PROCESS EVALUATION REPORT

For the

SCE Agricultural Energy Efficiency Program

CALMAC Study ID SEC0287.01

October 13, 2009

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EXECUTIVE SUMMARY

This report presents the results of a process evaluation of Southern California Edison's (SCE's) Agriculture Energy Efficiency Program. In late 2006, SCE's long-standing hydraulic testing services program was expanded to include nonresidential audits and incentives/rebates for the renovation or replacement of inefficient pumps and the purchase of efficient equipment. The audit and incentive/rebate components of the Agricultural Energy Efficiency Program previously existed within other free-standing programs open to all SCE nonresidential customers. The new Agricultural Energy Efficiency Program offers these components within an integrated environment for SCE's agricultural customers.

The primary objectives of this process evaluation study include:

- Discover barriers encountered by the new program and develop recommendations for improving program performance;

- Estimate the overall pump test implementation rate, which is currently thought to be 33%,
  - See if this rate varies by customer and pump type,
  - See if the new incentive has an influence on implementation, and
  - Identify payback periods and their possible influence on implementation;

- Examine whether follow-up and expert consultation, if provided, would improve implementation; and

- Estimate the effective useful life (EUL) of the pump measures.

Methodology

To meet the objectives of this process evaluation project, the project team conducted a review of the program records and surveys with the key market actors, including program participants and non-participants. The program documentation review helped to gain a full understanding of program design, previous evaluation findings, and current customer outreach and marketing activities.

There were four distinct samples drawn for this study. For the rebate participant and rebate non-participant surveys, sample size calculations were based on the proportional approach based on pump size and application. The sample design was developed to achieve an 80% confidence level ± 20%. The various types of data collected in this evaluation were as follows:

- **Interviews with Edison Pump Test Program management staff**. In-depth interviews were conducted with program management/evaluation and field services management staff. The interviews were structured to gain insights into the research questions at the management level and help to structure and refine the participant interviews and research activities.

- **Interviews with pump testers**. The project team conducted in-depth interviews with a census of pump testers. They are the primary program interface with Edison customers and offer a valuable field of potential information on customer perceptions about the program, barriers to program participation, and the uptake of efficiency improvement recommendations.

- **Program participant interviews**. In-depth interviews were conducted with knowledgeable program participant contacts in order to gather feedback on researchable issues and customer perceptions regarding implementation rates, EUL, and other issues. The project team prepared interview guides for review by Edison, selected participant samples in conjunction with Edison staff, and scheduled and conducted telephone interviews.

- **Non-participant interviews.** In-depth interviews were also conducted with a sample of non-participating program eligible customers to assess market barriers, effectiveness of messaging, use of other services, and other related issues.

The primary markets served by the program are municipal water service and agricultural irrigation. Pumping applications include well water extraction, reservoir and storage tank refill, and pressure boosting. A review of the January 2006 to June 2008 participation data indicates that over 9,500 pumps were tested. As shown in Table E-1, of these 9,500 pumps tested, about 7% received an incentive to implement pump improvements.

Table E-1: Pumps Tested and Pumps Receiving an Incentive by Market Segment

Sector	Pumps Tested	% of Pumps Tested by Sector	Receivied Incentive	% Receiving Incentive by Sector	% Receiving Incentive of all Pumps Tested Within Sector
Agriculture	3,253	34%	131	20%	4.0%
Non-Agriculture	6,249	66%	531	80%	8.5%
Total	9,502	100%	662	100%	7.0%

As shown in Figure E-1 and Figure E-2, most of the pumps tested, as well as most of the pumps receiving an incentive, were non-agricultural pumps. About 34% of the pumps tested were agricultural pumps, but only 20% of the pumps receiving an incentive were agricultural pumps.

Figure E-1: Share of Pumps Tested

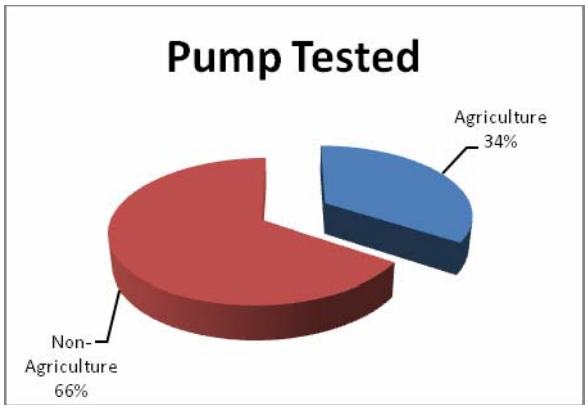


Figure E-2: Share of Pumps Receiving an Incentive

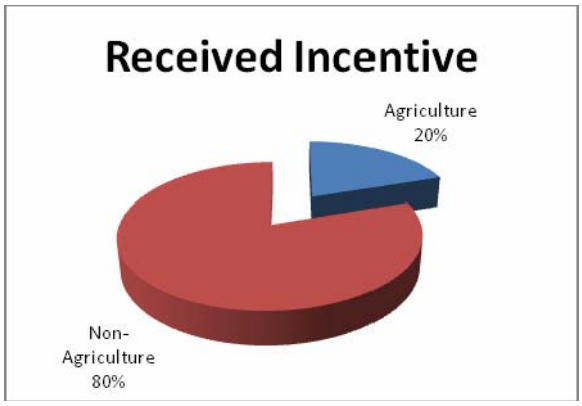


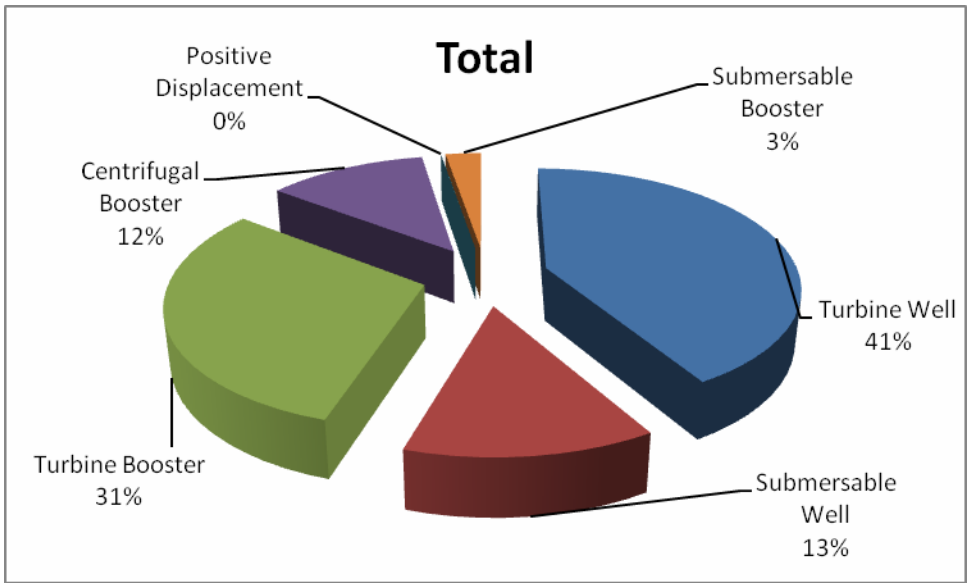
Table E-2 shows the types of pumps tested by pump type. The two most common types of pumps that received a test were turbine well pumps and turbine booster pumps. On the opposite end, very few submersible booster pumps and only one positive displacement pump received a pump test.

Table E-2: Type of Pump Tested by Market Segment

	Agriculture	Non-Agriculture	Total	% Agriculture	% Non-Agriculture
Turbine Well	2,170	1,771	3,941	55%	45%
Submersable Well	676	586	1,262	54%	46%
Turbine Booster	131	2,773	2,904	5%	95%
Centrifugal Booster	259	881	1,140	23%	77%
Positive Displacement	0	1	1	0%	100%
Submersable Booster	17	237	254	7%	93%
Total	3,253	6,249	9,502	34%	66%

Figure E-3 illustrates the distribution by pump type for all pumps tested. Over 70% of the pumps tested were either turbine well or turbine booster pumps. Less than 5% were either submersible booster or positive displacement pumps.

Figure E-3: Share of Pumps Tested by Pump Type



The distribution of pumps by pump type varied significantly by market segment. Figure E-4 illustrates the distribution by pump type for non-agricultural pumps tested and Figure E-5 illustrates the distribution by pump type for agricultural pumps tested.

For the non-agricultural market segment, turbine booster pumps are the most common being tested with a share of 44%. This is followed by turbine well pumps with a 28% share, and then distantly by centrifugal booster pumps with a share of 14%.

For the agricultural market segment, turbine well pumps are the dominant type of pump receiving a test with a 67% share followed by submersible well pumps with a 21% share. None of the remaining pump types had a share greater than 8%.

Figure E-4: Share of Pump Types Tested - Non-Agricultural

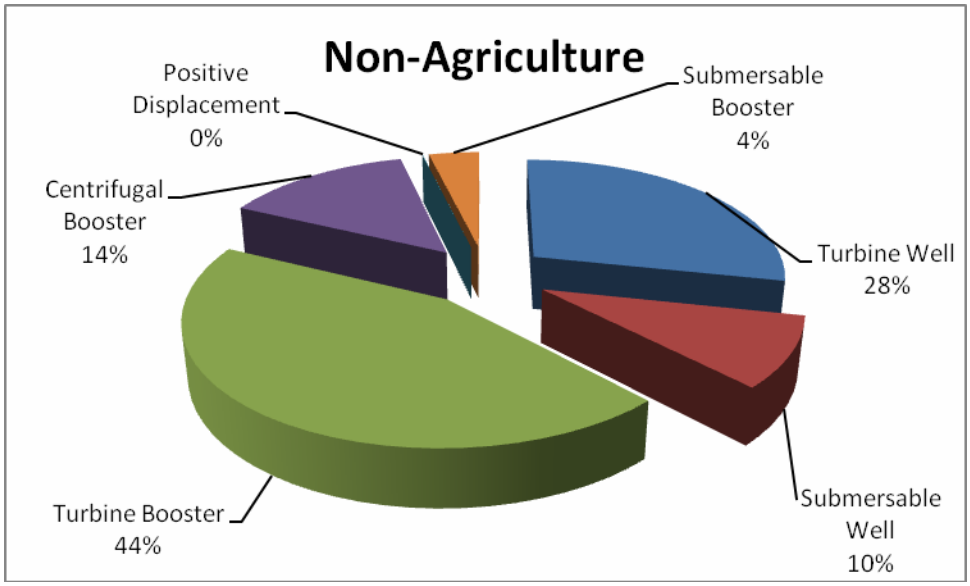
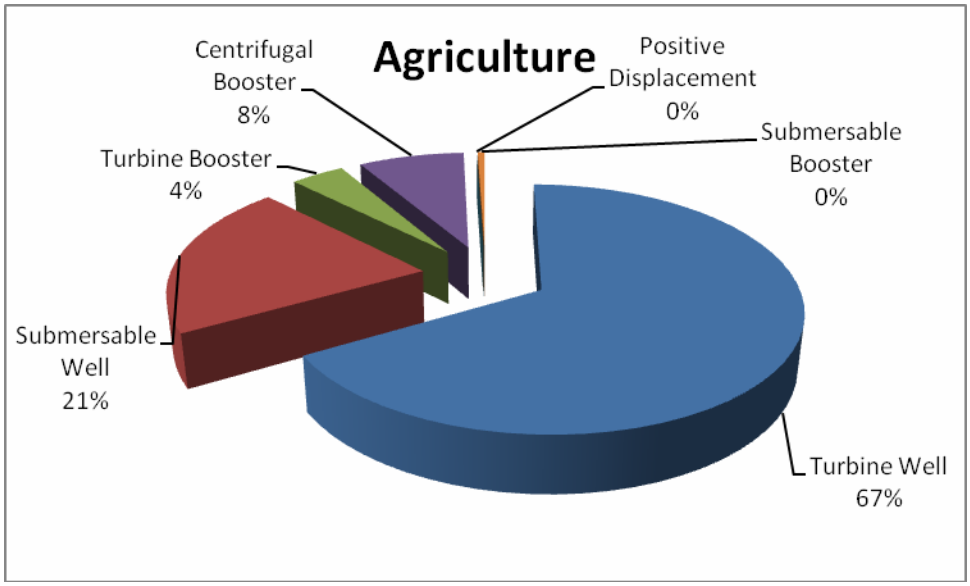


Figure E-5: Share of Pump Types Tested – Agricultural



Conclusions and Recommendations

There were four primary objectives of this process evaluation study, which included:

- Discover barriers encountered by the new program and develop recommendations for improving program performance;

- Qualitatively assess the overall pump test implementation rate, which is currently thought to be 33%,
  - See if this rate varies by customer and pump type,
  - See if the new incentive has an influence on implementation, and
  - Identify payback periods and their possible influence on implementation;

- Examine whether follow-up and expert consultation, if provided, would improve implementation; and

- Estimate the effective useful life (EUL) of the pump measures.

In addition to these four primary objectives, the issues of free ridership and spillover were also qualitatively assessed.

Barriers and Recommendations

Questions that focused on identifying program barriers were asked of each group of program actors:

- The SCE program managers;

- The SCE pump testers;

- The incentive program participants; and

- The incentive program non-participants, who are made up of those who received a pump test, but did not receive an incentive.

Overall, the SCE Agricultural Energy Efficiency Program is considered highly successful among each of the actor groups. The barriers cited by the market actors have not led to poor program participation, but are more related to customer convenience and trying to increase implementation of recommended measures.

Pump Test Scheduling

Among both the SCE staff and the SCE pump testers, the issue of scheduling pump tests and the waiting time of about two to six weeks before a pump can receive a test after a request is received was cited as one of the primary barriers. This perception among the SCE staff and the pump testers was cited as one of the reasons that non-participants identified for not taking advantage of the available rebate and implementing a measure. Delays of when they received a test and delays to when they would get the rebate where among the timing issues identified in Table 5-10.

Recommendations for change. Pump testers acknowledged that there is a manpower shortage. This manpower shortage could become greater as several of the most senior pump testers may soon retire. To become a fully qualified pump tester takes several years of on the job training and there are not enough pump testers currently being trained. An alternative is to hire third part pump testers, which is done to some extent already. However, several pump testers said that these third party pump testers should be removed from the program because of quality of service concerns on their part. Recommendations would be first to hire more pump testers to be part of the program or, if more third party testers are utilized, that they be screened for knowledge and ability and their work spot checked for quality.

Financial Issues

All market actors identified financial issues both as a reason to participate in the program and as a barrier to participation. The pump testers and SCE staff indicated that there are only limited funds for rebates and that many of those wanting to perform pump tests need the rebates to insure a faster payback. The pump testers and SCE staff felt that limited funds among those receiving a pump test, as well as a desire for quick payback, limited more widespread measure implementation.

Among the program participants, cost-benefit concerns were cited by over 80% of the respondents as the reason for not implementing recommended efficiency improvements. Among non-participants, this concern was not voiced as often as timing not being right as their primary reason for not participating in the rebate portion of the program.

On average, desired payback periods were around four to five years. However, the payback periods varied significantly by pump type and, to a lesser degree, by market segment. Turbine well and submersible well pumps had the shortest desired payback periods with the two shortest being 1.9 years for non-participant agricultural and 2.2 years for participant municipal customer turbine well pumps. The longest payback periods cited were for participant municipal customer turbine booster pumps at 7.2 years and non-participant agricultural centrifugal booster pumps at 12.3 years.

The relationship between desired payback periods and implementation is uncertain. Of the non-participants, all indicated that they had made at least some pump improvements regardless of pump type. For participants, there does seem to be partial correlation. Turbine well pumps had among the shortest payback periods, as well as among the lower implementation rates. At the market segment level, the correlation appears stronger. The desired overall payback period for agricultural customers was 3.8 compared to 4.2 for municipal customers. The average implementation rate for participant agricultural customers was 81% compared to 94% for municipal customers.

Among the rebate program participants, the importance of the rebate in their decision to implement a measure varied significantly both by market segment and pump type. The incentive was more important to the agricultural customers, especially those with turbine well and submersible well pumps. The rebate was not as important for the municipal customers, except for those with turbine well pumps.

Recommendations for change. The rebate seems to be an important, but not over-riding, consideration for those implementing pump improvements. If changes are to be made, it is recommended that the rebates be more focused through a higher rebate level or more funds available for turbine well pumps. Across both market segments, the rebate was cited as important for this pump type and, correspondingly, the desired payback period was the shortest for this pump type.

Other Barriers

The other most frequently cited barrier is the test itself. It is long and requires that the pumps are off-line. However, no alternatives were identified to overcome this barrier and no recommendations were provided.

Measure Implementation Rate

The measure implementation rate can be calculated from several perspectives. Each perspective is outlined in the text that follows. The perspectives include:

- The very narrow perspective of only estimating the implementation rate for the rebated only improvements made to pumps.
- Adding to the implementation rate the number of non-rebated measures implemented that are the same as the rebated measures.
- Adding to the implementation rate all pump efficiency measures implemented after receiving the pump test and efficiency recommendations. This includes maintenance type measures.

Summit Blue believes that the sum of all three perspectives is the most accurate representation of the measure implementation rate, but all three perspectives are provided.

Table E-3 provides a summation of the measure implementation rate from each of these perspectives. If only the "replaced their bowl and impeller" measure was considered for the measure implementation rate, the rate would be 26.2%. This value is similar to the current program value of 33%. However, if the additional measures are included, the implementation rate grows to 74.5%. Additional measures include the following:

- Replace pump bowl and impeller
- Adjust bowl and impeller on deep well pump
- Trim existing impeller on booster pump
- Install high-efficiency motor
- Install variable-speed drive on pump motor
- Replace well column with coated or treated pipe to reduce friction losses
- Change distribution system discharge lines to reduce pressure or friction
- Motor Rewind

The 74.5% value is over twice as large as the current value. However, past evaluations indicated that the current 33% rate was likely very conservative since these past evaluations did not attempt to identify the number of efficiency measure installations for all pumps at sites where multiple pumps received a pump test. Summit Blue believes that this higher value is reasonable based both on the results from this current evaluation, but also from the indications of higher implementation rates from the previous evaluation efforts.

Table E-3: Measure Implementation Rate

Measure Type	Implementation Rate
Pumps Receiving a Rebate	4.5%
Non-Participant Pumps Implementing the Rebated Measure	21.7%
Other Measures from the Rebate Population	2.7%
Other Measures from the Non-Participant Population	45.7%
Total Program Implementation Rate at the Pump Level	74.5%

Effective Useful Life

Effective useful life is calculated using the estimates of average useful life by pump type provided by the program participants and weighting those results by the number of pumps tested by pump type.

The measure lives at the pump type level are weighted by the total number of pumps tested in order to provide a weighted average measure life. Both the unweighted and weighted average measure life estimates are provided in Table E-4. Unweighted, the average life is 8.8 years. However, turbine wells make up over 40% of the pumps tested and its average measure life is a lower 6.8 years. Using a weighting by the number of pumps tested, the average measure life is 8.3 years. The 8.3 average for measure life is recommended by Summit Blue. This is lower than the current estimate of 11 years.

Table E-4: Weighted Measure Life

Pump Type	Pumps Tested	% of Participants	Average Measure Life
Centrifugal Booster	1,140	12%	12.7
Submersible Well	1,262	14%	6.5
Turbine Booster	2,904	31%	9.3
Turbine Well	3,941	43%	6.8
Unweighted Average Measure Life			8.8
Weighted AverageMeasure Life			8.3

Would Follow up or Expert Customer Consultation Improve Program Implementation?

Questions regarding this topic were asked of both the rebate program participants and rebate non-participants. Where possible, responses were differentiated by market segment and pump type.

On the question regarding a desire to have SCE provide follow-up after pump tests, rebate program participants responded about in the middle of the range between 0 (not likely) and 10 (yes) with the overall average of 5.3. The highest response was from the owners of turbine well pumps with a rating of 6.7. The lowest from the owners of turbine booster pumps with a rating of 3.3. Among market segments, agricultural customers were more inclined to want follow-up.

On the question, "If SCE offered additional consultation would you be more likely to implement any or all of the recommended measures?", rebate program participants responded somewhat higher than the previous question with an average response of 6.4 (on a scale of 0 to 10). The same two pump types had the highest and lowest ratings, as they did the last question. Turbine well pump owners responded with a high 8.3 rating, while turbine booster pump owners responded with a low 2.9 rating. Among market segments, agricultural customers again were much more inclined to want additional consultant services.

Rebate program non-participants were provided a slightly different phrased question. They were asked "How important is follow up and expert consultation to you in relation to the program?" About 60% of the respondents indicated that follow-up and expert consultation is important, while only 15% said it was not important. The importance of follow-up and expert consultation was consistent within each pump type. These results are in contrast to the participant survey results where importance of follow-up was given a rating of only 5.3 (on a scale of 0-10), which indicates that those who participate do not need much follow-up and expert consultation, whereas those who have not participated do. As indicated in Table 5-14, several respondents specifically indicated that expert consultation is important, but follow-up not so important.

Free Ridership and Spillover

The issues of free ridership and spillover were not specific objectives of this study. However, questions addressing these two issues were included in both the rebate participant survey and pump testers survey.

Overall, the pump testers thought that the pump test was more influential for some measures than for others. The results indicate that when it came to replacing the pump bowl and impeller, on average the pump testers believed that over half (59%) of the participants made the change because of the pump test, whereas on average less than half (43%) of the pump testers believed that participants adjusted the pump bowl and impeller on a deep well pumps because of the pump test. The pump testers felt that the pump test was not a key factor for trimming the existing impeller on a booster pump, as they felt that less than third (29%) of the participants would make that change, because of the pump test results.

On the issue of potential spillover, the pump testers were asked if they thought the influence of participating in the program led to other, non-program, efficiency improvements. The pump testers reported that many different measures were being implemented. These include VSDs, lighting measures, air conditioning, control measures, solar, premium efficiency motors, valve replacement to larger valves, micro drip sprinklers, system soft starts, high efficiency motors, and low pressure nozzles. The pump testers also mentioned that some customers shifted their usage to off peak times and others changed their rate classification. In summary, the pump testers believe that there is a significant amount of program spillover.

As with the pump testers, the rebate program participants were given a series of questions addressing the topics of free ridership and spillover. The responses from the pump testers indicated moderate to high estimates of free ridership, but that free ridership appeared to be different by type of measure. Potential spillover effects were found to be significant by the pump testers. Similar indications can be drawn from the responses to the rebate participant survey.

The rebate participants were asked if the incentive was meaningful in their decision to implement the measure. They were then asked if the measure would have been implemented even without the incentive. The responses are scaled from one to five with one being no influence or not likely and five being highly influential or highly likely.

As did the pump testers, the rebate program participants gave the lowest rating of importance to the trim impeller on booster pump measure and this same measure was identified as the most likely to be implemented anyway without the program. However, supporting the findings from the pump testers, the rebate program participants indicated that the program influenced many other improvements beyond those recommended by the program.

The findings from the rebate program participants is essentially the same as the pump testers. The level of free ridership appears high, especially for the trim impeller measure, but spillover also appears high.

However, it is uncertain what the conclusions should be given these findings. The findings indicate a high level of awareness among those whose pumps are being tested. Why there is a high level of awareness is uncertain. A strong possibility is that both the many years that this program has been offered along with the high levels of pumps being re-tested over the years has directly led to the high levels of energy efficiency awareness for pumps among the program participants. The current high free ridership along with high spillover may be the direct consequence of these many years of program operation and participation.

1 INTRODUCTION

This report presents the results of a process evaluation of Southern California Edison's Agriculture Energy Efficiency Program. The study specifically focuses on those program participants that received a pump test.

The pump testing element of SCE's Agriculture Energy Efficiency Program has been run continuously by SCE since 1911. This program provides a testing service for pumps in both agricultural and municipal settings. In 2006, the program changed from a program that provided only pump testing services to one that also offered rebates for energy efficiency measures implemented through the program.

Through the program, SCE provides in-field test services for water pumping applications. Test services include an assessment of pumping plant efficiency, including water flow and overall plant efficiency (OPE), as well as a written report submitted to the customer that describes the results of the test and recommendations for improving the efficiency of the plant. The program is thus both an information and education program and an incentive based program where incentives are provided to implement recommended upgrades. The program is delivered to customers as a free-of-charge energy service.

The program provides well trained pump test staff that test participants' pumps and make recommendations about how the pump's efficiency could be improved. The program targets pump owners in agricultural and municipal settings for any pump that moves potable water, especially high load factor customers. The program relies primarily on word of mouth advertising. Some marketing at shows and community events is also conducted. However, the program has been in existence for such a long period of time that people know of it and word of mouth has been an effective method. Participants request a pump test and SCE pump test staff visit the pump site and conduct a test that can last about three hours. The pump tester then sends written results to the pump owners that discuss the efficiency of the pump and makes recommendations on how the efficiency could be improved. This program is meeting its goals. It is currently fully subscribed with pump owners having to wait up to four weeks for a pump test.

The program addresses a variety of pump types, including turbine well, turbine booster, submersible well, submersible booster, and centrifugal booster pumps. This process evaluation study focused on three specific pump improvements; replacing the bowl and impeller, adjusting the bowl and impeller on a deep well pump and trimming the impeller on a booster pump. Other efficiency improvements are also implemented through the program and are based on recommendations made by the pump testers in their pump test reports. These improvements include variable speed drives, premium efficiency motors, valve replacements, micro drip sprinklers, soft start of equipment, low pressure nozzles, lighting measures, air conditioning measures, control measures, and shifting to off peak time periods.

1.1 Summary of Process Evaluation Study Objectives

The objectives of this process evaluation study are to investigate program implementation barriers, various aspects of the pump test implementation rate, any need for additional assistance, and estimate effective useful life (EUL). Specifically, the objectives include:

- Discover barriers encountered by the new program and develop recommendations for improving program performance;

- Qualitatively assess overall pump test implementation rate, which is currently thought to be 33%,
  - See if this rate varies by customer and pump type,
  - See if the new incentive has an influence on implementation, and
  - Identify payback periods and their possible influence on implementation;

- Examine whether follow-up and expert consultation, if provided, would improve implementation; and

- Estimate the effective useful life (EUL) of the pump measures.

1.2 Program Participation Summary

The primary markets served by the program are municipal water service and agricultural irrigation. Pumping applications include well water extraction, reservoir and storage tank refill, and pressure boosting. A review of the program database reveals that a variety of other market segments are also served by the program. A review of the January 2006 to June 2008 participation data indicates that over 9,500 pumps were tested. As shown in Table 1-1, of these 9,500 pumps tested, about 7% received an incentive to implement pump improvements.

Table 1-1: Pumps Tested and Pumps Receiving an Incentive by Market Segment

	Pump Tested	Received Incentive	Received Incentive %
Agriculture	3,253	131	4.0%
Non-Agriculture	6,249	531	8.5%
Total	9,502	662	7.0%

As shown in Figure 1-1 and Figure 1-2, most of the pumps tested, as well as most of the pumps receiving an incentive, were non-agricultural pumps. About 34% of the pumps tested were agricultural pumps, but only 20% of the pumps receiving an incentive were agricultural pumps.

Figure 1-1: Share of Pumps Tested an Incentive

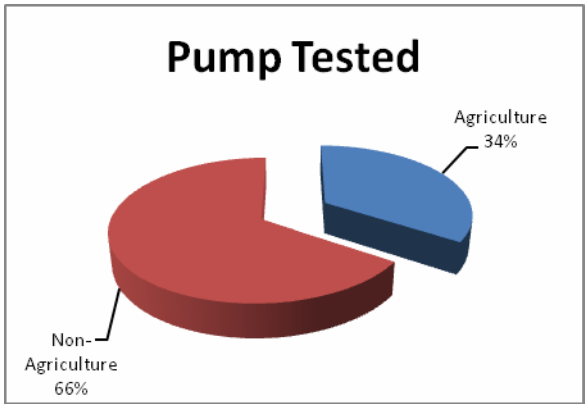


Figure 1-2: Share of Pumps Receiving

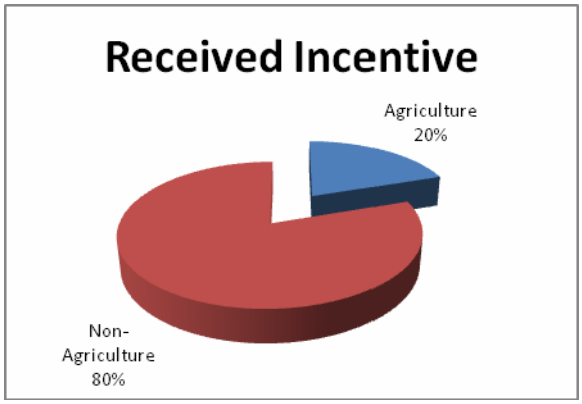


Table 1-2 shows the types of pumps tested by pump type. The two most common types of pumps receiving a test were turbine well pumps and turbine booster pumps. On the opposite end, very few submersible booster pumps and only one positive displacement pump receive a pump test.

Table 1-2: Type of Pump Tested by Market Segment

	Agriculture	Non-Agriculture	Total	% Agriculture	% Non-Agriculture
Turbine Well	2,170	1,771	3,941	55%	45%
Submersable Well	676	586	1,262	54%	46%
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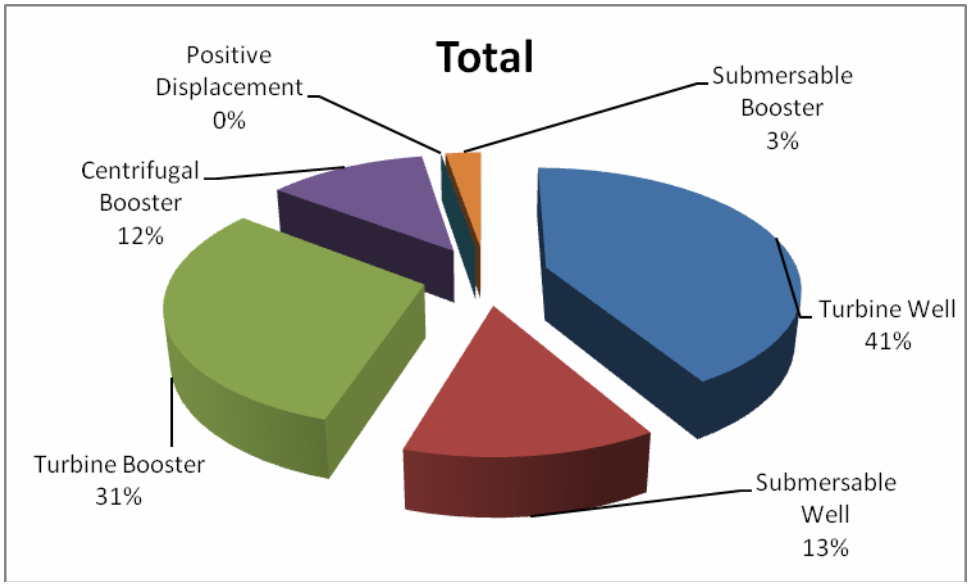
Total	3,253	6,249	9,502	34%	66%

Figure 1-3 illustrates the distribution by pump type for all pumps tested. Over 70% of the pumps tested were either turbine well or turbine booster pumps. Less than 5% were either submersible booster or positive displacement pumps.

Figure 1-3: Share of Pumps Tested by Pump Type



The distribution of pumps by pump type varied significantly by market segment. Figure 1-4 illustrates the distribution by pump type for non-agricultural pumps tested and Figure 1-5 illustrates the distribution by pump type for agricultural pumps tested.

For the non-agricultural market segment, turbine booster pumps were the most common being tested with a share of 44%. This was followed by turbine well pumps with a 28% share, and then distantly by centrifugal booster pumps with a share of 14%.

For the agricultural market segment, turbine well pumps are the dominant type of pump receiving a test with a 67% share followed by submersible well pumps with a 21% share. None of the remaining pump types had a share greater than 8%.

Figure 1-5: Share of Pump Types Tested - Non-Agricultural

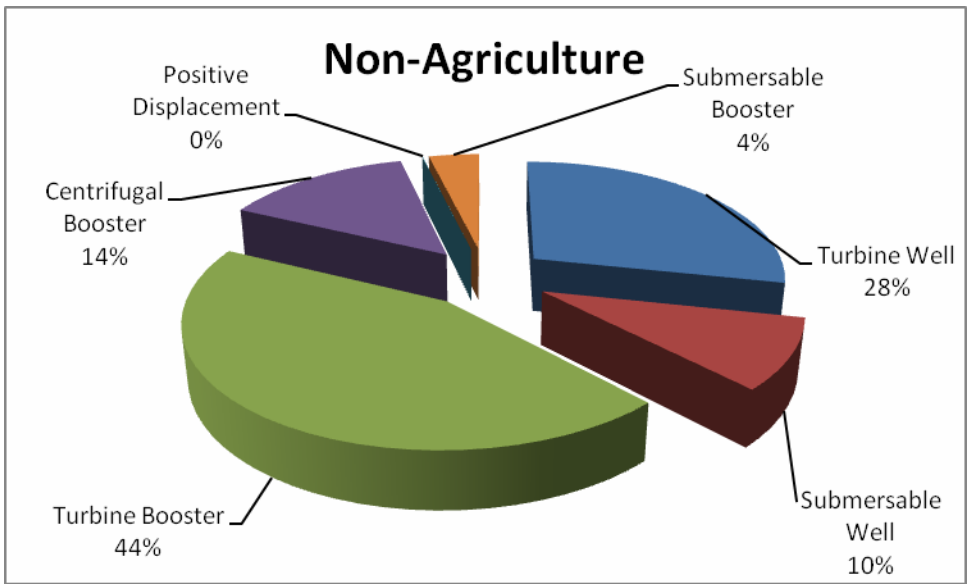
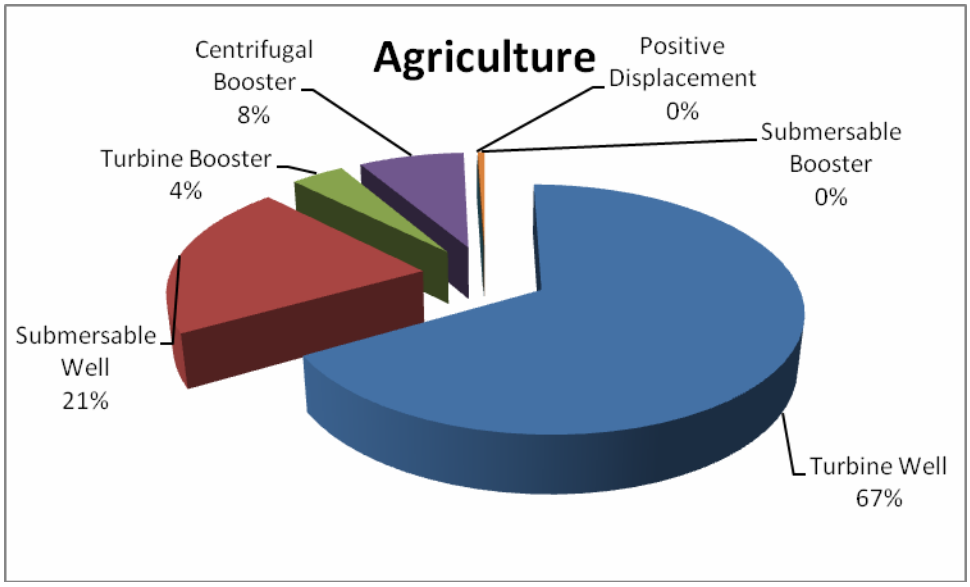


Figure 1-4: Share of Pump Types Tested – Agricultural



2 RESEARCH METHODS AND APPROACHES

A number of different market actors were interviewed either by telephone or in person during the evaluation of the SCE Ag Efficiency program. The sample design was developed specifically for this program. Both the evaluation methodology and the sample design are discussed in greater detail below.

2.1 Process Evaluation Methodology

The Summit Blue project team conducted primary data collection activities in order to assess the implementation rate and other research objectives of this study. The project team undertook a series of research activities that included a review of program documentation, databases, and records; interviews with Edison Ag Efficiency Program management staff; interviews with Ag Pump testers; program participant interviews; and non-participant interviews. Each of these elements is discussed in further detail below. The research instruments were designed based on the researchable issues and questions identified during the project initiation phase of the project. All the in-depth discussion guides and survey instruments used for these interviews are attached in Appendix A. On average, these interviews lasted about 30 minutes and were conducted by Summit Blue analysts. Study respondents were asked to discuss:

- Their participation or non participation in the program;
- Effectiveness of marketing the program;
- Free ridership and spillover;
- The lifetime of efficiency improvement measures in different scenarios;
- Reasons for making the improvements;
- Satisfaction with the program; and
- Suggestions for program improvement.

Review of program documentation, databases, and records. The project team conducted a review of program documentation, participation databases and project records in order to gain an understanding of the recent history and changes to the program design. The databases also provided the detailed identification of those who have received a pump test, as well as those who have received an incentive. This data was used to identify the characteristics of the program participants, as well as provide the populations needed for drawing participant and non-participant samples.

For the purposes of this study, participants were defined as the pumps that both received a pump test and received an incentive payment. Non-participants are defined as the pumps that received a pump test, but not an incentive payment.

Interviews with Edison Ag Efficiency Program management staff. In-depth interviews were conducted with program management/evaluation and field services management staff. The interviews

were structured to gain insights into the research questions at the management level and help to structure and refine the participant interviews and research activities.

Interviews with Ag Pump testers. The project team conducted in-depth interviews with the census of Ag Pump testers. They are the primary program interface with Edison customers and offer a valuable field of potential information on customer perceptions about the program, and barriers to program participation, and the uptake of efficiency improvement recommendations.

Program participant interviews. In-depth interviews were conducted with knowledgeable program participant contacts in order to gather feedback on researchable issues and customer perceptions regarding implementation rates, EUL, and other issues. The project team prepared interview guides for review by Edison, selected participant samples in conjunction with Edison staff, and scheduled and conducted telephone interviews. Participants were defined as those that both received a pump test and received an incentive payment.

Non-participant interviews. In-depth interviews were also conducted with a sample of non-participating program eligible customers to assess market barriers, effectiveness of messaging, use of other services and other related issues. Non-participants are defined as the pumps that received a pump test, but not an incentive payment.

2.2 Sample Design

The evaluation of this program includes phone interviews with a variety of different program stakeholders with the intent to gather information and impressions from multiple perspectives. The sample frame used for this evaluation is shown below in Table 2-1. Sample sizes were based on an overall 90% confidence and 10% error, with each market segment subset at an 80% confidence and 20% error level.

2.3 Program Staff and Pump Testers

All four of the SCE Ag efficiency Program staff were interviewed. The Summit Blue team completed the interviews through a conference call that included all four program staff members to discuss the program.

All active pump testers were interviewed. This resulted in a total of sixteen interviews. The survey instrument can be found in Appendix A.

2.4 Participants and Non-Participants

There were several possible ways of approaching the sampling plan. First, there were multiple ways to segment the sample: by pump type, by pump horsepower, or by pump use. The goal of this segmentation was to produce roughly equal size populations that represented differing priorities for pumping systems. Second, the random sample could be selected by either client or pump. This is discussed below.

The recipients of a pump test were divided into agricultural and non-agricultural sectors by SIC code. SIC codes below 1000 correspond to agricultural uses, and codes above 1000 are non-agricultural. Most of the non-agricultural customers were municipal entities. In general, the agricultural customers had more of the smaller pumps and the municipal ones had more of the larger type. Notably, the irrigation SIC code is in

the non-agricultural category. Entities with this code did not appear to be agricultural customers and such irrigation under this SIC appear to primarily apply to non-agricultural uses, such as landscaping.

Subdividing the pumps in each sector by horsepower produced the most equal distribution if the categories were divided at 50 and 100 horsepower. Although some customers had pumps in multiple horsepower categories, the difference in typical applications for these categories could be observed by pump types within the categories. For example, the majority (13 out of 18) of the participant submersible well pumps were less than 50 horsepower.

The sample was checked for pump type distributions, but some categories had mostly a single pump type. There were six pump types in the program database: turbine well, turbine booster, submersible well, submersible booster, centrifugal booster, and positive displacement. The database, however, contained only one positive displacement pump and it did not receive a rebate, so this pump type was not included in the sampling. Additionally, there were no submersible booster pumps among program participants.

Table 2-1: Sample Design for the SCE Ag Efficiency Program

Type of Respondent	Number of Pumps for 80/20 Sample	Number of Pumps for 90/10 Sample	Number of Completed Sample Points
SCE Program Staff			4 (all)
Pump Test Staff			16 (all)
Participants		59	59
Agricultural <50 HP	*9*		*10*
Agricultural 50-100 HP	*9*		*9*
Agricultural >100 HP	*8*		*9*
Municipal < 50 HP	*9*		*10*
Municipal 50-100 HP	*10*		*11*
Municipal > 100 HP	*10*		*10*
Non-Participants		67	77
Agricultural < 50 HP	*11*		*14*
Agricultural 50-100 HP	*11*		*11*
Agricultural >100 HP	*10*		*13*
Municipal < 50 HP	*11*		*14*
Municipal 50-100 HP	*11*		*13*
Municipal >100 HP	*11*		*12*
Total Pumps	**120**	**126**	**136**

One major issue was that many participants in the pump test program had multiple pumps, some of which had rebates issued and some of which did not. Since the sample was drawn on a per-pump basis, it would be possible for a single customer to be defined as both a participant and a non-participant if all pumps were included. However, during the initial participant calls it was determined that many pump owners could not distinguish exactly which pump was being discussed. Their answers often tended towards the generalities of their system as a whole, rather than being about specific pumps within the system.

A final determination was made to define a "non-participant" as a customer who had not had any rebates issued, but who had received a pump test. The most important factor in making this decision was the tendency of customers to discuss their pumping system as a whole rather than on a pump by pump basis.

This was also demonstrated by the fact that a few incentives were issued for system level improvements, such as piping rather than for specific pump improvements.

The samples were chosen by pump, rather than by customer. Since the sample was segmented by pump horsepower, and many customers had multiple pumps of varying sizes, selecting a sample based solely on a per customer basis was not viable. Instead, all pumps with incentives were used as the population for participants. The population for non-participants consisted of all pumps tested since 2006 for which the pump owner did not receive incentives for any pumps.

Each pump was assigned a random number and the sample was taken by lowest random number in each category. If a pump owner could not be reached or did not wish to participate in the survey, the pump with the next lowest number was substituted. Customers with multiple pumps in the sample were interviewed only once, but the sample was weighted by the number of pumps sampled, not by the number in the test program.

3 SCE STAFF AND PUMP TESTER SURVEY RESULTS

Each of the four SCE Program staff and each of the 16 active pump testers were interviewed. The survey asked a number of questions that are arranged into six topic areas. These areas include:

- General Information;
- Staffing and Training;
- Outreach and Marketing;
- Design and Delivery;
- Factors Affecting Measure Life; and
- Free Ridership and Spillover.

3.1 General information

Two questions were asked regarding general information.

3.1.1 Strengths / Weaknesses

Strengths. SCE program management believes this program has many strengths. Program management believes that they have a higher quality program primarily because an in-house team completes the pump tests. With the in-house team, they build strong participant relationships because of the long-term nature of the relationship and they serve their customers with expertise that further strengthens the relationship. The Ag Efficiency Program consistently has high customer satisfaction results in the general customer satisfaction surveys conducted by SCE.

The pump testers all felt that this is a great program and that customers highly value the service. Multiple pump testers stated that customers like the free service and the incentives are a new added bonus. The pump testers feel that they do a good job explaining energy efficiency and that the results presented help the customers prioritize pump maintenance and replacement decisions, because the test results provide valuable information, clarify equipment status, and identify kWh savings. The service also provides standardized pump tests so that customers can track pump performance over time. The pump testers feel they are a quality long term team that is well trained and well educated who can provide quality information of high integrity.

Weaknesses. SCE staff agreed that this program also has some weaknesses. Scheduling is an issue, because there are wait lists and pumps cannot be tested immediately. They feel the service is valuable,

but because it is a regulated program, staff has to focus attention on the larger pumps. Therefore, they cannot be comprehensive for all pumping systems

The pump testers were also explicitly asked about weaknesses in the program. The predominant response concerned time. The pump testers were concerned about the wait time for customers, which could be anywhere from two to six weeks. They felt they were not as responsive as they would like to be, due to lack of manpower, and they mentioned that paperwork slows them down. The test itself also is time consuming for the participant, which the pump testers felt was a drawback. They felt that the turnaround time on rebates was too slow. They were concerned about the linkage between testers and SCE Account Execs and felt the handoff could be improved. They also were concerned about maintaining the knowledge base given upcoming retirements. Last of all, they noted that some participants are not having the test done for energy savings reasons, rather they are using the test for Watermasters who use the information to bill the customers for their water usage. This creates an issue considering the purpose of the program is to provide efficiency information with the goal of implementing pumping efficiency measures on tested pumps.

3.2 Staffing and Training

SCE program staff felt that current staffing levels are appropriate and that the staff is well managed. The program staff also felt that the pump testers are well trained and that the training method of in field on the job training method was working well.

From the responses from both the SCE program staff and the pump testers themselves, it appears that the SCE pump testers are well trained. To become a pump tester, candidates must have a technical background, an aptitude for the work, and have a California Water District Level 1 qualification. Candidates then enter into a one year apprentice program to be trained for an entry level position. They spend three to five years in in-house training to become a technical specialist. Someone coming in from the outside would have to have 15 – 20 years of water experience to become a tech specialist 4. All training is on the job and on average it takes five years before a new pump tester is proficient and considered fully trained.

The SCE program staff had few recommendations for change. However, the following comments were mentioned.

- They felt that additional staffing at the analyst and clerical level was needed;
- That the organization should be managed as a service organization, but they did not elaborate on what this change would bring; and
- They recommended reducing the time spent on team meetings, team building, and corporate meetings. While these activities were received as important, it was felt that the amount of time could be reduced and more time spent on testing pumps.

The current staffing level is meeting program goals, however, SCE is considering expanding the program to include oil, gas, and wastewater pump testing. With those additions the staffing levels would not be adequate to meet goals.

The pump test staff agreed that staffing and training was good. They suggested more on the job training with senior staff and that the training be conducted with a variety of staff, because each pump tester

approaches situations differently. They also suggested training on computer skills and advanced training in industrial specialties. However, they felt it would be difficult to schedule training because of the work schedules.

3.3 Outreach and Marketing

Six questions were asked within this topic area. The responses to each are discussed separately below.

Why did the pump test recipient not implement recommended measures? Summit Blue staff asked the pump testers for their opinion on why recommended measures were not implemented. Financial reasons were the most commonly cited, with a few other issues being cited. In the financial arena, pump testers discussed cost, budget, limited funds available for energy efficiency and reliability, the need for a quick payback, which is especially true for agricultural pumps, which are seasonal and do not run all the time. The small size of the incentive in relation to the cost of the efficiency improvement was also cited. Other reasons cited for not implementing the recommended measures include: other priorities for the pump owners, timing, lack of knowledge on how easy the rebate is to get, and difficulty in the handoff from the pump tester to the account executive that led to non implementation of the recommended measures.

How do those receiving a pump test learn about the program? Both SCE staff and the pump testers indicated that participants primarily learn of the pump test program via word of mouth. This program has been in existence since 1911, and as a result, they thought that people just know about it because of its longevity. Pump testers also mentioned that participants may have heard of the program through their SCE account executives, brochures, seminars, trade shows, and farm expositions. While more interest could be generated with marketing, this program is on target to meet its goals and additional marketing may be not be necessary.

Is marketing and outreach successful? The SCE program staff felt that marketing and outreach was successful, because they were meeting their program participation goals. Pump testers had mixed responses about the success of the marketing and outreach for the pump test program. The majority of the pump testers felt that it was successful, as evidenced by the long waiting list of owners wanting their pumps tested. One felt that the effort was more successful with the municipal participants than the agricultural participants. However, others mentioned there is not much marketing occurring and that while this level of marketing may be good for now, more marketing and outreach will be needed in the future. One felt that the effort was successful, but not sufficient to get more participants, and another felt that the effort was public relations rather than marketing and did not generate enough leads.

Changes improvements to outreach & marketing that need to be made. The SCE program staff felt that the marketing fliers could be improved. Pump testers were asked specifically what changes could be made to improve the marketing and outreach efforts. Most said the program was doing well and was fully subscribed and, therefore, they could suggest no major changes. When pressed, they offered a variety of suggestions. They thought that the outreach and marketing should be geared to the decision makers and they suggested a two tiered marketing approach, where the high kWh usage customers were actively marketed to and the lower kWh usage customers would be part of a mail campaign. Any ads should be targeted ones and should be placed in pumping and agricultural magazines. One liked the traveling road show and wanted to continue it, because he thought that it was a successful approach, and another liked the vendor fairs. Other suggestions included dedicating time to the liaisons, hiring more people, sending information with the utility bills, and focusing on local community clubs.

In the pump test program, the underserved markets would include smaller pumping operations. In order to be cost effective, the program focuses on larger pumping operations, so to better serve the underserved market the principles of the program would have to be changed. In addition, the program does reach geographically hard to serve areas. However, the respondents indicated that they do not want to impinge on the independent testers and, thus, do not want to expand their services too broadly.

Pump testers were asked to discuss any barriers they saw which limited participation in this program. The majority said they saw no barriers. When pressed they mentioned that the time on the waitlist is an issue for some, and that some potential participants did not know about the program, but if they did know about the program, they would want it. Program non-participants did not mention the waitlist as a barrier but 17% of the non-participants stated they were unaware of the program. Budgets were mentioned as an issue, as was the time involved in having the test completed. One mentioned that people had heard the program was ending and another noted that the call center is not fully versed on the services the pump test program offers so that when potential participants call in, call center staff are unable to give them the correct information about the program. However, the number of program inquiries through the call center are is very limited.

Are there practices from independent testers that SCE should adopt? SCE program staff and the pump testers are aware of the independent testers and were asked if there were any practices the third party testers utilized that this program should incorporate. Primarily they did not see any practices they should be adopting. However, some noted that they did not necessarily know what practices the independent testers use. In general, they felt that the SCE program does the pump testing the right way and that the independent testers have an incentive to cut corners, which results in a poor and misleading test. The two adoptable practices mentioned include the use of digital equipment and the use of ultrasonic flow testing. They noted that ultrasonic flow testing can be tricky to use and some configurations do not work with ultrasonic flow testing.

3.4 Program Design and Delivery

Four questions were asked within this topic area. The responses to each are discussed separately below.

Customer perceptions of the program. The pump testers were asked to discuss customer perceptions of the pump test program. Predominantly, the pump testers think customers view the tests as a valuable service that provides a report of high integrity. They believe that participants trust SCE pump testers and hold them to a high standard, because they are making major financial decisions based on the pump test results. The pump testers say that customers think it is a good service, are happy with the education, the quality of the information provided, and the incentives offered, and they also think that participation has increased because of the incentive. The pump testers also noted that some potential participants are hesitant to have the test done, but once they do, they are very happy and come back for future tests. The pump testers also commented that the SCE Account Executives need to be better trained so that they can better explain the rebates.

Most attractive features of the program. The Agricultural Energy Efficiency and Pump Testing Program are very popular programs. It teaches pump owners about the efficiency and performance of their pumps. SCE program staff felt that the pump tests are of high quality, integrity, and consistency. Pump testers say that pumpers feel SCE has a reputation of trustworthiness such that they use the results of the pump tests for operations and planning purposes. They say that pump testers are known for their thoroughness and the accuracy of the test, they perform. Many thought that participants like the rebates offered and the clear and concise information presented by the program. The analysis provides a method to track the

pump efficiencies over time so that the owner can learn when something has changed and needs to be addressed, and it provides a way to check if water meters are correct. The participants appreciate the rate and cost analyses completed by the program, and they rely on the pump testers as an information source, because they can provide on the spot answers. The pump testers have become a local face with a relationship with the customers, which the respondents say they value.

Least attractive features of the program. When asked, pump testers mentioned several unattractive features in this program. The predominant factor mentioned was the wait time to have an Ag pump tested. This can be a month to six weeks, which many felt was far too long. One felt that he would like to provide more detailed information to the participants. Another noted that the pump test can take a long time, up to three hours, which ties up the participant's manpower, because they go with the pump tester when the test is run. One also noted that the test itself can be an issue for participants because the water has to be turned off and on. In the case of a golf course, they are reluctant to turn the water on during the day.

What changes to the program would make it more successful? SCE program staff offered several suggestions that they thought would make the program more successful. The most common suggestion was to add staff, one noted that several pump testers are set to retire and with the five year timeframe necessary to develop a good pump tester, the time to start adding staff is now. The incentive was viewed as a benefit and one suggested improving on the incentives. The pump testers strive to be the best and a few suggested bringing in new technology to be on the cutting edge. Others offered that the information to the customer should be more in-depth and that the letters need to be made clearer. A few mentioned expanding the service to include industrial applications, wastewater applications, and other markets. One mentioned that the time limitation between rebates should be shortened. Currently, a customer may receive a rebate for a pump only once every ten years, but this tester feels that this interval should be once every five years instead. They believe they provide a good service and that any expansion needs to be done slowly to maintain the core values of the program. Another felt that the third party testers should be eliminated from the program, because they do not deliver the high quality pump test that SCE pump testers do.

3.5 Factors that Affect Measure Life

One of the primary objectives of this project is to provide estimates of effective useful life for the pump efficiency measures installed. Within this survey were questions that explored some of the issues that the pump testers thought affected measure life. In addition to these survey questions, the pump testers were also given a matrix that was segmented by customer type, pump type, and different hours of operation. With this matrix, they were asked to provide their estimates of effective measure life. However, this same matrix was also asked of the program participants. Therefore, discussion of the results from this question is deferred to the Effective Measure Life sub-section to the Conclusions section later in this report.

Key factors. Nearly all of the pump testers stated that the usage is the key factor for estimating EULs. A few mentioned that pumping conditions were also important. For example, well pumps tend to wear out faster than booster pumps due to the sand in the well. For small pumps, one pump tester mentioned that duty cycle can have an impact and another mentioned that the size of the pump was important because a larger pump draws more electricity, making it hotter and, therefore, causing it to wear out sooner.

Are deep well lifetimes affected by sand and particulates? The majority of the pump testers agree that in deep wells, sand and particulates decrease the useful life of the pump. Only one mentioned not seeing it as a factor.

3.6 Free Ridership and Spillover

Summit Blue staff addressed free ridership by asking participants free rider questions and further asking pump testers two questions. Pump testers were asked "What percentage of your customers do you think make the following changes to their pumping systems as a result of an SCE Ag Efficiency?" The measures included Replace pump bowl and impeller, adjust bowl and impeller on a deep well pump, and trim existing impeller on booster pump. They were also asked, "If the pump test results received through SCE's Ag Efficiency program had not been available, how likely do you think it is that your customers would have made the efficiency improvements exactly the same way anyway? Please rate on a scale from zero to ten, with zero being not at all likely and ten being very likely." The pump testers were also asked to address these questions for any additional measures they mentioned. The results of this inquiry give an indication of free ridership from the pump tester point of view.

Percent of customers, according to the pump testers, that implement efficiency measures because of the pump test. Overall, the pump testers thought that the pump test was more influential for some measures than for others. However, opinions varied significantly among the pump testers. Some thought that 100% of their customers made efficiency improvements because of the pump test results, whereas others felt that the pump test results were minimally influential. This variability in response was addressed by averaging the responses. The results are reported in Table 3-1. These results indicate that when it came to replacing the pump bowl and impeller, on average the pump testers believe that over half (59%) of the participants made the change because of the pump test, whereas on average less than half (43%) of the pump testers believe that participants adjusted the pump bowl and impeller on a deep well pumps because of the pump test. The pump testers felt that the pump test was not a key factor to trimming the existing impeller on a booster pump as they felt that less than third (29%) of the participants would make that change because of the pump test results.

Table 3-1: Free Ridership Responses by Pump Testers

Measure	Percent of Participants to Make Changes Due to the Pump test Results	Rating for "Would have made the change without the program" (1 not likely 10 Likely)
Replace pump bowl and impeller	59%	3
Adjust bowl and impeller on a deep well pump	43%	3
trimming the existing impeller on a booster pump	29%	3

To further assess free ridership pump testers were also asked to rate how likely they thought their customers would be to implement the measures without the program. The Ag Pump testers felt that customers used the results of the pump test to make changes to their pumping systems and that they would not have made the changes without the results of the pump test. On average, when asked, "If there were no program, how likely would you have been to make the change in the same way on a scale of one to ten, where one is not at all likely and ten is very likely, they gave an average rating of three with the highest rating being a five. This means that customers rely on the pump tests and are not very likely to make the changes without the results of the test. The pump testers conclude that the pump test is effective in causing people to make changes to their pumps. The amount of free ridership was thought to be lower in the agricultural versus non-agricultural sectors.

To address the potential of spillover, the Summit Blue staff asked the pump testers "Other than improvements to the efficiency of their water pumping system, do you think the program has influenced your customers to take other steps to improve the energy efficiency of any other aspect of their operation as a result of the information provided by the test?" The pump testers reported that many different measures were being implemented. These include VSDs, lighting measures, air conditioning, control measures, solar, premium efficiency motors, valve replacement to larger valves, micro drip sprinklers, system soft starts, high efficiency motors, and low pressure nozzles. The pump testers also mentioned that some customers shifted their usage to off peak times and others changed their rate classification. In summary, the pump testers believe that there is a significant amount of program spillover.

4 PARTICIPANT SURVEYS

The participant telephone surveys were conducted during the fall of 2008. The main objectives for these surveys were to:

- Discover barriers encountered by the new program and develop recommendations for improving program performance;
- Estimate the overall pump test implementation rate, which is currently thought to be 33%,
  - See if this rate varies by customer and pump type,
  - See if the new incentive has an influence on implementation, and
  - Identify payback periods and their possible influence on implementation;
- Examine whether follow-up and expert consultation, if provided, would improve implementation; and
- Estimate the effective useful life (EUL) of the pump measures.

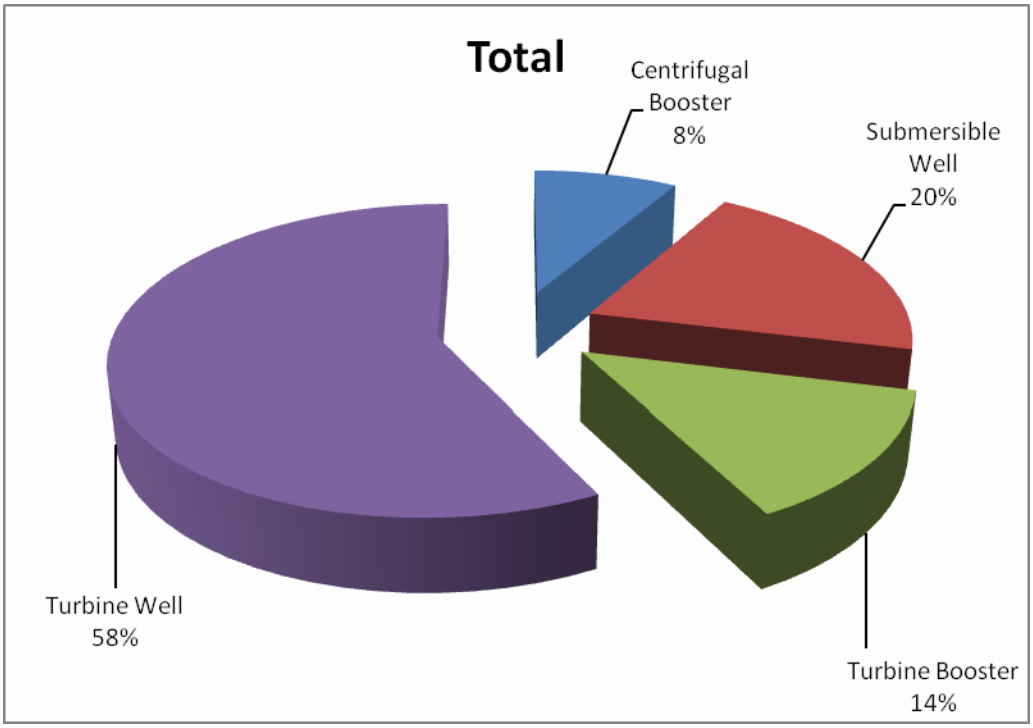
The Summit Blue team completed surveys representing 59 pumps that received an incentive for an energy efficiency improvement. The total population of pumps receiving a financial incentive (662 pumps) were segmented into two market groups (agricultural and non-agricultural – primarily municipal) and within these two market groups, into pump size classifications (< 50 HP, 50-100 HP, > 100 HP). Representative samples were drawn from each of these six market segments. Table 4-1 identifies the number of pumps and the amount of horsepower by market group and pump type that were part of the participant survey.

Table 4-1: Pumps in the Participant Survey

	Number of Pumps			Amount of Horsepower		
Pump Type	Municipal	Agricultural	Total	Municipal	Agricultural	Total
Centrifugal Booster	5	0	5	422	0	422
Submersible Well	9	3	12	575	220	795
Turbine Booster	7	1	8	1,005	30	1,035
Turbine Well	11	23	34	1,460	2,220	3,680
TOTAL	32	27	59	3,462	2,470	5,932

Figure 4-1 illustrates the share of pumps by pump type that were part of the participant survey. The greatest share was from turbine well pumps with 58% followed by submersible well at 20%.

Figure 4-1: Participant Sample Pumps by Pump Type



However, by market group, the share of the participant sample by pump group is different. Figure 4-2 illustrates the share by pump type for the municipal market segment and Figure 4-3 shows the share for the agricultural market segment.

Figure 4-2: Municipal Pump Type Share

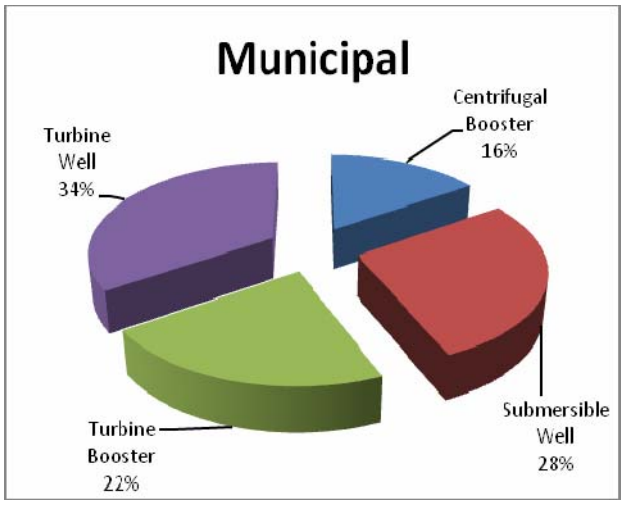
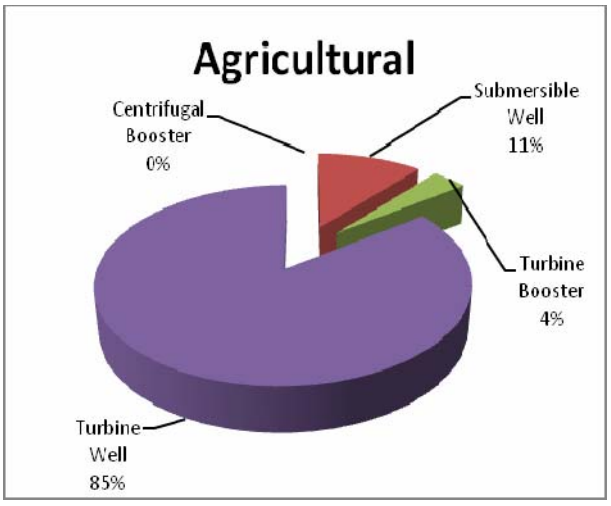


Figure 4-3: Agricultural Pump Type Share



For the municipal market segment, the distribution among the four pump types is relatively close, ranging from 34% for turbine well pumps to 16% for centrifugal booster pumps. For the agricultural market

segment, turbine well pumps represents 85% of the pump share and there are no centrifugal booster pumps in the sample.

The survey asked a number of questions that are arranged into five topic areas. These areas include:

- General Information;
- Customer Satisfaction;
- Design and Delivery ;
- Free Ridership and Spillover; and
- Effective Measure Life.

4.1 General Information

Several opening questions were asked at the beginning of the survey of the participants to determine what they remembered, what they did, and how they heard about the program.

97% of the survey participants remembered receiving a pump test and remembered receiving the pump test report and cost analysis letter regarding the results of the test and potential savings from making the recommended efficiency improvements. Since this is a survey of participants who received a rebate, one would expect 100% of them would say they implemented a measure. However, as shown in Table 4-2, 88% indicated that they had made an improvement. This is likely due to some confusion as to which pump among all of their pumps actually received the rebate. The question was directed to the specific type of pump the program records indicated had received the rebate.

By pump type, the greatest level of efficiency level implementation was with centrifugal booster and submersible well pumps at 100% and the lowest level with turbine booster pumps at 75%. By market segment, the highest rate of implementation, which was 94%, was among municipal customers. Agricultural customers reported 81%. Of those who stated they did not make the improvements, two were because the property was sold and one said it was rental property.

Table 4-2: Survey Respondents Making Efficiency Improvements

Pump Type	% of Municipal Pumps w/Efficiency Improvements	% of Agricultural Pumps w/Efficiency Improvements	% of All Pumps w/Efficiency Improvements
Centrifugal Booster	100%	na	100%
Submersible Well	100%	100%	100%
Turbine Booster	86%	0%	75%
Turbine Well	91%	83%	85%
TOTAL	94%	81%	88%

The survey participants were next asked if they had implemented all, only some, or none of the recommended improvements. Table 4-3 shows the distribution of their responses. Most indicated that they only implemented some of the recommended improvements.

Table 4-3: Number of Efficiency Improvements Implemented

Pump Type	All	Some	None
Centrifugal Booster	3	2	0
Submersible Well	2	10	0
Turbine Booster	0	6	2
Turbine Well	4	20	5
TOTAL	9	38	7

Next, the survey participants were probed as to the reason why they did not make all of the recommended improvements. Table 4-4 provides these responses. The overwhelming reason was cost-benefit concerns.

Table 4-4: Reasons for not Implementing Recommended Efficiency Improvements

Pump Type	Not Enough Time	Project Delayed	Cost-Benefit Concerns	Don't Remember Why
Centrifugal Booster	0	0	0	1
Submersible Well	0	0	8	0
Turbine Booster	1	0	7	0
Turbine Well	1	3	11	0
TOTAL	2	3	26	1

The remainder of the general information questions asked respondents how they heard of the program, what features of the program they liked, and how they would like to learn more about the program.

Table 4-5 identifies the responses on how the participants knew about the program. The largest number of respondents indicated that they have known about the program for a long time. This was followed closely by those who said they learned of the program through a SCE representative.

Table 4-5: How Did You Hear About the Program?

Pump Type	Friend	Known About Program for Long Time	SCE Representative	Pump Company	Other
Centrifugal Booster	0	3	2	0	0
Submersible Well	0	9	3	0	0
Turbine Booster	0	4	4	0	0
Turbine Well	5	9	15	1	2
TOTAL	5	25	24	1	2

As shown in Table 4-6, the one feature of the program that was most often cited as the one that made them decide to participate was the information provided in the reports that illustrated the costs and benefits of the measures being recommended. This reason was followed distantly by the existence of a rebate and the quality of the pump test. However, there is strong correlation between the amount of

energy savings identified in the reports for the program participants and non-participants. The program participant energy savings was on average about 3.5 times larger per pump than the non-participants.

Table 4-6: What Feature of the Program Made You Decide to Participate?

Pump Type	Cost Analysis Letter Cost-Benefit Issues	The Rebate	Test Quality	Don't Know
Centrifugal Booster	3	2	0	0
Submersible Well	4	1	3	4
Turbine Booster	7	1	0	0
Turbine Well	1	0	0	0
TOTAL	15	4	3	4

The final question in this topic area of the survey asked how the participants would like to hear more about the program in the future. Table 4-7 provides these responses. A large number of respondents (13) indicated that they already knew the program well and did not need to hear more about it. Of those who would like to hear more, most indicated that they would like to hear from their SCE representative (18 responses) or through email, mail, or a phone call (10 responses).

Table 4-7: How Would You Like to Learn More About the Program?

Pump Type	Already Know Program Well	Email, Mail, Phone Call	SCE Representative	Seminar/Class	Training
Centrifugal Booster	1	1	2	1	0
Submersible Well	5	1	4	1	1
Turbine Booster	2	0	1	0	4
Turbine Well	5	8	11	3	1
TOTAL	13	10	18	5	6

4.2 Customer Satisfaction

Another topic area of the participant survey included questions regarding satisfaction with the program. In general, satisfaction was very high. Table 4-8 identifies the responses to the question of how, overall, the participants were with the services and information received from the pump test service. The responses are on a scale of one to five with one being not satisfied and five being satisfied. The overall rating given averaged 4.9 and was 5.0 for all pump types except turbine well pump owners.

Table 4-8: Overall Satisfaction with the Program.

Pump Type	Confidence in the pump test information (not confident = 1, confident = 5)
Centrifugal Booster	4.6
Submersible Well	4.9
Turbine Booster	5.0
Turbine Well	4.9
All	4.9

The level of confidence regarding the information received from the pump test results was also asked. Again, the responses are on a scale of one to five with one being not satisfied and five being satisfied. The overall confidence in the information received was very high with an average score of 4.9. A slightly lower confidence of 4.6 was expressed by respondents with centrifugal booster pumps. These results are provided in Table 4-9.

Table 4-9: Overall Confidence with the Pump Test Information.

Pump Type	Confidence in the pump test information (not confident = 1, confident = 5)
Centrifugal Booster	4.6
Submersible Well	4.9
Turbine Booster	5.0
Turbine Well	4.9
All	4.9

The last question in this topic area asked how the pump testing program helped each of them. Table 4-10 identifies their responses. Three reasons were identified by 98% of the respondents. These included:

- Reduced time/cost for collecting pump information;
- Reduced doubt and uncertainty about pumping system efficiency; and
- Reduced hassle of performing test themselves.

Table 4-10: How Has the SCE Pump Testing Service Helped You?

Pump Type	Reduced time/cost for collecting pump information	Reduce doubt and uncertainty about pumping system efficiency	Work more effectivel with dealers and suppliers	Reduce hassle of performing test themselves	Increase the availability of products and services
Centrifugal Booster	100%	80%	60%	100%	60%
Submersible Well	100%	100%	50%	100%	90%
Turbine Booster	88%	100%	14%	88%	67%
Turbine Well	100%	100%	83%	100%	62%
TOTAL	98%	98%	65%	98%	68%

4.3 Design and Delivery

The third topic area addressed in the participant survey included questions regarding program design and delivery. A series of different questions were asked ranging from preferred payback periods and important decision making factors to questions on whether additional services should be provided by SCE.

The first of these questions asked about the payback period needed by the survey respondent to make the decision regarding making pump improvements. Table 4-11 provides a listing of the responses. The responses are segmented into both agricultural vs. municipal customer groups, as well as pump type. Overall, there is only a small difference in payback requirements between agricultural and municipal customer groups. Municipal customers require on average a payback of 4.2 years and agricultural customers on average a payback of 3.8 years. However, payback periods varied significantly by pump type. The longest payback periods, for both customer groups, was for turbine booster pumps with 7.2 years for municipal customers and 5.0 years for agricultural customers. The shortest payback period was 2.2 years for turbine well pumps for municipal customers. Turbine well pumps, along with submersible well pumps, had the shortest payback period for agricultural customers at 3.7 years.

Table 4-11: Customer Payback Periods

Pump Type	Payback Period (years)	
	Municipal	Agricultural
Centrifugal Booster	4.3	na
Submersible Well	3.5	3.7
Turbine Booster	7.2	5.0
Turbine Well	2.2	3.7
All	4.2	3.8

The most important factors influencing survey respondents regarding their decision to invest in efficiency improvements in their pumps are highlighted in Table 4-12. As can be seen in the table, a number of different reasons were given. However, the most frequently given reason is the cost effectiveness of the efficiency improvement with 16 responses. This was followed by water needs (nine responses), energy efficiency and reliability (six responses each), and pump run time with four responses.

Table 4-12: Important Decision Factors

Pump Type	Cost Effective	Energy Efficiency	Reliability	Run Time	Water Need
Centrifugal Booster	1	1	0	1	1
Submersible Well	2	1	0	1	3
Turbine Booster	3	1	0	2	0
Turbine Well	10	3	6	0	5
TOTAL	16	6	6	4	9

Another question asked what the respondent's main reasons for making a pump improvement were. Four reasons were listed, with the expectation that perhaps one or two of them would be more dominant than the others. However, none proved to be dominant with 85% of the respondents saying that all four were important. The four reasons are:

- Reduce energy costs;
- Improve pumping performance/flow rate;
- Reduce maintenance costs; and
- The financial incentive.

The next series of three questions asked about possible additional support and about how often a pump should be tested. Table 4-13 provides the results to the question, "If SCE were to follow up more with you after you received your pump test results would you be more likely to implement any or all of the recommended measures?" The responses are on a scale of zero to ten where zero is not very likely and ten is very likely. On average, the responses in the middle of the range with the overall average of 5.3. The highest response regarding more follow up being helpful was from the owners of turbine well pumps with a rating of 6.7. The lowest from the owners of turbine booster pumps with a rating of 3.3. Among market segments, agricultural customers were more inclined to want follow up.

Table 4-13: Importance of Follow-up Support

Pump Type	If SCE were to follow up after the test, would you have been more likely to implement the measure? (not likely=0, yes=10)		
	Municipal	Agricultural	All
Centrifugal Booster	5.8	na	5.8
Submersible Well	2.1	6.7	3.4
Turbine Booster	3.6	1.0	3.3
Turbine Well	8.3	5.7	6.7
All	5.0	5.6	5.3

With a similarly worded question, the survey participants were asked, "If SCE offered additional consultation, would you be more likely to implement any or all of the recommended measures?" Again,

responses are on a scale of zero to ten where zero is not very likely and ten is very likely. On average, the responses were somewhat higher than the previous question with an average response of 6.4. The same two pump types had the highest and lowest ratings as they did in the last question. Turbine well pump owners responded with a high 8.3 rating while turbine booster pump owners responded with a low 2.9 rating. Among market segments, agricultural customers were much more inclined to want additional consultant services. Table 4-14 provides the responses to this question.

Table 4-14: Importance of Additional Services

Pump Type	If SCE were to offer additional consultation, would you have been more likely to implement the measure? (not likely=0, yes=10)		
	Municipal	Agricultural	All
Centrifugal Booster	5.8	na	5.8
Submersible Well	1.7	6.7	3.2
Turbine Booster	3.3	0.0	2.9
Turbine Well	8.4	7.3	7.6
All	5.0	6.9	6.0

The last question in this topic area asked how often pumps should be tested. On average, respondents stated that pumps should be tested every 1.6 years. By type of pump, the responses varied. The shortest time frame is for turbine booster pumps at 1.2 years and the longest for centrifugal booster pumps at 2.6 years. Table 4-15 provides the responses to this question.

Table 4-15: How Often Should Pumps be Tested?

Pump Type	How Often Should Pumps be Tested (years)
Centrifugal Booster	2.6
Submersible Well	1.5
Turbine Booster	1.2
Turbine Well	1.6
All	1.6

4.4 Free Ridership and Spillover

As with the pump testers, the program participants were given a series of questions addressing the topics of free ridership and spillover. The goal of this evaluation is not to provide a free ridership or spillover estimate, but rather to give indications of potential free ridership and spillover through survey question responses. The responses from the pump testers indicated moderate to high estimates of free ridership, but that free ridership appeared to be different by type of measure. Potential spillover effects were found to be significant. Similar indications can be drawn from the responses to the participant survey.

The first sets of free ridership questions were asked in a matrix fashion in order to estimate free ridership tendencies by measure type, as well as potential spillover. Table 4-16 identifies the responses received. Information in the table is provided by measure type and pump type, as well as by two questions. The first asked whether the incentive was meaningful in the decision to implement the measure and the second asked if the measure would have been implemented even without the incentive. The responses are scaled from one to five with one being no influence or not likely and five being highly influential or highly likely.

Table 4-16: The Importance of the Incentive in the Decision Process to Implement a Measure

	Replace Bowl and Impeller	Adjust bowl Impeller on deep well pump	Trim impeller on booster pump	Other (generally replace motor)
Incentive Meaningful (low=1, high=5)				
Centrifugal Booster	3.0	na	5.0	5.0
Submersible Well	2.8	2.9	2.3	3.1
Turbine Booster	5.0	5.0	5.0	4.0
Turbine Well	3.7	4.1	3.7	4.4
TOTAL	3.5	3.6	3.2	4.1
Implemented Anyway (yes=1, no=5)				
Centrifugal Booster	4.0	na	3.0	1.0
Submersible Well	1.7	1.7	2.0	1.6
Turbine Booster	5.0	5.0	5.0	2.5
Turbine Well	2.3	2.8	4.0	2.2
TOTAL	2.3	2.4	3.0	2.0

The three measures listed in columns two, three, and four are the three measures included in the pump test results report. Other measures can also be incented, but these generally are initiated by the customer and are not necessarily recommended in the reports.

For the three measures, the incentive is found to be meaningful for each, but least meaningful for the "trim impeller on booster pump" measure. When asked if they would have implemented the measure anyway, responses averaged under 2.5, except for the "trim impeller on booster pump" measure. This measure was also cited by the pump testers as more likely to have free riders.

By pump type, the incentive was most meaningful for the turbine booster pumps and least meaningful for the submersible well pumps. This same relationship by pump type held under the second question regarding if they would have implemented anyway.

Spillover effects can be inferred from the results for "Other" measures. For these measures, the incentive was considered highly influential (much more than the standard three measures) and the "Other" measure group was the least likely to be installed anyway.

Spillover can also be inferred from responses to another question within the matrix. This question asked "did the incentive influence you to make changes to other pumps?" Unfortunately, it is uncertain if the respondents interpreted this question to mean that they had other pumps participate in the program

because they too could receive an incentive or that they made improvements to other pumps they owned outside of the program but based on the information they received in the program. However, either way, participation increased because of the existence of the incentive. Table 4-17 provides a listing of the response to this question.

Table 4-17: Did the Incentive Influence Other Pump Improvements?

Pump Type	Incentive Influenced Other Pump Improvements
Centrifugal Booster	20%
Submersible Well	58%
Turbine Booster	50%
Turbine Well	24%
TOTAL	34%

The issue of free ridership was also addressed by the question "how likely would you have been to get a pump test done without the SCE program?" Responses were provided on a scale of zero to ten with zero meaning not at all likely and ten likely to have gotten a pump test anyway. Table 4-18 provides the responses to this question. A large share of municipal customers said they would have gotten a pump test anyway (rating of 7.1). However, their answers varied significantly by pump type. Nearly all of the respondents with turbine booster pumps (rating of 9.9) would have gotten a test anyway, but the rating for centrifugal booster pumps was much lower at 4.4. Agricultural customers were less likely to get a pump test anyway, compared to the municipal customers, but they still responded with a relatively high 5.9 rating. No cost for a pump test was included in the question and including pump test cost information may change these results.

Table 4-18: Would You Likely Get a Pump Test Even Without the SCE Program?

Pump Type	Would you get a Pump Test w/o the Program? (not likely=0, yes=10)	
	Municipal	Agricultural
Centrifugal Booster	4.4	na
Submersible Well	7.9	4.3
Turbine Booster	9.9	0.0
Turbine Well	6.0	6.3
All	7.1	5.9

Two additional questions probed the issue of free ridership. The first asked if the respondent would have implemented the measure without first receiving the pump test. The results from this question can be found in Table 4-19. The second asked if the respondent would have implemented the measure without the existence of the incentive. The results from this question can be found in Table 4-20. For both questions, the responses are scaled from zero to ten with zero being not at all likely and ten being would have done it anyway.

As seen in responses to earlier questions, the agricultural customers are more dependent on the program than the municipal customers. The average rating for implementing the measure without the pump test was only 2.2 for agricultural customers, compared to 3.3 for municipal customers. Receiving the incentive is not quite as important with either customer group as the pump test itself, but the agricultural still depend on the incentive more with an average rating of 4.4 compared to the average rating of 6.6 for municipal customers.

Table 4-19: How Likely Would You Have Been to Implement Without Receiving the Pump Test?

Pump Type	Without the pump test, would you have implemented the measure? (not likely=0, yes=10)	
	Municipal	Agricultural
Centrifugal Booster	1.7	na
Submersible Well	1.9	4.0
Turbine Booster	5.0	5.0
Turbine Well	4.0	1.8
All	3.3	2.2

Table 4-20: How Likely Would You Have Been to Implement Without Receiving the Incentive?

Pump Type	Without the incentive, would you have implemented the measure? (not likely=0, yes=10)	
	Municipal	Agricultural
Centrifugal Booster	7.6	na
Submersible Well	7.3	4.7
Turbine Booster	7.3	8.0
Turbine Well	5.0	4.2
All	6.6	4.4

The last question asked in this series of free ridership questions approaches the issue from a slightly different wording. The reason for doing several questions that pursue the same answer but with different wording is to check for consistency of response. The last question asked "Before you obtained the pump test results, were you already planning to make any operating efficiency improvements in your pumping system?" Table 4-21 provides the results from this question.

As with previous questions, those with turbine booster pumps indicated that they would have made improvements without needing to participate in the program. They were already planned. Each of the other three pump types scored much lower.

Table 4-21: Before Receiving the Pump Test, Were You Already Planning to Implement The Measure?

Pump Type	% Planning Improvements Before Having Pump Test
Centrifugal Booster	50%
Submersible Well	50%
Turbine Booster	75%
Turbine Well	42%
TOTAL	50%

4.5 Effective Measure Life

One of the key objectives of this study was to investigate the issue of effective useful life. Not only was an average value wanted, but it was also important to see if effective useful life varied significantly by customer type, pump type, and hours of operation.

The issue was approached from two directions. The first was through a matrix question given to the program participants. The second was the same matrix question, but given to the pump testers. Since the results from these two approaches must both be considered, discussion of the results from this question is deferred to the Effective Measure Life sub-section to the Conclusions section later in this report.

5 NON-PARTICIPANT SURVEYS

The non-participant telephone surveys were conducted during the fall of 2008. The main objectives for these surveys were to:

- Discover barriers and develop recommendations for improving program performance;
- Identify awareness of the rebate portion of the program; and
- Examine whether follow-up and expert consultation, if provided, would improve implementation.

The Summit Blue team completed surveys representing 33 pumps that received a pump test but did not receive an incentive from the program for an energy efficiency improvement. The total population of pumps receiving a pump test but not a financial incentive (nearly 9,000 pumps) were segmented into two market groups (agricultural and non-agricultural – primarily municipal) and within these two market groups, into pump size classifications (< 50 HP, 50-100 HP, > 100 HP). Representative samples were drawn from each of these six market segments.

The survey asked a number of questions that are arranged into four topic areas. These areas include:

- General Information;
- Pump Improvements Made;
- Marketing; and
- Design and Delivery.

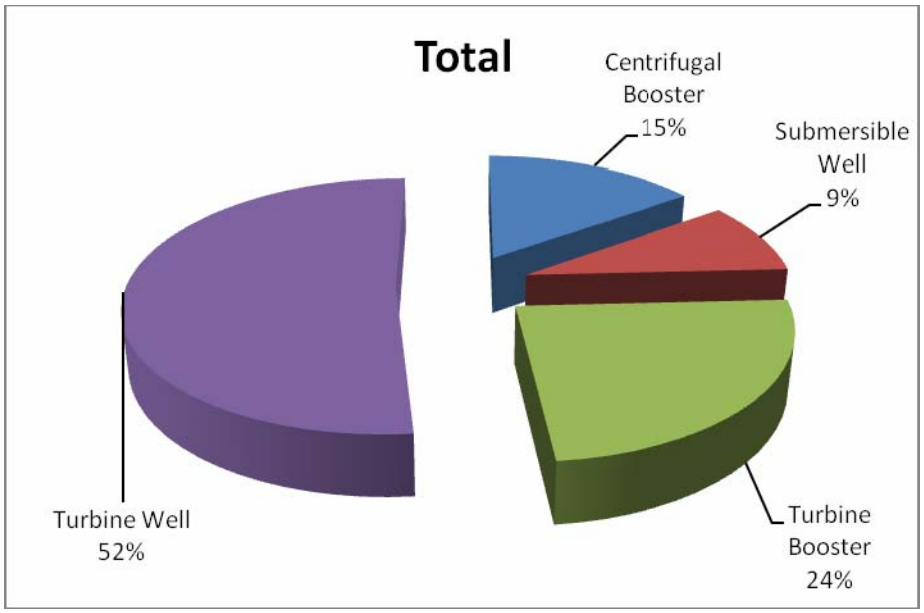
5.1 General Information

Several opening questions were asked at the beginning of the survey of the non-participants to determine what they remembered, what they did, and how they heard about the program. As shown in Table 5-1 and Figure 5-1, most of the 33 respondent pump types in the non-participant survey were turbine well pumps at 52%. Turbine booster pumps followed with 24%.

Table 5-1: Pumps in the Non-Participant Survey

Pump Type	Municipal	Agricultural	Total
Centrifugal Booster	3.0	2.0	5.0
Submersible Well	3.0	0.0	3.0
Turbine Booster	8.0	0.0	8.0
Turbine Well	6.0	11.0	17.0
Total	20.0	13.0	33.0

Figure 5-1: Non-Participant Sample Pumps by Pump Type



However, by market group, the share of the participant sample by pump group is different. Figure 5-2 illustrates the share by pump type for the municipal market segment and Figure 5-3 the share for the agricultural market segment.

Figure 5-2: Municipal Pump Type Share

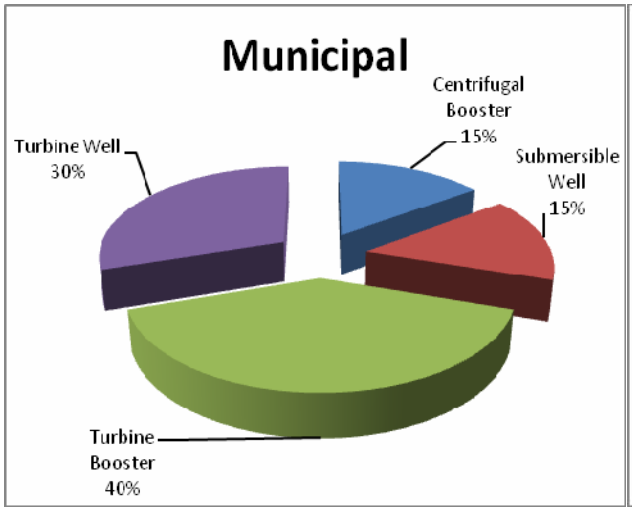
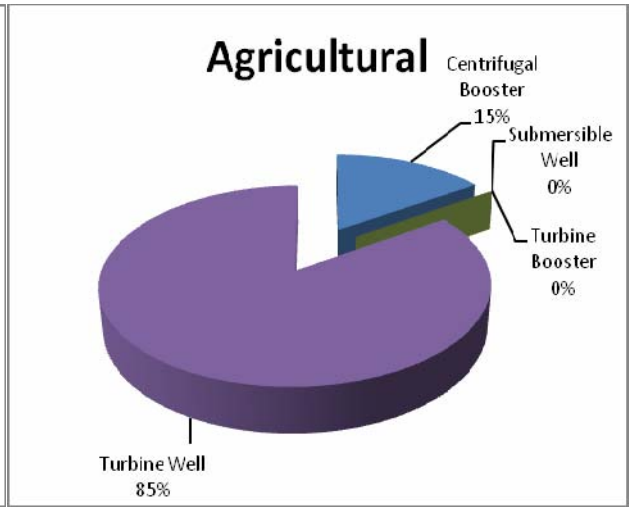


Figure 5-3: Agricultural Pump Type Share



For the municipal market segment, the distribution among the four pump types ranges from 40% for turbine well pumps to 15% for centrifugal booster pumps and submersible well pumps. For the agricultural market segment, turbine well pumps represents 85% of the pump share and there are no turbine booster or submersible well pumps in the sample.

As shown in Table 5-2, the average horsepower of pumps was 1,383 HP at each respondent's site. This average varied by pump type and market segment. Those with turbine booster pumps generally had the most pump HP on-site with an average of 1,971 HP and those with submersible well pumps the least at only 398 HP. The average amount of pump horsepower was about twice as large at respondent sites categorized as municipal compared to agricultural.

Table 5-2: Average Total Pump Horsepower

Pump Type	Municipal	Agricultural	Total
Centrifugal Booster	1,233	400	1,025
Submersible Well	398	-	398
Turbine Booster	1,971	-	1,971
Turbine Well	1,790	858	1,324
AVERAGE	1,613	793	1,383

Respondents were asked how familiar they were with the new rebate portion of the pump test program. The responses are scaled from one to five with one being not familiar and five being very familiar with the program. As shown in Table 5-3, the overall familiarity of the program was only a little higher than average with a scaled response of 2.9. Familiarity was higher in the municipal market segment with a rating of 3.2, and lower in the agricultural market segment with a rating of 2.6. By pump type, the familiarity of the program was high among those with turbine booster pumps with a rating of 3.8, but relatively low among those with turbine well pumps at 2.5. These relatively low values indicate a need for more marketing regarding the availability of the rebate.

Table 5-3: Familiarity with the Rebate Portion of the Program

Pump Type	Familiarity with the Program (not familiar = 1, very familiar = 5)		
	Municipal	Agricultural	Total
Centrifugal Booster	3.3	2.5	3.0
Submersible Well	3.3	-	3.3
Turbine Booster	3.8	-	3.8
Turbine Well	2.2	2.6	2.5
Total	3.2	2.6	2.9

As a follow-up to this question, the respondents were asked about how they learned about the pump test program and the available rebate. Figure 5-4 and Table 5-4 illustrate that the largest share of respondents (47%) simply state that they have known about the program for a long time. The next two most frequently identified sources were SCE contacts at 28% and the pump testers at 22%. The high share of those who have known about the program for a very long time coupled with the relatively low knowledge regarding the availability of the rebate indicates that marketing regarding the rebate availability should be directed towards long-term participants.

Figure 5-4: How Did You Learn About the Program and Available Incentive?

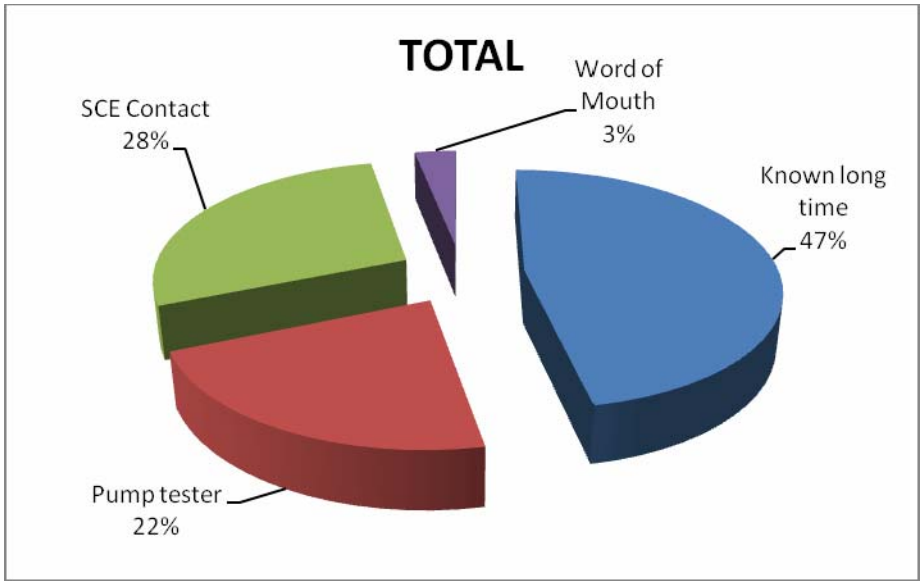


Table 5-4: How Did You Learn About the Program and Available Incentive?

Pump Type	Known long time	Pump tester	SCE Contact	Word of Mouth
Centrifugal Booster	3	1	1	0
Submersible Well	1	2	0	0
Turbine Booster	4	3	1	0
Turbine Well	7	1	7	1
TOTAL	15	7	9	1

The next question in this topic area asked what was the main reason for receiving a pump test. As illustrated in Figure 5-5 and listed in Table 5-5, the primary reason cited with a response rate of 43% was to improve the performance of the pump with increased flow rates. This was followed at 30% by saying the pump test was part of regular maintenance

Figure 5-5: Reasons for Receiving a Pump Test

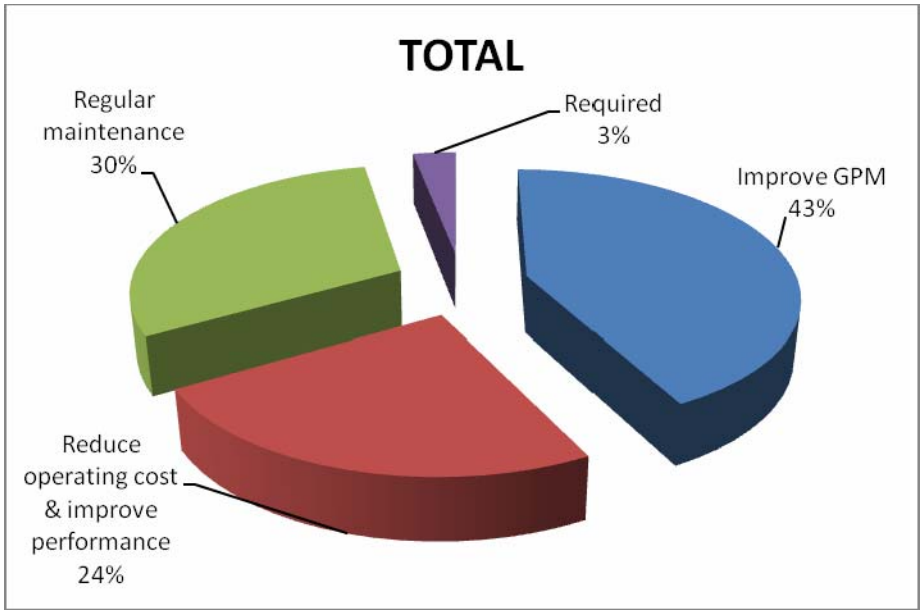


Table 5-5: Reasons for Receiving a Pump Test

Pump Type	Improve GPM	Reduce operating cost & improve performance	Regular maintenance	Required
Centrifugal Booster	2	2	1	0
Submersible Well	2	1	0	0
Turbine Booster	2	3	3	0
Turbine Well	8	2	6	1
TOTAL	14	8	10	1

The final question in this topic area asked how frequently the survey participants tested their pumps. Over one-half of the survey participants indicated that they tested their pumps annually and this was followed in frequency by pumps being tested every two years. Table 5-6 provides a listing of the responses by category

Table 5-6: How Often are Pump Tests Conducted?

Pump Type	Twice a year	Annually	Every two years	As needed
Centrifugal Booster	0	3	2	0
Submersible Well	0	3	0	0
Turbine Booster	0	4	3	1
Turbine Well	0	7	5	4
TOTAL	0	17	10	5

5.2 Pump Improvements Made

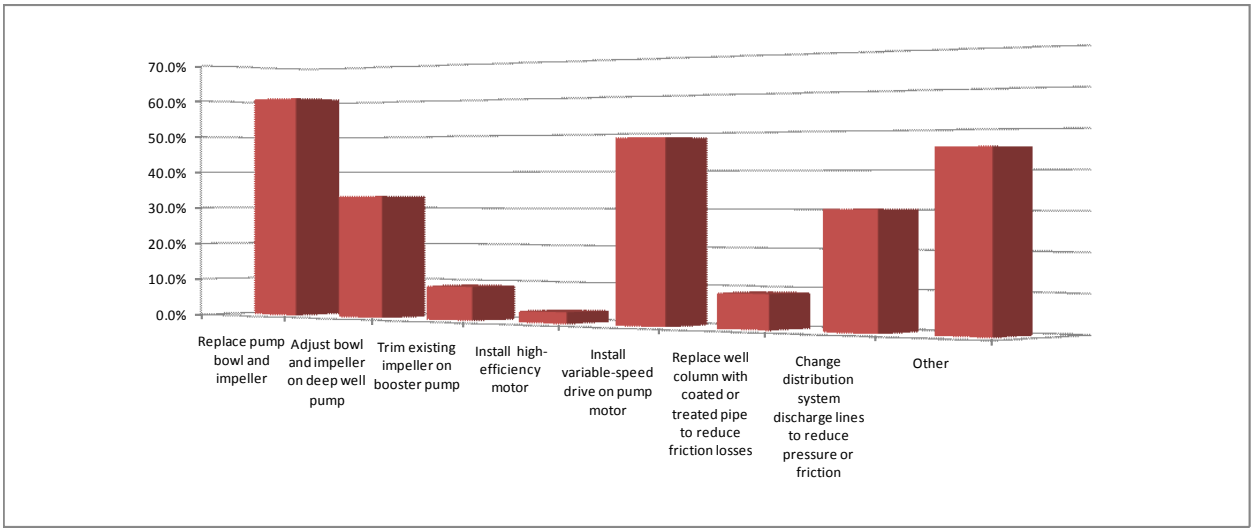
In this topic area, three questions were asked regarding improvements made by the survey respondents to any of their pumps. The first asked if over the past two years, whether any improvements had been made to their pumping system. As shown in Table 5-7, all survey respondents stated that they had made some improvements over the past two years.

The follow-up question to this was to ask each what kind of improvements had been made. Both Table 5-7 and Figure 5-6 illustrate the responses. The most common improvement was to replace the pump bowl and impeller. This was followed by installing a variable speed drive on the pump motor.

Table 5-7: Pump System Improvements Made Over the Past Two Years

Pump Type	In the past 2 years have you made any improvements to your pumping systems?	Replace pump bowl and impeller	Adjust bowl and impeller on deep well pump	Trim existing impeller on booster pump	Install high-efficiency motor	Install variable-speed drive on pump motor	Replace well column with coated or treated pipe to reduce friction losses	Change distribution system discharge lines to reduce pressure or friction	Other
Centrifugal Booster	5	4	1	0	1	4	0	3	4
Submersible Well	3	2	1	0	0	1	0	1	2
Turbine Booster	8	6	3	1	0	4	2	2	1
Turbine Well	17	8	6	2	0	7	1	4	8
TOTAL	33	20	11	3	1	16	3	10	15

Figure 5-6: Pump System Improvements Made Over the Past Two Years



The final question in this topic area asked the respondents what their main reason was for making their pump system improvements. Multiple responses were allowed but all respondents identified reducing energy costs as one of their reasons. The most frequent combination of responses are provided in Table 5-8. More than 80% of the respondents said it was a combination of reducing energy costs as well as improving pump performance.

Table 5-8: Reasons for Making Pump System Improvements

Pump Type	Reduce energy and maintenance costs	Reduce energy costs and improve performance
Centrifugal Booster	2	3
Submersible Well	0	3
Turbine Booster	2	6
Turbine Well	2	15
TOTAL	6	27

5.3 Marketing

The third topic area addressed in the non-participant survey included questions regarding program marketing. Several questions were asked, and they included questions on how the respondents thought that program marketing could be improved, how effective they thought the current marketing was, what prevented them from participating in the rebate portion of the program, and what their payback requirements are.

The first question asked is a re-statement of an earlier one regarding the respondent's familiarity with the rebate portion of the program. The earlier question asked about their familiarity with the rebate portion of the program on a scale of one to five. The overall average was 2.9, indicating that many respondents did

not know much about the rebate. A more specific question was asked in this topic area. They were asked if they were aware of the rebate portion of the program. Both Table 5-9 and Figure 5-7 illustrate the responses. Only 67% of the respondents indicated that they were aware of the program. By pump type, the lowest awareness was among those with turbine well pumps with a 50% awareness level and highest among those with turbine booster pumps with an awareness level of 88%.

Figure 5-7: Percent Aware of the Rebate Portion of the Program

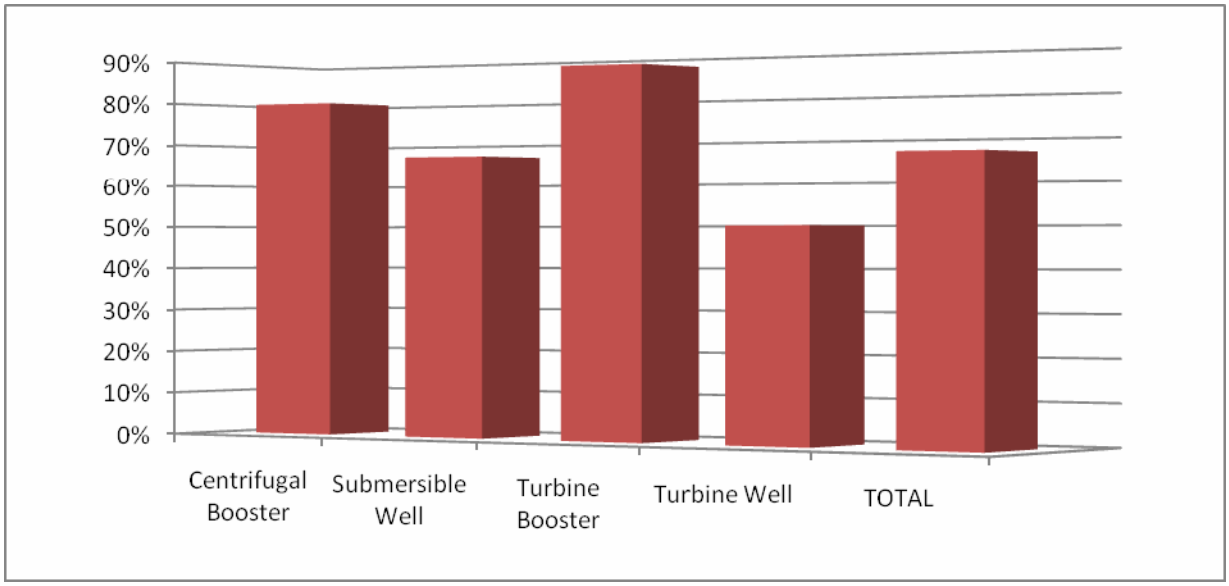


Table 5-9: Respondents Aware of the Rebate Portion of the Program

Pump Type	Yes	No	% Yes
Centrifugal Booster	4	1	80%
Submersible Well	2	1	67%
Turbine Booster	7	1	88%
Turbine Well	7	7	50%
TOTAL	20	10	67%

A question was then asked about what prevented the respondents from participating in the rebate portion of the program. These responses are provided in Table 5-10. The most common reason given for not participating was that the timing was not right. The next most common was that they were unaware of the availability of the rebate, followed by not having enough information about the program, as well as not being qualified to participate.

Table 5-10: What Prevents You From Participating in the Rebate Portion of the Program?

Pump Type	Cost	Don't qualify	Looking into participating	No significant improvements identified	Not enough information	Timing not right	Unaware
Centrifugal Booster	0	0	0	0	0	4	1
Submersible Well	0	1	0	0	1	1	0
Turbine Booster	0	3	1	0	0	3	1
Turbine Well	2	0	2	1	3	3	3
TOTAL	2	4	3	1	4	11	5

A lack of knowledge regarding the rebate and not having enough information were two of the top responses identified in Table 5-10. The final two questions in this topic area were in regards to SCE's marketing efforts, which may provide some insight into these high response rates regarding lack of information. The first of these two final questions asked the respondents to say how the marketing could be improved. Table 5-11 provides the responses to this question. Only one respondent stated that the current marketing of the program was fine. Over one-half of the respondents indicated that they had not seen any marketing materials and about one-third indicated that more marketing information was needed.

Table 5-11: How Can Marketing of the Program be Improved?

Pump Type	Haven't seen any	More needed	Fine
Centrifugal Booster	2	2	1
Submersible Well	2	0	0
Turbine Booster	2	2	0
Turbine Well	7	2	0
TOTAL	13	6	1

The final question in this topic area asked the respondents their opinion on how effective they thought the program marketing was. Table 5-12 provides the responses to this question. Only three of the eleven respondents thought that the program marketing was effective. Five indicated that it was not effective. However, none of the 13 respondents who said they had not seen any marketing in the previous question responded to this question. It is likely that most, if not all, of those who said they had not seen any marketing would also indicate that the marketing was not effective.

Table 5-12: How Effective was the Program Marketing?

Pump Type	Effective	Not effective	Known long time
Centrifugal Booster	1	1	0
Submersible Well	0	0	0
Turbine Booster	0	2	3
Turbine Well	2	2	0
TOTAL	3	5	3

5.4 Design and Delivery

The final topic area addressed in the non-participant survey included questions regarding program design and delivery. A series of different questions were asked ranging from preferred payback periods and important decision making factors to questions on whether additional services should be provided by SCE.

The first of these questions asked about the payback period needed by the survey respondent to make the decision regarding making pump improvements. Table 5-13 provides a listing of the responses. The responses are segmented into both agricultural vs. municipal customer groups, as well as pump type. Overall, there is only a small difference in payback requirements between agricultural and municipal customer groups. Municipal customers require on average a payback of 4.5 years and agricultural customers on average a payback of 4.9 years. However, payback periods varied significantly by pump type. The longest payback period was for centrifugal booster pumps with 7.6 years. The shortest payback period was 2.8 years for submersible well pumps.

Table 5-13: Customer Payback Periods (Years)

Pump Type	Municipal	Agricultural	Total
Centrifugal Booster	3.0	12.3	7.6
Submersible Well	2.8	-	2.8
Turbine Booster	4.0	-	4.0
Turbine Well	6.5	1.9	4.2
AVERAGE	4.5	4.9	4.6

The next series of three questions asked about possible additional support and about how often a pump should be tested. Table 5-14 provides the results to the question "How important is follow up and expert consultation to you in relation to the program?" About 60% of the respondents indicated that follow up and expert consultation is important, while only 15% said it was not important The importance of follow up and expert consultation was consistent within each pump type. These results are in contrast to the participant survey results where importance of follow-up was given a rating of only 5.3 (on a scale of zero to ten), which indicates that those who participate do not need much follow up and expert consultation, whereas those who have not participated do.

Table 5-14: How Important is Follow Up and Expert Consultation?

Pump Type	Important	Expert testers are important, follow up not	Moderately	Not important
Centrifugal Booster	3	2	0	0
Submersible Well	1	0	1	1
Turbine Booster	5	1	2	0
Turbine Well	10	1	2	4
TOTAL	19	4	5	5

Immediately following this question, respondents were asked if they would have been more likely to participate in the rebate portion of the program with more follow-up and expert consultation. Table 5-15 provides the results to this question. Though most respondents said no, a large number (39%) said they would have.

Table 5-15: Would You Have Been More Likely To Participate In the Rebate Portion of the Program With More Follow Up and Expert Consultation?

Pump Type	Yes	No	% Yes
Centrifugal Booster	2	3	40%
Submersible Well	0	2	0%
Turbine Booster	4	4	50%
Turbine Well	6	10	38%
TOTAL	12	19	39%

The next question asked the respondents how often they believed that their pumps should be tested. As shown in Table 5-16, the majority (18) thought that their pumps should be tested annually and a large number (13) thought it should be every two years.

Table 5-16: How Often Should Your Pump Be Tested?

Pump Type	Twice a year	Annually	Every two years	Every three of four years	As needed
Centrifugal Booster	0	2	2	1	0
Submersible Well	0	3	0	0	0
Turbine Booster	0	3	5	0	0
Turbine Well	0	10	6	0	1
TOTAL	0	18	13	1	1

The final question in the non-participant survey asked the respondents to say how SCE could improve the program. Ten of the 25 respondents thought the program was good as it is and needed no changes. There was a wide scattering of other responses with none being dominant. Table 5-17 provides the responses to this question.

Table 5-17: What Could SCE Do to Improve the Program?

Pump Type	Good as is	Increase staff available	Less paperwork	Make recommendations for other motor types	More Incentives	More Marketing	Provide list of qualifying pumps	Test annually
Centrifugal Booster	3	0	1	0	0	1	0	0
Submersible Well	1	0	0	0	0	0	1	1
Turbine Booster	2	2	0	1	1	2	0	0
Turbine Well	4	0	1	0	1	0	0	3
TOTAL	10	2	2	1	2	3	1	4

6 CONCLUSIONS AND RECOMMENDATIONS

There were four primary objectives of this process evaluation study, which included:

- Discover barriers encountered by the new program and develop recommendations for improving program performance;
- Qualitatively assess the overall pump test implementation rate, which is currently thought to be 33%,
  - See if this rate varies by customer and pump type,
  - See if the new incentive has an influence on implementation, and
  - Identify payback periods and their possible influence on implementation;
- Examine whether follow-up and expert consultation, if provided, would improve implementation; and
- Estimate the effective useful life (EUL) of the pump measures.

In addition to these four primary objectives, the issues of free ridership and spillover were also qualitatively assessed.

6.1 Barriers and Recommendations

Questions that focused on identifying program barriers were asked of each group of program actors;

- The SCE program managers;
- The SCE pump testers;
- The incentive program participants; and
- The incentive program non-participants who are made up of those who received a pump test but did not receive an incentive.

Overall, the SCE Agricultural Energy Efficiency Program is considered highly successful among each of the actor groups. The barriers cited by the market actors have not led to poor program participation, but are more related to customer convenience and trying to increase implementation of recommended measures.

6.2 Pump Test Scheduling

Among both the SCE staff and the SCE pump testers, the issue of scheduling pump tests and the waiting time of about two to six weeks before a pump can receive a test after a request is received was cited as one of the primary barriers. This perception among the SCE staff and the pump testers was cited as one

of the reasons that non-participants identified for not taking advantage of the available rebate and implementing a measure. Delays of when they received a test and delays to when they would get the rebate where among the timing issues identified in Table 5-10.

Recommendations for change. Pump testers acknowledged that there is a manpower shortage. This manpower shortage could become much more severe as several of the pump testers may soon retire. To become a fully qualified pump tester takes several years of on the job training and there are not enough pump testers currently being trained. An alternative is to hire third party pump testers, which is done to some extent already. However, several pump testers said that these third party pump testers should be removed from the program because of quality of service concerns on their part. Recommendations would be first to hire more pump testers to be part of the program or if more third party testers are utilized, that they be screened for knowledge and ability and their work spot checked for quality.

6.3 Financial Issues

All market actors identified financial issues both as a reason to participate in the program and as a barrier to participation. The pump testers and SCE staff indicated that there are only limited funds for rebates and that many of those wanting to perform pump tests need the rebates to insure a faster payback. The pump testers and SCE staff felt that limited funds among those receiving a pump test, as well as a desire for quick payback limited more widespread measure implementation.

Among the program participants, cost-benefit concerns were cited by over 80% of the respondents as the reason for not implementing recommended efficiency improvements. Among non-participants, this concern was not voiced as often as timing not being right as the primary reason for not participating in the rebate portion of the program.

On average, desired payback periods were around four to five years. However, the payback periods varied significantly by pump type, and to a lesser degree by market segment. Turbine well and submersible well pumps had the shortest desired payback periods with the two shortest being 1.9 years for non-participant agricultural and 2.2 years for participant municipal customer turbine well pumps. The longest payback periods cited were for participant municipal customer turbine booster pumps at 7.2 years and non-participant agricultural centrifugal booster pumps at 12.3 years.

The relationship between desired payback periods and implementation is uncertain. Of the non-participants, all indicated that they had made at least some pump improvements regardless of pump type. For participants, there does seem to be partial correlation. Turbine well pumps had among the shortest payback periods, as well as among the lower implementation rates. At the market segment level, the correlation appears stronger. The desired overall payback period for agricultural customers was 3.8 compared to 4.2 for municipal customers. The average implementation rate for participant agricultural customers was 81% compared to 94% for municipal customers.

Among the program participants, the importance of the rebate in their decision to implement a measure varied significantly both by market segment and pump type. As shown in Table 4-20, the incentive was more important to the agricultural customers, especially those with turbine well and submersible well pumps. The rebate was not as important for the municipal customers, except for those with turbine well pumps.

Recommendations for change. The rebate seems to be an important, but not over-riding consideration for those implementing pump improvements. If changes are to be made, it is recommended that the rebates

be more focused through a higher rebate level or more funds available for turbine well pumps. Across both market segments, the rebate was cited as important for this pump type and, correspondingly, the desired payback period was the shortest for this pump type.

6.4 Other Barriers

The other most frequently cited barrier is the test itself. It is long and it requires that the pumps are off-line. However, no alternatives were identified to overcome this barrier and no recommendations are provided.

6.4.1 Pump Test Implementation

The surveys were limited in their ability to specifically assess this issue in detail. Rather, a qualitative assessment is made. Complicating the assessment of pump test implementation is the frequency that some participants have pump tests performed and the number of pumps tested per customer. It becomes difficult for customers to specifically remember which pumps received what tests and what improvements were made when.

Data from the pump test database indicates that since 2003, about ½ of the pumps have been re-tested. Of those re-tested, the average interval between tests was 604 days and the median was 518 days. The number of pumps tested per customer was 6.7 during the timeframe from January 2006 through June of 2008.

From the information gathered, a lower bound estimate can be inferred for the pump test implementation rate.

6.4.2 Would Follow-up or Expert Customer Consultation Improve Program Implementation?

Questions regarding this topic were asked of both the rebate program participants and rebate non-participants. Where possible, responses were differentiated by market segment and pump type.

On the question regarding a desire to have SCE provide follow-up after pump tests, rebate program participants responded about in the middle of the range between zero (not likely) and ten (yes), with the overall average of 5.3. The highest response was from the owners of turbine well pumps with a rating of 6.7. The lowest was from the owners of turbine booster pumps with a rating of 3.3. Among market segments, agricultural customers were more inclined to want follow up.

On the question, "If SCE offered additional consultation would you be more likely to implement any or all of the recommended measures," rebate program participants responded somewhat higher than the previous question with an average response of 6.4 (on a scale of zero to ten). The same two pump types had the highest and lowest ratings as they did the last question. Turbine well pump owners responded with a high 8.3 rating, while turbine booster pump owners responded with a low 2.9 rating. Among market segments, agricultural customers again were much more inclined to want additional consultant services.

Rebate program non-participants were provided a slightly differently phrased question. They were asked, "How important is follow up and expert consultation to you in relation to the program?" About 60% of the respondents indicated that follow up and expert consultation is important, while only 15% said it was not important. The importance of follow-up and expert consultation was consistent within each pump type. These results are in contrast to the participant survey results, where importance of follow-up was given a rating of only 5.3 (on a scale of zero to ten), which indicates that those who participate do not need much follow-up and expert consultation, whereas those who have not participated do. As indicated in Table 5-14, several respondents specifically indicated that expert consultation is important but follow up not so important.

6.5 Measure Implementation Rate

The measure implementation rate can be calculated from several perspectives. Each perspective is outlined in the text that follows. The perspectives include:

- The very narrow perspective of only estimating the implementation rate for the rebated only improvements made to pumps.
- Adding to the implementation rate the number of non-rebated measures implemented that are the same as the rebated measures.
- Adding to the implementation rate all pump efficiency measures implemented after receiving the pump test and efficiency recommendations. This includes maintenance type measures.

Summit Blue believes that the sum of all three perspectives is the most accurate representation of the measure implementation rate, but all three perspectives are provided.

Table 6-1 provides information for estimating the measure implementation rate from the first perspective. The table shows that between the beginning of 2006 and June of 2008, 4.5% of the pumps tested received a rebate and 11.8% of the customers receiving pump tests received a rebate. The 4.5% is the rebate measure implementation rate.

Table 6-1: Pumps Tested and Pumps Receiving Rebates

	Pumps Tested - Jan 2006 - June 2008	
	Number	Percentage
Pumps Tested	9836	-
Pumps Receiving a Rebate	442	4.5%
Customers Tested	1460	-
Customers Receiving a Rebate	172	11.8%

The second perspective involves identifying how many non-rebate pumps have also replaced their bowl and impeller after receiving a pump test and the recommended actions. There were 33 non-rebate pumps in the non-participant survey. Recalling back to Table 5-7, the survey found that 20 of these 33 survey participants did replace their bowl and impeller after receiving their pump test and recommendations. The 33 non-participant survey respondents were drawn from random from the universe of pumps tested that did not receive the incentive. Generally speaking, multiple pumps have been tested are usually at each site. At these 33 sites, a total of 92 different pumps received a pump test. Dividing the 20 pumps that did replace their bowl and impeller by the total of 92 pumps tested gives a measure implementation rate of 21.7% from this perspective.

The third perspective takes into account both from the rebate participant and non-participant surveys, pump efficiency measures installed beyond the "replaced their bowl and impeller" measure. Table 6-2 outlines the additional measures installed by the survey participants. In addition to the "replaced their bowl and impeller" measure, a large number of additional measures were installed. Maintenance type measures, such as adjusting or trimming the bowl impeller are among this group along with non-maintenance measures such as new pumps and the adding of variable speed drives.

The largest addition to the measure implementation rate comes from replacing existing pumps with new pumps or adding a variable speed drive. The least is from trimming the impeller on booster pumps.

Table 6-2: Additional Measures Installed

Efficiency Measure	Survey Rebate Participants	Survey Non-Participants	Survey Rebate Population Weighted Implementation Rate	Non-Participant Survey Weighted Implementation Rate	Implementation Rate From Additional Measures
Adjust bowl Impeller on deep well pump	22	11	0.9%	11.4%	12.3%
Trim impeller on booster pump	16	3	0.6%	3.1%	3.7%
Replace Pump or add VFD	17	17	0.7%	17.6%	18.3%
Other	13	13	0.5%	13.5%	14.0%
Total	68	44	2.7%	45.7%	48.3%
Total number of pumps tested at survey respondent sites	115	92			
Tested Pumps in Survey Population	442	9,394			

Table 6-3 provides a summation of the measure implementation rate from each of these perspectives. If only the "replaced their bowl and impeller" measure was considered for the measure implementation rate, the rate would be 26.2%. This value is similar to the current program value of 33%. However, if the additional measures are included, the implementation rate grows to 74.5%. This value is over twice as large as the current value. However, past evaluations indicated that the current 33% rate was likely very conservative since these past evaluations did not attempt to identify the number of efficiency measure

installations for all pumps at sites where multiple pumps received a pump test. Summit Blue believes that this higher value is reasonable based both on the results from this current evaluation, but also from the indications of higher implementation rates from the previous evaluation efforts.

Table 6-3: Measure Implementation Rate

Measure Type	Implementation Rate
Pumps Receiving a Rebate	4.5%
Non-Participant Pumps Implementing the Rebated Measure	21.7%
Other Measures from the Rebate Population	2.7%
Other Measures from the Non-Participant Population	45.7%
Total Program Implementation Rate at the Pump Level	74.5%

6.6 Effective Useful Life

Effective useful life is calculated using the estimates of average useful life by pump type provided by the program participants and weighting those results by the number of pumps tested by pump type.

The results of asking the program participants about measure life are presented in Table 6-4. All measure types are included since the measure implementation rate is also based on implementation of all measures. The pump type experiencing the longest measure life are centrifugal booster pumps with an average of 12.7 years. The shortest are submersible wells with and average life of 6.5 years. There are differences in measure life by sector type. Measure life by pump type is longer in all cases for agricultural pumps vs. municipal pumps. However, much of this is driven by the fact that municipal pumps, on average, operate for more hours per year.

Table 6-4: Program Participant Estimates of Effective Useful Life

Pump Type		Replace Bowl and Impeller	Adjust bowl Impeller on deep well pump	Trim impeller on booster pump	Average for the Three Measures
	Hours/year				
Centrifugal Booster	>5,000	13.5	na	12.8	13.1
Submersible Well	>5,000	4.3	5.0	na	4.6
Turbine Booster	>5,000	na	na	na	na
Turbine Well	>5,000	7.2	na	7.8	7.5
Centrifugal Booster	>2,000 to 5,000	na	na	na	na
Submersible Well	>2,000 to 5,000	5.3	2.0	7.5	4.9
Turbine Booster	>2,000 to 5,000	15.0	na	12.5	13.8
Turbine Well	>2,000 to 5,000	7.2	na	5.0	6.1
Centrifugal Booster	<= 2,000	10.0	na	na	10.0
Submersible Well	<= 2,000	10.0	10.0	10.0	10.0
Turbine Booster	<= 2,000	9.0	na	4.5	6.8
Turbine Well	<= 2,000	12.5	na	na	12.5
Municipal vs Agriculture					
Centrifugal Booster	Municipal	12.6	na	12.8	12.7
Submersible Well	Municipal	5.6	3.5	7.5	5.5
Turbine Booster	Municipal	10.2	na	4.5	7.3
Turbine Well	Municipal	7.4	na	4.5	6.0
Centrifugal Booster	Agriculture	na	na	na	na
Submersible Well	Agriculture	10.0	10.0	10.0	10.0
Turbine Booster	Agriculture	15.0	na	12.5	13.8
Turbine Well	Agriculture	7.9	na	6.8	7.4
Centrifugal Booster	Combined	12.6	na	12.8	12.7
Submersible Well	Combined	5.6	5.7	8.1	6.5
Turbine Booster	Combined	10.2	na	8.5	9.3
Turbine Well	Combined	7.4	na	6.3	6.8

The average measure lifetimes presented in Table 6-4 are weighted by the total number of pumps tested in order to provide an overall weighted average measure life. Both the unweighted and weighted average measure life estimates are provided in Table 6-5. Unweighted, the average life is 8.8 years. However, turbine wells make up over 40% of the pumps tested and its average measure life is a lower 6.8 years. Using a weighting by the number of pumps tested, the average measure life is 8.3 years. The 8.3 average for measure life is recommended by Summit Blue. This is lower than the current estimate of 11 years.

Table 6-5: Weighted Measure Life

Pump Type	Pumps Tested	% of Participants	Average Measure Life
Centrifugal Booster	1,140	12%	12.7
Submersible Well	1,262	14%	6.5
Turbine Booster	2,904	31%	9.3
Turbine Well	3,941	43%	6.8
Unweighted Average Measure Life			8.8
Weighted AverageMeasure Life			8.3

6.7 Free Ridership and Spillover

The issues of free ridership and spillover were not specific objectives of this study. However, questions addressing these two issues were included in both the rebate participant survey and pump testers survey.

Overall, the pump testers thought that the pump test was more influential for some measures than for others. The results, as shown in Table 4-1, indicate that when it came to replacing the pump bowl and impeller, on average the pump testers believed that over half (59%) of the participants made the change because of the pump test, whereas on average less than half (43%) of the pump testers believed that participants adjusted the pump bowl and impeller on a deep well pumps because of the pump test. The pump testers felt that the pump test was not a key factor on trimming the existing impeller on a booster pump, as they felt that less than third (29%) of the participants would make that change because of the pump test results.

On the issue of potential spillover, the pump testers were asked if they thought the influence of participating in the program led to other, non-program efficiency improvements. The pump testers reported that many different measures were being implemented. These include VSDs, lighting measures, air conditioning, control measures, solar, premium efficiency motors, valve replacement to larger valves, micro drip sprinklers, system soft starts, high efficiency motors, and low pressure nozzles. The pump testers also mentioned that some customers shifted their usage to off peak times and others changed their rate classification. In summary, the pump testers believed that there was a significant amount of program spillover.

As with the pump testers, the rebate program participants were given a series of questions addressing the topics of free ridership and spillover. The responses from the pump testers indicated moderate to high estimates of free ridership, but that free ridership appeared to be different by type of measure. Potential spillover effects were found to be significant by the pump testers. Similar indications can be drawn from the responses to the rebate participant survey.

The rebate participants were asked if the incentive was meaningful in their decision to implement the measure. They were then asked if the measure would have been implemented even without the incentive. The responses are scaled from one to five with one being no influence or not likely and five being highly influential or highly likely and the results are provided in Table 4-16.

As did the pump testers, the rebate program participants gave the lowest rating of importance to the trim impeller on booster pump measure and this same measure was identified as the most likely to be implemented anyway without the program. However, supporting the findings from the pump testers, the rebate program participants indicated that the program influenced many other improvements beyond those recommended by the program.

The findings from the rebate program participants is essentially the same as the pump testers. The level of free ridership appears high, especially for the trim impeller measure, but spillover also appears high.

However, it is uncertain what the conclusions should be given these findings. The findings indicate a high level of awareness among those whose pumps are being tested. Why there is a high level of awareness is uncertain. A strong possibility is that both the many years that this program has been offered along with the high levels of pumps being re-tested over the years has directly led to the high levels of energy efficiency awareness for pumps among the program participants. The current high free ridership along with high spillover may be the direct consequence of these many years of program operation and participation.

APPENDIX A:

DISCUSSION GUIDES AND SURVEY INSTRUMENTS

2003 PT&HS Program Evaluation: SCE Program Staff Interview Guide – Pump Testers

2006-2007 PT&HS Program Evaluation: Non-Participant Telephone Survey Questionnaire

2006 - 2007 PT&HS Program Evaluation: Participant Telephone Survey Questionnaire

2006-2007 PT&HS Program Evaluation: SCE Program Staff Interview Guide - Pump Testers

2003 PT&HS Program Evaluation: SCE Program Staff Interview Guide - Pump Testers

2003 PT&HS Program Evaluation

SCE Program Staff Interview Guide - Pump Testers

SCE Staff Person: _____ **Phone:** _____

Respondent Company: _____

Interviewer: _____ **Date:** _____

A. General Information

A1. What is your role in the program?

A2. How long have you been involved in the program?

A3. What do think are the areas of strengths of the program?

A4.What do you think are the areas of weaknesses of the program?

B. PROGRAM STAFFING AND TRAINING

B1. Do you believe that current *SCE* staffing is adequate to:

a) meet program goals

b) meet customer needs and demand?

B2. What changes would you recommend to the way the program is currently staffed and managed?

B3. What qualifications are required of pump testers?

B4. What training do test personnel receive?

B5. What kinds of training or education do you believe would help improve the performance of test staff?

C. PROGRAM OUTREACH AND MARKETING

Note: Probe for differences between agricultural customers and municipal water district market in the following set of questions.

C1. What markets are you serving?

C2. Are any specific markets underserved?

C3. How would you characterize the hard-to-reach components of the program market?

C3.a What makes it hard to reach?

C4. What do you believe is the primary way that customers learn about the program?

C5. In your opinion, are the marketing and outreach activities sufficient and successful?

C6. What changes do you think need to be made, if any, to program outreach and marketing in order to better reach target or underserved markets?

D. PROGRAM DESIGN AND DELIVERY

D1. What other changes, if any, do you think need to be made to the program to make it more successful?

1. What other pump types and uses are included in the program and why?
2. What are your savings targets how do you define them (# pumps, kW, kWh etc)
3. Do you have specific targets in each sector targeted by this program?
4. Tell me about payback periods for this program. Has that payback increased since this program has been operating?

D2. What features of the program do you think are most attractive to customers?

D3. What features of the program do you think are least attractive to customers?

2006-2007 PT&HS Program Evaluation

Non-Participant Telephone Survey Questionnaire

Respondent Name: _____ **Phone:** _____

Respondent Company: _____

Interviewer: _____ **Date:** _____

A. Introduction

Hello, my name is _____ and I'm calling on behalf of the Southern California Edison Company. We are seeking your cooperation in a study, which will help EDISON to better understand the needs of its water pumping customers. Your responses are completely confidential and we would like for you to be candid. If there are any questions at any point about the purposes of this study, we would ask you to contact Gary Suzuki of SCE who can be reached at 626-633-3130 at the Southern California Edison Company Pump Test program. **(ADD, IF NECESSARY:** This survey will take approximately 15 minutes.)

B. Customer Testing Questions

B1. How familiar are you with the rebate portion of the Southern California Edison Pump Test program? Please use a scale from 1 to 5, with 1 being not at all familiar and 5 being very familiar.

1 (not familiar) **2** **3** **4** **5** (very familiar)

B1a. *(If B1 > 3)* How did you learn about the Pump Test Program and the available rebates? *(Ask as open ended question and select appropriate response below. If response is poor, read the list below and select best response)*

_____ You approached a pump equipment vendor or distributor 1
_____ You approached a pump service contractor or engineering firm..... 2
_____ You approached SCE..... 3
_____ Through printed material sent by SCE 4
_____ An SCE representative contacted you 5
_____ A pump service contractor or engineer contacted you..... 6
_____ A pump equipment vendor or distributor contacted you 7
_____ By word of mouth..... 8
_____ At industry trade shows 9
_____ Other *(SPECIFY)* _____ 10
_____ Don't know *(DO NOT READ)* .....DK (88)
_____ Refused *(DO NOT READ)* .....RF (99)

B2. The Southern *California* Edison Pump Test program has been in operation for many years, and our records show that you have participated in the Pump Test and Hydraulic Services program? What was your main reason for participating in this program?

_____ I wanted the rebate offered by SCE 1
_____ Part of regularly scheduled maintenance procedures 2
_____ Reduced pump operating costs 3
_____ Required by water district 4
_____ Improve water output or overall plant performance 5
_____ Other (SPECIFY) 6
_____ Don't know *(DO NOT READ)* ..... DK (88)
_____ Refused *(DO NOT READ)* ..... RF (99)

B3. Can you tell me about the marketing of the program and how you think it could be improved?

B3a. How effective was the marketing, did you feel you fully understood the program?

B3b. Are you aware of the rebate portion of the program?

B4. What do you estimate is the total horsepower of all the pumps in your system?
_____ Total HP in system

B5. How frequently do you conduct pump tests?

_____ Weekly 1
_____ Bi-weekly 2
_____ Monthly 3
_____ Quarterly 4
_____ Annually 5
_____ On an as need basis 6
_____ Other *(SPECIFY)* _____ 7
_____ Don't know *(DO NOT READ)* ..... DK (88)
_____ Refused *(DO NOT READ)* ..... RF (99)

B6. Can you tell me about what prevents you from participating in the rebate program?

B7. Can you tell me about the payback period you need to make an improvement to a pump?

C. Efficiency Measure Questions

C1. In the past 2 years have you made any improvements to your pumping systems?
Y / N / DK / RF *(If "N", "DK", "RF" skip to C2.)*

C1a. *(If C1 = "Yes")* I am going to read you a list of pump and pumping system changes. Please indicate which of these measures that you implemented. Did you … *(Read 'Measure' in table below and indicate answer in column C1. For each measure that is 'Yes', immediately ask C1b. for that measure, then return to C1a. and finish asking about all remaining measures)*

C1b. *(If C1 = "Yes")* Of the total number of pumps that you operate, what percentage of these pumps have you applied these measures to? *(Rate in column C1b. in table below)*

Measure	**C1a.**	**C1b**. (%)
1. Replace pump bowl and impeller	Y / N / DK	
2. Adjust bowl and impeller on deep well pump	Y / N / DK	
3. Trim existing impeller on booster pump	Y / N / DK	
4. Install high-efficiency motor	Y / N / DK	
5. Install variable-speed drive on pump motor	Y / N / DK	
6. Replace well column with coated or treated pipe to reduce friction losses	Y / N / DK	
7. Change distribution system discharge lines to reduce pressure or friction	Y / N / DK	
8. Other (describe) _____	Y / N / DK	
9. Other (describe) _____	Y / N / DK	
10. Don't Know	Y / N / DK	
11. Refused.	Y / N / DK	

C1c. *(If C1 = "Yes")* What was your main reason for making the improvements?

_____ Reduce energy costs 1
_____ Improve pumping performance/flow rate 2
_____ Reduce maintenance costs 3
_____ To take advantage of the rebates 4
_____ Other *(describe)*_____ 5
_____ Other *(describe)*_____ 6
_____ Don't Know..... DK (88)
_____ Refused ..... REF (99)

C1d. How important is follow up and expert consultation to you in relation to this program?

C1e. Would you have been more likely to participate with more follow up and expert consultation?

C2. How often do you believe that your pumps should be tested in order to maintain their efficiency and performance?

Every _____ years
Don't know *(DO NOT READ)* ..... DK (88)
Refused *(DO NOT READ)* ..... REF (99)

C3. SCE offers many other programs have you participated in any of them?

Which one(s)

D. Program Improvement suggestions

D1. What could SCE do to improve the program?_____

D2. Would you be interested in having your pumps tested by SCE? Y N

Those are all my questions. On behalf of Southern California Edison, I thank you very much for your time.

2006 - 2007 PT&HS Program Evaluation

Participant Telephone Survey Questionnaire

Respondent Name: _____ **Phone:** _____

Respondent Company:_____

Interviewer: _____ **Date:** _____

A. Introduction

Hello, my name is _____ and I'm calling on behalf of the Southern California Edison Company Pump Test program. May I please speak with _____ _____?

SCHEDULE CALL-BACK, IF NECESSARY.

Hello, my name is _____and I'm calling on behalf of the Southern California Edison Company. We are seeking your cooperation in a study, which will help EDISON to better understand the needs of its water pumping customers. Your responses are completely confidential and we would like you to be candid.

(ADD, IF NECESSARY: If there are any questions at any point about the purposes of this study, we would ask you to contact Gary Suzuki the program manager at the Southern California Edison Company Pump Test program. He can be reached at 626.633.3130.

(ADD, IF NECESSARY: This survey will take approximately 15 minutes.)

Our records indicate that your company participated in SCE's Pump Test Program. Are you the person in your company most knowledgeable about your company's pumping plant and SCE's Pump Test Program?

IF NO: Who in your company would be the most knowledgeable about your company's pumping plant and participation in the EDISON Pump Test Program? _____

May I please speak with _____?

B. Pump Test and Post-Implementation Recruitment Questions

SCE records indicate that, in 2006 - 2007, your company received a pump test for one or more pumps and received a report on the potential savings from efficiency improvements to your pumping system:

B1. Do you remember receiving a pump test through SCE's Pump Test Program in 2006 - 2007?
_____ *Y / N / DK / RF*

B2. Do you remember receiving a report and cost analysis letter regarding the results of the test and potential savings from making efficiency improvements to your pumping system?
Y / N / DK / RF

[Thank and terminate if Q-B1 and Q-B2 = No or Q-B1= DK or RF and Q-B2=DK or RF]

B3. Did you make any changes to improve the energy efficiency of your pump or pump system based on the information that you received from the pump test report? (OBJ 1,2,3,4)
Y / N / DK / RF

B4. Of the measures recommended how many did you install? (OBJ 1,2,3,4)

a. (If they did not install all measures) Can you tell me why you chose not to install the other recommended measures?

B5. How did you hear of the program? (OBJ 9)

B6. What feature of the program made you decide to participate? (OBJ 6,9)

B7. What would be the best way for you to learn more about the program? (OBJ 9)
How would you like to hear about it and who would you like to hear it from?

Is now a good time to ask you additional questions (it will take about 20 minutes) or could I schedule a time to call you back and finish the survey? Date _____ Time _____

C. Freeridership Questions [Ask only if implemented something in Q-B3]

C1. I am going to read you a list of pump and pumping system changes. I would like to know if you implemented the measure and if you did how much influence the **pump test** and the incentive had on your decision to make the changes. [Answer in Column C1 in table below] (OBJ 1)

C2. How much influence did the **incentive** have on your decision to make the changes to your pumping system? Please rate the influence on a scale from 1 to 5, with 1 being no influence at all and 5 being a lot of influence. [Rate in column C2b in table below] (OBJ 6)

C2b. Did the incentive influence you to make changes to **other** pumps? (OBJ 1)

C3. Looking at it another way, if the pump test results received through SCE's Pump Test Program had not been available, how likely is it you would have made the efficiency improvements exactly the same way anyway? Please rate on a scale from 1 to 5, with 1 being not at all likely and 5 being very likely. [Rate in column C3 in table below] (OBJ 1,6)

Measure	C1 Measure implemented *(Y / N / DK)*	C2 Influence of incentive *Low(1 – 5) Hi*	C3 Implement anyway *(Low (1 – 5) Hi)*
Replace pump bowl and impeller			
Adjust bowl and impeller on deep well pump			
Trim existing impeller on booster pump			
Other (describe) _____			
Other (describe) _____			
Don't Know			
Refused.			

C4. Was there some other factor that influenced you to make the changes? (*Probe for other factors e.g. savings, reliability etc.)* (OBJ 7,9)

C5. We are interested in learning more about the how long different measures last. Based on your experience can you tell me about the lifetime of the pump system changes you made on your pump. *(Fill in information about customer's pump from database before the interview)* (OBJ11)

Pump Scenario *(From Database)*			**Average Effective Useful Life (Years)**				
Pump Type	**Customer Type** Agricultural Municipal	**Usage (Hrs/Year) Ask parts** >5000 >2000<5000 >500<2000 <500	**A** **Replace Bowl and Impeller**	**B** **Adjust bowl Impeller on deep well pump**	**C** **Trim impeller on booster pump**	**D** **Other**	**Test Intervals (Yrs)**
Turbine Well							
Turbine Booster							
Submersible well							
Submersible Booster							
Centrifugal booster							

C6. How likely would you have been to get a pump test done without the SCE program? *Rate on a scale of 0-10 with 0 not at al likely and 10 I would have done it anyway.* (OBJ 1)

C7. a. How likely would you have been to implement the measure without the pumptest? *Rate on a scale of 0-10 with 0 not at al likely and 10 I would have done it anyway.* (OBJ 1)

b. How likely would you have been to implement the measure without the incentive? *Rate on a scale of 0-10 with 0 not at al likely and 10 I would have done it anyway.* (OBJ 1,6)

C8. Can you tell me about the payback period you need to make an improvement to a pump? (OBJ 5)

C9. What are the most important factors to you in deciding whether or not to renovate your pump? On a scale of 0-10 where 0 is not at all important and 10 is exceedingly important, how would you rate these elements? *(suggest OPE, simple payback, energy cost savings, the existence of a rebate)* (OBJ 7)

C10. What was your main reason for making the improvements? (OBJ 7)

Reduce energy costs 1
Improve pumping performance/flow rate 2
Reduce maintenance costs 3
Incentive 4
Other (describe)_____ 5
Other (describe)_____ 6
Don't Know ..... DK (88)
Refused ..... REF (99)

C11. Before you obtained the pump test results, were you already planning to make any operating efficiency improvements in your pumping system? (OBJ 1,6)

Y / N / DK / RF

C12. On a scale of 0- 10 If SCE were to follow up more with you after you received your pump test results would you be more likely to implement any or all of the recommended measures where 0 is not very likely and 10 is very likely. (OBJ 10)

C13. Likewise if SCE offered additional consultation would you be more likely to implement any or all of the recommended measures? Where 0 is not very likely and 10 is very likely. (OBJ 10)

C14. How often do you believe that your pumps should be tested in order to maintain their efficiency and performance? (OBJ 11)

Every _____ years
Don't know (DO NOT READ) ..... DK (88)
Refused (DO NOT READ) ..... REF (99)

D. Process and Customer Satisfaction Questions

D1. Has SCE's pump testing program helped you to (Read each response in table below and select answer.): (OBJ 8)

D1a. Reduce the time or cost of collecting information you would otherwise need to get on your own?	Y / N / DK / Refused
D1b. Reduce your doubt and uncertainty about your pumping system efficiency?	Y / N / DK / Refused
D1c. Work more effectively with dealers and suppliers.	Y / N / DK / Refused
D1d. Reduce the hassle of performing the test yourself	Y / N / DK / Refused
D1e Increase the availability of products and services of benefit to you?	Y / N / DK / Refused
D1f. Was there anything else?	

D2. Overall, how confident are you in the information received from the SCE pump test results? Please use a scale from 1 to 5, with 1 being not at all confident and 5 being very confident.

__ Response **(1-5)** **88** Don't Know **99** Refused to Answer (OBJ 7)

D2a. [If the response to D2 was 3 or less] What could SCE do to improve your confidence in the test results? _____

(OBJ 7)

D3. Overall, how satisfied are you with the services and information you received from the SCE Pump Test Program? Please use a scale of 1 to 5 with 1 being very unsatisfied and 5 being very satisfied

__ Response (**1-5**) **88** Don't Know **99** Refused to Answer (OBJ 10)

D4. Do you have any question or comments you would like to add about the SCE Pump Test and Hydraulic Services program?_____

_____

Those are all my questions. On behalf of Southern California Edison, I thank you very much for your time.

2006-2007 PT&HS Program Evaluation

SCE Program Staff Interview Guide - Pump Testers

SCE Staff Person: _____ **Phone:** _____

Respondent Company: _____

Interviewer: _____ **Date:** _____

The purpose of the interview is to explore your views on some of the market aspects of the Pump Test Program. When answering the questions, feel free to note when there are areas that you do not have experience or an opinion. We are interested in honest and candid answers, and your individual answers will be kept confidential. SCE has agreed to confidentiality on these surveys.

A. General Information

A1. What do think are the areas of strength of the program?

* *

A2.What do you think are the areas of weakness of the program?

* *

B. PROGRAM STAFFING AND TRAINING

B1. What changes would you recommend to the way the SCE Pump test program is currently managed?

* *

B2. What kinds of training or education do you believe would help improve the performance of SCE pump test staff?

* *

C. PROGRAM OUTREACH AND MARKETING

(Note: Probe for differences between agricultural customers and municipal water district market in the following set of questions.)

C 1. Can you tell me IF A CUSTOMER RECEIVES A COST ANALYSIS LETTER, why you think the pump owner did not implement some of the recommended measures?

* *

C2. What do you believe is the primary way that customers learn about the program?

* *

C3. In your opinion, are the marketing and outreach activities sufficient and successful?

* *

C4. What changes do you think need to be made, if any, to SCE'S PUMP TEST program outreach and marketing in order to better reach target or underserved markets?

* *

C5. Can you tell me about any barriers you see that prevent customers from ASKING FOR A SCE PUMP TEST?

* *

C6 Are there any practices/methods/equipment used by independent testers that SCE should adopt?

D. PROGRAM DESIGN AND DELIVERY

D1. How do you think customers view SCE'S PUMP TEST program? What are their perceptions?

* *

D2. What other changes, if any, do you think need to be made to the SCE PUMP TEST program to make it more successful?

* *

D3. What features of the program do you think are most attractive to customers?

* *

D4. What features of the program do you think are least attractive to customers?

* *

D5. We are interested in learning more about the effective useful life of various measures. Based on your experience can you tell me about the measure life of the each of the measures for the following pumps in the scenarios listed?

a.	Replace pump bowl and impeller
b.	Adjust bowl and impeller on deep well pump
c.	Trim existing impeller on booster pump

Pump Scenario				**Average Effective Useful Life (Years)**		
Pump Type	Customer Type	# per Usage (Hrs/Year)	Test Intervals (Yrs)	A Replace Bowl and Impeller	B Adjust bowl Impeller on deep well pump	C Trim impeller on booster pump
Turbine Well	Agricultural	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
	Municipal	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
Turbine Booster	Agricultural	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
	Municipal	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
Submersible Well	Agricultural	≥5000				
		≥2000<5000				

		≥500<2000				
		< 500				
	Municipal	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
Submersible Booster	Agricultural	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
	Municipal	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
Centrifugal Booster	Agricultural	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				
	Municipal	≥5000				
		≥2000<5000				
		≥500<2000				
		< 500				

D6. Is effective useful life affected by the size and usage of the pump? (Y / N)

If Yes How? * *

D7. For deep wells, have aquifer levels been relatively stable over time? Y/ N

a. If unstable, has this caused pumps to be pulled and redesigned? (Y / N)

D8. For Deep wells, are sand and particulates causing lower useful life? Y / N)* *

D9. For Booster pumps have System Design Changes:

a. Caused a need for Irrigation System redesign? (Y / N)* *

b. Caused increased system demand? (Y / N) * *

D10. How often do you believe pumps should be tested in order to maintain their efficiency and performance? _____ Years

a. Does this vary by size and usage? (Y / N) * *

b. How? * *

E. FREERIDERSHIP AND INSIDE SPILLOVER QUESTIONS

E1. What percentage of your customers do you think make the following changes to their pumping systems AS A RESULT OF AN SCE PUMP TEST? [Rate on a scale of 0-10 with 0 being no influence at all and 10 being a lot of influence. Read 'Measure' in table below and indicate answer in column E1. For each measure that is 'Yes', immediately ask E2 and E3, for that measure, then return to E1 and finish asking about all remaining measures]

E2. Looking at it another way, if the pump test results received through SCE's Pump Test Program had not been available, how likely do you think it is that your customers would have made the efficiency improvements exactly the same way anyway? Please rate on a scale from 0 to 10, with 0 being not at all likely and 10 being very likely. [Rate in column E3 in table below]

Measure	E1 (0-10)	E2 (0-10)
Replace pump bowl and impeller		
Adjust bowl and impeller on deep well pump		
Trim existing impeller on booster pump		
Other (describe) _____		
Other (describe) _____		
Don't Know		
Refused.		

E3. Other than improvements to the efficiency of their water pumping system, do you think the program has influenced your customers to take other steps to improve the energy efficiency of any other aspect of their operation as a result of the information provided by the test?
Y / N / DK / RF

[IF E3 is YES] What changes do you think they make? (Describe)

* *

F. OTHER COMMENTS AND SUGGESTIONS

* *

2003 PT&HS Program Evaluation

SCE Program Staff Interview Guide - Pump Testers

SCE Staff Person: _____ **Phone:** _____

Respondent Company: _____

Interviewer: _____ **Date:** _____

A. General Information

A1. What is your role in the program? *bk*

A2. How long have you been involved in the program? *bk*

A3. What do think are the areas of strengths of the program? *bk*

A4.What do you think are the areas of weaknesses of the program? *bk*

B. PROGRAM STAFFING AND TRAINING

B1. Do you believe that current *SCE* staffing is adequate to:

a) meet program goals *bk*;

b) meet customer needs and demand? *bk*

B2. What changes would you recommend to the way the program is currently staffed and managed? *bk*

B3. What qualifications are required of pump testers? *bk*

B4. What training do test personnel receive? *bk*

B5. What kinds of training or education do you believe would help improve the performance of test staff? *bk*

C. PROGRAM OUTREACH AND MARKETING

Note: Probe for differences between agricultural customers and municipal water district market in the following set of questions.

1. What markets are you serving? Ag etc why are you targeting that market

C2. Are any specific markets underserved? *bk*

C3. How would you characterize the hard-to-reach components of the program market? *Bk*

What makes it hard to reach*? Bk*

C4. What do you believe is the primary way that customers learn about the program? *bk*

C5. In your opinion, are the marketing and outreach activities sufficient and successful? *Bk*

C6. What changes do you think need to be made, if any, to program outreach and marketing in order to better reach target or underserved markets? *bk*

D. PROGRAM DESIGN AND DELIVERY

D3. What other changes, if any, do you think need to be made to the program to make it more successful?
Bk

2. What other pump types and uses are included in the program and why?
Bk

3. What are your savings targets how do you define them (# pumps, kW, kWh etc)
Bk

4. Do you have specific targets in each sector targeted by this program?
Bk

5. Tell me about payback periods for this program. Has that payback increased since this program has been operating?
Bk

D4. What features of the program do you think are most attractive to customers?
Bk

D5. What features of the program do you think are least attractive to customers?
bk

Other survey design

6. What do you want to know from the pump testers when we talk to them?
Bk

7. What do you want to know from the participants when we talk to them?
Bk