL g.*
❑ No ❑ Maybe/DK

Why Not?
❑ DK

6b. **20-watt CFL** ❑ Yes – *triggers follow up questions CFL a-CFL g.*

❑ No **Do you plan on using this item?** ❑ Yes – *triggers CFL e – CFL g.*
❑ No ❑ Maybe/DK

❑ DK

CFLa. How many watts was the old bulb that you took out? (repeat for all installed out of the 3 provided)

❑<=44 ❑45-70 ❑71-99 ❑100+

CFLb. On average, approximately how many hours per day is this light used? (repeat for all installed out of the 3 provided)
❑<=1 ❑1-2 ❑3-4 ❑5-10 ❑11-12 ❑13-24

CFL c. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's 13-watt CFL(s).

very dissatisfied very satisfied
1 2 3 4 5 6 7 8 9 10

CFL d. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's 20-watt CFL.

very dissatisfied very satisfied
1 2 3 4 5 6 7 8 9 10

CFL e. Were you planning on buying <additional> CFLs for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available sockets – *skip to next series*

CFL f. Have you purchased any CFLs since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, CFL g. **How many?** _____

6c. **Low-flow showerhead** ❑ Yes – *triggers follow up questions LFS a-i (and below)*
❑ No **Do you plan on using this item?** ❑ Yes – *triggers LFS f-i.*
❑ No ❑ Maybe/DK

❑ DK

LFS a. Was it easy to install?
❑ Yes ❑ No ❑ DK

If no, Why not? _____

LFS b. Typically how many showers per week are taken using this showerhead?
❑ 0-4 ❑ 5-10 ❑ 11-15 ❑ 16-20 ❑ 21+

LFS c. Would you estimate that the water coming out of this showerhead is…
❑ Less than the old unit
❑ About the same as the old unit
❑ More than the old unit

LFS d. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's low-flow showerhead.

very dissatisfied									very satisfied
1	2	3	4	5	6	7	8	9	10

LFS e. *If yes to 6c:* Did you use the teflon tape included in the kit when you installed the showerhead?

❑ Yes
❑ No
❑ DK

LFS f. Did you have any low-flow showerheads installed in your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ DK

LFS g. Were you planning on buying a low-flow showerhead for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all showers – *skip to next series*

LFS h. Have you purchased any additional low-flow showerheads since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, **LFS i. How many?** _____

6f. **kitchen faucet aerator** ❑ Yes – *triggers follow up questions KFA a-h.*
❑ No **Do you plan on using this item?** ❑ Yes – *triggers KFA e-h.*
❑ No ❑ Maybe/DK

❑ DK

KFA a. Was it easy to install?
❑ Yes ❑ No ❑ DK

If no, Why not? _____

KFA b. Was there an aerator already installed that you had to remove?
❑ Yes ❑ No ❑ DK

KFA c. Would you estimate that the water coming out of this aerator is…
❑ Less than the old unit
❑ Same as the old unit
❑ More than the old unit

KFA d. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's kitchen faucet aerators.

very dissatisfied									very satisfied
1	2	3	4	5	6	7	8	9	10

KFA e. Did you have any faucet aerators installed in your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ DK

KFA f. Were you planning on buying any faucet aerators for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available faucets – *skip to next series*

KFA g. Have you purchased any additional faucet aerators since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, **KFA h. How many?** _____

6g. **bathroom faucet aerator** ❑ Yes – *triggers follow up questions BFA a-h*
❑ No **Do you plan on using this item?** ❑ Yes – *triggers BFA e-h.*
❑ No ❑ Maybe/DK

❑ DK

BFA a. Was it easy to install?
❑ Yes ❑ No ❑ DK

If no, Why not? _____

BFA b. Was there an aerator already installed that you had to remove?
❑ Yes ❑ No ❑ DK

BFA c. Would you estimate that the water coming out of this aerator is…
❑ Less than the old unit
❑ Same as the old unit
❑ More than the old unit

BFA d. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's bathroom faucet aerators.

very dissatisfied									very satisfied
1	2	3	4	5	6	7	8	9	10

BFA e *(skip e-h if KFA e-h answered)*. **Did you have any faucet aerators installed in your home before you received the kit from the Home Energy House Call program?**

❑ Yes ❑ No ❑ DK

BFA f . Were you planning on buying any faucet aerators for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available faucets – *skip to next series*

BFA g. Have you purchased any additional faucet aerators since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, **BFA h. How many?** _____

6h. **outlet gaskets** ❑ Yes – *triggers follow up questions OG a-g*
❑ No **Do you plan on using this item?** ❑ Yes – *triggers OG d-g.*
❑ No ❑ Maybe/DK

❑ DK

OG a. How many did you install on the interior walls of your home?
❑ 1-2 ❑ 3-5 ❑ 6-8 ❑ 9-12 ❑ DK

OG b. How many did you install on the exterior walls of your home?
❑ 1-2 ❑ 3-5 ❑ 6-8 ❑ 9-12 ❑ DK

OG c. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's outlet gaskets.

very dissatisfied very satisfied
1 2 3 4 5 6 7 8 9 10

OG d. Did you have any outlet gaskets installed in your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ DK

OG e. Were you planning on buying any outlet gaskets for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available outlets – *skip to next series*

OG f. Have you purchased any additional outlet gaskets since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, **OG g. How many?** _____

6i. **switch gasket insulators** ❑ Yes – *triggers follow up questions SGI a-g.*
❑ No **Do you plan on using this item?** ❑ Yes – *triggers SGI d-g.*
❑ No ❑ Maybe/DK
❑ DK

SGI a. How many did you install on the interior walls of your home?
❑ 1-2 ❑ 3-5 ❑ 6-8 ❑ 9-12 ❑ DK

SGI b. How many did you install on the exterior walls of your home?
❑ 1-2 ❑ 3-5 ❑ 6-8 ❑ 9-12 ❑ DK

SGI c. On a scale from 1-10, with 1 indicating that you were very dissatisfied, and 10 indicating that you were very satisfied, please rate your satisfaction with the kit's switch gaskets.

very dissatisfied									very satisfied
1	2	3	4	5	6	7	8	9	10

SGI d. Did you have any switch gaskets installed in your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ DK

SGI e. Were you planning on buying any switch gaskets for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed in all available windows – *skip to next series*

SGI f.. Have you purchased any additional switch gaskets since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, **SGI g. For how many switches?** _____

6j. **weather stripping** ❑ Yes – *triggers follow up questions WS a-e.*
❑ No **Do you plan on using this item?** ❑ Yes – *triggers WS b-e.*
❑ No ❑ Maybe/DK

❑ DK

WS a.How many feet did you install?
❑ 1-5 ❑ 6-10 ❑ 11-17 ❑ DK

WS b. Did you have any weather stripping installed in your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ DK

WS c. Were you planning on buying any weather stripping for your home before you received the kit from the Home Energy House Call program?

❑ Yes ❑ No ❑ Maybe ❑ DK

❑ No, already have them installed around all available doors – *skip to next series*

WS d. Have you purchased any additional weather stripping since receiving the kit from Home Energy House Call?

❑ Yes ❑ No ❑ DK

If yes, **WS e. For how many doors?**

_____

Audit recommendations:

If "Your home needs attic ducts insulated to R-19" was recommended:

Did you insulate your attic ducts as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "Your home needs attic ducts sealed" was recommended"
Did you seal your attic ducts as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "Your home needs attic insulation" was recommended:
Did you insulate your attic as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "your home needs basement wall insulation" was recommended:
Did you install basement wall insulation as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "Your home needs garage ducts insulated to R-19" was recommended:
Did you insulate your garage ducts as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "Your home needs garage ducts sealed" was recommended:
Did you seal your garage ducts as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "Your home needs insulation in the floor or around perimeter of the home" was recommended:
Did you insulate in the floor or around the perimeter of the home as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

If "your home needs wall insulation" was recommended:
Did you insulate your walls as recommended in the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

Did you make any other changes to your home as a result of the Home Energy House Call Audit Report?

❑ Yes ❑ No ❑ DK

If yes, what did you do: _____

13. **Do you recall receiving the CFL magnet that was included in the kit?**

❑ Yes ❑ No ❑ DK

If yes, 13b. **Where is it?** _____

15a. **Have you visited Duke Energy's website to read the CFL safe handling tips?**

❑ Yes ❑ No ❑ DK

If yes, 15b. **Were you able to find the CFL safe handling tips on Duke Energy's web site?**

❑ Yes ❑ No ❑ DK

If yes, 15c. **Did what you read about CFL safe handling tips on Duke Energy's web site change your opinion of CFLs?**

❑ Yes ❑ No ❑ DK

If yes, 15d. **How?** _____

16. **Did you read the "DOE Energy Savers" Booklet?**

❑ Yes ❑ No ❑ No, but I will ❑ DK

***If yes,* Did you read and discuss the book with your family?**

❑ Yes ❑ No ❑ No, but I will ❑ DK

Have you taken any actions based on the advice in the booklet in the following areas?

Insulation/Air Leaks ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Heating and Cooling ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Heating and Cooling ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Water Heating ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Windows ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Lighting ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Appliances ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Home Office ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Home Electronics ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Driving/Car Maintenance ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Renewable Energy ❑ Yes ❑ No ❑ No, but I plan to ❑ DK
If yes, what did you do: _____

Spillover Questions

17. **Since you participated in the Home Energy House Call Program, have you purchased and installed any other type of energy efficiency equipment or made energy efficiency improvements in your home that were recommended by the audit report?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

18. **Did you order additional energy efficiency kits?**

1. ❑ Yes
2. ❑ No
3. ❑ Don't Know

If yes, 18a. **What did you do with the additional kits?**

_____
_____

19. **What type and quantity of high efficiency equipment did you install on your own?** *PROBE TO GET EXACT TYPE AND QUANTITY AND LOCATION*

Type 1: _____ Quantity 1: _____ Location 1: _____
Type 2: _____ Quantity 2: _____ Location 2: _____
Type 3: _____ Quantity 3: _____ Location 3: _____
Type 4: _____ Quantity 4: _____ Location 4: _____

20. **Was this improvement suggested by the home energy audit provided to you through the Home Energy House Call program?**

Type 1: _____ ❑ Yes ❑ No ❑ DK
Type 1: _____ ❑ Yes ❑ No ❑ DK
Type 1: _____ ❑ Yes ❑ No ❑ DK
Type 1: _____ ❑ Yes ❑ No ❑ DK

21. *For each type listed in 19 above,* **How do you know that this equipment is high efficiency? For example, was it Energy Star rated?**

Type 1: _____
Type 2: _____

Type 3: _____
Type 4: _____

I'm going to read a statement about this equipment that you purchased on your own. On a scale from 1-10, with 0 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statement.

22. **My experience with the Home Energy House Call Program in** <2006, 2007, 2008> **influenced my decision to install** <Type 1/Type 2/Type 3/Type 4> **on my own.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

23. **What other actions, if any, have you taken in your home to save energy and reduce utility bills at least in part as a result of what you learned in this program?**
Response:1 _____

Response:2 _____

Response:3 _____

Response:4 _____

Now I am going to ask you some general satisfaction statements. On a scale from 1-10, with 1 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statements.

24. **The web site's form for getting the kit was easy to understand and complete.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

25. **Scheduling the home energy audit was easy to do.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

26. **The interactions and communications I had with the energy auditor were satisfactory.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Not Applicable (no interaction)

If 7 or less, **How could this be improved?**_____

_____

27. **The energy auditor was helpful and knowledgeable.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Not Applicable (no interaction)

If 7 or less, **How could this be improved?**_____

_____

28. **The audit report was easy to read and understand.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

29. **The recommendations in the audit report provided new ideas that I was not previously considering.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

30. **The recommendations in the audit report increased the likelihood that I would take recommended actions.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

31. **The interactions and communications I had with Duke Energy staff was satisfactory.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know ❑ Not Applicable (no interaction)

If 7 or less, **How could this be improved?**_____

_____

32. **The measures I installed from in the energy efficiency kit were of satisfactory quality.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

33. **Overall I am satisfied with the program.**

1 2 3 4 5 6 7 8 9 10

❑ Don't Know

If 7 or less, **How could this be improved?**_____

_____

34. **What additional services would you like the program to provide that it does not now provide?**

Response: _____

_____

35. Are **there any other things that you would like to see changed about the program?**

Response: _____

36. **What do you think can be done to increase people's interest in participating in the Home Energy House Call Program?**

Response:1 _____
Response:2 _____
Response:3 _____
Response:4 _____

37. **What do you like most about this program?**

Response: _____

38. **What do you like least about this program?**

Response: _____

Thank you, that completes our survey, but we are looking for residential customers to participate in a research study in which a Duke Energy representative will visit homes to look for additional ways in which Duke Energy can help to reduce their customers' energy bills. If you choose to participate, a Duke Energy representative will visit your home at your convenience in June. The appointment would take about 30 minutes. We will only use your data for internal purposes and your responses will be grouped with other households. This will help us to improve Duke Energy's Home Energy House Call program. As a thank you, you will receive a $50 Visa pre-paid check card that will be mailed within 8 weeks of your participation. Are you interested in participating?

1. ❑ Yes

2. ❑ No – **OK, thank you for your time and feedback today!** (*politely end call*)

If Yes: **A Duke Energy representative will be calling your home to schedule your appointment. After the home visit, you will receive a $50 Visa pre-paid check card that will be mailed within 8 weeks of your participation. Can you please provide the best phone number to reach you:**

1. ❑ Number on file
2. ❑ Different number: _____

OK, thank you for your time and feedback today! (*politely end call*)

Appendix B: Program Manager Interview Instrument

Name: _____

Title: _____

Position description and general responsibilities:

_____

_____

_____

We are conducting this interview to obtain your opinions about and experiences with the Home Energy House Call program. We'll talk about the Home Energy House Call Program and its objectives, your thoughts on improving the program, and the technologies the program covers. The interview will take about an hour to complete. May we begin?

Program Objectives

1. In your own words, please describe the Home Energy House Call's current objectives. How have these changed over time?

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

3. Are there any program objectives that are not being addressed or not being addressed as well as possible or that you think should have more attention focused on them? If yes, which ones? How should these objectives be addressed? What should be changed?

4. Should the program objectives be changed in any way due to technology-based, market-based, or management based conditions? What objectives would you change? What program changes would you put into place as a result, and how would it affect the operations of the program?

Operational Efficiency

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

6. Please review with us how the Home Energy House Call operates relative to your duties, that is, please walk us through the processes and procedures and key events that allow you do currently fulfill your duties.

7. Have any recent changes been made to your duties? If so, please tell us what changes were made and why they were made. What are the results of the change?

8. Describe the evolution of the Home Energy House Call Program. How has the program changed since it was it first started?

9. Do you have suggestions for improvements to the program that would increase participation rates or interest levels?

10. Do you have suggestions for improving or increasing energy impacts?

11. Do you have suggestion for the making the program operate more smoothly or effectively?

Program Design & Implementation

12. *(If not captured earlier)* Please explain how the interactions between the auditors, customers and Home Energy House Call's management team work. Do you think these interactions or means of communication should be changed in any way? If so, how and why?

13. Describe your quality control and tracking process.

14. Are key industry experts, trade professionals or peers used for assessing what the technologies or models should be included in the program? If so, how does this work?

15. Are key industry experts and trade professionals used in other advisory roles? If so how does this work and what kinds of support is obtained?

16. Describe Home Energy House Call's auditor program orientation training and development approach. Are auditors getting adequate program training and program information? What can be done that could help improve auditor effectiveness? Can we obtain training materials that are being used?

17. In your opinion, do the audits cover enough different kinds of energy efficient products or recommendations?

1. ☐ Yes 2. ☐ No 99. ☐ DK/NS

If no, 20b. What other products or equipment should be included? Why?

_____

_____

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

19. What market information, research or market assessments are you using to identify market barriers, and develop more effective delivery mechanisms?

20. Overall, what about the Home Energy House Call program works well and why?

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

22. Can you identify any market, operational or technical barriers that impede a more efficient program operation?

23. In what ways can these operations or operational efficiencies be improved?

24. In what ways can the program attract more participants?

25. How do you make sure that the best information and practices are being used in Home Energy House Call operations?

26. *(If not collected above)* What market information, research or market assessments are you using to determine the best target markets and program opportunities, market barriers, delivery mechanisms and program approach?

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

Appendix C: Estimated Statistical Model

This appendix presents the complete regression models use to determine the program effects. The models include the participation variables by state (Audit and kit), weather conditions (temperature and dew point), and indicator variables for each month in the model (in the form MMMYY).

Table C.1 Audit and Kit Savings

	kWh/Day
Audit, Ohio	-3.391*** (-8.08)
Audit, NC	-1.761*** (-3.74)
Audit, SC	-1.427*** (-1.76)
Kit, Ohio	-2.520*** (-6.02)
Kit, SC	-1.521*** (-1.87)
Kit, NC	-0.989** (-2.09)
Temperature	0.0940* (1.66)
Dew Point	-0.0770 (-1.23)
Humidity	0.238*** (8.50)
sept08	16.06*** (11.07)
oct08	11.88*** (5.05)
nov08	18.82*** (6.47)
dec08	35.88*** (10.84)
jan09	46.29*** (16.50)
feb09	47.91*** (15.12)
march09	38.12*** (10.96)
april09	31.43*** (8.65)
may09	30.38*** (8.07)
june09	37.89*** (9.89)
july09	50.57*** (13.06)
aug09	50.14*** (12.74)
sept09	44.92*** (11.32)
oct09	33.29*** (8.35)
nov09	30.87*** (7.70)
dec09	41.68*** (10.46)
jan10	55.88*** (19.75)
feb10	52.60*** (16.44)
march10	41.85*** (12.05)
april10	34.46*** (9.46)
may10	31.31*** (8.29)
june10	44.60*** (11.50)
july10	62.80*** (15.92)
Observations	293,388

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table C.2 Total Savings

	kWh/Day
Total, Ohio	-5.505*** (-23.61)
Total, NC	-2.420*** (-9.02)
Total, SC	-2.577*** (-6.09)
Temperature	0.0940*** (1.66)
Dew Point	-0.0762*** (-1.21)
Humidity	0.237*** (8.47)
sept08	16.03*** (11.05)
oct08	11.84*** (5.03)
nov08	18.77*** (6.45)
dec08	35.83*** (10.83)
jan09	46.28*** (16.50)
feb09	47.86*** (15.11)
march09	38.06*** (10.95)
april09	31.36*** (8.63)
may09	30.30*** (8.05)
june09	37.78*** (9.87)
july09	50.44*** (13.03)
aug09	49.99*** (12.70)
sept09	44.77*** (11.29)
oct09	33.13*** (8.31)
nov09	30.68*** (7.65)
dec09	41.48*** (10.41)
jan10	55.71*** (19.70)
feb10	52.38*** (16.38)
march10	41.58*** (11.97)
april10	34.15*** (9.38)
may10	30.93*** (8.19)
june10	44.18*** (11.39)
july10	62.35*** (15.81)
Observations	293,388

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Process and Impact Evaluation of the Residential Smart $aver Energy Efficiency Products (CFLs) Program in Ohio

Final Report

Prepared for
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Executive Summary

Key Findings and Recommendations

This section presents the key findings and recommendations identified through this evaluation of Duke Energy's Ohio Residential Smart $aver Energy Efficiency Products Program. The program evaluation covers the period of time from July 1st 2010 through April 26th 2011 (n=243,393 participants. Table 1 presents the estimated overall ex post energy impacts from the engineering analysis.

Table 1. Estimated Overall Impacts

	Gross Savings	Net Savings
Annual Savings Per Bulb Distributed		
kWh	34.4	29.0
kW	0.0043	0.0036

The impacts in this table were calculated using engineering algorithms from Appendix G: Impact Algorithms. These estimates also take into account a participant's tendency to over-report operating hours. This is explained in further detail in the Self-Reporting Bias section. The net-to-gross ratio used to calculate net savings is 84.24%. Freeridership and spillover, the two components of the net-to-gross ratio, are calculated in their respective sections: Freeridership and Spillover. Market effects energy savings are not included in this program evaluation report and if present, are above and beyond those savings reported.

Significant Process Evaluation Findings

From the Management Interviews

- Overall, this program was highly successful in meeting its goals and is not experiencing significant problems. A member of Duke Energy's program management summarized it as "working wonderfully." The IVR and online platforms have performed well and exceeded all goals for increasing CFL participation with comparatively low levels of freeridership.
- Duke Energy wants to grow the portfolio to include specialty bulbs in their promotional offer. TecMarket Works agrees that this would be a reasonable change to the program's offerings.
- Consumer education is an area for potentially enhancing CFL acceptance and adoption.

From the Participant Surveys

- Overall program and CFL satisfaction levels are very high, and overall Duke Energy satisfaction is high.

- The direct mail CFL program in Ohio is doing an excellent job of targeting participants with little or no prior CFL use. More than half of all participants indicate that this is their first acquisition of CFLs.
- The desire to "save on utility costs" was the most influential factor in their decision to obtain CFLs via the program. "Desire to save energy" placed second.
- While the mean satisfaction rating for the tracking system is very high among users, a large majority of respondents did not use it and therefore it appears to not be a useful part of the CFL direct mail program.
- Three quarters of respondents indicated that the program has made them more likely to use CFLs in the future, indicating increasing levels of spillover well beyond what is measured in this study.
- The direct mail and coupon delivery methods rated the highest satisfaction levels by far. Respondents are much less likely to participate in a program that delivers CFLs through a community event, online vendor, or parking lot stand.
- While the two highest rated factors influencing bulb purchasing were energy savings and cost savings, factors often perceived as barriers to CFL adoption such as aesthetics, mercury content, and availability of dimmable bulbs were among the lowest rated factors.
- A CFL program that offers three-way bulbs had the highest levels of interest among all surveyed customer

From the Non-Participant Surveys

- Overall satisfaction with Duke Energy across all non-participants surveyed averaged 8.2 out of 10. A high score.
- The most popular reason for not participating in the program was because customers did not find the offer compelling enough to take action, indicating a potential need for customer education focusing on importance of action.
- Despite not participating in the program, nearly two thirds of the non-participants surveyed indicated that learning of Duke Energy's CFL program had increased their awareness about how to save energy by using CFLs. This suggests that the program is having an energy savings transformative effect on non-participants and increasing savings well beyond the levels documented in this study.
- The desire to save on utility costs and the desire to be environmentally responsible tied as the most influential factors on CFL purchases by non-participants, suggesting key marketing messages for non-participants.
- Among low income and standard income non-participants the direct-mail and coupon delivery methods were most favored while the online vendor option was the least desirable.

Significant Impact Evaluation Findings

- Mean wattage of a replaced incandescent is 63 watts.
  - See Impact Analysis on page 63.
- A first year installation rate of 63.5% was reported, with an ISR of 77.9%.
  - See In Service Rate (ISR) Calculation on page 65.

- Living/family room, master bedroom, and kitchen, in that order, are the three most popular room types for bulb replacements; together they make up 64% of all bulb installations.
    - See Figure 17 on page 65.
- Surveyed participants report slightly increased operating hours when switching from an incandescent to a CFL having a very small effect on energy savings.
    - See Survey Data on page 64.

Recommendations

Because the program is meeting its goals and running very effectively, and because the Duke Energy team has already acted upon suggestions given during the previous evaluation, the recommendations given here focus on increasing the effectiveness of future efforts rather than correcting any shortfalls in performance. With that in mind we suggest the following:

- Customers are interested in specialty bulbs and this seems a reasonable direction to change the promotional offer. Customers indicated that they were most interested in three-way bulbs, outdoor floods, and dimmable bulbs in close order. Dimmable and recessed bulbs are the most prevalent specialty bulbs currently in use among those surveyed. Taken together these findings indicate that dimmable bulbs hold the strongest combination of customer interest and market share. Focusing on dimmable bulbs, followed by three-way and outdoor floods appear to be a logical place to start.
- Because "saving on utility costs" and "saving energy" were the two most influential factors among both program participants and nonparticipants, Duke Energy may be able to increase program participation and CFL purchases by emphasizing the particular benefits.
- The program is doing a strong job of increased awareness among nonparticipants about how to save energy using CFLs. Continued marketing and consumer education may enhance acceptance and adoption of CFLs among this audience in the future.
- Because a high percentage of Duke Energy customers never acted upon the offer despite the stated interest, Duke Energy may be able to improve take rates among nonparticipants by using time limited offers to compel customers to take action.

Introduction and Purpose of Study

Summary Overview

This document presents the evaluation report for Duke Energy's Residential Smart $aver® Energy Efficiency CFLs Program as it was administered in Ohio. 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 participants in the CFL campaigns as presented in Table 2 below.

Table 2. Evaluation Date Ranges

Evaluation Component	Sample Pull: Start Date of Participation	Sample Pull: End Date of EMV Sample	Dates of Analysis
Participant and Non-Participant Surveys	July 1st 2010	April 26th 2011	Surveys conducted from 12/6/11 through 4/3/12
Engineering Estimates	July 1st 2010	April 26th 2011	N/A

TecMarket Works conducted a phone survey with a random sample of 161 participants and 60 non-participants from Ohio between December 6th, 2011 and April 3rd, 2012. Surveyed participants fall into one of two income categories based on the Experian identifier that used Federal Poverty Guidelines[1] (and further confirmed[2] by the survey's demographic questions) provided by Duke Energy indicating the customer was a low income customer. Survey sampling targeted half low income customers, and half "standard" income participants.[3] This allows Duke Energy to understand if the transition for low income customers to IVR/Web was successful.

Low Income customers are estimated[4] to be 38% of the population in Ohio.

Surveyed participants were asked how many CFLs that were currently installed in light fixtures were ordered through Duke Energy's CFL direct mail program. Additional, more specific information was collected for a maximum of three bulbs. This information included the location of the installed CFL, the type and wattage of the bulb that it replaced, and the mean hours per

[1] U.S. Department of Health & Human Services 2012 HHS Poverty Guidelines.
[2] Confirmation process determined that 79.2% were correctly identified as Low Income and Standard Income. In view that conditions may change from year to year, this was determined acceptable for the purposes of classification for this report.
[3] In the past, Duke Energy Ohio has also offered the Agency Assistance Kit to low-income customers. In partnership with various local assistance agencies, qualifying customers could complete a survey to receive 12 compact fluorescent light bulbs. For their assistance in helping customers complete the survey, agencies received monetary compensation for each survey completed. The Residential CFL program now provides this service to all customers in Ohio through the automated IVR/Web platform.
[4] http://www.statehealthfacts.org/comparebar.jsp?ind=877&cat=1

day that it is in use. The decision to limit the number of CFLs about which to collect detailed information to three was made in the interest of time and evaluation cost, as the surveys are quite lengthy. The information gathered about the three CFLs is sufficient and provides statistically significant data. A separate sample of participants were sent e-mails or letters inviting them to take part in the survey online via Duke Energy's website, through which an additional 221 responses were collected from October 31st to November 28th, 2011.

To assess barriers to and interest in this program and other Duke Energy programs, TecMarket Works conducted phone surveys with a random sample of 60 non-participants (31 low income and 29 standard income customers) from Ohio between February 21st and April 3rd, 2012.

An impact analysis was performed for all CFLs by room type and can be seen in Table 47 and Table 48. 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 customer-reported hours of use were adjusted downward for the self-reporting bias, identified in a previous CFL study[5] that included a reconciliation between customer reported and lighting logger data. The reasons for the inclusion of the self-reporting bias is explained in the section "Self-Reporting Bias".

This report is structured to provide program impact estimations per bulb distributed as well as overall program savings based on an extrapolation of these results to the full participant population (participants from July 1st 2010 through April 26th 2011; n=243,393 participants).

[5] TecMarket Works and Building Metrics. "Ohio Residential Smart Saver CFL Program". June 29th, 2010. Pg. 35.

Description of Program

Duke Energy residential customers have the ability to 'opt-in' and order CFLs by responding to a direct mail campaign (campaign ID = 664), or by calling the IVR toll free number, or by logging into their account information in OLS (Online Services) (IVR and OLS campaign ID = 701). Customers are eligible for up to 15 CFLs (depending on past program participation).

The program was designed to provide on-demand ordering, while checking eligibility with program updates in the CFL tracker, Duke Energy's online order tracking system. The platform provided customers access to check the status of their CFL order from beginning to end (delivery to home).

Program Participation

Table 3. Program Participation

Program	Campaign	Participation Count From: July 1st, 2010 To: April 26th, 2011
Residential Smart $aver CFL	664	62,595
Residential Smart $aver CFL	701	180,798
Residential Smart $aver CFL	**TOTAL**	**243,393**

Methodology

Overview of the Evaluation Approach

This process evaluation had four components: management interviews, participant surveys, non-participant surveys, and an impact analysis based on engineering algorithms.

Study Methodology

Management Interviews

TecMarket Works conducted interviews with Duke Energy's Product Manager and with the Client Manager at Niagara Conservation, the vendor contracted to provide order tracking and bulb fulfillment from program inception until April of 2012.

Participant Surveys

This survey focused on customers who, according to program tracking records, responded to the CFL program marketing efforts by Duke Energy to receive free CFLs. The survey was conducted by phone by TecMarket Works' staff from a randomly generated sample of 243,393 customers who requested the CFLs, with 161 survey respondents responding to all of the survey questions. In addition, Duke Energy fielded an online version of the survey with 221 participants responding. The survey instrument can be found in Appendix B: Participant Survey Instrument.

Non-Participant Surveys

This survey focused on customers who recalled the promotion for the free CFLs but did not respond to the offer from Duke Energy. The survey was conducted by phone by TecMarket Works staff from a randomly generated sample from 261,522 non-participating customers, with 60 survey respondents responding to all of the survey questions. The survey instrument can be found in Appendix C: Non-Participant Survey.

Impact Analysis

Engineering algorithms taken from the Draft Ohio Technical Resource Manual (TRM) were used to estimate savings. These unit energy savings values were applied to customers in the engineering analysis sample.

Data collection methods, sample sizes, and sampling methodology

Management Interviews

Three management interviews were conducted with program implementation staff and management in order to capture their insights about the programs operations and challenges. We interviewed the Residential Account Manager (Marketing) and the Product Manager at Duke Energy, and the Marketing Manager for Utilities at GE. The interview instrument can be found in Appendix A: Management Interview Instrument.

Participant Surveys

A sample list of customer records was randomly pulled by TecMarket Works from a list of 243,393 participants (between the dates of August 31st, 2011 through April 28th, 2011) provided

by Duke Energy. Surveys were conducted by telephone with 161 participants, and online surveys were completed with 221 participants. The survey instrument can be found in Appendix B: Participant Survey Instrument.

Non-Participant Surveys

A sample list of customer records was randomly pulled by TecMarket Works from a list of 261,522 customers that did not respond to the marketing efforts for the free CFLs Surveys were conducted by telephone. Sixty non-participants completed the survey. The survey instrument can be found in Appendix C: Non-Participant Survey.

Impact Analysis

Phone surveys were conducted with a random sample of 161 participants. Online surveys were answered by 221 people that were also selected at random.

Number of completes and sample disposition for each data collection effort

Management Interviews

Two out of two management representatives were contacted in 2012 for a 100% response rate.

Participant Surveys

From the sample list of customers, 882 participants were called between December 6th, 2011 and February 16th, 2012, and a total of 161 usable telephone surveys were completed yielding a response rate of 18.3% (161 out of 882). Surveys were completed by an additional 221 participants through an online survey.

Non-Participant Surveys

From the sample list of customers, 1,157 non-participants were called between February 21st, 2012 and April 3rd, 2012, and a total of 60 usable telephone surveys were completed yielding a response rate of 5.2% (60 out of 1,157).

Impact Analysis

A total of 161 participants answered the phone survey and 221 participants answered the online survey. The surveys asked the same questions and were combined for a total of 382 completed surveys.

Expected and achieved precision

Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 5.3% and an achieved precision of 90% +/- 4.2%.

Non-Participant Surveys

The survey sample methodology had an expected precision of 90% +/- 10.6% and an achieved precision of 90% +/- 10.6%.

Impact Analysis

Engineering estimates rely on participant survey responses. Sampling procedures for the participant survey had an expected precision of +/- 5.3% at 90% confidence and an achieved precision of +/- 4.2%.

Description of baseline assumptions, methods and data sources

Baseline assumptions were determined through phone surveys with customers providing self-reported values of baseline lamp watts and 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. 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 G: Impact Algorithms.

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

The program distributed CFLs exclusively. The Draft Ohio TRM's impact algorithms were enhanced with primary data and used to calculate energy savings. All customers are in the residential market.

Use of TRM values and explanation if TRM values not used

The HVAC interaction factors were developed using customer specific HVAC system information collected through Duke Energy's appliance saturation survey Ohio as they more accurately represent the participant population than the deemed values.

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

CFL installations and hours of operation were self-reported by the surveyed participants. There is a potential for social desirability bias[6] 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 of building energy simulation models, which are considered to be state of the art for building shell and HVAC system analysis.

[6] Social desirability bias occurs when a respondent gives a false answer due to perceived social pressure to "do the right thing."

Management Interviews

Description of the Program

The Residential Smart $aver Energy Efficiency Products (CFL) Program began in 2010 and is designed to provide qualifying Duke Energy residential customers with up to 15 CFLs that are mailed directly to the customers' homes.

Initially the program offered customers six CFLs via coupon or a business reply card. The program then expanded by increasing both the incentive size and the range of message channels. The 2011 incentive offered customers up to a maximum of 15 CFLs at one time, shipped directly to their home, and utilized a wide variety of channels, including low cost/no cost options such as toll-free interactive voice recognition (IVR) and online ordering platforms.

The 2011 program was originally test-piloted in August 2010, and was initially limited only to customers who are Duke Energy employees to reduce operational risks associated with getting the program operating well before offering it to customers. The IVR number subsequently went viral as individuals posted it on web blogs, Facebook, Twitter, and other online social media (which also drove occasional television and radio reporting). This rapidly engaged the participation of Duke Energy's general public customers in September-December 2010 despite little targeted marketing of the program by Duke Energy during that time.

As the IVR went viral in the fall of 2010, the range of channels for the program expanded further. The online service account (OLS) that customers utilize for billing added a pop-up asking the customer if he/she wants free CFLs. Customers were eligible for up to 15 CFLs (minus the number redeemed from previous Duke Energy promotional campaigns), and could elect to accept fewer than the maximum if they preferred. Customers received the pop-up box only once in order to avoid annoying customers with repeated pop-ups. However, for those who chose "no thanks", the next time that they logged back in they received a small promotional message (that can click to pursue CFL offer) in the OLS advertising area.

Additional electronic channels included: a program website that enables customers to directly request CFLs, utility website promotions, Duke Energy state website promotions, Facebook advertising targeted by specific zip code areas, and email messages (for customers who previously opted in to receive email promotions). Other channels were also used to help drive traffic to the IVR and other electronic platforms. These other channels included: direct mail (customized with account number to make responding easier), bill insert promotions, marketing in some Spanish journals and magazines, and press releases. Duke used a unique URL for each message type and utilized Google Analytics to track each URL.

This program enabled customers to order on-demand and have the CFLs shipped directly to their home, and to track their order throughout the ordering/shipping process. Customers were told to allow either 4-6 weeks or 6-8 weeks for delivery, although most orders were actually delivered within 1-2 weeks. TecMarket Works considers delivery of web or phone CFL orders with 1-2 weeks a best practice.

Goals of the Program

Duke Energy's pre-launch Communication Plan for this program described the goal of this campaign as "to expand participation in the [CFL] program…[by marketing to each segment] where and how they prefer, and provide an easy way to order and receive bulbs." In other words, the overall goal was to increase CFL participation through new IVR and online ordering platforms with direct shipping to customers. Specific objectives included engaging customers who had not been previous coupon redeemers, reaching more total customers, and establishing cost-effective promotion platforms. Additionally, specific types of messages and channels were identified for particular target audiences, as outlined in Table 4.

Table 4. 2011 CFL Communication Plan Targets

Target Audience	Key Message	Channel
Budget Conscious Homeowners	Free Save money Get attention with CFL game because this segment includes a lot of online gamers	State landing page promos OLS promos Advantages of CFLs via CFL game Social media YouTube videos Blogger outreach
Sustaining Seniors	Free No risk Save money Overcome safety objections	Earned media State landing page promos OLS promos Bill message Envelope message Low income printed piece Postcard
Mainstream Families	Green message Save money	State landing page promos OLS promos Online CFL game Envelope messages Vehicle signage Blogger outreach Social Media YouTube videos
Financially Secure Traditionalists	Green message Save money	State landing page promos OLS promos Bill messages Envelope messages Postcard Vehicle signage
Financially Secure Homeowners	Green message Save money	State landing page promos OLS promos Bill messages Envelope messages Postcard Vehicle signage Searchability
Young Mobile Achievers	unspecified	Social media YouTube videos CFL game Searchability

Fulfillment

Niagara Conservation of Cedar Knolls, NJ was chosen to serve as Duke Energy's fulfillment contractor, providing a customer- and order-tracking database, bulb order processing and handling, shipping (via FedEx), and a call center for customer assistance with ordering difficulties, shipping issues, broken bulbs, and questions regarding the use of the CFLs. Niagara served in this capacity from program inception until April of 2012.[7]

In its arrangement with Niagara, Duke Energy agreed to an initial purchase of 8 million CFLs in May of 2010 for the first round. These bulbs were to be used to fulfill customer requests from all Duke Energy CFL programs. In March of 2011, a second round of nine million bulbs was purchased.

Under the original arrangement, business reply card orders were sent to Duke Energy for processing and in turn forwarded to Niagara in batches for fulfillment within nine business days. In its early days, this process was occasionally slowed by Duke Energy's need to manually scan and process the BRCs[8]. However, when the IVR and online ordering systems were incorporated, the process was streamlined and all new orders were sent directly to Niagara. The nine business day processing requirement remained in the service level agreement.

Bulb requests were compiled daily (weekly for BRCs) and sent to Niagara in electronic form for processing beginning the next day. Typical volume ranged from 2,000 to 20,000 customer bulb requests per day, and Niagara was required to be staffed to ensure sufficient labor for compiling the efficiency kits, which consisted of a branded cardboard box loaded with the appropriate number of CFLs, Duke Energy's marketing copy, additional collateral, and packing materials. Prior to fulfillment, all customer bulb requests were checked against the CFL tracker database to ensure customer eligibility based on the previous number of bulbs received through other Duke Energy program efforts.

Duke Energy coordinated closely with Niagara to ensure that the fulfillment vendor was informed in advance of new marketing efforts that were likely to increase bulb order volumes. Within normal volumes, customer orders were generally processed in a timely fashion. However, in August of 2011 Niagara was falling behind schedule, and by September of that year the backlog became problematic as bulb order volume shot upwards. During the week of September 4, 2011 alone, over 80,000 customers requested more than 1 million bulbs. Continued high demand during subsequent weeks added another million bulbs. This surge in demand was spurred in part by a direct mail campaign that achieved unusually high response rates and by the viral nature of the reaction by the customers. Without sufficient quantities of bulbs in stock, Niagara needed time to acquire additional CFL supplies. To mitigate any potential issues with customer satisfaction, Duke Energy shifted customer expectations by changing the bulb delivery time period from its original timeframe of 4-6 weeks to a new time period of 6-8 weeks. The additional time window enabled Niagara to source and stock additional CFLs and fulfill the bulb requests. The backlog, which extended for several weeks, was cleared by late autumn of 2011.

[7] While the management section of this evaluation covers activities extending into 2012, the M&V time period for the participant surveys described in other sections covers from July 1, 2010 through April 26, 2011,
[8] However, participant surveys indicate that customers were satisfied with the delivery time of the CFLs.

Customer and Order Tracking

Niagara Conservation was also responsible for developing and maintaining the database for tracking and coordinating all CFL program activity, including: the number of bulbs requested by customer, specific Duke Energy CFL program generating each request, customer address, dates of order and shipment, and shipping information concerning delivery, returns, and reasons for returns.

It took Niagara longer to develop the database than originally anticipated. Then Duke Energy required Niagara to make further changes to ensure that the correct data was being captured. With the bugs out of the software, the tracking system worked well for data capture, but it continued to have issues with its reporting functions, which were insufficient for generating accurate, timely, and on-demand reports as stipulated in the contract. Duke Energy then requested that Niagara make these changes as well. Niagara fixed the reporting issues by March of 2012, but by then Duke Energy was in the process of transitioning to a new fulfillment vendor.

Results and Evaluation

Overall, this program was highly successful in meeting its goals. A member of Duke Energy's program management summarized it as "working wonderfully." TecMarket Works agrees with this assessment. The IVR and online platforms have performed well and exceeded all goals for increasing CFL participation. Once established, these platforms have functioned very effectively at low/no cost. These platforms synchronize well with inventory management, and provide real-time tracking information to the customer about his/her order, and to Duke Energy regarding program performance (i.e., order files and program reports can be accessed nightly).

When the pilot first went viral, IVR was the primary mode of participation. As the OLS channel was established, that drew the greatest number of participants. Nonetheless, IVR and web-based platforms, in conjunction with the other channels promoting them, have also attracted considerable participation. Together these efforts created a powerful demand for the Duke Energy CFLs.

In summary, the program has been highly successful overall while it did experience some growing pains due to its rapid expansion, it and is now running well and not experiencing any problems. Some potential areas for further improvement/expansion have been identified. For instance, Duke Energy will explore additional creative marking ideas, perhaps adding new channels such as newspaper inserts, billboard advertisements, and possibly increased radio advertising. However, given the expansive range of channels already utilized by the current campaign, the potential impact of such additions is unclear.

Duke Energy also wants to grow the portfolio to include specialty bulbs in their promotional offer. They are currently developing a program that they intend to launch in late 2012 or early 2013. That program will offer a discount toward the purchase of CFL specialty bulbs rather than a free bulb incentive because of the higher cost of specialty CFLs. The exact discount will likely vary by type of specialty bulb, but those details are yet to be determined.

Consumer education is another area for potentially enhancing CFL acceptance and adoption. This includes explaining the new labeling, i.e., helping consumers understand the transition from wattage to lumens. Other education possibilities may include clarifying the savings benefits to the customers, as well as the overall environmental value of transitioning to CFLs. Education may also address common misconceptions about CFLs that deter adoption. Examples of common misconceptions include: no instant on, not meeting lifetime claims, not fitting some fixtures, stark color of the light, and safety issues such as risks of mercury contamination or fire.

Participant Surveys

This section presents the results of the surveys conducted with customers who participated in the CFL program.

Program Awareness

All of the participants responding to the survey (n=382) recall receiving the direct mail CFLs provided by Duke Energy. Of the 382 survey respondents, 176 were identified by Duke Energy in the participant database[9] as living in low income households and 206 were identified as not living in low income (labeled as standard herein) households.

Reasons for Participation

Phone survey participants were asked an open-ended question to give all the reasons that made them decide to take advantage of the CFL offer from Duke Energy. Web survey participants were asked to either choose the reason or reasons for participation from a list, or to enter a reason that was not provided.

All answers were codified into the following categories:

- Needed light bulbs
- To save energy
- To save money
- Because it was free
- To try CFLs
- It was environmentally correct
- Convenience
- CFL last longer than standard bulbs
- Other

The distribution of answers is shown in Table 5 in order of most to least mentioned reasons. The free CFLs, along with desire to save money and energy, were by far the most cited reasons for participating in the CFL program.

Table 5. Reasons for participation in the CFL direct mail program

Category	Low Income participants (N=176)		Standard Participants (N=206)		All survey respondents (N=382)	
	N	%	N	%	N	Weighted %
Because it was free	77	47.8%	110	49.8%	187	49.0%
To save energy	84	52.2%	100	45.2%	184	47.9%
To save money	78	48.4%	88	39.8%	166	43.1%
CFLs last longer	53	32.9%	51	23.1%	104	26.8%
To try CFLs	46	28.6%	56	25.3%	102	26.6%
Convenience	47	29.2%	49	22.2%	96	24.9%
It was environmentally correct	42	26.1%	43	19.5%	85	22.0%

[9] Low-Income status was identified using Experian data.

Needed light bulbs	26	16.1%	24	10.9%	50	12.9%
Other	6	3.7%	12	5.4%	18	4.8%

Note: Survey respondents were allowed multiple responses

Promoting the Program

TecMarket Works surveyed program participants to determine if they had told anyone about the CFL program and, if so, how many people they told and how they told them. As shown in Table 6, 84% (weighted) reported telling others about the program. Not surprisingly, the percentages seen in the total population corresponded closely within the low income group (86%), as well as within the standard income group (83%).

Table 6. Participants who told others about the program

Did you tell others about the CFL program?	Low Income		Standard Income		Total Population	
	N	%	N	%	N	Weighted %
Yes	151	86%	171	83%	322	84%
No	23	13%	33	16%	56	15%
Don't Know	2	1%	2	1%	4	1%

When asked with whom they had spoken, 54% (weighted) of respondents reported talking about the program with family members, and 54% (weighted) of respondents indicated that they had spoken with friends. Interestingly though, respondents had a greater number of conversations with their friends (445) and co-workers (358) than they did with family members (330).

When considered by income level, low income and standard income participants also had more conversations among friends than with any other group. But low income customers spoke with more neighbors (207) than they did with family members (175) or co-workers (143). Table 7 compares these groups and their respective number of conversations.

Table 7. Type and number of people told about the CFL program

Did you tell others about the CFL program?	Low Income		Standard Income		Total Population	
	# of Participants	# of People Told	# of Participants	# of People Told	# of Participants	# of People Told
Family	107	175	103	155	210	330
Friends	99	229	109	216	208	445
Co-Workers	31	143	45	215	76	358
Neighbors	29	207	27	90	56	297
Other	6	31	16	34	22	65

Note: Survey respondents were allowed multiple responses

As seen in Table 8, among all income categories, word of mouth was the most prevalent means of communication. Email placed second, while various forms of social media, such as Facebook, Twitter and website forums came in a distant last.

Table 8. Methods of communicating about the program

	Word of mouth	Email	Facebook	Twitter	Web site forum	Other
Total Population	304	35	8	1	1	4
Low Income	139	20	4	0	1	4
Standard	165	15	4	1	0	0

Program Influence

Participants were also asked to rate the influence, on a 1-to-10 scale, that various factors had on their decisions to obtain CFLs through the Duke Energy program. According to those surveyed, the desire to "save on utility costs" had a weighted mean influence rating of 9.0, making it the most influential factor in their decision to obtain CFLs via the program. "Desire to save energy" placed second with a weighted mean influence score of 8.6. "Desire to be environmentally responsible" rounded out the top three most influential factors with a weighted mean score of 8.1. The remainder of the scores for each factor is noted in Table 9.

Table 9. Factors influencing decision to obtain CFLs

Factor	Low Income Mean Influence	Standard Mean Influence	Total Population Weighted Mean Influence
Your desire to save on utility costs	9.0	9.0	9.0
Your desire to save energy	8.5	8.7	8.6
Your desire to be environmentally responsible.	7.9	8.2	8.1
Friends or family by word of mouth	6.2	5.5	5.8
Duke Energy advertising on TV, Radio, or newspaper	4.4	4.3	4.3
The brand of CFLs offered by the program	4.7	4.1	4.3
Advertising on Duke Energy's Web site	4.1	3.7	3.9
Friends or family by email	3.5	2.8	3.1
Other non-Duke Energy advertising	3.5	2.7	3.0
Friends or family by social media such as Facebook	2.7	2.3	2.5
Duke Energy advertising on social media sites such as Facebook	2.5	2.2	2.3
Someone you don't know personally or a group that you follow on Facebook or Twitter	2.4	2.0	2.2

Figure 1 below compares participant influence ratings by income group. Standard and low income groups scored the same on their mean influence rating of "Desire to save on utility costs" with a mean score of 9.0. And only slight differences emerged on their ratings of the second most influential factor "Desire to save energy." Standard income participants rated it as an 8.7, while low income participants rated it marginally lower at an 8.5.

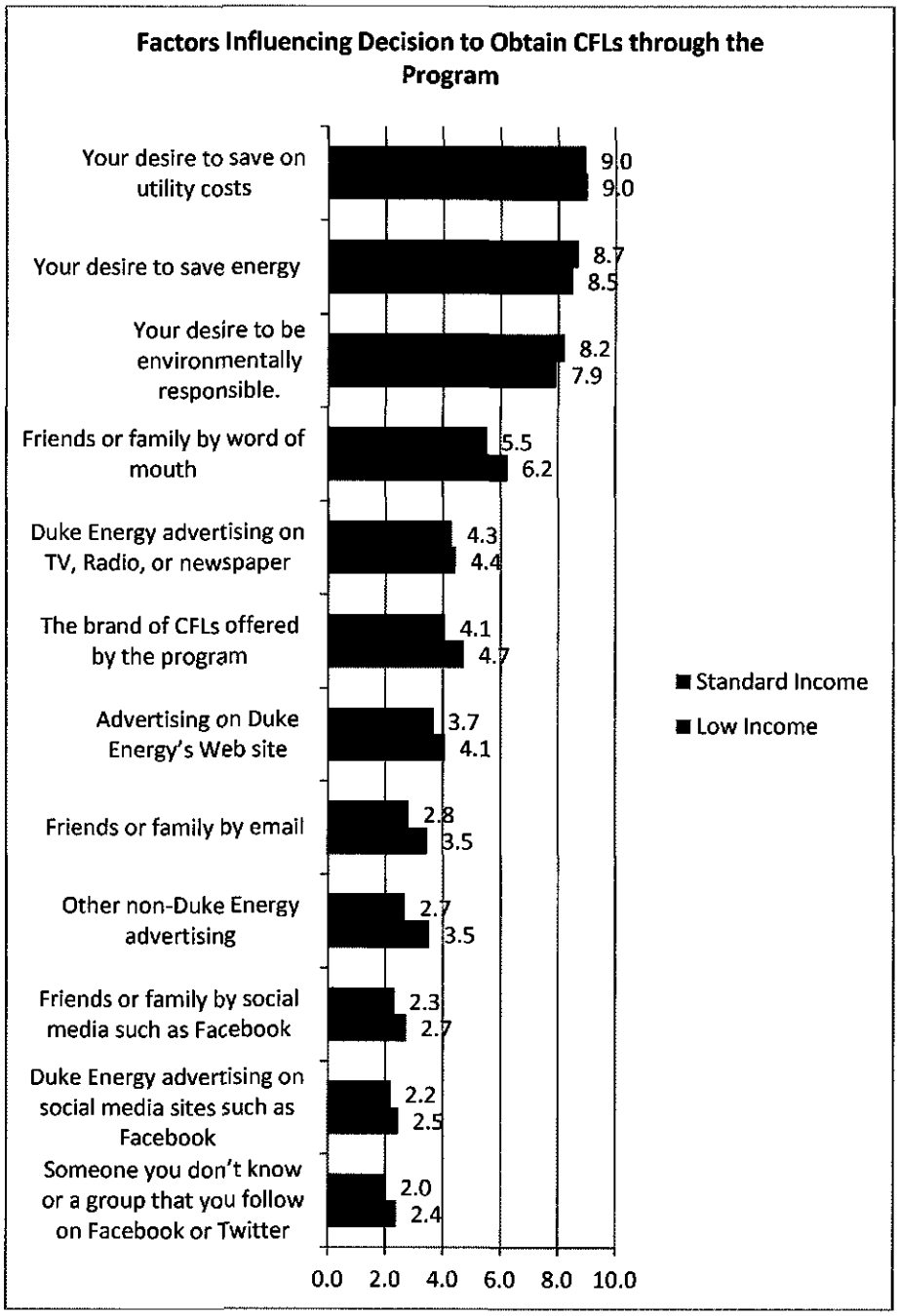

Figure 1. Mean influence score of factors influencing decision to obtain CFLs

Prior CFL Use

All survey respondents were asked how long they had been using CFLs before receiving CFLs from the Duke Energy CFL program. Responses included:

- Never purchased until now
- 1 year or less

- 1-2 years
- 2-3 year
- 3-4 years
- 4 or more years

As seen in Table 10 below, 17.3% (weighted) of all CFL program participants in Ohio indicate that they have purchased CFLs in the past two years or less and 55.7% (weighted) of all participants indicate that this is their first acquisition of CFLs. This data suggests that CFL saturation was low within the direct mail CFL participant population prior to the use of the Duke Energy CFL program. It also indicates that the direct mail CFL program in Ohio is doing an excellent job of targeting participants with little or no prior CFL use.

Table 10. Time since first purchase of CFLs

	Don't Know	Never acquired until now	1 year or less	1-2 Years	2-3 Years	3-4 Years	4 or more years
Low Income Participants, n=172	0.5%	57.7%	6.2%	10.8%	10.8%	6.2%	7.7%
Standard Participants, n=201	1.1%	54.5%	6.3%	11.1%	9.0%	5.8%	12.2.%
All Survey Respondents Weighted %, n=382	0.9%	55.7%	6.3%	11.0%	9.7%	6.0%	10.5%

Eligible Number of CFLs vs. Number CFLs Ordered

Overall, participants are ordering all the CFLs that the program allows. A very small minority of participants (3 low income and 4 standard participants out of the 382 survey participants - 1.8%) reported that they did not order all of the CFLs that they were eligible to receive through the direct mail CFL program. All seven respondents gave reasons why they did not order all the bulbs they were eligible to receive. Three respondents indicated that they had small houses or apartments and did not need the full amount of CFLs at the time of ordering. Two ordered some bulbs with plans to order more later in the year. One person was not aware of the number of available bulbs.

Program CFL Self-Reported Installation

TecMarket Works asked all participant survey respondents how many of the CFLs that they obtained through the CFL program were currently installed. Three-hundred seventy-three (373) of 382 participants (97.6%) reported that 2,659 program CFLs were currently installed for a weighted mean of 7.0 installed CFLs per all surveyed participants. One-hundred seventy-two (172) low income participants installed a mean of 7.2 CFLs, and 201 standard participants installed a mean of 6.8 CFLs.

Program CFL Removal

Of the 373 participants who had installed program CFLs, 83 respondents (22% weighted[10]) indicated that they had subsequently removed at least one program CFL from a working socket.

[10] 21% of Low Income, 22% of Standard

Forty-two (42) respondents gave specific reasons for their removal of program CFLs: 37 respondents removed program CFLs that had burned out, two respondents removed program CFLs for aesthetic reasons, two respondents removed CFLs because they were flickering, and one respondent removed a CFL because it was not dimmable.

CFL Order Tracking System

TecMarket Works asked all survey respondents who ordered their CFLs online if they were aware of the direct mail program's online order tracking tool which allows participants the option to check their CFL order status. Twenty-four percent (93 out of 382[11]) respondents indicated that they were aware of the order tracking tool. Of those who were aware of the system, 20 respondents (23% weighted[12]) indicated that they had used the online tool to track their order. The 20 respondents who reported using the system were asked to rate their satisfaction with the system on a 1-to-10 point scale with 1 indicating Very Unsatisfied and 10 indicating Very Satisfied. The weighted mean satisfaction rating for the online tracking tool is 9.1[13]. Two respondents gave a satisfaction score of less than eight. The respondent who gave a 7 stated that the tracking feature did not work on the first attempt, but worked fine on the second attempt. The respondent who gave a 6 said they were very satisfied.

The online order tracking system has a low awareness rate and a very low participation rate. While the mean satisfaction rating for the tracking system is very high among users, the low participation rate (n=20), even among those aware of the tool, indicates that a large majority of respondents do not currently find it to be a useful part of the CFL direct mail program.

Participant Satisfaction

Overall program and CFL satisfactions are very high, and overall Duke Energy satisfaction is high.

Program and CFL Satisfaction

Participants were asked to rate, on a 1-to-10 scale, their satisfaction with the ease of ordering their CFLs (weighted mean = 9.4), the delivery time of the CFLs (weighted mean = 9.0), the light quality of the CFLs obtained (weighted mean = 8.2), the overall quality of the CFLs obtained through the CFL program (weighted mean = 8.8), and the overall satisfaction with the CFL direct mail program (weighted mean = 9.5). The satisfaction means, stratified by income type, are shown in Figure 2, and the rating distributions for these categories are shown in Figure 3 through Figure 7.

Participants who rated their satisfaction for any category at a seven or lower were also asked a follow-up question as to the reason for their satisfaction level. These reasons are listed following each distribution.

[11] 29% of Low Income, 21% of Standard
[12] 19% of Low Income, 26% of Standard
[13] 9.2 mean Low Income, 9.0 mean Standard

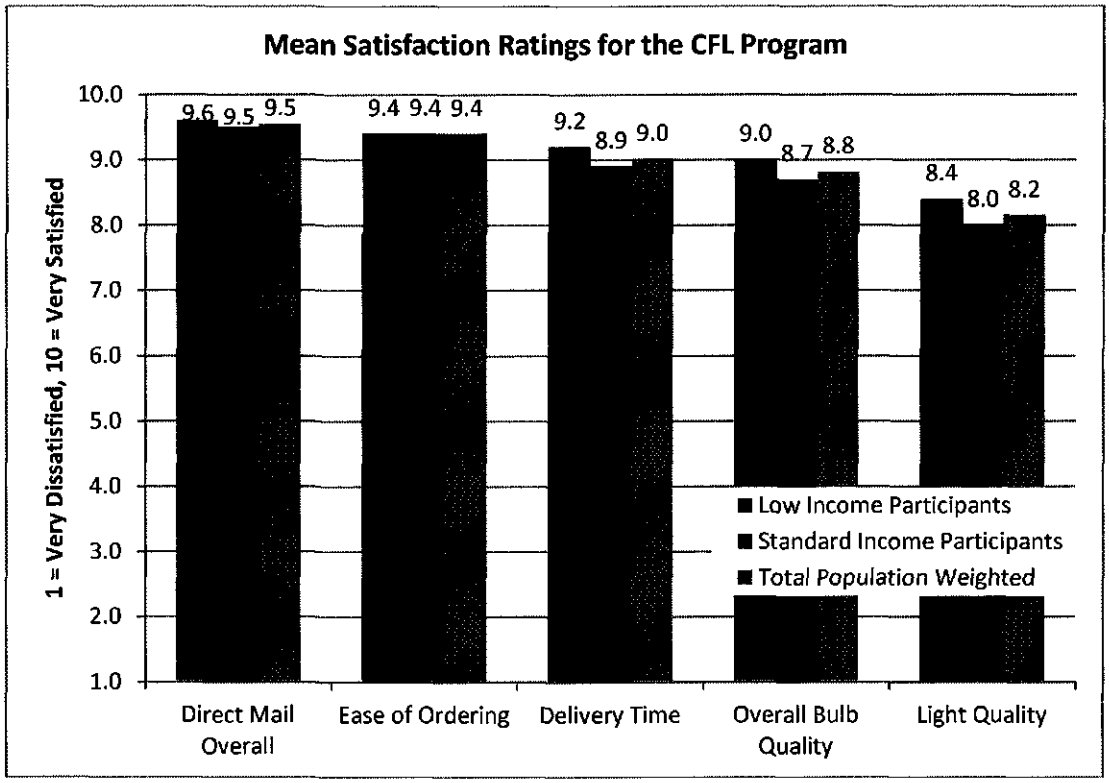

Figure 2. Mean Satisfaction Rating for CFL Direct Mail Program

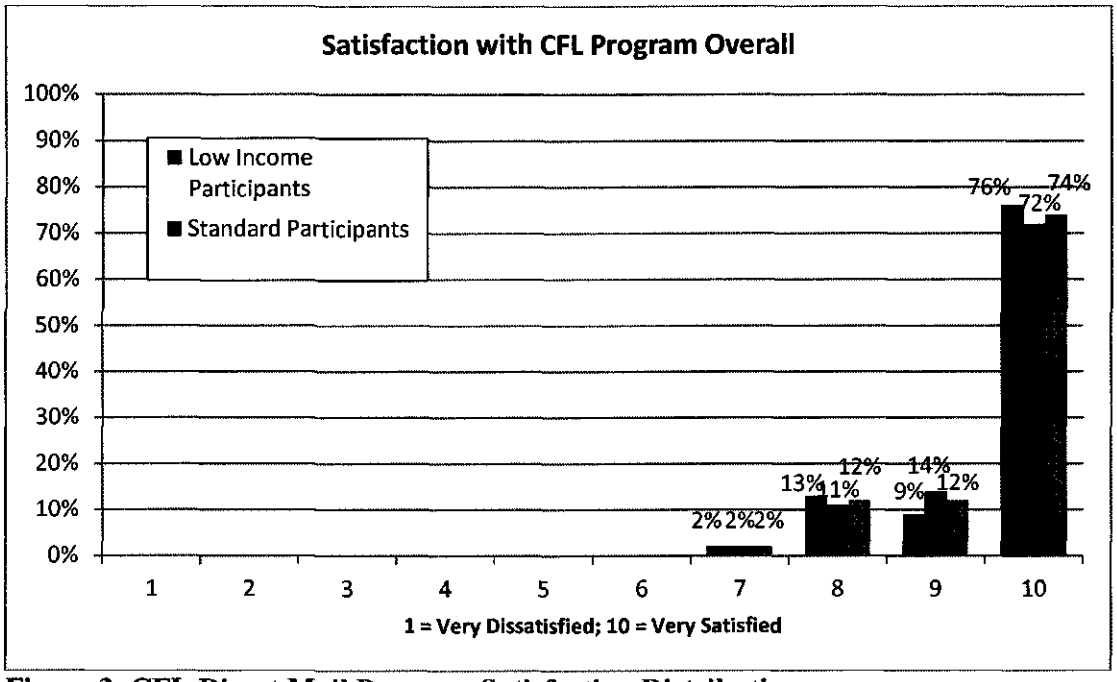

Figure 3. CFL Direct Mail Program Satisfaction Distribution

Reasons for program satisfaction ratings of seven or less:

- Never received my CFLs

- Would like to have received more than 3 bulbs
- Would like daylight or bright white bulbs
- Would like three-way bulbs

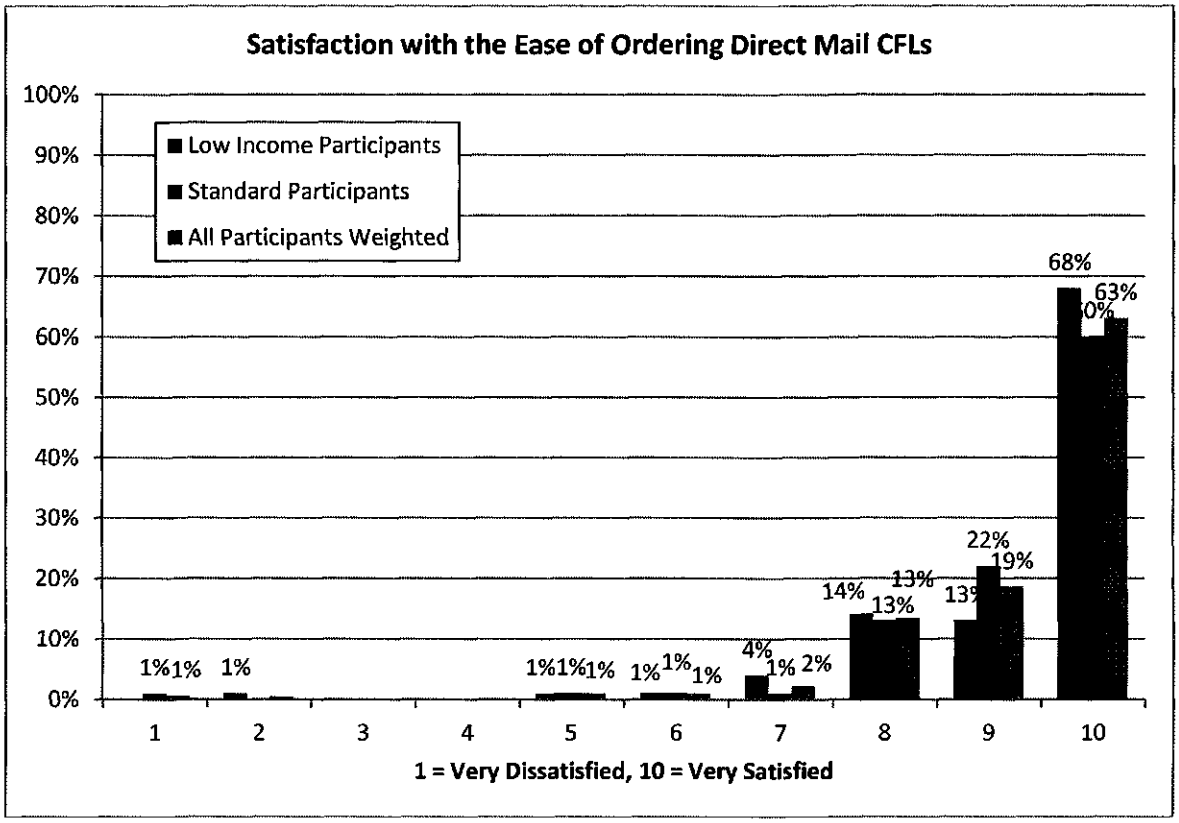

Figure 4. Ease of Ordering CFLs Satisfaction Distribution

Reasons given for ease of ordering ratings of seven or less:

- Mail in card would have taken less time than phone (n=2)
- Got frozen on the web site during ordering
- Ordering online would have been easier than the mail-in card
- It would have been easier to call and order than go online
- Long wait times on the phone; I had to try to place the order more than once
- Took too long to order by phone
- I had to talk to three different people to finally get the bulbs ordered
- Ordering them was easy, but I still haven't received them
- I had to wait 3 months to receive them

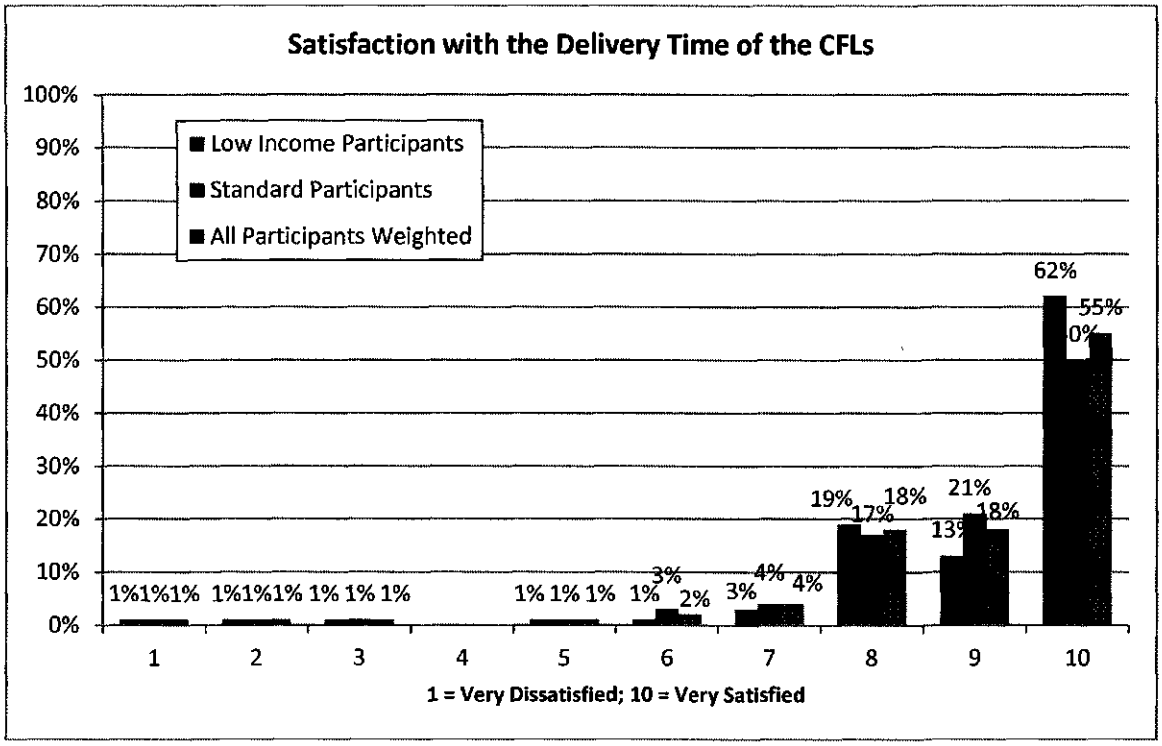

Figure 5. Delivery Time Satisfaction Distribution

Reasons given for delivery time ratings of seven or less:

- It took longer than expected (n=18)
- I never received my bulbs (n=3)
- It took so long I had forgotten about them (n=2)

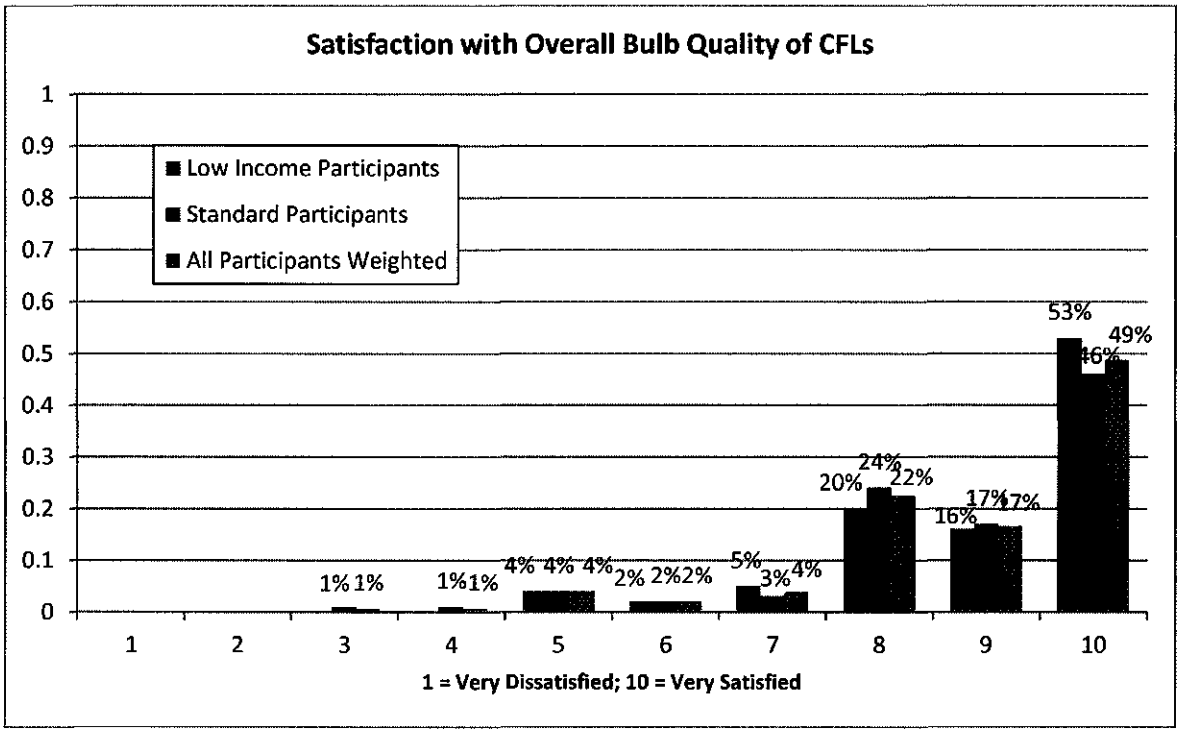

Figure 6. Overall Bulb Quality Satisfaction Distribution

Reasons for overall bulb quality ratings of seven or less:

- Bulbs burned out (n=5)
- Concerned about mercury/disposal (n=3)
- Not a convenient size for all fixtures
- They are a bit more difficult to handle and store

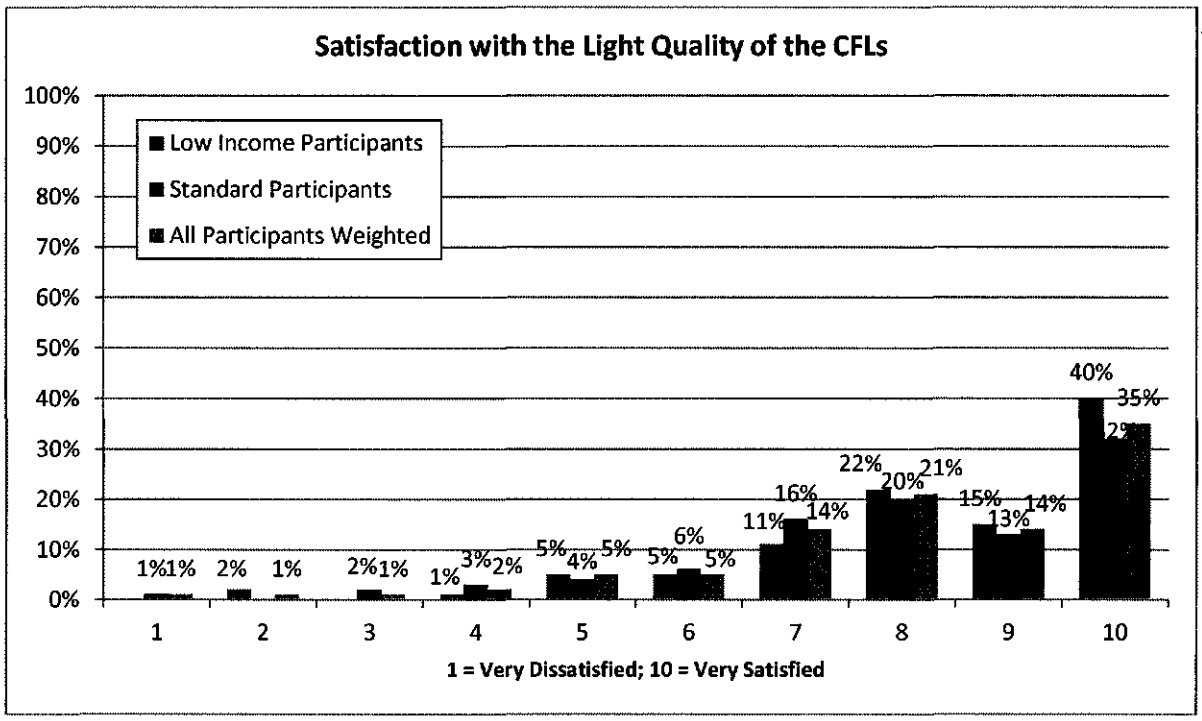

Figure 7. Light Quality of CFLs Satisfaction Distribution

- Reasons for light quality ratings of seven or less:
- Not bright enough (n=63)
- Take too long to warm up (n=24)
- Light is different from what I'm used to (n=4)
- Light is too harsh (n=3)
- Light is too yellow (n=2)
- Do not like the color (n=2)
- I prefer daylight CFLs
- Light has a strange hue
- When it's cold outside they barely give off any light at all

Duke Energy Satisfaction

Participants were also asked to rate, on a 1-to-10 scale, their satisfaction with Duke Energy overall (weighted mean=8.4). Mean ratings stratified by income type are show in Figure 8 and the satisfaction rating distribution for this category is shown in Figure 9.

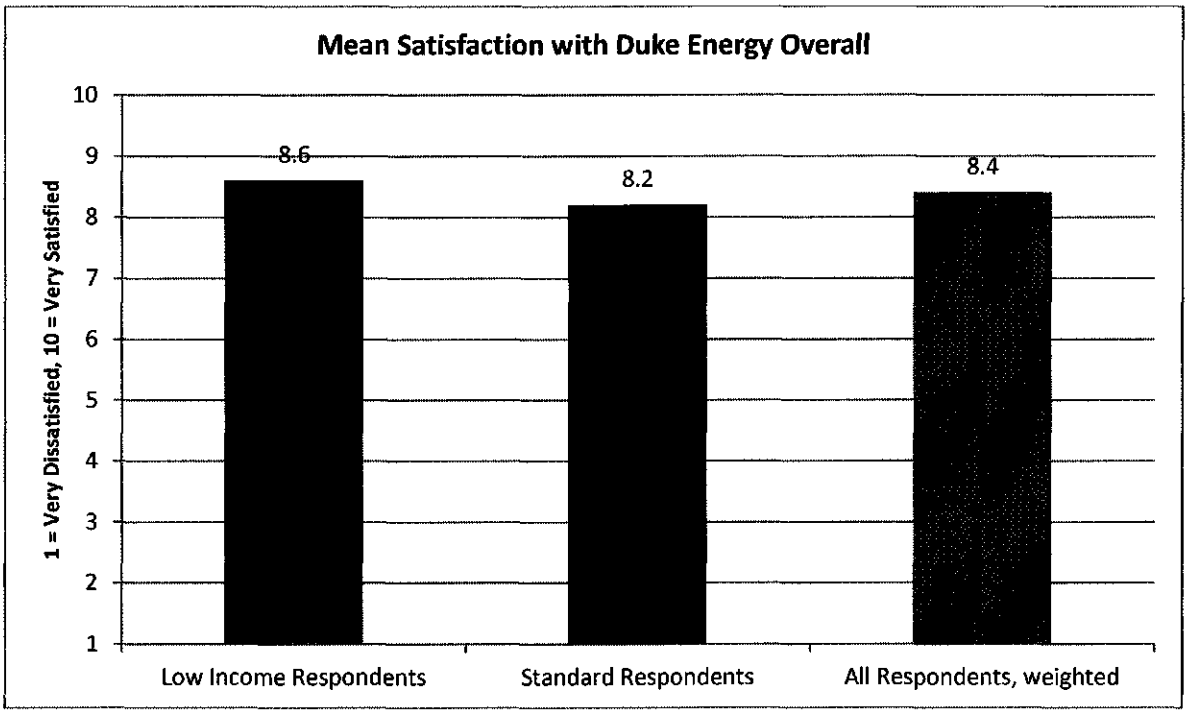

Figure 8. Duke Energy Mean Satisfaction

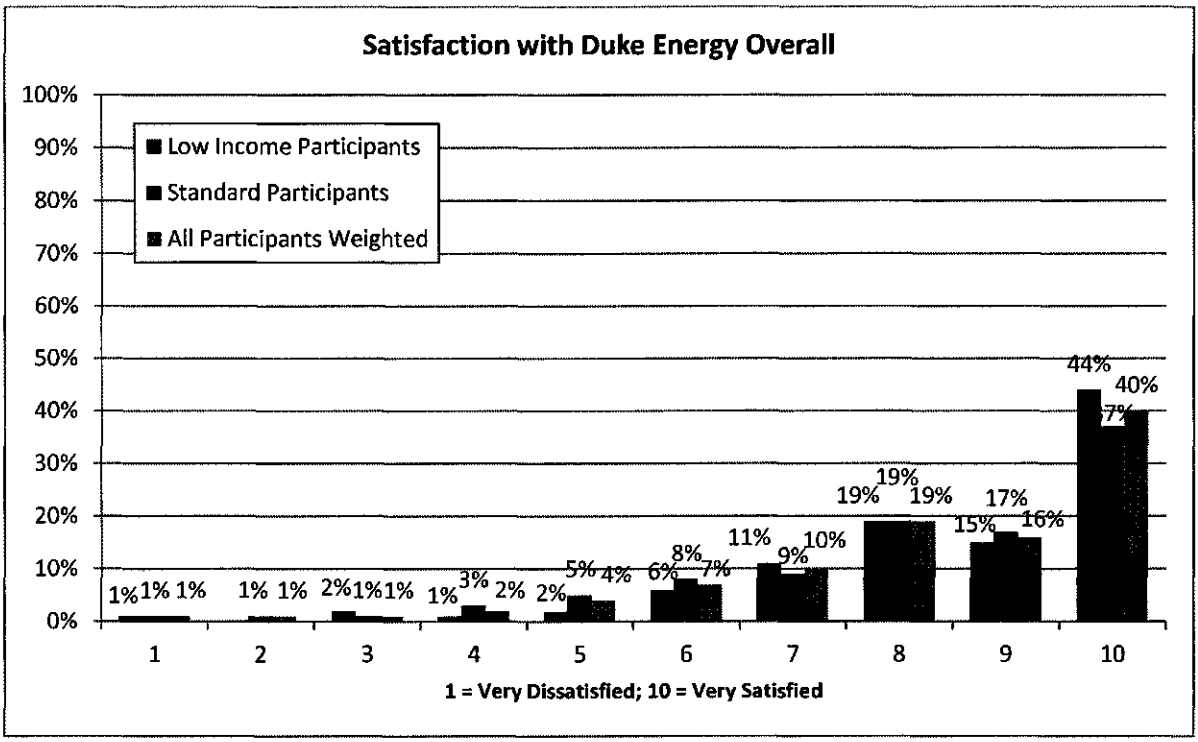

Figure 9. Duke Energy Satisfaction Distribution

Reasons for Duke Energy satisfaction ratings of seven or less from all surveyed participants:

- Rates are too high (n=46)
- Poor customer service (n=7)
- Too many outages (n=6)
- Outages take too long to correct (n=5)
- Do not think gas delivery fee is fair/appropriate for amount of gas used (n=4)
- Not enough flexibility with payment plans (n=4)
- Insufficient billing details/understandability (n=3)
- Inconsistent meter reading (n=2)
- Inconvenient meter reading (n=2)
- Not enough payment assistance during hardship (n=3)
- Using too many subcontractors and not accountable for work provided
- Generation costs are too high
- Do not use enough solar and renewable energy
- Would prefer to deal with someone local rather than someone based in North Carolina

In addition to rating their satisfaction on the 1-10 point scale described above, Ohio participants were also asked to rank their overall program satisfaction using the following response categories: Very Satisfied, Somewhat Satisfied, Neither Satisfied nor Dissatisfied, Somewhat Dissatisfied, or Very Dissatisfied. The responses are summarized in Table 11 below.

Table 11. Overall Program Satisfaction

Response	Low Income		Standard Income		Total Population	
	N	%	N	%	N	Weighted %
Very Satisfied	154	88.0%	163	78.7%	317	82.2%
Somewhat Satisfied	14	8.0%	30	14.5%	44	12.0%
Neither Satisfied nor Dissatisfied	-	-	8	3.9%	8	2.4%
Somewhat Dissatisfied	-	-	1	0.5%	1	0.3%
Very Dissatisfied	-	-	-	-	0	0.0%
Don't Know/No Response	7	4.0%	5	2.4%	12	3.0%

After the surveyed respondent ranked their satisfaction, they were asked why they provided that ranking. Their responses are below, by response category:

Very Satisfied

- It was easy, free, and convenient. (n=132)
- CFLs save energy and money (n=70)
- Because they are free (n=64)
- I like the CFLs quality (n=35)
- I am pleased with the program (n=31)
- CFLs are long-lasting (n=27)
- Allow us to try a new product for free (n=7)

Somewhat Satisfied

- Because they are free (n=8)

- CFLs do not impress me (n=6)
- I am satisfied (n=6)
- It was easy, free, and convenient (n=6)
- I am concerned about mercury if they break (n=4)
- They are not bright enough (n=3)
- Because the bulbs burned out quickly (n=2)
- CFLs save energy and money (n=2)
- A Duke employee had to come to my house before they would give me the bulbs
- Because they came in the mail
- Duke should be doing this
- I had to talk to three people before the right person was reached and then the bulbs got ordered
- It is nice that Duke Energy is giving something back to the customers
- It took too long to get the bulbs
- We were not allowed to order bulbs for our business
- I wish they would include three-ways and Refrigerator-Stove bulbs
- I would rather have LED bulbs

Neither Satisfied nor Dissatisfied

- I don't like CFLs (n=2)
- There was nothing special about the program (n=2)
- They are not bright enough (n=2)
- It was supposed to save energy, but my bill keeps increasing every month
- I felt forced to participate since customer's bills presumably fund the program
- I am concerned about mercury if they break

Somewhat Dissatisfied

- The CFLs are supposed to last a long while; these have been burning out within a few months

DK/NS

- I have not yet received the CFLs

Future Use of CFLs

Surveyed participants were asked if their experience with the CFLs provided by the Duke Energy CFL program made it more or less likely that they would purchase and install CFLs in the future, and 290 out of the 382 respondents[14] (75% weighted) indicated that the program made them more likely to use CFLs in the future. These results suggest the program is having substantial longer-term participant spillover savings, well beyond the level of savings documented in this study. Their reasons are listed below.

Low Income Participant Responses

- Saving money (n=41)

[14] 79% Low Income, 73% Standard Income

- Long lasting (n=34)
- They are energy efficient (n=32)
- I had a good experience with these CFLs (n=20)
- Because I like the light (n=7)
- Better for the environment (n=6)
- Quality of the bulbs (n=5)
- Incandescents are being phased out (n=2)
- Because we will have to use them in the future
- CFLs are getting better
- The CFLs are cooler than old bulbs

Standard Participant Responses

- Saving energy and money (n=73)
- Long lasting (n=27)
- I had a good experience with these CFLs (n=22)
- I like CFLs (n=8)
- Incandescents are being phased out (n=8)
- Better for the environment (n=6)
- Light quality (n=5)
- The CFLs are cooler than old bulbs (n=2)
- Quality of the bulbs (n=2)
- LEDs cost too much

Eleven participants[15] (3% weighted) indicated that they were less likely to use CFLs as a result of their participation in the CFL program and provided the following reasons:

Low Income Responses

- Because of the poor light quality, and because I am scared the bulbs will explode or break.

Standard Participant Responses

- Not bright enough (n=4)
- Mercury (n=2)
- Disposal is a problem
- Light color
- Do not like anything about them
- Unsafe
- They take a while to warm up
- Not happy with the quality in comparison to "regular" bulbs
- Too expensive

[15] 1% Low Income, 5% Standard Income

CFL Program Interest

Survey respondents were asked a series of questions about the likelihood that they would participate in a CFL program given several different conditions. For the purpose of this series, respondents were split, beyond income bracket, into two separate groups.

Figure 10 shows a graphical comparison of the mean likelihood of participation responses between CFL program participants and non-participants. The data shows that, in general, participants in the CFL program are more likely to participate in future CFL programs.

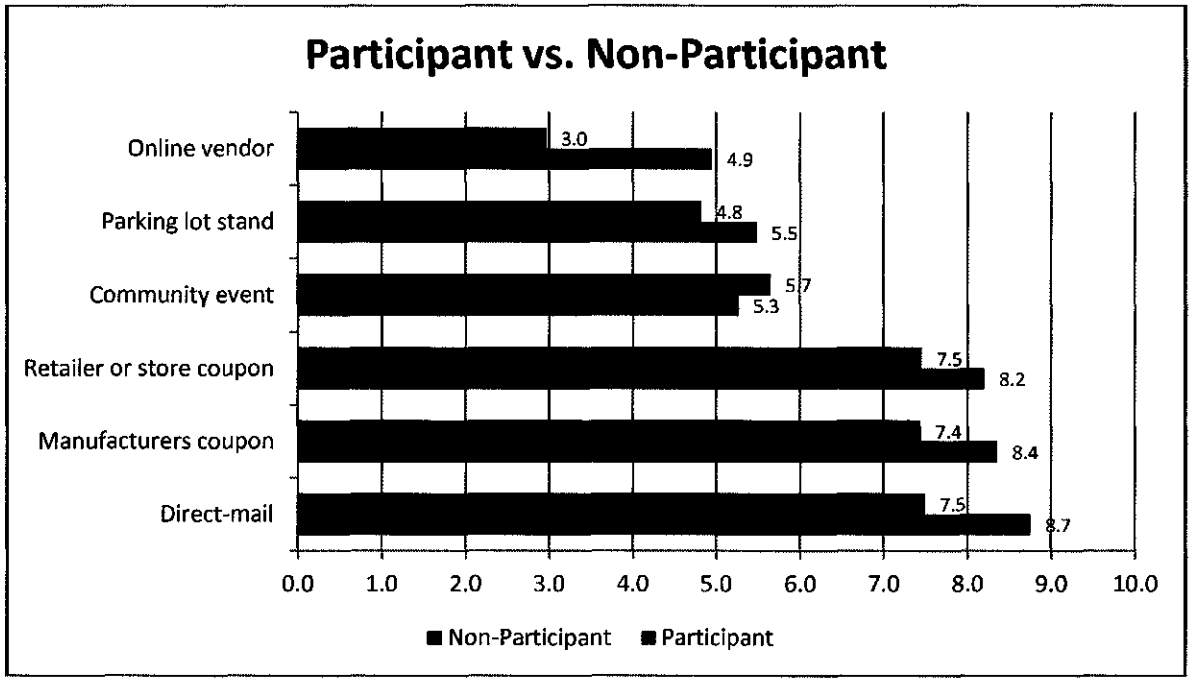

Figure 10. Likelihood of Participation Mean Responses, Participant vs. Non Participant

Light Bulb Characteristics

Surveyed participants were asked to rate the importance of specific bulb characteristics when making their bulb purchasing decisions. The results of these importance ratings are shown in Table 12. Responses were provided on a one to ten scale, where one is not at all important and ten is very important.

Table 12. Importance of Bulb Characteristics When Purchasing Bulbs

Bulb Characteristic	N	Low Income	Standard	Population Weighted Mean
Energy savings	381	9.2	9.2	9.2
Cost savings on your utility bill	381	9.2	9.2	9.2
Selection of wattage and light output levels available	381	8.7	8.8	8.8
Availability of the bulb in stores you normally shop	381	8.7	8.6	8.6
Purchase price of the bulb	382	8.6	8.5	8.5

Availability of utility programs or services that offer	381	8.4	8.0	8.2
Ease of bulb disposal	370	7.6	7.9	7.8
Speed at which the bulb comes up to full lighting level	381	7.2	7.4	7.3
Recommendations from the utility company	380	7.6	6.8	7.1
Mercury content of the bulb	370	6.9	6.8	6.8
Recommendations from family and friends	381	7.0	6.4	6.6
Ability to dim the lighting level	375	6.1	6.0	6.0
Attractiveness or appearance of the bulb	382	6.0	5.8	5.9

Interestingly, the "Selection of wattage and light output levels available" (8.8 weighted mean) and the "Availability of the bulb in stores you normally shop" (8.6 weighted mean) were rated higher than the "purchase price of the bulb" (8.5 weighted mean). The two highest rated factors were "Energy savings" (9.2 weighted mean) and "cost savings on your utility bill" (9.2 weighted mean). Factors often perceived as barriers to CFL adoption, such as aesthetics (5.9 weighted mean), mercury content (6.8 weighted mean), and availability of dimmable bulbs (6.0 weighted mean), were among the lowest rated categories. A graphical representation in ascending order of importance can be seen in Figure 11.

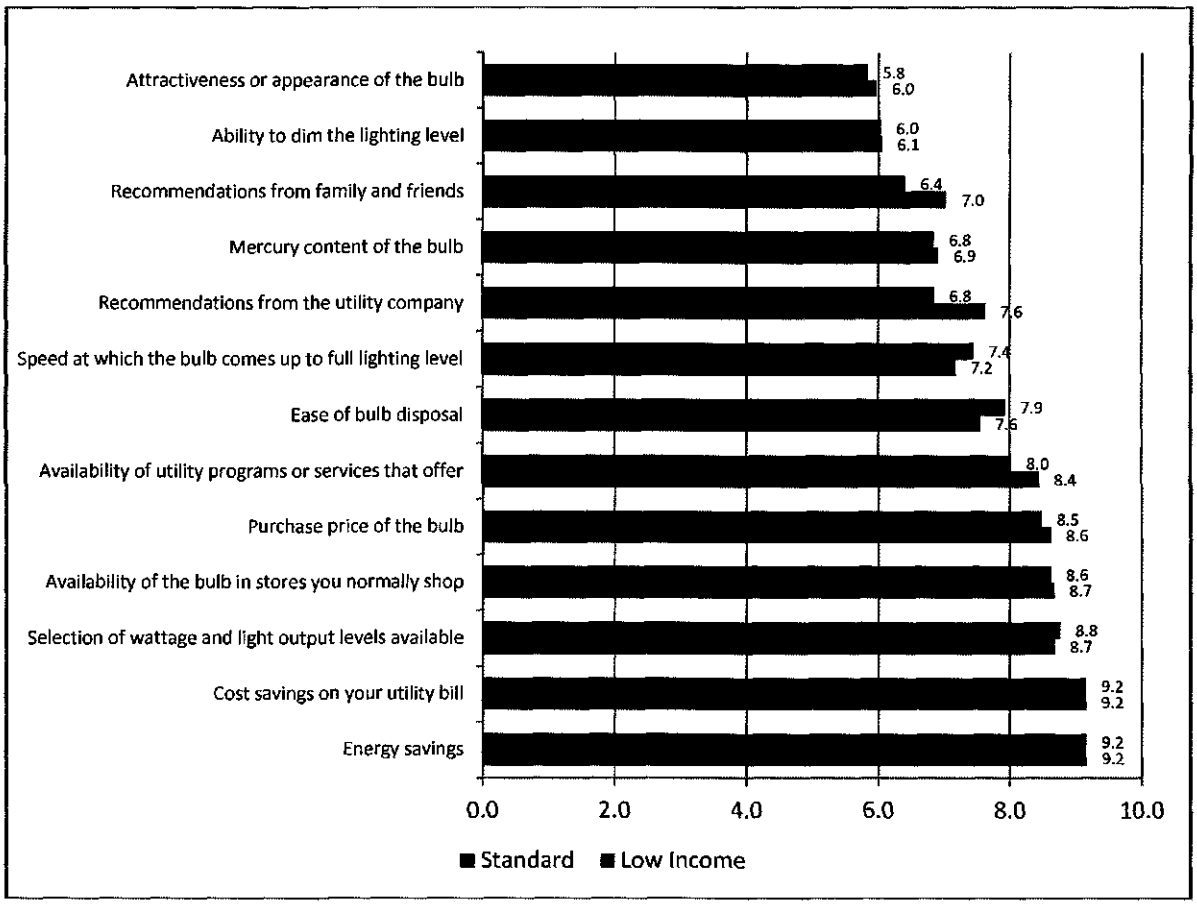

Figure 11. Importance of Bulb Characteristics by Income Group

Figure 12 shows a graphical comparison of the importance of the various bulb characteristics for the participant and non-participant populations. Participants rated all but three of the characteristics higher in importance than their non-participant counterparts.

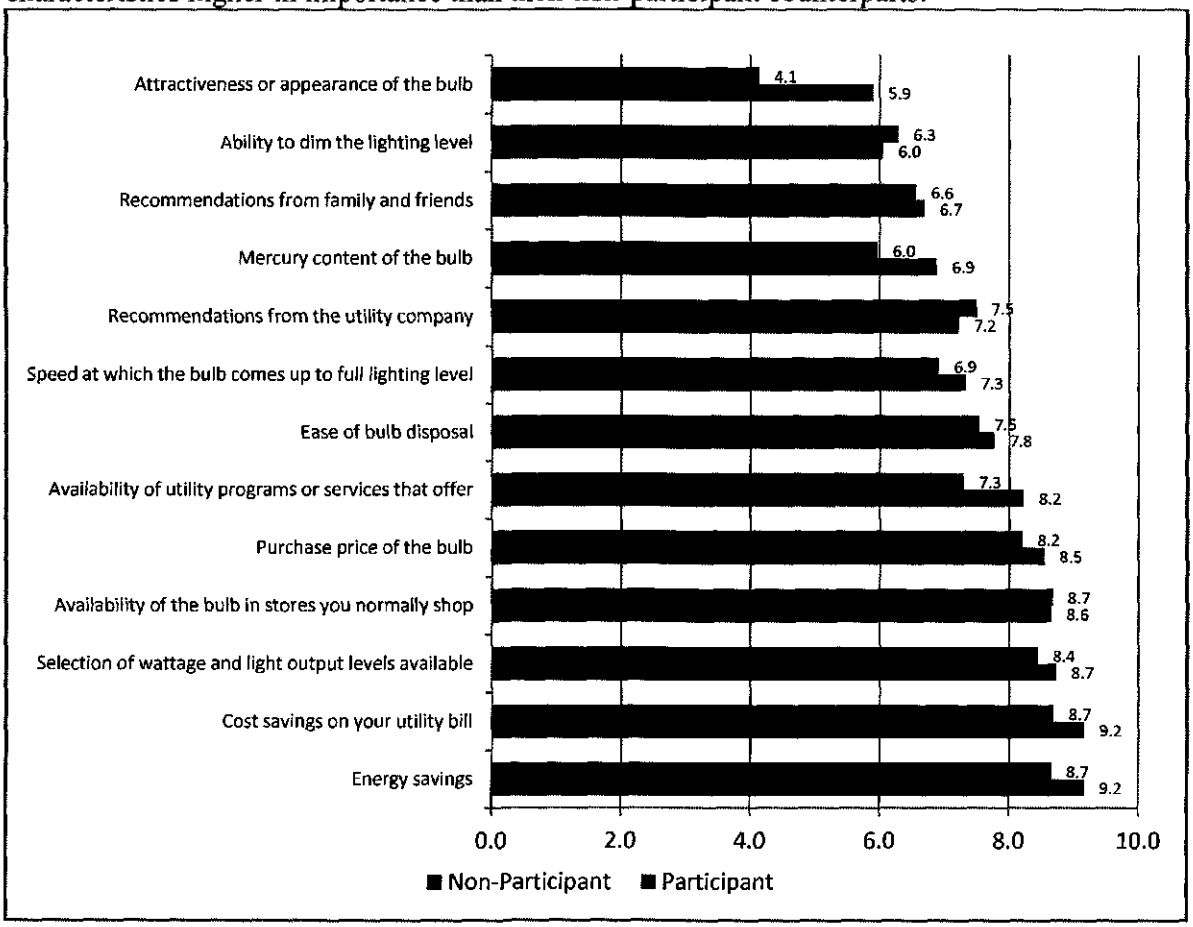

Figure 12. Importance of Bulb Characteristics, Participants vs. Non-Participants

What Participants Liked Most About the Program

Participants were asked what they liked most about the CFL program, and provided the following responses. Participants overwhelmingly liked that the CFLs were free and that the program was easy and convenient.

Low Income Responses

- It was easy, free and convenient (n=87)
- Because they are free (n=49)
- Saving energy and money (n=17)
- Everything (n=6)
- Quick delivery(n=5)
- Opportunity to try CFLs for free (n=4)
- CFLs are long-lasting (n=2)
- I like the CFLs' quality (n=2)

- Educational about CFLs

Standard Participant Responses

- Because they are free (n=110)
- Convenience (n=53)
- Ease of ordering (n=44)
- Opportunity to try CFLs for free (n=11)
- Saving energy (n=7)
- Quick delivery(n=7)
- Saving money (n=5)
- CFLs are long-lasting (n=4)
- Brand name CFLs (n=3)
- Duke's concern for customers (n=3)
- Educational about CFLs (n=2)
- It made me think about changing out all my light bulbs

What Participants Liked Least About the Program

Participants were asked what they liked least about the CFL program, and provided the following responses.

Low Income Responses

- I did not receive enough bulbs (n=6)
- It took too long to receive the bulbs (n=5)
- Taking this survey (n=4)
- Poor delivery service (n=3)
- Not bright enough (n=3)
- Bulbs burned out soon after installing (n=2)
- Need dimmable bulbs (n=2)
- The box the CFLs came in was bulky
- CFLs do not work well in my bathroom
- Delay in getting information
- Disposal of CFLs
- I am still waiting on the second order
- Need three-way bulbs
- Paperwork
- Duke should expand program to businesses
- Do not like CFLs
- Too much cardboard used in packing the bulbs
- Website froze

Standard Participant Responses

- I did not receive enough bulbs (n=12)
- It took too long to receive the bulbs (n=12)

- Limited choice of bulb wattage and types (n=9)
- Not bright enough (n=9)
- Do not like CFLs (n=6)
- The CFLs' mercury content (n=6)
- I didn't receive any instructions on how to safely dispose of CFLs (n=4)
- Time on phone (n=3)
- Didn't offer LEDs (n=2)
- Light quality (n=2)
- The poor quality of the CFLs (n=2)
- Switching to all CFLs did not lower my power bill (n=2)
- Bulbs burned out soon after installing
- Did not fit
- Mailman left the box on the porch with no notice of delivery
- The box the CFLs came in was bulky
- Taking this survey
- They take a while to warm up

Participation and Interest in Other Duke Energy Programs

TecMarket Works asked the CFL participants if they were participants of any of the following Duke Energy programs.

- Online Services
- Power Manager®
- Home Energy House Call
- Home Energy Comparison Report
- Personalized Energy Report
- Residential Smart $aver®

We also asked what their level of interest is in other Duke Energy programs (after providing a brief description of the program[16]) on a 1-to-10 scale with 1 indicating "not at all interested" and 10 indicating "very interested".

The most commonly reported program (20% weighted) they have participated in was "Online Services," which is a variation of the Personalized Energy Report in which customers can log into their Duke Energy accounts online and complete a survey about their home to receive recommendations for energy efficiency improvements that they can make. However, it should be noted that many of these customers may not have been aware of the survey and the report (and free CFLs) that they would receive for completing the survey, and instead believed that having on online account with Duke Energy meant the same thing as completing the survey and being a participant in the program.

[16] Please see questions 56a-56e in Appendix B: Participant Survey Instrument for the program descriptions provided to the customers.

With the similarity of the Personalized Energy Report and Online Services, we did not ask about their interest in Online Services.

The programs generating the highest levels of weighted mean interest were Residential Smart $aver (6.4), Personalized Energy Reports (6.4) and Home Energy House Call (6.3). While the amount of interest in one program or another varied by income group, for no program did survey respondents from either income group have more than 0.6 of a point difference, indicating relatively consistent levels of interest in all Duke Energy programs throughout the survey population.

As presented in Table 13 below participants of the CFL program typically are not participating in other Duke Energy programs, and have only a mild interest in them.

Table 13 . Participation and Interest in Other Duke Energy Programs

	Power Manager	Residential Smart $aver	Home Energy House Call	Home Energy Comparison Report	Personalized Energy Report	Online Services
# Participants Low Income	13	5	5	16	14	33
% Low Income	7%	3%	3%	9%	8%	18%
# Participants Standard	16	8	9	33	17	42
% Standard	8%	4%	5%	17%	9%	21%
# Total Participants	29	13	14	49	31	75
Total Weighted %	8%	4%	4%	14%	8%	20%
Mean Interest Low Income	3.9	6.0	5.9	5.6	6.3	NA
Mean Interest Standard Income	3.7	6.6	6.5	6.0	6.5	NA
Mean Interest Total Weighted	3.7	6.4	6.3	5.9	6.4	NA

Participants were also asked what other services Duke Energy could provide to help them improve their energy efficiency. The verbatim responses are below. Not all of the responses are about energy efficiency, but are included here for completeness.

Low Income Participant Responses

- Weatherization and insulation programs (n=12)
- Help with bills (n=6)
- Lower energy rates (n=5)
- Rebates for energy-efficient devices (n=5)
- I need a new door (n=3)
- Classes on energy efficiency (n=2)
- More free CFLs by mail (n=2)
- Work with landlords (n=2)
- Advising how to save money on the bill
- Brochures on energy saving tips

- Infrared heat loss detection to determine heat-conserving measures to be taken.
- Maybe a do-it-yourself section on home improvements on Duke's web site. A separate link that would take people to a page that would walk a novice through simple things that can really save money for them. Gaskets on outlets/switches, lighting timers and or motion switches, tips on programming their thermostats, that sort of thing. Surprising to me how many people actually don't know those things.
- Money back each month if you stay under a certain usage
- Duke could provide solar panels
- Reflective film for windows to cool rooms in the summer
- Senior discount rate
- Shrink wrap for windows
- Units to measure electric consumption of devices
- I need new windows
- I would like specialty light bulbs

Standard Participant Responses

- Lower energy rates (n=13)
- Rebates for energy-efficient devices (n=5)
- Home-energy inspections (n=4)
- Education about saving energy (n=3)
- Discount or free LEDs (n=2)
- More free CFLs (n=2)
- Weatherization help for elderly or low income customers (n=2)
- A program in which customers could pay a certain flat rate every month for their energy.
- Along with the energy saving programs now in place, Duke could offer a small discount to customers who own Duke stock. Money would be available to the customer in the form of stock purchases and the customer would be able to purchase stock from Duke without going through a broker.
- Assistance for single moms
- Build energy-efficient houses
- E-newsletter reminding us of energy saving tips
- Duke could provide a list of energy-efficient appliances
- Give customers a month free of service as a reward for paying all of their bills on time
- Money back each month if you stay under a certain usage
- More energy-efficiency supplies
- More online tools
- Duke should educate people about the disposal of CFLs.
- Recycle program for bulbs
- Solar cell rebate program
- Tips for apartment dwellers
- I need new windows

Interest in Specialty CFLs

Surveyed participants were asked to list the number of bulbs currently installed in their homes that are specialty bulbs. As a follow-up to that question, they were asked how many of the specialty bulbs are CFLs. The results are summarized in Table 16. There are a total of 4,879 specialty bulbs of various types installed in the homes of surveyed participants (2,246 low income and 2630 standard). Of these, 1,127 (23%) are specialty CFLs (528 low income and 599 standard). Across the entire survey population the most prevalent type of bulbs are dimmable bulbs. This holds true among low income households as well. However, recessed bulbs were the most prevalent specialty bulb for the standard population.

Table 14. Currently Installed Specialty Bulbs and CFLs

Bulb Type	N	Low Income, n=182		Standard, n=200		Population Total	
		Total	CFL	Total	CFL	Total	CFL
Dimmable		804	162	326	82	1130	244
Outdoor flood		231	52	293	95	524	147
Three-way		160	59	246	96	406	155
Spotlight		181	54	381	75	562	129
Recessed		304	75	604	146	908	221
Candelabra		388	89	479	56	867	145
*Other		178	37	301	49	479	86
TOTAL		2246	528	2630	599	4876	1127

When surveyed participants were asked to rate their interest in Duke Energy providing a direct mail specialty CFL program, their responses had a weighted average of 7.8 on a scale from one to ten, where one indicated no interest and ten indicated great interest. Low income and standard survey respondents were similarly interested in the proposition, as can be seen in the table below.

Table 15. Interest in Specialty CFL Program by Income Group (n=382)

Low Income	Standard	Weighted Population Average
8.0	7.6	7.8

After providing a rating of their general interest in specialty CFL programs, respondents were asked to indicate their interest in receiving specific types of specialty bulbs if they were to be offered in the future. As a follow-up, if they were interested, they were asked to include an estimate of how many hours per day they would use the bulb. Their responses are summarized in Table 16. Of the surveyed participants, the highest level of interest was in three way CFLs (54% weighted), and surveyed participants indicated that these bulbs would be used for a weighted average of 4.1 hours a day. The lowest level of interest was in candelabra CFLs, and they also would be used 4.1 hours per day on weighted average.