



EVALUATION OF AMERENUE'S REFRIGERATOR RECYCLING AND REBATE PROGRAM

Prepared for
AMERENUE

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Executive Summary

AmerenUE along with the Midwest Energy Efficiency Alliance (MEEA) offered a Refrigerator Recycling and Rebate Program in 2003 and again for two months at the end of 2005. The goal of these programs was to encourage the use of Energy Star refrigerators by offering an incentive to remove older refrigerators from the market. According to the AmerenUE program description, "The Refrigerator Rebate and Recycling Program was designed to increase market share of energy-efficient refrigerators in use within the markets served by AmerenUE. The program's energy savings are produced by accelerating the pace at which Energy Star® qualified models gain market share by offering a rebate on the purchase of a new Energy Star® refrigerator and by providing people who purchase an Energy Star unit an incentive to recycle through an environmentally sound process that permanently removes older, energy-inefficient units from the market well in advance of reaching their expected years of use." (A full description of the program can be found in Section II.)

Based on the findings from this evaluation, program accomplishments for 2003 and 2005 include:

- Increasing the number of refrigerators recycled by 2,438 units: 2,314 units recycled in 2003 and 124 units recycled in 2005
- Sales of 496 Energy Star units in conjunction with the program: 379 in 2003 and 117 in 2005
- The early retirement of some units
- Savings of 1,904 MWh

The 2003 and 2005 programs both attempted to influence customers to purchase new Energy Star refrigerators and recycle older refrigerators. Due to the nature of the implementation contracts, however, program intervention occurred at the customer level for only 22% of the units recycled (for the remaining units, program intervention occurred with the haul away contractor). However, most of the customers participating in the program appear to be satisfied with the program (86% of those who participated in 2005). Participants were most satisfied with the pick up and removal process with 92% stating they were very satisfied with this process, followed by 82% stating they are very satisfied with the sign up process. Participants were least satisfied with the amount of time it took to receive the incentive check however 71% still stated they were very satisfied. (See Section VI Table D-3 and Section VI Table D-19.)

Overall, program savings from these programs are relatively low (among the lowest in AmerenUE's portfolio during the 2003-2006 period), with the 2003 program being cost-effective while the 2005 program was not cost-effective due to the short implementation period. (See Section IV.)

No additional refrigerator recycling programs have been funded to date. However if AmerenUE and the Collaborative decide to run a similar program in the future, we recommend the following:

- Clearly state the goals of the program to focus the program approach, and consider extending the program to include customers who “only recycle” and/or customers who “only purchase an Energy Star refrigerator”
- Consider at what point in the process you want to reach potential program participants and expand promotions to reach those who were not already looking to purchase a new refrigerator
- Refocus the program to encourage early retirement of refrigerators through marketing outside of appliance stores
- Raise awareness of opportunities to recycle, and building the infrastructure for this effort, perhaps in lieu of providing customer incentives
- Extend planning time and the length of commitments from retailers and subcontractors
- Find ways to ensure that customer units are not switched during the recycling process
- Collect consistent data from both older models and new models (e.g., nameplate amperage for both).

Details on each of these recommendations are provided in Section V.

I. Introduction and Methodology

AmerenUE along with the Midwest Energy Efficiency Alliance (MEEA) offered a Refrigerator Recycling and Rebate Program in 2003 and again for two months at the end of 2005. According to the AmerenUE program description, "The Refrigerator Rebate and Recycling Program was designed to increase market share of energy-efficient refrigerators in use within the markets served by AmerenUE. The program's energy savings are produced by accelerating the pace at which Energy Star® qualified models gain market share by ... providing people who purchase an Energy Star unit an incentive to recycle through an environmentally sound process that permanently removes older, energy-inefficient units from the market well in advance of reaching their expected years of use." AmerenUE partnered with the Midwest Energy Efficiency Alliance to administer this program. (A full program description is provided in Section II.)

This report provides a process and impact evaluation of the Refrigerator and Recycling Program, led by Opinion Dynamics Corp. in partnership with GDS Associates. This evaluation report is based on (1) an in-depth interview with the MEEA program administrator and program stakeholders, including MEEA and ARCA, (2) review of MEEA annual reports (3) our review of the 2003 and 2005 program databases, (5) our review of a MEEA survey of participants from 2003, (6) telephone interviews with participants in the 2005 program, and (7) telephone interviews with non-participants.

In March 2007, ODC conducted telephone surveys with 65 participants in the 2005 program; representing 54% recycled refrigerators and 56% new Energy Star refrigerators attributed to the program. The list of program participants and their contact information was provided to ODC by AmerenUE. Where possible, we combined this data with survey data collected by MEEA from 2003 program participants.

ODC also interviewed 100 AmerenUE customers who had not participated in the Refrigerator Rebate and Recycling program. AmerenUE provided ODC with a list of zip codes that fall within its service territory. Using this list, ODC obtained a random sample of phone numbers from these zip codes. We then removed program participants from our non-participant sample. These non participant interviews were conducted in April 2007. Of these non participants 32% purchased a new refrigerator within the past five years.

We do not provide all of the detailed tables in the body of the write-up for the purpose of keeping the write-up as succinct as possible. Key tables are provided in the body of the write-up, with additional detailed tables denoted by the letter "D" and provided in Section VI of this report.

II. Program Description

This section describes the history of the 2003 and 2005 programs including the incentive structures, costs, and recycling and sales goals for the 2003 and 2005 programs.

2003 Program Description

The 2003 program "sought to increase the sales of Energy Star qualified refrigerators and link these sales to an accelerated retirement of old operational refrigerators. Therefore, the consumer incentive to purchase an Energy Star qualified unit was linked to recycling bounties. By linking these two activities at the consumer level the program would allow a high replacement rate and high cost effectiveness in terms of kWh reclamation."¹

The 2003 program was run by the Midwest Energy Efficiency Alliance (MEEA), in coordination with Honeywell Utility Solutions; Sears; and the Sears local pick-up vendor in Missouri, S&S Recycling; and the Appliance Recycling Centers of America (ARCA), which recycled all units. Customers who purchased an Energy Star refrigerator from Sears received a 10% discount from Sears, and were then paid a \$30 bounty if they recycled their old refrigerator through Sears using a program sticker from their new Energy Star refrigerator. In addition, if they recycled a second unit through the program (using the stickers from their new Energy Star refrigerator) they could receive another \$50 bounty on their second recycled refrigerator or freezer. As part of the contract with Sears and their local pick-up vendor, S&S Recycling, AmerenUE and MEEA paid S&S Recycling a fee for any unit picked up from a customer who bought a refrigerator from Sears (even if they did not replace this refrigerator with an Energy Star refrigerator). As part of the program, S&S Recycling received \$40 per unit recycled. MEEA (and AmerenUE) then paid ARCA to recycle the units. The program also spent \$32,739 for six advertisements in the St. Louis newspaper.

The total program costs for the PY 2003 program were \$378,382.

As documented in MEEA's PY2003 report, this program experienced difficulties because they were:

- Unable to work with manufacturers given the limited region covered by AmerenUE
- Unable to extend beyond certain parts of the AmerenUE territory given the lack of a centralized appliance delivery and haul away service outside of St. Louis
- Only able to work with eight Sears retailers since there were no opportunities for recycling beyond the Saint Louis area.

2005 Program Description

The 2005 program sought to improve upon the 2003 program. To do this MEEA amended the design of the program to link the purchase of an Energy Star qualified refrigerator to any bounty or rebate a consumer would receive in order to introduce a stronger market transformation aspect to the program (thus eliminating recycling without the purchase of an Energy Star refrigerator).

¹ MEEA 2003 Regional ENERGY STAR® Refrigerator Rebate & Recycling Program Final Report

The 2005 program was an improvement on the 2003 program, including the following changes:

- The geographic area was expanded to include St. Louis, Jefferson City and Cape Girardeau
- The retail locations were broadened to include all stores, not just Sears
- Energy Star units on sale were allowed
- All primary units were replaced by an Energy Star refrigerator

The 2005 program was also administered by MEEA, working directly with the Appliance Recycling Centers of America (ARCA). A \$50 bounty was given for old units if the customer could provide a receipt for a new Energy Star refrigerator.

The 2005 program, however, experienced a very late program launch due to the approval process, and the difficulties of coordinating contractor selection and contract negotiations with a large committee. Although MEEA requested an extension, AmerenUE's tariff ended on December 31, 2005 and they were unable to extend the program without going back to the commission.

In 2005, ARCA was paid for units picked up. ARCA was paid \$145 per unit (or \$115 for the second unit), and the customer was given a \$50 incentive, for a total of \$195 per unit (or \$165 per second unit). Notably, the costs per unit were much higher than in 2003.

Total program costs for 2005 were \$66,257 (with incentives for recycling accounting for \$17,980, and bounty payments to customers equaling \$6,200).

III. Program Accomplishments

Program accomplishments during the program period include:

- Increasing the number of refrigerators recycled by 2,438 units: 2,314 units recycled in 2003 and 124 units recycled in 2005
- Sales of 496 Energy Star units in conjunction with the program: 379 in 2003 and 117 in 2005
- The early retirement of some units (77% of those recycled)
- Savings of 1,904 MWh

These accomplishments are described in more detail below.

Increasing the number of refrigerators recycled by 2,438 units: 2,314 units recycled in 2003 and 124 units recycled in 2005

Overall, the program recycled 2,438 units: 2,314 units in 2003 and 124 units in 2005.² While program participants reported that most refrigerators (96%) would have been replaced regardless of the program, almost none of them would have been recycled. (See Section VI Table D-9 and Section VI Table D-10.) As such, the majority of units that were still working could have remained in the secondary market.³

According to the PY2003 final report from MEEA, the program met its recycling goals. However, the recycling goals were ultimately met by collecting units that would have been picked up by S&S anyway; AmerenUE's program recycled these units (rather than returning them to the secondary market where possible). Many of these units, could have been replaced by new standard refrigerators (rather than Energy Star refrigerators) but information on the unit that replaced the recycled refrigerator was not available for most units. In all, the 2003 program paid for 2,373 units to be recycled through the program, but our analysis was only able to verify documentation for 2,314 units.

Table 1: Program Recycling Goals

	2003		2005	
	Goal	Actual	Goal	Actual
Primary Units Recycled	1,600	2,136	1,945	
Secondary Units Recycled	624	237		7 ^b
Reported Total Units Recycled	2,225	2,373 ^a	1,945	124 ^c
Verified Units Through Impact Analysis		2,314		124

^a Note that the number of units recycled in 2003 reflects all of the units that S&S Recycling picked up, including ones that would have been picked up even in the absence of the program.

^b 5 refrigerators and 2 freezers

^c 122 refrigerators and 2 freezers

² Note that the 2003 report indicates 2,373 units recycled, but program databases only allowed us to verify 2,314 units.

³ Given the fact that S&S Recycling required AmerenUE to pay for all refrigerators that they picked up, it did not appear to be an established refrigerator recycling center/way to get it to ARCA. More than likely, units would have been picked up and refurbished or thrown away.

The 2005 goal was to recycle 1,945 refrigerators in an environmentally sound manner. In all, 117 customers participated in the program, for a total of 124 units recycled (117 primary refrigerators, 5 secondary refrigerators and 2 freezers). As such, the 2005 program did not meet its goals. All of these units were documented by the program databases.

Sales of 496 Energy Star units in conjunction with the program: 379 in 2003 and 117 in 2005

The AmerenUE program supported the sale of 379 models in 2003 and 117 in 2005. While 75% of the 2005 participants who we interviewed stated that they would have purchased an Energy Star model if the program had not required it, one-quarter (25%) of participants either would not have purchased an Energy Star model or were unaware of the Energy Star label.

Notably, while the program was running, Sears sold 3,028 Energy Star refrigerators, but only a small fraction of those customers recycled a refrigerator through the program, so ultimately only 379 of the refrigerators sold by the participating stores are recorded in the program database (although the 10% discount by Sears, which was part of the program, could have encouraged some of the remaining sales). While the 2003 annual report does not report a sales goal, it appears that they would have hoped to have the ratio of newly purchased Energy Star to recycled units be a 1:1 ratio. As such, the program did not reach their sales goal.

Table 2: Program Energy Star Sales Goals

	2003		2005	
	Goal	Actual	Goal	Actual
Sales goal (Bounties paid)	[1,600]	379	1,880	117

^aNote that the number of units recycled in 2003 reflects all of the units that S&S Recycling picked up, including ones that would have been recycled from Sears customers even in the absence of the program.

The 2005 goal was to support the purchase of 1,880 Energy Star qualified refrigerators. In all, only 117 customers participated in the program due to the short time frame of the program. As such, the 2005 program did not meet its goals. However, the program did achieve nearly a 1:1 ratio (i.e., 117 Energy Star units were purchased for 124 units recycled).

Enabled the Early Retirement of Some Units (77% of Those Recycled)

Based on program data, we estimate that the combined 2003 and 2005 programs are responsible for the early retirement of 77% of the units. This estimate is based on responses from retailers and consumers about what would have happened to the units without the program (e.g., the retail would have hauled away, the refrigerator would have been used as a second unit, etc.), as well as on the assumption that approximately 75% of refrigerators that are hauled away or thrown away are eventually refurbished. While this is an approximation (since no definitive data is available on the market), this assumption takes into account ARCA's extensive experience in the market, the evaluation teams experience, as well as the age of the refrigerators that were recycled through the program.

Table 3: Percent of Refrigerators Would Have Remained in Use

	Percent of all units recycled through the program (n=2,314) (column 1)	Assumed Percent That Would Remain in Use (column 2)	Percent of Total Remain in Use (col. 1 * col. 2)
Had the retailer haul it away (Still purchased a new unit)	87%	75%	65%
Kept it, and not purchased a new one	4%	100%	4%
Kept it as a second unit	3%	100%	3%
Sold or given it away	3%	100%	3%
Thrown it out or had someone else pick it up	3%	75%	2%
Paid to have it recycled	1%	0%	0%
		Total*	77%

* The parts do not equal the sum due to rounding.

Savings of 1,904 MWh

Gross savings per unit range from 912 kWh to 1,038 kWh. However, since only 77% would have remained in the market, net realized energy savings are as follows:

- 2003 are 1,816,346 kWh with a demand reduction of 0.2790 MW.
- 2005 are 87,904 kWh with a demand reduction of 0.0135 MW.

A detailed analysis of the impacts and cost-effectiveness of the 2003 and 2005 programs are reported below.

IV. Impacts and Cost Effectiveness Analysis

We conducted the impact evaluation of AmerenUE's 2003 and 2005 Energy Star Refrigerator Rebate and Recycling Program using information about the refrigerators that were picked up and recycled by MEEA, as well as energy use information of older existing refrigerators and new Energy Star qualifying refrigerators.⁴

Overview of Gross Savings Calculations

Because amp draw information in the program databases was connected load (actual operating) amperage versus nameplate amperage, and Energy Star only reports nameplate amperage for new units, we were not able to use the information in the program databases and it was necessary for us to calculate program impacts using another method. Information from a study completed by D&R International, Ltd., for DOE from the Directory of Certified Refrigerators, Freezers, and Refrigerator Freezers published by the California Energy Commission (CEC) from 1979 to 1992 shows average annual energy consumption by size of unit, style of unit, and age of unit. We sorted this information by unit size in order to develop a lookup table of annual energy use for side-by-side style units and top freezer and other styles sized 9 cubic feet to 30 cubic feet (see Table 4).

Table 4: Lookup Table for Existing Refrigerators

Vol (cu ft)	Side-by-side (KWh)	Top Mount freezer and other (KWh)
9	850	770
10	880	800
11	900	850
12	950	870
13	1,000	930
14	1,050	975
15	1,100	1,005
16	1,200	1,030
17	1,260	1,070
18	1,300	1,100
19	1,330	1,130
20	1,350	1,150
21	1,375	1,170
22	1,400	1,190
23	1,425	1,215
24	1,440	1,240
25	1,465	1,260
26	1,475	1,280
27	1,480	1,300
28	1,495	1,300
29	1,550	1,370
30	1,650	1,430

⁴ Information collected on the refrigerators that were recycled included amp draw of the removed units, size in cubic feet of the units, and the style of the units (side-by-side, top mounted freezer, bottom mounted freezer, single door refrigerator, etc.).

Consumption used in the lookup table was typical consumption seen for units of a particular size for units ten years old or less. We observed that increasing these consumption levels by 30% results consumption levels that are similar to those observed for units more than ten years old. This multiplier of 1.3 was applied if the age data for a recycled unit indicated that it was more than ten years old when picked up. Similarly, we developed typical energy consumptions of Energy Star qualifying models sized 9 cubic feet to 30 cubic feet to create a second lookup table (Table 5). The lookup tables provided an efficient method for assigning an estimated annual energy consumption level for all units recycled as part of the AmerenUE program. After a base consumption was determined for a unit, that consumption was multiplied by 1.3 to obtain an age-adjusted consumption if the unit was determined to be over ten years old at the time of removal. The anticipated annual energy use of an Energy Star qualifying replacement of the same size and type was subtracted from the age adjusted energy use of the removed unit to calculate annual energy saving resulting from the removal of that unit. Savings for all units removed through the program were then added to determine KWh savings for program years 2003 and 2005. In order to account for secondary refrigerators, the totaled savings were increased slightly by first deducting the number of secondary refrigerators removed multiplied by the average annual savings per unit and then adding back in the number of secondary refrigerators multiplied by average base consumption for the recycled refrigerators. This was done because secondary refrigerators would most likely not be replaced, while primary refrigerators would be. It is therefore fair to claim the entire base use consumption of secondary units as savings.

Because annual savings data were used to determine total program savings, it was not possible to independently calculate peak demand reduction; therefore, the ratio of demand reduction to energy savings (0.0001536 KW/KWh) derived from data in the Final Report Impact Evaluation of the Spare Refrigerator Recycling Program CEC Study #537 completed by Xenergy for Southern California Edison was used to compute peak demand reduction from calculated annual KWh savings.

Table 5: Lookup Table for ENERGY STAR Refrigerators

Vol (cu ft)	Side-by-side (KWh)	Top Mount freezer and other (KWh)
9	400	316
10	400	320
11	400	330
12	420	345
13	430	355
14	440	365
15	460	376
16	480	390
17	507	407
18	508	408
19	518	420
20	524	432
21	530	440
22	584	488
23	595	510
24	607	540

Vol (cu ft)	Side-by-side (KWh)	Top Mount freezer and other (KWh)
25	617	550
26	637	570
27	680	600
28	720	630
29	770	670
30	810	710

Overall, 94% of recycled refrigerators were plugged in and working at the time of the pickup.⁵ Of the total number of refrigerators collected in 2003, over 1,800 were not replaced with Energy Star units directly through the program. It may be assumed that many were replaced with Energy Star units, and this was the assumption used in completing the impact analysis. Finally, the average age of refrigerators recycled in 2003 was calculated to be 16.8 years. This is already beyond the expected life of 15 years for refrigerators. It is not known how many more years the refrigerators would have been in use, but many collected were 30, 40, or even 50 years old. Therefore, for the purposes of program cost effectiveness, we have used an expected measure life of 15 years in calculating lifetime program savings.

Program Year 2003 Gross Savings

The final invoice summary for 2003-2004 lists a total 2,314 units removed from Missouri customers. This differs from the total of 2,373 units shown in the MEEA 2003 Final Report. This invoice summary also lists a program total of 4,165 units compared with 4,546 units reported, indicating that a discrepancy in the unit totals exists. Based on the methodology described above, gross program savings were calculated to be 2,401,939 KWh with a peak demand reduction of 0.36796 MW.

The savings reported in the 2003 final report and the calculated gross savings are summarized in Table 6.

Table 6: 2003 Program Savings

	Units Removed	Gross Annual Savings (KWh)	Demand Reduction (MW)	Savings per unit (KWh)
ODC/GDS	2,314	2,401,939	0.36894	1,038
<i>MEEA 2003 Final Report</i>	2,373	4,077,763	0.626472	1,718
Difference	-59	-1,675,824	-0.25753	-680
Percent of reported	97.5%	58.9%	58.9%	60.4%

Prior program savings reported by MEEA were calculated based on per-unit savings from the Final Report Impact Evaluation of the Spare Refrigerator Recycling Program CEC Study #537 completed by Xenergy for Southern California Edison. Refrigerators were assigned an average annual consumption of 2,148 KWh and 0.33 KW; with a six-year estimate of remaining useful

⁵ We collected additional details about the recycled refrigerators, but due to the available information, we did not incorporate these details since the program estimates are not as detailed as was expected given the level of data available for impacts.

life. A net to gross ratio of 0.8 was then applied, resulting in per unit annual savings of 1,718 KWh. This calculation appears not to have subtracted the expected energy use of the replacement unit if the recycled unit was a primary refrigerator. In reality, the majority of units recycled in the 2003 program (2,136 of 2,373 reported for Missouri) were primary units that would be expected to be replaced.

MEEA's program results for Missouri customers in 2003 were reported as 2,373 units removed, for a total annual energy savings of 4,077,763 KWh and a peak demand reduction of 0.626472 MW. As discussed above, refrigerators were assigned an average annual consumption of 2,148 KWh and 0.33 KW; with a six-year estimate of remaining useful life. A net to gross ratio of 0.8 was then applied, resulting in per unit annual savings of 1,718 KWh, regardless of size or type. Two factors appear to account for the majority of the difference between the gross savings claimed in the 2003 final report and the gross savings calculated as part of the impact evaluation. First, and probably most significant, claimed savings were determined to be the full expected annual consumption of the recycled units, modified by a net to gross ratio of 0.8. This did not account for the refrigerators that would replace the recycled units, even though 2,136 of the 2,373 recycled refrigerators in Missouri were primary refrigerators and would most likely have been replaced.

Second, the estimated consumption was an average value determined in the Final Report Impact Evaluation of the Spare Refrigerator Recycling Program CEC Study #537 completed by Xenergy for Southern California Edison. This consumption estimate appears similar to consumption data seen for older refrigerators (20 years old or older) that would be expected to be used as spare refrigerators. As mentioned above, the vast majority of recycled refrigerators were primary refrigerators, not spares, and a survey of Missouri customers indicated that only 45% of recycled refrigerators were over 16 years old. This indicates that the average consumption used in calculating reported savings was probably too high to represent the units recycled in this program.

Program Year 2005 Gross Savings

The final invoice summary for 2003-2004 lists a total 124 units removed from Missouri customers. Based on the methodology described above, gross program savings were calculated to be 116,245 KWh with a peak demand reduction of 0.0178 MW.

The savings reported in the 2005 final report and the calculated gross savings are summarized in Table 7.

Table 7: 2005 Program Savings

	Units Removed	Gross Annual Savings (KWh)	Demand Reduction (MW)	Savings per unit (KWh)
ODC/GDS	124	116,245	0.0178	937
<i>MEEA 2003 Final Report</i>	124	212,888	0.030	1,718
Difference	0	-96,643	-0.0122	-781
Percent of reported	100%	54.6%	59.3%	54.5%

Program results for Missouri customers in 2005 were reported as 124 units removed, for a total annual energy savings of 212,888 KWh and a peak demand reduction of 0.030 MW. As for the

2003 program year, refrigerators were assigned an average annual consumption of 2,148 KWh and 0.33 KW; with a six-year estimate of remaining useful life. A net to gross ratio of 0.8 was then applied, resulting in per unit annual savings of 1,718 KWh, regardless of size or type.

Two factors appear to account for the majority of the difference between the gross savings claimed in the final report and the gross savings calculated as part of the impact evaluation.

First, and probably most significant, claimed savings were determined to be the expected consumption of the recycled units, modified by a net to gross ratio of 0.8. This did not account for the refrigerators that would replace the recycled units, even though 122 of the 124 recycled refrigerators in Missouri were primary refrigerators and would most likely have been replaced. Second, the estimated consumption was an average value determined in the Final Report Impact Evaluation of the Spare Refrigerator Recycling Program CEC Study #537 completed by Xenergy for Southern California Edison. This consumption estimate appears similar to consumption data seen for older refrigerators (20 years old or older) that would be expected to be used as spare refrigerators. As mentioned above, the vast majority of recycled refrigerators were primary refrigerators, not spares, and a survey of Missouri customers indicated that only 45% of recycled refrigerators were over 16 years old. This indicates that the average consumption used in calculating reported savings was probably too high to represent the units recycled in this program.

Net Realized Savings

For the combined 2003 and 2005 programs, 77% of the refrigerators recycled through the program would have remained on the market if the program had not existed, meaning that 23% of them would likely have been thrown away or recycled even without the program. In addition, a factor of 1.06 was also applied to freeridership because 6% of recycled refrigerators were not functioning at the time of pickup. Spillover data are not available, therefore, estimating 24.4% free riders, net realized savings for 2003 is calculated to be 1,816,346 KWh, with a demand reduction of 0.2790 MW and for 2005 is calculated to be 87,904 KWh, with a demand reduction of 0.0135 MW.

Cost Effectiveness

Table 8 shows the cost effectiveness of AmerenUE's Refrigerator Recycling Program for 2003 and 2005. FEMP UPV Discount Factors for electricity for Census Region 2 (Including Missouri) were used for the benefit/cost analysis. The Department of Energy currently uses a 3% discount rate in determining discount factors. The expected life of refrigerators is 15 years, and this was the life used in determining the appropriate residential discount factors and in calculating lifetime savings. Clearly, the very few units collected in 2005 resulted in that program year having a poor benefit cost ratio. This is probably because any fixed administrative costs needed to be spread out over much fewer units in 2005 as compared with 2003.

Table 8: Refrigerator Program Cost Effectiveness

Year	Program Cost	First Year Program Savings	Effective Life of Recommendations	Lifetime Savings	Lifetime Benefit/Cost Ratio
2003	\$378,000	\$119,879	15.0	\$827,164	2.2
2005	\$66,000	\$5,802	15.0	\$40,031	0.6

Detailed spreadsheets on the savings and life cycle costs analyses were provided to AmerenUE along with this report.

V. Process Findings and Recommendations

Overall, most participants in the 2005 program were very satisfied the program (86%). (See Section VI Table D-3)⁶ Participants were most satisfied with the pick up and removal process with 92% stating they were very satisfied with this process, followed by 82% stating they are very satisfied with the sign up process. Participants were least satisfied with the amount of time it took to receive the incentive check however 70% still stated they were very satisfied. (Section VI Table D-19). Participants that were not fully satisfied said they experienced delays in getting their refrigerators picked up or receiving their rebate checks.

No additional refrigerator recycling programs have been funded to date. However if AmerenUE and the Collaborative decide to run a similar program in the future, we recommend the following:

- **Clearly state the goals of the program to focus the program approach, and extend the program to include customers who “only recycle” and/or customers who “only purchase an Energy Star refrigerator”**

It is unclear what the main goals of the programs were: To recycle older units instead of keep using them or putting them into the secondary market? Early retirement? To increase the sale of Energy Star units? If the goal was on increasing sales of Energy Star units, the 2003 program did not require the linking of recycled appliances to new Energy Star appliances. While the 2005 program did require this, the 2005 program also mentions early replacement of older operational units as a goal, although then fails to encourage early retirement since many of the 2005 participants (83%) were planning to replace their refrigerators prior to hearing about the recycling program and incentive (See Section VI Table D-9b.) Additionally, many participants stated that they would have purchased an Energy Star model without the program. (See Section VI Table D-17.)

By design (but not implementation in 2003), the AmerenUE refrigerator programs focused on the nexus of people who were both purchasing Energy Star units, and willing to recycle their old unit. As described by ARCA, if one thinks of it in terms of two intersecting circles (one representing those who purchase Energy Star units and one for those who are getting rid of units) the AmerenUE program sought only to capture those who met both requirements, or the intersection of the two circles. Expanding the program in a way to incorporate all customers either purchasing and/or getting rid of refrigerators would help to increase the number of customers affected through the program. (Notably, however, this expansion would have to occur in a cost-effective way, which might assume just education and not incentives for all units). According to interviews with ARCA, uncoupling the recycling with efforts to promote and sell Energy Star units could also reduce the program costs per unit. Increasing the volume of units could also bring down the cost per unit.

Any future programs should more clearly state the goals (and/or the balance of the three goals mentioned above) in order to focus the program more.

⁶ No satisfaction questions were asked in the MEEA survey of 2003 participants.

- **Consider at what point in the process you want to reach potential program participants and consider expanding promotions to reach those that were not already looking to purchase a new refrigerator**

Most participants (71%) found out about the program in the store either from in-store displays or stickers on appliances (see Section VI Table D-1). This is consistent with the finding that most (96% of all or 83% of the 2005 participants) were also planning on purchasing a new refrigerator prior to hearing about the program (see Section VI Table D-9). While in-store advertising is getting customers to participate in the program and getting refrigerators recycled that otherwise would not be, it is not encouraging customers to replace their refrigerators earlier than they normally would since these customers who find out about the program through in-store advertising are likely to be shopping for a new unit already.

AmerenUE should look to promote the program to customers who are not currently looking to purchase a new refrigerator. This could possibly include targeting low to middle income customers or neighborhoods where the housing stock is older.

- **Refocus the program to encourage early retirement of refrigerators through marketing outside of appliance stores**

Based on non-participant survey data, over 25% of non-participant refrigerators are over 11 years old (See Section VI Table D-5.). Yet based on non-participant comments, only 5% of non-participants are in the market to purchase a refrigerator over the next year, so there may be opportunities to encourage the early retirement of additional older energy hogs.

Most of the participants in the program were replacing refrigerators that were at the end of their useful life. As the age of the refrigerator replaced through the program increases to its useful lifetime the savings that can be claimed by the program decreases. Forty-five percent of participants replaced a refrigerator that was over 16 years old with another 22% replacing a unit that was 11-15 years old. According to the Association of Home Appliance Manufacturers (AHAM) the average useful life of a refrigerator ranges from 14 years to 17 years.

Future programs should focus on getting customers that own high use units but are likely to wait until the refrigerator stops working to replace it. Thus, additional marketing outside of the stores would be required.

- **Raise the awareness of opportunities to recycle, and building the infrastructure for this effort, perhaps in lieu of providing customer incentives**

None of the non-participants who purchased a refrigerator in the past five years said they paid to have their old unit recycled, and only 4% of participants said they would have done this if the program had not been offered (representing 1% of all units in the program). However, when all non-participants were specifically asked if they would look for someone to recycle their old refrigerator when the time came to get rid of it, 52% said

“yes” and 20% would be willing to pay \$50 for the service. (See Section VI Table D-11.) This is similar to participants: 49% said they would have looked for someone to recycle their old refrigerator if the program had not been available, and 20% would be willing to pay \$50 for it. Notably, therefore, just raising awareness of the possibility of recycling the refrigerator appears to generate interest. Future programs should consider this, and whether the customer incentive is needed.

➤ **Extend planning time and the length of commitments from retailers and subcontractors**

Based on information gathered through our in-depth interview with the program administrator, the 2005 was launched late due to the amount of time required for planning and approval. The time it took to get feedback from AmerenUE and the Collaborative on the RFP process, and then the time to sign the contracts and coordinate with the contractor, was much longer than anticipated. As a result, the program did not launch until a few months before the tariff ended, and it appears as though AmerenUE was unable to extend the tariff and thus the program period.

In addition, the contract time frame and volume did not allow for a recycling center to be established within the Missouri market. Due to the limited commitment from the program, ARCA recycled the units through neighboring states, thus not allowing for the transformation of the market. As such, the program was limited to the existing infrastructure (e.g., only being able to haul away from the St. Louis area). A commitment to a longer timeframe and higher volume of units would allow for additional infrastructure to be established.

For future efforts, AmerenUE should allow for a planning period, work to streamline the approval processes, and seek a longer-term commitment. Notably, in the first program year, MEEA found that since they covered only a limited regional area, manufacturers did not want to participate because the rebated conflicted with nationwide rebates. They also found that certain areas of the state were not able to participate because they lacked a centralized appliance delivery and haul away service (which is why ARCA stepped in for the 2005 program). In future efforts, additional planning time and longer-term commitments could help build the infrastructure needed.

➤ **Find ways to ensure that customer units are not switched during the recycling process**

The assumption within the refrigerator market is that if the unit is working, someone will use it; and if the unit looks good but is not working, someone will fix it and use it.⁷ Because of this, throughout the country, there are problems with policing units to ensure that the units that are retired early are not switched with older units that would have been thrown away. Some policing of this should occur with any program. Suggestions include but are not limited to destroying the unit at the time of pick-up (for example, by piercing the wall of the unit), and/or tracking serial numbers or make/models. Any future

⁷ Paraphrased from discussion with Bruce Wall, ARCA, 05/30/07.

programs should require the implementer to ensure how the market will be "policed" to ensure that units are not being switched.

➤ **Collect consistent data from both older models and new models (e.g., nameplate amperage for both)**

In the program databases, the amperage information collected from the recycled refrigerators was generally lower than the nameplate wattage for Energy Star qualifying refrigerators of the same size. This implies that the amperage for the recycled units was probably a running amperage rather than nameplate amperage. Collecting the nameplate amperage would allow for a direct comparison to the nameplate amperage of Energy Star units of the same size and would result in more accurate baseline data. For future efforts, the program should collect consistent data from both older models and new models.

VI. Detailed Tables

Section VI Table D-1: Where Customers Heard About Program

	Participants (n=65)
In the store (in store display or stickers on appliances)	71%
Friend/family/neighbor	8%
TV advertisement	6%
At work-Ameren employees	5%
Advertisement in cable bill	2%
Newspaper	2%
Bill inserts	2%
Don't know	6%

Section VI Table D-2: Why Customers Participate (multiple response)

	Participants (n=65)
Rebate	55%
Needed to have old refrigerator removed	23%
Energy savings	17%
Needed a new refrigerator	17%
Other	6%

Section VI Table D-3: Satisfaction with Program

	Participants (n=65)
Very satisfied	86%
Somewhat satisfied	11%
Somewhat dissatisfied	2%
Very dissatisfied	-
Don't know	2%

Section VI Table D-4: Non Participant Refrigerator Purchases

	Non Participant (n=100)
Yes, I purchased fridge that is in use in my home	79%
<i>Purchased New</i>	75%
<i>Purchased Used</i>	4%
No, I did not purchase the fridge that is in use in my home	21%

Section VI Table D-5: Age of Non Participant Refrigerators

	Non Participant (n=100)
Less than 1 year	5%
1-5 years	38%
6-10 years	25%
11-15 years	14%
Over 16 years	11%
Don't know	7%

**Section VI Table D-6: Age of Refrigerator at Time of Replacement
(according to 2005 survey, not database)**

	Participant			Non Participant (n=32)
	Participant Refrigerators (n=67)	Primary Refrigerators (n=51)	Secondary Refrigerators (n=16)	
Less than 1 year	1%	2%	-	-
1-5 years	1%	2%	-	6%
6-10 years	22%	24%	19%	9%
11-15 years	22%	29%	-	25%
Over 16 years	45%	37%	69%*	38%
Don't know	7%	6%	13%	22%

*significantly higher than primary refrigerators at the 90% level

Section VI Table D-7: Plugged In and Working (valid percentages)

Was the fridge plugged in and working?	Participant			Non Participant (n=32)
	Total Participant Refrigerators (n=64)	Primary Refrigerators (n=48)	Secondary Refrigerators (n=16)	
Yes	92%*	92%	94%	72%
Some of the time	2%	-	6%	-
No	6%	8%	-	25%^

*significantly higher than non participants at the 90% level

^significantly higher than participants at the 90% level

Section VI Table D-8: Refrigerator in a Room with Heating/Cooling

Q5 & Q14: Was the fridge in a room that has heat, ac or both?	Total Refrigerators (n=67)	Primary Refrigerators (n=51)	Secondary Refrigerators (n=16)
Heat only	4%	2%	13%*
AC only	-	-	-
Both heat and AC	85%	96%*	50%
Don't know	10%	2%	38%*

**Section VI Table D-9a: Planning on Replacing Prior to Hearing About Program
(all units, valid percentages)**

MEEA Program Data & ODC Survey Q6 & Q16: Were you planning on replacing this refrigerator prior to hearing about the program?	Inferred Total Refrigerators (n=2,314)
Yes	96%*
No	4%

*Based on the 2005 ODC survey data which shows that 83% of refrigerators would have been replaced regardless of the program. This assumes that 83% of the 496, and 100% of the remaining 1,935 in 2003 would have been replaced anyway. (See below.)

**Section VI Table D-9b: Planning on Replacing Prior to Hearing about Program
(2005 survey responses only, valid percentages)**

Q6 & Q16: Were you planning on replacing this refrigerator prior to hearing about the program?	Total Refrigerators (n=64)	Primary Refrigerators (n=49)	Secondary Refrigerators (n=15)
Yes	83%	86%	63%
No	17%	14%	37%

Section VI Table D-10: Fate of Old Refrigerator

	Participants (what would you have done if program did not exist) ¹			Non Participants	
	Total Refrigerators (all units)	Primary Units (n=200)	Secondary Units (n=45)	Purchased new unit within last 5 years (n=32)	Plan for old unit when buying a new unit (n=68)
Thrown it out or had someone else pick it up	3%	19%	18%	13%	9%
Had the retailer haul it away (Still purchased a new unit)	87%	50%	16%	41%^	19%
Sold or given it away	3%	12%	36%	22%	21%
Kept it as a second unit	3%	15%	29%	9%	4%
Paid to have it recycled	1%	5%	2%	-	6%
Kept it, and not purchased new one	4%				
Other	-	-	-	3%	4%
Don't know	-	-	-	-	12%

¹ Combined MEEA survey of PY 2003 participants and ODC survey of PY 2005 participants. Notably, the primary and secondary unit columns are much smaller since these only include customers surveyed, not the 1,935 units recycled without customer intervention.

*significantly higher than non participants that purchased a unit within 5 years and those that have not at the 90% level

^significantly higher than participants at the 90% level

Section VI Table D-11: Would Have Looked For Someone to Recycle Refrigerator

Would you look for someone to recycle your refrigerator if the program had not been available/when you get rid of an old refrigerator?	Participants			Non Participants (n=100)
	Total Participants (n=63)	Participants with Primary Refrigerators (n=50)	Participants with Secondary Refrigerators (n=13)	
Yes	46%	52%*	23%	52%
No	46%	38%	77%*	31%
Don't know	8%	10%	-	17%

*significantly higher than the comparison group at the 90% level

- 20% of participants and non participants would pay someone \$50 to recycle their old refrigerator.

Section VI Table D-12: Why Would You Not Look for Someone to Recycle Your Fridge?

Q11b	Participants (n=29)	Non Participants (n=31)
Would have let retailer take it	28%	6%
Would have donated/given it away/sold it	17%	29%
Didn't know you could recycle it	14%	-
Would have kept it and used it	14%	-
Didn't think of recycling it	10%	-
Just wanted to get rid of it	3%	-
It's too much trouble	-	3%
Other	-	6%
Don't know/refused	14%	54%*

*significantly higher than the comparison group at the 90% level

Section VI Table D-13: Plan to Purchased in Next 12 Months

	Non Participants (n=100)
Yes	5%
No	92%
Don't know	3%

- Only 2% of non participants plan on purchasing an Energy Star refrigerator within the next 12 months

Section VI Table D-14: Energy Star Awareness

	Participants (n=65)	Non Participants (n=100)
Aware	89%*	54%
<i>Unaided</i>	74%*	40%
<i>Aided</i>	15%	14%
Not Aware	9%	45%*
Don't know	2%	1%

Section VI Table D-15: What Energy Star Label Means (multiple response)

	Participants (n=58)	Non Participants (n=54)
Uses less energy	71%	56%
Lower utility bills	22%	35%
High quality	7%	4%
Good for the environment	5%	11%
Government endorsed	3%	2%
Product is tested	2%	7%
Less pollution	2%	7%
Haven't thought about it	-	6%
Other	10%	-
Haven't thought about it	2%	6%

Section VI Table D-16: Energy Star Refrigerators Among Non Participants

	Participants (n=100)
Yes, current refrigerator is Energy Star	25%
No, current refrigerator is not Energy Star	14%
Haven't heard of Energy Star	46%
Don't know	15%

Section VI Table D-17: Would Have Purchased of an Energy Star Unit Without the Program

Q27: Would you have purchased an Energy Star refrigerator if the program did not require it?	Participants (n=65)
Yes	75%
No/Haven't heard of Energy Star/Don't know	25%

Section VI Table D-18: Signing Up for the Program

Q29: Did you sign up for the program through the website or by calling the toll- number?	Participants (n=65)
Phone	63%
Website	8%
Don't know	29%

Section VI Table D-19: Satisfaction

Q30, Q32 & Q34: Were you satisfied or dissatisfied with...	Sign Up (n=65)	Pick Up and Removal (n=65)	Amount of Time to Receive Check (n=65)
Very satisfied	82%	92%	71%
Somewhat satisfied	9%	8%	12%
Neither satisfied nor dissatisfied	-	-	3%
Somewhat dissatisfied	2%	-	6%
Very dissatisfied	2%	-	-
Don't know	6%	-	8%

Section VI Table D-20: Refrigerator Participant Demographics

Demographics	Participants (n=65)	Non Participants (n=100)
Own/Rent		
Own	95%	84%
Rent	3%	13%
Don't know	2%	3%
Household Type		
Single family	91%	83%
Duplex or 2 family	3%	4%
Apartment 2-4 units	5%	5%
Apartment >4 units	2%	5%
Mobile home	-	1%
Townhouse	-	2%
Number of People		
1	8%	27%*
2	38%	45%
3	18%	10%
4	11%	11%
5	12%	4%
6	3%	1%
7 or more	2%	1%
Refused	8%	1%

Demographics	Participants (n=65)	Non Participants (n=100)
Low Income		
Non Low Income	80%	69%
Low Income	2%	16%
Don't know/refused	18%	15%
Year Built		
Built in 2006	-	-
2004-2005	-	1%
2001-2003	-	7%
1990-2000	22%	15%
1980-1989	15%	5%
1970-1979	17%	12%
1960-1969	26%	13%
1950-1959	5%	10%
1940-1949	3%	5%
Prior to 1939	5%	12%
Don't know	8%	20%
Education		
Less than 9 th grade	2%	2%
9 th to 12 th grade	-	4%
High school graduate	15%	33%
Some college, no degree	15%	21%
Associates degree	6%	8%
Bachelors degree	40%	18%
Graduate or professional degree	11%	10%
Don't know/refused	11%	4%



EVALUATION OF AMERENUE'S ONLINE ENERGY INFORMATION AND ANALYSIS PROGRAM

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Executive Summary

The Online Energy Information and Analysis Program consists of an online energy audit where customers answer questions about their energy use and home characteristics on the AmerenUE website, and then are immediately provided with customized recommendations on ways to save energy. (A full description of this program is provided in Section II.)

Program accomplishments for the Online Energy Information and Analysis Program during the program period (2003-2006) include:

- Over 9,500 active Missouri users over the three year period
- Nearly 36,400 recommendations made
- Filling a unique informational niche for many, and
- Over 1,000 MWh of electricity savings and nearly 200,000 therms of natural gas savings to customers

Details on these program accomplishments are provided in Section III.

Customers use the online energy analysis primarily to save money on their electric bill or for related reasons such as learning how they can reduce their energy consumption and improve their home's energy efficiency (see Section VI Table D-3). Overall, most customers (89%) are satisfied with the program with 51% stating they are "very satisfied" and an additional 37% stating they are "somewhat satisfied". In addition, 46% of customers would strongly recommend this web-based analysis to others.

In addition to overall satisfaction among participants, the results of our impact analysis indicate that the program does lead to cost-effective energy savings. (See Section IV.) The savings from this program, however, are lower than for any other program in AmerenUE's portfolio, primarily because it is difficult to demonstrate savings since this is an information only program (i.e., no measures are provided through the program). However, our findings indicate that the program is cost effective, and that there is a need for this program: 43% of AmerenUE non-participants expressed an interest in the online energy analysis.

If AmerenUE and the Collaborative continue to fund this program, process recommendations for future programs include:

- Increase marketing efforts (such as email announcements and information on bills) since most AmerenUE customers are not aware of the offering
- Work to overcome barriers of multi-state marketing (since the AmerenUE merger, marketing has been limited)
- Make sure that the online tool is prominently placed on the website
- Consider additional ways of encouraging customers to log in such as drawing customers into the energy analysis by placing information about what the tool offers on earlier web pages

- Provide more customized recommendations to users, or to make users feel as though the current recommendations are customized
- Develop documentation for web extract data and reconcile the web statistics with the web extract data
- Improve usefulness of web extract data by collecting time and date stamp
- Require Nexus to provide algorithms for future impact analyses
- Confirm compatibility of software with Microsoft Vista

Details on each of these recommendations are provided in Section V.

I. Introduction and Methodology

The Online Energy Information and Analysis Program consists of an online energy audit where customers answer questions about their energy use and home characteristics on the AmerenUE website, and then are immediately provided with customized recommendations on ways to save energy. According to the program description, the Online Energy Information and Analysis Program “allows all residential customers with internet access to view their billing information and comparisons of their usage on a daily, weekly, monthly or annual basis. This tool analyzes what end uses make up what percent of their usage, and provides information on ways to save energy by end use through a searchable resource center. This tool also allows the user to analyze why their bill may have changed from one month to another. A home comparison also displays a comparison of the customer’s home versus an average similar home via an Energy Guide label concept. AmerenUE is partnering with Nexus Energy Software to provide this functionality.”

This report provides a process and impact evaluation of the Online Energy Information and Analysis Program, led by Opinion Dynamics Corp. in partnership with GDS Associates. This evaluation is based on (1) a review of program databases 2004-2006¹, (2) a review of program materials including monthly web statistics, traffic analysis, web extract data, and the program contract (3) an in-depth interview with the program implementer, i.e., Nexus, (4) telephone interviews with program participants, and (5) telephone interviews with non-participating customers.

ODC conducted telephone interviews in April 2007 with 70 AmerenUE customers who have used the Online Energy Analysis tool. All of the customers interviewed viewed recommendations on AmerenUE’s website. We targeted customers who viewed recommendations between November 2005 and December 2006 so that they had enough time to react to recommendations—but not so long ago that they would not recall completing the analysis. Our survey asked respondents whether they took action as a result of up to 10 recommendations that were made to them. The survey then asked in detail about no more than five of the actions that they took at least in part due to the online energy analysis.

ODC also interviewed 100 AmerenUE customers who had not used the online energy analysis tool. AmerenUE provided ODC with a list of zip codes that fall within its service territory. Using this list, ODC obtained a random sample of phone numbers that corresponded with those zip codes. We compared this list to the list of program participants and removed the program participant phone numbers. We conducted these non-participant interviews in April 2007.

We do not provide all of the detailed tables in the body of the write-up for the purpose of keeping the write-up as succinct as possible. Key tables are provided in the body of the write-up, with additional detailed tables denoted by the letter “D” and provided in Section VI of this report.

¹ Provided by Nexus.

II. Program Description

In 2004, AmerenUE contracted with Nexus Energy Software to offer the Bill Analyzer and Home Energy Analysis to its residential customers. The budget for this program was \$800,000 over the three year period, with a goal of reaching 9,000 customers per year. Spending to-date has totaled \$786,333 since 2002, with upfront and implementation costs of \$263,367 and annual expenses equal to \$142,916 in 2003, \$200,367 in 2005, and \$124,683 in 2006.

The website can be accessed by clicking on "My Home" on AmerenUE's home page and then clicking on the "Energy Savings Toolkit". A user is then required to login by entering their username and password, and first time users must create a login by entering their name, email address, UserID, password and answer to a secret question. Until a user logs in they cannot see a description of what features are available within the application. The "Energy Savings Toolkit" includes the following five features:

- Home Energy Analysis is an energy audit where customers answer questions about their energy use and home characteristics and are provided personalized ways to save energy.
- Appliance Savings Calculators provide information about how much energy can be saved by replacing major appliances with more energy efficient models.
- Bill Analyzer compares a customer's current bill to their past bills and explains why they are different.
- Energy Smart Library gives low-cost tips that can help customers save money and energy.
- Energy Smart University offers facts about energy sources, safety, and the environmental impact of energy use.

As a customer completes more information the recommendations become more personalized to their home. There are three levels of questions that are used to generate a customer's Home Energy Analysis:

Level 1 – Basic Home Profile Questions: This section asks about property details (i.e., square footage, household type); property features (i.e., heating fuel, cooling type); utility details (i.e., ownership type, who pays the bills if rented); and equipment and amenities (i.e., do you have an oven and what is the fuel type).

When a customer answers the basic home profile questions they receive a list with the top ways that they can save energy with a range of estimated annual savings in dollars, a graph showing how their costs compare to similar homes, seasonal tips and tools, and a chart showing how their home uses energy broken into eight categories (heating, cooling, hot water, other, lighting, food storage, pool/spa, and other).

Level 2 – Appliance Inventory: For 24 appliance types, customers are asked whether the appliance is present in their home, how many and the fuel type (if applicable).

A customer who completes the appliance inventory section gets a picture of a house and when they click on an appliance a box pops up which tells them what the annual cost is to operate that

appliance as well as the energy usage. They also see a chart which shows them what appliances fall into that category and what the cost and energy usage is of each of the appliances in that category.

Level 3 – Detailed Questions on End-Use: Detailed questions about their home are broken into eight different end-use categories: weatherization, heating, cooling, hot water, kitchen, lighting, pool/spa, and other.

A customer who answers those detailed questions gets recommendations by those eight end-use categories broken into one of three categories: *no-cost/low-cost* ways to save that can be implemented immediately; ways to save which *need investment*, but will pay off; and ways to save, which are *not cost justified*.

There is also a detailed Home Energy Analysis Report that the customer can access after completing any of the three levels which is approximately 10 pages and includes a couple of graphs showing typical annual energy costs by end use for homes with similar appliances, an estimate of how much similar homes spend on energy on a monthly basis, and several detailed recommendations.

Customers are given a range of savings in dollars when they complete any of those three levels which are based on the rate the customer is on from AmerenUE billing data and the profile of the home based on their responses.

In aggregate, the program recommends 72 unique actions. The 72 recommendations fall into 13 different categories based on ODC's analysis (See Table 1 below). Many are associated with heating (13), water heating (11), and food storage (9).

Table 1: Recommendations by Category

Category	Number of Unique Recommendations
Heating	13
Water Heating	11
Food Storage	9
Cooling	7
Pool/Spa	7
Laundry	7
Lighting	4
Waterbed	4
Dishwasher	3
Windows and Doors	2
Insulation	2
Ducts	2
Home Electronics	1
TOTAL	72

AmerenUE handles most of the marketing efforts and promotions for the program. Until June 2005, the tool was promoted on the front page of Ameren's website. However, since AmerenUE's merger with an Illinois-based utility, the tool is no longer promoted on the first page because Illinois customers are not eligible to use the tool to its full extent. Use has declined since the merger and the weaker promotion of the tool, according to indepth interviews with program administrators (See also Figure 1). The last time the application was actively promoted was August 2005. Other marketing efforts by AmerenUE before the merger include:

- March 2004: Postcard mailing,
- June 2004: Email announcement – graduate hat,
- January 2005: Email announcement and billing insert,
- April – June 2005: Mentioned in the AmerenUE lines, and
- July - August 2005: Cash distribution contest run (contest offered money off the customer's bill for going to the application and filling out their profile on the home energy center).

Nexus provides the software and tracks customers' access to the website. Nexus sends web statistics to AmerenUE on the number of customers that accessed the Home Analyzer (including the Energy Analysis and Appliance Savings Calculators), Energy Saving Calculators, Energy Smart University and Energy Smart Library and what they looked at while logged in.

III. Program Accomplishments

Program accomplishments during the program period (2002-2006), described further below, include:

- Over 9,500 active Missouri users over the three year period
- Nearly 36,400 recommendations made
- Filling a unique informational niche for many, and
- Over 1,000 MWh of electricity savings and nearly 200,000 therms of natural gas savings to customers

Over 9,500 Active Missouri Users

Table 2 below shows several different estimates of users based on both the Web Statistics reported by Nexus and the web extract data files reported by Nexus on a monthly basis. The table shows that there were 13,420 hits on the "Energy Savings Toolkit" during the three year program period. (Note that hits do not equate to unique Missouri customers.)

Nearly 9,600 users were in the web extract tables, which include users who have entered some type of information. If a customer came to the site but did not provide any data, they would be included in the total number of hits but not in the web extract data (i.e., they are active users).

The table also shows that 8,033 users completed enough of their profile information that the system generated recommendations, however, only 2,011 of those users actually saw the top ways that they could save energy. According to Nexus, the user does not see all of the measures that the system generates (in "MeasurePlan" web extract tables). Only measures that provide the most savings (in "MeasuresResults" web extract tables) are displayed.

Based on the Web Statistics reported by Nexus, the total number of hits increased each year, however the number of customers who saw recommendations decreased slightly. If we look at the number of users who saw recommendations as a percentage of all "active users," 21% of users who start to fill in some information make it through the process and view the recommendations. (Notably, we do not look at it as a percentage of total hits since total hits does not include unique users, and captures people who get to the page by mistake, or have no interest at all.)

Table 2: Number of Users^a

	2004	2005	2006	Total
Total Number of Hits ^b	3,805	4,672	4,943	13,420
Total Number of Active Users ^c	3,465	3,031	3,089	9,585
Total Number of Users who Completed Enough of the Profile that the System Generated Recommendations ^d	2,574	2,776	2,683	8,033
Users who Saw Recommendations ^e	756	637	618	2,011

a. Does not represent unique users across months and years.

b. Based on the "Home Analyzer: Total Number of Users: Detailed Analysis" row in the Web Statistics Reports compiled monthly by Nexus.

c. Based on the "UserMaster" tables which are a component of the web extract data. Based on conversations with Nexus, these tables include customers who have entered information.

d. Based on the "MeasurePlan" tables which are a component of the web extract data. According to Nexus, these tables show all the measures that were generated by the home profile.

e. Based on the "MeasuresResults" tables which are a component of the web extract data. According to Nexus, these tables show the results the user sees in the "Top Ways To Save" when they complete the home profile. The user does not see all the measures in the "MeasurePlan" table. Only measures that fall in the top category are displayed.

Nearly 36,400 Recommendations Made

In general, the number of recommendations that each participant receives varies widely, from one to 44 recommendations. Users receive an average of 18 recommendations for a total of 36,369 recommendations overall.

Table 3 shows the users who looked at recommendations that Nexus characterized as the "Top Ways to Save", the total number of recommendations made, the average number of recommendations made per user, as well as a minimum, maximum and standard deviation.

Table 3: Summary of Recommendations Made^a

	2004	2005	2006	Total
Users who Saw Recommendations with the "Top Ways to Save"	756	637	618	2,011
Recommendations Made	14,557	10,752	11,060	36,369
Avg. # of Recommendations Made	19.3	16.9	17.9	18.1
Minimum Number of Recommendations	1	1	1	1
Maximum Number of Recommendations	42	44	41	44
Standard Deviation	11.6	11.6	11.5	(see by year)

a. Based on the "MeasuresResults" tables which are a component of the web extract data. According to Nexus, these tables show the results the user sees in the "Top Ways To Save" when they complete the home profile. The user does not see all the measures in the "MeasurePlan" table. Only measures that fall in the top category are displayed.

The recommendations most often made are associated with water heating (8,751), heating (5,878), and food storage (4,516). These are the same three categories for which there are the most unique recommendations.

Table 4: Recommendations by Category

Category	Number of Unique Recommendations	Number of Recommendations Made (2004, 2005 & 2006)
Water Heating	11	8,751
Heating	13	5,878
Food Storage	9	4,516
Laundry	7	3,897
Ducts	2	2,836
Insulation	2	2,351
Dishwasher	3	2,067
Lighting	4	1,888
Windows and Doors	2	1,776
Cooling	7	1,519
Home Electronics	1	435
Pool/Spa	7	241
Waterbed	4	214
TOTAL	72	36,369

The recommendations made are shown in Table 5 below. "Lower your thermostat setting" is the most frequently mentioned, recommended to approximately 74% of all customers who viewed recommendations.

Table 5: Most Frequently Made Recommendations (made to over 50% of participants, see also Section VI Table D-1 for top 30)

Category	Recommendation	Number of Times Recommendation Made (2004, 2005 & 2006)	Percentage of Customers who Received Recommendations ^a
Heating	Lower your thermostat setting	1,495	74%
Ducts	Seal leaks in your home's air ducts	1,474	73%
Windows and Doors	Install exterior solar screens on your windows	1,427	71%
Heating	Avoid heating unoccupied areas	1,381	69%
Ducts	Insulate your ducts	1,362	68%
Insulation	Control air leakage from windows and doors	1,343	67%
Water Heating	Install heat traps on your water heater	1,091	54%
Water Heating	Insulate your hot water pipes	1,091	54%
Water Heating	Maintain your water heater regularly	1,080	54%
Heating	Replace your heating system with a higher efficiency model	1,037	52%

Category	Recommendation	Number of Times Recommendation Made (2004, 2005 & 2006)	Percentage of Customers who Received Recommendations ^a
Laundry	Dry full loads of clothes when possible	1,021	51%
Insulation	Improve your home's insulation	1,008	50%
Food Storage	Maintain your refrigerator regularly	1,002	50%
Food Storage	Raise the temperature setting of your refrigerator	1,002	50%

a. Percentage is based on the 2,011 users who saw recommendations.

Filling a Unique Niche for Many

While 69% of participants stated that they had taken energy saving actions before using the online energy analysis, 64% of participants did not think they could easily find the information if the AmerenUE program did not exist. Actions taken before participating included installing efficient lighting, turning off unused lighting and adjusting heating and cooling temperatures.

Table 6: Could Find Info without Online Energy Analysis

Q11a: Do you think you could easily find this info if AmerenUE's Online Energy Analysis did not exist?	Participants (n=70)
No	64%
Yes	26%
Don't know	10%

Over One Thousand MWh of Electricity Savings to Customers and Nearly 200,000 Therms of Natural Gas Savings

Net realized savings were determined to be 407,554 kWh of electricity and 80,885 therms of natural gas in 2004, 297,099 kWh of electricity and 58,405 therms of gas in 2005; and 322,348 kWh of electricity and 60,037 therms of natural gas in 2006. The benefit cost ratio of the Online Energy Information and Analysis Program was determined to be 2.3, based on total program costs of \$746,333. This program, therefore, is cost-effective. A full description of the impact and cost-effectiveness analysis is presented below.

IV. Impacts and Cost Effectiveness Analysis

The impact evaluation of AmerenUE's Online Energy Information and Analysis Program for years 2004 through 2006 was completed by reviewing for reasonableness the cost savings estimates for each of the recommendations that were made by Nexus through the website, estimating electric, peak demand, and natural gas savings per installation based on the cost savings, multiplying by the number of times the recommendation was made during a particular program year, and finally applying an installation factor based on the survey information collected from participants. The top fifteen recommendations in terms of savings were reviewed in detail, and by completing engineering calculations in order to determine if the savings estimated by the website algorithm were reasonable. (Notably, the top 15 in terms of savings is different than the top 15 recommendations made. The top 15 in terms of savings was determined using the unit savings multiplied by the number of times the recommendation was made.)

Review of Recommendations

First, we examined the mean savings in dollars for each recommendation (provided by Nexus in the database) for reasonableness based on the description of the recommendation since the algorithm used by Nexus was not available for review. In addition, we determined the top fifteen recommendations in terms of savings (that is, based on the number of times the recommendation was made and the mean savings per unit) and then reviewed the top 15 recommendations in terms of savings in detail.

The top fifteen recommendations accounted for over 81% of savings estimated by the Nexus software. As part of our detailed review, we completed engineering calculations in order to determine if the savings estimated by the website algorithm could be reverse engineered using reasonable assumptions of equipment sizes, efficiencies, run times, and home square footages. The results of the review of the top fifteen recommendations are shown in Table 7 below.

Table 7: Review of the Top 15 Recommendations

ID	Description	Website mean savings per installation	Total 2006 savings based on number of times recommended	Adjusted savings per installation	Est. KWh	Est. KW	Est. Therms
WE3	Control air leakage from windows and doors	\$135.43	\$50,776	\$135.43	339	0.12	108
HT27	Install an add-on Heat Pump	\$167.09	\$28,958	\$167.09	-2,628	-0.01	319.00
WE6	Seal leaks in your home's air ducts	\$67.58	\$27,164	\$67.58	169	0.06	54
HT1	Lower your thermostat setting	\$73.78	\$17,652	\$73.78	0	0.00	69
WE7	Install exterior solar screens on your windows	\$44.46	\$17,148	\$44.46	741	0.26	0
HT2	Avoid heating unoccupied areas	\$41.20	\$15,477	\$41.20	0	0	39

ID	Description	Website mean savings per installation	Total 2006 savings based on number of times recommended	Adjusted savings per installation	Est. KWh	Est. KW	Est. Therms
CL10	Replace your central air conditioner	\$73.88	\$14,121	\$73.88	1,119	0.39	0
WE1	Replace your windows or install storm windows.	\$165.18	\$13,451	\$271.00	678	0.24	215
HT16	Replace your heating system with a higher efficiency model	\$25.01	\$12,240	\$79.68	0	0	74
WE5	Improve your home's insulation	\$105.88	\$12,059	\$105.88	265	0.09	84
OA10	Turn off your computer(s) overnight	\$98.60	\$9,723	\$15.00	227	0.00	0
CL2	Raise your thermostat setting and consider using ceiling fans	\$60.47	\$9,393	\$33.00	500	0.18	0
WH13	Install low-flow showerheads	\$39.12	\$7,775	\$39.12	228	0.023	24
WE4	Insulate your ducts	\$19.00	\$6,743	\$19.00	111	0.011	12
WH22	Replace your water heater	\$56.28	\$6,339	\$56.28	328	0.033	34

As shown in the table above, savings for most of the top fifteen recommendations were not adjusted because engineering calculations resulted in savings estimates similar to those suggested by the website algorithm. Two recommendations had savings adjusted upward (WE1 and HT16) and two recommendations had savings adjusted downward (OA10 and CL2). We also adjusted two other measures outside of the top 15 based on our quick review of all of Nexus's savings estimates provided in the program database. Other measures that had savings adjusted are shown in Table 8.

Table 8: Other recommendations that had savings adjusted

ID	Description	Website mean savings per installation	Total 2006 savings based on number of times recommended	Adjusted savings per installation	Est. KWh	Est. KW	Est. Therms
CL8	Use your whole-house fan more	-\$28.47	-\$1,340	\$23.00	348	0.12	0
WH14	Take shorter showers	-\$27.90	-\$4,943	\$23.00	134	0.013	14

The recommendations shown in Table 8 were adjusted because it was not clear why the associated savings would be negative. All other recommendations from the website were left unchanged.

Determination of Gross Savings

Gross savings were determined by estimating electric, peak demand, and natural gas savings per installation based on the cost savings, multiplying by the number of times the recommendation was made during a particular program year, and finally applying an installation factor based on the survey information collected from participants. Surveyed participants were asked if they took action on the recommendation for each recommendation they received. The percentage of participants that took action was applied to the savings associated with each recommendation. In instances in which a recommendation was not received by any of the participants surveyed, the average installation percentage for the recommendation category was used.

By recommendation category, the percentage of participants surveyed that acted based on the recommendations made is shown in Table 9.

Table 9: Percentage of participants surveyed that acted based on the recommendations (average for each category)

ODC Category	N	ACTION TAKEN			
		Did you take action after receiving the online energy analysis...			
		Yes	No BUT planning to in future	No and NOT planning to	No, already did it
Cooling	17	47%	18%	24%	12%
Heating	85	46%	13%	22%	19%
Food Storage	13	15%	46%	38%	0%
Lighting	20	70%	25%	5%	0%
Pool/Spa	7	43%	14%	43%	0%
Windows and Doors	30	10%	23%	60%	7%
Insulation	42	50%	19%	17%	14%
Ducts	47	32%	15%	38%	15%
Water Heating	57	28%	12%	49%	11%
Laundry	15	53%	13%	20%	13%
Dishwasher	6	50%	0%	33%	17%
Home Electronics	10	50%	20%	20%	10%
Waterbed	0	--	--	--	--

Based on the methodology described above, gross program savings for the Online Program are shown in Table 10 below.

Table 10: Online Program Gross Savings

	Gross Annual Electric Savings (KWh)	Coincident Peak Demand Reduction (KW)	Gross Annual Gas Savings (Therms)
2004	699,391	173	146,248
2005	520,492	130	109,242
2006	559,777	142	152,392
Total	1,779,660	445	407,882

Determination of Net Realized Savings

Part of the participant survey asked how likely it is that if the recommendation hadn't been made by the online program participants would still have take the action they took. Table 11 shows the results of this survey.

Table 11: Free Ridership Survey Responses

ODC Category	N	FREE RIDERSHIP				
		If it had not been recommended in the online energy analysis how likely is it that you would have taken action...				
		Probably would have	Definitely would have	Might or might not	Probably would not	Definitely would not
Cooling	7	0%	43%	14%	29%	14%
Heating	36	39%	36%	14%	11%	0%
Food Storage	2	0%	0%	50%	50%	0%
Lighting	14	50%	36%	7%	7%	0%
Pool/Spa	3	67%	0%	0%	33%	0%
Windows and Doors	3	33%	0%	33%	0%	33%
Insulation	21	43%	33%	5%	14%	5%
Ducts	15	53%	20%	13%	7%	7%
Water Heating	14	43%	14%	14%	14%	14%
Laundry	7	43%	29%	0%	0%	29%
Dishwasher	2	0%	50%	0%	0%	50%
Home Electronics	5	0%	0%	40%	40%	20%
Waterbed	0	--	--	--	--	--

In developing a free rider percentage for each category, it was necessary to make a determination by response category of how likely the action would have been, and then adjust the percentage of respondents accordingly. It was assumed that 100% of those in the "Definitely Would Have" category, 70% of those in the "Probably Would Have" category, and 30% of those in the "Might or Might Not" category would have taken the action they did in the absence of the program. This total free-ridership percentage was then applied to the gross savings. Finally, participants were asked if they learned anything from the online energy analysis that caused them to take actions or purchase equipment that was even more efficient than what was recommended. 34% said that they did. It is not known how much more efficient the purchased materials were, but it was assumed that, on average, the purchased materials in these cases were 10% more efficient than was recommended. In order to represent this spillover effect, 34% of the savings (after factoring free-ridership) were increased by 10% and back to the unaffected portion of the savings.

Table 12: Online Program Net Realized Savings

	Gross Annual Electric Savings (KWh)	Coincident Peak Demand Reduction (KW)	Gross Annual Gas Savings (Therms)
2004	407,554	103	80,885
2005	297,099	77	58,405
2006	322,348	84	60,037
Total	1,027,001	264	199,327

Program Cost Effectiveness

Table 13 shows the cost effectiveness of the three-year operations of AmerenUE's Online Energy Information and Analysis Program. FEMP UPV Discount Factors for electricity and natural gas for Census Region 2 (Including Missouri) were used for the benefit/cost analysis. The Department of Energy currently uses a 3% discount rate in determining discount factors. The weighted average of the expected lives of Online Program recommendations was 7.2 years for electric recommendations and 7.8 for natural gas recommendations, so an effective life of 8.0 years was used in determining the appropriate residential discount factors.

Table 13: Online Program Cost Effectiveness

Program Cost	First Year Program Savings	Effective Life of Recommendations	Lifetime Savings	Lifetime Benefit/Cost Ratio
\$786,333	\$281,062	8.0	\$1,770,836	2.3

Detailed spreadsheets on the savings and life cycle costs analyses were provided to AmerenUE along with this report.

V. Process Findings and Recommendations

Customers chose to use the online energy analysis primarily to save money on their electric bill or for related reasons such as learning how they can reduce their energy consumption and/or to improve their home's energy efficiency (see Section VI Table D-3). Overall, most customers (89%) are satisfied with the program with 51% stating they are very satisfied and an additional 37% stating they are somewhat satisfied. In addition, 46% of customers stated that they would strongly recommend this web-based analysis to others.

Table 14: Overall Satisfaction

Q4a: Overall, how satisfied were you with the Online Energy Analysis?	Participants (n=70)
Very satisfied	51%
Somewhat satisfied	37%
Neither satisfied nor dissatisfied	4%
Somewhat dissatisfied	6%
Very dissatisfied	1%

Almost all participants (81%) found the initial log in process to be very easy. In all, about 87% of participants read the recommendations. Sixty percent of participants said they thoroughly read the recommendations, and 27% read some portions of the recommendations. In addition, another 13% just glanced through them. Most customers found the reporting and recommendations easy to understand. However, customers are less confident about the relevance and accuracy of the recommendations and information (as described more below).

➤ **Continue to provide service to customers in need of information since 43% of AmerenUE customers expressed an interest in the online energy analysis**

Sixty-three percent of AmerenUE's customers use a computer at work, home or school. Of those who have a computer, 69% (representing 43% of all non-participants) said that they are at least somewhat interested in the Home Energy Analysis application. Thus, the interest is there (and many customers are "online") but most residential customers are not currently using the AmerenUE website, so are not that likely to come across the online energy analysis.

Among those who have used the online energy analysis, almost half of respondents were at least slightly more satisfied with AmerenUE because of the program (see table below), and as mentioned above, most of those who use it are satisfied. And as described above, for many, it fills a unique information niche, that is, they don't feel that they can find this information anywhere else. As such, the online energy analysis does appear to offer value to customers—however, customers are not aware of this offering (see below).

**Table 15: Satisfaction with AmerenUE
As A Result of Use Online Energy Analysis**

Q03: How much has the online energy analysis and the energy saving information on the website changed your level of satisfaction with AmerenUE?	Participants (n=70)
Much more satisfied	17%
Slightly more satisfied	31%
No change in satisfaction	46%
Slightly less satisfied	1%
Much less satisfied	1%
Don't know	3%

➤ **Increase marketing efforts (such as email announcements and information on bills) since most customers are not aware of the offering, and work to overcome barriers of multi-state marketing**

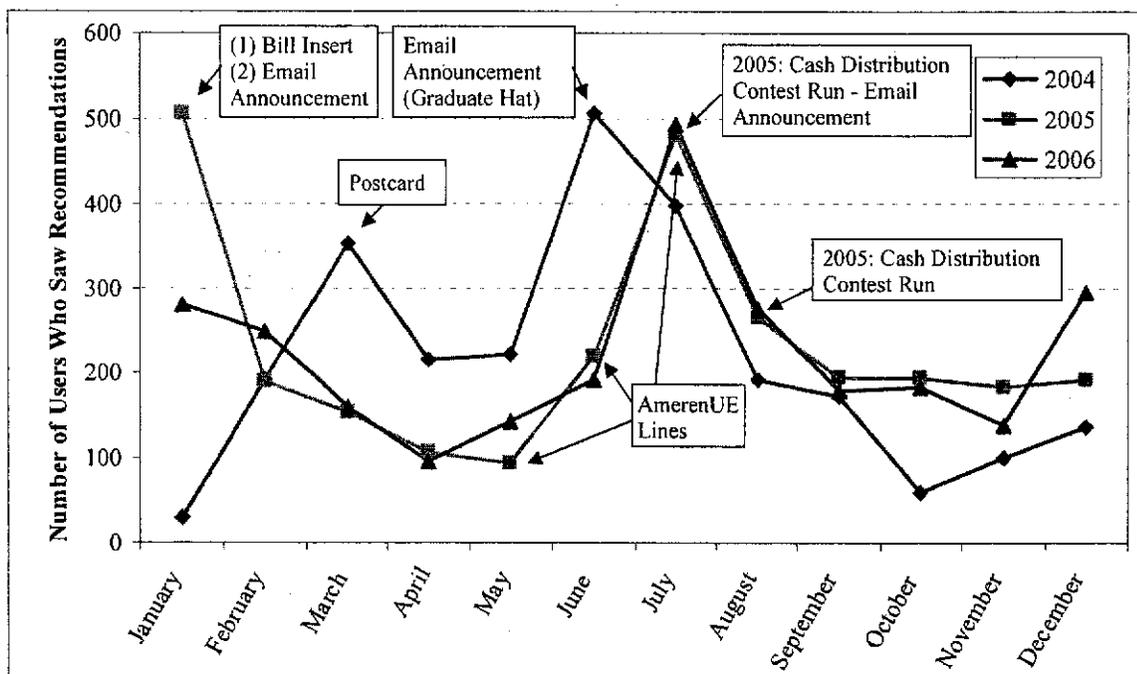
While there appears to be interest, most AmerenUE customers are not aware that AmerenUE offers an online energy analysis. (Only 5% of non-participants that we spoke with were aware that AmerenUE's website includes an Energy Saving Toolkit.) As such, there is a need to increase awareness of this program through marketing efforts. Notably, however, the recent merger with Illinois has affected the overall marketing of this program.

Table 16: Awareness Among the General Population

QV1: AmerenUE's website includes an Energy Saving Toolkit or Energy Analysis for residential customers. Before this call, were you aware that AmerenUE offered this service?	Non-Participants (n=100)
No	95%
Yes	5%

Figure 1 below shows the number of users who received recommendations during the program period. Not surprisingly, the most active months correspond to when marketing events occurred. It seems that the most effective way to increase program activity would be to increase marketing efforts. AmerenUE should consider additional email announcements or information on customer bills to raise awareness of this program.

Figure 1: Program Activity by Month



Note: Ideally this graph would show the total number of hits from Table 2 but we did not receive customer-level data which could validate those numbers.

➤ **Make sure that the online tool is prominently placed on the website**

The majority of customers who use the online energy analysis come across it while looking for other things on the AmerenUE website; about three-quarters (73%) of program participants with whom we spoke heard about the online energy audit program from the AmerenUE website.

Until June 2005, the tool was promoted on the front page of the website. However, since AmerenUE's merger with an Illinois-based utility, the tool is no longer promoted on the first page because Illinois customers are not eligible to use the tool to its full extent.

Without a "shout out" on the front page, the application is hard to get to on the website. The site can be accessed by clicking on "My Home" on the home page and then "Energy Savings Toolkit". A user is then required to login by entering their username and password or create a login by entering their name, email address, UserID, password and answer to a secret question.

AmerenUE should more actively promote and more prominently place the offering on AmerenUE's website (and consider offering the tool to its Illinois customers as well which would allow this to happen). Notably, however, only 8% of all non-participants have visited the AmerenUE website, so the "more prominent placement on the website" must be done in tandem with a general promotion of the offering (see above).

- **Draw customers into the energy analysis by placing information about what the tool offers on earlier web pages, and consider additional research to better understand the value of this offering**

The front page and the first few pages of questions do not appear to draw people further into the application as there were over 4,900 hits in 2006 but only 3,089 started to fill out any information (63%), and even fewer who got to the point of receiving recommendations. There is a significant difference between the total number of users who the system generated recommendations for (8,033) and the number of users who saw recommendations (2,011). In all, only 21% of those who started filling in some information saw recommendations AmerenUE may want to conduct interviews with participants who dropped out along the way to explore the reasons these people are not using the analysis to its full extent.

Until a user logs in they cannot see a description of what features are available within the application. AmerenUE should consider promoting aspects that customers like such as energy saving tips, information on the top ways to save, and information about my bill upfront (as customers are logging in). AmerenUE may also wish to conduct further research with customers to test different marketing strategies on the front page.

Table 17: Useful Information

Q5a: Was there any information provided by the Online Energy Analysis, in particular, that you liked or thought was useful?	Participants (n=70)
Energy saving tips	21%
Information on the top ways to save in my home	16%
Information about my bill	14%
Energy calculators	9%
Comparison of bills to other customers	6%
Pie chart of usage	3%
Graphs and charts	1%
Other	10%
No	21%
Don't recall/don't know	11%

➤ **Consider additional ways of encouraging customers to log in**

While participants generally felt that the process of signing in to the online energy analysis was easy and did not encounter any problems, non-participants who use computers were split on whether they would provide their name, email address, and account number on AmerenUE's website. (See table below.) As such, AmerenUE should also consider additional ways to encourage customers to log in. Drawing customers into the energy analysis by placing information about what the tool offers on earlier web pages may help to do this.

Table 18: Likely to Provide User Information

QW5: If you were visiting AmerenUE's website, how likely would you be to provide your name, email address and AmerenUE account number if you were prompted to log-in to the website?	Non-Participants (n=63)
Very likely	17%
Somewhat likely	21%
Neither likely nor unlikely	-
Somewhat unlikely	21%
Very unlikely	27%
Don't know	14%

➤ **Consider ways to provide more customized recommendations, or to make users feel as though the current recommendations are customized**

While most participants were satisfied to some extent, there is still room for increasing satisfaction with the tool. Most participants felt that it was easy to answer the questions that were asked at the beginning of the online analysis, and that the series of questions was of reasonable length. However, fewer customers felt that the survey asked the right questions to provide information customized for their home (see Section VI Table D-5).

Participants who were not fully satisfied stated that the recommendations were not specific enough, provided information that was not relevant to them, or provided information they already knew. Only 29% of participants stated that they strongly agreed that information provided to them was new, only 39% strongly believe the dollar savings that the energy report claimed customers would experience if they adopted the recommendations and only 41% strongly agreed that the recommendations were relevant to their homes. (See Section VI Table D-5.)

Only 37% of participants feel that the survey asks the right questions to result in customized information. Additional questions about what customers have already done, i.e., energy efficient actions taken, would provide better results for customers. Since almost everyone feels that the amount of time it took them to complete the survey was reasonable, it may be feasible to add questions to yield better recommendations.

AmerenUE should consider refining the questions so that they lead to even more customized recommendations. AmerenUE could find that customer confidence in the savings estimates will increase with more customized reports. Alternatively, there may be simple ways of

referring back to information the customer provided and/or to the customer billing data to make customers feel more like the information is specific to their home.

➤ **Develop documentation for web extract data and reconcile the web statistics with the web extract data**

Nexus was unable to provide the evaluation team us with a User Guide or any documentation to help the ODC Team understand the web extract data. While we were able to get some understanding of the data through telephone calls and emails it would be very helpful for those using the data to have some documentation that defines the variables and tables.

Specifically, it is not clear what users and recommendations are captured in the "MeasurePlan" table and "MeasuresResults" table. According to an email from Nexus:

"The "MeasurePlan" tables show all the measures that were generated by the home profile. The "MeasuresResults" tables show the results the user sees in the "Top Ways To Save" when they complete the home profile. The user does not see all the measures in the "MeasurePlan" table. Only measures that fall in the top category are displayed."

Questions that remained unanswered included:

- Why is the number of users in the "MeasureResults" table (618 in 2006) so much lower than the number of users in the "MeasurePlan" table (2,683 in 2006)?
- When we completed a home profile (see Appendix B), only four recommendations were generated in the "Top Ways To Save" section and 19 recommendations were shown in the "Home Energy Analysis Report". Based on the average number of recommendations per user of 18 using the "MeasureResults" data (see Table 3), it seems much more likely that the recommendations in the "MeasureResults" tables are actually those in the "Home Energy Analysis Report".

ODC was also not able to reconcile the web statistics compiled by Nexus with the web extract data. For example, the web extract data shows 618 users in 2006 in the "MeasuresResults" table which are the results the user sees in the "Top Ways To Save" when they complete the home profile, however, the Web Statistics show 828 users viewing at least one measure. We do not understand why the number of users viewing at least one measure would be higher than the number of users who see results in the "Top Ways To Save."

➤ **Improve usefulness of web extract data, collect time and date stamp**

When we completed a profile in the application we could see four recommendations in the "What are my top ways to save?" section of "My Home Energy Center": (1) insulate water heater tank, (2) use compact fluorescent bulbs in recessed fixtures, (3) use compact fluorescent bulbs in high-use lamps, and (4) lower the thermostat setting. We received 19 detailed recommendations (each a few paragraphs long) in the "Home Energy Analysis Report" (see *Online-Reports.pdf*). Ideally, we would like the web extract data to capture by user which recommendations the user saw in the "What are my top ways to save?" section, which of those recommendations were clicked on and viewed in detail, and which recommendations were viewed in the "Home Energy Analysis Report."

We would also like to be able to use the web extract data to determine the total number of user sessions and total number of recommendations made during a single user session. We do not know the total number of user sessions in a month because one user could have accessed the application multiple times in one month. Nexus also indicates that the recommendations shown for a single user in December may not actually reflect recommendations made during that month.

➤ **Require Nexus to provide algorithms for impact analysis**

Nexus was unwilling to share the algorithm behind their savings estimates because it is proprietary information. While this is understandable, the existing algorithm could help to refine and/or confirm energy savings estimates.

➤ **Confirm compatibility of software with Microsoft Vista**

Based on a very limited group, we found that it takes a long time to get into the "My Home" section of AmerenUE's website, the "Energy Savings Toolkit" and each link within the application when using a computer with the new Microsoft Vista operating system. AmerenUE may wish to have its IT staff look into this possible issue.

VI. Detailed Tables

Participant Tables

Section VI Table D-1: Most Frequently Viewed Recommendations (Top 30)

Category	Recommendation	Number of Times Recommendation Made (2004, 2005 & 2006)	Percentage of Customers who Received Recommendation
Heating	Lower your thermostat setting	1,495	74%
Ducts	Seal leaks in your home's air ducts	1,474	73%
Windows and Doors	Install exterior solar screens on your windows	1,427	71%
Heating	Avoid heating unoccupied areas	1,381	69%
Ducts	Insulate your ducts	1,362	68%
Insulation	Control air leakage from windows and doors	1,343	67%
Water Heating	Install heat traps on your water heater	1,091	54%
Water Heating	Insulate your hot water pipes	1,091	54%
Water Heating	Maintain your water heater regularly	1,080	54%
Heating	Replace your heating system with a higher efficiency model	1,037	52%
Laundry	Dry full loads of clothes when possible	1,021	51%
Insulation	Improve your home's insulation	1,008	50%
Food Storage	Maintain your refrigerator regularly	1,002	50%
Food Storage	Raise the temperature setting of your refrigerator	1,002	50%
Water Heating	Wrap your water heater with an insulating blanket	970	48%
Water Heating	Install efficient faucet aerators on your sinks	942	47%
Laundry	Match the clothes washer load setting to load size	920	46%
Dishwasher	Air dry your dishes	901	45%
Dishwasher	Wash full loads of dishes when possible	872	43%
Lighting	Use compact fluorescent bulbs in high-use lamps	814	40%
Water Heating	Install low-flow showerheads	785	39%
Water Heating	Lower the temperature of your water heater	713	35%
Heating	Install an add-on Heat Pump	665	33%
Water Heating	Take shorter showers	634	32%
Water Heating	Replace your water heater	629	31%
Cooling	Replace your central air conditioner	617	31%
Lighting	Turn off your lights when you're not using them	582	29%
Laundry	Replace your clothes washer with a higher efficiency model	577	29%
Laundry	Replace your dryer with a higher efficiency model	577	29%
Food Storage	Turn off your refrigerator's moisture control heater	564	28%

a. Percentage is based on the 2,011 users who saw recommendations.

Section VI Table D-2: First Heard About Program

Q1: How did you first hear about the Online Energy Audit?	Participants (n=70)
Ameren or utility website	73%
Utility bill insert	9%
Friend/relative	6%
Email sent to me	4%
Other	7%
Don't know	1%

Section VI Table D-3: Reasons for Using Online Energy Analysis (multiple responses)

Q2: What did you hope to accomplish by using the Online Energy Analysis?	Participants (n=70)
Save money on electric bill	56%
Reduce energy consumption	31%
Learn how you could improve your home's energy efficiency	16%
Make home more comfortable	11%
Improve the environment	6%
Increase value of home	1%
Other	9%
Don't know	4%

Section VI Table D-4: Difficulty of Sign In/Log On

Q5c: How difficult was the initial sign in or log on process?	Participants (n=70)
Very easy	81%
Somewhat easy	10%
Neutral	4%
Somewhat difficult	1%
Very difficult	-
Don't know	3%

Section VI Table D-5: Satisfaction with Process

Q6: I'm going to read you a series of statements about AmerenUE's online energy analysis. For each statement please tell me whether you ...	Q6a: The questions about my home and appliances were easy to answer	Q6b: The amount of time it took to complete the online energy analysis was reasonable	Q6c: It asked the right questions to provide information customized for my home	Q6d: I would recommend the online energy analysis to others
Strongly disagree	-	-	4%	6%
Somewhat disagree	1%	6%	6%	1%
Neither disagree nor agree	1%	-	3%	1%
Somewhat agree	34%	33%	49%	43%
Strongly agree	59%	59%	37%	46%
Don't know	4%	3%	1%	3%

Section VI Table D-6: Reading the Recommendations

Q7a: Would you say that you...	Participants (n=70)
Read the recommendations thoroughly	60%
Read some portions of the recommendations	27%
Just glanced through them	13%
Did not read the recommendations at all	-

Section VI Table D-7: Satisfaction with Information Received

Q8: I'm going to read you a few more statements about the information that was provided by the online energy analysis. For each statement please tell me whether you ...	Q8a: Was easy to understand	Q8b: Helped me better understand how I use energy in my home	Q8c: Provided information that I was not already aware of	Q8d: Helped me better understand the actions I could take to reduce my usage	Q8e: The recommendations were relevant to my house	Q8f: The amount of money it said I could save was believable
Strongly agree	63%	47%	29%	46%	41%	39%
Somewhat agree	36%	43%	39%	43%	43%	33%
Neither disagree nor agree	1%	4%	6%	1%	3%	7%
Somewhat disagree	-	4%	16%	1%	7%	11%
Strongly disagree	-	1%	10%	6%	4%	3%
Don't know	-	-	1%	3%	1%	7%

Section VI Table D-8: Actions Taken Before Participating (multiple responses)

Q12a,b: What actions had you taken before completing the energy analysis?	Participants (n=70)
Installed CFLs or efficient lighting	30%
Adjusted heating temperature	25%
Turned off lights	23%
Adjusted cooling temperature	21%
Purchased energy efficient appliances	16%
Other	20%
None	31%

Section VI Table D-9: More Efficient Actions

QPS1: Did you learn anything from the online energy analysis that caused you to take actions or purchase equipment that was even more efficient than what was recommended to you?	Participants (n=70)
No	60%
Yes	34%
Don't know	6%

Section VI Table D-10: Website Visits

Q04: How many times have you visited the AmerenUE.com website during the past 12 months?	Participants (n=70)
This was my first visit (once)	7%
2-5 times	46%
6 or more	43%
Don't know	4%

General Population (i.e., Non-Participant) Tables**Section VI Table D-11: Computer Use**

QW0: Do you use a computer at home, work or school?	Non-Participants (n=100)
Yes	63%
No	37%

Section VI Table D-12: Visit Webpage

QW1: Have you ever visited AmerenUE's webpage?	Non-Participants (n=63)
No	87%
Yes	13%

Section VI Table D-13: Energy Analysis Use

QW2: Have you ever used the Energy Saving Toolkit or the Energy Analysis on the AmerenUE website?	Non-Participants (n=8)
No*	88%
Yes	12%

* The only reason given by a respondent for why they haven't used the toolkit even though they are aware of it is: "I get so much off of the national news regarding energy that I didn't find it necessary."

Section VI Table D-14: Usefulness of Information

QW2a: How useful did you find the information provided by the Energy Saving Toolkit on the AmerenUE website?	Non-Participants (n=1)
Very useful	100%
Somewhat useful	-
Neither useful nor useless	-
Somewhat useless	-
Very useless	-

Section VI Table D-15: Problems with Sign Up/Log In

QW3: Did you have any problems signing up for this service or logging into it?	Non-Participants (n=1)
No	100%
Yes	-

Section VI Table D-16: Interest in Online Energy Analysis

QW4: AmerenUE offers an online energy analysis on their website. How interested would you be in using the web-based energy analysis tool?	Non-Participants (n=61)
Very interested	21%
Somewhat interested	48%
Neither interested nor uninterested	3%
Somewhat uninterested*	5%
Very uninterested*	18%
Don't know	5%

* Reasons for not being interested include not having the time or the need and the information is generally too broad.

Section VI Table D-17: Online Energy Analysis Demographics

Demographics	Participants (n=70)	Non-Participants (n=100)
Household Type		
Single family	81%	83%
Duplex or 2 family	9%	4%
Apartment 2-4 units	1%	5%
Apartment >4 units	6%	5%
Mobile home	1%	1%
Other	1%	-
Number of People		
1	16%	27%*
2	36%	45%
3	16%	10%
4	20%	11%
5	10%	4%
6	3%	1%
7 or more	-	1%
Refused	-	1%
Low Income		
Non Low Income	80%	70%
Low Income	7%	16%
Don't know/refused	13%	14%

Demographics	Participants (n=70)	Non-Participants (n=100)
Year Built		
Built in 2006	-	-
2004-2005	7%	1%
2001-2003	10%	7%
1990-2000	17%	15%
1980-1989	13%	5%
1970-1979	17%	12%
1960-1969	7%	13%
1950-1959	6%	10%
1940-1949	-	5%
Prior to 1939	17%	12%
Don't know	6%	20%
Age		
22-35	36%	n/a
36-45	21%	n/a
46-55	20%	n/a
56 or older	17%	n/a
Don't know/refused	6%	n/a
Education		
Less than 9 th grade	3%	2%
9 th to 12 th grade	-	4%
High school graduate	13%	33%
Some college, no degree	33%	21%
Bachelors degree	36%	18%
Graduate or professional degree	14%	10%
Don't know/refused	1%	4%
Ethnicity		
Caucasian	89%	88%
African American or black	6%	10%
Asian	1%	-
Other	1%	-
Don't know/refused	3%	2%