



PacifiCorp Irrigation Energy Savers 2006–2008 Idaho Program Evaluation

Prepared for
PacifiCorp

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Executive Summary

The Irrigation Energy Savers Program (the program) offers agricultural customers in Idaho the opportunity to increase the efficiency of their irrigation system(s) through energy-efficiency upgrades and education. Customers served under Rocky Mountain Power's Schedule 10 irrigation rate are eligible to participate. The program includes prescriptive and custom incentive options, as well as an equipment exchange component, to help growers improve the efficiency of their irrigation systems.

Evaluated energy savings from this program, determined through billing analysis, fell short of planning estimates when normalized for water and cropping practices using the best available data. Utilizing the 2006-2008 IRP decrement values¹ and evaluated savings, the program was only cost effective from the Participant Cost Test (PCT) perspective during the 2006-2008 program cycle. Utilizing expected savings estimates, the program was cost effective from the PacifiCorp Total Resource Cost Test (PTRC), Total Resource Cost Test (TRC), Utility Cost Test (UCT), and PCT perspectives. When program cost effectiveness was assessed using third party² data for deemed savings and cost estimates, which removes the analytical complexity of normalizing for water and cropping practices where applicable, the program was cost effective from the PTRC, TRC, UCT, and PCT perspectives.

Cadmus obtained expected savings and other program-related data from Rocky Mountain Power's tracking database and records of program implementation. Expected savings were calculated for each installed measure and documented based on original measure savings estimates. To increase the precision of the estimates, the evaluation of savings was conducted on the program as a whole, encompassing calendar years 2006-2008.

To evaluate achieved energy savings, Cadmus and its subcontractor, IRZ Consulting (collectively referred to as the Cadmus team, or the team), performed site visits for 79 unique participants representing 123 sites and 140 projects. Based on measurements and observations obtained from these site visits, in addition to data provided in the project files and conversations with irrigators, Cadmus calculated evaluated energy savings and the associated realization rate for each of two participation categories. The first category consisted of sites that participated in the equipment exchange and pivot and linear system upgrade components of the program, including sites at which a system consultation and/or system analysis was also performed. The second category included those sites that received only a system consultation and/or system analysis.

Overall, Cadmus calculated energy savings at a precision of ± 51 percent for the equipment exchange, pivot and linear system upgrade, and combined project category. The system consultation and/or system analysis only category was calculated at ± 86 percent precision. Both categories are reported at a 90 percent confidence interval. Due to this high uncertainty, Cadmus

¹ The analysis was based on the East Commercial Cooling 16 percent load factor decrement which most closely represents irrigation usage.

² Cadmus utilized the Regional Technical Forum's Eastern Idaho-specific proposed deemed savings, measure costs, and measure lives for this cost-effectiveness scenario.

concluded that the savings estimate is inconclusive and calculated high case and low case savings based on the upper and lower bounds of the precision estimates. Table 1 summarizes expected energy savings, evaluated energy savings, and realization rates by participation category, including high and low case savings estimates.

Table 1. Evaluated Energy Savings by Participation Category

Participation Category	Measure Count	Expected Savings Estimate (kWh)	Evaluated Savings ³		Evaluated Savings High Case		Evaluated Savings Low Case	
			Savings (kWh)	Realization Rate	Savings (kWh)	Realization Rate	Savings (kWh)	Realization Rate
Equipment Exchange, Upgrade, and Combined Projects	222,175	6,663,442	447,864	7%	2,917,476	44%	0	0%
System Consultation and / or System Analysis Only	59	338,659	1,583,142	467%	2,938,012	868%	228,273	67%
Total	222,234	7,002,101	2,031,006	29%	5,855,488	84%	228,273	3%

The Regional Technical Forum (RTF) recently proposed new savings estimates, measure costs, and measure lives for irrigation equipment.⁴ As a second approach to estimating savings, Cadmus calculated expected savings based on the number of measures incented through the Program and the proposed RTF deemed savings estimates. The results are presented in Table 2.

Table 2. Savings Based on RTF Proposed Deemed Savings Estimates

Participation Category	Count	Expected Savings Estimate (kWh)	RTF Proposed Deemed Savings ⁵ (kWh)	Realization Rate
Equipment Exchange, Upgrade, and Combined Projects	222,175	6,663,442	8,411,549	126%
System Consultation and / or System Analysis Only	59	338,659	338,659	100%
Total	222,234	7,002,101	8,750,208	125%

Cadmus also fielded two participant surveys; one that focused on the exchange aspect of the program and one that focused on the non-exchange aspects, resulting in separate freeridership estimates for each group. Cadmus determined freeridership to be 27 percent among exchange participants and 26 percent among non-exchange participants, or a weighted average of 26.5 percent overall. For this evaluation, freeridership was the only factor used to calculate the net-to-

³ Due to the broad error band around the evaluated results, the results are inconclusive.

⁴ <http://www.nwcouncil.org/energy/rtf/meetings/2010/01/Default.htm>

⁵ The RTF did not propose deemed savings estimates for sprinkler packages, system consultations, or system analyses. Sprinkler package savings are based on the RTF per unit savings estimates for individual components, and an estimate of the number of components included in a typical sprinkler package incented by the Irrigation Energy Savers Program. Savings for system consultations and analyses were carried over from the Program's expected savings estimates.

gross (NTG) ratio.⁶ Applying the NTG ratio of 73.5 percent to the evaluated savings listed in Table 1 resulted in net program savings of 1,492,790 kWh (Table 8).

Cadmus determined program cost-effectiveness for five scenarios:

- Scenario 1: Expected Savings
- Scenario 2: Evaluated Savings
- Scenario 3: High Case Evaluated Savings
- Scenario 4: Low Case Evaluated Savings
- Scenario 5: RTF's Proposed Deemed Savings, utilizing Eastern Idaho-specific savings and cost estimates (2010).

Table 3 presents a summary of program cost-effectiveness from 2006 to 2008 for each of the scenarios described above using Idaho-specific assumptions.

Table 3. Cost-Effectiveness Summary for the Program – 2006-2008

Cost-Effectiveness Test	Benefit-Cost Ratio				
	Scenario 1: Expected Savings	Scenario 2: Evaluated Savings	Scenario 3: Evaluated Savings High Case	Scenario 4: Evaluated Savings Low Case	Scenario 5: Proposed RTF Savings
Total Resource + Conservation Adder (PTRC)	1.10	0.43	1.12	0.05	1.10
Total Resource No Adder (TRC)	1.00	0.39	1.02	0.05	1.00
Utility (UCT)	1.45	0.57	1.47	0.07	1.80
Ratepayer Impact (RIM)	0.61	0.38	0.63	0.06	0.67
Participant (PCT)	1.82	1.05	1.79	0.66	1.61

Conclusions

Overall, the program is successful in getting customers engaged in systematic equipment replacement, which helps minimize pumping energy and wasted water and improve overall operational efficiencies. However, it remains difficult to normalize both pre- and post-installation conditions for water and cropping practices and measure the electric energy savings through field studies and billing analysis.

Most of the participating customers are very satisfied with their involvement in the program and with the performance of the installed energy-efficiency measures. Table 4 presents customer satisfaction with the program as a whole, as well as their satisfaction with the measures installed through the program. In addition, over 97 percent of surveyed participants indicated they would participate in the program again.

⁶ This method is consistent with the Model Energy Efficiency Program Impact Evaluation Guide authored by the EPA as part of the National Action Plan for Energy Efficiency.

Table 4. Overall Satisfaction with the Program

Rating (1-10)	Program Satisfaction (Number of Respondents)	Measure Satisfaction (Number of Respondents)
10 – Extremely satisfied	46	59
9	25	29
8	26	24
7	14	3
6	4	0
5	3	4
4	1	0
3	0	0
2	0	0
1 – Extremely Dissatisfied	0	0
Total	119	119

Cadmus has drawn several other conclusions, which are summarized below:

- At the onset of the evaluation, the field team recognized that measuring savings for systems where measure installations were limited to the exchange of nozzles, gaskets, drains, and/or the installation pivot packages would be difficult to do through billing analysis and, even after normalizing with the best available water and cropping history data, might yield inconclusive results. The impact analysis reaffirmed this complexity, but identified the opportunity to educate growers on more systematic approaches to measuring and controlling water application.
- Due to the variation in savings observed in the results of the field work, true program savings are likely to be somewhere between the evaluated savings values and the original program and RTF engineering estimates.
- The RTF estimated savings for measures equivalent to those incented through the program yield a realization rate in excess of 100 percent when compared to PacifiCorp's expected savings.
- Despite a low evaluated savings realization rate, the installed measures have a beneficial impact on the irrigation systems. When old worn-out components are replaced with new ones, a system will perform better. In the case of an irrigation system, that typically means that water is more efficiently distributed and uniformly applied. However, without precise tracking of water application using established water management techniques, evaluation approaches that rely on billing analysis may continue to yield inconclusive results.
- While many participants had general plans to replace their equipment eventually, most would not have replaced all of the equipment covered by the program. Half would not have been able to undertake upgrades for several years without the program.
- Energy efficiency was reported by survey respondents as being important, primarily because of the cost savings. Participating irrigation equipment vendors reported that some customers were reluctant to invest in the program measures because of the up-front costs.

- Survey respondents reported that although energy efficiency is important, they often don't have the necessary technical knowledge to address it.

Recommendations

- Collect information on water application and cropping practices from participating sites as part of the participation process.
- Promote overall grower education on water management and tracking practices. Growers need to know that potential energy savings achieved by replacing equipment may be substantially increased by implementing irrigation water management.
- Refine program marketing to decrease confusion between the Irrigation Energy Savers and Direct Load Control programs, and to decrease customer concerns regarding system shut-off.
- Consider increasing incentives, particularly for linear and pivot sprinkler packages, to get more customers involved.
- Engage an evaluation firm to design a pre/post evaluation strategy to refine the savings estimates.

Introduction

Program Description

The Irrigation Energy Savers Program offers Idaho customers under Rocky Mountain Power's Schedule 10 the opportunity to increase the efficiency of their agricultural irrigation systems through implementation of energy-efficiency measures and education. The program offers the following prescriptive and custom incentive options:

- Prescriptive Incentive Options:
 - Equipment exchange (nozzles, gaskets, drains)
 - Pivot and linear equipment upgrades
- Custom Incentive Options:
 - System consultations and pump tests (service incentives)
 - System analyses (service incentive)
 - \$0.12/kWh, up to 50 percent of the eligible costs, for site-specific projects that save energy as determined by the program administrator.

The prescriptive incentive options are available to customers who wish to replace existing equipment with qualifying new equipment, while the custom options are available for customers wishing to install new equipment or expand or redesign their existing system. Specifically, the equipment exchange option is for customers with handlines, wheellines, and solid set sprinkler systems, and requires participants to exchange their worn nozzles, gaskets, or drains for equivalent new equipment. The pivot and linear system upgrade option is available for customers with center pivot and linear move systems and provides incentives for the replacement of existing equipment with new low pressure drains, sprinkler pressure regulators, or sprinkler packages.

The custom incentive options were designed to address system upgrades not included in the prescriptive incentive offerings. The program provides customers with service incentives consisting of system consultations and pump tests to help them determine the pumping efficiency of their system and to suggest efficiency improvements. The system analysis component provides a service incentive, in addition to supporting calculations, for incentives available on equipment installed as part of a system expansion or redesign. Customers who are adding capacity, changing their water source, or replacing all or part of their system may qualify for incentives under the system analysis component.

Customers interested in participating in the program can choose from a list of participating vendors in Rocky Mountain Power's service territory or contact the program administrator. A list of participating vendors is available on the Company's web site.

The program was administered by Franklin Soil and Water Conservation District and Rocky Mountain Power from 2006-2008. In 2009, Nexant assumed implementation responsibilities.

For the prescriptive incentive offers, the program administrator performed an on-site inspection on a statistically significant sample to confirm pre- and post-installation conditions, and to verify the accuracy of applications and incentives paid. Appendix A of this report presents process flow diagrams illustrating how the Irrigation Energy Savers Program operates.

Expected Savings

At the onset of the evaluation, Cadmus developed a participant-level database from vendor invoices and records of program implementation to supplement the measure-level expected savings PacifiCorp provided. Expected savings as indicated by PacifiCorp total 7,003,117 kWh. The measure-level database developed by Cadmus captured a total of 7,002,101 kWh in expected savings for projects with a valid Site ID, a difference of only 0.015 percent when compared to PacifiCorp's records. Therefore, the participant-level database developed by Cadmus was used to determine the number of individual measures installed through the program and the expected savings used to calculate the program realization rate, which is discussed in a later section.

According to implementation records, the program incented 222,234 unique measures from 2006-2008, with expected savings of 7,002,101 kWh. Irrigation Energy Savers Program customers exchanged 81,791 nozzles, 127,939 gaskets, and 11,447 drains, and purchased 782 pressure regulators and 187 sprinkler packages. In addition, program implementers performed 81 system consultations and 7 system analyses. Measures were installed on at least 610 unique service points.⁷ Table 5 presents expected energy savings by measure. Gasket exchanges represented the greatest percentage of program expected savings at 44 percent, followed by sprinkler packages at 29 percent.

Table 5. Expected Energy Savings by Measure

Measure	Number of Installations	Expected Savings	
		kWh	% of Total
Nozzles	81,791	973,313	14%
Gaskets	127,939	3,108,918	44%
Drains	11,447	278,162	4%
Pressure Regulators	782	88,366	1%
Sprinkler Packages	187	2,018,104	29%
System Consultations	81	259,200	4%
System Analyses	7	276,038	4%
Total	222,234	7,002,101	100%

⁷ Measures exchanged as a single transaction were often installed across several sites, but not all of the sites were specified at the time of exchange. Therefore, there is some imprecision surrounding the exact number of affected sites. However, the number of unknown sites was not significant.

Impact Evaluation

Evaluation Approach

To review and evaluate Rocky Mountain Power's Irrigation Energy Savers Program in Idaho an irrigation field evaluation plan was developed by the Cadmus team and presented to Rocky Mountain Power. This plan laid out procedures for both the collection and analysis of data.

Overview of the Plan

The Irrigation Energy Savers Program in Idaho offered several possible measures:

1. Exchange: Growers exchanged old nozzles, gaskets, and/or low pressure drains for new ones.
2. Non-Exchange: Growers purchased new sprinkler packages and/or pressure regulators for pivots.
3. System Consultation: A consultant met with the grower to conduct a site inspection of the irrigation system and discuss possible changes, including exchange and/or non-exchange measures, which could be implemented to reduce power usage.
4. System Analysis: Similar to a system consultation, but included measurements of system parameters (i.e. flow rates, pressures, power usage, etc.), the calculation of potential savings for identified system modifications, and the installation of energy-efficient equipment.

A popular non-exchange measure that was tied to system analyses was the installation of a variable frequency drive (VFD). A VFD is used to control a pump motor so that the discharge pressure can be maintained regardless of the discharge rate. Reducing the pumping head when lower discharge rates are needed reduces the power used.

From records of program implementation and participation, a random sample set of participants was identified by measure and by year of implementation. The sample set was adjusted when individual participants could not accommodate a field evaluation of their system within the window allocated to complete the field work. Additional sites were selected as replacements for the sites that could not accommodate a field visit. The target number of projects to be evaluated was 140. The Cadmus team performed site visits for 79 unique participants representing 123 sites and 140 projects.

The utility records for three years prior to and up to three years after the implementation of measures were compiled for each account in the sample. Seasonal cropping and weather data for these same years were also documented for each participant in the sample. The crop and weather data were used in the analysis phase to normalize the energy usage by determining energy usage per required unit volume of water pumped. Where possible the pumps associated with the meter records were flow tested by the field evaluation teams using an ultrasonic (non-invasive) portable flow meter. The volume of water pumped was based on these actual field flow measurements and the documented historic hours of operation. These normalized records were

used to compare the energy usage before and after measure implementation. If the flow could not be measured directly, most often because systems that had been shut down for the season, the team utilized available information (i.e., pump and motor sizes, measured lifts, reported operating pressures, system sizes and package rates, and the monthly demands (kW) from the utility records) to estimate the typical pumping conditions. Any inaccuracy that resulted from these estimates was applied to both pre- and post-installation conditions and therefore minimized.

Each recruited participant was interviewed and an on-site visit was conducted. During each visit, an inspection of each affected system was made to:

- Verify that the measure components were present and operating as intended
- Measure operational parameters, such as flow rates and pressures, while the system was operating under normal conditions
- Gather cropping history corresponding to utility record years
- Verify baseline assumptions
- Document any changes to system operations post implementation

Based on the site visit findings, the post-implementation energy usage was calculated and compared to the pre-implementation usage to determine the verified energy savings.

Site Visit Protocol

During each site visit, the following information was gathered through customer interview questions, field observations, and measurements. For the purpose of the field measurements, the system needed to be operating. This was not always possible due to the farm's irrigation schedule and other operational practices. In these cases, as much information was gathered as possible. For the convenience of the participant, the field staff gathered all relevant field data while the system was operating to avoid system starting and stopping.

Interview Questionnaire: During each site visit, the participant was asked some basic questions, such as:

- What measure(s) was (were) implemented and when? This was to confirm the records provided.
- What were the crops grown during the three years before and up to three years after these changes?
- How do you decide to irrigate (hours per day to irrigate, how often to change sets, time interval per pivot revolution, what pressure, variable flow operation)?
- Have there been any changes to the operation of the system since measure implementation (number of irrigations, frequency of irrigations, length of irrigations, operating pressure)?
- Have there been any other changes made (system conversion, pump rebuild or replaced, other efficiency measures, changes in well water conditions)?

System Inspection: Each system was visually observed to verify that the documented measures had actually been implemented.

- Nozzle exchange/replacement: SAE drill bits were used to validate nozzle sizes. If nozzles were not replaced, the age was estimated and the wear measured using drill bits.
- Gasket and/or drain exchange/replacement: joints and/or drains were inspected for leaks.
- Regulator and/or sprinkler package replacement: a spot check of the system components was made to identify and verify that appropriate types were installed.

Field Measurements: Where applicable, the following measurements were made during each site visit:

- Using an ultrasound flow meter, the total irrigation flow rate was measured.
- Pumping lift was measured, when practical. For low lift systems, this measurement was made using a tape measure. For well systems, this lift was to be measured using an airline, if in place, or an e-tape using available access port(s) when available. However, in cases where no access ports or airlines were found, Cadmus relied on information provided by the growers – e.g. how deep the pump was set in the well. If the grower reported no changes to the well or pump system, this value was estimated using the same assumptions for pre- and post-installation conditions.
- The pump discharge pressure was measured using an accurate pressure gauge.
- For booster pumps the incoming pressure was also measured, if possible, using an accurate pressure gauge.
- The type and size of fittings and/or valves between the free water surface and the point where pressure measurements were made was documented. A picture was taken of the pumping station as part of this documentation, including pump nameplate data if available.
- For instantaneous power usage, the revolutions or pulses on the utility meter were counted per time interval and the meter constants (K_h , PTR, and Multiplier), as displayed on the meter face, were documented. Other loads on the pumping station utility meter, such as pivot motors, end gun and system booster pumps, were noted and disaggregated from the total.
- A basic map of the system layout was sketched showing pipeline types, sizes, and lengths, as well as the position of all laterals and/or pivots during the time of the visit.
- For each irrigation lateral in operation, the pressure at the first and last sprinkler was measured using an accurate pressure gauge and pitot tube, while the sprinkler system was operating normally.
- For set-move and solid-set systems, the distances between sprinklers and between risers or laterals were measured.
- The lengths of pivots, both to the end of steel and of total coverage, were determined through farm records as available from project files or by field measurement.

Analysis of Field Data

In order to determine the effectiveness of measures implemented, the following calculations were performed using the field measurements and utility records:

1. Head losses associated with the fittings and/or valves were estimated from field observations and the measured flow rate.
2. The work being done by each pump, the water horsepower (WHP) was calculated using:

$$\text{WHP} = Q \times \text{TDH} / 3960$$

where: Q = amount of system water flow in gallons per minute (gpm)
 TDH = total dynamic head in feet (ft), based on lift, head losses, and pressures

3. The electrical demand for each pump motor was calculated from the count of utility meter revolutions or pulses per time interval and the corresponding meter constants:

$$\text{Demand (kW)} = 3.6 \times [\text{Rev or Pulse}] \times \text{Kh} \times \text{CTR} \times \text{PTR} \times \text{Multiplier} / \text{Time interval (sec)}$$

4. The demand was converted to electrical horsepower by:

$$\text{EHP} = \text{Demand} / 0.746$$

5. The overall efficiency of the pumping unit was then calculated by:

$$\text{Eff}_{\text{overall}} = \text{WHP} / \text{EHP} \times 100$$

6. The rate of power usage to pump a volume of water was then calculated by:

$$E^* (\text{kWh/acre-foot}) = 1.0227 \times \text{TDH} / (\text{Eff}_{\text{overall}} / 100)$$

7. For each of the three years before the first measure was implemented and up to three years after, the annual crop water requirement was estimated for each field and/or crop. These estimates were based on the reported weather and crop water requirements from the AgriMet Station closest to the particular system. There are four AgriMet Stations in eastern Idaho at Ashton, Fort Hall, Kettle Butte, and Montevue. It is important to note that these are only estimates because they cannot account for variations in weather conditions between where the system is and even the closest station, nor the differences in planting dates. Because the field work and analysis was undertaken during the 2010 season, only partial crop water requirement data were available.
8. Using these estimated crop water requirements and the acreage of each field and/or crop, the total volume of crop water required was calculated. This represents the net irrigation requirement to fully satisfy the entire crop water requirement. If more water is applied, over irrigation has occurred, and if less water is applied deficit irrigation has occurred. No irrigation system can apply water in perfect uniformity. Therefore, to ensure that the crop water requirement is satisfied across each field, some over irrigation is required. On the other hand, some crops such as wheat may be deficit irrigated to save the water for other higher value and water-sensitive crops such as potatoes.
9. For each of the three years before the first measure was implemented and up to three years after, the annual power usage of the pump station was obtained from the utility. If the utility meter measured power for uses other than just the pump station or pump(s) in

question, that usage was estimated and subtracted from the total usage. This accounting for other uses was subjective and may have reduced the accuracy of the calculations for the particular systems. This information was provided by the growers while the field team was on site. Because the field work and analysis was undertaken during the 2010 season, only partial power usage records were available for 2010.

10. Dividing the total annual power usage by the rate of power usage (E^*) gives the total volume of water pumped that year. Then dividing the volume of water required for irrigation by the volume of water pumped gives an indication of the overall irrigation efficiency. As previously mentioned, an irrigation efficiency of less than 100 percent indicates some degree of over irrigation and, conversely, one higher than 100 percent indicates deficit irrigation. The irrigation efficiencies calculated for each system were for the entire system, not for a specific field or crop. Average irrigation efficiency for both the three pre-measure years and post-measure years were calculated. Differences in these pre- and post-efficiencies can indicate changes in irrigation practices.

Since only partial crop water requirement data and power usage records were available for 2010, that year was largely excluded for use of comparison. Additionally, 2009 was an unusually wet year and farmers reacted and scheduled their irrigations differently as a result of the rain fall. The timing of the rain events and the different stages of crop growth affected the farmer's perception of the rain's benefit; consequently, this resulted in some extreme irrigation efficiency numbers in 2009. If we could not determine a reasonable cause for the extremity we disregarded these numbers when determining the averages.

11. For each year after the first measure was implemented the following calculations were made. First, dividing the volume of crop water requirement by the pre-measure average irrigation efficiency provided the water quantity that would have been pumped as the system existed and was operated prior to the implementation of the measure. Second, multiplying the volume of water that would have been pumped by the previously calculated rate of power usage (E^*) gives the total usage of power that would have been required. Third, subtracting the actual power usage from this calculated-required-usage gives the estimated savings. And fourth, dividing the savings by the calculated-required-usage gives the percent savings. The calculated usages and savings for each year were also averaged.

For the purposes of the impact evaluation, Cadmus placed sites into one of two categories, depending on program activities and measures installed at the site. The first category consisted of sites that participated in the equipment exchange and pivot and linear system upgrade components of the program, including sites at which a system consultation and/or system analysis was also performed. The second category included those sites that received only a system consultation and/or system analysis. Appendix B presents site visit results.

To calculate evaluated savings, Cadmus determined annual participant usage and multiplied this value by the percent savings results from the site visits. To calculate total participant usage, Cadmus pulled usage data for each site at which at which measures were installed. Usage data for the year prior to the first year of participation was utilized. If energy usage was zero in the year prior to participation, Cadmus used data for the first year of participation. If energy usage

data was zero in the year of participation, but participation occurred after the irrigation season began, Cadmus used data for the year following participation.

In some cases, a valid site ID was not documented in the records of program implementation. Cadmus used to build the participant data set. In these instances, Cadmus utilized utility usage records to compile a list of all site IDs associated with the account or meter number listed in the invoice (or provided by PacifiCorp). If only one site ID was associated with the account or meter number, Cadmus assumed this was the site where measures were installed. If multiple site IDs were associated with the account number, Cadmus retrieved usage data for all associated site IDs and used the site with the largest annual usage (in the year prior to the first installation) in the calculation of total annual usage. Usage for each site was only counted once. If usage data did not correlate with participation records, or if Cadmus was unable to determine the correct site ID or a pool of potential site IDs, measures and savings associated with the unverifiable site IDs were excluded from the analysis unless they were also associated with a valid site ID. In total, 11 sites, representing 59,389 kWh of expected savings, were not included in the calculation of expected savings or in the subsequent analysis.

Evaluated Savings and Realization Rates

As discussed above, Cadmus calculated percent savings for each measure category and multiplied this by the total usage calculated for that category to determine evaluated energy savings. Overall, Cadmus calculated energy savings at a precision of ± 551 percent for the equipment exchange, pivot and linear system upgrade, and combined project category. The system consultation and/or system analysis only category was calculated at ± 86 percent precision. Both categories are reported at a 90 percent confidence interval. Due to this high uncertainty, Cadmus concluded that the savings estimates are inconclusive and calculated high case and low case savings based on the upper and lower bounds of the precision analysis.

Cadmus calculated an energy savings realization rate for both categories as the ratio of evaluated savings to expected savings. As discussed, evaluated energy savings reflect any deviation from expected conditions observed during the on-site verification. Overall, the program achieved a 29 percent energy savings realization rate when considering only evaluated savings, as seen in Table 6, which presents energy savings and realization rates by measure category, including the high and low case evaluated savings estimates.

Table 6. Evaluated Energy Savings by Participation Category

Participation Category	Measure Count	Expected Savings Estimate (kWh)	Evaluated Savings ⁸		Evaluated Savings High Case		Evaluated Savings Low Case	
			Savings (kWh)	Realization Rate	Savings (kWh)	Realization Rate	Savings (kWh)	Realization Rate
Equipment Exchange, Upgrade, and Combined Projects	222,175	6,663,442	447,864	7%	2,917,476	44%	0	0%
System Consultation and / or System Analysis Only	59	338,659	1,583,142	467%	2,938,012	868%	228,273	67%
Total	222,234	7,002,101	2,031,006	29%	5,855,488	84%	228,273	3%

Discussion of Results

Field Observations

The vast majority of participants were very open to have their systems inspected. In fact, a majority went out of their way to facilitate the site visits. In spite of this openness and interest in the audits, many were unclear as to what measure was installed on which system and when. On a small number of audits, the farmer would direct a team to a system that did not match the utility site ID associated with the sample, but would insist that measures were installed on that system. In these cases, the team made sure that the power records used for evaluation matched the actual field read utility site ID and/or meter number.

A major issue affecting the ability to assess the effectiveness of the nozzle and/or gasket exchange for handlines was how the portable pipe is stored during the winter. At the end of an irrigation season, portable pipe is hauled out of the fields and stacked. If a farmer has multiple fields, the pipe is typically brought to a common stack yard. In the spring, the pipe is hauled back to the fields, but not necessarily to the same field it came out of the previous fall. After a few seasons, the result is that the pipe is shuffled around the farm, making savings analysis difficult.

Another issue affecting the assessment of all of the measures was the fact that most systems were not on a single field associated with just one pump or meter. Most systems were a blend of handlines and/or wheel lines in corners around pivots, or in small odd-shaped fields. In some cases, the team observed systems with numerous fields, of which only a portion of the total acreage or flow was associated with the installed measure, or systems with multiple measures installed over a period of several years. And in some cases, farms had pumps or meters from multiple locations supplying a common pipeline system on which only one or a few measures were installed. All of these factors increased the uncertainty of the analysis.

When asked how soil moisture was measured and the decision to irrigate was made, the most common answer given by the farmers was to use a shovel and the 'feel' method. With experience, an irrigator can learn to gage the relative moisture content of a soil by feeling it. This method is subjective, however, and does not allow for precise control. Some farmers stated that they used a local consultant to monitor soil moisture and make recommendations for irrigation scheduling for their fields.

⁸ Due to the broad error band around the evaluated results, the results are inconclusive.

For most farmers, irrigation scheduling is driven by the number of sets needed to cover a field and the number of moves per day, usually one (24 hour set time) or two (12 hour set time), rather than by the soil moisture. Water is more accurately delivered with replaced gaskets and nozzles; however, pumping time is not reduced if the grower does not adjust the irrigation schedule to account for this improved efficiency. Many of the pump panels had timers whereby set times could be precisely controlled, but their use was seldom observed. Unless water application is more precisely tracked using well established water management techniques, the energy savings associated with the replacement of gaskets and nozzles will remain difficult to measure through inferential methods such as billing analysis. This results in the low realization rate for the measure category that included equipment exchanges.

When asked their opinion of how effective the measures were, growers provided various answers. Typically, all farmers thought the programs were worthwhile and that their systems had improved. Those with the strongest opinions were those who installed VFDs as a result of a system consultation or system analysis. All believed strongly that the VFD had reduced their power usage. They were more enthused, however, about how the VFD had simplified the operation of their system, reducing both the risk of over pressurizing their system and the hours required to make changes.

RTF Estimated Savings

The Regional Technical Forum (RTF) was formed in 1999 with the intent of providing standardized protocols for regional entities to use when determining energy savings and impacts. In that capacity, the RTF originally approved deemed savings for irrigation measures in 2005. The RTF subsequently established a subcommittee in 2009 to review the original assumptions and provide recommendations on potential improvements or corrections. The subcommittee revised the deemed savings and measure costs based on a review of available literature, proposed technologies, and the experience of those serving on the subcommittee. The RTF subcommittee requested and reviewed project level information provided by the Company that was obtained from Idaho Irrigation Energy Savers participant projects.

To provide an alternate analysis that minimized the complexity of normalizing for water and cropping practices, Cadmus calculated savings using the revised estimates from the RTF. Table 7 presents estimated savings based on proposed RTF savings⁹ and the number of measures installed through the Irrigation Energy Savers Program.

⁹ <http://www.nwcouncil.org/energy/rtf/meetings/2010/01/Default.htm>

Table 7. Savings Based on RTF Proposed Deemed Savings Estimates

Participation Category	Count	Expected Savings Estimate (kWh)	RTF Proposed Deemed Savings ¹⁰	Realization Rate
Equipment Exchange, Upgrade, and Combined Projects	222,175	6,663,442	8,411,549	126%
System Consultation and / or System Analysis Only	59	338,659	338,659	100%
Total	222,234	7,002,101	8,750,208	125%

Net-to-Gross

Net savings are the savings “net” of what would have occurred in the absence of the program.¹¹ Net-to-gross (NTG) is typically calculated from the results of freeridership and spillover; however, for this evaluation we only quantified freeridership. Spillover is noted separately in Section 4, but was not quantified due to the level of complexity involved in determining the potential savings associated with spillover for irrigation measures.

Freeridership

Freeridership is defined as the percentage of savings that would have occurred in the program’s absence. Cadmus quantified this amount by analyzing the results of our telephone surveys with program participants. The accuracy of self-report surveys partly depends on the respondent’s memory of their decisions. For the Irrigation Energy Savers Program, some interviewees were asked to recall actions taken four years ago. Participant candor may also be a factor, as participants’ responses may tend to reflect a “halo” effect, where customers indicate they would have made the energy-efficient choice because they perceive it to be the response preferred by the interviewer.

Cadmus fielded two participant surveys; one that focused on the exchange aspect of the program (70 respondents) and one that focused on the non-exchange aspects (49 respondents), resulting in separate freeridership estimates for each group. Respondents were asked several questions about what influenced their energy-efficient actions. Based on responses to these questions, Cadmus determined freeridership to be 27 percent among exchange participants and 26 percent among non-exchange participants, or 26.5 percent as a whole. For this evaluation, freeridership was the only factor used to calculate the net-to-gross (NTG) ratio.¹² Applying the NTG ratio of 73.5

¹⁰ The RTF did not propose deemed savings estimates for sprinkler packages, system consultations, or system analyses. Sprinkler package savings are based on the RTF per unit savings estimates for individual components, and an estimate of the number of components included in a typical sprinkler package incented by the Irrigation Energy Savers Program. Savings for system consultations and analyses were carried over from the Program’s expected savings estimates.

¹¹ Model Energy Efficiency Program Impact Evaluation Guide authored by the EPA as part of the National Action Plan for Energy Efficiency.

¹² This method is consistent with the Model Energy Efficiency Program Impact Evaluation Guide authored by the EPA as part of the National Action Plan for Energy Efficiency.

percent to the evaluated savings listed in Table 1 resulted in net program savings of 1,492,790 kWh¹³ (Table 8).

Table 8. Freeridership Analysis (All Respondents), 2006-2008

	Net-Gross-Ratio (1-Freeridership)	Evaluated Energy Savings (kWh)	Net Energy Savings (kWh)
Exchange, Non-Exchange, and Combined Projects	73.5% (+/-8%)*	447,864	329,180
System Consultation and / or System Analysis Only	73.5% (+/-8%)*	1,583,142	1,163,610
Combined Score / Total Savings	73.5% (+/-8%)*	2,031,006	1,492,790

* Reported at 90% confidence

Conclusions

At the onset of the evaluation, the field team recognized that measuring savings for systems where measure installations were limited to the exchange of nozzles, gaskets, drains, and/or the installation pivot packages would be difficult to do through billing analysis and, even after normalizing with the best available water and cropping history data, might yield inconclusive results. The results presented in Table 6 reaffirmed this complexity, but identified the opportunity to educate growers on more systematic approaches to measuring and controlling water application.

Actual program savings are likely to be somewhere between the evaluated savings values and the original program and RTF estimates. The RTF estimated savings for measures equivalent to those incented through the program yield a realization rate in excess of 100 percent as compared to PacifiCorp's expected savings.

Despite a low savings realization rate, the installed measures have a beneficial impact on the irrigation systems. When old worn-out components are replaced with new ones, a system will perform better. In the case of an irrigation system, that typically means that water is more efficiently distributed and uniformly applied. However, without precise tracking of water application using established water management techniques, evaluation approaches that rely on billing analysis may continue to yield inconclusive results.

Recommendations

- Collect information on water application and cropping practices from participating sites as part of the participation process.
- Promote overall grower education on water management and tracking practices. Growers need to know that potential energy savings achieved by replacing equipment may be substantially increased by implementing irrigation water management.

¹³ Net energy savings were only calculated for evaluated savings.

Process Evaluation

Process Evaluation Overview

With customer, vendor, implementer, and Company perspectives in mind, the Cadmus team conducted a process evaluation of the Irrigation Energy Savers program to assess what has worked well and what can be improved. This evaluation relied on interviews with utility and program staff, as well as on surveys of participants, nonparticipants, and participating irrigation equipment vendors. Interview and survey activities also informed Cadmus' evaluation of spillover and freeridership impacts.

Due to potential differences in the decision-making process associated with different program offerings, Cadmus fielded two participant surveys; one focused on the exchange aspect of the program and one focused on the non-exchange aspects. As discussed above, a participant database was developed based on invoices and outputs from PacifiCorp's records; Cadmus used the database to develop the survey sample frames. Cadmus randomly selected participants for both the exchange and non-exchange surveys. In addition, Cadmus interviewed nonparticipating customers, program implementers, and irrigation equipment vendors. Survey instruments and interview guides can be found in Appendices C, D, E, F, and G.

In total, 198 interviews and surveys were conducted for the process evaluation, as shown in Table 9.

Table 9. Process Evaluation Samples

Group	Goal	Achieved
Exchange Participants	70	70
Non-Exchange Participants	70	49
Nonparticipants	70	70
Implementers	3	4
Participating Equipment Vendors	7	5
Total	220	198

Both exchange and non-exchange participants reported energy efficiency to be very important to the operation and management of their businesses, as demonstrated by a median score of 9 on a scale from 1 to 10. When asked why energy efficiency is of high importance, 67 percent of respondents mentioned cost savings.

Among respondents from both the exchange and non-exchange programs, customers devoted an average of 16.2 percent of their annual operating costs to electricity.

Participation and Enrollment

Program staff noted that growers are a tight-knit community, and that word-of-mouth is a major factor in marketing and promoting the program (a statement which is supported by the participant survey results). As shown in Table 10, participants heard about the program from a

wide range of sources, with the most common being irrigation contractors and equipment dealers and word-of-mouth.

Table 10. How Participants Learned of the Irrigation Energy Savers Program

Source	Number of Exchange Respondents	Number of Non-Exchange Respondents
Irrigation contractor / Equipment dealer	30	20
Word-of-mouth: Family, friend, or neighbor	14	8
Word-of-mouth: Another business colleague	8	5
Rocky Mountain Power account representative	7	3
Printed material or outreach materials sent by the program	4	6
Other Rocky Mountain Power staff	3	3
Participation in other Rocky Mountain Power programs	1	3
Other	4	3

*Multiple responses allowed.

When asked why they participated in the Irrigation Energy Savers Program, both exchange and non-exchange participants cited replacing old equipment and saving money on their electric and water bills most often. Table 11 presents participant responses.

Table 11. Reason for Participating in the Program – Equipment Exchange Measures

Reason	Number of Exchange Respondents	Number of Non-Exchange Respondents
To replace old or broken equipment	41	11
To save money on electric bills	21	24
To save money on water bills	22	11
To save energy	8	9
To reduce maintenance costs	4	5
Part of a broader maintenance or renovation	3	5
To obtain a program incentive	1	7
Other	2	7

*Multiple responses allowed.

A few exchange participants reported having some concerns when they initially heard about the program. Three of them were not sure if the information they had was accurate, but then found that the program worked as stated. One respondent noted that certain parts of his or her system were not covered by the equipment exchange program.

Non-exchange participants also voiced some initial concerns. Thirty-seven percent of those surveyed had concerns when signing up for the program. As shown in Table 12, the most common concerns were related to the shut-off period and the effectiveness of the equipment replacement packages. The reference to a shut-off period indicates some confusion between the Irrigation Energy Savers program and the irrigation load control program.

Table 12. Initial Non-Exchange Participant Concerns

Reason	Number of Respondents
Shut off period	6
Effectiveness and reliability	4
Paperwork	2
The representative	2
Cost of participation	2
Length of the contract	1
Water metering	1

Most non-exchange applications went smoothly, with 16 percent of respondents (8 total) reporting problems with the application process. Five said there were delays in the application process, including one case of lost paperwork.

When asked what they would like changed about the application process, one exchange participant suggested that there could have been more advertising from Rocky Mountain Power or from a source other than the irrigation contractor. Non-exchange participants voiced little need for application process changes. Feedback from participants suggested that:

- The process should be quicker or require less paperwork,
- The website should be easier to navigate,
- There should be an easier way to contact a representative, and
- There should be an option to apply for the program directly, instead of through a third party.

After participation in this program, all but one exchange and two non-exchange respondents indicated they would participate in this program again.

Most participating equipment vendors made contact with prospective customers on the Energy Savers program through their previous work with those customers, or through advertising. In addition, the vendors tapped into their strong network of contractors to introduce customers to the program and get them involved. Vendors stated that Rocky Mountain Power provided some additional customer leads to them. Customers heard about the Energy Savers program from the equipment dealers or through advertisements on the Internet and television, as well as word-of-mouth.

Results from the nonparticipant interviews suggest there is some confusion between the Irrigation Energy Savers and Direct Load Control programs. Thirty-seven nonparticipants did not participate in the Irrigation Energy Savers program because they did not want to lose control of their irrigation schedule, and several expressed concern that irrigation interruptions would occur when they needed to irrigate the most.

Energy-Efficiency Measures

Exchange Measures

The program staff Cadmus interviewed noted that they are interested in increasing the number of measures offered through this program. Several of the survey respondents had similar sentiments which are discussed later in this report.

The irrigation equipment replaced under the program came in a range of conditions. Most frequently, respondents reported exchanging equipment that had problems, but was still working. In addition, 56 percent of respondents mentioned that in their opinion the replaced equipment had been wasting water, and 27 percent mentioned that the equipment had been wasting energy (Table 13).

Table 13. Condition of Exchanged Equipment

Reason	Number of Respondents
Old equipment had problems, but was still working	35
Old equipment in working condition with no problems	11
Old equipment had failed or burned out	10
Old equipment wasted water	39
Old equipment wasted energy	19

The vast majority of exchange respondents reported being satisfied with the performance of the new equipment; on a scale of 1 to 10, the median score was a 9. Only 3 percent had a neutral opinion, and none reported being dissatisfied.

Non-Exchange Measures

Seventy-eight percent of non-exchange respondents (38) applied all of the recommendations that were suggested by the program. Cost was the reason cited by 16 percent of respondents (8) who did not implement all of the recommendations. One participant hadn't had time to make the changes yet, and one did not replace one pump, as it was no longer necessary in his or her system.

Forty-three percent of non-exchange respondents replaced existing equipment through the program, 12 percent installed only new equipment, and 20 percent did both. The remaining respondents participated through other means. As was the case with exchange participants, the condition of the equipment replaced through the Program varied. As shown in Table 14, respondents most commonly replaced old equipment that had problems, but was still functional.

Table 14. Condition of Replaced Equipment

Reason	Number of Respondents
Old equipment had problems, but was still working	24
Old equipment had failed or burned out	3
Old equipment in working condition with no problems	7
Expanding services or production line; wanted efficient equipment	4
Don't Know	1

Respondents were satisfied overall with the performance of the measures. On a scale of 1 to 10, the median satisfaction rating was an 8, and the lowest scores were two 5's. Both of the respondents that gave a rating of 5 did not feel that their sprinkler packages were worth the work to install them. In particular, one respondent found his or her sprinkler systems to be too restrictive and the other had trouble turning the sprinkler system on after the new equipment was installed.

Irrigation Equipment Dealers

Participating vendors stated that nearly all of the customers reacted favorably to the Irrigation Energy Savers program, including a big push for the program when it was first introduced. The efficiency options that were most popular with customers were equipment exchanges, particularly for nozzles and gaskets. Dealers also stated that the equipment exchange of sprinkler packages on pivot and linear systems was highly utilized. Some customers were initially skeptical about the costs and benefits of the Energy Savers program, but that once they began investing in the efficiency measures they got on-board with the program. Several participating vendors indicated that, as part of the equipment exchange, there was initially a problem with buildup of non-recyclable materials, but that over time, with the assistance of Rocky Mountain Power, they were able to effectively unload the materials.

Operational Changes

At the time they participated in the equipment exchange, 61 percent of respondents had an overall plan for increasing the efficiency of their systems. However, only 23 percent of exchange respondents changed the manner in which they operated the equipment; all of these participants said these changes were part of their overall plan to increase energy efficiency. This is consistent with the observations and savings noted in the site visits.

Sixty-six percent of non-exchange respondents had overall plans to improve the energy efficiency of their irrigation systems, and 39 percent changed the way they operated their equipment after installing the new measures. All but one made those changes as part of their overall plans to increase energy efficiency.

Installation

Forty percent of exchange respondents reported already having some of the equipment scheduled for replacement before hearing about the program, although only 29 percent had scheduled purchases specifically within their budgets. Gaskets and nozzles were most commonly

mentioned amongst those who had scheduled replacements. Drains, rain birds, sprinkler heads, hand lines, wheel lines, and pivots were also mentioned.

As mentioned earlier, many exchange respondents knew that the equipment they were replacing wasted energy or water, so they expected energy savings from these measures. Of the 74 percent that expected electric savings, 83 percent reported that the amount of electric savings met their expectations. Respondents also reported the additional benefits of improved crop quality and yield as a result of their participation in the program (see Table 15).

Table 15. Additional Benefits Associated with Exchange Measures

Additional Benefits	Number of Respondents
Crop quality	13
Yield	12
Soil conservation	5
Consistency	2
Improved operations	1

Only four exchange respondents (six percent) reported replacing equipment installed through the program. Three replaced broken or worn equipment, and one replaced gaskets with new gaskets.

Thirty-three percent of non-exchange respondents had plans for replacing some of the equipment covered by the program before hearing about the program. This primarily included sprinklers, regulators, and nozzles. Only 23 percent of respondents receiving audit or consultation services had already budgeted for that service. Thirty-three percent of installed measures were also previously accounted for in budgets.

When questioned on a measure-by-measure basis, non-exchange respondents expected electricity savings from 60 percent of the measures. Seventy-one percent of respondents indicated that their energy savings expectations were met.

Non-exchange respondents also saw additional benefits beyond energy. As shown in Table 16, the most common benefits were a more uniform distribution of water, improved crop yields, and improved crop quality.

Table 16. Additional Benefits Associated with Non-Exchange Measures

Benefit	Number of Respondents
Uniformity in water distribution	18
Improved crop yield	8
Improved crop quality	6
Reduced maintenance costs	3
Other	5

Ten percent of non-exchange respondents (four participants) reported removing equipment that had been installed as part of the program. Two respondents replaced nozzles for proper functioning of the system, and two respondents switched out equipment because they changed to gravity fed systems.

Spillover

Exchange

Prior to participating in this program from 2006-2008, 23 percent of exchange respondents had participated in an energy-efficiency program. Six participated in other programs related to irrigation equipment.

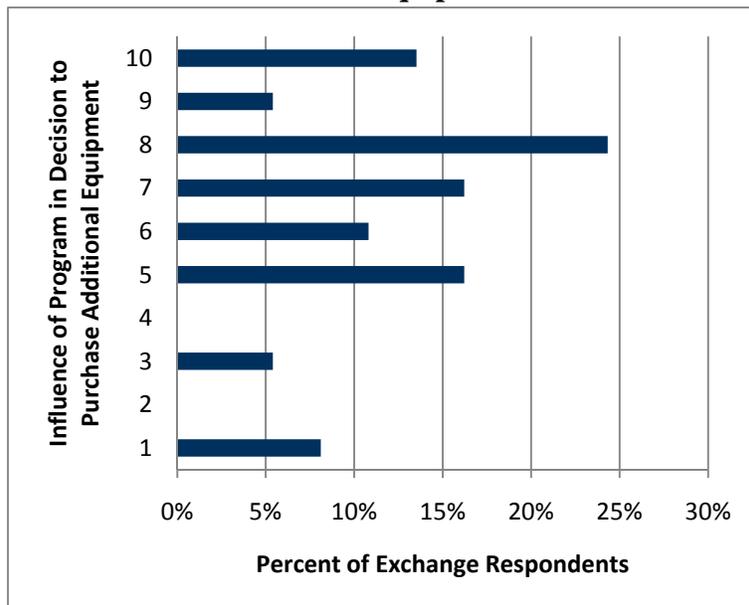
After program participation, 53 percent of respondents claim to have purchased additional energy-efficient measures on their own. These included additional nozzle and gasket replacements, as well as upgrades to pipes and lines, pumps, pivots, sprinklers, and rain birds. One individual installed a windmill (Table 17).

Table 17. Measures Installed Outside the Program

Additional Measure	Number
Pipes and lines	11
Nozzles	8
Gaskets	7
Pumps	7
Pivots	3
Rain birds	3
Sprinkler heads	3
Windmill	1
Other	8

Most respondents agree that their participation in the equipment exchange program influenced their decision to install other high-efficiency equipment; on a scale of 1 to 10, the median score was 7. These results are presented in Figure 1.

Figure 1. Influence of Equipment Exchange Component in Decision to Install Additional Efficient Equipment



Non-Exchange

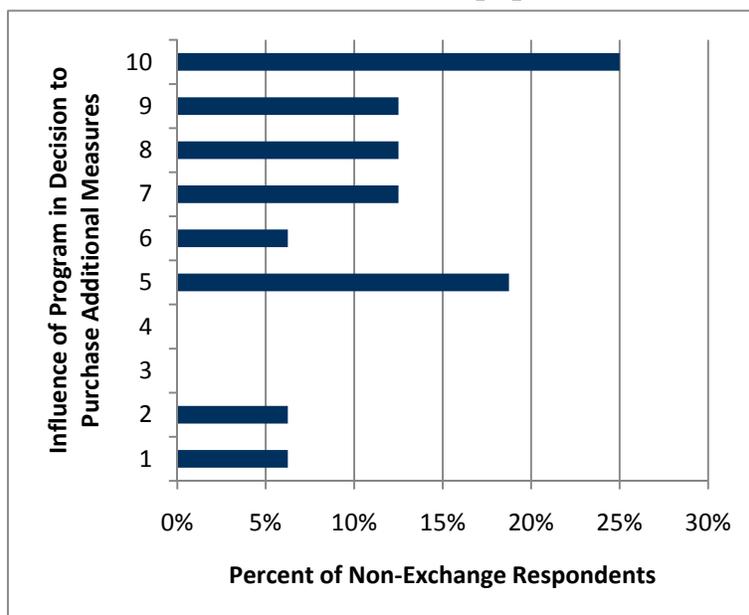
After participating in the program, 33 percent of non-exchange respondents made additional energy-efficient improvements. As shown in Table 18, the most common improvements were pumps and VFDs, followed by sprinkler packages.

Table 18. Measures Installed Outside the Program – Non-Exchange Respondents

Additional Measure	Number
Pumps	5
VFDs	4
Sprinkler packages	3
Motors	1
Rain bird	1
Risers	1
Gaskets	1
Drains	1
Pivots	1
Main line	1
Valves	1
Regulators	1
Other	2

When asked how much participating in this program influenced them to make these additional energy-efficient improvements, there was a wide range of responses, with a median score of 7 on a scale of 1 to 10 (Figure 2).

Figure 2. Influence of Influence of Non-Exchange Component in Decision to Install Additional Efficient Equipment



Energy-Efficiency Decision Making

Exchange

Exchange participants were asked a less detailed set of questions due to the nature of the exchange component and the lack of an explicit decision tree as compared to the non-exchange measures. Respondents find energy efficiency to be very important to the operations and management of their business. On a scale of 1 to 10, the median score was 9. When asked why, 74 percent of all respondents mentioned costs. Respondents devoted an average of 18 percent of their annual budgets to electricity and 9.5 percent to water bills.

Respondents were evenly split between those who felt they had sufficient technical resources in house to address the management of electric and water costs, and those who did not.

Non-Exchange Measures

Non-exchange respondents reported that energy efficiency is very important to their business. On a scale of 1 to 10, the median score of 9 was largely attributed to cost, as specified by 59 percent of respondents. Some mentioned it was a large portion of their operating budgets. Two respondents mentioned that they are dependent on energy to operate their businesses. Of the few who did not rank energy efficiency as important, three mentioned that ensuring their crop is produced is their first and foremost priority, and energy efficiency comes after that goal is met.

Despite those results, 47 percent of non-exchange respondents reported that they do not have sufficient in-house technical resources at their sites to address the management of electric and water costs. Most commonly, non-exchange participants reported a need for education and

equipment to help them gauge and monitor their energy use. Rocky Mountain Power has taken steps to address this lack of technical expertise by changing implementation contractors.

Table 19. Desired Technical Assistance

Additional Measure	Number
Education	3
Energy Use / Metering Equipment	3
More info on programs	2
Engineering assistance or information	2
Don't know what help is needed	8

For this program, 88 percent of respondents either did not need assistance or received adequate assistance from Rocky Mountain Power or Franklin Soil and Water Conservation District.

Irrigation Equipment Vendors

Participating irrigation equipment vendors reported that, overall, customers were interested in participating in the program because they were attracted by the financial incentives and recognized the need for efficiency improvements at their site. Some customers were somewhat reluctant initially to get involved in the program because of the financial investment required, but vendors said that once they showed customers that energy management efforts improved their bottom line, the customers usually invested in the program. Nevertheless, it was often a challenge to convince customers to lay out the cash up-front. Most customers were sufficiently motivated by the incentives to undertake energy efficiency upgrades following the audit.

However, some equipment vendors stated that the incentives offered by Rocky Mountain Power were a little low. In particular, some customers stated that Rocky Mountain Power should increase its incentives on sprinkler pivots and linear systems, as the incentives only covered about half the price for the product (e.g., sprinkler regulators are at least \$10 per head but the incentive was only \$6 per head). Similarly, customers noted that, while the incentives on straight board nozzles covered 100 percent of the product cost, the incentive on the flow control nozzle was \$4, which covered about half the cost. Finally, vendors noted that customers asked for incentives for some other products, such as sprinkler heads and discharge hoses from the mainline to the wheel line, and that the pump upgrade component of the program was unclear, reducing customer participation.

A couple of irrigation equipment vendors also questioned the incentive limit of \$900 per package. Specifically, they pointed out that, if a customer spends \$1000 on new equipment, then \$900 in compensation is too high. On the other hand, for a customer that spends \$5000, a \$900 incentive package is too low. These vendors stated that Rocky Mountain Power should not use a “one size fits all” incentive program, because it does not make sense in energy efficiency terms to more fully compensate the smaller systems as opposed to the larger systems.

Interaction with Rocky Mountain Power or Third-Party Staff

Exchange

Exchange respondents worked with an average of three program representatives as part of the equipment exchange. As shown in Table 20, 84 percent of exchange respondents worked with irrigation dealers, 31 percent worked with Rocky Mountain Power account representatives, and 30 percent worked with other Rocky Mountain Power staff.

Table 20. Interaction with Rocky Mountain Power or Third-Party Staff – Exchange Measures

Organization	Number of Respondents	Percent of Total
Irrigation Dealers	59	84%
Rocky Mountain Power Account Representatives	22	31%
Other Rocky Mountain Power Energy Staff	21	30%
Franklin Soil and Water Conservation District	10	14%
Installation Contractors	4	6%
Other	5	7%

Overwhelmingly, exchange respondents had positive feedback on about the program representatives they worked with. Eighty-nine percent of exchange respondents either said that their experience was good or that the people were helpful.

Non-Exchange

On average, non-exchange respondents interacted with two program representatives while participating in the program. The most common interactions were with installation contractors and Rocky Mountain Power account representatives, as shown in Table 21.

Table 21. Interaction with Rocky Mountain Power or Third-Party Staff – Non-Exchange Measures

Organization	Number of Respondents	Percent of Total
Franklin Soil and Water Conservation District	30	61%
Irrigation Dealers	26	53%
Rocky Mountain Power Account Representatives	15	31%
Installation Contractors	13	27%
Nexant Staff	9	18%
Other Rocky Mountain Power Energy Staff	0	0%
Other	6	12%

Non-exchange respondents were very pleased with the interactions they had with program representatives. Eighty-two percent provided positive feedback, stating that program representatives were easy to work with, informative and helpful when it came to questions about

both the program and the irrigation equipment. Only five respondents (11 percent) provided neutral feedback, and in four of these cases, their concerns related to slow payment or measure installation.

Irrigation Equipment Vendors

All irrigation equipment dealers reported that Rocky Mountain Power staff was easy to work with and helpful regarding the Irrigation Energy Savers program. During the 2006-2008 program cycle, some vendors expressed concerns over the time it took to receive payments from Rocky Mountain Power (e.g., 3 to 4 months), but that payment speed improved over time. However, some dealers stated the amount of paperwork for the program was a bit high.

Satisfaction

Exchange

Exchange respondents were very satisfied overall with the program. On a scale of 1 to 10, there were no scores below 6, and the median score was a 9.

Respondents made several suggestions for program improvement. Most commonly, exchange participants suggested expanding program offerings to include additional measures (mentioned six times). Nearly a quarter of exchange respondents said they would not change anything about the program.

Non-Exchange

Overall, non-exchange respondents were satisfied with the program. On a scale of 1 to 10, the median score was an 8. Only two participants reported that they would not participate in the program again: one that uses a gravity fed system, and one that did not find the program solutions to be cost effective. The most common suggestions from non-exchange participants for improving the program were increasing the incentive amount and reimbursing them faster. Other suggestions include providing a list of local contacts.

In addition, one person suggested a post-installation audit to determine the effectiveness of the newly installed system. There were also two suggestions from this group for expanding the program to include rain birds and small pivots.

Irrigation Equipment Vendors

In general, most equipment vendors stated the Energy Savers program was very effective in getting customers to make energy management changes, and participants were strong proponents of the program. For example, dealers noted that water pressure improved significantly with new gaskets and nozzles. They also stated that the incentives for most products were sufficient. However, some participants did indicate that the incentives for some products, e.g., pivot and linear sprinkler systems, were too low, and that some additional sprinkler products should be incentivized.

Conclusions

- Overall, the program is successful in getting customers engaged in systematic equipment replacement, which helps minimize pumping energy and wasted water and improve overall operational efficiencies.
- Most of the participating customers are very satisfied with their involvement in the program and with the performance of the installed energy-efficiency measures. Table 4 presents customer satisfaction with the program as a whole, as well as their satisfaction with the measures installed through the program. In addition, over 97 percent of surveyed participants indicated they would participate in the program again.
- While many participants had general plans to replace their equipment eventually, most would not have replaced all of the equipment covered by the program. Half would not have been able to undertake upgrades for several years without the program.
- Energy efficiency was reported by survey respondents as being important, primarily because of the cost savings. Participating irrigation vendors reported that some customers were reluctant to invest in the program measures because of the up-front costs.
- Survey respondents reported that although energy efficiency is important, they often don't have the necessary technical knowledge to address it.

Recommendations

- Promote grower education on water management and tracking practices.
- Refine program marketing to decrease confusion between the Irrigation Energy Savers and Direct Load Control programs, and to decrease customer concerns regarding system shut off.
- Consider increasing incentives, particularly for linear and pivot sprinkler packages, to get more customers involved.

Cost-Effectiveness Analysis

To assess cost-effectiveness, Cadmus conducted an analysis of program costs and benefits from a Total Resource Cost test perspective including a 10 percent benefit for DSM, as well as from the Participant, Program Administrator, Rate Impact, and standard Total Resource Cost perspectives, using Cadmus' DSM Portfolio Pro model. These five perspectives follow methods and guidelines consistent with the California Standard Practice Manual. The perspectives are defined as follows:

- (1) **PacifiCorp Total Resource Cost Test (PTRC):** This test examined program benefits and costs from the Company and customers' perspectives, combined. On the benefit side, it includes avoided energy costs, capacity costs, and line losses plus a 10 percent adder to reflect non-quantified benefits. On the cost side, it includes costs incurred by both the utility and participants.
- (2) **Total Resource Cost Test (TRC):** This test examined program benefits and costs from Company and customer's customers' perspectives, combined. On the benefit side, it included avoided energy costs, capacity costs, and line losses. On the cost side, it included costs incurred by both the utility and participants.
- (3) **Utility Cost Test (UCT):** From Rocky Mountain Power's perspective, benefits were achieved through avoided energy and capacity costs and line losses. Costs included any program administration, implementation, or incentive costs associated with funding the program.
- (4) **Ratepayer Impact (RIM):** All ratepayers (participants and nonparticipants) may experience increases in rates to recover lost revenues. This test included all Rocky Mountain Power program costs as well as lost revenues. As benefits, this test included all avoided energy costs, capacity costs, and line losses.
- (5) **Participant Cost Test (PCT):** From this perspective, program benefits included bill reductions. Costs included any customer contribution to the measure cost.

Table 22 summarizes various components of the five tests.

Table 22. Benefits and Costs Included in Various Tests

Test	Benefits	Costs
PTRC	Present Value of Avoided Energy and Capacity Costs with 10% Adder for Non-quantified Benefits	Program Administrative and Marketing Cost + Participant Cost
TRC	Present Value of Avoided Energy and Capacity Costs	Program Administrative and Marketing Cost + Participant Cost
UCT	Present Value of Avoided Energy and Capacity Costs	Program Administrative, Marketing, and Incentive Cost
RIM	Present Value of Avoided Energy and Capacity Costs	Program Administrative and Marketing Cost + Present Value of Lost Revenues
PCT	Present Value of Bill Savings	Participant Share of Measure Cost

Cadmus determined program cost-effectiveness for five savings scenarios:

- Scenario 1: Expected Savings¹⁴
- Scenario 2: Evaluated Savings
- Scenario 3: High Case Evaluated Savings
- Scenario 4: Low Case Evaluated Savings
- Scenario 5: RTF's Proposed Deemed Savings¹⁵

Table 23 presents selected measure-level assumptions used to generate the inputs for each cost-effectiveness scenario. In addition to savings estimates, Cadmus utilized proposed measure cost estimates and measure lives developed by the RTF to calculate cost effectiveness for the RTF scenario.

Table 23. Selected Per-Unit Assumptions Used for Cost-Effectiveness Analysis

Measure	Per Unit Savings (kWh)		Per Unit Incremental Measure Cost (\$)		Measure Life (years)	
	Original Program Assumptions	RTF Proposed Deemed Savings	Original Program Assumptions	RTF Proposed Costs	Original Program Assumptions	RTF Proposed Measure Lives
Nozzles	11.9	36.7	\$0.40	\$2.12	4	4
Gaskets	24.3	22.1	\$1.78	\$3.92	4	5
Drains	24.3	22.1	\$2.65	\$13.67	4	5
Pressure Regulators	113.0	37.6	\$8.50	\$6.13	4	5
Sprinkler Packages	10,792.0	11,204.4	\$3,820.00	\$2,936.33	4	5
System Consultations	3,200.0	3,200.0	\$0.00	\$0.00	7	7
System Analyses	55,089.5	55,089.5	\$57,082.60	\$57,082.60	7	7

Table 24 provides selected inputs to the cost-effectiveness analysis. These include the energy savings for each scenario, measure lives, discount rates, line losses, and program costs. Program benefits are comprised of energy savings and their associated avoided costs. Benefits are accrued over the expected useful life of the installed measure.

¹⁴ Cadmus used measure cost and measure life assumptions from *Review and Development of Utah Power's Irrigation Program in Idaho*, John Fazio, August 31, 2005, for the expected and evaluated cost-effectiveness scenarios. Expected savings are also based on this document.

¹⁵ <http://www.nwcouncil.org/energy/rtf/meetings/2010/01/Default.htm>

Table 24. Selected Cost-Effectiveness Analysis Inputs

Input Description	Scenario 1: Expected Savings	Scenario 2: Evaluated Savings	Scenario 3: Evaluated Savings High Case	Scenario 4: Evaluated Savings Low Case	Scenario 5: RTF Proposed Deemed Savings
Net Program Savings (kWh/year)	7,002,101	2,031,007	5,855,488	228,273	8,750,208
Discount Rate	7.40%	7.40%	7.40%	7.40%	7.40%
Line Loss	10.392%	10.392%	10.392%	10.392%	10.392%
Schedule 10 Retail Rate	\$0.0347	\$0.0347	\$0.0347	\$0.0347	\$0.0347
Net Participant Costs	\$872,760	\$872,760	\$872,760	\$872,760	\$1,146,375
Program Costs					
Program Management Costs	\$176,812	\$176,812	\$176,812	\$176,812	\$176,812
Engineering Costs	\$11,554	\$11,554	\$11,554	\$11,554	\$11,554
Incentive Costs	\$528,496	\$528,496	\$528,496	\$528,496	\$528,496
Utility Administrative Costs	\$72,036	\$72,036	\$72,036	\$72,036	\$72,036
Total Program Costs	\$788,897	\$788,897	\$788,897	\$788,897	\$788,897

Table 25, Table 26, Table 27, Table 28, and Table 29 present the results of our cost-effectiveness analysis for the Irrigation Energy Savers Program from five perspectives across all program years, using a freeridership of 26.5 percent. The analysis was based on the East Commercial Cooling 16 percent load factor decrement which most closely represents irrigation usage.¹⁶

Table 25. Cost-Effectiveness Summary for the Program 2006-2008 – Scenario 1: Expected Savings

Cost Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.044	\$1,112,799	\$1,226,204	\$113,405	1.10
Total Resource No Adder (TRC)	\$0.044	\$1,112,799	\$1,114,731	\$1,932	1.00
Utility (UCT)	\$0.031	\$768,535	\$1,114,731	\$346,196	1.45
Ratepayer Impact (RIM)	\$0.073	\$1,824,562	\$1,114,731	-\$709,831	0.61
Participant (PCT)	\$0.035	\$872,760	\$1,584,522	\$711,762	1.82
Lifecycle Revenue Impact (dollars)				\$0.000058589	
Discounted Participant Payback (years)				5.23	

¹⁶ IRP decrements are detailed in Appendix G of PacifiCorp's 2008 Integrated Resource Plan Volume II Appendices, available online: http://www.pacificorp.com/content/dam/pacificorp/doc/Environment/Environmental_Concerns /Integrated_Resource_Planning_6.pdf

Table 26. Cost-Effectiveness Summary for the Program 2006-2008 – Scenario 2: Evaluated Savings

Cost Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.125	\$1,112,799	\$479,573	-\$633,226	0.43
Total Resource No Adder (TRC)	\$0.125	\$1,112,799	\$435,975	-\$676,824	0.39
Utility (UCT)	\$0.086	\$768,535	\$435,975	-\$332,560	0.57
Ratepayer Impact (RIM)	\$0.130	\$1,157,946	\$435,975	-\$721,971	0.38
Participant (PCT)	\$0.098	\$872,760	\$917,907	\$45,147	1.05
Lifecycle Revenue Impact (dollars)				\$0.000042121	
Discounted Participant Payback (years)				5.96	

Table 27. Cost-Effectiveness Summary for the Program 2006-2008 – Scenario 3: Evaluated Savings High Case

Cost Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.047	\$1,112,799	\$1,246,933	\$134,133	1.12
Total Resource No Adder (TRC)	\$0.047	\$1,112,799	\$1,133,575	\$20,776	1.02
Utility (UCT)	\$0.032	\$768,535	\$1,133,575	\$365,040	1.47
Ratepayer Impact (RIM)	\$0.075	\$1,800,212	\$1,133,575	-\$666,637	0.63
Participant (PCT)	\$0.036	\$872,760	\$1,560,172	\$687,413	1.79
Lifecycle Revenue Impact (dollars)				\$0.000045333	
Discounted Participant Payback (years)				2.12	

Table 28. Cost-Effectiveness Summary for the Program 2006-2008 – Scenario 4: Evaluated Savings Low Case

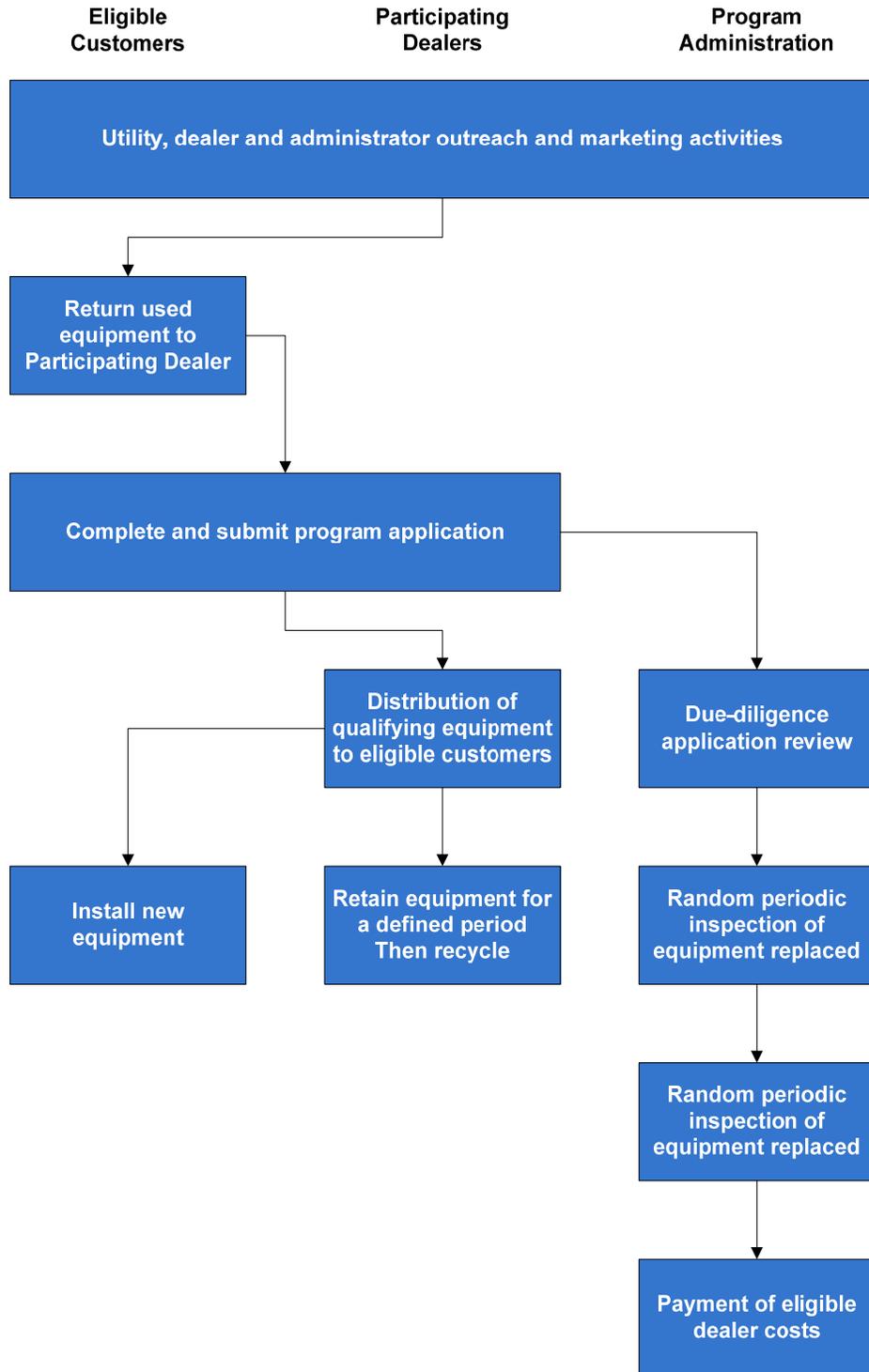
Cost Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$1.053	\$1,112,799	\$58,101	-\$1,054,698	0.05
Total Resource No Adder (TRC)	\$1.053	\$1,112,799	\$52,819	-\$1,059,980	0.05
Utility (UCT)	\$0.727	\$768,535	\$52,819	-\$715,716	0.07
Ratepayer Impact (RIM)	\$0.771	\$815,120	\$52,819	-\$762,300	0.06
Participant (PCT)	\$0.825	\$872,760	\$575,080	-\$297,680	0.66
Lifecycle Revenue Impact (dollars)				\$0.000039232	
Discounted Participant Payback (years)				0.00	

**Table 29. Cost-Effectiveness Summary for the Program 2006-2008 – Scenario 5: RTF
Proposed Deemed Savings**

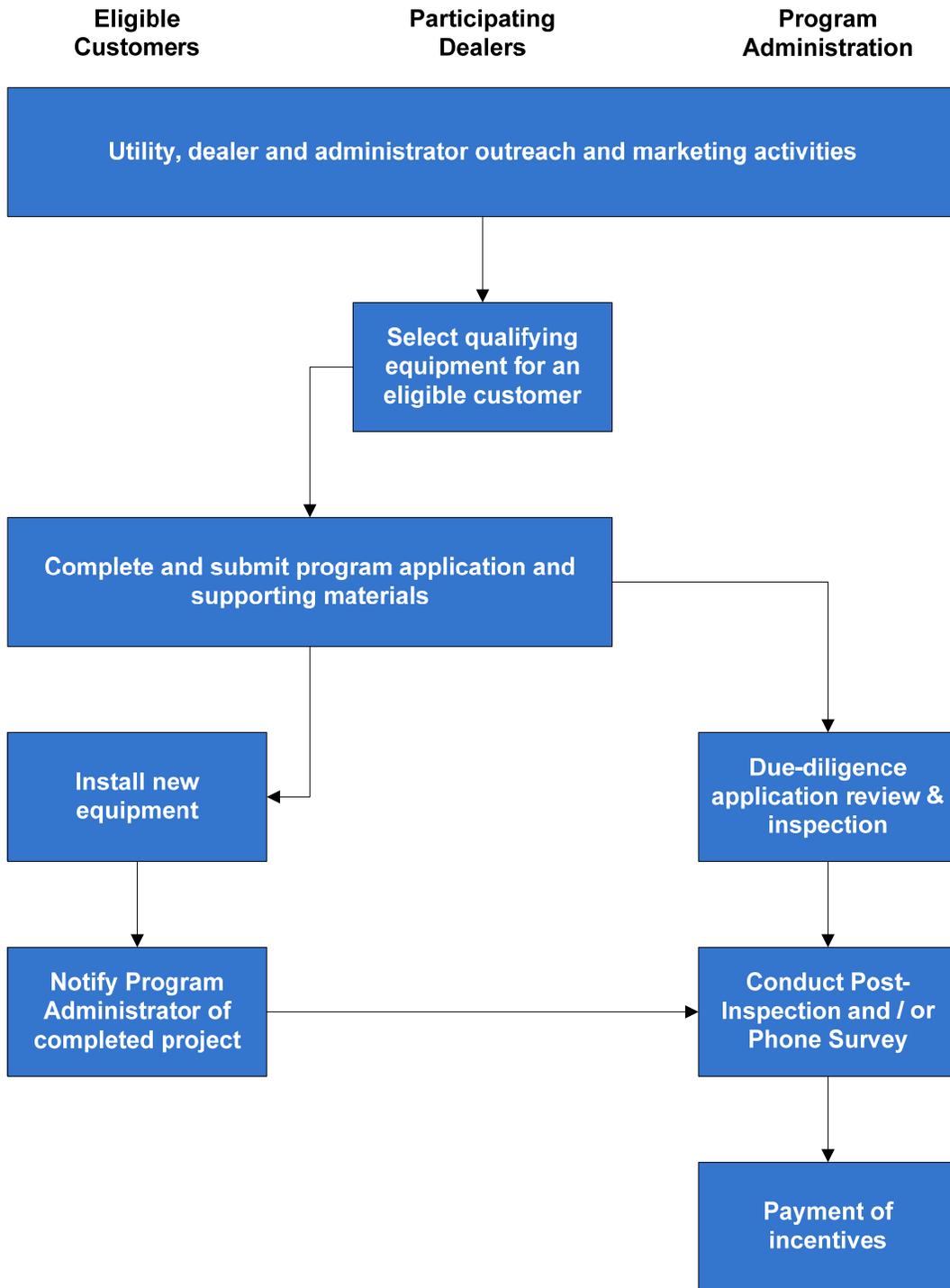
Cost Effectiveness Test	Levelized \$/kWh	Costs	Benefits	Net Benefits	Benefit/Cost Ratio
Total Resource + Conservation Adder (PTRC)	\$0.044	\$1,386,415	\$1,525,277	\$138,862	1.10
Total Resource No Adder (TRC)	\$0.044	\$1,386,415	\$1,386,615	\$201	1.00
Utility (UCT)	\$0.025	\$768,535	\$1,386,615	\$618,080	1.80
Ratepayer Impact (RIM)	\$0.067	\$2,083,472	\$1,386,615	-\$696,857	0.67
Participant (PCT)	\$0.037	\$1,146,375	\$1,843,432	\$697,057	1.61
Lifecycle Revenue Impact (dollars)				\$0.000047388	
Discounted Participant Payback (years)				2.49	

Appendix A. Irrigation Energy Savers Process Flow Diagrams

Equipment Exchange Overview



Pivot Package/Linear Equipment Upgrade Overview



Appendix B. Site Visit Results

Site ID	Measures Installed	Participation Category	Power Usage w/ No Change (kWh)	Power Usage w/ Change (kWh)	Power Savings (kWh)	Percent Savings	Comments
927994382	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	176,884	172,453	4,431	3%	
420496673	gaskets	Exchange, Non-Exchange, and Combined Projects	31,586	22,779	8,807	28%	
959944911	gaskets	Exchange, Non-Exchange, and Combined Projects	299,205	387,547	-88,342	-30%	Deficit irrigated but less than in past years. Also prior to 2006 all acreage in HL, after majority to pivots.
962285361	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	13,325	15,963	-2,638	-20%	Deficit irrigated but less than in past years.
383706407	gaskets, drains	Exchange, Non-Exchange, and Combined Projects	29,199	33,892	-4,693	-16%	Deficit irrigated but less than in past years.
358536705	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	19,549	23,900	-4,351	-22%	Deficit irrigated but less than in past years.
924404017	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	20,991	22,885	-1,894	-9%	This user is one of six on this system; all lots are equal size and irrigator has no control of how other five owners irrigate.
170473110	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	20,551	22,885	-2,334	-11%	Farmer seems to over irrigate and there were many leaks found!!
047987478	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	181,278	135,434	45,844	25%	Farmer appeared to deficit irrigate more in drier years 07 & 08
158855309	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	97,278	87,607	9,671	10%	
620179911	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	65,626	67,200	-1,574	-2%	
693465723	gaskets	Exchange, Non-Exchange, and Combined Projects	38,792	25,938	12,854	33%	Deficit Irrigated in 2006 through 2009
561534622	gaskets	Exchange, Non-Exchange, and Combined Projects	15,885	19,416	-3,531	-22%	Deficit irrigated but less than in past years.
986623400	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	168,286	169,120	-834	0%	This comparison is for years before and after 2006. There appears to be less deficit irrigation in 2009 and 2010.
738264391	gaskets	Exchange, Non-Exchange, and Combined Projects	1,689,352	1,397,432	291,920	17%	
819305944	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	19,883	17,835	2,048	10%	
764534995	drains	Exchange, Non-Exchange, and Combined Projects	78692	82,071	-3,379	-4%	Farmer typically deficit irrigated Alf in wetter years.

Site ID	Measures Installed	Participation Category	Power Usage w/ No Change (kWh)	Power Usage w/ Change (kWh)	Power Savings (kWh)	Percent Savings	Comments
219976860 894813515	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	178,119	165,168	12,951	7%	
514243114	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	13,945	12,053	1,892	14%	
365729101	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	22,229	30,556	-8,327	-37%	Farmer deficit irrigates some crops and the amount of deficit decreased over past 3 yrs!!
354663593	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	14,181	15,860	-1,679	-12%	Farmer deficit irrigates grain crops and over past 3 yrs the amount of deficit on the grains increased but decreased the years in spuds!!
361579689	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	9,697	9,135	562	6%	Farmer deficit irrigates grain crops and over past 3 yrs the amount of deficit on the grains increased but decreased the years in spuds!!
357429970	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	8,127	10,358	-2,231	-27%	Farmer deficit irrigates grain crops and over past 3 yrs the amount of deficit on the grains increased but decreased the years in spuds!!
161621993	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	22,440	21,953	487	2%	
162175821	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	10,683	9,984	699	7%	2008 showed a 12% improvement; 2009 was a wet year; 2010 was a partial year.
66745792	nozzles	Exchange, Non-Exchange, and Combined Projects	57,853	84,792	-26,939	-47%	Farmer deficit irrigated less than in past
325897079	gaskets	Exchange, Non-Exchange, and Combined Projects	382,903	394,453	-11,550	-3%	
292431623	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	51,849	46,235	5,614	11%	
418562573	gaskets	Exchange, Non-Exchange, and Combined Projects	29,865	23,751	6,114	20%	
451467140	nozzles, gaskets, drains, system consultation	Exchange, Non-Exchange, and Combined Projects	85,460	94,773	-9,313	-11%	Deficit irrigated but less than in past years.
979986060	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	70,441	81,837	-11,396	-16%	Deficit irrigated but less than in past years.
372091369	sprinkler package	Exchange, Non-Exchange, and Combined Projects	178,292	165,412	12,880	7%	
684341990	sprinkler package	Exchange, Non-Exchange, and Combined Projects	109,655	94,973	14,682	13%	Even including 2009 data.
11240499	sprinkler package	Exchange, Non-Exchange, and Combined Projects	178,896	208,053	-29,157	-16%	Half pivot that gets occasional water may be affecting results. Also farm location in Howe may be cooler and/or wetter than Montevue Agrimet site.

Site ID	Measures Installed	Participation Category	Power Usage w/ No Change (kWh)	Power Usage w/ Change (kWh)	Power Savings (kWh)	Percent Savings	Comments
915278749	sprinkler package	Exchange, Non-Exchange, and Combined Projects	365,237	285,733	79,504	22%	Better analysis because measure was for two pivots off same location and accounted for majority of acres.
697059465	nozzles, regulators, sprinkler package	Exchange, Non-Exchange, and Combined Projects	365,792	301,653	64,139	18%	Very erratic records. Bulk of Exchange items were nozzles for a pivot.
346644753	sprinkler package	Exchange, Non-Exchange, and Combined Projects	120,850	134,280	-13,430	-11%	Deficit irrigated but less than in past years.
133960065	sprinkler package	Exchange, Non-Exchange, and Combined Projects	123,493	110,154	13,339	11%	Ave IE went up
400306818	gaskets, sprinkler package	Exchange, Non-Exchange, and Combined Projects	55,742	49,730	6,012	11%	
468061718	nozzles, gaskets, regulators, sprinkler package	Exchange, Non-Exchange, and Combined Projects	126,112	107,980	18,132	14%	
463912920 935737229	nozzles, gaskets, sprinkler package	Exchange, Non-Exchange, and Combined Projects	220,510	250,367	-29,857	-14%	Deficit irrigated but less than in past years.
890390259	nozzles, sprinkler package	Exchange, Non-Exchange, and Combined Projects	520,640	592,000	-71,360	-14%	One pivot and some HL part of ~6 pivot system. Also farm location in Howe may be cooler and/or wetter than Montevue Agrimet site.
830369610	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	137,383	190,507	-53,124	-39%	Deficit irrigated but less than in past years.
31154054	system consultation	System Consultation and / or System Analysis Only	89,755	74,200	15,555	17%	Did not use 2009 yr averages because the year was a wet year, there was no potato crop with higher demand and the farmer did not deficit irrigate the grains as much as in past years.
793305500	system consultation	System Consultation and / or System Analysis Only	31,738	36,227	-4,489	-14%	Only one partial year's (2010) data after measure, may have under irrigated more in the past
161895837 81358578 160236195	system consultation, system analysis	System Consultation and / or System Analysis Only	354,842	342,360	12,482	4%	Worked on one pump and was able to quit using one.
657240030	system consultation, system analysis	System Consultation and / or System Analysis Only	68,689	86,340	-17,651	-26%	Deficit irrigated but less than in past years.

Site ID	Measures Installed	Participation Category	Power Usage w/ No Change (kWh)	Power Usage w/ Change (kWh)	Power Savings (kWh)	Percent Savings	Comments
23302222	system consultation, system analysis	System Consultation and / or System Analysis Only	422,595	381,720	40,875	10%	Excluded 2009 data because the farmer under irrigated that year.
711716873 707014554	system consultation	System Consultation and / or System Analysis Only	1,002,588	802,987	199,601	20%	After the VFD was installed the booster pump at second well was no longer needed.
952053051	nozzles, gaskets, system consultation	Exchange, Non-Exchange, and Combined Projects	26,023	31,574	-5,551	-21%	Deficit irrigated but less than in past years.
121510601	nozzles, gaskets, drains, regulators, sprinkler package, system consultation, system analysis	Exchange, Non-Exchange, and Combined Projects	389,817	292,080	97,737	25%	Over irrigated in 2009, a wet year
123723764	regulators, sprinkler package, system consultation, system analysis	Exchange, Non-Exchange, and Combined Projects	228,681	242,693	-14,012	-6%	Farmer deficit irrigated more than in past. May have had more 2010 rain than shown at Agrimet site.
703973412	gaskets, system consultatoin	Exchange, Non-Exchange, and Combined Projects	110,799	165,920	-55,121	-50%	Limited data year following measures and those two years (09 &10) have been relatively wet compared to 3 previous yrs.
451743440	sprinkler package, system consultation	Exchange, Non-Exchange, and Combined Projects	24,148	26,663	-2,515	-10%	Deficit irrigated but less than in past years.
906978390	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	48,410	64,347	-15,937	-33%	Deficit irrigated but less than in past years.
458383850	gaskets, drains	Exchange, Non-Exchange, and Combined Projects	45,499	45,001	498	1%	Includes 2009 data; 2008 data alone showed a 5% improvement.
408049972	gaskets	Exchange, Non-Exchange, and Combined Projects	286,363	227,533	58,830	21%	
648664906	nozzles, gaskets, drains, system consultation	Exchange, Non-Exchange, and Combined Projects	18,182	25,237	-7,055	-39%	Deficit irrigated but less than in past years. No changes as result of Consultation.

Site ID	Measures Installed	Participation Category	Power Usage w/ No Change (kWh)	Power Usage w/ Change (kWh)	Power Savings (kWh)	Percent Savings	Comments
789706232	nozzles, gaskets, drains, sprinkler package	Exchange, Non-Exchange, and Combined Projects	35,914	41,357	-5,443	-15%	Deficit irrigated but less than in past years.
371537848	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	4,725	4,572	153	3%	
46024827	gaskets	Exchange, Non-Exchange, and Combined Projects	70,095	57,519	12,576	18%	
746834910	nozzles, gaskets, drains	Exchange, Non-Exchange, and Combined Projects	150,463	208,408	-57,945	-39%	Farmer deficit irrigated less than in past
991883538	sprinkler package	Exchange, Non-Exchange, and Combined Projects	364,493	380,933	-16,440	-5%	One pivot part of ~4 pivot system. Also farm location in Howe may be cooler and/or wetter than Montevue Agrimet site.
44620302	sprinkler package	Exchange, Non-Exchange, and Combined Projects	140,633	125,160	15,473	11%	Did not over irrigate as much in 2009
566238783	sprinkler package	Exchange, Non-Exchange, and Combined Projects	120,063	112,915	7,148	6%	
609668231	gaskets, sprinkler package	Exchange, Non-Exchange, and Combined Projects	27,839	29,231	-1,392	-5%	Deficit irrigated but less than in past years. Gaskets & nozzles purchased in early part of year and then later in same year corner pivots added and HL sold.
497928520	sprinkler package	Exchange, Non-Exchange, and Combined Projects	42,427	38,994	3,433	8%	
754579906	sprinkler package	Exchange, Non-Exchange, and Combined Projects	40,295	46,575	-6,280	-16%	Farmer appeared to deficit irrigate alfalfa more in its last years (05, 06 & 07)
194808079	nozzles, gaskets, drains, sprinkler package	Exchange, Non-Exchange, and Combined Projects	239,051	376,467	-137,416	-57%	Deficit irrigated but less than in past years. - Also, Fort Hall Agrimet site is not good match for this farm. - Exchange items only account for a few HL gaskets where as Non-Exchange portion is for 2 pivot packages.
975283127	sprinkler package, system consultation	Exchange, Non-Exchange, and Combined Projects	32,715	36,420	-3,705	-11%	Deficit irrigated but less than in past years. Consultation resulted in pivot package.
454233517	sprinkler package	Exchange, Non-Exchange, and Combined Projects	37359	39,280	-1,921	-5%	
962008447	sprinkler package	Exchange, Non-Exchange, and Combined Projects	13436	17,028	-3,592	-27%	
751539071	sprinkler package	Exchange, Non-Exchange, and Combined Projects	37013	34,310	2,703	7%	Even including 2009 data.
887896805 2860627	nozzles, gaskets, drains, sprinkler package	Exchange, Non-Exchange, and Combined Projects	216,731	248,930	-32,199	-15%	Deficit irrigated but less than in past years.

Site ID	Measures Installed	Participation Category	Power Usage w/ No Change (kWh)	Power Usage w/ Change (kWh)	Power Savings (kWh)	Percent Savings	Comments
91362894	system analysis	System Consultation and / or System Analysis Only	312,232	300,480	11,752	4%	Partial 2010 power record excluded.
400306818	gaskets, sprinkler package	Exchange, Non-Exchange, and Combined Projects	50,436	34,399	16,037	32%	Deficit irrigation in last two years.
260721524	gaskets	Exchange, Non-Exchange, and Combined Projects	4,215	5,206	-991	-24%	Deficit irrigated in 2010 and not in past
259520609	gaskets	Exchange, Non-Exchange, and Combined Projects	100,339	104,444	-4,105	-4%	Deficit irrigated but less than in past years.
346921360	sprinkler package	Exchange, Non-Exchange, and Combined Projects	113,098	125,640	-12,542	-11%	Deficit irrigated but less than in past years.
212509085	sprinkler package	Exchange, Non-Exchange, and Combined Projects	23,612	26,805	-3,193	-14%	Deficit irrigated but less than in past years.
910300437	sprinkler package	Exchange, Non-Exchange, and Combined Projects	153,998	128,324	25,674	17%	
217761855	sprinkler package	Exchange, Non-Exchange, and Combined Projects	45,959	31,968	13,991	30%	Farmer deficit irrigated more, maybe due to better water uniformity and/or wetter years.
918870342 922189319 919146949	sprinkler package	Exchange, Non-Exchange, and Combined Projects	1,279,167	1,252,240	26,927	2%	
059490154	sprinkler package	Exchange, Non-Exchange, and Combined Projects	49,056	42,886	6,170	13%	
265605963	sprinkler package	Exchange, Non-Exchange, and Combined Projects	79,793	81,623	-1,830	-2%	Farmer appeared to deficit irrigate wheat
126489527	sprinkler package	Exchange, Non-Exchange, and Combined Projects	92,860	88,020	4,840	5%	Excluded 2010 data.
123170243	regulators, sprinkler package	Exchange, Non-Exchange, and Combined Projects	267,172	282,540	-15,368	-6%	Farmer deficit irrigated more than in past. May have had more 2010 rain than shown at Agrimet site.
120403866	sprinkler package	Exchange, Non-Exchange, and Combined Projects	75,144	77,370	-2,226	-3%	Less deficit irrigation in 2009, a wet year
464744276	sprinkler package	Exchange, Non-Exchange, and Combined Projects	24,590	23,232	1,358	6%	
869646883	sprinkler package	Exchange, Non-Exchange, and Combined Projects	80,159	51,733	28,426	35%	
45731844	sprinkler package	Exchange, Non-Exchange, and Combined Projects	180,638	236,832	-56,194	-31%	Considers only 2009 when the farmer over irrigated.
491013345	nozzles, gaskets	Exchange, Non-Exchange, and Combined Projects	77,217	78,000	-783	-1%	
395600815	gaskets, drains	Exchange, Non-Exchange, and Combined Projects	20,297	30,762	-10,465	-52%	
Total Exchange, Non-Exchange, and Combined Projects			11,895,680	11,817,278	78,402	0.66%	
Total System Consultation and / or System Analysis Only			2,282,439	2,024,314	258,125	11.31%	
Total			14,178,119	13,841,592	336,527	2.37%	

Appendix C. Participant Exchange Survey Instrument

Irrigation Energy Savers Equipment Exchange Participant Interview Guide

Company: _____ Telephone: _____
 Name: _____ Cell phone: _____
 Title: _____ Fax: _____
 City: _____ State: _____ Zip: _____
 Interview date: _____ Time: _____

Hello, my name is _____ from [interview firm], calling on behalf of Rocky Mountain Power.

We are conducting a study for Rocky Mountain Power regarding their energy efficiency programs. Could I please speak with [*CUSTOMER OF RECORD*] or the person who most often pays the electric bills?

[If “Yes,” continue with introduction below]

[If “No, this site is under new ownership or that person is no longer involved at this site,” ask respondent if they have any contact information for the person you are trying to reach. If they do, record the information and try reaching the party at the new number. If they do not, thank them and end call.]

Introduction

Rocky Mountain Power is evaluating its Irrigation Energy Savers Program and would appreciate your input. “It is important for Rocky Mountain Power to include your opinions in this study so they can serve your needs better.”

This survey is for research purposes only and this is not a marketing call. Your individual responses will be kept strictly confidential and only reported in aggregate. The survey will take approximately 20 minutes. **As a Thank You for your assistance, at the end of the survey we would like to offer you a \$25 gift card, which will be mailed to you.**

Do you have a moment to answer some questions about your experience with the program?

[NOTE: If the customer states that he has participated in an Irrigation Energy Savers site visit, or has been scheduled for a site visit, state: “We are conducting this survey in addition to the site visit. We perform site visits to get a better understanding of the energy savings you get from the program, while this survey is focused on your energy efficiency decisions and your satisfaction with the program.”]

[If “No – Not a convenient time,” ask if Respondent would like to 1. Start now and do part of the survey, or 2. Arrange a more convenient time we can call them at work or at home.]

[If customer wants to verify the validity of the survey, tell them that they are welcome to contact Hallie Gallinger, PacifiCorp Program Manager, at (503) 813-5215.

[If “No” – Arrange callback]

[If “Refused” – Thank and terminate.

Confirmation

I would like to give you a bit more background on this survey. All of these questions are about your participation in the Irrigation Energy Savers Equipment Exchange program in the 2006 through 2008 time period. These questions are **not** about participation after 2008. We understand that you may have also participated in other Irrigation Energy Savers program options, but this survey focuses specifically on the equipment exchange option.

1. The Rocky Mountain Power records show that you participated in the Irrigation Energy Savers program during [Year(s)], and at that time exchanged [*NAME THE TYPES OF EQUIPMENT EXCHANGED.*] Is that correct?
 1. Yes [*IF YES → GO TO QUESTION 5.*]
 2. No, type of equipment exchanged is incorrect
 3. No, type of participation incorrect (*SKIP TO 3*)
 98. No, date is incorrect (*SKIP TO 4*)
 99. 98 DK (*TERMINATE*)
2. [*IF Q1= NO, TYPE OF EQUIPMENT EXCHANGED IS INCORRECT, ASK*] What did you exchange?
 _____ [*RECORD RESPONSE*]
3. [*IF Q1= NO, TYPE OF PARTICIPATION IS INCORRECT, ASK*] How did you participate?
 _____ [*RECORD RESPONSE, SWITCH TO OTHER SURVEY*]
4. [*IF Q1= NO, DATE IS INCORRECT, ASK*] About when did you participate in these activities?
 1. _____ MONTH _____ YEAR
 98. DK (*DO NOT TERMINATE*)
 99. REF (*TERMINATE*)

Participation

5. How did you first learn about the Irrigation Energy Savers Equipment Exchange?
 [*DO NOT READ RESPONSES; MARK ALL THAT APPLY*]
 1. Contacted by my Rocky Mountain Power account representative
 2. Contacted by other Rocky Mountain Power staff

3. Contacted by Franklin Soil and Water Conservation District
4. Contacted by Nexant
5. Program sponsored a presentation
6. Trade Publication
7. Word of mouth; from another business colleague
8. Through an equipment dealer
9. Through an irrigation contractor
10. Through a trade organization or professional organization/association
11. Through printed material or outreach materials sent by the Program
12. At a trade show
13. Through family, friend, or neighbor
14. Participation in other Rocky Mountain Power Programs
15. Had exchanged equipment through the program previously
16. Internet research/found Program on the Rocky Mountain Power website
17. Other [SPECIFY] _____
98. Don't know
99. Refused

6. Why did you decide to participate in the equipment exchange?

[DO NOT READ RESPONSES; MARK ALL THAT APPLY]

1. To save money on electric bills
2. To save money on water bills
3. To replace old equipment
4. To replace broken equipment
5. To reduce maintenance costs
6. Because the Program was sponsored by ROCKY MOUNTAIN POWER
7. Previous experience with other Rocky Mountain Power Programs
8. To help protect the environment
9. To save energy
10. Recommended by Program contact
11. Recommended by contractors/trade allies
12. Recommended by another Rocky Mountain Power customer; word of mouth
13. Recommended by family, friend, or neighbor
14. Part of a broader maintenance or renovation
15. Other [SPECIFY] _____
98. Don't know
99. Refused

7. Thinking back to when you were first involved with this exchange, were there any aspects of the Program that initially caused you concern?
1. Yes
 2. No *[SKIP TO ENROLLMENT]*
 98. Don't know *[SKIP TO ENROLLMENT]*
 99. Refused *[SKIP TO ENROLLMENT]*
- 7a. *[IF 7 = YES, ASK]* What caused your concern?
 _____ *[RECORD RESPONSE]*
- 7b. *[IF 7 = YES, ASK]* Was this issue resolved?
1. Yes
 2. No *[SKIP TO ENROLLMENT]*
 98. Don't know *[SKIP TO ENROLLMENT]*
 99. Refused *[SKIP TO ENROLLMENT]*
- 7c. *[IF 7 = YES, ASK]* How was it resolved?
 _____ *[RECORD RESPONSE]*

Enrollment

8. Did you encounter any problems or difficulties during the application, review or approval processes for this exchange?
1. Yes
 2. No *[SKIP TO 10]*
 98. Don't know *[SKIP TO 10]*
 99. Refused *[SKIP TO 10]*
9. *[IF 8 = YES]* What problems, delays or difficulties did you encounter?
[DO NOT READ RESPONSES; MARK ALL THAT APPLY]
1. The process took too long
 2. The process was too complex
 3. The applications materials were difficult to understand
 4. The equipment dealer was not knowledgeable
 5. The Program staff was not knowledgeable
 6. Other *[SPECIFY]* _____
 98. Don't know
 99. Refused
- 9a. *[IF 9 = MORE THAN ONE ANSWER]:* What was the **most** difficult issue for you?
 _____ *[RECORD RESPONSE]*
10. If you could change anything about the application process, what would you change?
 _____ *[RECORD RESPONSE]*

- 10a. Before this equipment exchange had you participated in this program or other energy efficiency programs?
1. Yes
 2. No [IF NO skip to Exchanged Efficiency Measures]
 98. Don't know [IF DON'T KNOW/REFUSED, skip to Exchanged Efficiency Measures]
 99. Refused [IF DON'T KNOW/REFUSED, skip to Exchanged Efficiency Measures]

10b. [IF 10a= YES] What energy efficiency programs have you participated in?
 _____ [RECORD RESPONSE]

10c. [IF 10a= YES] Who were the sponsors of these programs?
 _____ [RECORD RESPONSE]

Exchanged Efficiency Measures

11. What was the operating condition of the equipment that was replaced through this exchange? [MULTIPLE RESPONSES OK.]
1. Old equipment had failed or burned out
 2. Old equipment had problems, but still working
 3. Old equipment wasted water
 4. Old equipment wasted energy
 5. Old equipment in working condition with no problems
 6. Other [SPECIFY] _____
 98. Don't know
 99. Refused
12. On a scale of 1 to 10, where 1 is not at all satisfied and 10 is very satisfied, how satisfied would you say you are with the performance of the new measures installed as a result of this exchange?
 _____ [RECORD RESPONSE]
98. Don't know
 99. Refused
- 12a. [If 12 <=5] Why do you say that?
 _____ [RECORD RESPONSE]

Operational Changes

13. At the time that you participated in this equipment exchange, did you have an overall plan to increase the energy efficiency of your operations?
1. Yes

2. No
 98. Don't know
 99. Refused
- 13a. Did you change the manner in which you operated equipment after the exchanged equipment was installed?
1. Yes
 2. No *[SKIP TO 15]*
 98. Don't know
 99. Refused
- 13b. Were these changes part of the overall plan to increase the energy efficiency of your operations?
1. Yes
 2. No *[SKIP TO 15]*
 98. Don't know *[SKIP TO 15]*
 99. Refused *[SKIP TO 15]*
- 13c. What did you change?
_____ *[RECORD RESPONSE]*
14. *[ASK IF 13C MENTIONS DURATION OR FREQUENCY OF SCHEDULING]* Did you change the duration or frequency of irrigation scheduling since the measures were installed?
1. Yes
 2. No *[SKIP TO 15]*
 98. Don't know
 99. Refused
- 14a. Please explain what changes were made
_____ *[RECORD RESPONSE]*
15. Have any measures installed through this project been removed?
1. Yes
 2. No *[SKIP TO 16]*
 98. Don't know
 99. Refused
- 15a. **What** was removed?
_____ *[RECORD RESPONSE]*
- 15b. **Why** was it removed or replaced?
_____ *[RECORD RESPONSE]*

15c. **About when** was it removed or replaced?

_____ [RECORD RESPONSE]

16. Thinking about the equipment that you exchanged, was replacement of any of the equipment scheduled before you heard about the program?

1. Yes [IF YES, PROBE]

2. No [SKIP TO 17]

98. Don't know

99. Refused

16a. What replacement was scheduled?

_____ [RECORD RESPONSE]

17. [FR]Was money for exchange equipment included in your most recent budget before you participated in the program?

1. Yes

2. No

98. Don't know

99. Refused

98. Don't know

99. Refused

18. When you exchanged this equipment, did you expect savings on:

	Yes	No	Don't Know	Refused
18a. Electricity?				
18b. Water?				

18c. [ASK IF 18a = YES] Do the electric energy savings meet your expectations?

1. Yes [SKIP TO 18e]

2. No

98. Don't know

99. Refused

18d. [ASK IF 18c =No] When do you expect these energy savings?

1. Immediately

2. Within the next 6 Months

3. Within the next year

4. Within the next two years

5. Never [IF NEVER, ASK "Why do you not expect savings from this in the future?"]

98. Don't know

99. Refused

18e. *[ASK IF 18b = YES]* Do the water savings meet your expectations?

1. Yes *[SKIP TO 18g.]*

2. No

98. Don't know

99. Refused

18f. *[ASK IF 18e =No]* When do you expect these water savings?

1. Immediately

2. Within the next 6 Months

3. Within the next year

4. Within the next two years

5. Never *[IF NEVER, ASK 'Why do you not expect savings from this equipment exchange in the future?']*

98. Don't know

99. Refused

18g. Are there any other benefits that you anticipate?

[PROBE IF NEEDED: HAVE YOU OBSERVED ANY CHANGES IN LEVEL OF PRODUCTION? PRODUCT QUALITY?]

_____ *[RECORD RESPONSE]*

19. How satisfied are you with the equipment exchange?

Please use a scale from 1 to 10, with 1 being extremely dissatisfied and 10 being extremely satisfied.

_____ *[RECORD RESPONSE]*

98. Don't know

99. Refused

19a. *[IF Q19<=5]* Why do you say that?

Freeridership and Market Effects

20. On a scale from 1 to 10, how important were the following factors in deciding which energy efficiency actions to take:

Factor	Score
Information provided by equipment dealer on measure savings	
Equipment provided at no cost to me	

Familiarity with these measures	
Able to get rid of old equipment through the exchange	
Had replaced this type of equipment in the past	

21. [FR] Before this program, had you previously replaced similar equipment?

1. Yes
2. No [IF NO, SKIP TO 22]
98. Don't know
99. Refused

21a. What equipment had you replaced? _____ [RECORD RESPONSE]

22. [FR] Regarding the equipment you replaced through this project, would you have replaced all of the equipment or some of the equipment without the program?

1. All
2. Some
3. None [IF NO, SKIP TO 24]
98. Don't know
99. Refused

22a. [ASK IF 22 = "All" or "Some"] What would you have replaced? _____ [RECORD RESPONSE]

22b. [ASK IF 22 = Yes] [FR] Would you have replaced the equipment to the...

1. Same level of efficiency
2. Higher level of efficiency
3. Lower level of efficiency
98. Don't know
99. Refused

23. [ASK IF 22 = Yes] [FR] Without the program, would you have replaced this equipment...

4. In the same year?
5. In one to two years?
6. In three to five years?
7. More than five years out?
98. Don't know
99. Refused

Energy Efficiency Decision Making

Next, I would like to ask you some questions about the decision making process in regards to energy efficiency purchases and upgrades.

24. Using a 1 to 10 rating scale, where 0 means not at all important and 10 means extremely important, please rate how important energy efficiency is to the operations and management of your business?

_____ *[RECORD RESPONSE]*

98. Don't know

99. Refused

- 24b. Why do you say that?

_____ *[RECORD RESPONSE]*

25. Do you have sufficient technical resources in house to address the management of energy and water costs?

1. Yes

2. No

98. Don't know

99. Refused

Spillover

26. After this equipment exchange, did you participate in other energy efficiency program activity sponsored by this utility?

1. Yes *[RECORD NAME OF PROGRAM]*

2. No *[IF NO, SKIP TO 28]*

98. Don't know

99. Refused

27. *[IF 26 = YES, ASK]* What did you do through the program(s)? _____ *[RECORD RESPONSE]*

28. After this equipment exchange, have you since made any other energy efficiency improvements or purchases on your own without any assistance from a utility or other organization?

1. Yes

2. No *[SKIP TO INTERACTION]*

98. Don't know *[SKIP TO INTERACTION]*

99. Refused *[SKIP TO INTERACTION]*

28a. *[IF 28 = YES]* What did you purchase or install?

_____ *[RECORD RESPONSE]*

28b. *[IF 28 = YES]* I'm going to read a statement about the equipment that you purchased on your own. On a scale from 1 to 10, with 1 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statement.

"My experience with the Irrigation Energy Savers program influenced my decision to install other high efficiency equipment on my own."

_____ *[RECORD RATING]*

98. Don't know

99. Refused

Interaction with Rocky Mountain Power or 3rd Party Staff

We are also interested in learning more about your interactions with the Program staff.

29. How many people did you work with in this equipment exchange? This would include irrigation dealers, installation contractors, people from Franklin Soil and Water Conservation District or Nexant, people from Rocky Mountain Power and others

_____ Number of people

[SKIP TO 32 IF =0]

30. Who worked with you with you on this project?

[PROBE IF NEEDED. WAS IT PROJECT MANAGERS, ACCOUNT REPS, THIRD PARTY STAFF, CONTRACTORS; MULTIPLE RESPONSE]

1. _____ Irrigation Dealers
2. _____ Installation Contractors
3. _____ Rocky Mountain Power Account Representatives
4. _____ Other Rocky Mountain Power Energy Staff
5. _____ Franklin Soil and Water Conservation District
6. _____ Nexant Staff
7. _____ Other *[SPECIFY]* _____

31. Please describe your overall experience working with these people in relation to this project. _____ *[RECORD RESPONSE]*

Satisfaction

32. Would you participate in the equipment exchange again?

1. Yes *[IF YES, SKIP TO 33]*
2. No

- 32a. *[IF 32 = NO]* Why not?
_____ *[RECORD RESPONSE]*
33. If you could change anything about the equipment exchange, what would you change?
_____ *[RECORD RESPONSE]*
98. Don't know
99. Refused
34. Using a scale from 1 to 10, with 1 being extremely dissatisfied and 10 being extremely satisfied, how satisfied are you with your overall experience with the equipment exchange?
_____ *[RECORD RESPONSE]*
98. Don't know
99. Refused
- 34a. *[IF Q34 <=5]* Why do you say that?

Organizational Data/Firmographics

I have a few last questions about your business or organization

35. Approximately, what percent of your total annual operating costs do your electricity bills represent?
_____ *[RECORD RESPONSE]*
98. Don't know
99. Refused
36. Approximately, what percent of your total annual operating costs do your water bills represent?
_____ *[RECORD RESPONSE]*
98. Don't know
99. Refused
37. How many people does your business employ full time?
_____ *[RECORD RESPONSE]*
98. Don't know
99. Refused

38. How many people does your business employ seasonally?

_____ [RECORD RESPONSE]

98. Don't know

99. Refused

39. Finally, in order to send you the \$50 gift certificate for participating in this survey, I need you to confirm the spelling of your name and your mailing address:

Thank you for your time. Your opinions are very valuable to this research for Rocky Mountain Power. As part of this evaluation, we will be conducting site visits and may contact you in the future to arrange a time to conduct a site visit.

Appendix D. Participant Non-Exchange Survey Instrument

Irrigation Energy Savers Non-Exchange Participant Interview Guide

Company: _____ Telephone: _____
Name: _____ Cell phone: _____
Title: _____ Fax: _____
City: _____ State: _____ Zip: _____
Interview date: _____ Time: _____

Hello, my name is _____ from _____, calling on behalf of Rocky Mountain Power.

We are conducting a study for Rocky Mountain Power regarding their energy efficiency programs. Could I please speak with [*CUSTOMER OF RECORD*] or the person who most often pays the electric bills?

[If “Yes,” continue with introduction below]

[If “No, this site is under new ownership or that person is no longer involved at this site,” ask respondent if they have any contact information for the person you are trying to reach. If they do, record the information and try reaching the party at the new number. If they do not, thank them and end call.]

Introduction

Rocky Mountain Power is evaluating its Irrigation Energy Savers Program and would appreciate your input. “It is important for Rocky Mountain Power to include your opinions in this study so they can serve your needs better.”

This survey is for research purposes only and this is not a marketing call. Your individual responses will be kept strictly confidential and only reported in aggregate. The survey will take approximately 20 minutes.

As a Thank You for your assistance, at the end of the survey we would like to offer you a \$25 gift card, which will be mailed to you.

Do you have a moment to answer some questions about your experience with the program?

[NOTE: If the customer states that he has participated in an Irrigation Energy Savers site visit, or has been scheduled for a site visit, state: “We are conducting this survey in addition to the site visit. We perform site visits to get a better understanding of the energy savings you get from the

program, while this survey is focused on your energy efficiency decisions and your satisfaction with the program.”]

[If “No – Not a convenient time,” ask if Respondent would like to 1. Start now and do part of the survey, or 2. Arrange a more convenient time we can call them at work or at home.]

[If customer wants to verify the validity of the survey, tell them that they are welcome to contact Hallie Gallinger, PacifiCorp Program Manager, at (503) 813-5215.]

[If “No” – Arrange callback]

[If “Refused” – Thank and terminate.]

Confirmation

I would like to give you a bit more background on this survey. All of these questions are about your participation in the Irrigation Energy Savers program from 2006-2008. These questions are **not** about participation after 2008. We understand that you may have also participated in the equipment exchange option, but this survey focuses specifically on the pivot and linear equipment upgrade, system consultation and system analysis options.

The Rocky Mountain Power records show that you participated in the Irrigation Energy Savers program during [YEAR(S)], and at that time:

1. RECEIVED ON-SITE SYSTEM CONSULTATION; AND/OR
 2. RECEIVED SYSTEM ANALYSIS AND SYSTEM REDESIGN OR EXPANSION, AND/OR
 3. RECEIVED INCENTIVES FOR PIVOT AND LINEAR SYSTEM EQUIPMENT;
1. Is that correct?
 1. Yes *[IF CONFIRMATION RESPONSE 1 IS SELECTED] → GO TO QUESTION 2A; IF CONFIRMATION RESPONSE 2 AND/OR 3 ARE SELECTED, GO TO QUESTION 4]*
 2. No, type of participation incorrect
100. No, date is incorrect (*SKIP TO 3*)
101. 98 DK (TERMINATE)
2. *[IF Q1 = NO, TYPE OF PARTICIPATION IS INCORRECT, ASK]* What type of service was received?
 _____ *[RECORD RESPONSE][IF RESPONSE IS “ON-SITE CONSULTATION” ASK 2A]*

[IF CONFIRMATION = 1) RECEIVED ON-SITE SYSTEM CONSULTATION, ASK]

- 2a. Did you have also have pump testing as a result of the system consultation?
 1. Yes
 2. No
 98. Don’t know

99. Refused

3. *[IF Q1 = NO, DATE IS INCORRECT, ASK]* About when were these services provided?

1. _____ MONTH _____ YEAR

98. DK (*DO NOT TERMINATE*)

99. REF (*TERMINATE*)

Participation

4. How did you first learn about the Irrigation Energy Savers?

[DO NOT READ RESPONSES; MARK ALL THAT APPLY]

1. Contacted by my Rocky Mountain Power account representative
2. Contacted by other Rocky Mountain Power staff
3. Contacted by Franklin Soil and Water Conservation District
4. Contacted by Nexant Staff
5. Program sponsored a presentation
6. Trade Publication
7. Word of mouth; from another business colleague
8. Through an equipment dealer
9. Through a trade organization or professional organization/association
10. Through printed material or outreach materials sent by the Program
11. At a trade show
12. Through family, friend, or neighbor
13. Participation in other Rocky Mountain Power Programs
14. Past Program participants
15. Internet research/found Program on the Rocky Mountain Power website
16. Other [SPECIFY] _____
98. Don't know
99. Refused

5. Why did you decide to participate in the Program?

[DO NOT READ RESPONSES; MARK ALL THAT APPLY]

1. To save money on electric bills
2. To save money on water bills
3. To obtain a program incentive
4. To replace old equipment
5. To replace broken equipment
6. To acquire the latest technology
7. To reduce maintenance costs
8. Because the Program was sponsored by ROCKY MOUNTAIN POWER
9. Previous experience with other Rocky Mountain Power Programs

10. To help protect the environment
 11. To save energy
 12. Recommended by Program contact
 13. Recommended by contractors/trade allies
 14. Recommended by another Rocky Mountain Power customer; word of mouth
 15. Recommended by family, friend, or neighbor
 16. Part of a broader maintenance or renovation
 17. Other [SPECIFY] _____
 98. Don't know
 99. Refused
6. Thinking back to when you were first involved with the Program, were there any aspects of the Program that initially caused you concern?
1. Yes
 2. No [SKIP TO ENROLLMENT]
 - 98 Don't know [SKIP TO ENROLLMENT]
 - 99 Refused [SKIP TO ENROLLMENT]
- 6a. [IF 6 = Yes, ASK] What caused your concern?
_____ [RECORD RESPONSE]
- 6b. [IF 6 = Yes, ASK] Was this issue resolved?
- 1 Yes
 - 2 No [SKIP TO 7]
 - 98 Don't know [SKIP TO ENROLLMENT]
 - 99 Refused [SKIP TO ENROLLMENT]
- 6c. [IF 6 = Yes, ASK] How was it resolved?
_____ [RECORD RESPONSE]

Enrollment

7. Did you encounter any problems, delays or difficulties during the application, review or approval processes for the Program?
1. Yes
 2. No [SKIP TO 9]
 - 98 Don't know [SKIP TO 9]
 - 99 Refused [SKIP TO 9]
8. [IF 7 = YES] What problems, delays or difficulties did you encounter?
[DO NOT READ RESPONSES; MARK ALL THAT APPLY]
1. The process took too long
 2. The process was too complex

3. The applications materials were difficult to understand
 - 4.
 5. The Program staff was not knowledgeable
 6. The incentives were less than I expected
 7. Multiple requests for more information from Rocky Mountain Power throughout the process
 8. Disagreement over initial energy savings calculations
 9. Disagreement over final energy savings calculations
 10. Other *[SPECIFY]* _____
 98. Don't know
 99. Refused
- 8a. *[IF 8 = MORE THAN ONE ANSWER]:* What was the **most** difficult issue for you?
 _____ *[RECORD RESPONSE]*
9. If you could change anything about the application process, what would you change?
 _____ *[RECORD RESPONSE]*
10. After this project did your business participate in the program after 2008?
1. Yes
 2. No
 - 98 Don't know
 - 99 Refused
- 10a. Have you participated in other energy efficiency programs?
1. Yes
 2. No *[IF NO SKIP TO 11]*
 - 98 Don't know *[IF DON'T KNOW/REFUSED, SKIP TO 11]*
 - 99 Refused *[IF DON'T KNOW/REFUSED, SKIP TO 11]*
- 10b. *[IF 10a= YES]* What other energy efficiency programs have you participated in?
 _____ *[RECORD RESPONSE]*
- 10c. *[IF 10a= YES]* Who were the sponsors for these programs?
 _____ *[RECORD RESPONSE]*
- 10d. *[IF 10a= YES]* How did this program's application process compare to your prior experience? Was it easier, harder, or about the same?
1. Easier
 2. Harder
 3. About the same

- 10e. *[IF 10d = EASIER OR HARDER]* Why do you say that?
 _____ *[RECORD RESPONSE]*

Recommended Efficiency Measures

11. Were there any equipment, controls, services or other actions recommended through this Program that you didn't put into place?
1. Yes
 2. No *[IF NO SKIP TO 12]*
 98. Don't know *[IF DON'T KNOW, SKIP TO 12]*
 99. Refused *[IF R, SKIP TO 12]*
- 11a. *[IF YES]* What was recommended that you didn't put in place?
 _____ *[RECORD RESPONSE]*
- 11b. *[IF YES]* Why did you choose not to?
 _____ *[RECORD RESPONSE]*

Installed Efficiency Measures

12. Did this project replace existing equipment, add new equipment, do both, or do neither?
1. Only replaced existing equipment OK
 2. Only added new equipment *[IF TOTALLY NEW, "PLEASE DESCRIBE" AND, SKIP TO 14]OK*
 3. Replaced existing equipment and added new equipment OK
 4. Neither replaced nor added equipment *[SKIP TO Q 15]*
 98. Don't know *[SKIP TO Q 15] OK*
 99. Refused *[SKIP TO Q 15]*
13. What was the operating condition of the equipment that the *[INSTALLED MEASURE]* replaced?
1. Old equipment had failed or burned out
 2. Old equipment had problems, but still working
 3. Old equipment in working condition with no problems
 4. Expanding services or production line; wanted efficient equipment
 5. Other *[SPECIFY]* _____
 98. Don't know
 99. Refused
14. On a scale of 1 to 10, where 1 is not at all satisfied and 10 is very satisfied, how satisfied would you say you are with the performance of the new *[INSTALLED MEASURE]*?
 _____ *[RECORD RESPONSE]*
98. Don't know
 99. Refused

14a. [If 14 <=5] Why do you say that?
_____ [RECORD RESPONSE]

Operational Changes

15. At the time that you participated in the program, did you have an overall plan to increase the energy efficiency of your operations?

1. Yes [ASK NEXT QUESTION]
2. No [SKIP TO 16]
98. Don't know
99. Refused

15a. Did you change the manner in which you operated equipment after the new measure(s) was/were installed?

1. Yes [ASK NEXT QUESTION]
2. No [SKIP TO 16]
98. Don't know [SKIP TO 16]
99. Refused [SKIP TO 16]

15b. Were these changes part of the overall plan to increase the energy efficiency of your operations?

1. Yes
2. No [SKIP TO 16]
98. Don't know [SKIP TO 16]
99. Refused [SKIP TO 16]

15c. What did you change?

_____ [RECORD RESPONSE]

1. [ASK IF 15c MENTIONS DURATION OR FREQUENCY OF SCHEDULING] Did you change the duration or frequency of irrigation scheduling since the measures were installed?
2. No [Skip to 16]
98. Don't know
99. Refused

15d. Please explain what changes were made

_____ [RECORD RESPONSE]

16. Have any measures installed through this project been removed?
1. Yes
 2. No [Skip to 18]
 98. Don't know
 99. Refused

17a. **What** was removed or replaced?
 _____ [RECORD RESPONSE]

17b. **Why** was it removed or replaced?
 _____ [RECORD RESPONSE]

17c. **About when** was it removed or replaced?
 _____ [RECORD RESPONSE]

18. Thinking about the equipment you installed through this program, was any of this equipment scheduled for replacement/upgrade before you heard of the program?
1. Yes [If yes, probe]
 2. No [Skip to 19]
 98. Don't know [SKIP TO 19]
 99. Refused [SKIP TO 19]

18a. Which equipment?
 _____ [RECORD RESPONSE]

[IF THEY RECEIVED 1) ON-SITE SYSTEM CONSULTATION OR PUMP TESTING; OR 2) SYSTEM ANALYSIS AND SYSTEM REDESIGN OR EXPANSION, ASK:

19. [FR] Was money for the [TYPE OF SERVICE –1) Onsite system consultation or pump testing, 2) System analysis and redesign or expansion] you received through this project in your budget before you participated in the program?
1. Yes
 2. No
 98. Don't know
 99. Refused

[IF THEY RECEIVED 3) INCENTIVES FOR PIVOT AND LINEAR SYSTEM EQUIPMENT, ASK:

20. [FR] Was money for the installation of the [INSTALLED MEASURE] in your budget before you participated in the program?
1. Yes
 2. No
 98. Don't know
 99. Refused

21. When you installed the new *[INSTALLED MEASURE(S)]*, did you expect savings on:

	Yes	No	Don't Know	Refused
21a. Electricity?				
21b. Water?				

21c. *[ASK IF 21a = YES]* Do the electric energy savings meet your expectations?

1. Yes *[SKIP TO 21e]*
2. No
98. Don't know
99. Refused

21d. *[ASK IF 21c = No]* When do you expect these energy savings?

1. Immediately
2. Within the next 6 Months
3. Within the next year
4. Within the next two years
5. Never *[IF NEVER, ASK 'Why do you not expect savings from the [INSTALLED MEASURE] in the future?']*
98. Don't know
99. Refused

21e. *[ASK IF 21b = YES]* Do the water savings meet your expectations?

1. Yes *[SKIP TO 22]*
2. No
98. Don't know
99. Refused

21f. *[ASK IF 21e = No]* When do you expect these water savings?

3. Immediately
4. Within the next 6 Months
5. Within the next year
6. Within the next two years
7. Never *[IF NEVER, ASK 'Why do you not expect savings from the [INSTALLED MEASURE] in the future?']*
98. Don't know
99. Refused

22. Are there any other benefits that you anticipate?

[PROBE IF NEEDED: HAVE YOU OBSERVED ANY CHANGES IN LEVEL OF PRODUCTION OR SALES? PRODUCT QUALITY?]

_____ *[RECORD RESPONSE]*

23. How satisfied are you with the final cost to you of the *[INSTALLED MEASURES]*? Please use a scale from 1 to 10, with 1 being extremely dissatisfied and 10 being extremely satisfied.

_____ *[RECORD RESPONSE]*

98. Don't know
99. Refused

- 23a. *[IF Q23<=5]* Why do you say that?

Freeridership and Market Effects

[NOTE: ONLY ASK FOR SAME MEASURE AS PRIOR QUESTIONS]

24. On a scale from 1 to 10, how important were the following factors in deciding which energy efficiency actions to take:

Factor	Score
Information provided by program staff on measure savings	
Information on payback for the measure	
The project incentive	
My previous familiarity with these measures	
Had purchased these measures in the past	

25. Regarding the actions you took to save energy through this project, would you have taken any of these actions without the program?

1. Yes
2. No
98. Don't know
99. Refused

26. Before this program, had you previously taken similar types of actions to save energy?

1. Yes
2. No *[IF NO, SKIP TO 27]*
98. Don't know
99. Refused

- 26a. What actions have you taken?

_____ *[RECORD RESPONSE]*

27. [FR] Without this program, would you have taken all of the actions, some of the actions or none of the actions?
1. All
 2. Some
 3. None [SKIP TO 29]
 98. Don't know [SKIP TO 29]
 99. Refused [SKIP TO 29]
 - _____ [RECORD RESPONSE]

27a. [FR] [If 27=Some] Which actions would you have taken?

- 27b. [FR] Without this program, would you have added or replaced the equipment to the...
1. Same level of efficiency
 2. Higher level of efficiency
 3. Lower level of efficiency
 98. Don't know
 99. Refused

28. [FR] Without the program, would you have taken these actions...
1. In the same year?
 2. In one to two years?
 3. In three to five years?
 4. More than five years out?
 98. Don't know
 99. Refused

Energy Efficiency Decision Making

Next, I would like to ask you some questions about the decision making process in regards to energy efficiency purchases and upgrades.

29. Using a 1 to 10 rating scale, where 1 means not at all important and 10 means extremely important, please rate how important energy efficiency is to the operations and management of your business.
- _____ [RECORD RESPONSE]
98. Don't know
 99. Refused

29a. Why do you say that?

_____ [RECORD RESPONSE]

30. Do you have sufficient technical resources in house to address the management of energy and water costs?

1. Yes *[SKIP TO 30b]*
2. No
98. Don't know *[SKIP TO 30b]*
99. Refused *[SKIP TO 30b]*

30a. What additional technical assistance do you need? *[RECORD RESPONSE]*

30b. For this project specifically, were ROCKY MOUNTAIN POWER, Franklin Soil and Water Conservation District, or Nexant able to provide you with the needed technical assistance?

1. Yes
2. No
3. Did not need technical assistance *[SKIP TO 31]*
98. Don't know
99. Refused *[SKIP TO 31]*

30c. What additional technical assistance did you need? *[RECORD RESPONSE]*

30d. Who provided technical assistance? *[RECORD RESPONSE]*

Spillover

31. Besides installing the measures through this program, have you since made any other energy efficiency improvements or purchases on your own without any assistance from a utility or other organization?

1. Yes
2. No *[SKIP TO INTERACTION]*
98. Don't know *[SKIP TO INTERACTION]*
99. Refused *[SKIP TO INTERACTION]*

31a. *[IF 31 = YES]* What improvements or purchases did you make?
 _____ *[RECORD RESPONSE]*

31b. *[IF 31 = YES]* I'm going to read a statement about the equipment that you purchased on your own. On a scale from 1 to 10, with 1 indicating that you strongly disagree, and 10 indicating that you strongly agree, please rate the following statement.

“My experience with the Irrigation Energy Savers program influenced my decision to make other energy efficiency improvements or purchases on my own.”

_____ *[RECORD RATING]*

98. Don't know
99. Refused

Interaction with Rocky Mountain Power or 3rd Party Staff

We are also interested in learning more about your interactions with the Program staff

32. How many people did you work with throughout your participation in the Program? This would include people from Franklin Soil and Water Conservation District, Nexant, ROCKY MOUNTAIN POWER, contractors, etc.
 _____ Number of people

[SKIP TO 35 IF = 0]

33. Who worked with you with you on this project?
[PROBE IF NEEDED. WAS IT PROJECT MANAGERS, ACCOUNT REPS, THIRD PARTY STAFF, CONTRACTORS; MULTIPLE RESPONSE]
1. _____ Rocky Mountain Power Account Representatives
 2. _____ Other Rocky Mountain Power Energy Staff
 3. _____ Franklin Soil and Water Conservation District
 4. _____ Nexant Staff
 5. _____ Installation Contractors
 6. _____ External Consultant
 7. _____ Other *[SPECIFY]* _____

34. Please describe your overall experience working with these people in relation to this project. _____ *[RECORD RESPONSE]*

Satisfaction

35. Would you participate in the Program again?
1. Yes
 2. No
- 35a. *[IF 35 = NO]* Why not?
 _____ *[RECORD RESPONSE]*
36. If you could change anything about the Program, what would you change?
 _____ *[RECORD RESPONSE]*
98. Don't know
99. Refused
37. Using a scale from 1 to 10, with 1 being extremely dissatisfied and 10 being extremely satisfied, how satisfied are you with your overall experience with the Program?
 _____ *[RECORD RESPONSE]*
98. Don't know
99. Refused

37a. [IF Q37 <=5] Why do you say that?

Organizational Data/Firmographics

I have a few last questions about your business or organization

38. Approximately, what percent of your total annual operating costs do your electricity bills represent?

_____ [RECORD RESPONSE]

98. Don't know

99. Refused

39. Approximately, what percent of your total annual operating costs do your water bills represent?

_____ [RECORD RESPONSE]

98. Don't know

99. Refused

40. How many people does your business employ full time?

_____ [RECORD RESPONSE]

98. Don't know

99. Refused

41. How many people does your business employ seasonally?

_____ [RECORD RESPONSE]

98. Don't know

99. Refused

Finally, in order to send you the \$25 gift certificate for participating in this survey, I need you to confirm the spelling of your name and your mailing address:

Thank you for your time. Your opinions are very valuable to this research for Rocky Mountain Power.

Appendix E. Nonparticipant Survey Instrument

Irrigation Energy Savers Non - Participant Interview Guide

Company: _____ Telephone: _____
 Name: _____ Cell phone: _____
 Title: _____ Fax: _____
 City: _____ State: _____ Zip: _____
 Interview date: _____ Time: _____
 SIC Code (4-digit) NAIC: _____

Hello, my name is _____ from _____, calling on behalf of Rocky Mountain Power. We are conducting a study for Rocky Mountain Power regarding their energy efficiency programs. Could I please speak with _____ or the person who most often pays the electric bills?

[IF DIRECTED TO A DIFFERENT RESPONDENT, REPEAT INTRODUCTION]

Our records indicate that you have **not** participated in Rocky Mountain Power's Irrigation Energy Savers Program. Is that correct?

[IF YES, CONTINUE.]

[IF NO, THANK, TERMINATE SURVEY AND TALLY.]

My questions are for research purposes only. We are interested in your opinions to help improve Rocky Mountain Power's programs and understand how to assist customers in saving money on their utility bills. Your individual responses will be kept confidential and only reported in aggregate. Are you willing to participate? *[IF RESPONDENT ASKS HOW LONG, SAY: "APPROXIMATELY 15 MINUTES."]*

As a Thank You for your assistance, at the end of the survey we would like to offer you a \$25 gift card, which will be mailed to you.

[If a customer asks if this is the Total Quality Service survey, or states that he has recently participated in the Total Quality Service survey, say 'this is a separate survey about Rocky Mountain Power's energy efficiency programs.']

[If customer wants to verify the validity of the survey, tell them that they are welcome to contact Hallie Gallinger, PacifiCorp Program Manager, at (503) 813-5215.]

Screening:

S2. *First, I need to validate my records.*

S3. Which electric company provides electric power to your business?

1. Rocky Mountain Power [CONTINUE]
2. OTHER [TERMINATE AND TALLY]
98. DON'T KNOW [TERMINATE AND TALLY]

Participation

3. Have you heard of the Rocky Mountain Power Irrigation Energy Savers Program?

1. Yes [Continue]
2. No [Skip to 11]
98. Don't know [Skip to 11]
99. Refused [Skip to 11]

5. How did you first learn about the Irrigation Energy Savers program?
[DO NOT READ RESPONSES; MARK ALL THAT APPLY]

17. Contacted by my Rocky Mountain Power account representative
18. Contacted by other Rocky Mountain Power staff
19. Contacted by Franklin Soil and Water Conservation District
20. Contacted by Nexant Staff
21. Program sponsored a presentation
22. Trade Publication
23. Word of mouth; from another business colleague
24. Through an equipment dealer
25. Through a trade organization or professional organization/association
26. Through printed material or outreach materials sent by the Program
27. At a trade show
28. Through family, friend, or neighbor
29. Participation in other Rocky Mountain Power Programs
30. Past Program participants
31. Internet research/found Program on the Rocky Mountain Power website
32. Other [SPECIFY] _____
98. Don't know
99. Refused

3. Regarding the Irrigation Energy Savers program, from 2006 through 2008 have you either begun participation in the program and dropped out, or had a project application rejected?
 1. Dropped out *[SKIP TO 5]*
 2. Application rejected *[SKIP TO 5]*
 3. No
 98. Don't know
 99. Refused

4. What are the reasons you have not been in the Program?

_____ *[RECORD RESPONSE AND SKIP TO 11]*

 98. Don't know
 99. Refused

Program Drop-Outs and Rejected Applications

ASK THIS SECTION ONLY IF RESPONDENT IS: (1) PROGRAM DROP-OUT (2) REJECTED APPLICATION

5. Thinking back to when you were first considered the Program, were there any aspects of the Program that initially caused you concern?
 1. Yes
 2. No *[SKIP TO 5C]*
 98. Don't know *[SKIP TO 5C]*
 99. Refused *[SKIP TO 5C]*

- 5a. What were the aspects that caused concern?

_____ *[RECORD RESPONSE]*
- 5b. How was it resolved?

_____ *[RECORD RESPONSE]*

ASK ONLY IF RESPONDENT IS A PROGRAM DROP-OUT

- 5c. Why did your business drop out of the Program?

_____ *[RECORD RESPONSE]*

ASK ONLY IF RESPONDENT'S APPLICATION WAS REJECTED

- 5d. Do you know why your application to participate in the program was denied?

_____ *[RECORD RESPONSE]*

ASK FOR BOTH GROUPS

- 5e. Was the underlying problem resolved to your satisfaction? If not, why not?

We are also interested in learning more about your interactions and experience with the Program staff.

6. How many people did you work with during your time with the Program? This would include people from Franklin Soil and Water Conservation District, Nexant, Rocky Mountain Power, contractors, and others.

_____ Number of people

[SKIP TO 9 IF = 0]

7. Who worked with you with you on this project?

[PROBE IF NEEDED. WAS IT PROJECT MANAGERS, ACCOUNT REPS, THIRD PARTY STAFF, CONTRACTORS; MULTIPLE RESPONSE]

3. _____ Rocky Mountain Power Account Representatives
4. _____ Other Rocky Mountain Power Energy Staff
5. _____ Franklin Soil and Water Conservation District
6. _____ Nexant Staff
7. _____ Installation Contractors
8. _____ External Consultant
9. _____ Other *[SPECIFY]* _____

8. Please describe your overall experience working with these people in relation to this project. _____ *[RECORD RESPONSE]*

9. If you could change anything about the Program, what would you change?

_____ *[RECORD RESPONSE]*

98. Don't know

99. Refused

Efficiency Measures Installed or Instituted

10. In the past year, have you taken any of the following actions?

1. Installed pivot and linear system equipment
2. Replaced drains, gaskets, nozzles, regulators or sprinkler packages
3. Received on-site system consultation or pump testing
4. Received system analysis
5. Expanded or redesigned your irrigation system
6. Installed a VFD to a pump
7. Other actions *[SPECIFY]* _____
8. No actions *[IF NO, SKIP TO ENERGY EFFICIENCY DECISION MAKING]*

- 11a. Did you receive a financial incentive or tax credit for any these actions?

1. Yes *[Specify the incentive and/ or tax credit amount, and the agency/program offering the incentive/tax credit.]*
2. No *[IF NO, SKIP TO ENERGY EFFICIENCY DECISION MAKING]*

- 98. Don't know
- 99. Refused

11. Why did you decide to take these actions?

[DO NOT READ RESPONSES; MARK ALL THAT APPLY]

- 1. To save money on water bills
- 2. To save money on electric bills
- 3. To obtain a program rebate or incentive
- 4. It was scheduled for replacement/upgrade
- 5. To replace old equipment
- 6. To replace broken equipment
- 7. To acquire the latest technology
- 8. To reduce maintenance costs
- 9. Because [ROCKY MOUNTAIN POWER] account manager suggested it
- 10. Because a Nexant engineer suggested it
- 11. Because we had funds available in this fiscal year
- 12. Previous experience with other [ROCKY MOUNTAIN POWER] Programs
- 13. To help protect the environment
- 14. To save energy
- 15. Recommended by Program contact
- 16. Recommended by contractors/trade allies
- 17. Recommended by another word of mouth
- 18. Recommended by family, friend, or neighbor
- 19. Part of a broader expansion or redesign
- 20. Other *[SPECIFY]* _____

Energy Efficiency Decision Making

Next, I will ask some questions about the decision making process in regards to energy efficiency purchases and upgrades.

12. Using a 1 to 10 rating scale, where 1 means not at all important and 10 means extremely important, please rate how important energy efficiency is to the operations and management of your business?

_____ *[RECORD RESPONSE]*

- 98. Don't know
- 99. Refused

13. Why do you say that?

_____ *[RECORD RESPONSE]*

14. Do you have sufficient technical resources in house to address the management of energy and water costs?

- 1. Yes *[SKIP NEXT QUESTION]*

- 2. No
- 98. Don't know
- 99. Refused

15a. *[IF 15=NO]* What type of technical resources would be most helpful?

_____ *[RECORD RESPONSE]*

- 98. Don't know
- 99. Refused

Organizational Data/Firmographics

I have a few final questions about your business or organization.

15. Approximately, what percent of your total annual operating costs do your electricity bills represent?

_____ *[RECORD RESPONSE]*

- 98. Don't know
- 99. Refused

17. Approximately, what percent of your total annual operating costs do your water bills represent?

_____ *[RECORD RESPONSE]*

- 98. Don't know
- 99. Refused

18. How many people does your business employ full time?

_____ *[RECORD RESPONSE]*

- 98. Don't know
- 99. Refused

19. How many people does your business employ seasonally?

_____ *[RECORD RESPONSE]*

- 98. Don't know
- 99. Refused

20. Finally, in order to send you the \$25 gift certificate for participating in this survey, I need you to confirm the spelling of your name and your mailing address:

Thank you for your time. Your opinions are very valuable to this research for Rocky Mountain Power.

Appendix F. Staff and Implementer Interview Guide

Irrigation Energy Savers Program Discussion Guide

Name(s)

Title(s)

Company

Date

Program Overview

1. How do you describe the program to others? (What do you see as the key features and benefits of the program?)

2. What do you consider the broader program goals for the program? What are the market transformation goals for the program?

3. The program offers four energy saving options:

Fixed Incentive Options include:

- Equipment exchange (nozzles, gaskets, drains)
- Pivot and linear equipment upgrades (pressure regulators, sprinkler packages, and drains)

Custom Incentive Options include:

- System consultation and pump tests
- System analysis

4. For Equipment Exchange:

- a. What processes are in place to ensure that appropriate equipment is exchanged and installed?
- b. What issues, if any, are there related to the application review and verification of equipment exchange?
- c. What if anything would increase participation in the Equipment Exchange option?

5. For the Pivot Package and Linear System Upgrades:

- a. What processes are in place to ensure that appropriate equipment is replaced?
- b. What issues, if any, are there related to the application review and system upgrades?
- c. What if anything would increase participation in the Pivot and Linear System Upgrades option?

6. For System Consultation, Pump Tests, and System Analysis:

- a. These programs require that a customer sign a letter of intent before on-site visits are arranged. What if any issues arise regarding this or other elements of the application process?
- b. What is the conversion rate from completion of a report and implementation of recommended improvements? How does it differ by program option?

- c. What is the approximate length of time between completion of a report and implementation of recommendations?
 - d. How do customers generally respond to the recommendations? Do they tend to adopt some, most, or all recommendations? What seems to influence adoption recommendations?
7. Are some options more successful than others in terms of customer uptake and measure performance?
 8. Are there particular challenges associated with each option? What are these challenges?
 9. The fixed incentive portion of the Irrigation Energy Savers Program requires that:
 - Customers be served on rate schedule 10
 - Incentives apply only to measures approved by Rocky Mountain Power
 10. Do you think these requirements limit participation? How do they limit participation? How would you describe the role of the various market actors in project implementation:
 - Customers, contractors, engineering firms, energy services companies, retailers, and equipment manufacturers
 11. Are there any specific issues related to the various eligible program measures? What measures, if any, do you think should be added to the program?
 12. How has the program evolved or changed over time?
 13. How do you coordinate activities internally? [Marketing, service delivery, work with TAs, etc.]
 14. Are you providing training to:
 - a. Rocky Mountain Power staff
 - b. Implementers
 - c. Trade allies
 15. What feedback have you gotten back on the training?
 16. What improvements could be made in the administration of the programs?

Application process

17. What issues, if any, are there related to the application process?

Eligibility criteria

18. What issues, if any, are there related to the eligibility?

Marketing

19. What do you do to promote the program? [What marketing and outreach activities have been and are being conducted? What's worked best?]

Savings estimation techniques

20. How are savings calculated for the program as a whole and for individual projects? What issues if any arise related to verifying savings? How are these issues addressed?
21. Is there a way to improve the manner in which savings are calculated?

Participant interaction and satisfaction

22. What aspects of the programs do customers seem to be most interested in or most satisfied with?
 - a. Any concerns? How were they addressed?

Program data collection

23. Who is responsible for collecting and tracking participation data?
 - a. How effective and accurate is the data-tracking and data collection system?
 - b. Are data entered and reported in a timely fashion?
 - c. Have there been any difficulties with the data tracking systems?
24. Have the implementers had any problems meeting the tracking and reporting requirements?
25. Would you recommend any changes to the procedures?

Trade Allies – Communication

26. Is Rocky Mountain Power involved in the recruitment or management of Trade Allies, retailers or contractors? Please describe the relationship between these parties?
27. Have you had any particular challenges in working with trade allies?
28. How are their problems and questions dealt with?
29. What has/has not worked well?
30. How would you change or improve communications, either within the program, or with trade allies?

Implementation Barriers

31. Has the level of program participation met your expectations? Why do you think this has been the case?
32. Have any challenges resulted from perceptions or attitudes about the value of the program among the target population? If so, what?
33. How have you dealt with those perceptions and attitudes?
34. How about any challenges resulting from perceptions or attitudes about the value of the programs among the vendors? How have these been dealt with?

Close

35. What would you say are the program's strongest points? What are its weakest points?
36. Other than what we've discussed above, what would you change about the program?

Appendix G. Market Actor Interview Guide

Market Actor Interview Guide – Idaho Irrigation Energy Savers Program

Interviewee information:

Name:

Organization:

Title:

Telephone:

Hello, my name is _____ from The Cadmus Group, calling on behalf of Rocky Mountain Power.

Rocky Mountain Power is evaluating its Irrigation Energy Savers Program and would like your input regarding the program and how it has operated over time. This interview is part of a process evaluation we are conducting to understand how the program has functioned over time, and identify opportunities for improving the program. Our focus is on the program as it was operating in 2006 through 2008.

This survey is for research purposes only and this is not a marketing call. Your responses will remain confidential. Do you have a moment to answer questions about your experience with the program?

[If “No – Not a convenient time,” ask if Respondent would like to 1. Start now and do part of the survey, or 2. Arrange a more convenient time we can call them at home. Emphasize that]

“It is important for Rocky Mountain Power to include your opinions in this study so they can serve your needs better.”

[If “No” – Arrange callback]

Screening Questions

1. **[Rocky Mountain Power]** records show that in **[Year]** you were a participating dealer in Rocky Mountain Power’s Irrigation Energy Savers program. Is that correct?
 - a. Yes **[Go To Question 2]**
 - b. No, market actor was not a participating dealer Rocky Mountain Power’s Irrigation Energy Savers program in **[Year]**. **[Terminate]**
 98. Don’t know **[Terminate]**
 99. Refused **[Terminate]**
2. During what time frame were you a participating dealer?
 1. **[Month]** _____ **[Year]** _____

- 98. Don't know
 - 99. Refused
3. Did you provide equipment for the Equipment Exchange, Pivot and Linear System Upgrades or both?
- 1 Equipment Exchange
 - 2 Pivot and Linear System Upgrades
 - 3 Both

Program Overview

- 4. When did you become a participating dealer for the Irrigation Energy Savers program?
- 5. What did you see as the purpose of the program?
- 6. Who else was involved in program? How were they involved? [PROBE on Franklin Soil and Conservation District, PacifiCorp, other retailers, equipment manufacturers.]
- 7. At the start of the program were there particular measures or services that were more popular than others? If so, what were they? Why do you think they were more popular?
- 8. Have there been changes over time in the services or measures people are interested in? What are the changes?

Program Entry

- 9. How did a prospective customer find out about the program?
 - a. Equipment dealers,
 - b. Contractors
 - c. Engineering firms,
 - d. Energy services companies
 - e. Retailers,
 - f. Equipment manufacturers
 - g. Drilling companies
 - h. Electricians
 - i. Drive dealers
 - j. Other _____

Participant interaction and satisfaction

10. Did customers express any concerns about the program? How were the concerns addressed?

Rocky Mountain Power – Communication

11. Did your company have any particular challenges in working with Rocky Mountain Power?

12. How were these challenges dealt with?

Implementation Barriers

13. Did any challenges result from perceptions or attitudes about the value of the program among the Rocky Mountain Power customers? If so, what were they?

14. How did you deal with those perceptions and attitudes?

15. **[If they participated in the Equipment Exchange]** Did you have any issues regarding buildup of non-recyclable materials (i.e. rubber) at your business? How were these issues addressed?

Program data collection

16. Please describe the program's data collection and tracking requirements.

a. Were there any difficulties meeting those requirements?

17. Would you recommend any changes to the procedures?

Close

18. Other than what we've discussed above, what would you change about the program as it was operated in 2006 through 2008?

19. What would you change about the program as it is currently operated?

20. Is there anything else you would like to add?