2010-2011
Energy Efficiency Program
Evaluation Report

prepared for

Lodi Electric Utility

energy & resource
solutions

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November 21, 2011

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Executive Summary

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1.1 OVERVIEW

This report documents the evaluation activities undertaken by ERS for the Lodi Electric Utility (LEU). The evaluation focuses on the energy savings impacts of LEU's Residential Appliance Program and five commercial projects completed under the Commercial Rebate Program. The evaluated program and projects were completed during the 2010-2011 program year (July 1, 2010 through June 30, 2011).

The primary objective of the evaluation is to provide independent verification of LEU's reported energy savings. The secondary objective is to provide recommendations – based on the findings of this report – for program improvement.

The evaluation consisted of four primary sets of activities: conducting research, developing evaluation plans, collecting data, and estimating energy savings. For the appliance program, ERS developed a stratified sample design to randomly select appliances rebated through the program. ERS conducted a total of twenty telephone interviews with appliance program participants and visited all five commercial project sites.

ERS combined the research and data collection results to analyze and develop energy savings estimates using standard engineering principles and evaluation methodologies.

1.2 RESULTS

The Residential Appliance Rebate Program achieved 50,758 kWh of annual energy savings. The five Commercial Rebate Program projects achieved 582,663 kWh of annual energy savings. The combined energy savings achieved is 826,421 kWh. Tables 1-1, 1-2, and 1-3 summarize the results.

Table 1-1
Combined Results

		Energy Savings (kWh)	Demand Reduction (kW)
Combined results	Reported	826,421	NA
	Evaluated	633,421	173.2
	Realization rate	76.6%	NA

Table 1-2
Appliance Program Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Residential appliance rebates	Reported	35,844	54.0
	Evaluated	50,758	96.2
	Realization rate	141.6%	178.9%

Table 1-3
Commercial Program Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Site 1	Reported	275,881	NA
	Evaluated	170,559	18.5
	Realization Rate	61.8%	NA
Site 2	Reported	186,610	NA
	Evaluated	116,702	13.5
	Realization Rate	62.5%	NA
Site 3	Reported	82,954	NA
	Evaluated	128,783	24.4
	Realization Rate	155.2%	NA
Site 4	Reported	151,132	NA
	Evaluated	155,665	17.8
	Realization Rate	103.0%	NA
Site 5	Reported	94,000	NA
	Evaluated	10,955	2.8
	Realization Rate	11.7%	NA
TOTAL	Reported	790,577	NA
	Evaluated	582,663	77.0
	Realization Rate	73.7%	NA

1.3 RECOMMENDATIONS

ERS offers the following recommendations for LEU's consideration.

- Specify more formal program rules and equipment eligibility criteria to help customers prepare better rebate application packages.
- Require customers to provide make, model, and serial numbers of appliances being replaced.
- Take additional steps to ensure the reported source of heating for water heaters is accurate.
- Collect additional information on baseline equipment for the projects funded under the Commercial Rebate Program.
- Future program evaluations (as well as program administration) would benefit from a more streamlined program tracking and reporting system.

Introduction

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This report documents the evaluation activities undertaken by ERS for the Lodi Electric Utility (LEU). The evaluation focuses on the energy savings impacts of specific programs and projects completed during the 2010-2011 program year (July 1, 2010 through June 30, 2011).

2.1 PROGRAM OVERVIEW

Evaluation was conducted for two of LEU's energy efficiency programs: the Appliance Rebate Program and the Commercial Rebate Program.

The Lodi Appliance Rebate Program provides rebates to customers who purchase an ENERGY STAR refrigerator, dishwasher, or front-loading clothes washer. LEU issued rebates for 545 appliances during the program year.

The Lodi Commercial Rebate Program provides up to $20,000 in rebates to large commercial and industrial customers (G-3 to I-1 rate schedule customers). Projects that are typically rebated include pumps/motors, process equipment improvements, building envelope improvements, HVAC/chiller replacements, and high efficiency lighting retrofits. Five projects funded under this program were randomly selected by LEU for evaluation.

2.2 EVALUATION OBJECTIVES

The primary objective of the evaluation is to provide independent verification of LEU's reported energy savings for the Appliance Rebate Program and for five Commercial Rebate Program projects. The secondary objective is to provide recommendations – based on the findings of this report – for program improvement.

2.3 OVERVIEW OF EVALUATION ACTIVITIES

The evaluation consisted of four primary sets of activities: conducting research, developing evaluation plans, collecting data, and estimating energy savings.

2.3.1 CONDUCT RESEARCH

ERS conducted initial research and review of the following:

- Similar evaluation efforts
- LEU program process and procedures
- ENERGY STAR appliance program
- Publicly owned utility compliance reporting requirements and methodologies
- Project-specific technologies used to save energy

2.3.2 DEVELOP EVALUATION PLAN

ERS developed measurement and verification (M&V) plans for the Residential Appliance Program and for each of the commercial project's evaluated. A sampling plan for the appliance program was developed to randomly select appliances for evaluation.

2.3.3 COLLECT DATA

Appliance Program - ERS organized and reviewed hard copies of all rebate application documentation and constructed spreadsheet files for sampling and estimating energy savings. A telephone survey questionnaire was developed and then used to gather relevant data from a sample of program participants.

Commercial Program - ERS visited each of the selected commercial program project sites to interview staff and collect data regarding each energy efficient measure installed at the site.

2.3.4 ESTIMATE ENERGY SAVINGS

ERS combined the research and data collection results to analyze and develop energy savings estimates per the methodologies describe in Section 3.

2.4 REPORT STRUCTURE

The remainder of this report consists of four sections.

1. Section 3 describes the evaluation methodologies employed for sampling, data collection, and estimating energy savings. It also provides a discussion on the reliability of the results of the evaluation and provides recommendations for reporting program influence in terms of net-to-gross energy savings.
2. Section 4 provides the results for the Residential Appliance Program.
3. Section 5 provides the results for the Commercial Rebate Program projects.
4. Section 6 presents the combined results and provides recommendation for program improvement.

Methodology

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3.1 SAMPLING

This section describes the sampling methodologies used by ERS.

3.1.1 RESIDENTIAL APPLIANCE PROGRAM

ERS developed a stratified sample design to randomly select appliances from a total of 545 appliances rebated through the program. Sample units were optimally allocated among the three different types of appliances (refrigerators, clothes washers, and dishwashers) included in the program. The sample size was designed to achieve a relative precision of 20% at the 90% confidence level (precision of 90/20), which exceeds the recommendations (precision of 90/30) found in the CPUC evaluation protocols[1] for verification-level of rigor.

The selected precision level required at least sixteen sample units (appliances). The initial sample design included twenty appliances: ten refrigerators, six clothes washers, and four dishwashers. The achieved sample resulted in twenty-two appliances: eleven refrigerators, five clothes washers, and six dishwashers.

The sample realization rate was calculated using sample allocation weighting (case weights) and then expanded to the program population to determine the program's verified savings. The resulting realization rate is 89.3%, and the relative precision is 12.9% (see Table 3-1).

Table 3-1
Realization Rate

Realization rate	89.3%
Standard error	7.0%
Error bound (at 90% confidence level)	0.11
Relative precision	12.9%

3.1.2 COMMERCIAL REBATE PROGRAM

Because verification was performed at the site level, the results of the site verifications do not statistically represent the program's overall results. The site sampling methodology is census (count all measures), with the exception of the high school where a representative sample of fixtures were selected for verification.

[1] 2006 California Energy Efficiency Evaluation Protocols, California Public Utilities Commission

3.2 DATA COLLECTION

The section describes ERS's data collection efforts.

3.2.1 RESIDENTIAL APPLIANCE PROGRAM

ERS completed a total of twenty telephone interviews with survey respondents. After developing a survey questionnaire[2] to gather information about the appliance purchased and its technical and operational characteristics, we then called a total of thirty-six program participants up to three different times at various times of day over multiple days within a week. Most of the time, the customer was reached on the first or second attempt. Out of the thirty-six, sixteen were unresponsive. Only five of the twenty participants that responded were backups. No participant refused to participate. On average, the surveys took approximately 5 minutes to complete. This information can be seen in Table 3-2.

Table 3-2
Telephone Survey Disposition

Program	Attempts	Completes	Primary	Backups	Timeframe
Appliance program	36	20	15	5	Oct. 3, 2011 through October 21, 2011

3.2.2 COMMERCIAL REBATE PROGRAM

ERS visited each program participant selected for evaluation. ERS engineers collected information on-site regarding the retrofit project to determine if the measures were installed and operational. Information was also gathered to assist with verifying energy savings estimates. Site visits were conducted on October 10, 2011 and October 17, 2011.

3.3 VERIFICATION OF ENERGY SAVINGS

Note: All energy saving calculations performed by ERS will be provided to LEU in a spreadsheet file.

3.3.1 ENERGY SAVINGS REPORTED BY LEU

LEU uses the publicly owned utility's version of the E3 reporting tool (E3 tool) to report energy savings. The E3 tool allows utilities to report both deemed and custom measures. The source of the deemed savings values in the E3 tool is the 2009 KEMA Study3, which is largely based on the 2008 Database for Energy Efficient Resources, maintained by the CPUC. Custom measures energy savings are provided by the utility and are either calculated by the utility or provided by the customer.

For the appliance program, deemed per unit energy savings values from the E3 tool were used for all three appliances. For the commercial rebate program, LEU reported energy savings as custom measures in the E3 tool, and the customer provided the energy savings estimates.

[2] A copy of the survey instrument is included in Appendix A of this report.

[3] *2009 Measure Quantification Methodology Statewide Savings and Cost,* prepared for NCPA and SCPPA Members, KEMA, Inc.

3.3.2 APPLIANCE PROGRAM VERIFIED SAVINGS

ERS used the appliance unweighted energy savings values from the 2009 KEMA study to determine per unit energy savings for each appliance type. Per unit energy savings in E3 are based on weighted averages for appliances with different energy savings characteristics. For clothes washers and dishwashers, energy savings differ depending upon whether the water heating source is gas or electric. ERS was able to use unweighted values since LEU's rebate application recorded the water heating source. ERS also confirmed the water heating source during the telephone interviews. Refrigerator unit energy savings differ by the location of the freezer (top, side, or bottom). The refrigerator configuration was easily determined from the refrigerator model and was also recorded on the rebate application.

The sampling results are used to adjust the unweighted savings. If ERS found the appliance to be ENERGY STAR certified, installed, and operating in LEU's service territory, the unit was assumed to be saving energy. If it did not meet all three criteria, the unit was assumed to be saving zero energy.

3.3.3 COMMERCIAL REBATE PROGRAM VERIFIED SAVINGS

For lighting measures, ERS used the same methodology used in the 2009 KEMA study. ERS calculated energy savings as the difference between pre-retrofit (baseline) conditions and post-retrofit conditions. Baseline conditions were as stated in the rebate application. We used either actual lamp/ballast performance data or typical wattage values for calculating energy use. For hours of operation, we used typical facility end-use types (from 2009 KEMA study) and adjusted the hours if necessary based on information gathered during the site visit.

For all other measures, ERS calculated energy savings based on either the methodology used in the customer-provided calculations or an alternative methodology depending on the available project information. Assumptions and rationale for the methodology used are provided in the site summaries in Section 5 of this report.

3.4 RELIABILITY

Energy savings cannot be measured directly. Energy savings estimates are a predictor of the absence of energy use – they account for the difference between how energy-consuming systems and equipment operated beforehand (baseline conditions) and how they operate after being upgraded (post-retrofit conditions). Therefore, estimating energy savings is challenging under any circumstances. To assess the reliability of the verified energy savings presented in this report, ERS reviewed all potential sources of error associated with our evaluation efforts. Overall, we find the verified savings presented in this report to be a reasonably accurate and precise estimate of the energy savings achieved by program participants.

The following is a list of the potential sources of error:

Baseline conditions – Provided by the customer.

Telephone surveys –Used in lieu of site visits for evaluating the appliance program. However, a recent evaluation research study[4] for dishwashers indicates that on-site surveys and telephone surveys produced virtually the same results.

Sampling self-selection bias – Five of the twenty survey respondents were alternates to the primary list of participants. This introduces the element of self-selection bias. However, there is no indication that the use of alternates led to any material bias in the survey results.

Equipment operating hours – For the most part, operating hours were determined using typical values for end use types and adjusted based on customer interviews.

Primary school lighting count – Only 120 lighting fixtures were verified at the site while 190 fixtures were reported to be retrofitted. Although ERS attempted to locate all fixtures, it is possible a few fixtures were missed. To fully assess these discrepancies, LEU may wish to request a site walk-through with the lighting contractor to locate any fixtures not accounted for in the evaluation.

High school lighting count – In lieu of counting all site fixtures, a representative sample of fixtures were counted. Based on our walk-through of the school and the information provided by the installation contractor, it is expected that the sample counted and inspected reasonably represents the entire retrofit project.

Appliance energy savings – Appliance energy savings are based on deemed energy savings with standard assumptions regarding consumer behavior and appliance usage. Although we did capture (from the survey) some information regarding usage profiles for clothes washers and dishwashers, the high degree of uncertainty associated with this data led us not to incorporate it into any of our analysis. In addition, verified savings are based on customer-reported information regarding the heating source of their water heater.

3.5 PROGRAM INFLUENCE (NET-TO-GROSS ENERGY SAVINGS)

It is important to understand and properly reflect the influence of utility energy efficiency programs. Program influence is typically reported as net energy savings. Net energy savings is the fraction of the total energy savings that are considered attributable to the program. To determine net energy savings, a net-to-gross (NTG) factor is used to adjust gross energy savings for free ridership and spillover. Free ridership describes program participants who would have implemented energy efficiency in the absence of the program, and spillover describes the program's ability to indirectly influence behavior (customer or market behavior) leading to increased energy efficiency.

Program influence is difficult to assess, and the results of efforts to quantify this influence have a high degree of uncertainty. Given this uncertainty and the relatively high cost to conduct primary

[4] Source: *CPUC 2006-2008 Direct Impact Evaluation, HIM Evaluation Report,* Study ID PUC0016.02.

research on program influence, ERS recommends LEU use stipulated NTG factors for reporting program net savings.

To assist publicly owned utilities (POUs), the E3 tool includes stipulated NTG factors from large investor-owned utilities (IOU) programs. Although the scale and program delivery for these larger IOU programs can greatly differ from POU programs, there are few other readily available resources. Therefore, ERS recommends using the NTG factors included in the E3 tool that are best-aligned to the LEU program.

ERS recommends LEU use the stipulated NTG factors from the E3 tool listed in Table 3-3.

Table 3-3
NTG Factors

Appliance	NTG Factor
Clothes washers	81%
Dishwashers	80%
Refrigerators	75%
Lighting projects (sites 1-3)	78%
HVAC project (site 5)	84%
Industrial project (site 4)	85%

Residential Appliance Program

4

4.1 RESULTS

Table 4-1 summarizes the findings for Residential Appliance Program:

Table 4-1
Appliance Program Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Residential appliance rebates	Reported	35,844	54.0
	Evaluated	50,758	96.2
	Realization rate	141.6%	178.9%

4.2 REPORTED ENERGY SAVINGS

Table 4-2 provides the reported energy savings from LEU's E3 reporting tool.

Table 4-2
Reported Energy Savings

Appliance	Energy (kWh)	Demand (kW)
Refrigerator	18,271	3
Clothes washer	10,850	28
Dishwasher	6,723	23
Total	**35,844**	**54**

4.3 TELEPHONE SURVEY FINDINGS

Table 4-3 provides the sample survey findings:

Table 4-3
Survey Results

Site #	Appliance Type	Reported Energy Savings	Achieved Energy Savings	Reason for Difference
234	Clotheswasher	62	62	
445	Clotheswasher	62	62	
82	Clotheswasher	62	62	
448	Clotheswasher	62	62	
300	Clotheswasher	62	0	Not ENERGY STAR-rated
36	Dishwasher	30.7	30.7	
223	Dishwasher	30.7	30.7	
109	Dishwasher	30.7	30.7	
376	Dishwasher	30.7	30.7	
124	Dishwasher	30.7	30.7	
317	Dishwasher	30.7	30.7	
15	Refrigerator	121	121	
116	Refrigerator	121	121	
315	Refrigerator	121	0	Not ENERGY STAR-rated
171	Refrigerator	121	121	
223	Refrigerator	121	121	
317	Refrigerator	121	121	
7	Refrigerator	121	121	
253	Refrigerator	121	121	
238	Refrigerator	121	121	
140	Refrigerator	121	121	
341	Refrigerator	121	121	

ERS was unable to verify one clothes washer and one refrigerator as ENERGY STAR certified, and the clothes washer was not a front loader. The results of these two outliers were confirmed when ERS checked model numbers against manufacturer data. Otherwise, all appliances were found to be ENERGY STAR certified, installed, and operational.

Sites 223, 317, and 36 represent customers that had purchased more than one type of appliance (refrigerators and dishwashers). Site 317 is actually the same customer as 36 except that they purchased a different type of dishwasher. It was not uncommon to find multifamily owners participating in the appliance rebate program. In our selected sample, three sites represented multifamily owners.

4.3.1 ADDITIONAL FINDINGS

All but one of the participants replaced an old appliance with a new one. The majority of participants chose to purchase a particular appliance because the existing one was either broken or was on the verge of breaking down. Correlating with this number one reason was price. Respondents either felt it would be more expensive to try to fix the appliance rather than replacing it, or thought the price of the appliance was fairly reasonable. In addition to these top two reasons,

several others were mentioned including the physical attributes of the appliance, e.g., its size, freezer location, or level of noise when operating.

Those participants that purchased a refrigerator were asked what happened to the old one that was being replaced. Seven out of eleven respondents stated the installers took the old appliance back. Three participants stated they did not know what happened to the appliance, and one responded that it was delivered to the city dump.

With such a small sample, drawing comparisons for different ages of different appliances did not seem to generate any significant findings. Nevertheless, out of all the appliances within the sample, the average age of the existing equipment replaced was approximately 10 to 20 years.

4.4 SAVINGS ANALYSIS

The savings methodology is described in Section 2 of this report. ERS used the unweighted energy savings for each appliance from the 2009 KEMA study to determine the appliance energy savings before adjusting the savings by the sample realization rate.

The unweighted energy savings for all appliances is 56,840 kWh (see Table 4-4).

Table 4-4
Unweighted Savings

Appliance	Reported Savings (kWh)	Unweighted Savings (kWh)
Clothes washer	10,850	29,151
Dishwasher	6,723	8,726
Refrigerator	18,271	18,963
Total	**35,844**	**56,840**

The difference between the reported savings and the unweighted savings is due to the percentage of electric water heaters reported by program participants being much larger than assumed in the 2009 KEMA study (see Table 4-5).

Table 4-5
Percentage of Electric Hot Water Heaters

Appliance	KEMA Study Assumptions	Survey Results
Clothes washer	2.5%	53.7%
Dishwasher	2.5%	35.2%

ERS adjusted the unweighted savings (56,840 kWh) by the sample realization rate (89.3%) to determine the verified savings of 50,758 kWh. The overall realization rate is the ratio of the verified savings (50,840 kWh) to the reported savings (35,844 kWh), or 141.6%.

Commercial Rebate Program

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5.1 SITE 1 – LIGHTING RETROFIT

5.1.1 RESULTS

Table 5-1 summarizes the energy savings for each measure evaluated at Site 1. Energy savings reported by LEU are compared to the energy savings verified by ERS.

Table 5-1
Site 1 Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Four-lamp T8 retrofit	Reported	206,911	NA
	Evaluated	108,499	11.8
	Realization rate	52.4%	NA
Three-lamp, T8 retrofit	Reported	68,970	NA
	Evaluated	62,060	6.7
	Realization rate	90.0%	NA
Total	Reported	275,881	NA
	Evaluated	170,559	18.5
	Realization rate	61.8%	NA

5.1.2 SITE VISIT

Date of site visit: October, 10, 2011

Site 1 is a high school campus. ERS visited the campus and performed a spot evaluation of select offices and classrooms. The fixtures were visually inspected to verify installation of new lamps and ballasts. ERS also visually inspected the fixtures that were permanently modified where de-lamping was performed. Site personnel and the implementation contractor were interviewed about measures and campus schedules.

Findings

The implementation contractor re-lamped T8 fixtures in selected classrooms and office space with high lumen T8 lamps throughout the campus. The proposal indicated that T12 lamps were replaced with T8 lamps. Site personnel told ERS that T8 lamps had already been installed on most of the fixtures before the re-lamp. ERS visually inspected fixtures for new lamps and ballasts and noted that two lamps had been permanently removed. The inspection also revealed that every two fixtures shared one ballast.

ERS verified that three-lamp, T8 retrofit fixtures had two new high lumen T8 lamps installed. Inspection of the ballast showed that they had not been replaced. The installation contractor told ERS that ballasts were not replaced so that more lamps could be replaced throughout the campus. ERS verified that the fixture had been modified so that one lamp was permanently removed.

5.1.3 SAVINGS ANALYSIS

Methodology

As described in Section 3 of this report, ERS used the energy savings and demand reduction methodologies described in the KEMA study. Baseline fixture wattages were obtained from the IOU standard fixture wattage tables. The wattages for the installed lamps and ballasts for the four-lamp retrofit were obtained from manufacturer data provided by the installation contractor, and those for the three-lamp retrofit were obtained from the IOU standard fixture wattage tables.

ERS calculated energy savings using hours of operation typical for California secondary schools. The hour used (2,285) were obtained from Table 108 in the KEMA study. ERS interviewed school staff and reviewed the school's modified year-round school schedule. Based on information provided to ERS, the 2,285 hours of operation is a reasonable estimate of the average run time of the school's lighting.

Results

ERS estimates the total amount of energy savings for this site to be 170,559 kWh per year. The reported savings were 275,881 kWh per year. The realization rate is the ratio of verified energy savings to the reported energy savings, which equates to 61.8%.

Explanation of Deviation from Reported Savings

The most significant factor in the difference between the reported and verified savings is the difference in the assumed hours of operation. The reported savings are based on 3,199 hours, while ERS used the 2,285 hours from the KEMA study. As stated previously, we believe 2,285 hours is a reasonable estimate of the average on-time for lights at this site. No basis was provided for the reported savings estimate of operating hours.

The difference between lighting wattages used by ERS and those used for the reported savings also contributed to the difference in savings, but to a much lesser extent.

5.2 SITE 2 – LIGHTING RETROFIT

5.2.1 RESULTS

Table 5-2 summarizes the energy savings for each measure evaluated at Site 2. Energy savings reported by LEU are compared to the energy savings verified by ERS.

Table 5-2
Site 2 Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Four-lamp T12 to two-lamp T8, 25 watt	Reported	85,824	NA
	Evaluated	71,392	8.3
	Realization rate	83.2%	NA
Two-lamp T8 to twenty-lamp T8, 25 watt	Reported	37,215	NA
	Evaluated	11,713	1.4
	Realization rate	31.5%	NA
Four-lamp T12 to two-lamp T8	Reported	63,571	NA
	Evaluated	33,596	3.9
	Realization rate	52.8%	NA
Total	Reported	186,610	NA
	Evaluated	116,702	13.5
	Realization rate	62.5%	NA

5.2.2 SITE VISIT

Date of site visit: October, 10, 2011

Data Collection

Site 2 is a grammar school. ERS visited the campus and did a count of all the spaces including offices, classrooms, common areas, kitchen areas, and the cafeteria and library. The fixtures were visually inspected to verify installation of new lamps and ballasts. ERS also visually inspected the fixtures that were permanently modified where de-lamping was performed. Site personnel and the implementation contractor were interviewed about the measures and campus schedules.

Findings

The implementation contractor replaced 228 four-lamp, T12 fixtures in the classrooms and cafeteria with new two-lamp, 25-watt T8 fixtures. ERS verified all 228 fixtures, and visually inspected them for new lamps and ballasts. Our inspection revealed that every two fixtures shared one ballast.

ERS verified that the two-lamp fixtures in both the classrooms and the shared space between classrooms were retrofitted with new 25-watt T8 lamps and a new ballast. ERS visually verified that all 307 fixtures were installed and again found that every two fixtures shared one ballast.

ERS verified that high output T8 lamps and a new ballast had been installed on 120 fixtures in the modular classrooms and that the fixtures had been modified so that two lamps could be permanently removed.

5.2.1 SAVINGS ANALYSIS

Methodology

As described in Section 3 of this report, ERS used the energy savings and demand reduction methodologies described in the KEMA study. Baseline fixture wattages were obtained from the IOU standard fixture wattage tables, and the wattages for the installed lamps and ballasts were obtained from manufacturer data provided by the installation contractor.

ERS calculated energy savings using hours of operation typical for California primary schools. The hours used (2,141) were obtained from Table 108 in the KEMA study. ERS interviewed school staff and reviewed the school's modified year-round school schedule. Based on information provided to ERS, the 2,141 hours of operation is a reasonable estimate of the average run time of the school's lighting.

Results

ERS estimates the total amount of energy savings for this site to be 116,702 kWh per year. The reported savings were 189,610 kWh per year. The realization rate is the ratio of verified energy savings to the reported energy savings, which equates to 62.5%.

Explanation of Deviation from Reported Savings

The most significant factors in the difference between the reported and verified savings are the differences in the assumed hours of operation and a discrepancy in the lighting fixture count.

The reported savings are based on 3,199 hours, while ERS used 2,141 hours. As stated previously, we believe the 2,141 hours are a reasonable estimate of the average on-time for lights at this site. No basis was provided for the reported savings estimate of operating hours.

Although 216 fixtures were reported, ERS was only able to verify 120 lighting fixtures for the third measure (four-lamp T12 to two-lamp T8). It is possible that a greater number of fixtures were retrofitted than were verified by ERS, in which case the realization rate would be higher.

If the reported operating hours matched the verified operating hours and there was no discrepancy in the third measure's fixture count, the realization rate would have exceeded 100%.

The difference between lighting wattages used by ERS and those used for the reported savings also contributed to the difference in savings, but had little effect on the overall realization rate.

5.3 SITE 3 – LIGHTING RETROFIT

5.3.1 RESULTS

Table 5-3 summarizes the energy savings for each measure evaluated at Site 3. Energy savings reported by LEU are compared to the energy savings verified by ERS.

Table 5-3
Site 3 Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
400 watt metal halide to four-lamp HO T5	Reported	82,954	NA
	Evaluated	128,783	24.36
	Realization rate	155.2%	NA

5.3.2 SITE VISIT

Date of site visit: October, 17, 2011

Data Collection

Site 3 is a manufacturing facility with warehouse space. ERS visited the site and did a complete count of all the fixtures installed. We visually inspected the fixtures to verify that they were new and that new lamps and ballasts had been installed. We also interviewed site personnel about the measure installation and operation of the site.

Findings

ERS verified that the site replaced eighty-five metal halide high bay fixtures with eighty-five new four-lamp T5 high output (HO) high bay fixtures. This is five fewer than reported in the rebate application. ERS also verified that occupancy sensors were installed and functional.

5.3.3 SAVINGS ANALYSIS

Methodology

As described in Section 3 of this report, ERS used the energy savings and demand reduction methodologies described in the KEMA study. Baseline fixture wattages were obtained from the IOU standard fixture wattage tables, and the wattage for the installed fixtures were obtained from manufacturer data determined from the model numbers of the lamp, fixture, and ballast cut sheets. The assumption of 20% savings for occupancy sensor control was obtained from the KEMA study.

Results

ERS estimates the total amount of energy savings for this site to be 128,783 kWh per year. The reported savings were 82,954 kWh per year. The realization rate is the ratio of verified energy savings to the reported energy savings, which equates to 155.2%.

Explanation of Deviation from Reported Savings

The omission of occupancy sensor energy savings accounts for close to half of the difference between the verified and reported savings. ERS calculated and included energy savings for the installation of the occupancy sensors. Although occupancy sensor energy savings were included in the customer-provided calculations, the savings were not included in the reported savings.

The remaining difference cannot be assessed, as the customer-provided energy savings estimate lacked sufficient detail for comparison.

5.4 SITE 4 – EFFICIENT HEATING SYSTEM FOR INJECTION MOLDING PRESS

5.4.1 RESULTS

Table 5-4 summarizes the energy savings for each measure evaluated at Site 4. Energy savings reported by LEU are compared to the energy savings verified by ERS.

Table 5-4
Site 4 Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Energy efficient barrel heater	Reported	151,132	NA
	Evaluated	155,665	17.8
	Realization rate	103.0%	NA

5.4.2 SITE VISIT

Date of site visit: October, 17, 2011

Data Collection

Site 4 is a manufacturing facility that uses injection molding machines. The retrofit consists of replacing the barrel heating system with a more efficient insulated system. ERS visited the site and toured the facility, observing examples of the pre-existing heating collar and the new installed insulated heating coil. One hour of electric power trend data was provided to ERS by the plant manager for each of the nine zones of the heating process. This trend data is from December 9, 2010 and is the same data used to produce the summary provided in the rebate documentation.

ERS interviewed the plant manager to determine hours of operation and production schedule.

Findings

ERS verified that the new insulated heating coils were installed on the barrel machine and operating as intended. The plant manager indicated the hours of operation have since been reduced due to a decrease in demand for their product. The total number of original operating hours at the time of heater installation was 8,760. However, given operational characteristics of the new heaters, it is expected the new heating system will save additional energy by reducing the start-up time needed to get to the temperature setpoint and decrease the loss of process heat into the open space of the plant when the machine is idle.

5.4.3 SAVINGS ANALYSIS

Methodology

The energy savings is found by calculating the difference between the baseline energy use and the post-retrofit energy use. Baseline energy (kW) was determined from trend data taken September 21, 2010. Post-retrofit calculations were based on trend data from December 9, 2010 and provided to ERS during the site visit.

Annual energy savings are based on the difference between baseline and post-retrofit energy (kW) multiplied by the hours of operation at the time of the installation (8,760 hours).

Results

ERS estimates the total energy savings for this site to be 155,665 kWh per year. The reported savings were 151,132 kWh per year. The realization rate is the ratio of verified energy savings to the reported energy savings, which equates to 103%.

Explanation of Deviation from Reported Savings

There is no significant deviation between reported and verified savings.

5.5 SITE 5 – HVAC RETROFIT

5.5.1 RESULTS

Table 5-5 summarizes the energy savings for each measure evaluated at Site 5. Energy savings reported by LEU are compared to the energy savings verified by ERS.

Table 5-5
Site 5 Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
New HVAC units	Reported	94,000	NA
	Evaluated	10,955	2.8
	Realization rate	11.7%	NA

5.5.2 SITE VISIT

Date of site visit: October, 17, 2011

Data Collection

Site 5 is a retail drug store. ERS visually inspected the HVAC units and recorded each unit's model and serial number. The units were operational and appeared to be functioning properly.

ERS interviewed the store manager to determine hours of operation of the store and the purpose of the HVAC replacement.

ERS also attempted to contact the installation contractor to verify placement of CO_2 sensor and age of the baseline units.

Findings

The model numbers inspected on the units matched the model numbers in the rebate application.

The store manager verified that the store was open from 8 a.m. to 10 p.m. 7 days a week, and explained that the units were replaced because the previous package units failed to operate properly.

ERS was unable to confirm the CO_2 sensor location or the age of the units that were replaced.

5.5.3 SAVINGS ANALYSIS

Methodology

ERS used the per unit energy savings from the E3 tool to estimate each unit's energy savings. E3 measure #3037 was used for the 8 ½- and 7 ½-ton units, and measure #2653 was used for the 6-ton unit. The measure savings are based on a Title 24 baseline. This is appropriate for units replaced at, or within a few years of, the end of their useful life.

If the HVAC units that were replaced had more than 5 years of remaining useful life, additional energy savings could be claimed due to early replacement. However, we were unable to determine the age of the equipment and, given that the HVAC units were reported by the store manager to have failed, claiming early replacement savings would not be appropriate.

ERS also attempted to assess energy savings for the installation of a CO_2 sensor. However, additional information regarding ventilation rates for the units that were replaced was not available. CO_2 sensors can only reduce the ventilation rate to the Title 24-stated minimum and generally do not save energy in a retail store application unless the existing system is over-ventilating.

Results

ERS estimates the total energy savings for this site to be 10,955 kWh per year. The reported savings were 94,000 kWh per year. The realization rate is the ratio of verified energy savings to the reported energy savings, which equates to 11.7%.

Explanation of Deviation from Reported Savings

The verified savings are based on a Title 24 baseline, indicating they represent only the energy savings achieved over and above Title 24 requirements for new HVAC units. This is appropriate for counting energy savings that are attributable to a utility program. The reported savings appear to be based on the energy consumption difference between the new units and units that were replaced.

If the units replaced had not reached their effective useful life, additional savings could be claimed for early retirement. However, the savings would still be significantly lower than the reported energy savings.

Summary and Conclusion

6

6.1 COMBINED RESULTS

Table 6-1 provides the combined results for the residential appliance program and the five commercial program projects evaluated.

Table 6-1
Combined Results

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Combined results	Reported	826,421	NA
	Evaluated	633,421	173.2
	Realization rate	76.6%	NA

Tables 6-2 and 6-3 show the results by program.

Table 6-2
Appliance Program

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Residential appliance rebates	Reported	35,844	54.0
	Evaluated	50,758	96.2
	Realization rate	141.6%	178.9%

Table 6-3
Commercial Program

Measure Name		Energy Savings (kWh)	Demand Reduction (kW)
Site 1	Reported	275,881	NA
	Evaluated	170,559	18.5
	Realization Rate	61.8%	NA
Site 2	Reported	186,610	NA
	Evaluated	116,702	13.5
	Realization Rate	62.5%	NA
Site 3	Reported	82,954	NA
	Evaluated	128,783	24.4
	Realization Rate	155.2%	NA
Site 4	Reported	151,132	NA
	Evaluated	155,665	17.8
	Realization Rate	103.0%	NA
Site 5	Reported	94,000	NA
	Evaluated	10,955	2.8
	Realization Rate	11.7%	NA
TOTAL	Reported	790,577	NA
	Evaluated	582,663	77.0
	Realization Rate	73.7%	NA

6.2 RECOMMENDATIONS

Based on our observations and analysis, ERS offers the following recommendations for LEU's consideration.

Process

- Specify more formal program rules and equipment eligibility criteria to help customers prepare better rebate application packages.

Data Collection

- Require customers to provide the make, model, and serial number of appliances being replaced. Currently, LEU requires customers to report the age of the appliance being replaced. Capturing the make, model and serial number provides a means of confirming customer-reported information. It also would allow for reporting early replacement savings where applicable. We suggest asking customers to submit a picture of the equipment model information along with the rebate application.

- Take additional steps to ensure the reported source of heating for customer water heaters is accurate. For example, LEU staff could randomly select rebate applications that report electric water heaters and then visually post-inspect the water heater to confirm that it is electric.
- Collect additional information on existing or baseline equipment for the Commercial Rebate Program. Additional energy savings, such as for HVAC early replacement, may be claimed if sufficient baseline information is included in the rebate application documentation. Requesting photos of existing equipment be provided can be an efficient method of retaining baseline conditions.
- Future program evaluations (as well as program administration) would benefit from a more streamlined program tracking and reporting system.

Appendix A

A

Residential Appliance Measurement and Verification Plan

1.1 PROGRAM SUMMARY

The residential appliance rebate program provides cash rebates to customers purchasing Energy Star rated refrigerators, clothes washers, and dishwashers. Customers purchasing eligible appliances from participating retailers may submit a rebate application form to Lodi Electric Utility to receive a rebate. In addition, participating retailers may offer POS discounts and submit rebate applications on behalf their customers. LEU will pay customers $50 for purchasing an Energy Star refrigerator, $50 for purchasing a front-loading or Energy Star clothes washer, and $25 for purchasing an Energy Star dishwasher.

1.2 M&V OBJECTIVES

- ❑ Determine the percentage of appliances that are installed and operating properly.
- ❑ Verify unit energy savings, using best available information.
- ❑ Determine realization rate for appliance program energy savings.

1.3 SAMPLING METHODOLOGY

- ❑ Determine quantities of each appliance rebated.
- ❑ Determine telephone survey participants by selecting a simple random sample from each appliance type, based on a sampling precision of ±20% at a 90% confidence level.
- ❑ Develop survey instrument.
- ❑ Interview selected participants. Use back-up list to fill-in for unresponsive participants to achieve the desired confidence/precision levels.
- ❑ Number of call attempts for each participant: at least 3, at different times of day.
- ❑ Record and compile interview results.
- ❑ Determine confidence/precision levels achieved at the program level.

1.4 APPLIANCE-SPECIFIC METHODOLOGIES – CLOTHES WASHERS

To determine if the clothes washer is installed and operating properly:

- ❑ Survey participants to determine if
  - o The appliance reported on the application is installed at address reported and is within the electric utility's service territory.
  - o The appliance is being used and is performing as expected.

To determine clothes washer unit energy savings:

- Survey participants to determine:
  - If the hot water heater is natural gas or electric.
  - Type of clothes dryer, natural gas or electric.
  - Number of typical wash loads per week.
  - Determine age of appliance replaced if not reported on the rebate application.
- Determine if appliance make and model reported on application is Energy Star rated.
- Calculate energy savings:
  - Compare percentages used in KEMA study to survey results for type of water heater and dryer.
  - Calculate energy savings based on non-weighted energy savings values from KEMA study.

1.5 APPLIANCE-SPECIFIC METHODOLOGIES – DISHWASHERS

To determine if the dishwasher is installed and operating properly:

- Survey participants to determine if
  - The appliance reported on the application is installed at address reported and is within the electric utility's service territory.
  - The appliance is being used and is performing as expected.

To determine dishwasher unit energy savings:

- Survey participants to determine:
  - If the hot water heater is natural gas or electric.
  - Number of typical loads per week.
  - Determine age of appliance replaced if not reported on the rebate application.
- Determine if appliance make and model reported on application is Energy Star rated.
- Calculate energy savings:
  - Calculate energy savings based on non-weighted energy savings values from KEMA study.

1.6 APPLIANCE-SPECIFIC METHODOLOGIES – REFRIGERATORS

To determine if the refrigerator is installed and operating properly:

- Survey participants to determine if
  - The appliance reported on the application is installed at the address reported and is within the electric utility's service territory.
  - The appliance is being used and is performing as expected.

To determine dishwasher unit energy savings:

- Survey participants to determine:
  - If unit has a through the door ice maker.
  - If unit freezer is on the bottom, top, or side of the refrigerator.
  - Determine age of appliance replaced if not reported on the rebate application.
- Determine if appliance make and model reported on application is Energy Star rated.
- Calculate energy savings:
  - Calculate energy savings based on non-weighted energy savings values from KEMA study.

Appendix B

B

On-Site Measurement and Verification Plan for Commercial Projects

1.1 M&V OBJECTIVES

- ❑ Determine if the energy saving measures are installed and operating properly.
- ❑ Verify energy savings, using best available information.
- ❑ Determine realization rate for appliance program energy savings.

1.2 SAMPLING METHODOLOGY

- ❑ Not applicable.

1.3 PRIMARY SCHOOL

- ❑ Count and verify 751 lighting fixtures were retrofitted
  - o 228 2-lamp, T8 low wattage lamps
  - o 307 2-lamp low wattage lamps
  - o 216 2-lamp T8 HO lamps
- ❑ Verify lamp length & type installed by inspecting at least one lamp and ballast of each retrofit type
- ❑ Interview staff to determine
  - o If fixtures were delamped (what was original lamp count)
  - o Type of lamp replaced (T12?)
  - o School hours (school standard calendar schedule, summer school schedule, extra-curricular uses of school facilities)
- ❑ Determine energy savings:
  - o Use KEMA study formula: kwh = delta watts x operating hours x interactive effects
  - o Based on baseline and retrofit data obtained from site visit
  - o Lamp wattage: use standardized lamp/ballast wattages
  - o Operating hours: use E3 Reporting Tool end use operating hours, adjusted as necessary based on actual school schedule

1.4 HIGH SCHOOL

- ❑ Count and verify 1,617 lighting fixtures were retrofitted

- 1,078 2-lamp, T8 lamps
- 539 2-lamp, T8 lamps

- ❑ Verify lamp length & type installed by inspecting at least one lamp and ballast of each retrofit type
- ❑ Interview staff to determine
  - If fixtures were delamped (4 - 2 & 3-2 delamp)
  - Type of lamp replaced (T12 for 4-3 lamp retrofit & T8 for 3-2 lamp retrofit)
  - School hours (school standard calendar schedule, summer school schedule, extra-curricular uses of school facilities)
- ❑ Determine energy savings:
  - Use KEMA study formula: kwh = delta watts x operating hours x interactive effects
  - Based on baseline and retrofit data obtained from site visit
  - Lamp wattage: use standardized lamp/ballast wattages
  - Operating hours: use E3 Reporting Tool end use operating hours, adjusted as necessary based on actual school schedule

1.5 MANUFACTURING SITE

- ❑ Count and verify 90 T5, high bay lighting fixtures were installed
- ❑ Count and verify 50 motion sensors were installed
- ❑ Verify lamp quantity per fixture, lamp length & type installed by inspecting at least one lamp and ballast
- ❑ Interview staff to determine:
  - Quantity, wattage and type (MH)of fixtures removed
  - If occupancy sensors are operating as expected
  - Facility operating hours, lighting operating hours (by end use type- warehouse, office, etc)
  - How lights are controlled (time clock, switch, automatic, manual, etc)
- ❑ Determine energy savings:
  - Use KEMA study formula: kwh = delta watts x operating hours x interactive effects
  - Based on baseline and retrofit data obtained from site visit
  - Lamp wattage: use standardized lamp/ballast wattages

- Operating hours: use hours reported by facility staff to estimate lighting operating hours

1.6 MANUFACTURING SITE

- ❑ Verify TCS Barrel Heating System is installed and operational
- ❑ Interview facility staff to determine:
  - Operating schedule of 2700 ton injection molding press (24 hrs/day used in calculations)
  - If real-time kW readings of heating system are available through the heating system control system. If not, if kW reading can be replicated via spot metering?
  - Who took the 12/13/2010 power readings?
  - Their assessment of the performance of the barrel heating system.

1.7 RETAIL PHARMACY

- ❑ Verify three Trane HVAC units are installed and operating
  - 8.5 ton gas/electric
  - 6 ton gas/electric
  - 7.5 ton gas/electric
- ❑ Obtain make and model of each unit to verify unit size and efficiency
- ❑ Determine end use type of area serviced by the HVAC units
- ❑ Visually confirm economizers are installed and operational (if applicable)
- ❑ Verify the presence of CO2 sensor, if possible
- ❑ Verify location and programming of HVAC thermostats
- ❑ Interview facility staff to determine:
  - Age and condition of the HVAC units replaced
  - Facility operating hours
  - Name of contracting firm who services equipment
  - Their assessment of the performance of the new HVAC units
- ❑ Determine energy savings:
  - Using E3 Reporting Tool applicable measure unit energy savings, adjusted as necessary based on information obtained from site

Appendix C

C

Telephone Survey Questionaire

Lodi Electric Residential Appliance Rebate Program Survey Instrument

Survey Date	MM/DD/YY
Project ID	#
Site Contact Name	<Customer Name>
Site Contact Phone	Phone
Site Address	<Address>
Appliance Rebate	<Clothes Washer/Dish Washer/Refrigerator >
Age of equipment	<Age>
Purchase Date	<Month YYYY>
Total Savings (kWh)	< Savings>

List of Installed Measures:

Product Type	Description
<Dishwasher>	<Make and Model>
<Clothes Washer>	<Make and Model>
<Refrigerator>	<Make and Model>

1. INTRODUCTION

Hello, my name is <interviewer name>and I'm calling on behalf of Lodi Electric Utility regarding your recent purchase of an ENERGY STAR <Clothes washer/Dish washer/Refrigerator>.

My I speak with <Customer Name>

- ❑ Yes {*Proceed with intro*.}
- ❑ No

- {*find out when* <Customer Name>*will be available and reschedule*}
- {If not available, ask to speak to the person responsible or familiar with the purchase of this appliance}

Our firm is conducting research for Lodi Electric Utilities regarding their Residential Appliance Rebate Program to assess its accomplishments and to improve Lodi's energy efficiency programs. I am not selling anything and I will not report your responses in any way that would reveal your identity to anyone. . This survey will take 10 minutes to complete.

Our records indicate that you purchased <Dishwasher>, <Clothes Washer> and/or <Refrigerator>.

1. Are you the most appropriate person to talk to about the decision to purchase and install the appliance ?

- ❑ YES ➔ *Skip to Question A1*
- ❑ NO ➔ "May I ask who would be the best person to talk to?" {*Obtain, name, phone number, email address*}

  Name _____

  Phone _____

  Email _____

- ❑ DOES NOT REMEMBER purchase ➔ {*Ask Question 2*}

2. Do you recall purchasing a <appliance make/type, e.g., Kenmore dish washer> on <date> from <retailer name, if known>?

❑ YES ➔ *Skip to Question A1*

- ❑ NO ➔ "Can you provide me with a contact name and phone number for a person who might be familiar with this purchase? {*Obtain title, name, phone number, email address*}

  Name _____

  Phone _____

  Email _____

{*Ask to speak with this person and start again at the beginning.*}

{*If they express hesitation, use an appropriate combination of the following.*}

Security: "Your response will be kept confidential and your individual response will not be shared with anyone."

Sales concern: "I am not selling anything. I simply want to understand what factors were important when you decided to purchase an Energy Star appliance."

Contact: "If you would like to talk with someone from Lodi Electric Utilities about this effort, you can call **Rob Lechner**, who is the **Customer Service Manager**. He/she can be reached at **209-333-6800 x2583**."

[The next section will normally be conducted with the primary contact. Ask to conduct this interview while on the phone now, or schedule it for a more convenient time for the primary contact.]

2. DISHWASHERS

To determine if the appliance is installed and working properly:

A1: Is your dish washer installed at <Address>

Yes – {*jump to A2*}

No – If no, which of the following best describes what happened to your appliance:

- ❑ It was installed somewhere else. { find out if it was installed within the City of Lodi}
- ❑ It is in storage or is disconnected and not in use.
- ❑ It is broken and no longer working.
- ❑ It was sold or given away.
- ❑ Don't know
- ❑ Refused
- ❑ Other_{*describe*}_____

A2: Is your dishwasher working and performing as you expected?

- ❑ Yes
- ❑ No{*describe why*}_____
- ❑ Other {*describe*}_____
- ❑ Don't know

A3: The rebate application indicates you purchased a <<Make and Model>from application>. Is this correct?

- ❑ Yes – Make
- ❑ Yes – Model # {may be determined from owner's manual, appliance tag, or invoice receipt} on appliance
- ❑ Don't know either
- ❑ Other description provided:_____

A4: Why did you choose to purchase this <Dishwasher>

- ❑ Answer:_____

To determine the dishwasher estimated energy savings:

A5: Did you replace an older <Dishwasher> with this new one?

- ❑ Yes
- ❑ No {*skip to A7*}
- ❑ Don't know
- ❑ Refused

A6: About how old was the dishwasher you replaced? The appliance rebate form indicates <Age> years – is this correct? <Yes> <No>

- ❑ Less than 5 years old
- ❑ 5 to less than 10 years old
- ❑ 10 to less than 20 years old
- ❑ 20 or more years old

A7: About how many loads of dishes do you wash each week?

- ❑ Number:_____
- ❑ Don't know

{*Only ask A8 if they answered "Yes" to A5*}

A8. Would you say that this is more, the same, or less loads per week than you did with your old Dishwasher?

- ❑ More
- ❑ The same
- ❑ Less
- ❑ Don't know
- ❑ Refused

A9: Dishwashers use hot water and we would like to know what type of fuel your hot water heater uses. Is it:

- ❑ Natural gas {PG&E supplies natural gas for LEU customers}
- ❑ Electric
- ❑ Don't know

{*Record any qualitative information offered*} _____

_____

_____

_____

_____

_____

That is all the questions we have. Thank you very much for taking the time to talk with me. Your responses will help Lodi Electric Utilities continue to improve and enhance its energy efficiency programs for the City of Lodi and its residents. Do you have any final questions or comments you would like to share before we wrap up?

3. CLOTHES WASHERS

To Determine if the appliance is installed and working properly:

B1: Is your clothes washer installed at <Address>?

Yes – {*jump to B2*}

No – If no, which of the following best describes what happened to your appliance:

- ❑ It was installed somewhere else. {*find out if it was installed within the City of Lodi*}
- ❑ It is in storage or is disconnected and not in use.
- ❑ It is broken and no longer working.
- ❑ It was sold or given away.
- ❑ Don't know
- ❑ Refused
- ❑ Other_{*describe*}_____

B2: Is your clothes washer working and performing as you expected?

- ❑ Yes
- ❑ No{*describe why*}_____
- ❑ Other {*describe*}_____
- ❑ Don't know

B3: The rebate application indicates you purchased a <Make and Model> from application>. Is this correct?

- ❑ Yes – Make
- ❑ Yes – Model # {may be determined from owner's manual, appliance tag, or invoice receipt} on appliance
- ❑ Don't know either
- ❑ Other description provided:_____

B4: Why did you choose to purchase this <Clothes Washer>?

- ❑ Answer:_____

To determine the clothes washer estimated energy savings:

B5: Did you replace an older <Clothes Washer>with this new one?

- ❑ Yes
- ❑ No [*skip to B7*]
- ❑ Don't know)
- ❑ Refused

B6: About how old was the clothes washer you replaced?

- ❑ The appliance rebate form indicates <Age>years – is this correct? <Yes> <No>

- ❑ Less than 5 years old
- ❑ 5 to less than 10 years old
- ❑ 10 to less than 20 years old
- ❑ 20 or more years old

B7: About how many wash loads do you do per week?

- ❑ Number:_____
- ❑ Don't know

{*Only ask B8 if they answered "Yes" to B5*}

B8. Would you say that this is more, the same, or less loads per week than you did with your old clothes washer?

- ❑ More
- ❑ The same
- ❑ Less
- ❑ Don't know
- ❑ Refused

B9: Clothes Washer use hot water and we would like to know what type of fuel your hot water heater uses. Is it:

- ❑ Natural gas {PG&E supplies natural gas for LEU customers}
- ❑ Electric
- ❑ Don't know

B10: Similarly, what type of fuel does your clothes dryer use? Is it:

- ❑ Natural gas {PG&E supplies natural gas for LEU customers}
- ❑ Electric
- ❑ Don't know

{*Record any qualitative information offered*} _____

_____

_____

_____

_____

_____

That is all the questions we have. Thank you very much for taking the time to talk with me. Your responses will help Lodi Electric Utilities continue to improve and enhance its energy efficiency programs for the City of Lodi and its residents. Do you have any final questions or comments you would like to share before we wrap up?

4. REFRIGERATORS

To Determine if the appliance is installed and working properly:

C1: Is your refrigerator installed at <Address>?

Yes – {*jump to C2*}

No – If no, which of the following best describes what happened to your appliance:

- ❑ It was installed somewhere else. {*find out if it was installed within the City of Lodi*}
- ❑ It is in storage or is disconnected and not in use
- ❑ It is broken and no longer working.
- ❑ It was sold or given away.
- ❑ Don't know
- ❑ Refuse
- ❑ Other_{*describe*}_____

C2: Is your refrigerator working and performing as you expected?

- ❑ Yes
- ❑ No{*describe why*}_____
- ❑ Other {*describe*}_____
- ❑ Don't know

C3: The rebate application indicates you purchased a <Make and Model> from application>. Is this correct?

- ❑ Yes – Make
- ❑ Yes – Model # {may be determined from owner's manual, appliance tag, or invoice receipt} on appliance
- ❑ Don't know either
- ❑ Other description provided:_____

C4: Why did you choose to purchase this <Refrigerator>

- ❑ Answer:_____

To determine if the refrigerator estimated energy savings:

C5: Did you replace an older <Refrigerator> with this new one?

- ❑ Yes
- ❑ No [*skip to C8*]
- ❑ Don't know)
- ❑ Refused

C6: What did you do with your old refrigerator?

Answer:_____

C7: About how old was the refrigerator you replaced? The appliance rebate form indicates <Age> years – is this correct? <Yes> <No>

- ❑ Less than 5 years old
- ❑ 5 to less than 10 years old
- ❑ 10 to less than 20 years old
- ❑ 20 or more years old
- ❑ No refrigerator replaced

C8. Does the new refrigerator have a freezer unit?

- ❑ Yes-
- ❑ No {*skip to end*}
- ❑ Don't know
- ❑ Refused

C9. Where is the freezer unit located?

- ❑ Bottom
- ❑ Top
- ❑ Side of refrigerator

That is all the questions we have. Thank you very much for taking the time to talk with me. Your responses will help Lodi Electric Utilities continue to improve and enhance its energy efficiency programs for the City of Lodi and its residents. Do you have any final questions or comments you would like to share before we wrap up?