Final Report

Evaluation of the Certified Agri-Food Energy Efficiency (CAFEE) Program—1473-04

Prepared for:
Global Energy Partners

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Executive Summary

Introduction

Designed and implemented by Global Energy Partners (Global), the 2004 through 2006 Agri-Food Energy Efficiency Program (CAFEE, the Program) seeks to target the needs of Pacific Gas & Electric's (PG&E's) small, rural agricultural customers, organic farmers, and food processors. These customers represent a vital sector of the California economy and are typically underserved by energy-efficiency programs. Eligible customers were either small (using 29,700 kWh/year or less) or a certified organic producer. Organic producers could include very diverse customers including dairies, farmers, wineries, etc.

The annual savings goals of the Program were 4,053,349 kWh, 258,960 therms, and a net coincident peak reduction of 1,121 kW. The Program was designed to accomplish these goals through educational activities, on-site energy audits, incentives, and post-installation certification of measures.

Global partnered with the Ecological Farming Association (EFA) to design the Program because they believed the targeted customers were worthy of the programmatic focus for four principal reasons:

- Agriculture is one of the most important sectors in the California economy and California is the most important and largest producer of agricultural products in the U.S., producing well over $27 billion worth of agricultural products in 2000;
- Small family farms make up 84 percent of all California farms;
- Certified organic agricultural products are the fastest growing segment of California's (and the nation's) agriculture with retail sales growing 20% or more annually since 1990; and
- Certified organic farmers in California have been significantly underserved with respect to energy-efficiency programs, are hard-to-reach, and are interested in learning how to be more energy efficient.

Quantec, LLC, conducted an EM&V study of the Program. This study was conducted at the request of the California Public Utilities Commission (CPUC). It was funded through the public goods charge (PGC) for energy efficiency and is available for download at www.calmac.org.

The study objectives, as defined in the CPUC Energy Efficiency Policy Manual, and approaches we used to address them are shown in Table 1.

Table 1. EM&V Objectives and Approaches

Objectives	Evaluation Approach	Evaluation Component
Measuring level of energy and peak demand savings achieved	Used the IPMVP Option B[1]: verified installation and underlying assumptions for prescriptive measures	Impact
Measuring cost-effectiveness	Re-calculated the Program cost effectiveness using actual program expenditures, *ex-post* energy savings from evaluation, CPUC/Program net-to-gross ratios confirmed through interviews	Impact, Process
Providing up-front market assessments and baseline analysis, especially for new programs	Rely on baseline data for each project and existing market baseline studies	Impact, Process
Providing ongoing feedback, and corrective and constructive guidance regarding the implementation of programs	The evaluation team was in close contact with Global and provided ongoing feedback and recommendations as necessary through the process evaluation	Process
Measuring indicators of the effectiveness of specific programs, including testing of the assumptions that underlie the program theory and approach	The process evaluation developed effectiveness indicators as the primary way to assess Program efficiency	Process
Assessing the overall levels of performance and success of programs	Utilized the impact and process evaluations together to assess overall performance and success	Impact, Process
Informing decisions regarding compensation and final payments (except information-only)	The effectiveness indicators developed will help the CPUC assess achievement of Program goals and make informed compensation/final payments decisions	Impact, Process
Helping to assess whether there is a continuing need for the program.	The impact and process evaluations will help assess Program the performance and the continuing need for it.	Impact, Process

Findings

Process Issues

Outreach and Awareness

Global actively contacted targeted customers about the Program. Through March 2006 they had made 639 contacts.

Most participants were not familiar with the website, but it received high marks from the ones who were. Feedback on other marketing materials was mixed. The participants we interviewed had little knowledge of workshops conducted by the Program; however, the Program goal was two workshops and two were held.

[1] The International Performance Measurement & Verification Protocol can be found at http://www.ipmvp.org/info/downloads.html.

Understanding of the Program among participants and non-participants was generally good. A couple of the non-participants we interviewed, however, raised concerns that they either did not understand the Program properly or they were misinformed.

Customer Satisfaction

Overall, participants expressed a high level of satisfaction with the processes involved in participating in the Program. The most consistent positive feedback was directed at Global's staff implementing the Program. All the participants we interviewed were satisfied with the measures they had installed through the Program and almost all were very pleased with the incentive amount. Other positive responses focused on the ease of participation and quick turnaround time.

The two major areas of dissatisfaction on the part of non-participants were the timing of the Program and the incentive level. Several potential participants did not sign up because the Program offer did not come at a favorable time in the customer's planning cycle. Along with a desire by some non-participants for a larger incentive was an expressed interest in expanding the scope of the Program to provide incentives for additional measures including solar technologies.

As the Program implementers noted, the comprehensive audits originally planned were scaled back to be a less detailed site survey because the allowed measures were so prescriptive. These audits/surveys received good ratings from participants. The ratings from non-participants were more mixed, but the number of respondents was too small to generalize.

Increased Vendor Promotion of Energy Efficiency

One of the challenges encountered by the implementers was integrating vendors into the Program. Global found the vendor segment to be quite fragmented, thus making it difficult to identify vendors who worked with a significant number of the targeted customers. As a result, the involvement of vendors was less than anticipated originally.

Additional Energy-efficiency Improvements

Almost all the Program participants and non-participants stated that they had been interested in ways to increase energy efficiency even before hearing about the Program. In addition, the large majority of both groups could point out specific efficiency improvements they had made in the prior three years.

Among the participants, about a fourth said the Program had increased their interest in energy efficiency. Some had already taken additional steps to improve efficiency and others were looking at implementing steps in the future. Though several of the non-participants had installed energy-efficiency measures since hearing about the Program, none attributed these to the Program.

Energy and Demand Savings

Table 2 compares Program energy and demand savings goals to the EM&V verified estimates. The verified natural gas savings were significantly lower than the Program goal for two reasons.

First, there were fewer projects than expected that installed measures affecting fossil fuel use. Second, our site visits showed that some measures were installed at sites where propane was used, rather than natural gas. As discussed in the chapter presenting the impact evaluation, of the 13 total measures with attributed therms savings, we estimated that only two actually reduced natural gas consumption although they did save fossil fuel in the form of propane.

Table 2. Energy and Demand Savings, Net

Savings	Goal	Verified	% of Goal
Electricity	4,053,349 kWh/year	4,034,430 kWh/year	99.5%
Coincident Peak	1,121 kW	951 kW	84.8%
Natural Gas	258,960 therms/year	19,920 therms/year	7.7%

Cost Effectiveness

From the Total Resource Cost (TRC) perspective the Program was cost effective, producing net benefits of over $1.0 million with a benefit-cost ratio of 1.63. To participants, the net benefits were $6.6 million with a benefit-cost ratio of 5.8.

Table 3 compares the projected net benefits and benefit-cost ratios to those calculated in our evaluation based on the verified Program data.

Table 3. Projected and Verified Cost Effectiveness

	Projected	Verified
Participant Net Benefits	$10,547,197	$6,647,119
Participant Benefit-Cost Ratio	8.10	5.80
TRC Net Benefits	$2,182,645	$1,061,151
TRC Benefit-Cost Ratio	2.20	1.63

Recommendations and Continuing Need for Program

Recommendations

Based on the feedback from the Program implementers, participants, and non-participants, and our assessment of the Program, we believe there are some ways in which the Program could have been more effective. We offer the following recommendations for consideration in future programs:

- More flexibility should be provided for the types of measures that participants can implement. One option would be to use what was learned from this Program to expand the list of prescriptive measures. Another would be to prescribe an incentive per unit savings and a simplified methodology for calculating savings and the rebate for semi-custom measures.
- The program should be conducted over a sufficiently long time to allow customers the opportunity to plan their participation and incorporate the capital requirements into their budgeting process.

- Case studies should be developed and made available to potential participants in similar businesses or with similar equipment and needs.
- Leveraging of industry groups and associations should be maximized to ensure that information about the program is communicated cost effectively to the targeted customers.
- Ways to involve vendors more actively should be examined. Approaches such as working with vendor associations, holding information meetings with groups of vendors, or recruiting vendors who will be champions for the program should be considered. In some cases, it may be necessary to move up the supply chain to equipment distributors.
- Finally, a comprehensive tracking database should be used to document all potential participants, all contacts with those customers, and detailed information on the status of their involvement.

Continuing Need for Program

Based on the following observations from this study, we believe there is a continuing need for this Program:

1. There appears to be considerable potential for energy-efficiency improvements in the market targeted by the Program, ranging from lighting to very specialized equipment.

2. This market is currently underserved by efficiency Programs and includes a significant number of hard-to-reach customers.

3. Customers in the targeted market are, in general, quite interested in ways to save energy and many have a broader commitment to sound environmental practices.

4. The targeted customers do face clear barriers to implementing energy-efficiency improvements and the Program was able to help the participants overcome them.

5. Several of the participants said that they would like to see the Program continued and some of the non-participants that we interviewed indicated that they would be likely to participate if the Program were extended.

Introduction

This report presents the results of an evaluation, measurement, and verification (EM&V) study of the California Agri-Food Energy Efficiency Program (CAFEE, the Program) conducted by Global Energy Partners (Global). This Program was conducted as part of the 2004-'05 energy-efficiency program cycle. This study was conducted by Quantec, LLC, and it was conducted at the request of the California Public Utilities Commission (CPUC). It was funded through the public goods charge (PGC) for energy efficiency and is available for download at www.calmac.org.

The Program

Global and the Ecological Farming Association (EFA) designed a third-party energy-efficiency program targeted to the needs of Pacific Gas & Electric's (PG&E's) small, rural agricultural customers, organic farmers, and food processors.[2] These customers represent a vital sector of the California economy and are typically underserved by energy-efficiency programs. Eligible customers were either small (using 29,700 kWh/year or less) or a certified organic producer. Organic producers could include very diverse customers including dairies, farmers, wineries, etc.

Global and the EFA designed the Program because they believed the targeted customers were worthy of the programmatic focus for four principal reasons:

- Agriculture is one of the most important sectors in the California economy and California is the most important and largest producer of agricultural products in the U.S., producing well over $27 billion worth of agricultural products in 2000;
- Small family farms make up 84 percent of all California farms;
- Certified organic agricultural products are the fastest growing segment of California's (and the nation's) agriculture with retail sales growing 20% or more annually since 1990; and
- Certified organic farmers in California have been significantly underserved with respect to energy-efficiency programs, are hard-to-reach, and are interested in learning how to be more energy efficient.

The original Program Implementation Plan (PIP) for CAFEE was submitted in April 2004 and the Program began in May. Revisions to the PIP were requested and a revised PIP was issued in July 2005. This process delayed and affected Quantec's evaluation approach as well.

[2] Global had originally planned to partner with California Certified Organic Farmers Foundation (CCOF) in the Program, but CCOF has decided to not participate as a full partner. They did provide some outreach assistance.

The revised goals of the Program were 4,053,349 kWh annual electricity savings, 258,960 therms annual gas savings, and a net coincident peak reduction of 1,121 kW over the two-year term ending May 1, 2006. The Program was designed to accomplish these goals through educational activities, on-site energy audits, incentives, and post-installation certification of measures.

Global's recruitment process included the following steps:

1. Preliminary phone contact to establish a relationship and determine customer eligibility and interest

2. E-mail follow-up with educational packet explaining the details of the Program and the benefits to the participants

3. Phone follow-up to answer any additional questions from potential participant and set up initial phone survey.

Global and the EFA used a variety of marketing methods to identify potential Program participants. These included direct mail, meetings, e-mail campaigns, and promotions through partner/affiliate marketing.

Once a potential participant was identified, Global conducted an initial phone survey to qualify and prioritize opportunities. Part of this review included obtaining baseline information on the producer's energy-using equipment for the last two years (e.g., motors, fans, pumps, exterior and interior lighting, processing equipment, refrigeration, and HVAC).[3] After the survey, the results of the survey were reviewed and the opportunities qualified and prioritized.

Once an opportunity had been qualified and prioritized, the customer was sent a Letter of Understanding presenting the details of the Program, procedures, and the required steps for the participant. After receipt of the letter, Global conducted an on-site audit to determine the initial potential savings of the customer's facilities and operations. After the audit, the customer's opportunities were prioritized for further evaluation and the results were reported to the customer. Qualified energy-efficiency measures were defined by an itemized list Global developed in conjunction with the California Public Utilities Commission (CPUC) and PG&E. This list consisted of very specific measures and each was assigned a deemed energy savings amount. The list also included a "bundled measure" that was less prescriptively defined, but was assigned a predefined deemed energy savings value. Global required customers accepting financial incentives through the Program to sign a statement declaring that they had received no funds for the same activity from another program or source.

Global was responsible for the commissioning and certification of the proper installation of any recommended measures before rebates were issued to participants. In our interviews with the implementers, Global described "commissioning" as verification that the equipment was

[3] Global originally planned to obtain utility billing data as part of this process; however, because these data were not maintained or accessible by most participants this was not implemented.

installed prior to issuing a rebate, rather than the more a comprehensive review of the operation of the installed measures that commissioning typically implies.

Global was responsible for the Program's incentive payments.

- Global provided incentives for qualifying projects on a first-come, first-served basis, and paid a maximum of approximately 50% of installed cost.

- Global would not provide incentive payments that exceeded a participant's project cost under any circumstances. Additionally, a single facility or participant could not receive more than 15% of the total Program funds.

- Rebates were issued based on verification of actual measure installment.

EM&V Overview

Quantec conducted this evaluation of the effectiveness of CAFEE by fulfilling the tasks and responsibilities defined by the CPUC pursuant to Decision 03-12-060 and in accordance with the CPUC Energy Efficiency Policy Manual, Version 2 of August 2003.

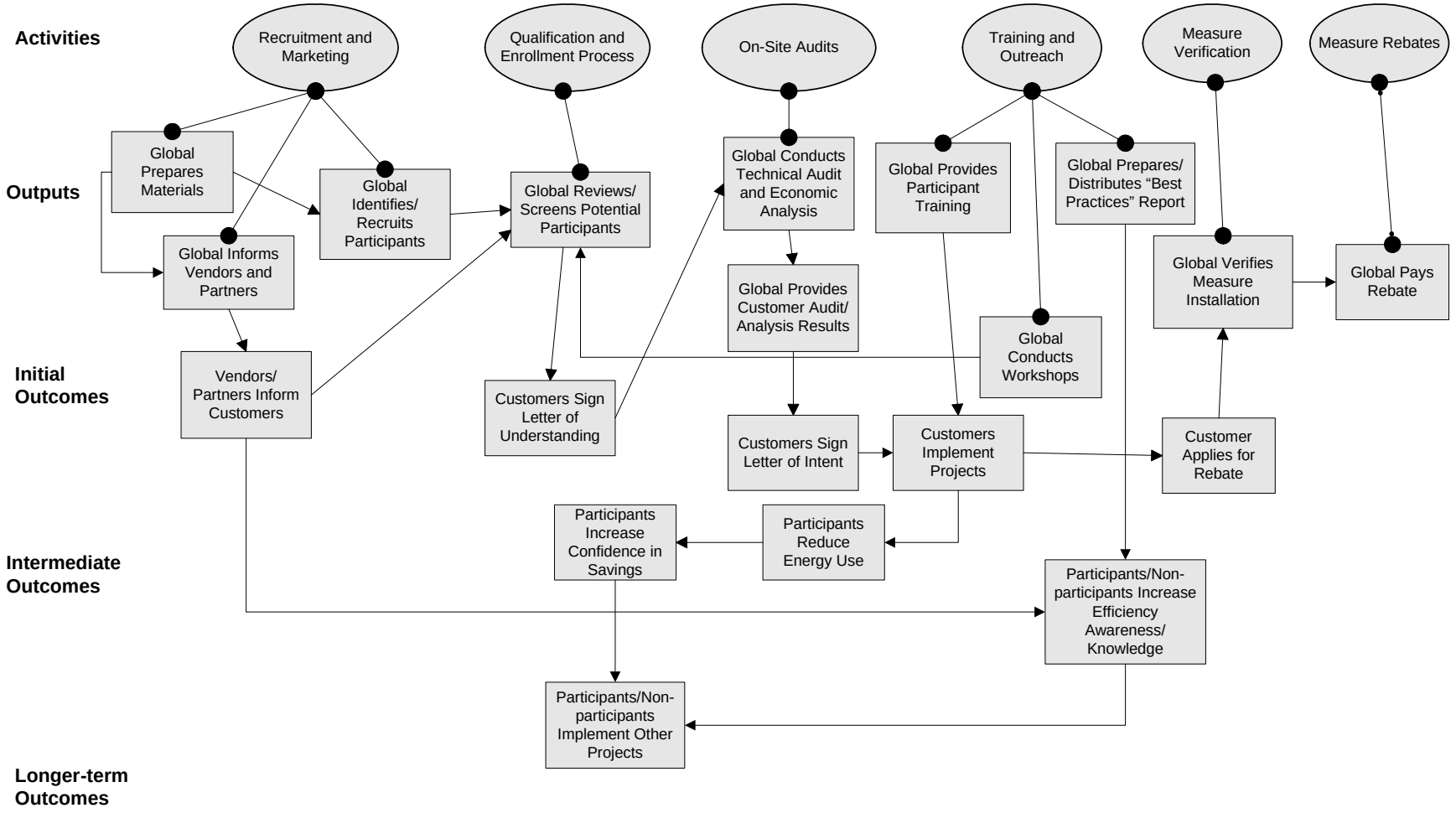
In August 2004, we held a study kick-off meeting by telephone with the Global Program Manager and in September we submitted a draft EM&V plan. Because the Program was in limbo for several months while revisions to the Program were being developed, we conducted only monitoring activities for several subsequent months. As a result, our original plan to submit two interim reports to the Program Manager in the form of memos at about eight months and 16 months was not implemented. Once the details of the Program were revised and finalized, we modified our draft EM&V plan and submitted it in February 2006. This report is consistent with that final EM&V plan.

We conducted an integrated process and impact evaluation. Our objectives were to provide an overall assessment of Program performance and success and to provide the implementers ongoing feedback with corrective and constructive guidance regarding implementation.

Program Theory

One of the first steps was development of a program theory. The original program theory is shown in Figure 1. It presents Global's major activities including recruitment and marketing to both customers and vendors, qualification and enrollment, on-site audits, training and outreach, measure installation verification, and payment of rebates. It is important to note that the components of the Program evolved over time in response to Global's experiences with the Program. These changes are described later (in particular a decreased emphasis on vendors). Global's primary outputs are shown including materials and audits. Expected outcomes include customers observing the benefits of the measures installed and, in the longer term, both participants and non-participants implementing additional energy saving measures.

Figure 1. Program Theory



Study Goals and Objectives

We established evaluation goals as outlined in our EM&V plan. These included:

- Verification of measure installation through site visits and telephone verification surveys for a sample of projects
- Assessment of Program cost effectiveness
- Use of project baseline data to assess the market
- Provision of ongoing feedback to the Program implementers
- Assessment of Program effectiveness based on indicators reflecting the Program theory
- Assessment of overall levels of Program performance and success
- Provision of information to inform decisions on Program compensation
- Assistance in the assessment of the continuing need for the Program

Sample Design and Data Collection

We developed a sampling plan for the participant sample for both the process evaluation interviews and impact evaluation data collection. The participant sample was drawn from those participants who had completed the entire participation process. Given the timing of the Program, we selected our final sample in November 2005.

Two of the three sites responsible for the greatest energy savings were selected for the purpose of performing site visits to verify equipment installation, as well as for phone interviews. Based on project information, we developed a site visit protocol for each. Quantec engineers conducted site visits during December 2005 and documented each project's status.

The second largest project and a randomly generated sample of nine additional projects were selected for telephone interviews. We developed a telephone interview instrument for verifying measure installation and obtaining feedback on process issues. Interviews were then scheduled and conducted with representatives of these projects and the two included in our site visit sample. Interviews were conducted with representatives from a total of 12 projects. These projects represented 16% of the total number of projects forecast initially and 18% of the kWh energy savings goal. In the end, these projects were 27% of the total number completed and they represented 19% of the claimed energy savings and 17% of the claimed demand savings. We also performed interviews with a sample of non-participants for the process evaluation. From a list of twenty non-participants that was provided to us by Global, a total of eight interviews were conducted. The non-participants were selected from a list of customers who were likely to recognize the Program when contacted, and who were informed about the Program through

various outreach activities, but who elected to opt out of the process at any point from initial recruitment through the decision to install measures. These customers did not include those Global screened out based on Program criteria. They represented diverse customer types and sizes. An interview instrument was developed to obtain their responses on Program processes and materials and why they chose not to participate. These interviews were completed in April 2006.

Finally, two Global Program staff primarily responsible for implementation were interviewed. We developed an interview instrument and conducted telephone interviews in April 2006 to get detailed information about their experiences with the Program, lessons learned, and recommendations for potential future programs.

In addition to the process interviews and verification site visits and interviews, we obtained incentive data from Global and the amount of the participant co-pay for each measure and project.

Analysis Methodologies

To analyze and report the survey results we tabulated the responses to specific questions. We also extracted responses to open-ended questions and present them in this report.

Quantec reviewed the underlying energy savings calculation assumptions and methods and how they were applied to the projects in the Program. The deemed savings values were set through a process conducted jointly among Global, the CPUC, and PG&E staff. Our review was done to ensure the values had been applied properly in Global's savings calculations; given that the estimates were deemed, we did not to attempt use our information or assessments to refine any of the underlying assumptions. Where possible, however, we do provide information relevant to the assumptions to inform future programs.

For each project in our sample, we used phone verification or the site visits to either confirm or revise the project information reported by Global. Upon verification of the installation, the equipment was compared to that which was included in the Program measure list. Appropriate measure assignment, for deemed savings purposes, was verified. In this way, we were able to calculate an overall realization rate (ratio of verified savings to claimed savings) for the sample projects. This rate was used to adjust the savings claimed for the Program as a whole.

A detailed free-rider and spillover analysis was not conducted. We did obtain information through participant interviews on the likelihood projects would have gone ahead without the Program, and the implementers provided detailed feedback on their efforts working with customers to ensure completion of the projects. The net-to-gross ratios used in our analysis were those taken by the implementers from CPUC recommended values; our limited analysis tended to support those estimates.

Finally, we used the verified savings estimates and the cost data supplied by Global to analyze Program cost effectiveness. We employed the CPUC methodology as reflected in the Program worksheet submitted to the CPUC to do these calculations.

Descriptions of Sample Participant Projects

Each of the projects in the sample of projects selected for analysis are described briefly below. Although phone interviews were conducted with the participants for the purpose of estimating energy impacts, as well as equipment verification (including the two projects for which verification was done on site), most of the participants were unable to provide any detailed information regarding the efficiency of the equipment, energy consumption, or hours of operation. Each of the participants was able, however, to verify whether or not the equipment had been installed, whether it was working "as expected," and occasionally provided estimates regarding energy and operational trends.

Project 1

This project was an organic, free-range chicken farm. This participant had 14 facilities that participated in the Program and we conducted a verification site visit to one of the facilities

With 14 total sites reporting participation, this certified organic company was responsible for about two-thirds of the Program's attributed savings. Our site visit was to the individual site that was listed as accomplishing the greatest energy savings. Measures implemented included CFL retrofits, high-efficiency fans, and bundled measures.

Project 2

This project was an organic, mixed-vegetable farm. Measures implemented at this location included high pressure sodium (HPS) retrofits, VSD installations, and the installation of high-efficiency motors.

Project 3

This project was a fruit processor offering certified organic products. We conducted a site visit at this location to verify the installation of high-efficiency motors.

Project 4

This project was a small, rural vineyard using less than 29,700 kWh/year. Measures implemented at this location included high efficiency pumps and motors.

Project 5

This project was a small, organic produce farm. The measures implemented at this location included high-efficiency refrigeration.

Project 6

This project was an organic vineyard which grows, produces, and markets organic ingredients and wines. The measures implemented at this location included HPS retrofits, VSD installations, high-efficiency motor installations, and the installation of high-efficiency pumps.

Project 7

This project was a dairy processing plant offering organic products. The measures implemented at this location included T-5 retrofits, high-efficiency refrigeration, VSD installations, high-efficiency motor installations, and the installation of high-efficiency pumps.

Project 8

This project was an organic dairy farm that had implemented high-efficiency refrigeration.

Project 9

This project was an organic vineyard and dairy. The measures implemented at this location included high-efficiency refrigeration, tank insulation, VSD installation, and the installation of a high-efficiency pump. At the time of our verification the participant was unable to confirm the installation of the high efficiency pump. However, this installation was confirmed before completion of the evaluation.

Project 10

This project was a company offering certified organic cold-storage services. The measures implemented at this location included the installation of a high-efficiency motor and VSD.

Project 11

This project was an organic vegetable garden that sells produce in “bins” for delivery, and at market. The measures implemented at this location included high-efficiency refrigeration.

Project 12

This project was an organic farm that had implemented high-efficiency refrigeration.

Process Evaluation

The process evaluation was conducted with the intent to provide information on the performance and effectiveness of the Program activities, materials, and delivery. While it was originally planned that the evaluation would include each of the components listed below, this plan was modified to reflect adjustments to the Program concept and components, as noted below.

- ***Marketing plan and channels used for marketing*** – Program implementers were asked to discuss effectiveness and methods of marketing efforts; Program participants were asked to rate the effectiveness of marketing materials.
- ***Marketing materials*** – Program participants provided ratings of any materials that were received.
- ***Recruitment process*** – Program implementers were asked to discuss various aspects of the recruitment process, including barriers, adjustments, suggestions; participants were asked to rate the ease of participation.
- ***Screening process: initial phone survey, qualification/prioritization of opportunities –*** Program implementers discussed the audit/survey process and identified adjustments that were made to the original Program concept, as well as described the process for identifying and contacting potential participants; participants and non-Participants were asked to identify methods of contact.
- ***On-site audits and technical and economic reports provided to potential participants –*** Program implementers were asked to discuss changes to and methods of conducting audits and surveys; participants were asked to discuss various components of the audit process, including any desire to receive a full audit. The Program was modified to not include provision of economic reports as originally planned.
- ***Incentive processing and payment*** – Program participants rated the ease of incentive processing and timeliness of payment.
- ***Program databases and tracking*** – This task was performed as part of the impact analysis.
- ***"In the field training" and materials provided such as "Best Practices" publication*** – The original Program concept was modified to discontinue availability of these materials.
- ***Program outreach workshops and recordings of workshops*** – The original Program concept was modified to discontinue availability of workshops, although Program participants were asked whether or not they had attended them since there were some conducted initially.
- ***Commissioning and certification of installations*** – Global intended these services to be verification that claimed measures were installed.
- ***Trade ally and equipment vendor participation*** – The original Program concept was modified to discontinue active recruitment of trade allies or vendors; Program

participants were asked to describe any interest in receiving information about local vendors and contractors.

Additional topics were discussed during our process evaluation. Among others, they included:

- Identification of participant decision-making processes
- Assessment of perceived need for financing options
- Participant and implementer identified needs
- Participant satisfaction with the Program and equipment
- Influence of the Program on participant interest in, and practice of, energy efficiency
- Discussion of additional participant efficiency improvements
- Implementer, participant, and non-participant suggestions and comments about the Program

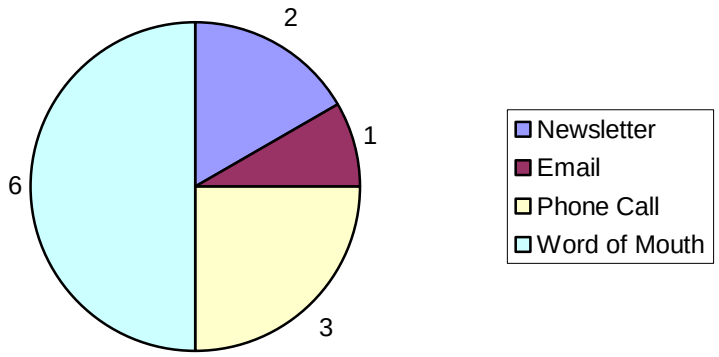
Participant Interviews

Interviews were conducted with 12 participants to gain feedback on a variety of subjects, including Program awareness, the application process, decisions impacting participation, an assessment of Program features, and additional efficiency opportunities, as well as general comments.

Program Awareness, Materials, and Process

When asked how they became aware of the Program, there was a mix of responses. Word-of-mouth was the most common response; 6 of the 12 participants said they had learned about it through word-of-mouth, as shown in Figure 2. Three indicated they first became aware through a phone call from Global, while one received an email. The remaining two heard about the Program through newsletters from trade organizations.

Figure 2. How Participants Became Aware of Program
(Number of Customers)



Six of the participants had never been to the Program website, and two could not recall whether they had. Of the four participants who recalled the website, the feedback was generally positive. Three found it to be helpful or very helpful while one said that it was somewhat helpful. No improvements were suggested.

Feedback on the marketing materials was more mixed. Of the nine participants who were able to remember receiving marketing materials (two said they had not received them and one was unsure), five found these materials to be very or extremely useful. Two participants reported that the materials were only somewhat useful, while two found them to be not at all useful.

Generally, the participants felt that the rebate process was clear, with eleven of the participants reporting that the steps required to receive the rebate were clear or very clear. Only one responded that the process was only somewhat clear. All of the participants found the process of preparing and submitting the project incentive application to be somewhat or very easy. None reported that the process was difficult.

As the implementer interview results presented later confirm, Global was proactive in facilitating the customer participation process. Participants we interviewed relied primarily on Global to submit their application, with seven stating that a representative picked it up from the site. Two mailed it, while one faxed and one emailed the application. None of the participants used the Program website to submit the application.

Audit and Decision to Participate

Nine of the 12 participants stated that their facility had received a free Program audit or survey before the energy-efficiency improvements were made. Of these nine, four rated the audit/survey

as excellent, three found it to be good, and one gave it a fair rating. The remaining participant was unsure how to rate it.

The investment decision-making processes at these companies varied. Because of their small size, investment decisions at five of the 12 companies were made directly by the owner. The main decision criterion mentioned by the respondents was the return on the investment. However, several stressed that they already were or were becoming increasingly conscious of energy efficiency and environmental impacts of their business, and these factors were important in their decision-making.

Eleven of the 12 participants were able to respond when asked to describe how the decision to install the energy-efficiency measures was made. Comments from six of the participants suggested that the Program had played a strong role in the identification and installation of the energy-efficiency measures. Two of the participants mentioned that they already were looking for energy-efficiency opportunities and performed in-house audits themselves. Three indicated that they had already been planning to make or already had made the improvements.[4]

Half (6) of all the respondents said the main reason they decided to participate in the Program was the rebate. Three of the participants indicated that the improved efficiency was the motivating factor, and two specifically cited being "environmentally sound" or "green" were key reasons. The following comments about this decision revealed the process used by several of the participants, including the significant role of green practices in their decision-making:

- *I'm an environmental person. I check all of the various measures and technologies, to see if they meet the rate of return requirements, as well as the net present value to help make the decision. Also, it needs to meet environmental considerations, and sometimes that is enough. We are 'into' efficiency…and want to be as green as possible.*

- *This is a two-person, household farm. I do all of my own research and [perform] the metering using a friend's gadgets, then I discuss my ideas with my husband, and also with the incentive provider…Efficiency is even more important because of our [photovoltaic] array.*

- *We try not to use fossil fuels and be very conservative, but there are things we have to do. So we research and decide ourselves. [Before this Program came along] I did a lot of research for this project and called a lot of people for help and didn't really find a whole lot.*

- *We have a "sustainability program" in place, and we've been trying to integrate this into everything we do. We do a lot of research into this area, and replace things as they get old.*

- *An in-house energy guru identifies opportunities. [Our company] has very recently gained an efficiency mindset.*

[4] The Program did not prohibit providing incentives on measures that had been installed already.

- *We're a "sustainable" company … so it's about reducing our footprints and being good stewards…So, really everyone wins.*

Finally, one participant decided to participate in the Program because the timing worked out well and they found Global to be very helpful throughout the process.

Assessment of Program Features and Satisfaction

When asked to identify the Program features that were the most attractive to the participants, the time required and the rebate were the most commonly reported positives. While four participants were unable to answer, three mentioned the rebate and three mentioned the quick turn-around. One of the other participants stated that they were impressed by the Program implementers "…eagerness; they were encouraging. [And there were] no hoops to jump through." Another participant stated that the most attractive Program features were "the simplicity, and the fact that it was open to processors ***and*** farmers." Other features that were mentioned included:

- The easy application process
- Having a rebate available for people who want to be more efficient
- The opportunity to upgrade old equipment

Only two of the participants were able to identify any difficult or troubling Program features. One of these participants expressed frustration over the inability to use non-Energy Star rated products that were nonetheless perceived as energy-efficient. The other participant seemed more aggravated with the existence of utility/tax funded programs in general, as opposed to the Program specifically. This participant commented that it was bothersome that the Program was funded through a surcharge, and went on to question how much the Program had cost as well as how this money had been distributed.

Additionally, this participant provided the only negative feedback when asked to rate the effectiveness of the Program implementers, responding that they were somewhat effective, and further commenting that it was bothersome that "the implementers, including the evaluators, are taking funds off the top. If people weren't made to pay a surcharge, they could just use the money to buy energy efficient equipment directly." The other 11 participants rated the implementers as very or extremely effective. Four of the participants mentioned that the implementers were helpful, while one simply called them "great." Other comments included:

- *They were persistent, which was good for us. They "goaded" us which was also good. [The staff] was very helpful.*
- *They answered all of my questions.*
- *They were very helpful and thorough, [especially with] the potential rebate stuff. The fact that they gave us reminders was helpful. Our staff is very busy, and we would have forgotten if Global hadn't been reminding us about the deadlines.*

None of the participants recalled the Program providing any financing options, but three stated that they would have liked to receive this type of information. From our interviews, we got the impression that the interest in financing options was at least partly academic and that most of these respondents probably would not have pursued other funding options, particularly since they were able to find the funding to participate anyway. As noted later, the implementers indicated that they provided financing information mostly when a potential participant suggested that financing was an issue; consequently, it is not surprising that most participants were not aware of any financing options being presented through the Program.

Only one of the Participants had attended a workshop, and this respondent thought that this was a utility-sponsored event.

Because of Global's shift away from its initial plan to emphasize working with vendors, it was not surprising that only one participant recalled being provided with a list of vendors or contractors. This participant found the information to be somewhat helpful. Only two participants indicated that they would have been at all interested in a list of vendors, thus providing some support for Global's decision to deemphasize this part of the Program. When asked what kinds of additional information they would have appreciated through the Program, most participants weren't able to provide any suggestions. Comments from the five participants who did respond included:

- ENERGY STAR product information: An explanation of criteria and product list
- Program information: An explanation of the Program theory and funding sources
- Additional guidance: Construction advice, technical advice, code details
- Financing information
- Equipment Specs: Motor ratings and efficiencies

All twelve of the participants received the Program rebate on-time, and 10 were very or extremely satisfied with the incentive amount. One participant was only somewhat satisfied with the incentive level, while the other was unsure.

All of the participants stated that they were satisfied with the energy-efficiency measures installed under the Program.

Interest in Energy-efficiency Improvements

Most of the participants had been interested in ways to improve their energy efficiency prior to their involvement in the Program. In fact, 10 of the 12 interviewed had considered themselves to be very interested, while one participant had been fairly interested, and one was unsure. This propensity was further demonstrated by the energy-efficiency improvements that many of the participants had installed within three years prior to the start of the Program. Ten of the participants were able to identify specific improvements, including photovoltaic panels; variable

frequency drives; lighting improvements; compressor, motor, or pump upgrades; insulation measures; and more resource efficient containers for product shipment.

Three of the participants reported that their interest in ways to increase efficiency had increased due to their involvement with the Program. However, eight of the participants reported no change in their interest in ways to improve efficiency. One participant was unsure. The fact that the participants already tended to have an interest in efficiency improvements probably limited the extent to which the Program could have increased their interest in efficiency.

The Program had some effect on the actions and plans of the participants. Most had not yet made any additional improvements to their facilities since participating in the Program, in part because so little time had passed. However, some said they were considering future changes. An inquiry into installing photovoltaic panels was the only action taken by a participant reported as being strongly influenced by the Program. Another solar project being considered was the purchase of solar-charged electric carts; this decision was said to be somewhat influenced by the Program, as was a lighting improvement. Additionally, one participant reported a variable speed drive installation in progress, while another was working on upgrading pumps and installing insulation. These participants, however, said that neither improvement was influenced by the Program.

Comments and Suggestions

When asked to provide any additional comments or suggestions, participants tended to elaborate on their responses already provided on other questions.

One participant expressed confusion regarding the criteria used to rate and evaluate ENERGY STAR equipment. This participant was frustrated by the higher cost of ENERGY STAR equipment and felt that the higher prices were driven by the costs to gain approval than the costs to increase efficiency. This participant requested that future programs provide more explanation of the criteria used to earn an ENERGY STAR label.

Another participant restated his general opposition to the utility surcharge: “The Program seems like a waste of money. They take the money away from the ratepayers, then give it back to the people who would install the equipment anyway.”

Comments from the remaining participants were positive, though one was unable to make any suggestions or comments. In addition to general statements such as “Really smooth,” and “Great Program,” comments included:

- *If it keeps going, it might influence us to do even more. It’s a good Program.*
- *I’m very happy, [the staff] was very helpful.*
- *I loved it! … I wouldn’t have done it without the Program. I would have had to buy something used, and maybe an inefficient model.*

- *Let's keep going and get another program started for the year 2006 or 2007.*

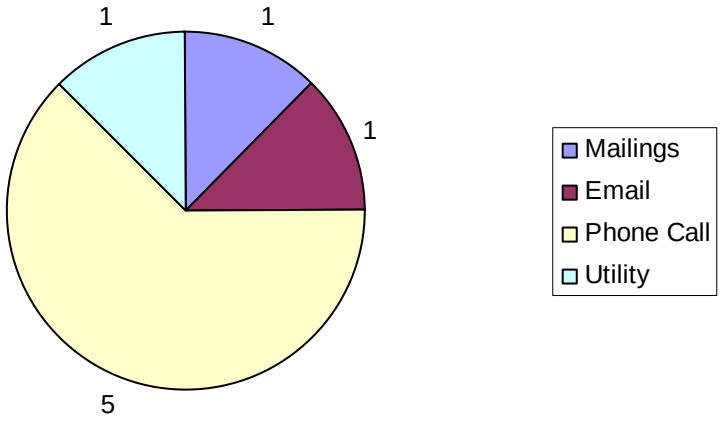
Non-Participant Interviews

Interviews were conducted with eight non-participants to gain feedback on a variety of subjects impacting participation. As noted earlier, non-participants were defined as customers who were contacted by Global about the Program but had decided not to participate at some stage in the process.

Program Awareness

When asked how they became aware of the Program, five of the non-participants had received a phone call from Global, as shown in Figure 3. One non-participant received an email, one received something in the mail, and one had become aware of the Program through a utility. These results differed from the participants who were most likely to have become aware through word-of-mouth.

Figure 3. How Non-participants Became Aware of Program (Number of Customers)



Non-Participation Decision

The most consistent factor influencing the decision not to participate was given as inconvenient or incompatible Program timing. In fact, when the non-participants were questioned about the reason for their decision not to participate, five of the eight responses included some mention of Program timing. These responses included:

- *We worked with an electrician to see if it would be worth it, and it wasn't. We had a list of all of their motors and it could have worked, but with our timeline, and an upcoming remodel, it wasn't worth it.*

- *We were not retrofitting any equipment at the time. The Program didn't have much to offer. It didn't really align with our needs at the time.*

- *I had already conducted the work that was suggested in the audit. We tend to evaluate our energy and EE issues in the fall and winter, so the Program's timing was off for us.*

- *At the time, the recommendations didn't add much savings to what we do, and the Program was working with small budgets.*

- *We were involved in other projects and funds were allocated in other ways [so we had] budgetary constraints. The Program's timing was off for us and we now wish we could participate.*

The remaining non-participants offered the following explanations for their decision:

- *The Program seemed to be geared to producers that were operating on a larger scale than our farm, [it] wasn't cost effective for us. If I recall, the Program offered incentives for lighting upgrades, but did not cover labor involved.*

- *The Program was too limited for us. We are pretty current regarding addressing our energy efficiency needs, and have invested a lot of time and resources over the last decade investigating energy efficiency and making appropriate upgrades and modifications.*

- *We are already associated with a program called the "Smart Grower" program, which offers similar, better services and incentives.*

The non-participants were then asked to identify the changes that would have been needed to sway their decision to participate in the Program. The responses were varied, but seemed to reflect the desire to better align the Program's timing with normal budget planning. Additionally, the non-participants felt that a greater incentive should have been offered, that the Program should include a greater depth of measures, and that it should be more participant friendly. These comments included:

- *Provide a more enticing incentive package; offer more for retrofitting equipment, as opposed to requiring lighting upgrades.*

- *It would have been ideal for the audit to have coincided with our fall and winter season, as that is when we budget time and money to address energy and equipment issues for the following season.*

- *Offer better incentives.*

- *[Adjust the] timing.*

- *Offer a more inclusive, full service…Program [that] does more of the "leg work." [Perform] full evaluation, explain how it's done, and allow us to simply "sign here" for all of the work. We have enough grunt work to do on the farm.*

- *Increase incentive offering and expand to include solar technology options.*

- *[Provide] more straightforward information. I was told how to do everything, but no assistance was offered. The Program was lacking clear-cut steps.*

One of the non-participants was unable to identify any changes, and stated that the Program "simply wasn't appropriate for us."

Assessment of Program Services

All four of the non-participants who had been offered an audit accepted this offer. Of these, three were able to offer assessments of the audit's usefulness. These responses were quite varied, as shown below:

- *[The audit was] not very useful at all.*

- *We appreciated it, but were not able to follow through with it at the time.*

- *[The audit] was very useful. I may go forward with recommendations whether rebates are still available or not, but it may take a year to be financially prepared to do so.*

Three of the non-participants had not been offered an audit, but only one of them indicated that an audit would have been useful. One of the non-participants did not answer.

Of the seven non-participants who were able to answer, five had received information on financing options.[5] One respondent had not received any financing information, while the other was unable to remember whether this information was provided; neither of these two was interested in this type of service.

Of the seven who answered, only one of the respondents was able to remember receiving a list of vendors. The remaining six non-participants could not remember or did not receive a vendor contact list; only two stated that they would have liked this type of information.

When asked to describe the Program features that were most attractive, only five non-participants were able to respond. The features that were given included the following:

- *[Details provided] in a spreadsheet, and were user friendly*

[5] The higher proportion of non-participants than participants who mentioned discussing Program financing options appeared to be consistent with statements by the Program implementers that they usually brought up financing options when a potential participant expressed concerns about the unavailability of financing.

- *The financing options for new equipment*
- *The audit offer, but the audit wasn't as in-depth as we were expecting or would have liked.*
- *[Ability to] upgrade refrigeration.*
- *The audit, specifically the motor recommendation.*

When asked to identify specific components of the Program that were troubling, many of the responses were similar to the reasons given for not participating. Below is a list of the features that were mentioned as causing concern for the respondents:

- *The focus on lighting.*
- *The lack of depth in the audit*
- *The offer and project were too limited in scope*
- *The options presented were already addressed at our facilities*
- *The incentive level*
- *The lack of step-by-step instructions and [customer] didn't have a pressing need to retrofit the lights in order to qualify for the more substantial rebate offerings*

Two of the non-participants did not identify any particular Program feature that concerned them.

Energy Use and Interest

A variety of equipment is being used on the plants and farms of the non-participants that were surveyed, including the following:

- Cold storage
- Irrigation pumps
- Processing equipment
- Conveyors
- Refrigeration
- Water pumping equipment
- Engines
- Pumps (50 HP)
- Fluorescent lights
- Motors
- Boilers

Similar to the responses of the participants, each of the seven non-participants who answered described themselves as having been very interested in ways to improve their energy efficiency

prior to hearing about the Program. Five of these respondents had made energy improvements within three years of hearing of the Program. Some of the improvements that had been made included

- Energy efficient lighting, motors, boilers
- Use of waste heat
- Programmable thermostats
- Installation of wind turbine
- Insulation improvements
- Cogeneration
- Modernization of refrigeration
- Pump maintenance

Three of the non-participants had made energy-efficiency improvements since hearing about the Program, including the installation of two submersible pumps, a methane turbine, lighting upgrades, and equipment modifications. However, none said these improvements were influenced by the Program.

Comments and Suggestions

Non-participants were asked to make suggestions for Program improvements so that future programs might be better able to encourage participation from the targeted farms and plants. Some of the suggestions were reflective of previous comments, such as a need for greater financial incentives, a more thorough audit, or a list of participating vendors. Other comments and suggestions included:

- *I feel this Program is reaching more growers, not manufacturers like us. This Program isn't very targeted to us… we have had a vested interest in energy efficiency for well over a decade and have addressed all of the "low hanging fruit." We have had more than five energy audits over the last decade and are well ahead of the field with regard to energy efficiency.*
- *The Program needs to be a "no-brainer." Offer free audits and then offer compelling rebates. There was too much paperwork.*
- *Develop an alliance to provide more capital to assist small farmers.*
- *Offer solar incentives/options.*
- *Great program. Is it still offered?*

Program Implementers

For the purpose of gathering information on issues involving Program effectiveness, success, and the continuing need for the Program, interviews were conducted with the two primary Program implementers at Global. Both the Senior Associate and Associate were interviewed at the close of the Program. Key details from interviews with both parties are presented below.

Program Goals and Modifications

From the beginning, the Program experienced significant modifications and some fine-tuning. According to the Senior Associate, two of the most significant changes occurred while still negotiating with the CPUC and PG&E, before the Program was implemented. First, they had proposed a Program strictly targeting organic producers and processors; adjusting the scope to include small farms was one of the biggest changes to occur early on. However, it was thought that this change did not have a significant impact.

In contrast, the proposal had included a list of preliminary measures that had been intended to be modifiable as the Program was unrolled. Instead, this list was interpreted to be fixed into the Program, and could only be modified by applying for a "change order" through the CPUC. The implementers had not been prepared to work from a fixed measure list, and they indicated that they would have created a more extensive list before submitting the proposal had this been known. It is unclear what the impacts would have been, had they "come out of the shoot with more measures, or more flexible measures," but a change order to broaden the list was eventually applied for and accepted. This is discussed further below.

Additional adjustments were made to the Program in response to the needs and interest of the participants. One such adjustment was more the result of a lack of interest as opposed to an official modification of the Program. Specifically, it was originally thought that money would be tight for the participants to pay for energy-efficiency measures, and so a financing option was developed to help overcome this barrier. This turned out for participants, at least, to not be a problem and none of the participants took advantage of the option of receiving financing through the Program.

Another service that was utilized on a very limited basis by the participants was the audit process. This was partly a result of the change to a very prescriptive Program; according to the Senior Associate:

> *"Since [the Program was] prescriptive, it didn't do any good to perform a full blown audit to identify every measure…if we found something that the participant could do, and it wasn't on the list, it wasn't very helpful."*

Thus, the audit process was adapted into a survey, dependent on the interest expressed by the individual participant. According to the Senior Associate, being able to go in for 15 or 30 minutes and deal with the survey quickly allowed them to "get in the door" in many instances. The implementer further stated that the approach was adaptable:

> *"If [the participants] said they were looking for ideas and they had a few hours we were able to perform a more detailed audit or survey. We responded to what the participant*

wanted, needed, and could do, from a simple 'Here's what you do and how you do it,' to providing more detailed information."

Finally, as alluded to above, when the original measure list was interpreted to be very prescriptive it was found that a number of efficiency improvements that were not included on the original list were "desperately needed." For this reason, a change order was requested to expand the list to include those measures. Though it was found to be simple, the process of amending the measure list took several months for completion. The implementers felt that this lengthy process reduced the number of potential participants who were able to implement the additional measures.

Reaching the Market

One of the most effective ways to encourage customers to make efficiency improvements is to provide them with the information that they need. However, as the Senior Associate stated:

"If you give them information and then just walk away, nothing's going to happen. We've found that in this Program, much like others, the farmers need somebody to hold their hand. They are much too busy doing what they do. You can give them information, but if you walk away their normal business takes over and [the improvements] will be back off the table in 6 months. It takes someone constantly there to move them along to do things."

This necessitated considerable effort to promote the Program, including multiple in-person visits to each site to remind participants, and non-participants alike, that the Program was available. Standard marketing tools such as workshops, print ads, emails, and newsletters were utilized to promote the Program, but the response to these was minimal compared to the impact of visiting each individual site on a continual basis. As described by the Senior Associate:

"You can (remind) the participants, give them all kinds of information, return to the site six times, and every time you'll have to re-explain who you are and what you're doing. If you show up one time, knock on the door, and [the participant] says they're not interested, it just means that they're not interested ***today****. But if you keep coming back…they'll change their minds, and you have to be there when it happens. Our Program...had been built on this design. We know that it's all about 'boot time,' and being present."*

Once projects were underway, having working examples of efficiency improvements encouraged further participation. According to the Associate, those projects spread to other participants, and suggestions to "talk to my sister company" were made. It was also found that the participants were spurred on to make additional improvements once they had been through the rebate process, and understood what was involved.

Encouraging Improvement: Identifying and Overcoming Barriers

Both of the interviews revealed that two of the greatest barriers preventing this segment from making energy efficiency improvements are a lack of motivation and time. While the existence of an incentive is often vital to the decision process, pushing the participant over the edge regarding whether or not to install efficient equipment, the amount of effort required to receive that incentive can be a barrier in itself. With this in mind, the implementers were prepared to

perform a great deal of hand-holding and reinforcement, including filling out much of the paperwork, reminding participants of deadlines, and providing guidance along the way.

It was felt that the larger businesses, especially those with a pre-existing mission or philosophy that reflected a desire to be "green friendly" were more likely to participate in this type of Program. However, the Senior Associate found that

> *"[While the organic market is even more interested in 'being green' than traditional program participants,] there's still not enough staff to take care of these kinds of things. We did a lot of hand-holding, literally going on-site and working with vendors and accountants to find the invoices…making copies of everything, filling out the applications, (making) one less thing that they have to do that keeps them from taking credit for a project. They'll buy a refrigerator, or put in the lights, or buy a motor, but filling out the paperwork, that's the hurdle. We fill out the paperwork so that we can take the credit, and they can take the incentive. It's the same whether you're working with a farmer for a $5,000 rebate, or a (substantially larger client) who's getting a $50,000 rebate."*

The Associate went on to say,

> *"The bosses aren't telling them locate every rebate program that's out there; they don't do it on a normal everyday basis, and they don't know how to incorporate it into their work schedule. Our job for customer recruitment is crucial. If a program is going to be participant driven, you need rebates at the 75% to 100% level for it to work. They just don't do it on their own."*

The implementers also observed that the deadlines motivated participation and the completion of otherwise slow moving projects. As stated by the Associate, "Once [the participant] found out the Program is wrapping up they move quicker. An incentive program can not be an open-ended program, or they'll never do it."

Additionally, the difficulty associated with gaining management buy-in was identified as a barrier that the Program had helped to address. Specifically, when the Associate found interest among staff members, but felt that a lack of managerial support was holding back participation, meetings were held in an effort to explain the process and potential benefits to the upper-level decision makers.

Finally, budgeting and financial barriers were a common problem in this sector. The problem appears to be primarily an internal one: it is difficult to find the in-house capital to implement these projects and compete with other capital budget projects. Even with the existence of incentive programs offering external financing or loans, it was thought that internal financing or capital budget issues still arose. The Senior Associate noted: "We had a number of participants that mentioned that budget issues were a problem with installing equipment. Some customers worked around their internal problems and found the funds or adjusted projects in order to accomplish the work within the program timeframe and others did not. When we knew there was a money issue we offered financing help but it was not accepted."

Additional Opportunities Within Small and Organic Farms

When asked to identify the greatest potential for energy-efficiency improvement within the small and organic farm segment, the Senior Associate identified variable speed drives as the best opportunity for future incentive programs: "On the motor side, without information or incentives, in most cases they're putting in standard motors. With just a small amount of information, they will put in VSDs." He also observed that "… huge numbers of VSDs are being installed as a normal course of business in this market," and that people are installing them with or without the existence of incentive programs. As he noted:

> *"I'm amazed by how many people are installing them…it used to be that [VSD technology] was a pariah because of the interference with other equipment and other problems; people shied away. Now we're seeing more interest. We're over the new technology hump, and now is the time to jump on those coat-tails."*

A similar sentiment was expressed by the Associate, who found that most of the participants were fairly "restrained" in their use and purchase of energy-efficient technologies. He stated:

> *"Not many of [the participants] are researching or pursuing 'hair-brained', 'wild', or 'Back-to-the-Future' type technologies. They're pretty much [purchasing] the off-the-shelf stuff…They're using the very standard, proven technologies, and don't have the financing do big R&D projects. They're organic farmers, and are doing something unusual already."*

Having made this observation, the Associate felt that future programs would benefit by expanding the coverage for more traditional, but higher efficiency, equipment. He stated:

> *"Some farms are using equipment that has been available for decades. The equipment itself is nothing new, although it is more sophisticated and capable now. [Many buy a particular] motor because it's the cheapest one out there, using the bottom-line cost. They don't justify the additional cost for the energy savings, and in some instances that is appropriate, as in when the equipment is only used for three months out of the year, and only for a couple of hours each day. The bundled measures [that were offered through the Program] helped to capture some of the more unique equipment. We had a decent grasp as far as what categories to offer, but now that we know what equipment is being used we can expand the measures."*

Additionally, the Senior Associate found that the opportunity for lighting improvements still existed, even though as he noted, "People say that this has been tapped, or 'been done'…I'm amazed by how much [energy-efficient] lighting still needs to be done."

Suggestions and Comments

As noted above, the need for a more extensive measure list was realized early into the Program. Having these additional measures available from the start would benefit future Programs, although the prescriptive quality of the design may limit participation. While there are many energy-efficiency opportunities within the farming industry, much of the equipment being used in the field is highly specialized, and does not fit will with a prescriptive program. It was found that the Program and its participants would benefit from having a customized, equipment based option for these instances.

It was also found that even though most participants were more interested in “traditional” technologies, some were interested in PV and solar opportunities. The Associate suggested that this interest may justify a future program.

Additionally, the Senior Associate commented that the Program would be improved if it were better able to address the fragmented nature of the vendor community and suppliers operating in the agricultural sector. He noted: “It’s difficult to mobilize vendors when they’re so fragmented.” It may be helpful for future programs to use larger, less fragmented vendors as an avenue to bring customers in, if they can be identified. The Associate expressed a similar sentiment, stating that the Program could benefit from “more technical resources…a vendor alliance and training session to tell people about the opportunities. We used the projects to sell the Program, but if we could hold a workshop to provide training and educate vendors and [business owners] on efficiency, as well as have a common vendor, it may make it easier…Educate the farmer about the improvements, as well as how to get rebates.”

Generally, participants were responsive to the Program and “liked it that there was a Program just for them, where they fit in.” The participants responded to people who were able to “talk the talk, [and] if you can drop names from the farming community, it helps a lot. [This market] is **very** community oriented.” However, he noted, the short Program cycle may undermine the success of similar programs. “It’s hard to gain trust when these programs come and go so quick. The one or two year program cycle is too short. Today it’s here, tomorrow it’s gone.” This can only have been aggravated by the shortening of the Program that occurred as a result of the change order process that was required.

Impact Evaluation

We conducted several steps as part of the impact evaluation portion of this study. These steps included:

- Review of the deemed savings estimates
- Data collection
- Estimate of energy and peak demand savings
- Cost-effectiveness analysis

Review of Deemed Savings Estimates

Because this was a prescriptive program, savings estimates were developed and assigned during the Program design phase to a finite list of approved prescriptive measures. The savings were calculated based on this assignment, regardless of the actual characteristics of the measures installed and operating conditions including actual hours of operation, specific efficiency levels, baseline energy use, etc. Global developed these values with the concurrence of PG&E and the CPUC.

Our first step in the impact evaluation was to conduct a thorough review of the approach and calculations used to estimate the energy savings for the prescriptive measures. We found the calculations of deemed energy savings to be both adequate and accurate, following the agreed upon assumptions and values drawn from multiple, accepted databases.

The prescriptive approach has many benefits, including the ability to avoid lengthy, time consuming audits; reduction in paperwork; simplified calculations; and easier tracking. These benefits can result in a more user-friendly program that may be more attractive to potential participants, especially those who may consider incentive programs to be time consuming or burdensome.

However, the prescriptive approach has drawbacks that may result in inaccurate savings estimates, especially when applied to very site-specific equipment that does not easily fit into, or cannot be predicted by, a “cookie-cutter” measure list. For example, participants in this Program were able to receive incentives for retrofitting their high-pressure sodium (HPS) exterior lighting. Because of the Program’s prescriptive nature, the energy savings associated with this improvement was independent of the equipment that was actually installed; the deemed savings value for the improvement was simply multiplied by the number of units installed. In the instance of HPS lighting, one participant installed six 1000 W lamps in addition to six 250 W lamps. Since the prescriptive list did not include 1000 W lamps, the deemed energy savings associated with the improvement treated each of these lamps equally, with the deemed savings assigned to 250 W lamp used as the savings value for each 1000 W lamp.

In some instances, such as the example above, the differences between the assumptions underlying the deemed savings and the characteristics of the actual measures installed produced

conservative estimates of the savings. In these situations, another outcome was that the incentive paid was also relatively small for the measure. For example, in some cases a 500 hp motor was installed, but it received the same incentive as a 150 hp motor since the 500 hp unit was not on the list of prescriptive measures.

Despite its process advantages, use of deemed savings limits the accuracy with which achieved energy savings can be determined. The scope of our EM&V activities did not include making adjustments to the deemed savings that were already established for the prescriptive measures. Our role was to verify that the methodology used by Global to calculate the savings for the installed measures was consistent with the assumptions and analysis conducted to develop the deemed savings values and to verify that the measures reported by Global were, in fact, those installed in each of the verified projects.

Data Collection

It was the original intent of this evaluation to obtain and review all billing data for the sample projects from PG&E for 12 months prior to the projects and for the months they were available after implementation. However, it was discovered that Global did not obtain these data as a condition of participation, as originally planned. We had planned originally to use the billing data as a check on the savings expected from each project. However, since many projects occurred late in the Program and little post-installation billing data were available, the data were not being collected, and our evaluation focused on the deemed savings, we did not attempt to collect or use billing data in our analysis.

Measure cost and incentive data were obtained from Global, through review of project databases, invoices, and approved applications. All applications for participation and invoicing for the 12 participants selected in our sample were reviewed for accuracy, including measures that were installed after our verification activities were completed. We note that the measure cost data were the total measure cost, not the incremental cost relative to some baseline measure. A review of individual project audit reports and commissioning and verification reports, as originally planned prior to our data collection activities, was not implemented because the Program did not produce these reports as originally anticipated.

The same 12 projects included in our process evaluation interview sample were included in the impact analysis and verification. Representatives from 10 of the projects were contacted by phone and two projects were visited to verify the operating characteristics of the installed measures for the purpose of establishing baseline conditions and to document operating schedules, equipment, and other assumptions. The site visits were conducted at two of the more complex and large scale projects. When contacted, the participants were asked to verify the installation of the listed equipment as well as provide the hours of operation and efficiency characteristics. When such information was available, the operating characteristics of any replaced equipment were recorded as well, although this was rarely available. With a few exceptions, it was found that most participants were unable to provide any level of detail regarding the operation of the equipment beyond confirmation that the measures had been installed.

Estimate of Energy and Peak Demand Savings

The total claimed energy and demand savings associated with the 12-participant sample are detailed in Table 4. Distinction is made between "Program Sample-Verified," which was calculated based on the measures installed before we conducted our verification efforts, and "Program Sample-Total" which includes measures that were installed at four of the sampled sites subsequent to when our verification had been performed.

Table 4. Claimed Savings and Incentives, Net Savings

Projects	Quantity*	Annual Savings (kW)	Annual Savings (kWh)	Annual Savings (therms)**	Rebate	Co-pay	Total Measure Cost
Program Sample-Verified	804	158	742,204	9,960	$89,198	$455,855	$545,053
Program Sample-Total*	3,861	196	897,870	9,960	$164,946	$1,523,025	$1,687,971
Program Total	**10,868**	**951**	**4,034,430**	**129,480**	**$508,727**	**$2,556,736**	**$3,065,463**

* One measure, "Tank Insulation" is quantified by square feet rather than "each" so the quantities shown are somewhat misleading and not directly comparable.
** Although the sample included a site which had installed a measure with attributed therms savings, it was determined during our site visits that the installation affected heaters using propane, rather than natural gas. Thus, even though we verified the measure installation, our verified savings do not include the reduction in propane consumption.

In addition to our observations during site visits or information provided by participants during telephone calls, we reviewed project applications, invoices, and receipts in an effort to verify purchase of equipment. This was attempted for all measures and projects, including the measures installed after our verification calls. We were able to do so for several of the projects; however, we discovered that many invoices and receipts had multiple charges for equipment and services not covered or reported by the Program. These additional charges, in addition to the practice of "lumping" multiple measure project costs into one project measure, made it impossible to separate and verify actual costs in many other cases.

Table 4 and the subsequent tables in this chapter show the net energy savings. We have used the net-to-gross values reported by Global in their PIP and other documents for each measure. A value of 0.83 was used for tank insulation installations and bundled measures, and 0.75 was used for all other measures. Global cited the CPUC Energy Efficiency Policy Manual, Version 2 as the source of these values. We did not explicitly develop net-to-gross estimates from our study, but based on the information that we did get through our participant interviews the CPUC values appeared reasonable. Of 11 participants, only three indicated that they definitely would have made the efficiency improvements without the Program.

Each of the 12 projects is discussed below. Details of our verification efforts are provided on a site-by-site basis.

Project 1

This project was one of a certified organic chicken company's 14 facilities participating in the Program. This company's 14 facilities were responsible for about three-fourths of the Program's

claimed savings and a little under half the total rebates. We note that the PIP indicated that no project or participant would receive more than 15% of the total incentives. The Program Manager indicated that this criterion was established to ensure that incentives would be available to as many participants as possible. None of this participant's individual sites received more than 15% of the incentives. The implementers allowed this customer to enroll the 14 sites, even though this customer received more than half the incentives in total, because there was still incentive funding available at the end of the Program. Table 5 below shows the claimed savings and costs for these 14 sites compared to the Program totals.

Table 5. Totals for Project 1 Company

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
Total of 14 Sites	5239	753.4	3,079,796	$242,065	$695,018	**$937,084**
Program Total	**10,868**	**951**	**4,034,430**	**$508,727**	**$2,556,736**	**$3,065,463**

The individual site that was listed as accomplishing the greatest energy savings was selected for the Project 1 site visit. Our findings are shown in Table 6.

Table 6. Project 1 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Savings (therms)	Rebate	Co-pay	Total
CFL Retrofits	597	32.7	111,042	0	$703	$703	$1,405
HE Ventilation Fans	90	60.8	340,200	0	$20,250	$26,143	$46,393
Bundled Measures	1	26.6	99,600	0	$14,130	$56,864	$70,994
Total	***688***	***120.0***	***550,842***	***0***	***$35,083***	***$83,709***	***$118,792***

This project consisted of several buildings and each operated for about 8 weeks in a row, followed by a two-week downtime period.

During our site visit we were able to verify that 90 high-efficiency ventilation fans were installed. The bundled measure was verified and consisted of digital controls installed in each of the production buildings that controlled lighting, ventilation boards, and curtains; and intermittent ignition devices installed on the heaters. However, the heaters were fueled by propane, rather than natural gas; consequently, this evaluation has not reported natural gas therms savings from this site. In addition, of the 13 total "bundled measures" installed through the Program, 11 were associated with the company that owned the Project 1 site. To extrapolate from our sample to the complete set of projects, we assumed that all the sites owned by this company were using propane, but that the two remaining sites owned by other companies used natural gas and did save natural gas through their projects.

The lights in these buildings operate for 23 hours for the first week of the approximate 8 week production cycle. The remaining 6 weeks they operate for 16 hours per day. Our review of the invoices showed that the CFLs were purchased, but our site visit showed they were not all installed at this site. The customer indicated that CFLs had been purchased in bulk and then

distributed across multiple sites. The table shows the CFL savings for this site because we were able to confirm their purchase, but the savings would be distributed across several sites. This did not affect the overall savings for this customer or their contribution to the Program total savings. Our review of the receipts associated with this site also revealed a small, non-Program charge that was included in the CFL retrofit installation. This charge would reduce the total Program cost by approximately $75, but we have not made any adjustment for this small difference.

Project 2

This project was an organic, mixed-vegetable farm. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. The contact was able to verify that the equipment was installed, but was unable to provide any specific details of operation other than to acknowledge that the company was operated seasonally, and that the equipment was not used in the winter months. Additionally, it was found that a 300 hp and 500 hp motor were installed at this location, rather than two 150 hp motors. These motors were processed as 150 hp installations because this was the upper limit on the prescriptive measure list. Receipts and invoices were found to confirm total project cost. Details are provided in Table 7.

Table 7. Project 2 Verified Measures and Net Savings

Program ECMs	Quantity	Savings		Rebate	Co-pay	Total
		(kW)	(kWh)			
HPS Retrofits	12	1.	8,163	$990	$9,517	$10,507
VSD	8		16,350	$15,840		$15,840
HE Motors - 5 HP	4	0.3	1,248	$1,300	$13,908	$15,208
HE Motors -150 HP	2	11.6	50,835	$7,660	$199,043	$206,703
Total	***26***	***13.8***	***76,596***	***$25,790***	***$222,469***	***$248,259***

Project 3

This project was a fruit processor offering certified organic products. Details are provided in Table 8.

Table 8. Project 3 Verified Measures and Net Savings

Program ECMs	Quantity	Savings		Rebate	Co-pay	Total
		(kW)	(kWh)			
HE Motors - 15 HP	2	1.3	5,655	$1,200	$1,852	$3,052
HE Motors - 25 HP	1	1.0	4,544	$890	$19,065	$19,955
HE Motors -150 HP	1	5.8	25,418	$3,621	$3,621	$7,241
Total	***4***	***8.1***	***35,616***	***$5,711***	***$24,537***	***$30,248***

During our site visit, we confirmed the installation of all four high-efficiency motors. The two 15

hp motors drove natural gas boiler pressurization pumps. They operated continuously for approximately seven months per year and replaced units that were about 15 years old. The 25 hp motor was for an air compressor for the fire riser sprinkler system. It operated about 500 hours per year. The 150 hp was a backup for the refrigeration system and it operated as needed during seven months each year.

Project 4

This project was a rural vineyard, and was processed through the Program as a "small, rural farmer or food processor using under 29,700 kWh/year." Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. The participant was unable to provide details regarding the operation of the equipment, except that it was used on an "as-needed" basis. Receipts and invoices were found to confirm total project cost. Details are provided in Table 9.

Table 9. Project 4 Verified Measures and Net Savings

Program ECMs	Quantity	Savings		Rebate	Co-pay	Total
		(kW)	(kWh)			
HE Motors - 5 HP	1	0.1	312	325	448	$773
HE Pumps	1	0.7	550	$100	$138	$238
Total	***2***	***1***	***862***	***425***	***586***	***1,011***

Project 5

This project was a small, organic produce farm. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. The two refrigeration units that were installed replaced two older units that were being operated at the site. The participant was unable to provide detailed information regarding the new or replacement equipment, except to verify that the equipment was working as expected, and that each unit operated 24 hrs per day. Receipts and invoices were found to confirm total project cost. Details are provided in Table 10.

Table 10. Project 5 Verified Measures and Net Savings

Program ECMs	Quantity	Savings		Rebate	Co-pay	Total
		(kW)	(kWh)			
HE Refrigeration	2	1.0	3,833	$1,007	$1,017	$2,024
Total	***2***	***1.0***	***3,833***	***$1,007***	***$1,017***	***$2,024***

Project 6

This project was an organic vineyard which grows, produces, and markets organic ingredients and wines. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. At the time of the verification, the participant

had installed 28 HPS lamps and was able to confirm that the equipment was working properly. Additionally, the wattage of the replaced lamps was provided as 400 watts each, while the new lamps were thought to be rated at 350 watts. Both new and replacement equipment was estimated to run for 12 hrs/day.

According to information provided by Global, multiple improvements were made after our phone verification at this location. We did not attempt to verify these improvements with the participant, due to the fact that they were installed after our verification efforts were completed. Because our initial phone call confirmed the installation of the measures claimed initially, we are confident that the additional measures were installed as well. Details are provided in Table 11.

Table 11. Project 6 Verified Measures and Net Savings

Program ECMs	Quantity	Savings		Rebate	Co-pay	Total
		(kW)	(kWh)			
HPS Retrofits	28	4.3	19,047	$2,310	$2,786	$5,096
VSD*	29	-	59,269	$57,420	$640,822	$698,242
HE Motors - 5 HP*	5	0.4	1,560	$1,625	$7,542	$9,167
HE Pumps*	4	2.7	2,199	$400	-	$400
Total	***66***	***295.8***	***82,075***	***$61,755***	***$651,150***	***$712,905***

* Measures were installed after interview was conducted and was not independently verified.

Project 7

This project was a dairy processing plant offering organic products. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. At the time of the verification, the participant had installed 7 VSDs and had performed 39 T-5 retrofits. The participant was unable to provide detailed information regarding the operation of the installed equipment except to verify that the equipment was working as expected, and operated approximately 16 to 24 hours per day.

According to information provided by Global, multiple improvements were made after our phone verification at this location. As with Project 6, we did not attempt to verify these improvements with the participant, but are comfortable that they were installed. Details are provided in Table 12.

Table 12. Project 7 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
T-5 Retrofits	39	0.6	3,510	$1,560	$24,710	$26,270
HE Refrigeration*	3	1.5	5,749	$4,050	$371,450	$375,500
VSD	7		14,306	$4,653	$4,653	$9,306
HE Motors - 5 HP*	5	0.4	1,560	$1,625	$18,265	$19,890
HE Motors - 25 HP*	1	1.0	4,544	$890		$890
HE Pumps*	6	4.1	3,299	$600		$600
Total	***61***	***7.6***	***32,967***	***$13,378***	***$419,078***	***$432,456***

* Measures were installed after interview was conducted and was not independently verified.

Project 8

This project was an organic dairy farm. Verification of the installed measure was performed by phone, in addition to the interview performed for the process evaluation. The equipment that was installed at this location was very specialized and replaced a standard refrigeration system. The participant estimated that the replaced equipment had been running at 10 hp, 4.5 hours per day. The participant was unsure of the efficiency of the installed equipment, but estimated that due to the operating characteristics of the new equipment, the run time had been reduced to 1.5 hours per day. Receipts and invoices were found to confirm total project cost. Details are provided in Table 13.

Table 13. Project 8 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
HE Refrigeration	1	0.5	1,916	$1,350	$2,838	$4,188
Total	***1***	***0.5***	***1,916***	***$1,350***	***$2,838***	***$4,188***

Project 9

This project was an organic vineyard and winery. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. At the time of the verification, the participant had installed one VSD and had received an incentive for installing one high efficiency pump. During the initial phone verification the participant stated that the pump had not yet been installed. We conducted a follow-up call later and the participant indicated that the pump had by then been installed. The participant was unable to provide detailed information regarding the operation of the installed equipment except to verify that the equipment was working as expected.

According to information provided by Global, multiple improvements were made after our phone verification at this location. As described for Project 6, we did not attempt to verify these improvements with the participant. Details are provided in Table 14.

Table 14. Project 9 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
HE Refrigeration*	3	1.5	5,749	$3,375	$3,375	$6,750
Tank Insulation*	3,000**	27.4	69,695	$3,783	$3,783	$7,566
VSD	1	-	2,044	$1,980	$3,079	$5,059
HE Pumps	1	0.7	550	$100	-	$100
Total	***3,005***	***29.5***	***78,037***	***$9,238***	***$10,237***	***$19,474***

* Measures were installed after interview was conducted and was not independently verified
**Tank insulation is a square foot quantity

Project 10

This project was an organic company offering cold-storage services. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. At the time of the verification, the participant had installed one HE motor. The participant was able to confirm that the equipment was working properly, and that it was running 24 hours per day. Additionally, the participant specified that the motor was actually rated at 300 hp, but that it was treated as a 150 hp motor through the Program in terms of energy savings and the incentive provided.

According to information provided by Global, a VSD was installed after our phone verification at this location. As with Project 6, we did not attempt to verify this improvement with the participant. Details are provided in Table 15.

Table 15. Project 10 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
HE Motors -150 HP	1	5.8	25,418	$3,830	$50,629	$54,459
VSD*	1	0.0	2,044	$1,980	$21,933	$23,913
Total	***2***	***5.8***	***27,461***	***$5,810***	***$72,562***	***$78,372***

* Measures were installed after interview was conducted and was not independently verified.

Project 11

This project was an organic vegetable garden that sells produce in “bins” for delivery, and at market. Verification of the installed measures was performed by phone, in addition to the interview performed for the process evaluation. The contact was able to verify that the equipment was installed, but was unable to provide any specific details of operation. Receipts and invoices were found to confirm total project cost. Details are provided in Table 16.

Table 16. Project 11 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
HE Refrigeration	3	1.5	5,749	$4,050	$32,259	$36,309
Total	***3***	***1.5***	***5,749***	***$4,050***	***$32,259***	***$36,309***

Project 12

This project was an organic farm. Verification of the installed measure was performed by phone, in addition to the interview performed for the process evaluation. The contact was able to verify that the new equipment was installed, but was unable to provide any specific details of operation other than to acknowledge that the company was operated seasonally, six months per year, and that the equipment was running 24 hours per day during those months. Receipts and invoices were found to confirm total project cost. Details are provided in Table 17.

Table 17. Project 12 Verified Measures and Net Savings

Program ECMs	Quantity	Savings (kW)	Savings (kWh)	Rebate	Co-pay	Total
HE Refrigeration	1	0.5	1,916	$1,350	$2,583	$3,933
Total	***1***	***0.5***	***1,916***	***$1,350***	***$2,583***	***$3,933***

Realization Rate

Based on the results of our verification activities, all the claimed savings were achieved for the sample projects. Table 18 shows the reported (claimed) energy and demand savings and our verified savings. The values shown reflect only those measures that were installed at the time we conducted our verification data collection so savings for measures installed in these projects after our visits are not included in the totals. The electricity energy and demand savings realization rates were determined to be 100%.

Table 18. Program Realization Rate, Net Savings

Savings	Reported	Verified*	Realization Rate
Program Sample – kW	158	158	100%
Program Sample – kWh	742,204	742,204	100%
Program Sample – therms	9,960	0	15%

* Values based on measures installed at time of verification activities. See text for discussion of therms realization rate.

As pointed out earlier, the one project in our site visit sample for which therm savings were claimed reduced propane, rather than natural gas, consumption. Since we did verify installation of the claimed measure at this site, we assumed that all 13 sites did have the bundled measure installed. We determined the therms realization rate by assuming that all the remaining sites for

this company saved propane in lieu of natural gas, but that the two remaining sites with different owners did save natural gas. Therefore, the realization rate was estimated as 2/13, or 15%. Thus, the total number of bundled measures that were installed, and to which we attributed natural gas savings was reduced from 13 to 2, for a total Program net savings value of 19,920 therms.

Cost-Effectiveness Analysis

We used the results from the energy savings estimates and the cost data from Global to analyze the cost effectiveness of the Program. The CPUC methodology, as incorporated in its reporting workbook, was used to calculate the value of the life cycle electricity and natural gas savings. These values were combined with the relevant costs to calculate net benefits and the benefit-cost ratio from the Total Resource Cost (TRC) and Participant Cost Test (PCT) perspectives. The incremental measure cost estimates that Global used in its Program plan and the workbook provided to the CPUC were used to estimate measure costs. We assumed that all projects were completed by the end of 2005 and economic savings were then projected over the estimated life of each measure.

Table 19 presents the primary cost and savings input data and the calculated benefit and cost results. From the TRC perspective the Program will generate net benefits of more than $1.0 million with a benefit-cost ratio of 1.63. From the participants' perspective, the net benefits will be $6.6 million with a benefit-cost ratio of nearly 5.80. In both cases, the Program passed the cost-effectiveness test.

Table 19. Benefit-Cost Results

Inputs and Results	All Projects
Program Costs	$ 1,119,162
Gross Incremental Project Cost	$ 1,384,902
Net Incremental Project Cost	$ 1,067,306
Incentives	$ 508,727
Electricity Savings Present Value, TRC	$ 2,649,253
Electricity Savings Present Value, PCT	$ 7,348,334
Nat. Gas Savings Present Value, TRC	$ 89,640
Nat. Gas Savings Present Value, PCT	$ 174,960
Net Benefits, TRC	$ 1,061,151
TRC Ratio	1.63
Net Benefits, Participant Test (PCT)	$ 6,647,119
PCT Ratio	5.80

Findings and Recommendations

Findings

Our findings are presented in the context of the evaluation goals established for this study. These goals were described in the discussion of the EM&V approach.

Assessment of Program Effectiveness

Our assessment of the effectiveness of the Program is based on success indicators reflecting the program theory. Specifically, we considered the following indicators:

- Efficacy of Program outreach and level of awareness among targeted groups
- Customer satisfaction with participation process, audits, training, measure verification process, and incentive process
- Usefulness of audits
- Increased vendor role promoting efficiency measures
- Participant satisfaction with measures implemented
- Additional energy-efficiency improvements made by participants and non-participants

Outreach and Awareness

Global actively contacted targeted customers about the Program. Through March 2006 they had made 639 contacts. Customer outreach occurred through Global's telephone calls, in-person contacts, direct mail, and email and through the efforts of the EFA. Based on our interviews with both participants and non-participants, the customers confirmed that various channels were their first information source. For participants, in particular, secondary outreach through word-of-mouth appeared to be very effective.

Most participants were not familiar with the website, but it received high marks from the ones who were. Feedback on other marketing materials was mixed. The participants we interviewed had little knowledge of workshops conducted by the Program; however, the Program goal was two workshops and two were held.

Understanding of the Program among participants and non-participants was generally good. A couple of the non-participants we interviewed, however, raised concerns that they either did not understand the Program properly or they were misinformed. Particular comments suggested that some non-participants thought the Program focused on lighting and it was geared to larger producers.

Customer Satisfaction

Overall, participants expressed a high level of satisfaction with the processes involved in participating in the Program. The most consistent positive feedback was directed at Global's staff implementing the Program. Participants were extremely appreciative of the effort the staff put into making sure that participants were able to get through all the steps in the process, including providing help with the paperwork. All the participants we interviewed were satisfied with the measures they had installed through the Program and almost all were very pleased with the incentive amount. Other positive responses focused on the ease of participation and quick turnaround time.

The two major areas of dissatisfaction on the part of non-participants were the timing of the Program and the incentive level. Several potential participants did not sign up because the Program offer did not come at a favorable time in the customer's planning cycle. We believe that it is likely this issue arose in part because the Program start-up was delayed for many months until the prescriptive list of measures could be finalized. As a result, the nominal two-year Program started, stopped, and then re-started after several months leaving many of the late joiners only a few months to sign up and implement their projects. Along with a desire by some non-participants for a larger incentive was an expressed interest in expanding the scope of the Program to provide incentives for additional measures including solar technologies.

As the Program implementers noted, the comprehensive audits originally planned were scaled back to be a less detailed site survey because the allowed measures were so prescriptive. These audits/surveys received good ratings from participants. The ratings from non-participants were more mixed, but the number of respondents was too small to generalize. Based on comments from some of the participants and non-participants, it appeared that these surveys were not complete enough to significantly enhance the internal assessments that, at least, some of the customers were already doing or capable of doing. Nevertheless, they did provide an entree for Global to introduce their staff and the Program.

Increased Vendor Promotion of Energy Efficiency

One of the challenges encountered by the implementers was integrating vendors into the Program. Global found it the vendor segment to be quite fragmented, thus making it difficult to identify vendors who worked with a significant number of the targeted customers. As a result, the involvement of vendors was less than anticipated originally.

There was little evidence that vendors were influenced by the Program to increase their promotion of energy-efficient products. The customers we interviewed did not indicate that their vendors had taken such steps. Furthermore, most customers did not express a strong interest in being provided with vendor contact information, which was probably due partly to the fact that most already had one or more vendors they worked with routinely and partly because of natural concerns about the credibility of unfamiliar vendors.

Additional Energy-efficiency Improvements

Almost all the Program participants and non-participants stated that they had been interested in ways to increase energy efficiency even before hearing about the Program. In addition, the large majority of both groups could point out specific efficiency improvements they had made in the prior three years. These facts suggest key characteristics of the market targeted by the Program. For one, this market segment appears to be very conscious of the negative impacts of energy use. In fact, comments by several participants and non-participants alike suggested that they tended to be very concerned about environmental impacts and took the initiative to reduce environmental damages associated with their business. Second, this is a promising market for such Programs because its members are generally quite receptive to ways to improve energy efficiency. Third, focusing on increasing awareness is probably not as critical as providing information, technical assistance, and incentives in this market. The comments from the Program implementers emphasized the critical need for this type of information.

Among the participants, about a fourth said the Program had increased their interest in energy efficiency. Some had already taken additional steps to improve efficiency and others were looking at implementing steps in the future. Though several of the non-participants had installed energy-efficiency measures since hearing about the Program, none attributed these to the Program.

It was too soon to tell how much the Program was likely to affect the future actions of participants and spill over to other customers. However, the fact that word-of-mouth was the participants' primary source of information about the Program suggested that in this market it was likely that there would be effects beyond the direct ones observed during the Program cycle. In addition, the observations of the Program implementers indicated that other projects were undertaken by participants and their experiences were instrumental in other customers and sites taking similar actions.

Use of Project Baseline Data to Assess Market

Given the prescriptive nature of this Program, it was not necessary for the implementers to collect detailed information to document baseline equipment information prior to Program participation so there were no data available to us from this source to document baseline market conditions. We also found during our phone interviews and site visits that customers were able to provide only very limited information about what was installed at the project sites prior to participation and how it was operated.

Based on the observations of the implementers, however, there were clear areas where the baseline conditions offered significant market opportunities for efficiency improvements in the sectors targeted by the Program, particularly the installation of VSDs, high-efficiency motors, and even more efficient lighting. The implementers also observed that there were many special needs in this market that were difficult to satisfy under a prescriptive approach, but, nevertheless, offer potential savings opportunities.

In addition to information from the implementers and customers, we reviewed an agricultural market needs study that addressed irrigation systems, irrigation equipment maintenance, and water management assistance.[6] Though only partially applicable to the current Program, this study did demonstrate that the need for all three types of assistance was greatest among the small agricultural customers.

Verification of Measure Installation

Our site visits and telephone interviews provided measure installation verification information. We included over one-fourth of the total projects in our sample accounting for nearly 20% of the estimated electricity savings.

Provision of Ongoing Feedback to Program Implementers

During the course of the Program we provided feedback to the implementers about our findings. Because of the delays in the Program caused by the change orders discussed earlier, however, we were able to provide feedback mostly during a concentrated period late in the Program. One result of our feedback was a decision by the implementers to institute more extensive verification of measure installation.

Assessment of Overall Program Performance and Success

Table 20 summarizes the key Program activity goals and accomplishments. Approximately 70% of the goal set for customer contacts was achieved. Initially, Global was employing a review of measure invoices and site verifications to confirm installations. The initial site verifications did not include a review of 100% of the measures. After Quantec conducted the first EM&V site visits and provided feedback, Global revised their approach to conduct site verifications on all projects and measures.

Table 20. Activity Performance Goals and Accomplishments

Activity	Goal	Actual
Customer Contacts	937	639
Workshops	2	2
Survey/ Qualifications	140	148
Energy Audits	73	72
Verify Installations	73	63

One objective of the Program was to enroll hard-to-reach customers. In this context, such customers were defined based on the following characteristics:

[6] *Pacific Gas and Electric Company's Agricultural Sector Market Needs Study*, PG&E Study ID #: 405d, March 30, 2000.

- Reside in rural areas of PG&E's service territory
- May speak only Spanish
- Lack information about the benefits and value of high-efficiency measures
- Lack sufficient financial resources to fully pay for appropriate energy efficiency measures
- Because of their location or size, may be underserved by existing energy efficiency programs[7]

Based on the information available about the Program participants, Global did succeed in recruiting hard-to-reach customers.

Table 21 compares the goal for the number of each measure installed to the actual quantity installed. The installation of CFLs far exceeded the Program goal and VSD installations were twice the goal. High-efficiency motors, however, were installed in smaller quantities.

[7] Global's review indicated that agricultural customers of PG&E can participate in the Express Efficiency Program, Standard Performance Contract (SPC) Program, and New Construction "Savings by Design" Program. However, most of the participants in these programs are not agricultural customers. PG&E's (as well as SCE's and SDGE's) irrigation pumping program has been taken over by Fresno State University. PG&E was operating no energy-efficiency programs exclusively for agricultural customers when CAFEE was implemented.

Table 21. Measure Goals and Accomplishments

Measure	Goal	Actual
CFL Retrofits	498	4816
T-8 Retrofits	511	178
T-5 Retrofits	50	109
HPS Retrofits	100	55
HE Ventilation Fans	50	268
HE Refrigeration	28	48
Tank Insulation - Std Sys	18750	5097
Tank Insulation - HE Sys	6250	0
VSD	70	145
HE Motors - 5 HP	195	78
HE Motors - 10 HP	11	6
HE Motors - 15 HP	10	3
HE Motors - 20 HP	10	9
HE Motors - 25 HP	5	4
HE Motors - 30 HP	5	3
HE Motors - 40 HP	2	0
HE Motors - 50 HP	2	1
HE Motors - 60 HP	1	0
HE Motors - 75 HP	1	0
HE Motors - 100 HP	1	0
HE Motors - 125 HP	1	0
HE Motors -150 HP	1	5
HE Pumps	73	30
Bundled Measures	26	13

Table 22 summarizes the energy and demand savings goals and accomplishments for the Program. The Program essentially met its electricity savings goal and was within 15% of its peak demand goal. Natural gas savings, however, were only 7.7% of the Program goal because fewer measures were installed and several provided propane, rather than natural gas, savings.

Table 22. Savings Goals and Accomplishments, Net

Savings	Goal	Verified	% of Goal
Electricity	4,053,349 kWh/year	4,034,430 kWh/year	99.5%
Coincident Peak	1,121 kW	951 kW	84.8%
Natural Gas	258,960 therms/year	19,920 therms/year	7.7%

Assessment of Program Cost Effectiveness

From the TRC perspective the Program was cost effective, producing net benefits of over $1.0 million with a benefit-cost ratio of 1.63. To participants, the net benefits were $6.6 million with a benefit-cost ratio of nearly 5.8.

Table 23 compares the projected net benefits and benefit-cost ratios to those calculated in our evaluation, based on the verified Program data.

Table 23. Projected and Verified Cost Effectiveness

	Projected	Verified
Participant Net Benefits	$10,547,197	$6,647,119
Participant Benefit-Cost Ratio	8.10	5.80
TRC Net Benefits	$2,182,645	$1,061,151
TRC Benefit-Cost Ratio	2.20	1.63

Decisions on Program Compensation

The information provided in this report supplements the information submitted by Global on the Program accomplishments.

Continuing Need for the Program

Based on the following observations from this study, we believe there is a continuing need for this Program:

1. There appears to be considerable potential for energy-efficiency improvements in the market targeted by the Program, ranging from lighting to very specialized equipment.

2. This market is currently underserved by efficiency Programs and includes a significant number of hard-to-reach customers.

3. Customers in the targeted market are, in general, quite interested in ways to save energy and many have a broader commitment to sound environmental practices.

4. The targeted customers do face clear barriers to implementing energy-efficiency improvements and the Program was able to help the participants overcome them.

5. Several of the participants said that they would like to see the Program continued and some of the non-participants that we interviewed indicated that they would be likely to participate if the Program were extended.

Recommendations

Based on the feedback from the Program implementers, participants, and non-participants, and our assessment of the Program, we believe there are some ways in which the Program could have been more effective. We offer the following recommendations for consideration in future programs:

- More flexibility should be provided for the types of measures that participants can implement. One option would be to use what was learned from this Program to expand the list of prescriptive measures. Another would be to prescribe an incentive per unit savings and a simplified methodology for calculating savings and the rebate for semi-custom measures.

- The program should be conducted over a sufficiently long time to allow customers the opportunity to plan their participation and incorporate the capital requirements into their budgeting process.
- Case studies should be developed and made available to potential participants in similar businesses or with similar equipment and needs.
- Leveraging of industry groups and associations should be maximized to ensure that information about the program is communicated cost effectively to the targeted customers.
- Ways to involve vendors more actively should be examined. Approaches such as working with vendor associations, holding information meetings with groups of vendors, or recruiting vendors who will be champions for the program should be considered. In some cases, it may be necessary to move up the supply chain to equipment distributors.

Finally, a comprehensive tracking database should be used to document all potential participants, all contacts with those customers, and detailed information on the status of their involvement.

Appendix A: CPUC Savings Reporting Table

PG&E Program Energy Impact Reporting for 2004-2005 Programs

Program ID*:	1473-04							
Program Name:	Certified Agri-Food Energy Efficiency							
	Year	Calendar Year	Gross Program-Projected MWh Savings	Net Evaluation Confirmed Program MWh Savings	Gross Program-Projected Peak MW Savings	Evaluation Projected Peak MW Savings**	Gross Program-Projected Therm Savings	Net Evaluation Confirmed Program Therm Savings
	1	2004						
	2	2005	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	3	2006	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	4	2007	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	5	2008	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	6	2009	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	7	2010	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	8	2011	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	9	2012	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	10	2013	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	11	2014	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	12	2015	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	13	2016	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	14	2017	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	15	2018	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	16	2019	5,004.80	4,034.43	1.38	0.95	312,000	19,920
	17	2020	123.50	895.78	0.04	263.68	0	0
	18	2021						
	19	2022						
	20	2023						
	TOTAL	**2004-2023**						