PRODUCTION EFFICIENCY PROGRAM EVALUATION REPORT

Submitted To:

Energy Trust of Oregon

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Submitted to:

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ACKNOWLEDGEMENTS

The evaluation team would like to thank Dr. Phil Degens, Evaluation Manager, Energy Trust of Oregon, Inc. for the direction he provided to this study. A process and impact evaluation cannot be conducted without the cooperation and effort of the many people we need to interview or survey. We also wish to thank Energy Trust staff who contributed their time to this study: Elaine Prause, Senior Industrial Sector Manager (outgoing); Kim Crossman, Senior Industrial Sector Manager (incoming); Tricia McGuire, Industrial Technical Manager; Ted Light, Industrial Sector Coordinator; Steve Lacey, Energy Efficiency Director; and Fred Gordon, Director of Planning and Evaluation.

We also wish to thank the program delivery contractors, and the allied technical analysis contractors that make the program run on a day-to-day basis. We thank the participating vendors we spoke with, as well.

We contacted more than 100 participants in the 2007 and 2008 Production Efficiency Programs, visiting 27 customers on-site and interviewing many others by telephone. We appreciate the time they spent with us and the access to their facilities. Finally, we contacted nonparticipating industrial customers, and we thank them for taking the time to help the evaluation team and Energy Trust to understand their programmatic needs.

The evaluation team comprises many individuals: Kevin Cooney and Floyd Keneipp, who provided the overall direction, and Jennifer Barnes, who managed the evaluation on a day-to-day basis. Assisting them in key roles were Deborah Swarts, Jackie Goss, Roger Hill, and Mike Yim, who directed the impact evaluation; Argene McDowell, Marca Hagenstad, and Mark Thornsjo worked tirelessly on the process evaluation. Lastly, we received tremendous support from our industry partners Gregg Eisenberg and Misti Bruceri and Associates. Finally, Michelle Vitko and Kaisa Miller provided report editing and production.

E EXECUTIVE SUMMARY

The Energy Trust of Oregon's (Energy Trust) Production Efficiency (PE) program offers energy efficiency services for industrial processes of all kinds – including manufacturing, agricultural, and water/wastewater treatment. The program provides funding for studies to identify energy-saving opportunities and financial incentives to help businesses implement them.

Energy Trust solicited proposals to conduct process and impact evaluations of the PE program. The work will span two program years and will include two reports:

1. The first report will contain results of the impact evaluation of the savings for 2007 program participants and the process evaluation of the experiences of 2008 program planners, implementers, and participants.

2. The second report will contain results of the impact evaluation of the 2008 participants and a less detailed process evaluation of the experiences of 2009 program planners and implementers.

Summit Blue Consulting (Summit Blue) was selected to conduct these evaluations. This volume is the first report and contains results of the impact evaluation for 2007 and the process evaluation for 2008.

The current evaluations follow three previous evaluations of the PE program. The prior studies were a process evaluation conducted at the end of the program's first six months of operation,[1] a second process evaluation and impact evaluability assessment completed at the end of 2005,[2] and a third process and second impact evaluation conducted to assess the 2006 program.[3]

The purpose of these evaluations is to inform Energy Trust and program stakeholders of the effectiveness of the PE program, how the PE program can be improved, energy savings impacts, and market effects of the program. The specific goals of these evaluations will be to:

1. Develop reliable estimates of program and measure specific electric savings for the years 2007 and 2008.
2. Obtain feedback on program design and implementation that can be used to improve the implementation of the current program.

This evaluation employed a number of different methods to achieve its objectives. These methods included in-depth interviews with Energy Trust staff, Program Delivery Contractors (PDCs), Allied Technical Assistance Contractors (ATACs), and regional market actors, reviews of program databases, processes, marketing materials, and program communications, and surveys of participants, non-participants, and program vendors. The team also reviewed various data sources to inform a market assessment and conducted on-site verification and monitoring activities. A free-ridership and spillover assessment was conducted as part of the participant surveys.

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[1] Research Into Action, Production Efficiency Program End-of-First-Year Progress Evaluation, June 22, 2004.

[2] Research Into Action, Production Efficiency Program: Process Evaluation and Impact Evaluability Assessment, December 30, 2005.

[3] Research Into Action, 2006 Production Efficiency Program: Process and Impact Evaluation, August 12, 2008.

E.1 2007 Impact Evaluation

The Energy Trust's 2007 Production Efficiency Program working estimate of savings totaled 121,692,994 kWh across 149 participant sites. Within this participant universe, 27 sites were selected through the evaluation sample and comprised 109,318,571 kWh, or 90% of working savings. The single Mega Project accounted for 54,634,752 kWh, or roughly 45% of the PY 2007 working savings. Although numerous attempts were made to schedule verification activities with this site, participant staff were in the process of making site operating decisions and could not support the impact evaluation effort in time for the release of this report.

Excluding the standalone Mega Project, the impact evaluation yielded an end-use program realization rate of 94% and corresponding gross savings estimate of 63,098,466 kWh.

Table E-1. Impact Summary of the 2007 Production Efficiency Program

Indices of Program Savings Value	Value
Working Estimate of 2007 Savings	67,058,242 kWh
Realization Rate	94%
Gross Savings Estimate	63,098,466 kWh
Demand Savings	7,379 kW

Interview efforts with impact evaluation sample participants yielded a free-ridership estimate of 27% and a net-to-gross ratio of 73%. The final 2007 Production Efficiency Program Net Savings Estimates amounted to 46,061,880 kWh, or 69% of 2007 Program working savings.

E.1.1 Impact Recommendations

Based on discussions with participants, program data and auxiliary reports, and evaluation observations, the Summit Blue evaluation staff has developed the following recommendations to improve future Program and impact evaluation cycles.

Standardize Participant Data Requirements

The accuracy of impact evaluation findings is limited by the availability and quality of relevant participant measure data. Throughout the evaluation, Summit Blue staff encountered numerous challenges in collecting supporting evaluation data from various participants due to:

1. Lack of available project documentation and supporting savings methodologies, and
2. Lack of participant support for the impact evaluation process.

Evaluate the Quality of Project Documentation and Review the Technical Analysis Study (TAS) Guidelines

Summit Blue has found the TAS guidelines to be both informative and comprehensive. In many cases, however, the project level documentation does not clearly identify input assumptions and explain the rationale or resources used to justify them. Although the guidelines do request this level of fidelity, Summit Blue recognizes that it is difficult to enforce.

In order to leverage the guidelines to their full potential, Summit Blue recommends future evaluation efforts to closely monitor the quality of project level documentation provided to support the impact evaluation effort, along with the corresponding realization rates of measures installed. Using this information, measure-specific guidelines may be developed and enforced when low realization rates intersect with high-volume measures.

Incorporate a Plant Closure Study Component to Future Evaluations

Summit Blue technical staff distinguished between reduced consumption achieved through improved controls and efficient measure installations, relative to a decrease in production throughput as a result of economic influencers. Due to a significant number of sites that that had lower than expected post-installation production schedules, and a few that were planning to close completely, Summit Blue recommends adding a Plant Closure Study to future evaluation cycles to more accurately characterize the impact of these changes on realized savings.

Ensure that Participants are Aware of M&V Activities as Early as Possible

As with most evaluations, Summit Blue faced challenges in recruiting participants to support the impact evaluation process – particularly the on-site verification activities. Summit Blue recommends informing Program participants of M&V activities and their value in future Program planning efforts as early as possible in the project cycle. This will help ensure that participants are receptive to, and supportive of, post-installation evaluation efforts. Moreover, it will encourage the participants to improve the quality of project documentation to support future evaluation activities.

E.2 2008 Process Evaluation

In general, satisfaction with the Program was high across the various stakeholder groups and 2008 Program participants.

Program participants rated their satisfaction high across a variety of aspects from timeliness of incentive payments to the quality of work conducted by the vendor. They also experienced low rates of confusion over the program, although there were some exceptions.

PDCs report a positive relationship with the Energy Trust and appreciate the level of communication and openness with PE staff. They believe the change in program administration was a positive one, although pilot initiatives and additional administrative responsibilities take additional time and resources.

ATACs and vendors generally report high levels of understanding of the program requirements, but have experienced difficulties with the program requirements and slow incentive payments.

The economy was mentioned by all parties as a significant barrier to the investment in energy efficiency and program participation.

E.2.1 Process Recommendations

Below is a summary of recommendations on key issues investigated by the process evaluation.

ATACs and Industry Specialists

The Energy Trust should pursue adding more ATACs or other specialists to support the program.

- Industry segments and end uses that span multiple industries should be well represented by the ATAC pool.
- Industries with unique competitive or regulatory challenges may require that industry specialists be brought in to alleviate customer fears that energy efficiency recommendations may adversely affect their operations. It is reasonable for Energy Trust to bring in out of state resources to meet these needs.
- ATACs with experience with gas measure will need to be added as these measures are added to the program.

PDC/ATAC Conflict of Interest

Energy Trust should communicate their policies and processes for assigning ATACs to studies, pointing out instances where the PDC was not also assigned as an ATAC. The Energy Trust administration is fair and lingering perceptions are likely to be dispelled through familiarity with the process.

BETC

Energy Trust should continue regular communications with ODOE. Efforts should be made to better understand BETC measure eligibility and application process and to communicate these to PE PDCs, ATACs, vendors, and participants.

Energy Trust should enhance PE program materials to include the BETC. PE program process descriptions and flow diagrams should include key milestones in the BETC application process, especially emphasizing that equipment cannot be purchased prior to the BETC application. BETC should be an ongoing topic at the quarterly PDC meetings and the annual ATAC forums, possibly with an ODOE staff member in attendance to answer questions and receive feedback.

Energy Trust should develop materials to make participants with no tax liability aware that they can transfer the BETC tax credit. Energy Trust should also support creative solutions for tax-neutral participants to take advantage of BETC.

Application Process, Data Collection, Tracking, and Storage

Key recommendations for streamlining the application and data entry process include developing an online application and data entry system. To facilitate this, existing Energy Trust policies will need to be modified to allow for digital signatures.

Payment Process

Although participants are generally satisfied with the amount of time it takes to receive their incentive payment, ATACs and vendors report instances of payment delays. The following recommendations will not only improve the incentive payment turnaround time, but they will also streamline the process for PE staff:

- Conduct imports more than once a week; and
- Eliminate double review of checks or allow for electronic review.

Marketing and Outreach

Energy Trust marketing department should guide PDC market plan development by:

- Developing a marketing and communications outline for each PDC to follow. This outline should include marketing elements and activities to be addressed in each plan, such as industry trade associations and shows, and industry case studies or other items needed from the Energy Trust; and
- Reviewing and providing feedback to the PDCs to refine and finalize their marketing plans.

Marketing efforts and plans should be customized to each key industry and rely heavily on direct contact. This includes developing a more standardized approach to becoming involved with trade associations, making presentations at industry events, and publishing case studies in industry journals and newsletters.

Communications

Energy Trust should continue quarterly PDC meetings and the annual ATAC Forum. These activities are viewed as meaningful and effective communication channels. They are appreciated by the PDCs and ATACs and considered a good use of their valuable time. During these events, Energy Trust should continue to include time for the parties to share their issues, challenges, and perspectives.

The ATAC Forum should:

- Update the ATACs on the technical study assignment process in order to dispel a lingering perception that the PDCs who are also ATACs are identifying projects to benefit their own organizations;
- Clarify the ATAC and PDC roles in the PE program process and set expectations about communication and collaboration between the two parties;
- Review of the baseline, eligible cost, and TAS requirements;
- Availability and use of PE program forms and calculators including the PE program process flow diagram; and
- BETC measure eligibility and limitations, and the application requirements and process.

Program communication channels should be expanded to include vendors. Although vendors indicate that they understand the program requirements, they also report challenges with moving projects through the program in a timely manner and some difficulties with project documentation.

S STAFF RESPONSE MEMO

Date: September 1, 2009
To: Board of Directors
From: Philipp Degens, Evaluation Manager
Kim Crossman , Sr. Industrial Sector Manager
Subject: Staff Response to the 2007 Impact and 2008-2009 Process Evaluation of the Production Efficiency Program

The Production Efficiency (PE) program is now in its seventh year of operation. The evaluation covers a period of significant program changes. The most significant change was the transition of program management from the Program Management Contractor to an internal team of three permanent Energy Trust staff. The program has also widened its scope of services with the adoption of three pilots focusing on O&M and a vendor-oriented Small Industrial Initiative. The pool of Project Development Coordinators (PDCs) has also been expanded and their areas of geographic coverage and industrial specialization have also been adjusted. Smaller changes have included the addition of gas efficiency offerings and the development and adoption of technical study guidelines.

The program-predicted savings for custom measures was on average close to those verified. The exceptions were the four wastewater projects that came on-line in 2007, where only a small fraction of the savings could be verified. The program has been aware of issues in this sector and since 2008 has had a half-time wastewater specialist to provide project oversight. If this sector is not included, the average program realization rate is 98%.

One major area of concern is the megaproject that represents 45% of the expected program savings. The savings could not be verified as a site visit could not be scheduled. There are many reasons for this (change in ownership, short-term plant shutdown, the plant becoming a self director). The inability to verify the savings will delay finalizing the evaluation. Energy Trust has instituted steps to reduce this type of event for megaprojects by requiring megaprojects to include evaluation plans that will specify monitoring and verification plans for these projects that will begin after final site verification. Instituting monitoring and verification plans for other large projects that make up a significant portion of the programs will also be considered.

The impact of the economy on savings was also an issue for the evaluation. Short term changes in plant operations were viewed as such and savings were estimated for normal operating conditions. In the few cases where it was unclear if and when the plant would resume normal operations, the midpoint of current and normal operating savings was used to incorporate this uncertainty. Energy Trust also plans on addressing the issue of savings persistence by performing a study of the prevalence of plant closures among participating plants.

Free ridership estimates increased in 2007 and 2008 (28% and 25%) over 2006 (20%). With the majority of participants indicating that corporate policies played a roll in their decision (80%) and that energy efficiency features were common for the application (78%), a high level of free ridership is not unexpected. Unfortunately no specific trend could be identified in these estimates to provide guidance in program redesign. To help provide more robust estimates Energy Trust has implemented a pilot to obtain information on participant investment decisions closer to the time of project completion and from a larger sample of participants. This should provide more timely information to the program with sufficient detail to support program design decisions. With program goals being set using net savings estimates, the higher free rider rates pose a significant challenge in meeting increasing program goals and drive up program levelized costs.

The program continues to garner a high level of participant satisfaction and all survey respondents stated that they would participate in the program again. Over half of the respondents also indicated that they had installed additional energy efficiency measures that had not received program incentives. Nearly a third of these indicated that the program had a high level of influence on this decision.

Project study guidelines have been instituted and are reviewed on a regular basis and the program plans on more clearly communicating Energy Trust's need to verify savings to ensure greater participation in future evaluations. Energy Trust continues to streamline and simplify data collection and program paperwork to facilitate participation. Program staff are also engaged in recruiting and mentoring vendors and contractors to expand the ATAC and vendor pool.

With an initiative focused on the smaller industrial customers, two pilots focused on O&M, one pilot aimed at plant-level energy management and one pilot focused on gas efficiency, the program now provides services to a broad spectrum of the industrial sector. These new services combined with an existing set of services that are well attuned with the needs of the nonparticipant population and a base of satisfied participants should provide the program with a stream of projects well into the future.

1 INTRODUCTION

The Energy Trust of Oregon's (Energy Trust) Production Efficiency (PE) program offers energy efficiency services for industrial processes of all kinds – including manufacturing, agricultural and water/wastewater treatment. The program provides funding for studies to identify energy-saving opportunities and financial incentives to help businesses implement them.

Energy Trust solicited proposals to conduct process and impact evaluations of the PE Program. The work will span two program years and include two reports:

3. The first report will contain results of the impact evaluation of the savings for 2007 program participants and the process evaluation of the experiences of 2008 program planners, implementers and participants.

4. The second report will contain results of the impact evaluation of the 2008 participants and a less detailed process evaluation of the experiences of 2009 program planners and implementers.

Summit Blue Consulting (Summit Blue) was selected to conduct these evaluations. This volume is the first report and contains results of the impact evaluation for 2007 and the process evaluation for 2008.

1.1 Prior Program Evaluations

The current evaluation follows three previous evaluations of the PE Program. The prior studies were a process evaluation conducted at the end of the program's first six months of operation,[4] a second process evaluation and impact evaluability assessment completed at the end of 2005,[5] and a third process and second impact evaluation conducted to assess the 2006 program.[6]

The most recent process evaluation offered seven recommendations:

1. For maximum effectiveness of program marketing, program staff should take steps to increase program understanding and augment the skills of those expected to market the program, including PDCs, ATACs, and vendors.
2. To minimize uninformed speculation among program contractors about PE activities and procedures, program staff should continue and expand its ongoing communications with them.
3. Ensure PDCs convey to their not-for-profit and municipal clients that they can benefit from the BETC tax credits using the pass-through mechanism.
4. Increase communication with and program-related training of vendors and pursue ways to make program eligibility requirements and incentive calculations more transparent.

[4] Research Into Action, Production Efficiency Program End-of-First-Year Progress Evaluation, June 22, 2004

[5] Research Into Action, Production Efficiency Program: Process Evaluation and Impact Evaluability Assessment, December 30, 2005

[6] Research Into Action, 2006 Production Efficiency Program: Process and Impact Evaluation, August 12, 2008

5. To address data and list discrepancies, conduct a review of program data collection and entry procedures internal to Energy Trust and with program contractors.
6. Program funds should be managed and accounted for in a way that provides steady dependable funding for projects.
7. To simplify the program review and oversight function, and to enhance quality control of technical studies, program staff should promulgate and implement uniform procedures and standards or guidelines for both the technical studies and the review of those studies.

This document also constitutes a third impact evaluation of the PE Program. It evaluates the impact of a sample of Production Efficiency projects completed during 2007. As an outcome of this analysis, the evaluation team developed adjusted energy savings for 50 projects; this sample comprises 90% of the program's 2007 savings.

1.2 Evaluation Goals

The purpose of these evaluations is to inform Energy Trust and program stakeholders of the effectiveness of the PE Program, how the PE Program can be improved, energy savings impacts, and market effects of the program. The specific goals of these evaluations will be to:

3. Develop reliable estimates of program and measure specific electric savings for the years 2007 and 2008.
4. Obtain feedback on program design and implementation that can be used to improve the implementation of the current program.

Beyond reliable savings estimates, Energy Trust is interested in this evaluation providing observations and recommendations to help Energy Trust deliver the PE Program more effectively and efficiently in 2009 and beyond. Given that the program changed its administrative structure in 2008, the process evaluation will focus on the how the program is implemented in 2009 and how it will be implemented in the future.

Lastly, Energy Trust desires that these two new evaluation reports are consist with prior program evaluation activities conducted by Energy Trust so that they can build upon prior research findings and ensure that current and subsequent evaluation results can be used to assess progress towards meeting the public policy goals.

To meet these goals, the evaluation will:

1. Present an overview of the program's history and describe recent program changes;
2. Assess program data collection, data tracking, and data processing activities;
3. Assess program marketing, communications, and outreach strategies;
4. Assess and characterize the industrial market in Energy Trust territory;
5. Document the presence of the installed measures, as well as any changes to production processes, schedules, or other operating parameters that might affect the measure's energy savings;
6. Based on the preceding documentation of operating changes, make adjustments to the measures' reporting energy savings, and calculate the projects' realization rates; and
7. Estimate the Production Efficiency program's free-ridership and spillover effects.

1.3 Evaluation Approach

This evaluation employed a number of different methods to achieve its objectives. These methods included in-depth interviews, surveys, reviews of program databases, processes, marketing materials and program communications, and surveys of both participants and non-participants. The team also reviewed various data sources to inform a market assessment and conducted on-site verification activities.

In-Depth Interviews

The process component of the evaluation included in-depth interviews with program staff and PDCs conducted in March of 2009. Individuals contacted for the interviews included:

- Six Energy Trust staff
- Four PDCs supporting the custom component of the PE Program
- The PDC supporting the Small Industrial Initiative
- The PDC supporting the Lighting component of the PE Program
- The PDCs implementing the Industrial Energy Improvement and Kaizen pilots

Interviews were also conducted with members of three key market actors within the Oregon energy efficiency industry:

- Bonneville Power Authority
- Northeast Energy Efficiency Alliance
- Oregon Department of Energy

The above in-depth interviews focused on program changes in 2008; program marketing activities; the program application process, databases, and quality control measures; program communications between the key parties; prescriptive measures and incentive levels; the interaction with the Business Energy Tax Credit ("BETC"); and customer energy management practices.

Lastly, three of the largest participating customers were interviewed. Subjects addressed were their awareness of the PE Program, free-ridership and spillover (where appropriate), program satisfaction, energy management practices, self-directing (where appropriate), and the BETC.

In all of the in-depth interviews, the interviewees were asked to give any feedback on their program experience and identify opportunities for improvement.

Surveys

Surveys were completed with five of the ATACs. The surveys sought the ATAC's feedback on their role in the PE Program; changes in the program; technical studies; communication with the PE Program; program marketing; the role of energy efficiency with customers; prescriptive measures and incentives; the Oregon energy efficiency industry; and the BETC. The ATACs were also asked for their perspectives on customer satisfaction and spillover measures that customers install without seeking a PE incentive.

Surveys were also conducted with ten vendors who are active with the program. They were asked how they heard about the PE Program, how customers decide to participate in the program and make choices about equipment purchases, and the BETC.

Database and Program Process Assessment

A review was conducted of the PE Program databases, Gold Mine and Fast Track, and program application and incentive processes. A review of project files, and program applications, policies, and manuals was included. Survey and interview responses from Energy Trust staff and PDCs also informed this activity.

Market Assessment

Various evaluation activities informed an assessment of the market for energy efficiency within Oregon including program participation data, past program evaluations and market potential assessments, and industry databases.

Assessment of Marketing Materials and Program Communications

Program marketing materials, the Energy Trust Web site, the PDC marketing plans, PDC quarterly meeting notes, and other program communications informed the assessment of marketing materials and program communications. Feedback gathered from Energy Trust staff and PDC interviews, ATAC surveys, and program vendors was also used.

Free-Rider and Spillover Assessment

Free-rider and spillover questions were included in the 2008 participant surveys. Participating vendors were also asked about their perception of customer spillover.

To inform the 2007 impact assessment, free-rider and spillover questions were asked of each participant selected into the 2007 impact sample. A follow up telephone call was made to each participant subsequent to the site visit.

Participant and Non-Participant Surveys

Surveys were conducted with participants of the 2008 PE Program. This included both large, custom participants and small participants of the lighting program and the Small Industrial Initiative. Forty surveys were completed with participants of the custom PE Program and 67 surveys were completed with small participants. These surveys were conducted via telephone in April and May 2009. Topics included their awareness of the PE Program, free-ridership and spillover, program satisfaction, energy management practices, and the BETC.

During their in-depth interviews, each PDC was asked to provide the name and contact information for up to five contacts who received a Technical Analysis Study ("TAS" or "technical study") or other program intervention but who had not yet completed the recommended project. These non-participants were surveyed via telephone during April and May 2009 on their awareness of the PE Program, their potential for program participation, energy management practices, their barriers to energy efficiency, desired program training and support, and the impact of the current economy on their ability to invest in energy efficiency.

Site Visits and Metering

Impact analysis was conducted for 27 of the 2007 participants. After a thorough project file review, site visits were conducted on 26 of these sites; a phone verification was conducted for a single participant.

Short-term metering was gathered and analyzed as well as customer-provided logging data, where available.

1.4 Organization of Report

This introductory chapter gives background on the program and frames the results of this evaluation. The report has three additional sections:

Section 2: Program Description

Section 3: Process Evaluation

Section 4: Impact Evaluation

The following appendices are included at the end of this report:

A: Program History

B: Survey and Interview Guides

C: Summary of Other Utilities Programs

D: Free-Ridership and Spillover

E: Site-Level Energy Savings Evaluation Summaries

2 PROGRAM DESCRIPTION

The Energy Trust began operation in March 2002, charged by the Oregon Public Utility Commission with investing funds collected from Oregon's utility rate payers in cost-effective energy conservation. Energy Trust develops and manages outreach programs through which eligible Oregon residents and businesses receive cash and service incentives for saving energy.

This began with the passing of Senate Bill 1149 in 1999, a restructuring law which required Oregon's two largest investor-owned utilities, Portland General Electric and PacifiCorp, to collect a three percent public purpose charge from ratepayers to fund energy savings programs. Northwest Natural Gas began voluntary participation in Energy Trust program a year later and Cascade Natural Gas began participation in 2006.

The PE Program was established by Energy Trust in March 2003 to implement energy efficiency measures in Oregon's industrial organizations. Through the PE Program, eligible participants are provided financial and service incentives to improve the electric and natural gas efficiencies of their industrial and agricultural equipment, systems and processes in new and existing businesses.

The stated program goals are to achieve:

- A significant increase in industrial electric efficiency activity
- Low-cost savings
- Broad participation

2.1 Program Approach

Rather than focusing entirely on equipment replacement or upgrade projects, the Production Efficiency program encourages efforts involving substantial changes to the production process itself. The inclusion of such projects significantly distinguishes the program from its predecessors operated by the electric utilities. Process efficiency projects, in contrast to those for equipment replacement alone, imply larger energy savings and typically have lower per-unit energy-acquisition costs. These projects often have non-energy benefits that are greater, both in absolute and relative terms, than those that accrue to smaller projects; examples include reduced emissions, better labor utilization, less maintenance cost, and improved products.

The PE Program is able to accommodate projects that result in increased facility output through changes that increase the energy efficiency of the process and reduce electricity per unit of output. These projects may free up resources that enable an organization to increase plant output and total energy used at the meter, provided the projects are cost-effective. Projects of this nature are approved on a case-by-case basis.

Water and wastewater treatment projects were originally not included in the Production Efficiency program. These projects fit within the Energy Trust's Building Efficiency program's public and institutional market focus, so that including them within Building Efficiency offerings minimized confusion about program options available to public and institutional participants. In August 2003, the Energy Trust Board of Directors reallocated these projects, as well as their budget and energy goals, to the Production Efficiency program.

Incentives for design, installation, and materials are calculated on a per kWh or therm basis by capped at 50% of measure cost. Acceptance of the new application is contingent upon the availability of funds.

The Production Efficiency program launched with a per-customer incentive cap of $500,000 per calendar year. In November 2003, following the identification of several very large projects with high energy savings potential, the Energy Trust's Board of Directors approved a waiver of the incentive cap on a case-by-case basis for certain extraordinarily cost-effective projects. The waiver allows an industrial facility to exceed the incentive cap. Projects that exceed the cap are reviewed for approval by Energy Trust in a process distinct from Production Efficiency processes.

For projects other than water treatment projects, the incentive was diminished to 20¢ per kWh in 2005. At the end of 2005, it became apparent that funds for Production Efficiency projects had been overcommitted. To stretch the available funding during 2006, the incentive was reduced further to 12¢ per kWh. Since then, the incentive has been raised to its current 15¢ per kWh for projects other than municipal water and wastewater treatment projects, which are eligible for an incentive of 26¢ per kWh. (The higher incentives for municipal water and wastewater projects reflects their longer projected lifetimes and documented non-energy benefits.)[7]

In 2008, the program added two additional incentives for two categories of projects, lighting and natural gas. The lighting incentive is 15¢ per kWh, also up to 50% of the project cost, but incentives are only available for projects with paybacks of 12 months or higher. The incentives for natural gas projects are $1.00/therm, not to exceed 50% of the total approved project cost, only available for projects with paybacks of 18 months or greater (later reduced to 12 months or greater).

The program also offers free analytical services to identify potential efficiency projects. It pays 100% of the cost for detailed technical analysis studies for prospective efforts, provided the customer agrees to initiate the project within six months of the study's completion.

Facilities with loads > 1 MW can be "self directors" and not pay the public benefits charge (3% of utility bill) per SB 1149. They must identify their own projects but the incentive is 50% lower than the normal incentive.

Oregon has a Business Energy Tax Credit ("BETC") to help fund efficiency and renewable energy projects. Energy Trust promotes this and helps businesses with the application. The credit for energy efficiency projects is now 35% of incremental cost up to $10 million and the credit for renewable projects is 50% of incremental cost up to $20 million. There is legislation pending that would bring the credit for energy efficiency projects up to the same level as the credit for renewable energy projects but it is uncertain whether this legislation will pass.

2.2 Program Delivery

Initially, Energy Trust contracted with Aspen Systems Corporation, subsequently acquired by Lockheed Martin (Lockheed), to serve as the Program Management Contractor ("PMC") for the first eighteen months of the program, with an option to continue a third year if requested to do so. Subsequently, the Energy Trust Board of Directors twice renewed the PMC's contract to run through the end of 2007.

[7] Research Into Action, Production Efficiency Program End-of-First-Year Progress Evaluation, June 22, 2004

In 2008, program management responsibilities for the PE Program were transitioned internally to Energy Trust from the PMC, in an effort to improve program communications and build relationships with Oregon's large industrial companies.

Until early 2007, when the relationship with one of the Program Delivery Contractors ("PDCs") was discontinued, the PMC oversaw the program through four contractually-recognized PDCs. The discontinued PDC had responsibilities that were industry-specific; they included all pulp and paper and primary metals facilities throughout the state, and wood products facilities located in Northwestern Oregon. The other three PDCs were responsible for geographic territories: Southern Oregon, Eastern Oregon, and Northwestern Oregon (including the Willamette Valley). The former responsibilities of the discontinued PDC were allocated among the three remaining PDCs.

In addition to the PDCs, the program relies on a pool of Allied Technical Assistance Contractors ("ATACs") who conduct detailed studies (also referred to as "technical analysis studies" or "TAS"). The ATACs are diverse in size and type. They include engineering firms, equipment vendors, and all of the PDCs. However, the number of ATACs has varied from 14 in 2003 to 8 in 2007 to 10 in 2008.

The Energy Trust provides overall management to the process of project identification and completion. The PDCs market the program to industrial firms. They assess the interest of prospective participants in efficiency programs, a facility's ability to undertake efficiency measures, and the best direction for further activities. This assessment leads to a scoping study for facilities having the interest and ability to pursue an efficiency project, or the assessment may itself constitute a scoping study. The scoping study results in a list of recommended measures for further study or for immediate action.

There are three levels of technical analysis to assure the level of study for a given project is useful, timely, and cost-effective. The different levels of study are intended to allow the technical review to be tailored to each project. The review process begins with a scoping audit, conducted by the PDC, that simply identifies opportunities and verifies existing processes and equipment. The scoping audit is typically followed by a short technical analysis study, paid for by Energy Trust up to a cost of $3,000, and conducted by an ATAC. The emphasis of these studies is upon quick identification of projects and expected savings. Such studies offer industrial facilities a risk-free introduction to the program. If further evaluation is warranted, the Energy Trust may require a third, even more detailed, assessment. These steps are not always sequential and some elements may be skipped.

The completed studies, at whatever level is required, provide information needed to determine whether or not the identified project meets Energy Trust's cost-effectiveness criteria. After a review of the studies by the PDC and the Energy Trust, an incentive offer for cost-effective projects is presented to the customer by the PDC. Upon the customer's acceptance of the offer, it is signed by the Energy Trust. If requested, the PDC will help the customer to identify qualified vendors to perform the specified equipment and measure installation and process changes.

When a project has been completed, the PDC verifies project installation and delivers the incentive payment to the customer. Throughout the process, the PDC facilitates the completion of all program-related forms and delivers them to the Energy Trust for processing.

2.3 Program History

As part of this evaluation report, the Summit Blue Team conducted a review of past program evaluations. The findings are organized by topic area and are contained in Appendix A: Program History.

2.4 Program Changes in 2008

The Energy Trust implemented numerous changes to the PE Program in 2008. As described in Section 2.2, program management responsibilities were transferred to Energy Trust. To accommodate this transition, two program managers were hired to manage the program. This change also required the Energy Trust to contract directly with all PDCs and ATACs. The role of the PDCs changed substantially to include marketing and savings goals where previously, achievement of these goals was the responsibility of the PMC.

ATAC project assignments are administered by Energy Trust rather than assigned by the PDCs. Certain technical standards were developed to guide the development and Energy Trust review of the three types of technical energy studies ensuring better quality and increased consistency among the ATAC's studies.

Other program changes were also made in 2008 including:

- A focus on smaller sized industrial sites added to the program ("Small Industrial Initiative" or "SII"). The SII includes compressed air, motors, and irrigation equipment. The SII was added to the responsibilities of one of the existing PDCs.
- The water and wastewater treatment element of the program was expanded and a part time Energy Trust employee was hired to handle the water and wastewater projects.
- There was a campaign to reach the agricultural sector.
- Two new pilots were launched:
    - Industrial Energy Improvement (IEI), a two-year pilot focused on energy management is implemented by an additional PDC. Recruitment and implementation would begin in 2009; and
    - Kaizen Blitz focused on prompt action of operations and maintenance energy efficiency opportunities and year-long interaction with the customers. Services under this pilot program began being delivered in winter 2008.
- The program began incenting certain natural gas projects just prior to 2008.

At the beginning of 2009, a new focus was placed on the high tech industry. This segment was made the responsibility of the new PDC.

3 PROCESS EVALUATION

3.1 Process Summary

In 2008, the Production Efficiency program working estimate of energy savings totaled 73,405,839kWh achieved from 324 projects. These projects were installed through the various PE Program elements. Table 3-1 describes the breakdown of energy savings and projects across the program elements.

Table 3-1. 2008 PE Working Savings by Program Element

	Total Population			
Program Track	**kWh**	**% kWh**	**# Projects**	**% of Projects**
Custom#	56,590,459	77.1%	105	32.4%
SII	3,234,335	4.4%	77	23.8%
Prescriptive	1,348,982	1.8%	36	11.1%
Lighting	12,228,587	16.7%	102	31.5%
Green Rewind	3,476	0.0%	4	1.2%
TOTAL	73,405,839	100.0%	324*	100.0%

**Total projects includes multiple program tracks at a single site – this occurred 37 times.*
#Program tracks participant initiative, production efficiency, and custom were combined into the "Custom" category. Combining these sites reduced the total number by six projects.

For the purposes of the participant surveys, the custom participant population was made up of the custom and prescriptive program tracks including large lighting projects while the small participant population was comprised of the SII track and small lighting projects. The prescriptive program track was included in the custom participant population because an examination of the 2008 projects indicated that the vast majority were installed by large and very large customers.

3.2 Sampling

The sampling methodology for the program participant survey populations are described in the sections below.

3.2.1 Custom Participant Survey

There were 115 participating sites of the custom participants. The prescriptive participants were not selected into the custom sample as these measures have relatively predictable and well-documented energy savings. Where multiple projects existed at a site, the project with the largest savings was held in the sample, while the others were removed so that there would remain a population including only unique sites. From this population of unique sites:

- The customers contributing to the lowest 2% of energy savings were dropped from the sample.
    - Segment 1: Most of the savings were achieved by a small number of participants: 39 sites account for 90% of the savings. Therefore, 25 of these participants were sampled, including the 10 largest; and
    - Segment 2: a random sample of 15 of the remaining participants were included.
- There were a total of 40 sites (25 + 15) for the Custom Participant Survey.

3.2.2 Small Industrial Initiative and Small Lighting 2008 Participant Survey

For the sample of small lighting and SII customers, a savings-weighted sampling stratification was applied to the 169 total participant sites, as follows:

- The customers contributing to the lowest 5% of energy savings were dropped from the sample.
- The remaining sample of 99 was stratified into three segments, each segment contributing to 33% of energy savings.
    - The 1st segment was composed of seven participants:
        - a census of these participants were selected.
    - The 2nd segment was composed of 24 participants:
        - a census of these participants were selected.
    - The 3rd segment was composed of 68 participants:
        - Thirty of the 68 participants were selected -- taking proportionally from the Track code categories (taking 13 of the 30 sites marked “Lighting” Track code, and 17 of the 38 “Small Industrial”).
    - Also, three of the seven sites where ‘studies only’ have occurred were selected.
    - In total 64 sites (7 + 24 + 30 + 3).
    - To account for any non-responses, random sampling from the remaining participants was conducted to reach a sample of 67 sites.

3.3 Stakeholder Feedback

Feedback was solicited from multiple stakeholder groups. The following sections summarize their input.

3.3.1 Energy Trust Staff

Six members of the Energy Trust staff were interviewed. The PE Program staff members interviewed were:

- Industrial Sector Manager – incoming
- Industrial Sector Manager – outgoing

- Industrial Technical Manager
- Industrial Sector Coordinator

In addition, two members of Energy Trust's management team were also interviewed:

- Director of Energy Efficiency
- Director of Planning and Evaluation

Interviews were conducted by telephone during March of 2009. Topics discussed were their role with the PE Program, the program changes in 2008, the PDC contracts, goals, and marketing plans, program challenges and opportunities, the relationship with the customer, ATACs, vendors, and major market actors, program marketing and communications, and data and application processing. Given their differing involvement with the PE Program, not all interviewees addressed all of the subject areas under investigation. For instance, the incoming Industrial Sector Manager gave perspectives on the future direction of the PE Program but was not able to give any historical perspective.

Program Administration

The change in program administration from the PMC to the Energy Trust had the effect of bringing the Energy Trust closer to only the largest of customers who have an issue that needs attention, such as self-directing or an exception to the standard incentive agreement. In these circumstances, customers appreciated having a direct line of communication to Energy Trust. Most customers, however, did not see any change in their relationship with the customer as the PDCs continued to be responsible for the customer interface.

The Energy Trust is now responsible for program budgeting, forecasting, and program strategy. They are more connected to the program processes and can more expeditiously identify and resolve areas of poor performance. Issues are generally resolved more quickly because they do not have to be filtered through the PMC – all of the program management staff agreed that these shorter lines of communication are more functional. This is especially important when additional resources needed to be added to the program. For instance, prior to 2008, the PMC contract had to be amended each time a major change was made or an additional resource had to be added to the program.

There seems to be a greater sense of team work under Energy Trust program management. Energy Trust set up communication channels, like the quarterly PDC meetings, the ATAC Summit, and technical forums to solicit input from the PDCs and ATACs. Energy Trust staff admit that they didn't always follow the advice received, but the PDCs and ATACs appreciated the opportunity for input.

Program Goals and Contracts

Prior to 2008, the PMC was responsible for achieving the program energy savings goals. The PDCs were not given individual goals. As part of the transition in program management, Energy Trust gave each of the PDCs an individual energy savings goal. These goals were incorporated into the PDC contracts. As a whole, the program met its savings goals and achieved 94% of the stretch goal. All of the PDCs met their base goals and some met their stretch goals.

The change in program administration required that contracts be developed directly between Energy Trust and the PDCs and ATACs. During the transition period, the Energy Trust contracting resources were stretched thin but have reached a steady state now that the contracts are in place.

Energy Trust staff weren't aware that the ATACs or PDCs had any issues with their new contracts. They believed that the contract terms, including establishment of program goals, and the negotiation process were viewed as fair by the PDCs. They pointed out that the ATACs had to go through the extra effort of getting their ATAC status (demonstrating insurance levels, etc.), but the staff did not view this as a hardship for the ATACs.

PDC/ATAC Conflict of Interest

Energy Trust staff acknowledged that there is a perceived conflict of interest in allowing the PDCs to also act as ATACs but feel that it wasn't a conflict in reality because the Industrial Technical Manager assigns the TAS to the ATACs and they require a review by a non-PDC member of the PDC organization prior to finalizing the results.

In addition, some PDCs have other business units that sell products and services to the industrial market. There is concern that the PDCs may be using their position of trust with the customer to introduce their firm's other offerings.

Program Challenges

By far, the greatest program challenge identified by Energy Trust staff is the economy. The PDCs are concerned about how they are going to reach their goals in the current market. Energy Trust staff is finding it difficult to forecast energy savings and program spending over the foreseeable future.

Others challenges identified include:

- Managing SB838 funding and demonstrating that they aren't spending a disproportionate amount of money on large customers;
- Budgeting incentive dollars for very large projects that come along infrequently; and
- Integrating new initiatives into the program.

Customer Issues

PE Program staff are aware of a handful of customer issues with the program. These include:

- Incentive levels are not high enough;
- Wanting to conduct their own technical studies; and
- Wanting to know the algorithms behind the cost-effectiveness test.

Market Actors

The Industrial Sector Manager sits on stakeholder committees with NEEA and BPA; other PE staff do not interact with them. Staff agrees that the relationships with them are fine and that there are opportunities to coordinate on future initiatives.

There is room for improvement with PacificCorp. The PDCs regularly contact the PacificCorp account managers when they are going to contact one of their customer sites. Communication has been an issue in the past as new program information from Energy Trust was not being communicated to PacificCorp on a timely basis. The program is aware of this and will work to communicate directly to account managers in the future.

Coordination Between Energy Trust Programs

In general, PE Program staff recognize that the Energy Trust programs operation in silos and that they need to improve communication and coordination. There is some coordination between the PE Program and the Renewables program in the wastewater sector as these sites have good opportunities for both programs. Occasionally, the PE Program needs to work out issues of customer eligibility with the Existing Buildings program, but this doesn't happen often and is not an issue.

3.3.2 Program Delivery Contractors

The PE Program is delivered to the end use customer through the PDCs. They actively promote and sell the PE Program while acting as advocates for the participants. They identify energy efficiency measures to be studied, make recommendations on which ATAC is most appropriate for project specific analysis, and lead participants through each step of the program process.

Prior to 2008, there were three PDCs were assigned to various geographic regions of the Energy Trust territory and one PDC assigned to administer a lighting program ("Lighting Program"). By 2008, an additional PDC was added to handle the small industrial sub-sector of the industrial market ("Small Industrial Initiative" or "SII"). Both the Lighting Program and the SII are different than the mainstream or "custom" PE Program in that they work through the network of vendors who sell equipment to the end use customer instead of working with the end use customers themselves.

During 2008, a PDC was added to manage the IEI pilot. By the end of 2008, a PDC was added to take over a portion of the Energy Trust geographic region. In addition, each of the PDCs was also assigned an industrial specialty in addition to geographic areas. This resulted in the shifting of some customers from being served by one PDC to another.

Representatives from all six PDCs were interviewed in March of 2009. Two different representatives from Cascade Energy Engineering were interviewed, one for the custom PE Program and one for the SII.

Program Administration

The PDCs agree that the change in program administration has made it easier to resolve certain large customer issues because the Energy Trust can be directly involved with the customer.

One PDC notes that communications have improved with the change in PE Program administration and that both parties benefited from a better understanding of the perspectives of the other.

Some PDCs indicated that this improved communication had a downside in that it takes up time that would normally be spent on customer issues. One PDC was clear that PDC input to issues when contemplating new initiatives or changes to the program requirements or processes was very important and avoids making changes that negatively impact the program. It was a careful balance to manage their new marketing responsibilities and energy savings goals with the additional administrative requirements.

One PDC noted that the PMC had excellent technical expertise and understanding of the customers that helped to guide the program.

Program Role

The existing PDCs saw only nuanced changes to their role in the program from 2007 to 2008. One mentioned that they now spend more time working through administrative issues with the Energy Trust. Another feels that they are more “self-directed” now than under the PMC.

PDC/ATAC Conflict of Interest

Not surprisingly, none of the PDCs believe that there is a conflict of interest with the dual role of PDC and ATAC. One pointed out that when there’s an appearance of a conflict of interest this can be just as bad. Most indicate that by assigning the ATACS to projects themselves, the Energy Trust is helping to maintain integrity over the process.

PDC Contracts and Goals

All of the PDCs indicated that they were happy with the terms of their contracts, that the process went very smoothly, and that the program staff was “delightful” to work with. They indicated that the staff was open to their feedback and requests during the process that, overall, was “fair”. The four-year contracts (instead of the 1-year they had previously with the PCM) were much appreciated as was the funding for program marketing.

The PDCs also thought the program goals were fair although most are concerned that they will be difficult to meet in the current economy. They indicated that the goals were presented to them by the Energy Trust based on an unknown method and that they are satisfied with this process as long as the program continues to be open to working with them on their issues with meeting goals. For instance, the limited time offer of increasing the project cost cap to 60% was very helpful in the past.

ATACs

The PDCs didn’t notice a change in the ATACs’ roles with the program in 2008 and thought that customers do not misunderstand the separate role of the ATACs and PDCs.

Sometimes, an ATAC may have a relationship with a customer from another facility in another state. The Existing Buildings ATACs are allowed to promote themselves, but they aren’t in the PE Program. When an ATAC works for both the PE Program and Existing Buildings program, this can lead to problems and resentment if they generate a lead with a customer but the project gets assigned to another ATAC.

The PDCs think that the PE Program has a “good handle” on the ATACs and only let qualified firms participate in the program.

The PDCs had little to say about the assignment of ATACs to a project. They are satisfied with the way Energy Trust is handling this.

Some PDCs feel that the ATACs should have terms in their contracts around customer service, teamwork, and communication.

Technical Guidelines

The PDCs feel that the Energy Trust has made significant strides in improving the quality of the technical studies with the guidelines they’ve developed. They agree, however, that more work needs to be done to make the format less “skimpy” and that there could be some additional guidelines for the technical approach to specific system types.

Reservation Process

None of the PDCs had any insights to the new reservation process because the trigger to initiate it was not reached.

Business Energy Tax Credit

All of the PDCs promote the BETC because it is integrated into the program applications and the additional monies help to sell the project.

Some were aware of projects that qualified for the PE Program but not for BETC. One had a bad experience when they promoted the BETC to a customer but the BETC incentive was not approved. This PDC will be less definitive about promoting the BETC in the future.

3.3.3 Allied Technical Assistance Contractors

The PE Program utilizes a pool of Ally Technical Assistance Contractors (“ATAC”) to examine how a participant’s facility and processes use energy and identify potential ways to save energy. The findings and recommendations are presented in a Technical Analysis Study (“TAS”). The Energy Trust has three levels of approved ATACs based on their expertise and experience and the levels of insurance that the ATAC maintains. This affects the level of TAS that an ATAC will be allowed to perform for the Energy Trust.

In 2008, there were seven ATACs; three new ATACs were added in 2009. Four of the ATACs are also PDCs. This dual role has raised concerns that the PDCs may recommend unnecessary work to the customer or over inflate their savings estimates in order to help meet their PDC savings goals.

When a PDC identifies the need for a TAS at a participant site, the Industrial Technical Manager selects a qualified ATAC (sometimes several) and e-mails a description of the proposed TAS. The ATAC(s) then respond with a not-to-exceed price to perform the work.

In 2008, the Energy Trust began developing guidelines to enhance the technical rigor and consistency of each TAS. These guidelines included:

- Sample TAS template - indicating the areas that must be addressed in each report and examples of content;
- Equipment baseline – establishing guidelines for determining equipment baselines; and
- Allowable costs – outlining the allowable project costs that contribute to the incentive cap.

The Summit Blue Team interviewed five of the ten ATACs. They ranged in size from individual sole proprietorships to part of a firm with over 200 employees. Most did 0% to 25% of their total business though the PE Program, but one reported their ATAC work through the PE Program represented from 51% to 75% of their business. They were asked about their experience with the PE Program in 2008 especially in light of the program changes, as summarized below.

ATAC Program Roles

Three of the ATACs were business owners, one identified himself as a contractor and another as an engineer. The size of the ATACs ranged from a sole proprietorship to a company with over 200 employees.

The five ATACs stated that their Energy Trust work ranged from about 8% to 75% of their business revenue in 2008. For most of the ATACs, the amount of time spent on PE projects has fluctuated over the life of the program. For instance, new projects were suspended in 2006 when the program ran out of money. Three ATACs have seen no changes in their role over time, while two, who were involved in significant ways the early years, have seen their role diminish significantly. One ATAC took the initiative to propose a new option to increase their role in the program.

ATACs has observed that the number of projects slowed down at the end of 2008, and some saw a decrease in project size. Explanations ranged from the economic downturn to the ending of the "low hanging fruit". One ATAC thinks the trend toward smaller projects is due to a lack of desire on the part of Energy Trust to pursue longer, more complicated and more speculative process projects. This ATAC also reports a change in emphasis on total kWh saved to the number of projects completed, which also encourages smaller projects.

Only one ATAC has seen a 'fair amount of repeat business' with large wood products plants.

Two ATACs found the work for Energy Trust very similar or complementary to their other work, while two found it different from other work they perform.

Program Administration

ATACs were split on whether the transition from PMC to Energy Trust program management went smoothly or not. All found the management style different with the transfer to Energy Trust and some adjusted better than others. One ATAC thought the program changes were positive, one found them mostly negative, and one found the changes mixed.

Disagreement was also found on the issue of the effect of the change on the customer. One ATAC thought the PDC concept works well for the customer, while another believes the PDCs have no experience in his industry and are not serving the needs of his customers.

Communication and Coordination

Two ATACS work directly with Energy Trust staff while the others work with a PDC. One ATAC never works with a PDC. Communications were generally viewed as adequate between PDCs and the ATACs, although it is limited to project-related issues.

A few ATACs found less communication, and one found more with the new program structure. The amount of communication has lessened as the number of projects assigned to ATACs has decreased the need for communication. One ATAC said while the amount and quality of communication are the same, they are now communicating directly with Energy Trust rather than through the PMC.

Project Assignments and the PDC/ATAC Conflict of Interest

The ATACs indicated that most of the projects are assigned by the Energy Trust based on the scoping report but that it sometimes works in reverse with the ATACs taking a project to Energy Trust.

Interestingly, the ATACs did not observe any change in how the projects were assigned after the change to Energy Trust program administration.

The ATACs were split down the middle with a couple reporting their expectations for project assignments were met and others reporting their expectations were not met.

One ATAC believes that the other ATACs are designing customer solutions around their own product to create work for themselves, rather than searching for the best solution for the customer. Two PDCs are viewed as having less of a conflict of interest than a third PDC that was formerly very active in the program but now has a reduced role as an ATAC. Another PDC was viewed by one ATAC as assigning all of their ATAC work to their own staff.

Program Marketing: Measures and Incentives

Overall, ATACs did not think any measures have become baseline yet. Two ATACs suggested Energy Trust develop a prescriptive measure for Variable Speed Drives on standard pumps, although one pointed out it would not be a simple calculation.

ATACs believe incentives have an important role in motivating customers to install energy efficient equipment. They believe current incentives encourage energy efficient equipment in a stable economy. However, many customers have no capital budgets and/or are challenged in the current economy and are unable to make investments.

Business Energy Tax Credit

There is a wide range in attitudes toward the BETC from the five ATACs surveyed. Some always sell the BETC and some never selling the BETC. One sells the BETC with reservations. This ATAC reported that the ODOE was slow to process applications, was subjective in how they evaluated applications and was "stingy".

Some projects qualify for Energy Trust but not the BETC. One reason was the differing programs requirements; BETC requires that a project saves 10% of baseline energy, while the Energy Trust program has cost-effectiveness standards. One ATAC mistakenly believes that natural gas projects do not qualify for the BETC program.

If the ATAC proposes the BETC and the customer is turned down for the credit, sometimes the ATAC is blamed. One ATAC's experience has led them to conclude the ODOE is purposefully denying projects that have been approved by the Energy Trust. Some industrial customers will apply to both programs when they can use the tax credit and when the PDC will complete the application for them.

One ATAC said that the BETC can be a difficult sell for larger industrial customers who are unable to take the credit if they are tax neutral. They are unable to trade or sell the credits because there is no market due to the economy. One idea proposed was for Energy Trust to purchase the tax credits to breathe life into the BETC program. A few ATACs think there should be more coordination between the two programs but that Energy Trust cannot accomplish this without the cooperation of the ODOE.

ATAC Views of Customer Satisfaction

All of the ATACs have heard positive feedback about the PE Program from customers. A few pointed out, however, that as an ATAC they are usually "not in the feedback loop".

One ATAC with a long history with the program sees a trend toward large customers choosing to be self-directed, whereas a few years ago they believed not self-directing was a better deal. Reasons for this trend included the ability to capture their own public purpose money and close alignment between self-direction and the BETC because the technical review is conducted by the same people.

Negative perceptions are that the PE Program is cumbersome and slow. At least four large industrial customers have expressed frustration to ATACs with their PDC and a preference for the services of a particular ATAC.

Miscellaneous

The ATACs shared the following additional perspectives on other program aspects:

- All but one of the ATACs received the technical guidelines; the remaining ATAC remembered receiving a sample report.
- ATACs generally use their own calculators or older versions of the Energy Trust calculators to estimate the project incentive. One ATAC reported that they are not allowed to have the calculators so they can be objective.
- ATACs expressed some frustrations about the repeated minor changes they are asked to make to their reports by PDCs who are sometimes their competitors.

ATAC Suggested Program Improvements

ATACs shared a number of ways the program could be improved:

- Increase role of ATACs in the program;
- Streamline processes to reduce the time the customer waits for a decision from the Energy Trust;
- Give a less detailed review of the technical studies;
- Speed up payments - PDCs review the project and then Energy Trust reviews the project-causing delays in reimbursements to the ATACs and delays to the customer;
- Clarify project scopes - ATACs and PDCs sometimes have different views of the potential scope of the project and ATACs are expected to perform too much rework that cannot be billed;
- Monitor ATACs that also serve as PDCs - Competitors sometimes are in the PDC role and the ATACs have found that they can be “picky” with technical reports to “earn their fee”;
- Watch for utility/PDC conflict of interests - PDCs that are also utilities have a conflict of interest when it comes to encouraging energy efficiency; and
- Reduce emphasis on pre-audit monitoring for boilers and fan applications “... as it is expensive, time consuming and unnecessary”.

3.3.4 Vendors

As part of the process and impact evaluation of the Production Efficiency Program, the Summit Blue team contacted participating vendors and completed an in-depth telephone interview. The original list provided by Energy Trust staff contained names and contact information for 18 participating vendors. Of these 18 vendors, 10 participated in this interview. The vendors were asked to provide information about their program participation, level of program awareness, and assessment of program operations. This section summarizes the key findings from the vendor surveys.

Program Awareness

All but one of the participating vendors was aware of the program (90%). The vendor who was unaware was just recently assigned to this position, but that was clearly the exception. Rather, most vendors (70%) had a long history of working with efficiency programs before the Energy Trust and two vendors were involved in the original program design. One vendor learned about this program at an industry association meeting. However, most (80%) participating vendors learned about this program from staff directly, and most (90%) have been aware of this program for 5 years or longer.

> *"I was involved in original program design and worked on Governor's task force."*

Customer Participation Process

The vendors also answered a series of questions about the ways in which their customers enter the program. As Table 3-2 shows, most vendors take a proactive approach, telling the clients about energy efficiency directly, rather than waiting for clients to come to them for information or advice. Customers are also active in identifying program opportunities.

Table 3-2. Ways in Which Customers Enter the PE Program

Response	Total # of Responses	% Answering Yes	% Answering No
We initiate with contact with customers and introduce the possibility of participating in the program	10	100%	0%
A program representative approaches you with a program opportunity	10	20%	80%
The customer or someone else approaches my organization with program opportunities	10	60%	40%
The possibility of installing qualifying equipment arises as we discuss equipment needs with customers	10	90%	10%

The following statements explain more fully how customers enter the PE Program.

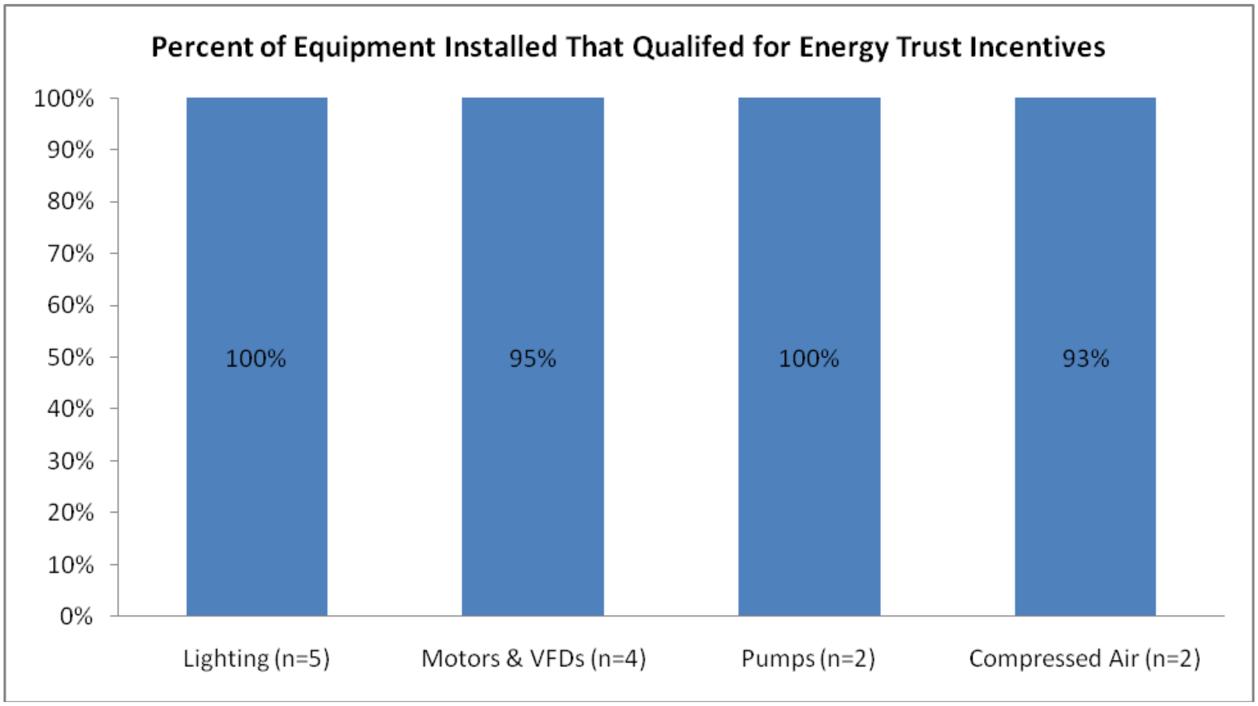
> *"We rely on referrals- that is the most cost-effective...but also working on promoting a Web site. Our focus is on cold calls and knocking on doors."*

"We tell the customers about the program... if the customer calls and asks about a motor, we tell them about energy efficiency options."

All but one vendor reported that customers have modified projects to meet Energy Trust incentives. Furthermore, only two of the surveyed contractors said they have lost out projects because Energy Trust could not deliver an incentive; while four said that had not been an issue. Four other contractors were unable to answer this question.

As Figure 3-1 shows, most of the equipment installed by these vendors did qualify for the program.

Figure 3-1. Percentage of Equipment That Qualified for Energy Trust Incentives



This further illustrates that vendors are focusing on projects that will qualify for Energy Trust incentives. For example, 67% of the vendors (6 out of 9) indicated that they "generally know if a project will qualify" when the idea is first presented.

"I only pursue projects that qualify for a rebate."

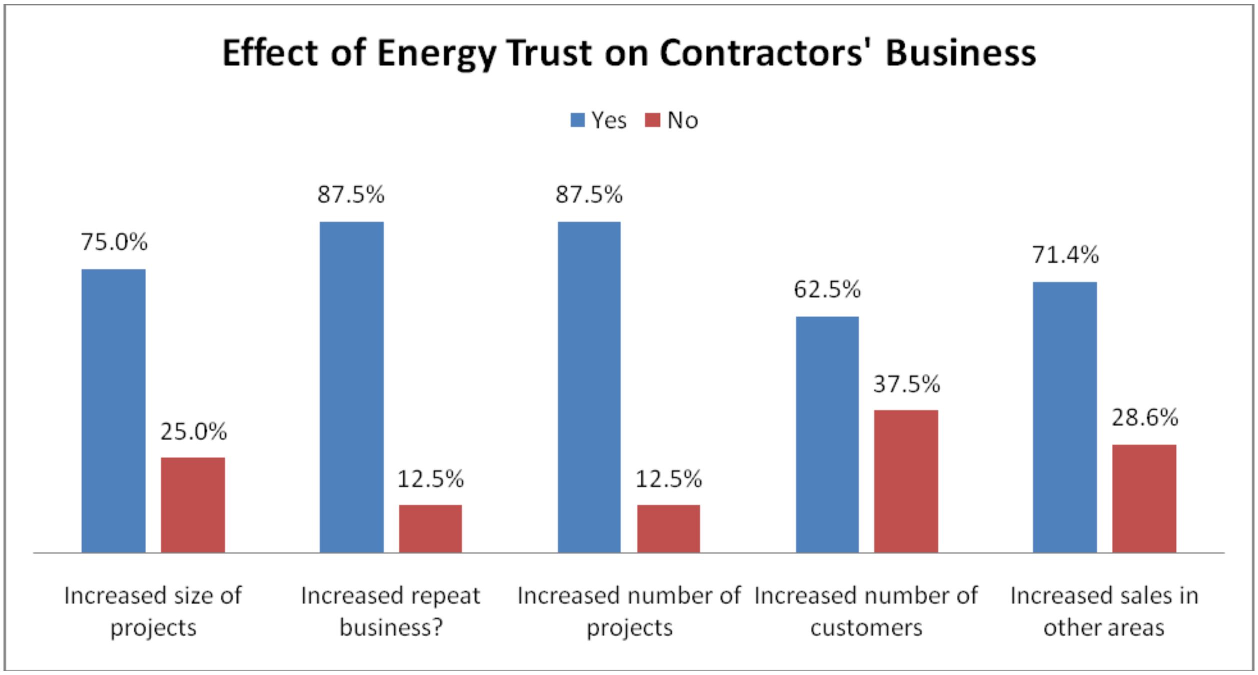
"All I do is recommending energy efficient equipment."

"Very few cases when don't use an incentive and usually know those from the start. Can eyeball those types of projects…we know what types of projects are going to work and which ones won't."

Overall, the contractors are also pleased with the current types of projects that qualify for the program and only one indicated they would change the types of projects that qualify. That contractor would like to see more qualifying projects from municipal organizations.

The participating contractors also indicated if the PE Program had positively affected their business. Overall, most contractors reported that as a result of program participation, they have been able to increase the size of their projects (75%); report increased rates of repeat business (88%); increased the number of projects (88%) and increased sales in other areas (71%). However, only 63% of the vendors said that the program has increased the number of customers they serve.

Figure 3-2. Ways Program Participation Has Affected the Contractors' Business



Overall, these findings suggest that the program has a positive impact on participating vendors and has lead to increased business for them, especially in terms of project scope and number.

Interest in Renewables

The majority of the participating vendors (78%) were aware that the Energy Trust is also developing a renewable program. However, two-thirds (67%) are not interested in participating in this program. Two vendors did want to receive more information about the program and one indicated that his firm had already completed several renewables projects. Overall, it appears that the renewables program has little appeal to most of these vendors.

> *"I think renewables are a waste of money."*

> *"We are trying to link solar and wind with our lighting systems for warehouses…we are interested in the renewables program."*

Business Energy Tax Credit

Nearly all the vendors (80%) promote BETC to their industrial customers. These vendors also indicated that their customers did try using that program (80%); however it was sometimes a challenge.

> *"I use the BETC... but they are difficult to work with."*

> *"When I go into a facility I use the BETC as well and that helps with the bids."*

Reasons Customers Discontinue Program Participation

The participating vendors also provided additional insights into reasons for customers deciding to discontinue program participation or abandon energy efficiency projects. As Table 3-3 shows, the most common reason (67%) was due to outside factors, such as the company changing its priorities or focus. A few vendors also mentioned that some customers (22%) did not want to bother with the "hassle" required to receive a program incentive.

Table 3-3. Reasons Customer Discontinued Participation with the Energy Trust Program

Reasons	# of Responses	Percent of Responses
Reasons internal to their company that don't pertain to the program	6	66.7%
Participating was too much of a hassle because	2	22.2%
Equipment didn't qualify	1	11.1%
Other	4	44.4%
Don't know	2	22.2%

As the following comments illustrate, most of these projects have been cut due to the economic downturn and changes within company priorities. Only two of the vendors indicated these decisions were directly related to the PE Program.

> *"Last year we got approval in lumber projects but since home sales have tanked, no one is doing anything right now."*

> *"Sales are off; my best salesman hasn't sold anything since last year… the economy is really down."*

> *"Even though the Energy Trust is giving incentives, the customers are scared right now. It is hard to have layoffs and also spend money on lighting upgrades."*

> *"Customer priorities have changed… the clients are busy and budgets are tight."*

Program Experiences

Nine of the active contractors (n=9) reported having no difficulty understanding the program requirements or information. Most (89%) of these contractors also indicated they had not received any complaints from their customers. Of the contractor who did have a problem, described it as "a medium" problem and the biggest issue was uncertainty about whom to call to resolve a specific issue.

The participating vendors also reported that time constraints do not influence their decision to apply for an incentive. In fact 78% of the vendors said that was "Never" an issue while two vendors (22%) said that it was an issue "Sometimes."

Overall, participating vendors reported they were very pleased with this program, as illustrated in the following statements.

"We decided to participate because it is a no brainer—if you want incentives you have deal with Energy Trust, it is on the frontlines for energy efficiency."

"Think the incentive program is very strong."

"We have worked with other utility programs but this is one of the better programs in the state and one of the better programs in the country. ...They have pretty darn good incentives and like working with Energy Trust staff. They are very sharp and responsive. No complaints."

However, several vendors did report ways in which the Energy Trust could improve its program. These suggestions include speeding up the processing of paperwork and using more realistic energy savings assumptions. Because of these issues, one vendor has discontinued working on Energy Trust programs and another two others are considering dropping out of the program as well.

"The program has evolved quite a bit and it has not evolved for the better. Now it has become an academic experiment instead of reality. The program has become unrealistic...We don't really work with the Trust anymore, we can't afford to… the projects are far too labor intensive in terms of the data requests. We don't have a budget for 6 months of collecting highly granular data… to prove out a theory."

"At one production facility, the Energy Trust manager wanted to know why the pump curve wasn't matching and that isn't rational. We want to make these projects as painless as possible but now it is the tail wagging the dog."

"Now the inspections take 30, 45, or 60 days and if the fixture count is wrong, then the whole project has to be recalculated... They did a count and it was off by three fixtures for a warehouse... had to wait over 90 days for payment. Energy Trust owes me $50,000 and this is starting to affect my cash flow…it is killing me."

Suggestions for Program Improvement

The vendors also offered additional suggestions for program improvement. Six vendors (86%) wanted more information about the program and one vendor wanted more networking opportunities.

"I would like to see the program expanded to colleges and universities but they are handled differently."

"I think Energy Trust should develop a sales tool for the customers."

"They used to team with vendors offering other types of equipment—but they don't do that anymore."

"I think the Energy Trust should do more advertising of the program and develop case studies that showcase end users

"Make it easier for customers to understand- only really need to do three calculations... made it simple, do not get into the 'why.'"

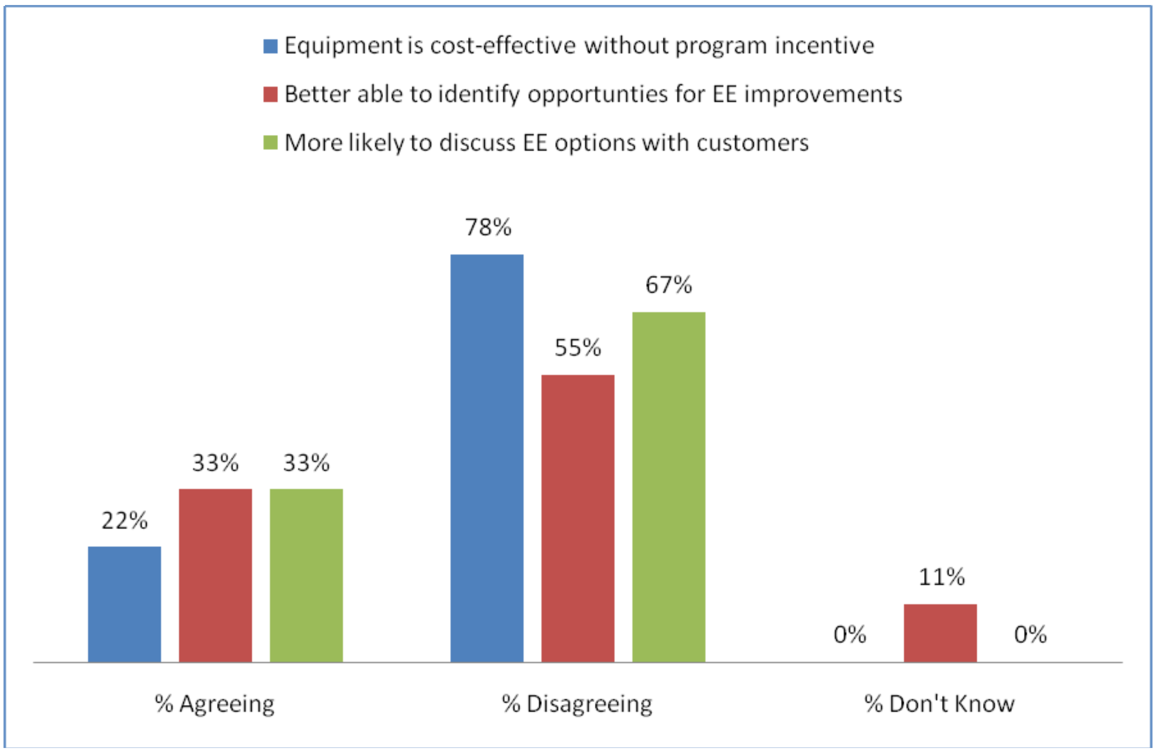
"I suggest Energy Trust should sponsor the Compressed Air challenge. Need to focus on sustainability of savings and that compressed air systems need tune ups periodically and should be done by tune ups."

"I want a consistent program... regional standardization on the projects that qualify, the incentives, and also publish a telephone tree so we know who to contact at each organization. This lack of information does slow down the process."

Program Market Effects

The participating vendors also answered a series of questions designed to determine the effect that the program has had in their business approach. Figure 3-3 illustrates that these vendors promote the benefits of energy efficiency to their customers regardless of their program participation. Rather, this is their sales approach and integral to the ways in which they find customer projects.

Figure 3-3. Analysis of Program Market Effects



The participating vendors also provided some additional information about the role that the program plays in business practices.

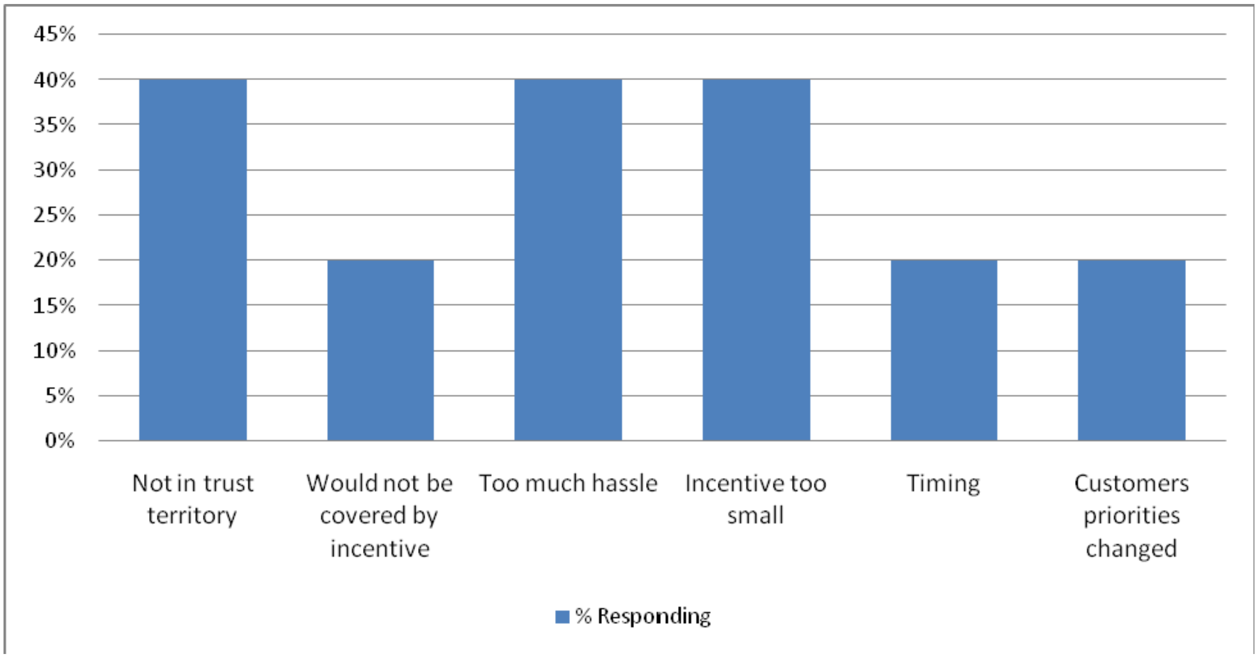
"Spillover not an issue but do think folks wouldn't do these installations without an incentive."

"I haven't seen any growth in business directly from the program. I get customers because of my product, my approach and persistence."

"The business is based around selling the benefits of energy efficiency."

The participating vendors also provided an explanation for why some equipment was installed without Energy Trust incentives (see Figure 3-4). Most of these reasons were that the projects were not installed in Energy Trust's service territory (40%); applying for the incentive would be too much of a "hassle" (40%); or the incentive was too small to justify the time required to file the application (40%).

Figure 3-4. Reasons Project Did Not Receive an Incentive



As Table 3-4shows, qualitatively, that customers are more likely to install process improvements, motors and lighting upgrades on their own, without incentives. However, that is less likely for compressed air installations.

Table 3-4. Types of Equipment Installed Without Energy Trust Incentives

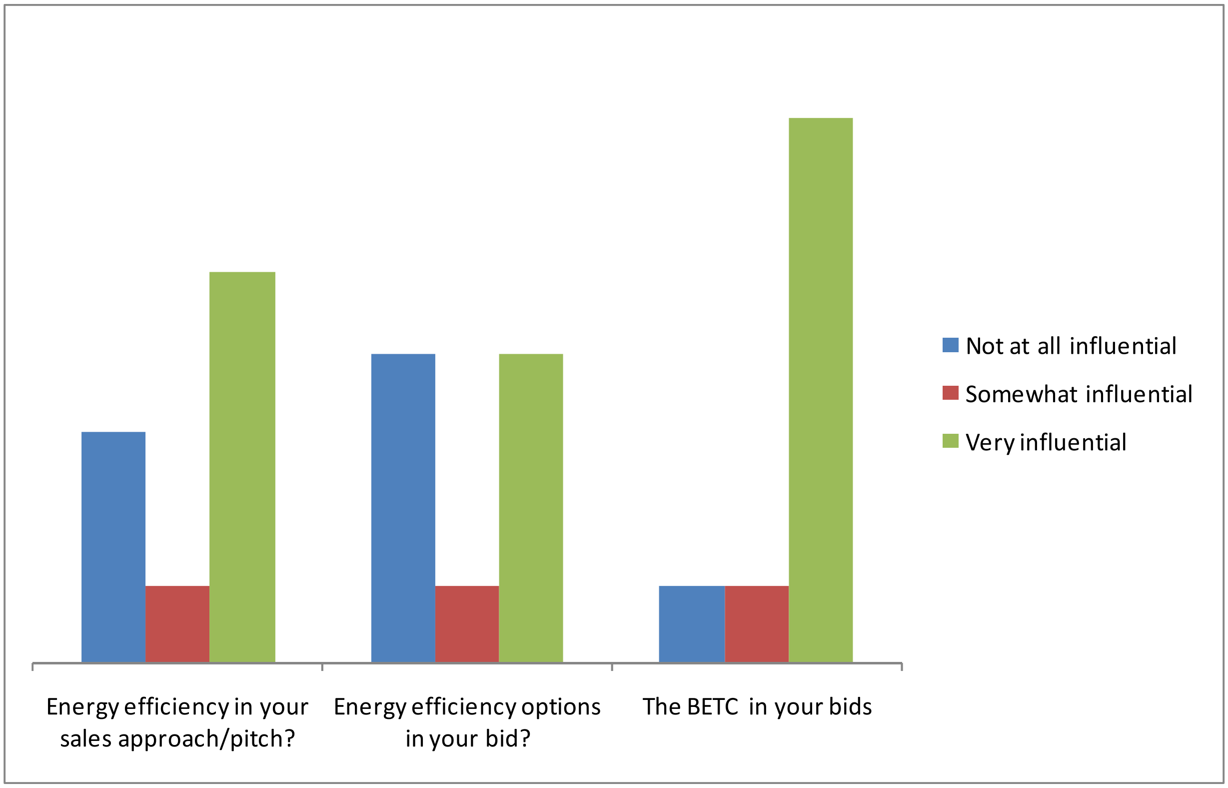
Customers installing on their own?	Types of Equipment Installed Without an Incentive*					Totals
	Process improvements (n=1)	Motors (n=2)	VFDs (n=1)	Lighting (=3)	Comp. Air (n=2)	
Yes	100%	200%	100%	67%	0	5
No	0	0	0	33%	1	2

**Multiple response question.*

It appears that Energy Trust incentives help customers make energy efficient choices for installations, but that is not the driving factor in determining if equipment is installed. If a facility needs equipment, it will be installed regardless of the availability of an incentive.

As Figure 3-5shows, the program appears to have little influence in these participating vendors' sales approach or including energy efficiency options. However, 78% of these respondents said the PE Program was "Very Influential" in getting them to include BETC information in their bids.

Figure 3-5. Level of Program Influence



These findings are consistent with the earlier results which suggest that the BETC program plays a critical role in attracting customers to participate. It also further illustrates that the program has had a significant influence in altering the contractors' business practices to include energy efficiency in their sales approach but fewer that actually include energy efficiency options in their bids.

Participant Demographics

Fifty percent of the vendors interviewed were business managers, while 30% were owners and 20% were involved in sales.

Table 3-5. Respondents' Role in their Company

Role in Company	# of Responses	% Responding
Owner	3	30%
Business Manager	5	50%
Sales Manager/Business Development	2	20%

Table 3-6 shows that Energy Trust projects represent anywhere from zero to more than 80% of the business for these vendors. These results are fairly distributed across all levels.

Table 3-6. Percent of Total Business Represented by Energy Trust Projects

% of total business do Energy Trust projects represents	# Responding	% Responding
0-25%	3	30%
26-50%	3	30%
51-75%	2	20%
76-100%	2	20%

Table 3-7 and Table 3-8 display the number of employees in these vendor firms and the number of employees assigned to Energy Trust projects. As these tables show, most of these participating contractors have less than 30 employees and have less than 15 employees assigned to Energy Trust projects.

Table 3-7. Number of Total Employees in Participating Firms

# of Employees	# of Companies	% of Distribution
5 or less	1	10%
6-15	6	60%
15-30	2	20%
More than 30	1	10%
Total	10	100%

Table 3-8. Number of Employees Assigned to Energy Trust Projects

# of Employees	# Assigned	% of Distribution
5 or less	9	90%
6-15	1	10%
15-30	0	0%
More than 30	0	0%
Total	10	100%

3.3.5 Regional Market Actors

As a way to provide additional insight into the operation of Energy Trust's PE Program, the Summit Blue team also conducted in-depth interview with representatives from three regional organizations:

- **Bonneville Power Authority** ("BPA") provides wholesale electricity and transmission to over 140 organizations across the Northwest, with a priority on serving municipal utilities, public utility districts, and cooperatives. Whereas Energy Trust directly implements energy efficiency programs for investor-owned utilities in Oregon, Bonneville provides the infrastructure needed to enable its customers to meet their portion of the region's energy efficiency target, as outlined in the Northwest Power and Conservation Council's Fifth Power Plan. Energy Trust and Bonneville work together on regional initiatives, including the Northwest Energy Efficiency Taskforce and the Northwest Energy Efficiency Alliance.

- **Northeast Energy Efficiency Alliance** is a private non-profit organization funded by Northwest utilities, Energy Trust, and BPA. NEEA and Energy Trust work in collaboration, along with NEEA's other stakeholders and market partners to accelerate the sustained market adoption of energy-efficient products, technologies and practices in the Northwest.
- **Oregon Department of Energy** administers the BETC.

A fourth organization, PacifiCorp, declined to participate in this interview.

These interviews with representatives from the regional organizations focused on the effects of recent changes in program administration, the current effectiveness of communication between Energy Trust and these organizations, and possible areas for collaboration.

Energy Trust Program Administration

All three respondents have been involved with Energy Trust's PE Program for a long period of time and were well aware of its program design and implementation. One respondent was actually involved in the original program design. All were aware of the recent change in program administration—a change that has been met with mixed reactions from the market actors.

Two respondents said that it was "too soon to tell" regarding the effects that the new staff has had on the program while one respondent believed that the change will further enhance the overall effectiveness of the program. None expressed concern regarding the change in program management.

> *"I think the change was positive…the staff became much more knowledgeable about the industrial customer."*

None of the respondents were able to provide any suggestions regarding how Energy Trust could enhance coordination with program delivery with other utilities.

Communication

All three respondents indicated that they did not engage in regular or ongoing communication with Energy Trust staff regarding the PE Program. Rather, it appeared that communication was more on an ad-hoc basis, but that has been reduced significantly in the past few months due to changes both at Energy Trust and also NEEA.

> *"We do not interact very frequently with Energy Trust and even less now that [the previous program manager] has left... we used to have quarterly meetings but ideally we should get together once a month."*

> *"We had a lot of interface with (the previous program manager) and when the Alliance would have its meetings, we would meet for breakfast before had to catch up and discuss projects…The staff has always been helpful and professional and have a positive attitude. It is a great network."*

All the respondents also indicated that they would like to develop a more formal communications process with Energy Trust staff that would encourage additional collaboration with these organizations. All three respondents said they wanted to work more closely with Energy Trust staff in delivering programs to industrial customers, but were unsure as to how best to achieve this objective.

“I think there should be a close working relationship with the Energy Trust and we should be collaborating more closely… I did feel like they could have used (our) resources and we could collaborate more closely on the food processing project. I would like to have more interest and feedback”

“We saw some opportunities to collaborate in small compressed air project and we all cooperated with the trade allies/vendors.. we got together to exchange information and that was valuable.”

These respondents also admitted that sometimes their own organizations are also barriers to collaborating more fully with the Energy Trust. This is especially true for organizations with close ties to large industrial customers in specific territories.

“We talked about ways to do that…the problem in the industry sector is that the serving utility is very protective of the customer and don’t want somebody else in the relationship.”

Collaboration is more of a sticking point regarding the BETC program. Program differences have created some challenges for the program staff, vendors and customers. There have been several cases of customers sending application forms to the wrong program (i.e., PE or BETC) and the customer ends up not receiving the BETC. This confusion is increased because the customer perceives that the PE Program and BETC are the same, when in fact, they have different requirements and qualifying criteria. These differences make it hard for the two programs to work harmoniously together, which has led to tension among vendors, customers, and staff in both organizations.

“We are constantly being asked to streamline BETC. In general, we are trying to do the same thing as Energy Trust’s program but we have different evaluation criteria…Energy Trust wants to market this as the same program, but it isn’t. …projects that qualify for Energy Trust’s program, may not qualify for BETC …these are two different programs, but they don’t always mesh.”

There is a perception on the part of the BETC staff that the program delivery approach does not meet the extensive contract procurement requirements for municipalities. Municipalities have to conform to a variety of legal requirements that address such issues as competitive bidding and conflicts of interest. They believe that because the PE Program projects are identified by the PDCs and ATACs that the municipalities that participate may be not be in strict compliance with all legal requirements and under the current operations municipalities are either precluded from receiving funds from the PE Program, or alternatively, would have to establish a separate procurement policy that conforms to their standards in order to be eligible to receive these funds. So until these issues have been resolved, this respondent would prefer to market these programs separately rather than jointly

“The vendors use BETC to sell the program. That creates issues for us. There are problems with the way Energy Trust wants to deliver program and the Energy Trust and vendors are not meeting the Oregon [legal] requirements.”

However, these respondents did identify other possibilities for collaboration with these organizations. In particular, the respondents would like to have a more formalized approach in developing a joint offering in the food processing, compressed air, and waste water programs. These respondents view Energy Trust as an ideal way to “pilot” programs for industrial customers before launching them on a regional basis.

"We want to develop standardized programs for customers and vendors in multi-states."

"In general, we would like to have more of a two-way dialog with them and set savings goals together."

Suggestions for Program Improvement

These respondents also offered suggestions on the ways in which Energy Trust could continue to improve its product offerings to industrial customers. These recommendations included developing a program specifically for municipalities that would meet the specialized procurement needs of these organizations. This is especially important given the energy efficiency savings potential in municipal waste water treatment facilities.

"Energy Trust needs to design a program for municipalities that complies with the procurement and RFP requirements... Energy Trust has to provide some type of template to meet the public entities' needs/requirements."

Another recommendation is for Energy Trust to take a more proactive approach in both designing and testing program offerings in the region. Two respondents indicated they would like to be able to leverage Energy Trust's program design across the entire region as a way to develop a more consistent and standardized approach.

"I think Energy Trust should be a catalyst to initiate activities, and they could start in Oregon and then branch into other states in the industrial sector. I want the Energy Trust to step up and show leadership. I am also wondering if we could hire them to help them set up programs. We waste so much time transferring knowledge it would be better if they just could set up a turn-key program for us."

Overall, these respondents believe that Energy Trust staff does a good job of working with other regional organizations, their customers, and vendors. However, they emphasized the need to collaborate more fully on program delivery, develop a more formalized communication process among these organizations, and want Energy Trust to become a leader in the region for these types of programs. However, these respondents also recognize the difficulties of collaborating effectively when dealing with the differing needs of vendors, customers, and regional organizations.

"95% of the time, the program works great and 5% of the time it is a train wreck."

"Collaboration is damn hard…we interfaced on compressed air and in market characterization study and we get more information that way…we've done some things but it takes a lot of communication and effort to bring a regional voice."

3.3.6 Custom Participants

Summit Blue completed 40 surveys of PE custom program participants from 2008. The survey results for this group are presented in this section of the report. When possible, these results are compared to the results from 2006 Production Efficiency Program Process and Impact Evaluation. Because the survey instrument was modified and improved between the two evaluations, the results do not line up perfectly in all cases. These comparisons were only made with the custom participants and not the small participants because the 2006 program was arguably had more large participants before the SII was undertaken.

The types of equipment replaced through the program include: air compressors, lighting, motors, primary process equipment and pumps (See Table 3-9, below).

Table 3-9. Types of measures installed under PE Custom Program

Measure Description	Number of Participants	Percent of total
Custom Compressed Air	11	28%
Custom Air Abatement	5	13%
Custom Primary Process	5	13%
Custom Pumping	4	10%
Custom Refrigeration	4	10%
Custom HVAC	3	8%
Custom Waste Water	2	5%
Lighting	3	0%
Detailed Study	1	3%
Custom Motors	1	3%
Custom Secondary Process	1	3%
Total	40	100%

Most participants generally were very satisfied with their program experience, learned more about energy efficient practices because they participated, and would participate again in the future.

Program Awareness

Most of the PE custom participants had been familiar with the Energy Trust for several years prior to receiving an incentive in 2008.

Table 3-10. PE Custom Participants awareness of the Energy Trust: 2008 and 2006

When did they first hear about the Energy Trust?	Number of responses (2008)	Percent of Total (2008)	Percent of Total (2006)
During same year	7	18%	NA
In the past 2 years or so	7	18%	28%
2-4 years ago	6	15%	52%
5 years or more ago	20	50%	15%
Total	40	100%	NA

Only 18% (7 out of 40) heard of the Energy Trust for the first time in 2008. Close to two-thirds (26 out of 40) had heard of the Energy Trust two years ago or longer. In 2006, program awareness levels were similar: Nearly two-thirds of the respondents (65%) had heard of the Energy Trust programs for more than two years (prior to participating) in 2008, which compares with 67% in 2008.

The vast majority (96%) of respondents also said that the vendors who provided the equipment (for which the participants received a financial incentive) were familiar with the Energy Trust. This compares with 80%, in 2006.

The PE Program increased participant awareness of both (a) the high-efficiency equipment installed and (b) Energy Trust efficiency programs, as illustrated by the self-reported data on awareness of these items before and after participating in the PE Program. Table 3-11, below, shows that roughly 40% (16 out 40) of the participants had *little or no prior awareness* of the energy efficient equipment that they ultimately installed through the PE Program. After participating in the Program, that number was reduced to zero.[8] (This question was not asked in the 2006 survey).

[8] Awareness was measured on a sale of 1-5, with 5 representing the greatest level of awareness.

Table 3-11. Change in awareness of energy efficient equipment (on a 1-5 scale)

Level of Awareness (Before and After Participation)	Equipment Installed (Prior to program participation) Number of times cited	Equipment Installed (After program participation) Number of times cited
Very Unaware	4	0
Unaware	5	0
Neither Aware Nor Unaware	7	0
Aware	5	5
Very Aware	18	35

Program participants went through a very similar learning curve regarding Energy Trust efficiency services. Table 3-12, below, using the same 1-5 scale as the preceding table, shows that almost half of the participants had *little or no prior awareness* of the energy efficiency services offered by Energy Trust. After participating in the program, that number was reduced again to zero.

Table 3-12. Change in awareness of Energy Trust efficiency services

Level of Awareness (Before and After Participation)	Energy Trust Efficiency Services (Prior)	Energy Trust Efficiency Services (After)
Very Unaware	4	0
Unaware	4	0
Neither Aware Nor Unaware	9	0
Aware	7	5
Very Aware	16	35

Satisfaction with the PE Custom Program

In this section, we analyze the PE custom participants' motivation for participating in and overall satisfaction with the PE Program. Table 3-13, below, shows the response rate for the multiple reasons cited for participating in the Energy Trust PE Program.

Table 3-13. Reasons for Participating in the PE Program –2008 and 2006

Reasons for Participating in the PE Program	Number of times cited (2008)	Percent of total (2008)	Percent of total (2006)
Energy cost savings	38	95%	90%
Incentive Amount	32	80%	NA
Improved reliability	32	80%	NA
Corporate policy	32	80%	17%
Efficiency features are common practice for this application	31	78%	6%
Improve production/process efficiency	28	70%	75%
Other (please specify):	27	68%	NA
Vendor/contractor recommended	26	65%	10%
Other cost savings (labor, O&M, improved scheduling)	18	45%	26%
Support a change in production level	16	40%	NA
Program representative recommended	16	40%	3%
Replace failed equipment	14	35%	9%
Product quality	14	35%	NA
Safety	12	30%	7%
Code or regulations	3	8%	2%

Respondents cited numerous reasons for participating in the PE Program in 2008 (multiple answers were allowed). As the table above shows, the top several reasons cited for participating in the PE Program are spread across a few important motivation areas (not just limited to energy savings and the incentive amount, which were the top reasons), including: improved reliability, improved production, corporate policy, and recommended by contractor/program representative.

In general, the motivational factors are similar in 2008 to those cited in 2006, with some important differences[9]. Cost savings were cited as the first (most important) reason for participating 90% of the time in 2006 (compared to 95% in 2008). Production improvements were cited 75% of the time in 2006 (compared to 70% in 2008).

The significant changes between 2006 and 2008 occur with corporate policy, vendor recommendation, other cost savings, program contact recommendation, safety, and replacing failed equipment. In 2006, only 17% cited corporate policy as a driver for participating in the PE Program. In 2008, that percent was up to 80%. There was a similar jump related to vendor recommendations. In 2006, vendor recommendations were cited only 17% of the time (as a reason for participating in the PE Program), whereas in 2008 that number more than tripled (to 65%). Likewise, other cost savings (labor, O&M, improved scheduling) were cited 25% of the time in 2006. In 2008, this number almost doubled (to 45%). Safety, which had been cited only 7% of the time in 2006, was cited 30% of the time in 2008. Replacing failed equipment, which had been cited only 9% of the time in 2006, was cited 35% of the time in 2008. Finally, respondents suggested that they had participated in the PE Program in 2006 due to recommendations made by program representatives 3% of the time. This number increased by more than an order of magnitude in 2008, up to 40% of the time.

About one-fifth of the custom participants first considered implementing the project (for which they received Production Efficiency incentive) in 2008, the same year in which they received the incentive (See Figure 3-6 below). This finding suggests that the Energy Trust was able to help many custom participants implement the project in the same year they first considered it. At the other end of the scale, almost one-quarter of the participants had first considered the project five years prior to participating in the program. This finding suggests that the Energy Trust was able to help finance projects which had been considered for many years and may have required financial or technical assistance.[10] These time lines are very similar to the timelines reported in 2006. More than two-thirds of the respondents in 2006 reported having first thought of the projects two or more years before actually implementing the project.

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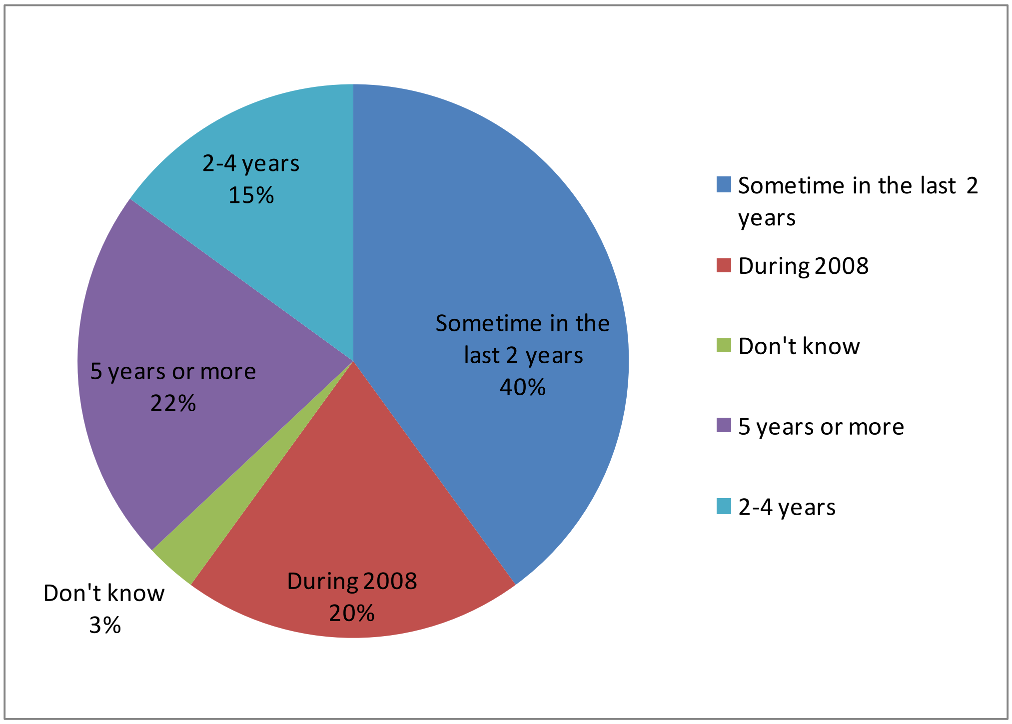
[9] Because the list of possible reasons were not identical between the two surveys, some points of comparison between 2006 and 2008 are not possible.

10 We did not inquire as to why there was a large time gap for some participants (between when they first considered the project and when they participated in the PE Custom Program). One possible explanation is that participants had been busy upgrading other equipment in those intervening years.

Figure 3-6. When program participants first considered the efficiency project



Participants rated their level of satisfaction with different aspects of the program very highly. On a 1-5 scale, with 5 being the highest rating, the program scored an impressive mean of 4.2 or higher on each aspect reviewed. The participants were very satisfied with the new equipment they installed (ranking it at 4.8).

Table 3-14. Program satisfaction (1-5 scale)

Aspect of Program	Mean Level of Satisfaction	Frequency: 1	Frequency: 2	Frequency: 3	Frequency: 4	Frequency: 5	Total Responses
Performance of equipment	4.8	0	0	0	7	33	40
Electricity Savings	4.7	0	0	0	8	26	34
Incentive Amount	4.6	0	1	1	10	28	40
Timeliness of incentive payment	4.5	1	0	2	10	26	39
Application process	4.2	0	1	8	13	17	39
Quality of work conducted by vendor	4.6	0	0	4	7	29	40
Overall program experience	4.6	0	0	1	13	26	40
Issues that needed resolution	4.1	1	2	1	10	10	24

These results are similar to the results in 2006, at which time there was also a high level of satisfaction for each aspect of the program. To make the comparison between 2008 and 2006 easier to view, the data is boiled down and provided below.

Table 3-15. Program satisfaction – Percent "satisfied" or "very satisfied" in 2008 and 2006

Aspect of Program	2008	2006
Performance of equipment	100%	92%
Electricity Savings	100%	91%
Incentive Amount	95%	87%
Timeliness of incentive payment	92%	NA
Application process	77%	84%
Quality of work conducted by vendor	90%	92%
Overall program experience	98%	94%
Issues that needed resolution	83%	74%

Program participants were generally very pleased with program, according to the survey results for both 2008 and 2006. In fact, satisfaction levels related to performance of equipment, electricity savings, incentive amount, overall program experience and issues that needed resolution all increased. Satisfaction levels with the quality of work provided by the vendor dropped a couple points, and satisfaction levels with the application process actually decreased from 84% to 77% (still arguably very high).

When a customer rated any aspect of the program below 3.0, they were asked how the program could be improved in that area. One salient comment on how to improve the PE Program focused on the application and approval process:

"The person who's in charge of evaluating the project should respond in a timely manner. It took our person 5 or 6 months to respond. It was a hardship when we were expecting a turn-around time within a month of finishing. Person seemed to want to re-evaluate project for approval instead of doing the final inspection of the project."

Other comments were:

"Streamline steps and increase ability to combine multiple measures."

"Have vendors/staff more educated on issues pertaining to the agriculture sector. [Our PDC] had great difficulty in coming to a whole plan due to lack of experience."

"Speed up the time between inspection and final write up. Our person seemed fairly incompetent."

There was almost no confusion about the PE Program. Only one participant in 40 claimed to experience any significant confusion. When there was confusion, it was related to: who makes program decisions, accuracy of information from program contact, whom to call and areas of expertise of program contacts. This appears to represent progress compared to the 2006 results, in which 17% of the respondents claimed that confusion with the program process actually caused some problems.

In general, custom participants didn't have strong desires for the program to offer additional services. Roughly 30% did say they wished it offered more facilitation (assistance with completing program applications, specifying equipment, etc.) and training, but did not specify what kind of facilitation or training they would like to see. Though participant satisfaction was very high, a few insightful comments were made about additional program services:

"More education on agricultural issues and needs (for vendors) would help."

"Explaining the process. How to compute the savings and rebates doesn't seem concrete."

"Less rigidity--larger projects tend to be unique, especially if they're process driven. It would be good if the ETO had more flexibility for special projects within a given industry."

"Like to see more classes from the Energy Trust for our staff for new programs and incentives to keep current and hear about possible savings and incentives coming."

Participants also gave some suggestions for how to improve the marketing materials and marketing efforts of the program:

"Use clearer vocabulary. Frequent use of acronyms makes information hard to understand for customers."

"I get marketing from PGE newsletter and representatives and that's working well."

"Make improvements to the website and provide more examples of other projects for a baseline."

"Might want to consider sending e-mail to participants monthly/quarterly to remind about things that we couldn't take advantage of when first heard about it."

"More broad notification of availability of incentives. The Energy Trust could make use of the League of Oregon Cities, The Oregon Association of Counties, The Association of Clean Water Agencies (AWWA, and APWA), etc."

"More printed materials rather than just on the internet, flyers and posters that can be put up to make workforce more aware. Seminars on offerings would be nice. We'd like to host a seminar to educate our people and the community."

"Some of the rural electric associations need more information on the programs."

"We don't get a lot of marketing materials; we mostly see stuff from our vendors. More literature from ETO directly would be nice."

"Having an example of a completed form for similar projects would help."

All 40 of the participants said that they would participate in the program again.

Program Contact and Vendor Involvement (in the PE Program)

Most custom participants (82%) were able to identify a key contact person (by name) during the interview. Almost 90% said that their program contact is someone they would think of calling if they had a question about purchasing new equipment or making a facility change. Finally, they rated their program contact's "understanding of the challenges (they) face in operating (their) specific facility" very highly, at a mean of 7.6 on a 10-point scale. This question was not posed in 2006, but the results of this question are similar to results found in 2006. In 2006, nearly two-thirds of respondents (71%) said either their program contact had an "excellent" understanding of the challenges they face in operating their facility or that their program contact "understands quite a lot".

Roughly 85% of the custom participants said that their vendors were familiar with the PE Program. Moreover, as shown in Table 3-16, over 70% of the participants claimed that their equipment vendors encouraged them to participate in the Energy Trust PE Programs in the 2008 survey. This represents a fairly steep climb from 2006, when only 54% of respondents suggested that vendors had encouraged them to participate in the program.

Table 3-16. Vendor encouragement: 2008 and 2006

Vendor Encouragement	Number of times cited	Percent of Total (2008)	Percent of Total (2006)
Encouraged participation	28	70%	54%
Neither encouraged nor discouraged participation	9	22%	17%
Identified pros and cons	NA	NA	7%
Discouraged participation	0	0%	0%
No opinion	3	8%	22%
Total	40	100%	100%

Business Energy Tax Credit

Almost 85% of the custom participants filed for a BETC (in the same year as receiving the incentive), which represents a slight increase from 2006 (when only 78% filed for BETC).

The few who did not file for a BETC suggested a few reasons why they didn't:

"BETC application seemed too difficult or time consuming."

"Reasons internal to company that don't pertain to Program."

"We had no profits to get a tax credit for."

When asked whether the Energy Trust incentive or the BETC had greater influence on their decision to buy efficient equipment, over half (52%) of the participants said the Energy Trust incentive held the greater influence. The other 48% commented that the Energy Trust incentive and the BETC had equal influence on their decision. These results are similar to 2006 results, when 93% said the same thing. However, in 2006, 7% commented that the BETC had a greater influence, whereas in 2008, none made that comment.

Participants were asked which program, the Energy Trust PE Program or BETC, was easier to participate in. Almost half claimed that the PE Program was easier to participate in than the BETC, though 25% thought they were equally difficult/easy, and a few thought BETC was easier. (This question was not posed in 2006, therefore no comparison is available).

Table 3-17. Ease of Program Participation: PE Program vs. BETC

Comparison between BETC and PE Program	Number of times cited	Percent of total
BETC was easier than the PE Program	4	13%
The PE Program was easier than the BETC	18	56%
BETC & PE Program were equally easy to participate in	6	19%
BETC & PE Program were equally difficult to participate in	4	13%
Total	32	100%

The verbatim comments provided about how participants perceive the pros and cons of these two programs are telling:

"I am more familiar with the Production Efficiency (Custom) program. Corporate takes care of the BETC."

"Because I get a response from the ETO but have a hard time getting a response from BETC."

"Being an S-Corp, the BETC program became a problem."

"BETC takes lots of time and paperwork and then it takes five years to pay."

"The application with BETC is easier than ETO but harder to get the money on the other end."

"The paperwork was done by the consultant and the payment is complete. With the BETC the process is strung out over 5 years."

Customer Energy Management Practices

Program participants have engaged in numerous activities to control energy consumption in the past two years. As shown in Table 3-18, 15% have purchased energy efficient equipment in the past two years (without any financial incentives). Seven percent have sent staff to energy management training workshops and 6% have developed energy plans. (This question was not posed in 2006).

Table 3-18. Energy Management Practices

Energy Management Activities	Number of times cited (2008)	Percent of Total (2008)	Percent of Total (2006)
Purchased energy efficient equipment	40	100%	NA
Track energy use	36	90%	NA
Manage motors (repair/replace critical motors when they fail)	36	90%	NA
Conduct an energy assessment of specific equipment systems	33	83%	NA
Conduct a plant-wide energy assessment	23	58%	NA
Sent staff to energy management training	18	45%	23%
Develop corporate policies for energy efficiency for procedures/operations	18	45%	25%
Create a committee or team that addresses energy	17	43%	NA
Develop an energy plan	17	43%	5%
Hire/assign staff responsible for energy use/efficiency	15	38%	50%
Use energy scorecard to track key performance indicators for energy	13	33%	NA
Informal	NA	NA	7%
Use an asset management system	5	13%	NA

Because the two surveys differed, in terms of the set of energy management practices that was queried, not all practices could be compared. A few interesting differences do emerge, however. For example, the number of times "sending staff to energy training" was cited almost doubled from the 2006 survey to the 2008 survey. The number of times "develop corporate policies for energy efficiency for procedures/operations" was cited also almost doubled in the same period. Whereas only 5% reported that they had developed energy management plans as a result of participating in the PE Program in 2006, over 40% said they had done so as a result of participating in the PE Program in 2008, which represents a very significant increase. In what appears to be an opposite trend, however, a lesser percent (38%) of respondents claimed (in the survey for the 2008 program) that they had hired staff specifically responsible for energy and energy efficiency than those who said the same thing in 2006. One possible reason for this is that a number of firms that had hired energy staff as a result of participating in the program in 2006 were then repeat participants in 2008, meaning they had already taken this step as a result of their previous program experience.

Of the 18 firms that sent staff to energy management trainings in 2008, close to 85% of them had actually implemented energy management practices. Of the 17 firms that said they developed energy management plans, almost 70% have plans that use *numeric* metrics and goals. Some of the energy plans are described below, highlighting how energy management strategies vary from firm to firm:

"We are striving for a 3% reduction in gas and electric each year on a 'per sq. ft. in production basis'."

"5% of total energy cost from last year."

"Done process by process. We focus on high energy output first--aeration and cogeneration."

"Reduce consumption 20% over 5 years."

Seventeen firms also said they track energy use. When asked about the frequency at which they track energy consumption in their facilities, many gave multiple answers (e.g., daily and monthly).[11] Whereas only one firm said they tracked annually, bi-annually or hourly, three said they track daily and 19 said they track monthly.

Different types of equipment lend themselves to different tracking practices, as illustrated in the verbatim comments made:

"After a specific project installation, we track that piece of equipment for confirmation."

"We track daily on some items and monthly on others."

"Some equipment daily, some weekly, and all monthly."

Almost two-thirds (60%) of the participants have heard of *ISO* (9000 or 14000 or 14001), *Six Sigma* (58%) and *TQM* (53%).

[11] The survey did not distinguish between how often Program Participants *analyze and review* energy consumption and how often they *record and collect* data. Future evaluations should distinguish between these two activities.

Table 3-19. Awareness of improvement methods

Type of improvement method	Number that have heard of it	Number that are doing it	Number that are planning to do it
ISO	60%	33%	3%
Six Sigma	58%	20%	8%
TQM	53%	23%	3%

A few program participants surveyed are already implementing at least one of these improvement methods, and a small number is planning to do so in the future.

Finally, participants were asked to provide any closing or additional remarks about the PE Program. These comments suggest several ideas to keep in mind going forward:

"Please keep it going. It's a great benefit to us keeping us competitive in the global market."

"Without programs like this cities with their budget limitations wouldn't be able to move ahead very effectively with energy efficient projects."

"More effort to understand needs of agricultural sector is necessary."

"It's a great program that benefits a lot of people, not just the people who receive the incentives. It promotes energy efficiency in many arenas, not just among program participants."

3.3.7 Small Industrial Initiative and Small Lighting Participants

Summit Blue completed 67 surveys with small lighting and SII participants in the Energy Trust's 2008 Production Efficiency Program. The participants were generally very satisfied with their program experience, thought the vendors were very knowledgeable, and believed the application process went smoothly (with some exceptions, of course). They increased their knowledge about efficiency by participating in the PE Program, they claimed the energy savings estimates were largely very accurate, and they have adopted more efficiency goals and practices as a result of their program experience.

The sample surveyed included customers who had participated in eight program areas, as shown in Table 3-20 below.

Table 3-20. Breakdown of sample, by program area

Program Area	Frequency	Percent of Total
Study Only	3	4%
Compressed Air	15	22%
Custom Lighting	2	3%
Custom Primary Process	2	3%
Pumps	8	12%
Irrigation	2	3%
Lighting	34	51%
Motors	1	1%
Total	67	100%

Lighting was the most common technology type (34 participants, or about 51% of the total sample), followed by compressed air (15 of 67).

Program Awareness

Though more than half (57%) of the small program participants had first heard of the Energy Trust from equipment vendors, and another 8% heard of the Energy Trust through utility representatives, almost one-third (30%) heard of it through "other" channels, suggesting that awareness of the Energy Trust trickles through numerous, diverse channels. Included in the 20 or so verbatim comments offered on how customers first heard of the Energy Trust were:

- through advertisement,
- through an engineer,
- from a flier,
- through an electrician,
- from an enclosure on electric bill, and
- from the Oregon Dairy Farmer's Board.

Advertising was cited only 1.5% of the time.

Participants often took initiative themselves to participate in the PE Program. Close to 42% of the survey respondents suggested that they themselves were the party who first thought of working with the Energy Trust. Vendors or contractors were cited about one-third (34%) of the time as suggesting to engage with the Energy Trust. Utilities (cited 3% of the time) and "Cascade Engineering or other program contact" (cited 1.5% of the time) both proved to be less important in this role. The vast majority (96%) of respondents also said that the vendors who provided the equipment (for which the customers received a PE Program financial incentive) were familiar with the Energy Trust.

The PE Program increased small participant awareness of both the high-efficiency equipment installed and utility efficiency programs, as illustrated by the self-reported data on awareness of these items before and after participating in the PE Program. Table 3-21 shows that roughly 41% (27 out 66) of the respondents had little or no awareness of the energy efficient equipment that they ultimately installed through the PE Program, prior to participating in the program. After participating in the program, that number was reduced to less than 5%.

Table 3-21. Change in awareness of energy efficient equipment (on a 1-5 scale)

Level of Awareness (Before and After Participation)	Equipment Installed (Prior to program participation) Number of times cited	Equipment Installed (After program participation) Number of times cited
Very Unaware	8	1
Unaware	6	0
Neither Aware Nor Unaware	13	2
Aware	23	17
Very Aware	16	46

Program participants went through a very similar learning curve regarding utility efficiency services. Table 3-22, using the same 1-5 scale as the preceding table, shows that roughly 43% of participants (29 of 66) had little or no awareness of the energy efficiency services offered by Energy Trust, prior to participating in the program. After participating in the program, that number was reduced, again, to less than 5%.

Table 3-22. Change in awareness of Energy Trust efficiency services

Level of Awareness (Before and After Participation)	Energy Trust Efficiency Services (Prior to program participation) Number of times cited	Energy Trust Efficiency Services (After program participation) Number of times cited
Very Unaware (1)	11	1
Unaware (2)	8	0
Neither Aware Nor Unaware (3)	10	1
Aware (4)	24	20
Very Aware (5)	13	44

Satisfaction with the Production Efficiency Program

In this section, we analyze small participants' motivation for participating in and overall satisfaction with the PE Program. Table 3-23, below, shows the response rate for the multiple reasons cited for participating in the Energy Trust program.

Table 3-23. Reasons for Participating in the PE Program

Reason for Participating in the PE Program	Number of times cited	Percent of total
Energy cost savings	58	87%
Incentive Amount	37	55%
Product quality	25	37%
Improve production/process efficiency	23	34%
Improved reliability	19	28%
Replace failed equipment	18	27%
Vendor/contractor recommended	18	27%
Other cost savings (labor, O&M, improved scheduling)	16	24%
Efficiency features are common practice for this application	13	19%
Support a change in production level	11	16%
Other (please specify):	11	16%
Safety	10	15%
Code or regulations	4	6%
Program representative recommended	3	4%
Corporate policy	3	4%

In general, most respondents cited two or more reasons for participating in the PE Program. As this table shows, the top two reasons cited for participating in the PE Program are economic in nature: either (a) energy cost savings (87%) and (b) incentive amount (55%). There are numerous other reasons cited for participating, however, which have little or nothing to do with economics. Improving production and increasing product quality were each cited about one-third of the time. The fact that the program was recommended by vendors/contractors, to replace failed equipment, and to improve reliability are also each cited 7% of the time.

There were also a few “other” reasons (verbatim responses) given, including “to be more green and sustainable,” to get equipment that is “easier to maintain and fix,” to have “better lighting” and “to consolidate equipment”. These data suggest that, while economic reasons were the primary motivating factors for participating, other important process, environmental and equipment-maintenance purposes were also served.[12]

About one-third of the small participants first considered implementing the project (for which they received Energy Trust financing) in 2008, the same year in which they received the financing (See Figure 3-7 below). This finding suggests that the Energy Trust was able to help many small participants implement the project in the same year they first considered it. At the other end of the scale, about 10% of the participants had first considered the project five years prior to participating in the program. This finding suggests that the Energy Trust was able to help finance projects which had been considered for many years and may have required financial or technical assistance.[13]

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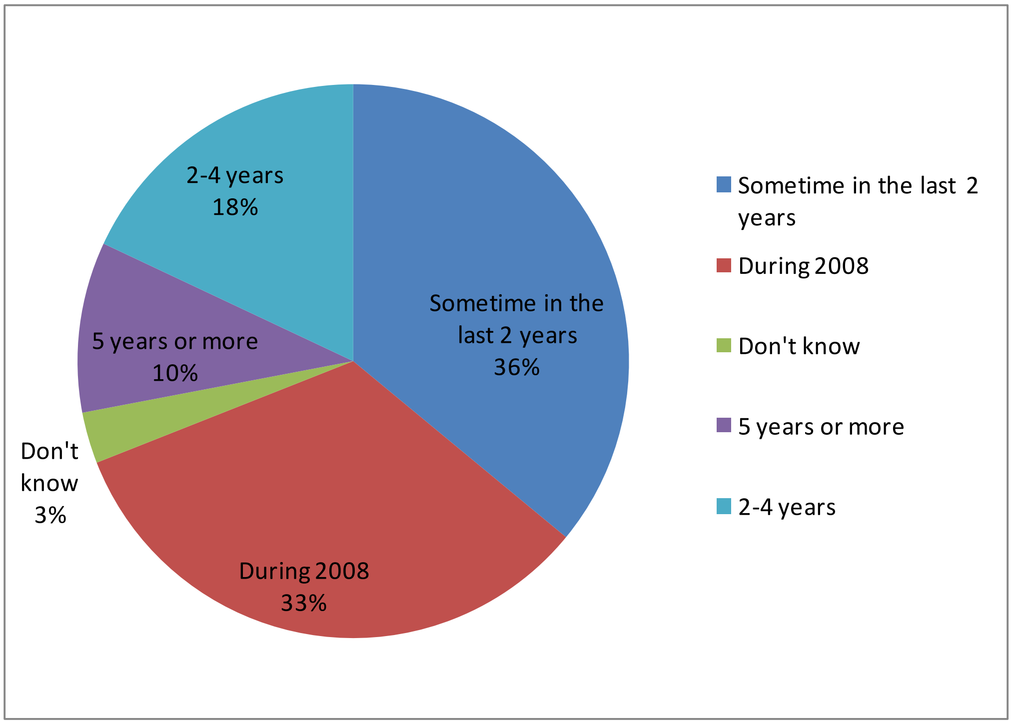
[12] These findings were again repeated when respondents were asked to identify the top three reasons for participating in the PE SII Program. Again, economic reasons were the most important, followed by production efficiency and product quality.

[13] We did not inquire as to why there was a large time gap for some participants (between when they first considered the project and when they participated in the SII). One possible explanation is that participants had been busy upgrading other equipment in those intervening years.

Figure 3-7. When program participants first considered the efficiency project



Participants rated their level of satisfaction with different aspects of the program very highly. On a 1-5 scale, with 5 being the highest rating, the program scored an impressive mean of 4.2 or higher on each aspect reviewed.

Figure 3-8. Program satisfaction (on a 1-5 scale)

Aspect of Program	Mean Level of Satisfaction	Frequency: 1	Frequency: 2	Frequency: 3	Frequency: 4	Frequency: 5	Total
Performance of equipment installed	4.7	0	0	2	14	50	66
Electricity Savings	4.7	0	0	3	12	47	62
Incentive Amount	4.7	0	0	3	12	51	66
Timeliness of incentive payment	4.6	0	2	3	16	43	64
Application process	4.2	0	2	2	18	34	56
Quality of work conducted by vendor	4.8	0	0	2	12	53	67
Overall program experience	4.7	0	0	2	15	50	67
Issues that needed resolution	4.7	0	1	3	4	33	41

When a customer rated any aspect of the program below 3.0, they were asked how the program could be improved in that area. Below are some of the key verbatim responses for program improvement. While there was a great deal of program satisfaction, the application process seemed to cause the most dissatisfaction for a few participants. In some cases, there was confusion as to what the rebate amount would be for the installation of certain equipment.

Regarding the application process:

"The application process did not seem consistent on how they (the Energy Trust staff) applied stuff. There was a lot of confusion and inconsistency. The process needs to be simplified. We had a hard time getting our vendor up on the program and getting anything done, and there seemed to be confusion between the vendor and the Energy Trust. It took a lot more time than we thought it should have."

"There were too many forms. It helped a lot once we got help from [our PDC] Engineering."

"It seemed like there could be simple, generic data about the project for what type of rebate will be available. It seemed that the vendor had to supply the Energy Trust with a lot of data they already should have known. I think the Trust made it too difficult for the vendor. We got different numbers at different times depending on who was working on it".

The vast majority (93%) of the participants experienced no (60%) or very little (33%) confusion. The 7% that experienced some confusion cited a few areas about which they were confused: project timelines, when products should be purchased, when deadlines were set, and why paperwork that had already been submitted was requested again.

Information was the top-cited service that participants would like to see offered by the PE Program, followed by more facilitation.

Table 3-24. Other services participants would like from the PE Program

Other possible services	Number of times cited	Percent of total
Training	1	1%
More facilitation	5	7%
Energy manager position	0	0%
Networking	0	0%
Information	7	10%
Don't know	54	81%
Total	67	100%

The verbatim comments about other services desired from the PE Program are more revealing:

"The program should cover more technologies."

"It would be nice to get funded for installing energy efficient motors for machines (rather than needing to buy a whole new machine)."

When asked to specify what kind of better information they want to see, participants named a few ideas:

"They could be clearer on what they are asking for on the forms."

"More information on how to get the federal tax rebates also."

"More information is needed up front about the overall process and what will be required."

"Outline of options and how to maximize incentive."

"Provide more cost saving ideas."

Small participants were also asked to suggest ways in which the PE Program, in general, could be improved. Though program satisfaction levels were extremely high, these participant comments shed light on some possible ideas for the future:

"They could have the state income tax all rolled into one form."

"E-mail updates on new programs as they arise."

"Explain the evaluation process."

"Higher incentives and shorter time frames."

"Simplify the process and make it more consistent."

"There is some resistance to pooling measures -- we would rather do all the measures at once and group them together into one line item."

"We would have liked more contact with the Energy Trust, rather than with the vendor."

Participants were also asked to provide more specific recommendations for how marketing materials and the application process could be improved. The following comments characterize the major themes heard, starting with marketing materials:

"Broaden scope of engineers they market the program to."

"Electricians should know more about the program and tell their customers."

"If I hadn't heard from my vendor, I wouldn't have heard about it at all. Needs more marketing to know it's out there."

"Put more on-line."

"There should be a guide/form for electricians telling them which equipment qualifies and what criteria meet the requirements."

The comments below were made about the forms required in the application process. In many cases, because the applications were filled out by the vendors, for most participants the application process was simple and largely unseen. The strongest of these recommendations come from participants who filled out their own paperwork.

"I didn't have to do anything. They came from [my PDC] and all I had to do was sign."

"There shouldn't be so many different forms. It's hard to figure out which ones we were supposed to fill out."

"Some of it is not oriented to farmers and it's all about stuff we wouldn't commonly use."

"They wanted you to load it onto a DVD or something and ship it. It wasn't really user friendly. It should have just been online where you could send it and just get confirmation."

Roughly 97% said they would participate in another program run by the Energy Trust, again confirming the high level of program satisfaction.

Vendor Knowledge of the Program

A total of 37 different vendors were named by the 67 participants surveyed. Whereas a small handful of vendors worked with multiple participants, most vendors worked with only one program participant in 2008. This suggests that most vendors' experience with the PE Program is fairly limited.

Small participants generally found the vendors to be very knowledgeable about the PE Program. Close to 75% said they thought their vendor was knowledgeable, 7% didn't think so, and 18% weren't sure. Vendors assisted participants by filling out the paperwork roughly 65% of the time, though 20% of the participants couldn't remember. Assuming they would have remembered actually filling out the forms, the percentage of times vendors filled out the paperwork was probably higher than 65%.

Over 80% said their vendor was easy to contact, and over 95% said that their vendor is someone they "would consider calling when (they) are considering an equipment purchase or facility change". Participants said the vendors explained the overall process and expected energy savings clearly both about 84% of the time and explained project costs and program incentives clearly about 86% of the time. Overall, vendor satisfaction levels were extremely high.

Energy Savings Estimates

About two-thirds of the small participants were familiar with the tools used by their vendors to estimate the energy savings for the equipment installed. Vendors used a variety of methods to present energy savings calculations to the participants (reports, charts, graphs and spreadsheets).

It seemed to the participants that the vendors who provided energy savings and program incentive estimates were themselves very familiar (4.4 mean on a 1-5 scale) with the tools they utilized. Roughly one-third of the respondents did not know if the energy savings estimate was accurate. Of the respondents who had a certain answer, 96% found the estimates to be accurate. Almost 99% found the estimates easy to understand, and in 96% of the cases the savings analysis supported their decision to invest in the energy efficient equipment. Participants rated their satisfaction with the estimate of energy savings at a mean of 8.6 (on a 10-point scale), suggesting a very high level of satisfaction with this aspect of the program. (This is a huge success for the program, in that a number of operational factors often make it difficult to predict, and measure, energy savings).

For one-third of the respondents, it is simply hard to know how effectively the measures have been performing relative to the original estimates. In some cases, the measure is mixed in with other equipment or other considerations make the effect difficult to isolate.

Participants were asked to suggest ways to improve the energy savings estimates. A few participants thought the estimates could have been more accurate. One participant summed it nicely, saying:

"There is no way to make the estimates better - there are too many variables, and only one meter."

Business Energy Tax Credit

Of the 91% who could remember whether they had applied for an Oregon Business Energy Tax Credit (BETC) on the equipment they installed through the PE Program, 90% claimed they had applied. Of the few participants who didn't apply, one still plans to, one knows their equipment won't qualify, one didn't know about the BETC, and two don't know why they didn't apply.

As shown in Table 3-25, the influence of the Energy Trust PE Program was a bit greater than the influence of the BETC (on participants' decision-making).

Table 3-25. Relative influence of PE Program and BETC

Comparison between BETC and PE Program	Number of times cited	Percent of total
BETC was easier than the PE Program	5	10%
The PE Program was easier than the BETC	10	20%
BETC & PE Program were equally easy to participate in	25	49%
BETC & PE Program were equally difficult to participate in	11	22%
Total	51	100%

Moreover, as shown in Table 3-26, the PE Program was found to be easier to participate in than the BETC:

Table 3-26. Relative ease of PE Program and BETC

Relative ease of program	Number of times cited	Percent of Total
BETC was easier than the PE Program	5	10%
The PE Program was easier than the BETC	17	35%
BETC & PE Program were equally easy to participate in	24	49%
BETC & PE Program were equally difficult to participate in	3	6%

The pros and cons of both the PE incentive and the BETC, as experienced by different small program participants, are illustrated in the variety of verbatim comments offered:

"Both were fairly simple, but the (SII) incentive was a larger amount of savings."

"The BETC takes a lot less paper work. You just submit the number of your certificate and take it right off your taxes."

"Only a couple pages (of forms) are required for BETC, but numerous for the SII incentive."

"The vendor (for the PE SII Program) did all the paperwork, so it was easy. The tax credit form needs an audit if you have more than $50K."

"They were both easy, hardly a difference. BETC was a little less cumbersome."

Customer Energy Management Practices

Most than half of the small PE Program participants have taken steps to control energy consumption in the past two years. Table 3-27 presents their list of actions. Purchasing energy efficient equipment and tracking energy use are the two top-cited actions.

Table 3-27. List of energy management actions taken in past two years

Actions to control energy consumption taken in past two years	Number of times cited	Percent of total
Purchased energy efficient equipment	35	52%
Track energy use	28	42%
None	25	37%
Develop an energy plan	15	22%
Manage motors through procedures to repair or replace critical motors when they fail	11	16%
Conduct a plant-wide energy assessment (audit, engineering review)	10	15%
Hire/assign staff responsible for energy use/efficiency	9	13%
Develop corporate policies for energy efficiency regarding procurement or operations	9	13%
Sent staff to energy management training	7	10%
Create a committee or team that addresses energy	5	7%
Develop an asset management system	5	7%
Use an energy scorecard to track key performance indicators for energy	3	4%

Of the seven that sent staff to energy management training, 86% said that energy management practices were adopted in their facility as a result. Of the 15 companies that developed energy management plans, one-third actually developed numerical goals. The goals are expressed in a few different metrics, as described in these salient comments below:

"To reduce energy by 5% in the next 12 months."

"Reduce energy use by 5% per year for 3 years."

"We have numerical goals based on kWh/cubic foot/month."

"We know what we want to do, but it varies for each piece of equipment. The most important thing is payback."

Of the 28 that said they have tracked energy use, the majority (18) said they track it one time per month (see Table 3-28, below).

Table 3-28. Tracking energy use

How often energy use is tracked	Number of times cited
Annually	2
Bi annually	1
Monthly	18
Daily	4
Every two weeks	1
Quarterly	1
Throughout the year	1

More than half of the participants (60%) have heard of *ISO* (9000 or 14000 or 14001), but less than half of the participants surveyed had heard of *Six Sigma* (43%) and *TQM* (49%).

Table 3-29. Awareness of improvement methods

Type of improvement method	Number that have heard of it	Number that are doing it	Number that are planning to do it
ISO	60%	12%	6%
Six Sigma	43%	9%	4%
TQM	48%	10%	3%

About 10% of the total number of participants surveyed is implementing any of these improvement methods. Another 3%-6% are planning to do so in the future.

Finally, small participants were asked to provide any closing or additional remarks about the PE Program. These comments suggest several ideas to keep in mind going forward:

"We appreciate Energy Trust of Oregon being there for us and would like to get in contact with them about another project."

"Wish it was all over the country... it is a great program."

"We're a small family farm. The incentive was very nice. Tax credit ended up being (worth) more, but both very helpful."

"I don't like that the ETO exists and I don't like public purpose funds are charged..."

Custom versus Small Participants Results

The PE Program was implemented very successfully in 2008 from both the custom and small program participant point of view. The participants reported very high levels of satisfaction for the programs overall and for a number of specific program features (incentive amount, energy savings, etc.). Awareness of the programs and knowledge about energy efficient equipment both increased as a result of the programs, and both vendors and program representatives were found to be helpful and well-informed in both programs. The energy savings forecasts were found to be reasonably accurate in both programs, and most participants felt that they understood most or all of the process.

The motivations for participating were also similar across both participant groups, in that the top reasons were similar (energy cost savings and incentive amount), but the table below shows some noteworthy differences between these two groups.

Table 3-30. Reasons for participating: Custom vs. Small Participants

Reasons for Participating in the Energy Trust Programs	Percent of Total (Custom Participants)	Percent of Total (Small Participants)
Energy cost savings	95%	87%
Incentive Amount	80%	55%
Improved reliability	80%	28%
Corporate policy	80%	4%
Efficiency features are common practice for this application	78%	19%
Improve production/process efficiency	70%	34%
Other (please specify):	68%	24%
Vendor/contractor recommended	65%	27%
Other cost savings (labor, O&M, improved scheduling)	45%	24%
Support a change in production level	40%	16%
Program representative recommended	40%	4%
Replace failed equipment	35%	27%
Product quality	35%	37%
Safety	30%	15%
Code or regulations	8%	6%
TOTAL	100%	100%

There are some dramatic differences between the custom and small participant results in terms of the motivations and driving forces for participating. In general, the custom participants are motivated by multiple factors significantly more than small participants.

For example, small participants cited “corporate policy” as a driver (in their decision to participate) 4% of the time. Corporate policy was cited as a motivating factor 80% of the time by the custom participants. Improved reliability was also less important to small participants. Improving process efficiency was also far less important to small participants (34%) than to custom participants (70%). Another enormous difference is in the area of program or vendor recommendations. For custom participants, vendor and program representative recommendations are much more influential than for small participants. Custom participants are also much more motivated by wanting to improve their process/production efficiency

(70%) compared to small participants (34%). Finally, the perception that "efficiency features are common practice for this application" was a much larger factor for custom participants (78%) compared to small participants (19%).

Custom and small participants have both implemented energy efficiency practices in the past two years, but in different ways. As shown in Table 3-31 below, custom participants generally are much more inclined to implement energy efficiency practices than small participants across all areas.

Table 3-31. Actions taken to manage energy use in the past two years

Actions to control energy consumption taken in past two years	Percent of total (Custom)	Percent of total (Small)
Purchased energy efficient equipment	100%	52%
Track energy use	90%	42%
None	0%	37%
Develop an energy plan	43%	22%
Manage motors through procedures to repair or replace critical motors when they fail	90%	16%
Conduct a plant-wide energy assessment (audit, engineering review)	58%	15%
Hire/assign staff responsible for energy use/efficiency	38%	13%
Develop corporate policies for energy efficiency regarding procurement or operations	45%	13%
Sent staff to energy management training	45%	10%
Create a committee or team that addresses energy	43%	7%
Develop an asset management system	13%	7%

Finally, the majority of participants in both programs applied for a BETC. Both groups said that the Energy Trust programs were more influential than the BETC, but both groups found the paperwork with BETC to be less burdensome.

3.3.8 Non-participants

This section reviews the perspective of customers who have been contacted by a PDC to participate in the program, but for whatever reasons the customer and PDC did not pursue a prospective project through the program. A small sample of these "contacted non-participants" were contacted by telephone and asked a slate of questions to better understand their non-participation decision and explore their business situation to identify how the program might better help bring projects to fruition. This indicative sample was intended to obtain supplemental information to update the broader non-participant survey conducted in the previous evaluation.

The purpose of the non-participant survey was several-fold, including appropriate comparisons with the 2006 evaluation:

- Get a sense of these non-participants' awareness of the Energy Trust and the PE Program;
- Research these customers' energy practices and policies, to update information on how the program might connect with customers through their energy practices and policies;
- Update the Energy Trust's understanding of these customers' interest, knowledge and experience with energy efficiency; and
- Continue to track the investment decision processes non-participating customers use.

To accomplish the nonparticipant survey task, a sample pool of 37 unique customers was drawn from the records of Program Delivery Contractors.[14] The list was of customers PDCs had approached about prospective projects, but for some reason had not continued to completion with the project. All customers but three in the sample pool were contacted to participate in the survey. Of the 34 prospective respondents for which contact was attempted, 16 were interviewed between mid-April and mid-May, 2009, for an overall 47% response rate. Table 3-32 indicates the disposition of the non-participant surveys.

Where appropriate, comparisons were drawn to the results of the most recent survey of non-participants conducted in 2006. It should be noted that in the 2006 survey, the non-participants had had no contact with the PE Program where in this study the non-participants had received some program services. Because improvements are made to the survey instruments after each evaluation, there may not be direct alignment between the format and selections for a particular question.

Table 3-32. Disposition of Non-participant Surveys

DISPOSITION		TOTAL
Surveyed		16
Refused		2
	Already Participated and interviewed for another project	2
	Out of business (1), wrong number (4), or contact no longer available (3)	8
List Errors	Completing their projects; no longer non-participants	1
	Duplicates in sample pool	3
	Attempts failed	5
No contact made	No attempt	3
Total		40

[14] Forty total customers were provided by the PDCs but 3 were duplicates.

At least one customer of each of the active PDCs was surveyed.

Respondents' Roles

A wide variety of roles was represented by the survey respondents. A number of respondents indicated they have changed roles recently, primarily in terms of having to take on additional responsibilities as their businesses have been downsized in the recession economy (see Table 3-33). Roughly one-third of the businesses surveyed have facilities in more than one location in Oregon.

Table 3-33. Roles of Respondents in Their Businesses

	Frequency	Percent
Plant facilities or corporate engineer	3	19
Plant Manager	1	6
Facilities Manager	2	13
Other	10	62

Those respondents who answered "Other" most often described themselves as Consultants. Other roles included purchasing, quality, and regional manager. There was a greater fraction of professionals and middle managers interviewed compared to the 2006 evaluation: nearly 2/3 of those interviewed in the 2006 evaluation were top managers, while the current evaluation interviewed mostly professional and middle management staff.

Program Awareness

All respondents were aware of Energy Trust, and all but three were aware of the Production Efficiency Program. Most respondents have known about the program for more than two years and, in fact, more than one-third have known about the program for five years or longer (see Table 3-34). The 2006 evaluation found a lower awareness level, with about two-thirds of the 2006 interviewees being aware of the Energy Trust, and under ten percent being aware of the Production Efficiency program at that time. This comparison may be skewed, however, by the approach used in the current evaluation, whereby all those interviewed in the current evaluation had been contacted by the program.

Table 3-34. When Respondents First Became Aware of the Program

	Frequency	Percent
During 2008	2	14
Sometime in the past 2 years	3	21
2-4 years	3	21
5 Years or more	6	43

Respondents heard about the program primarily through word of mouth from program, equipment vendors and utility representatives, as shown in Table 3-35. Thus, program contacts with these respondents have been mostly proactive from the program channels, not from customers seeking out the program.

Table 3-35. Source of Initial Program Awareness

	Frequency	Percent
Program representative	1	7
Utility representative	5	36
Equipment representative	4	29
Word of mouth	1	7
Other	3	21

Potential for Program Participation

Respondents were asked several questions related to the potential for program participation, including their perceptions of energy efficiency opportunities at their facility, program incentives they have applied for recently and whether they had purchased energy-efficient equipment recently but have done so independently of any efficiency programs.

Respondents generally (nearly 90%) believe there is at least some opportunity to reduce energy usage at their facility in the coming years (Table 3-36). The 2006 evaluation had a smaller fraction of interviewees seeing "significant" opportunity for future energy usage reductions (28%) compared to 44% in the current evaluation seeing a significant opportunity for such reductions – and none of the current evaluation's interviewees saw no opportunity or didn't know what the opportunity might be.

Table 3-36. Perceived Opportunity for Future Energy Usage Reductions

	Frequency	Percent
Significant opportunity	7	44
Some opportunity	7	44
Little opportunity	2	12

Just over one-third of respondents stated their company had applied for or received incentives or tax credits for energy efficiency improvements in the last two years, as shown in Table 3-37. Those companies that had done so utilized a variety of programs including the PE Program, the Oregon Energy Tax Credits (BETC) and federal government incentives/credits. All but one respondent (i.e., over 90%) had heard of the BETC offering – up from the 70% who were aware as reported in the 2006 evaluation.

Table 3-37. Incentives or Tax Credits for Efficiency Improvements – last 2 Years

	Frequency	Percent
Yes	6	38
No	9	56
Don’t know	1	6

Half the respondents stated their company had not purchased energy efficiency equipment in the last two years independently of any energy efficiency program, about the same fraction as reported in the 2006 evaluation. Some had just not bought much, if any, capital equipment. Others bought standard-efficiency equipment instead because of inadequate capital or too long a payback on the efficient equipment option.

Reasons for not applying for available incentives or tax credits were various, as shown in Table 3-38. There were comments that customers don’t want to bother with the hassle of program applications and processes, or that the project did not meet their internal financial requirements. In one respondent’s case their vendor failed to bring the program incentive to the customer’s attention, even though the vendor was aware of the incentive being available, and so the customer did not proceed with the project. The percentage reporting they were not aware of such incentives is down from the 2006 evaluation: 9% currently versus 29% in the 2006 evaluation. Roughly the same fraction in the current evaluation reported the incentive application process to be too difficult or time-consuming as was reported in the 2006 evaluation.

Table 3-38. Reasons for Not Applying for Incentives on Energy Efficient Equipment

	Frequency	Percent
Didn't know about financial incentives	1	9
Application too difficult or time consuming	2	18
For reasons internal to our company	5	46
Don't know	1	9
Other	2	18

Those respondents who indicated “Other” most often said that the incentive was not worth the “hassle factor” or that it was not big enough to warrant applying.

Based on these findings, it appears that, at least among the customers surveyed (who as noted above have had contact with the PE Program and are aware of the Energy Trust as well as the program), a reasonably significant potential exists for participating in energy efficiency programs.

When asked about questions or concerns they may have when considering participation in the PE Program, respondents provided a variety of information. Those who are self-directed have concerns about the restrictions associated with their participating in programs. Credibility is important, as are simple program procedures (e.g., one respondent commented on the relative ease of the BETC administrative process compared with the PE Program process). Others are concerned not so much with the program side but their own resources and associated inability to take advantage of efficiency improvement opportunities. Below are some of the verbatim responses:

> *"BETC admin approach is simple and streamlined, whereas Energy Trust process is more time-consuming and bureaucratic. We don't have the resources to navigate that process. May decide to wade through Energy Trust process but haven't yet."*
>
> *"First experience was good and we learned a lot about what to do."*
>
> *"No particular concerns, great program."*
>
> *"Bad timing and too much hassle. Once you start a project, have to play by the rules. We do that, but sometimes you just have to move on an opportunity."*

Respondents were asked to relate their experience with the PE Program to the extent they have had dealings with the program and PDCs. As the verbatim responses below indicate, most respondents felt the program and PDCs were very helpful and the experience they had was very positive. A couple of respondents were less effusive, citing cynicism about the Energy Trust being a government bureaucracy and some hassle in dealing with the program (though that respondent had not had contact with the program for some years).

> *"We want to move quickly and not be bogged down by communication delays or bureaucracy. ODOE is a good example of fast turnaround and good communications."*
>
> *"Good program, people good, just lacking time and resources to undertake projects."*
>
> *"The utility rep is well connected and the delivery contractor is on top of things. I don't have anything bad to say."*

Partial Program Participation

This issue is covered in greater depth elsewhere in this report. Briefly, most respondents logically had started participating in that they had been contacted by a PDC to explore and plan project opportunities, but then for various reasons they decided not to continue. Most reasons had to do with underlying factors associated with either the economy or the business (e.g., financial criteria and also physical criteria such as proximity to power source, but also concern about such issues as giving up self-direct credits). Most such decisions were made within the last two years as the economy has turned down.

Customer Energy Management Practices

Respondents indicated by a wide margin that they are <u>actively</u> engaged in controlling their electricity costs – 81%, twice the level reported in the 2006 evaluation (40%) as being <u>actively</u> engaged in controlling electricity costs. They are less engaged in c 2006 evaluation, which reported 29% being actively engaged in controlling natural gas costs.

Table 3-39. Level of Electricity Cost Control Effort

	Frequency	Percent
Actively engaged in controlling costs	13	81
Talking about but have not take action to implement cost controls	3	19

Table 3-40. Level of Natural Gas Cost Control Effort

	Frequency	Percent
Actively engaged in controlling costs	7	44
Planning to implement cost controls	1	6
Talking about but have not take action to implement cost controls	5	31
Do not know	3	19

Respondents stated a wide variety of actions they have taken to control energy costs. These range from outright equipment purchases to management policies, to energy use tracking and assessments (Table 3-41). Compared with the 2006 evaluation, across the board these customers are taking a variety of energy cost control actions at levels significantly higher – in some areas at twice or greater rates than three years ago.

Table 3-41. Actions to Control Energy Usage

	2006 Responses	2009 Responses		
	Percent of Cases	N	Percent	Percent of Cases
Purchased energy efficient equipment	57%	12	12.0%	75.0%
Hire or assign a staff member who is responsible for energy use and efficiency	29	10	10.0%	62
Sent staff to energy management training	NA	5	5.0%	31
Create a committee or team that addresses energy	10	6	6.0%	37
Develop an energy plan	8	5	5.0%	31
Use an energy scorecard to track key performance indicators for energy	6	2	2.0%	12
Develop corporate policies for energy efficiency regarding procurement or operations	12	8	8.0%	50.0
Track energy use	47	15	15.0%	94
Conduct a plant-wide energy assessment (audit, engineering review)	24	7	7.0%	44
Conduct an energy assessment of specific equipment systems	16	11	11.0%	69
Manage motors through procedures to repair or replace critical motors when they fail	NA	9	9.0%	56
An asset management system	31	10	10.0%	63
Total	NA	100	100.0%	NA

Half those reporting having an energy plan are not including numerical goals in those plans. Those who track their energy use by far do so only on a monthly basis, though there were several respondents who track usage more closely at times, down to an hourly or even more granular level as needed to understand their usage. Of the few who have sent staff to energy management training, there has been a generally positive outcome whereby some energy management practices have been initiated as a result of the training.

A couple of respondents seemed somewhat contrite about their energy tracking efforts, stating they need to pay more attention to their usage, and perhaps on a more granular level than just the monthly bill. Interestingly, the use of a corporate asset management system was not seen by most respondents as related to energy management, as they did not view energy savings as an asset.

When asked what they see as the primary barriers to improving energy management practices at their firm, respondents cited first cost or payback concerns in combination with the current economic conditions. Staff resources was also cited by more than one respondent, and also the relative importance of the project to the firm's business needs. Other responses indicated:

- Lack of understanding of financial impact of energy efficiency improvements;
- Initial cash outlay;
- Long project paybacks;
- Cost of energy is lower than other costs, so energy efficiency gets low priority;
- Lack of time and staff or no staff priority for energy;
- Focused on production, not energy;
- Companies is not engineering oriented so they don't have staff with energy awareness;
- Lack of energy plan;
- Needing to act quickly to implement a project but can't make the deadline due to bureaucratic delays; and
- Items using most electricity don't have many opportunities to improve efficiency.

Training and Support Services

Respondents were asked questions about their internal operations training practices and the types of external energy management-related training and support services that would be valuable to them. The universal comment about general operations training was that it is done primarily on-the-job and not as a formal process. This is consistent with the general finding in the 2006 evaluation for non-participants, where the evaluation reported that, "Few respondents reported providing such training for specific [energy-using] equipment or processes."[15] Some of the businesses surveyed offer formal training, as shown in Table 3-42, but the responses given strongly indicate that formalized training in equipment systems and operations is not frequently done. Tight budgets were cited as a major reason, but also the unique nature of the equipment at a given facility (configuration and/or operational dynamics).

[15] 2006 Production Efficiency Program: Process and Impact Evaluation. Research Into Action, August 12, 2008, p. 64.

Table 3-42. General Operations Training Offered

	Responses		
	N	Percent	Percent of Cases
OSHA/safety	5	27.8%	63
Compressed air systems	4	22.2%	50.0%
Controls	2	11.1%	25.0%
Heating (process heating, e.g., kilns)	2	11.1%	25.0%
Steam systems practices	2	11.1%	25.0%
Emergency preparedness	1	5.6%	13
Electrical generation (e.g., turbines, generators)	1	5.6%	13
None	1	5.6%	13

The following comments describe some of the general operations training these customers often.

> *"5-yr plan on equipment; assess cost of running & operations. Applies to all equipment. on- the -job plus suppliers provide equipment training, too. Part of service agreement includes training component."*
>
> *"Much training is on-the-job and folks are pretty good at the energy mgt already. Bringing in an expert to help would be of marginal value. PGE holds compressed air seminars so will send to that a few times a year."*
>
> *"On-the-job is the basis and thermoforming is the business – fairly specialized & doesn't lend itself well to piggybacking EE training on."*
>
> *"Try to hire people with experience already."*

The underlying implication of offering an energy management component to such trainings was well-received by respondents, as shown in Table 3-43. However, respondents often seemed unsure as to how to incorporate such a component into their general training efforts, particularly given that most training is on-the-job (OJT) and thus rather ad hoc.

Table 3-43. Importance of Including Energy Use/Efficiency Training With General Operations Training

	Frequency	Percent
Very important	6	43
Somewhat important	5	36
Not very important	3	21
Total	14	100

Respondents were also asked to choose from a list the two (of five) types of external support that they would find most valuable:

1. Specialized technical training in system or facility operations (not on site)
2. Technical studies of equipment or processes
3. Information on emerging technologies and energy management best practices in your industry
4. Technical assistance and training on site to optimize your facility's operations.
5. Forums on energy efficiency at industry events

Of the five alternatives, the fourth – on-site technical assistance and training – was one of the most-preferred types of support, with over two-thirds of respondents stating it would be one of their two most preferred types of support. Information on emerging technologies and energy management best practices in one's industry was the second most preferred type of support, with just over half of respondents stating that as one of their two highest preferences. Technical studies were third among preferences, followed respectively by off-site specialized technical training and forums on energy efficiency at industry events.

When asked if there are other types of support that would be valuable, a number of respondents offered additional insights:

"Like energy audit as 1st phase analysis – Cascade offers this. Then 2nd phase with economics."

"Need to task someone in the company to be the energy manager."

"Specialized energy audits for particular systems."

"I want people to come out and explain how the program works – I'm on the road a lot."

Quality Improvement Methods

Respondents were aware of quality improvement methods generally, having heard of at least one of the three quality improvement methods about which they were asked, and frequently being aware of all three types cited. All but two respondents were aware of ISO, three-quarters were aware of Six Sigma and all but one respondent were aware of the Total Quality Management concept. Half those aware of the ISO system are doing at least some aspect of the program, with many of those not doing ISO practices citing what they claim to be good reasons for not doing so. Perhaps reflecting the production-oriented nature of many firms surveyed, nearly 60% are operating as Six Sigma factories. Over three-quarters of those aware of TQM methods are practicing some form of that quality improvement method. Thus, formalized quality improvement methods are well-known to these respondents and many of their firms are practicing at least one method.

As with the level of engagement in energy cost controls, and the sorts of actions being taken to control such costs, the awareness and utilization of quality improvement methods has increased significantly since the 2006 evaluation, as shown in Table 3-44 below.

Table 3-44. Awareness and Use of Quality Improvement Methods

Awareness or Use	ISO (9000/14000) protocols		Six sigma		Total Quality Management (N=73)	
	2006 Percent	2009 Percent	2006 Percent	2009 Percent	2006 Percent	2009 Percent
Heard of It	40%	88%	37%	75%	51%	93%
Tried It	1%	6%	1%	0%	0%	6%
Doing It	19%	44%	16%	44%	10%	69%
Planning on Doing It	1%	6%	1%	6%	0%	6%
Not Considering It	8%	31%	8%	25%	5%	19%
Never Heard of the Method	30%	13%	36%	25%	34%	7%
TOTAL	**100%**	**100%**[16]	**100%**	**100%**	**73**	**107%**[17]

Impact of the Current Economy on Businesses

Finally, respondents were asked what they see being the major impact of the current economy on their business. “Survival” in the current economic recession was the term many used to describe what their operational mode is at present, as the economy has caused significant downsizing of various types, both staff and plant. The following comments were offered by those surveyed.

[16] The 2009 percentages for “Heard of it” are mutually exclusive from the other response options. The 2006 evaluation reported the “Heard of it” option on a mutually inclusive basis.

[17] Total is greater than 100% due to an enumeration error whereby one respondent responded that they are both doing TQM and planning to (continue) doing it in the future.

"Ability to survive the downturn and what it will look like the other side out. Training to position to take advantage of the recovery. Also, worried about unknown environmental regulations that take up significant resources and limit ability to profitably operate the business."

"We're being asked to do more with less. E.g. scheduling to get most production with least machinery running. Have blower system to pick up dust – can run machines and turn off blower? Or schedule chipper to run less frequently."

"Business is thriving, started second shift this year, so concerns center on determining whether to build new facility they own or continue leasing the existing facility."

"If cash situation got better, believes would recognize paybacks from lean mfg. including EE."

3.4 Assessment of Data Tracking, Data Collection, Processing, and Payment Activities

This section investigates the general administrative efficiency of the Production Efficiency Program. This effort assessed data tracking protocols and databases, project processing and payment activities, and quality control and quality assurance procedures. The following research approach was used to conduct the analysis:

- Review of Energy Trust Application Forms
- Review of existing information regarding Energy Trust's data tracking systems:
  - Review of PEP Implementation Manual (FastTrack and GoldMine)
- Review of additional publicly-available secondary sources including:
  - Previous studies relevant to the current effort completed by Summit Blue in other regions as well as entities in other jurisdictions.
- Incorporation of Survey Results into analysis. Interviews were conducted with:
  - Energy Trust staff
  - PDCs
  - ATACs
  - Vendors
  - Large Participants
  - Custom Participants
  - SII Participants
  - Non-Participants
- Calls to staff, vendors and other industry professionals to discuss assessment processes and other factors related to industrial energy efficiency

3.4.1 Application Process

The application process has two steps: the applicant (and PDCs) fills out the required form(s) and then Energy Trust approval signatures are obtained. The PDCs typically fill out the form(s) and the customer just has to sign. Cost-effectiveness calculations are integrated into the application form, which is an Excel form.

The application process for the Custom rebates uses the following PDC agreements and forms:

- Energy Information Release
- 420 Form
- W9

The first document the Custom customer signs is the Energy Information Release. Then, the PDCs ID the measures, indicate the measures on the 420 Form, and give it to the customer. When the customer signs it, the funds are reserved.

With SII, there is no Energy Information Release signed in advance. The first point of contact customers have with the SII is when the vendor gives them an offer of incentive from Energy Trust, that they sign at the same time the vendor gives them the contract for the equipment. The vendors send the completed forms within 24 to 48 hours to validate the savings estimates and inputs, and confirm the incentive amount and offer.

Assessment of Application Process

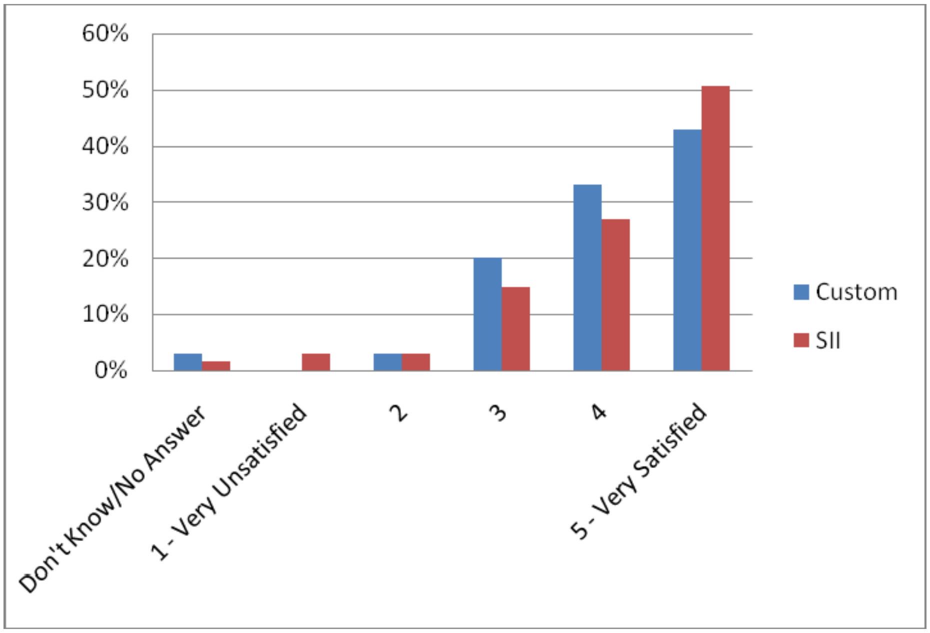
The application process appears to function well, with some opportunities for improvement. Experiences with the application process are discussed, by group, below:

- **Large Customers:** In a survey of three large customers, all three indicated they were much more satisfied with the application process now compared to their previous experiences. One customer said the assistance with the application process was appreciated.
- **Vendors:** A few vendors were not satisfied with the application process. A few reported that the energy savings estimates and other information required to receive approval have become burdensome for the customers. One contractor no longer works on Energy Trust projects because the data requests on projects had become excessive.
- **PDCs:** Over time, Energy Trust and PDCs have modified the application process to make it as efficient as possible. PDC's may request changes to forms. PDCs have been satisfied with the improvements, especially since everything has been incorporated into an Excel form. Each project needs a 400 form, and the PDCs have been helpful to applicants by not requiring the form again if it has already been filled out for a site. Also, the PDCs do not need the form if a project is not going to happen, so they do not get it signed unless the project has already been approved.
    - *Lighting:* The PDC for the Lighting Program (which does not use the same forms as the custom program) has streamlined their forms and incorporate feedback from TAs annually. They say their forms are easy to complete.
    - *Custom:* The PDC has initiated use of a streamlined, word-based document with similar content, with an onboard Energy Information Release and W9, so the customer only has to sign one agreement. This document is in the approval stage with Energy Trust.

- *SII:* In most projects, vendors fill out the SII rebate forms, which are in Excel, on their laptops. However, some vendors, typically more trade or technical contractors rather than engineers or consultants, do not enter inputs directly into the computer. This is common with compressed air, irrigation, and refrigeration vendors. Therefore, a different approach was needed. The SII PDC has developed a pad of paper with the inputs needed. The vendor faxes the completed form to the SII PDC who returns the savings estimates back to them.

- **Applicants:** Most applicants are satisfied with the application process. Many appreciate the assistance the PDCs provide in filling out the necessary forms. Figure 3-9 displays a chart of participant satisfaction with the application process. Both Custom and SII participants were surveyed (67 SII and 40 Custom participants). 78% of SII participants are satisfied or very satisfied with the application process. Similarly, 76% of Custom participants are satisfied or very satisfied. Just 3% (1 participant) of the Custom program was not satisfied with the process, and 6% (4 participants) of SII were not satisfied.

Figure 3-9. Participant Satisfaction with Application Process



Recommendations for Improvements to Application Process

The time requirements of the process and hassle were the reasons mentioned most to ATACs for a customer not applying for an incentive. The customer may not perceive there is enough time to complete the application and have the project approved within their preferred time frame. Sometimes the timing of the application process might be off, if the customer has already made the decision to install the equipment or discussed the installation and is rejected as a free-rider. One PDC pointed out that sometimes the participation process takes too long if there is a study involved. Customers generally understand the time requirements and have to weigh the benefits of waiting against getting the money. Therefore, most of the recommendations for improvements to the application process include ways to quicken the process and reduce hassle.

The following include recommendations from Energy Trust Staff, Vendors, ATACs, and PDCS, to improve the application process:

- **Develop an Online Application System:** Energy Trust staff believe there could be an easier way to complete forms and gather signatures. An online/web-based system could replace the hand-entry/e-mail/fax system they have now. Online applications could reduce the application process time – data could be gathered online (reducing time for data entry) and would then allow for online tracking of the application. This system would also remove the time-consuming steps of having to make PDF files from documents. ETO has piloted online systems for some of their simpler, high-volume programs (e.g., refrigerator recycling) and intends to bring the low-volume custom programs online in the future. Prescriptive measures are planned first and then the semi-prescriptive (where savings-based incentives are calculated from basic inputs.)
- **Allow for Digital Signatures:** Digital signatures could also reduce the application process time. Energy Trust has stated that they are moving in this direction.
- **Improve Forms:** A few comments were made about form appearance. It was suggested to improve user-friendliness and attractiveness of forms and that the forms were due for a makeover. One PDC commented that the data requested by the forms is not readily accessed by the customer. However, as long as PDC assistance with form completion continues, there are no recommendations to change requested information at this time. For companies that are eligible to self-direct, the form they have to complete has some algebra that can be intimidating and guidance should be given at the level needed.
- **Finalize Improvements to Custom Forms:** As mentioned above, there is a new single Word document in development, but it is not approved for use yet. The new document attempts to:
    - Concentrate user inputs in one or two places so they are not spread out over five pages;
    - Merge three forms (the 420C, 400R, and Substitute W9) into one simplified form for the participant, vendor, and all who must handle it in-house at some point in the current process;
    - Put the W9 signature and address block close to the funding agreement signing block in both space and time to reduce the frequency of blank or contradictory address information on Substitute W9 forms;
    - Improve readability (without affecting the necessary language developed by Energy Trust legal department); and
    - Save time generating the documents to be signed for approval. The Word-based version is prepared by Visual Basic procedures (not contained in the forms or the analysis tools themselves) that run at the click of a button. Document prep time, once the analysis in the tool is approved, is now a few seconds, down from about 20 minutes.
- **Improve W9 Form Process:** Sometimes the name on the W9 form does not match the business name named entered in other forms, and this can cause problems in the accounting department. It can hold up issuance of a check sometimes if the names do not match. It was recommended to obtain the W9 at the beginning of the process. This way, it may be detected earlier if the name on the W9 does not match what they thought the customer name was. There was also a suggestion to have W-9 forms filled out by personnel in the business office, instead of the maintenance office.
- **Require Supporting Documentation for Calculations and Baselines:** Reports or previous site studies are often cited to support energy savings calculations, assumptions, or baselines. When these studies are widely available, copies should be provided with the project application.

Participant suggestions for improvements to application process

Out of 38 participants that were asked how the application forms could be improved, 35 said the forms were fine as they are. Therefore, almost all of the custom applicants are satisfied with the application forms.

Participants (custom and small) had many suggestions for improvements to the application process, most of which encourage making the process more efficient:

- ***Reduce number of forms***. Several customers noted that there are too many forms to complete, and it was hard to figure out which ones they were supposed to fill out. A few mentioned that without help from the PDC, there were too many forms to do alone.
- ***Make less confusing***: Participants would appreciate more clarity in the forms and requested information. One participant thought that some questions could be clearer and that it could be clearer what they are asking for on the forms. More information could be provided up front about the overall process and what will be required.
- ***Be more consistent***: For some customers, the application process did not seem consistent on how they applied some measures. One customer was told different numbers for estimates and had to go back and forth. One customer experienced delays and had to make multiple phone calls since the Program director switched a few times during their process.
- ***Simplify***: A few participants commented that the process needs to be simplified. One customer had a difficult time getting their vendor up to speed on the program and getting anything done. They said there seemed to be confusion between the vendor and the Energy Trust, and this caused the process to take a lot more time than they thought it should have.
- ***Make more efficient:*** Many thought the whole application process could be streamlined. One commented that they were asked to load information on a DVD and ship it, and this was not user-friendly. They recommended having it online instead, where they could submit information and get confirmation. A few participants commented that what was required on the forms took some research to complete.
- ***Quicken process:*** A few participants requested that the process be shortened. One suggested having a fast-track option for some customers.
- ***Other:*** Other suggested improvements include:
  - Give participants an example of a completed form for similar projects and offer a seminar on how to complete forms.
  - Create form that is not designed just for commercial businesses: One agricultural participant commented that the forms including many items oriented towards a commercial applicant and not a farmer.
  - Link up to the related federal tax rebates and provide more information on how to get those rebates.
  - Make the lighting spreadsheet less cumbersome.

Ensuring that the application process is as efficient as possible is imperative for participant recruitment and retention. One SII participant said that improving the application process would encourage them to participate in the program again.

The three large customers surveyed mentioned that they appreciated the PDC helping to complete the forms and recommend that ETO consider expanding this practice beyond the large, custom participants.

3.4.2 Data Collection, Tracking and Storage Systems

Data collection primarily occurs through the application process. As previously mentioned, the PDCs typically fill out the form and the customer just has to sign. The cost effectiveness calculations are integrated into the application form, which is an Excel form. The PDCs pass these forms along to Energy Trust for entry into the databases. Many of the forms must be scanned into a PDF document and passed around to the appropriate personnel. Energy Trust staff also gather information through email and faxes. Monthly reports are received from each PDC, detailing projects and statuses. Data entry is done manually for each project and updates are made manually into systems.

FastTrack and GoldMine are the primary data tracking systems. GoldMine is used as a contact management tool, recording participant and site information, as well as contact history. FastTrack is used to track projects as they progress through the Program and forecast incentive payments. Data entered into FastTrack can be used for Program reporting and forecasting needs through Crystal Reports and Microsoft Access.

Assessment of Data Collection, Tracking and Storage Systems

The data processes appear to serve Energy Trust well, while a few opportunities exist for improvement. Some Energy Trust staff have stated that Fastrack and GoldMine meet their data reporting needs, while some have said they do not. Energy Trust staff appreciate that they can access Fastrack through Microsoft Access. One staff member was asked if there were any variables that the systems request that could be dropped from tracking, and none were stated to be unnecessary.

Data Entry

Currently, data entry is done by hand. There is a need for reliable and accurate data entry since errors in one form will propagate to the other forms. If the customers had to fill forms out themselves, then there might be some problems, but with the PDC's being trained, they perform this part of the process well. As mentioned above, an online/web-based system is recommended.

FastTrack

The FastTrack program runs a side Excel database program that tracks all new projects, which is what a staff members points out that FastTrack should be doing. The FastTrack program does not have all the capabilities that are available in Excel.

Several staff members commented on the need to modify FastTrack. Many say the system is awkward to use. Users would like to be able to see all the important information at a glance, which is not possible currently. Users would prefer the transparency that is available in an Excel spreadsheet, for example.

Searching the system can be difficult. Sometimes the utility account number is hard for the facilities manager to have access to. They need to know the correct legal name for a company, which sometimes is not available or there may be changes in ownership. Once data is in Fastrack, it is ideally up to date and staff can pull it up directly. However, sometimes information is lagged, such as the estimated completion date, and investigation will have to be done to ensure information is up to date. Monthly reports from PDCs will need to be searched, as they contain updates not yet reflected in the system. Automated updates would be more efficient, but this might put more administrative burdensome PDCs. So, for now, PDCs do their own data systems and then Energy Trust does the data entry into their systems.

GoldMine

The GoldMine database has an operational issue with contact information. The original contact name must stay associated with a site forever. The system must keep the original name in their tracking system, in addition to any subsequent names added from additional applications. It is the way the tracking system is set up and is how GoldMine and Great Plains (the AP system) systems are linked together. Several staff members have mentioned that this issue is confusing and can be time consuming, and recommended that the problem be examined and remedial actions taken.

Data Reporting

Energy Trust data reporting activities include the following:

- Weekly budget reports, summarizing completed and forecasted projects, including incentive amounts and energy savings;
- Weekly reporting to the Lighting program on lighting projects being brought into the program from PDCs (in addition to ones brought in by trade allies);
- Weekly reporting on the prescriptive incentive forms, particularly for motors, informing the small industrial group know about these projects.;
- Quarterly Internal reports – reporting with PUC, Production Efficiency reporting – given to accounting and then passed on to PUC reporting;
- Annual Forecasts; and
- Annual reporting on projects that will close.

Recommendations for Improvements to Data Collection, Tracking and Storage Systems

The following opportunities have been identified as ways to improve the PE Program's data collection, tracking and storage systems:

- ***Conduct Data Entry through Electronic Forms.*** Much information is currently entered manually and thus is very labor intensive. There is a movement to switch to electronic forms. An online system would eliminate some of this labor. However, since PDC's fill out most application forms, the same kind of guidance would need to be given to applicants applying online, with PDC's continuing to have most of the forms filled out before passing along to customers.
- ***Include Forecasting Elements in FastTrack.*** For Fastrack, one Energy Trust staff mentioned they would like some forecasting elements included in the system. IT is currently working on this.
- ***Resolve Contact Issue in GoldMine.*** The contact information issue in the GoldMine database is also being looked at by IT. They should also investigate ways to address multiple contact entries (if there is a difference in the way customer name is spelled, then there will be multiple entries for the same customer).

- ***Improve Search Capabilities in GoldMine:*** Staff members mentioned that they would like increased flexibility to search the GoldMine database, in order to search by other keywords and not just by utility account number and legal name of company.
- ***Increase Linking and Reporting Capabilities of Databases:*** Staff members would like to be able link reports to the data. When viewing project data, it would be helpful to be able to access the actual study.
- ***Seek PDC Coordination on Data Process Improvements:*** One PDC mentioned that they have heard that the IT department might make changes to how data is input into the databases, and if so, then the PDCs should be involved, especially if it might impact what the PDC have to provide. If it ends up impacting how PDCs input their information, then not having their input would be a lost opportunity for coordination. One PDC tried to sell Energy Trust their TrackSmart program (project management software). The PMs were interested but the IT department stated that they do not want an off-the-shelf product – they would rather improve their GoldMine internal system. Some PDCs keep their own databases (minimal Access databases) for project management, while they are aware that Energy Trust keeps the master. Energy Trust has considered auditing PDC databases as part of their audits. Energy Trust could also remind PDC's that they can request changes to the application forms – either through a written request or working through the IT action committee.

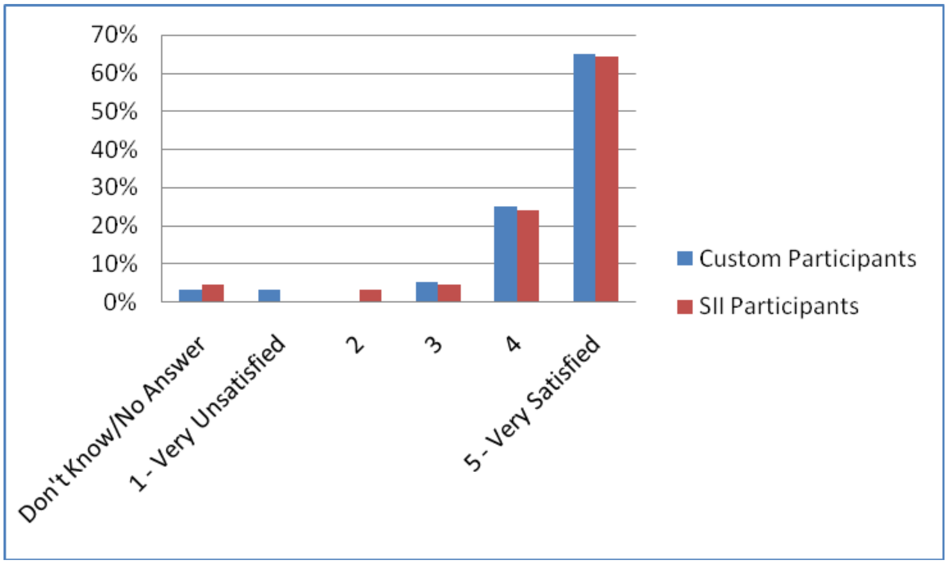
3.4.3 Payment Process

Once a project is complete, incentive payments typically take from two to three weeks. After project completion, the PDC performs a visual inspection which will take a few days, at a minimum. The PDC writes a report detailing the installation and sends Energy Trust the report. After Energy Trust receives the installation verification report, payment information is imported into the accounting system that week or the next, depending on the workload. The week after it is imported, following final approval, the check is printed, reviewed again, and then sent to the customer.

Assessment of Payment Process

Customers seem to be satisfied with the payment process and the length of time needed for payment (see Figure 3-10). 90% of the Custom Participants surveyed, and 88% of the SII Participants are satisfied or very satisfied with the timeliness of incentive payments. 6% of Custom and 4% of SII Participants are dissatisfied.

Figure 3-10. Custom Participant Satisfaction with Timeliness of Payment



A few participating vendors that were surveyed would like to have the incentive payment process accelerated. Two vendors said that the delays in payment processing by Energy Trust have affected their business finances.

The usual turnaround for the Accounting department is a week, if they have all the information and it matches. A delay may happen if a final review must occur after a check has been printed. If the check is more than $25K, it needs a director-level signature. This delay is typically one day, unless the PM is out of the office. Tracking staff down in person can be time consuming - if there was an electronic report or e-mail that they could approve instead of a physical review, this could save time.

At the end of the year, Energy Trust will get a few requests to receive checks by the end of the year. Sometimes they are unable to meet this deadline because it is a busy time of year. Sometimes there are delays – if the W9 name does not match the name in the system it holds up the check. Customers can become frustrated if the customer is waiting for a check and Energy Trust staff have to call to verify information.

The contact information issue previously stated in the GoldMine program causes an issue with payment as well. In the CRM contact management system and accounts payable software, there are preferences within the Accounting Department, that once they paid a contact at a facility, that person is listed in the contact management system. Accounting would rather not pay another person at that facility, so they have to enter the person they already paid, and then a second person who is the lead contact. The accounting record is a taxable identity that they have already paid – but in the project management software, that person has a name and number with it – they want the correct name with the project.

Vendors are concerned about the timeliness with which they get their incentives. Customers can assign their incentives to the trade allies. Vendors commented that for the PE Program they are generally timely[18].

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[18] Vendors stated that on the commercial side, the volume of files is greater and the project files have to go through LMA so it takes a bit longer.

Recommendations for Improvements to Payment Process

The current accounting system appears to have some opportunities to reduce burden on accounting staff. Imports into the accounting system are currently run once a week, on Thursday mornings. Therefore, if a report comes in on a Thursday afternoon, it will wait a week to be entered into the accounting system. Checks are cut on Fridays and then final check approval occurs sometime over the next few days, so checks are ready to be sent out usually on Tuesdays or Wednesdays.

The processing could be simplified if staff were given liberties to conduct imports and cut checks more than once a week, if a double review of the checks was not required or if the final review could be conducted electronically. There has already been some discussion of removing the double review.

3.4.4 Quality Assurance and Quality Control Processes

Energy Trust is dedicated to providing a quality program to its industrial customers and ensuring that the monies invested are used appropriately and documented clearly for its ratepayers. The overall process has quality checks incorporated throughout every project starting with contracted requirements of PDCs, clear expectations of ATACs performing Technical Analysis Studies, internal data validation and review, and finally through an external third party evaluation of completed projects. The multiple layers of data validation performed by various entities ensure an impartial check and balance from project initiation through completion. PDCs also maintain their own Quality Control processes.

Project documentation is maintained by Energy Trust and the PDC. Final inspection is performed prior to customer payment by Energy Trust and data is verified in both the official documented file and in FastTrack by the Industrial Coordinator, the Industrial Technical Manager, and the Senior Industrial Sector Manager before payment requests are authorized.

Quality assurance and Quality Control (QA/QC) activities for the PEP include the following internal and external activities, as reported by Energy Trust staff:

- Engineering does technical reviews (conducted of all the studies coming into the program) where assumptions, baseline data, calculations, costs, and incentives are all checked.
- PDC screenings are used to determine project eligibility and filtering out of as many free-riders as possible. They do the first overall technical review of all ATAC studies. They've developed a checklist to check the assumptions of each report. They visit facilities to scope projects and make sure equipment is reflected accurately in technical studies.
- Energy Trust staff do a final review of project reports, to ensure that costs are reasonable and truly applicable to the project.
- PDC QA/QC plans.
- 3-level approval requirement for payment approvals.
- Internal audits are performed on a random sample of projects from the previous quarter.
- PDC audits are performed and consist of accompanying PDCs on a project close out, interviewing staff, and observing how they keep records and distribute checks to verify internal file management activities.

The Production Efficiency Program Implementation Manual specifies details of QA/QC processes for many phases of a project:

- Project Qualification
- Quality Control of Technical Analysis Studies
- Post-Installation Inspections/ Project Completion
- Payment approvals
- External Project file Audits/ Monthly PDC tracking
- Internal Project Audit
- Overall Program Evaluations

The manual states that the quality assurance plan for the SII program is built on a foundation of three: 1) Energy savings calculated by tightly controlled tools; 2) Repeatable simple processes; and 3) Proactive training and coaching of trade allies. It states that the PDC quality control plan has the following objectives:

- Verify participant eligibility (including self direction and status);
- Perform site verifications;
- Maintain project files and tracking;
- Provide review of technical energy studies; and
- Demonstrate compliance with the customer service, security and confidentiality requirements of the PDC agreement.

Assessment of Quality Assurance and Quality Control Processes

The current QA/QC operations appear to be effective and function well, with Energy Trust staff members, ATACs and PDCs expressing satisfaction with current procedures. One Energy Trust staff member said that there were a few concerns which were revealed in the PDC audits, but all issues were addressed either on the spot or in subsequent conversations. The Energy Trust learned that PDCs were issuing checks inconsistently, and in one case a non-PDC member of their staff was delivering the checks.

One ATAC mentioned that the quality of the studies has varied widely in the past, and that he made suggestions for staff to develop a template for ATACs' consistency. He said that this has worked well, but that is a continual challenge to train new ATACs.

Recommendations for Improvements to Quality Assurance and Quality Control Processes

The results of the research and surveys show that the QQ/QC processes are effective; however, some opportunities exist for improvement. It is also be beneficial to memorialize the QA/QC requirements so that all parties are aware of their expectations. The following items are suggested actions for refining the QA/QC processes:

- ***Additional Site Visits:*** QA/QC procedures could be enhanced by additional site visits. Site visits could occur either when a technical study is received or before the study is done. However, it is believed that this could only occur with additional resources.

- ***Improve Quality of ATAC Studies:*** One staff members commented that they need to do more work on the ATAC study review process and standards.
- ***Definition of Scope and Rigor of PDC QA/QC plans:*** These plans are currently loosely defined by Energy Trust and therefore, plans are very inconsistent. It is recommended to design a standard process for plan development (including guidance to PDC's on the required contents of QA/QC plans) and a standard process for plan approval (giving opportunity for reviewing and refining plans before putting in the contracts).
- ***Including PDC QA/QC Plans in Contract:*** Currently, it is required in the contract that the PDC will develop a QA plan, but the plan is not in the contract. Therefore, when audits are conducted, the PDC contract terms and requirements (which use standard language) are used as a basis of comparison, not the plans. It is recommended that Energy Trust update the standard language currently in the contract and/or, the QA/QC plans be part of the contracts. The plans should also undergo a review and revision process with Energy Trust internal auditing department prior to incorporation into the PDC contract.
- ***Including PDC Audit Specifications in Contract:*** The PDC audit process could also be stated in the contract, including the time and scope of the audits. PDC QA/QC plans should be audited to ensure the plans are being followed.
- ***Additional Specifications in Contracts:*** The process for PDC delivery of checks could be stated in contracts. This would ensure consistency and prohibit non-PDC member delivery of checks. Energy Trust might also want to expand the definitions of conflict-of-interest to address this circumstance and require a disclosure of and "fire wall" between personnel who work on Energy Trust and other areas. A few Energy Trust staff members expressed concern that PDCs could sell their other services to Energy Trust customers they serve as PDCs. Delivering a check would be a perfect way to open the door to these other services.

3.5 Market Assessment / Market Penetration

As has been shown in numerous other jurisdictions across North America, well-designed energy efficiency programs represent an effective and affordable option for reducing energy demands and meeting growing demand for electricity. This effort examined the Production Efficiency program's role in the market, by revealing details about where the PE Program has influence and could expand its influence. The following research approach was used to conduct the analysis:

- Review of Energy Trust PE Program files
- Review of publicly-available information of industrial energy efficiency programs from other utilities:
    - EEI
    - ACEEE
    - CEE
- Review of existing information regarding Energy Trust's data tracking systems:
    - FastTrack
    - GoldMine
- Review of publicly-available secondary sources including:
    - 2006 Production Efficiency Program: Process and Impact Evaluation

- Energy Trust Industrial Sector Market Penetration, Prepared by Matthew Taylor, March 23, 2009
- Energy Efficiency and Conservation Measure Resource Assessment for the Years 2008-2027 (Prepared for Energy Trust by Stellar Process and Ecotope)
- Previous studies relevant to the current effort completed by Summit Blue in other regions as well as entities in other jurisdictions.

- Incorporation of survey results completed for this evaluation into analysis.
- Calls to staff, vendors and other industry professionals to discuss assessment processes and other factors related to the market for industrial energy efficiency.

3.5.1 The PE Program Role in the Market

As stated in the program's brochure, the PE Program offers "energy-efficiency services for industrial processes of all kinds including manufacturing, agriculture and water/wastewater treatment at facilities located within Portland General Electric or Pacific Power service territories in Oregon."

The PE Program funds studies to identify energy-saving opportunities in business operations and offers financial incentives that help offset implementation costs for a range of cost-effective, high-efficiency projects.

Energy Trust staff members have said that the PE Program's roles in the market are to:

- Encourage customers to purchase EE equipment;
- Offer incentives and bundle tax credits with incentives: "Provide money to companies to become more efficient in ways that they wouldn't have otherwise done;"
- Influence the energy efficiency market;
- Offer technical guidance and assistance; and
- Be a positive presence that people can plan on in the long run.

Staff members see the roles of the PE Program evolving. They state that while the primary function of the program is currently to help customers offset their energy efficiency costs, it may be evolving into expanded roles, beyond primarily serving as an incentive program. One staff member pointed out that the program is developing opportunities to influence behavior changes within operations and management (O&M). One commented that while the program currently offers some training opportunities, that the program could provide further education and training, expanding from what they currently offer, and perhaps provide more training to customer staff on how to obtain more low-cost savings from their customers. Several staff members concur that the biggest opportunity into increasing effectiveness of the PE Program may come from building on customer relationships that have been established through the capital improvement process.

Energy Trust may continue to expand their services offered and can apply their industry-specific knowledge:

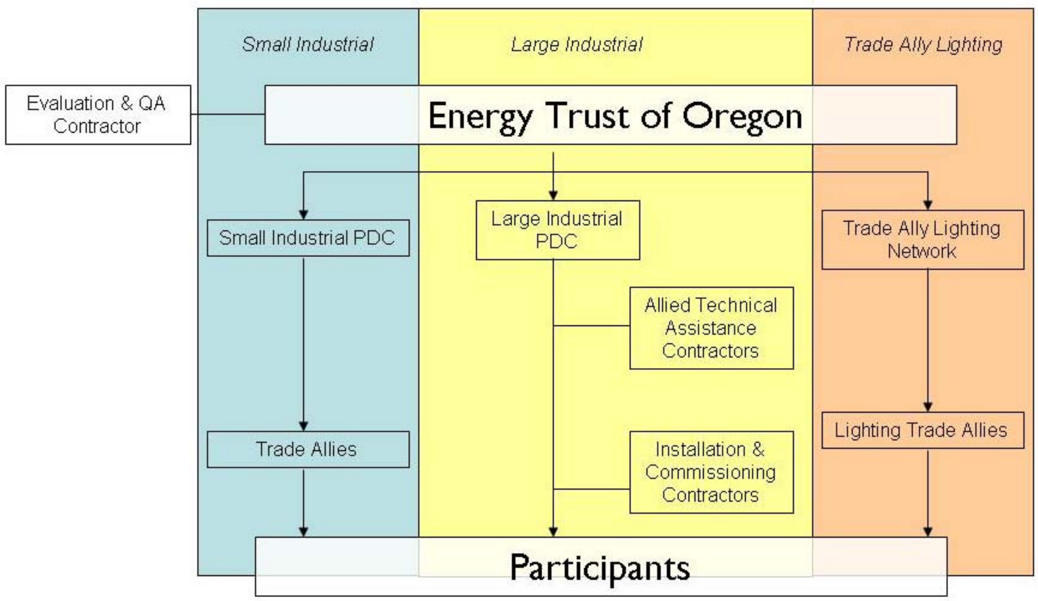
- For regulated industries such as municipal waste water treatment facilities, meeting regulations is a key concern.
- Small industrial customers are more concerned with keeping their product moving out the door.

- Large customers have energy management systems and do their best to control energy per unit of output, but do not always manage their energy use effectively.

The PE Program might be able to assist customers and vendors shift their current focus from a narrow perspective on a control device, such as variable speed drives, to a broader perspective on an overall control strategy for the process.

The following diagram (Figure 3-11) represents the different offerings and players within the PE Program.

Figure 3-11. Production Efficiency Program Summary Diagram



Areas Where the PE Program Has Influence

The PE Program has had its biggest influence in the market by providing capital for projects, which customers, vendors and staff members alike point out that in today's economy is very important. Customers are motivated by the incentives, and the motivation varies by site and customer. Also, customers are motivated by technical assistance. Many customers do not have the time and have found PDC assistance to be valuable.

The PE Program provides incentives for all cost-effective, high-efficiency industrial projects based on calculated energy savings with the exception of motors and lighting. Motor incentives are paid on a prescriptive basis. Depending on the measure, lighting is paid on a prescriptive or semi-prescriptive basis (meaning that incentives are based on energy savings calculated specifically for each project using a tool with simple inputs). The SII is moving toward a semi-prescriptive approach.

PDCs stated that there are no measures that should be dropped from prescriptive rebates and that all the measures included are appropriate. One commented that now that the SII program is operating, all customer segments are being reached and have opportunities to participate in the PE Program.

One ATAC thinks the market potential for energy efficient products and services is 'moderate to great,' and that the PE Program is responsible for keeping the market at a current 'moderate' level. This ATAC thinks the market will continue to have opportunities if incentives are strong and program delivery is efficient.

Energy costs are believed to be 'somewhat to very' important to customers. ATACs commented that they are seeing energy efficiency issues appear more and more in their customers' presentations. One ATAC stated customers are increasingly more likely to choose the energy efficient option, while another said that overall customer interest in energy efficiency has decreased.

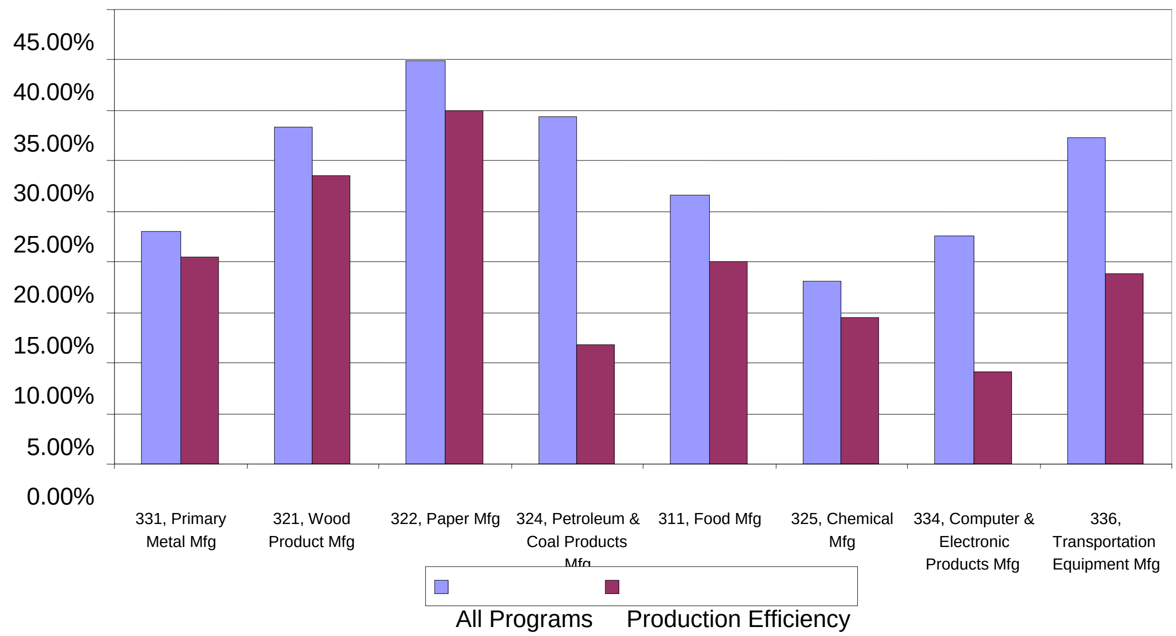
The PE Program saw the following activity in 2008:

- The SII program was initiated and therefore there has been an increase in small industrial customers.
- There were more motors and VFDs, possibly because of the work of the SII, and improvements to the application form to make it easier to use.
- There was increased participation from greenhouse projects, primarily due to the start of the agricultural program, but they also saw more Custom greenhouse projects.
- There were more self-directors, and thus more 50% incentives, which made the overall project economics look better.

An analysis of the market penetration of the PE Program was conducted in March 2009 (Taylor, 2009). The report found that by the end of 2008, the PE Program had saved over 260,000 annual MWh, which is 2.01% of 2006 total industrial consumption. Results also showed that a little over 10% of industrial facilities participate in the PE Program, and approximately 18% participate in some industrial program offered by Energy Trust.

Figure 3-12 displays the PE penetration into eight sectors, which make up 80% of total industrial energy consumption. The program sees highest penetration into the paper manufacturing, wood product manufacturing, and primary metal manufacturing markets.

Figure 3-12. Industrial Electricity Consumption Represented by ETO Industrial Participants, for the Eight Largest Industrial Electricity Consuming Subsectors



Source: M. Taylor, 2009.

Areas Where the PE Program Could Have Influence

Energy Trust PE Program has been expanding its influence and has many opportunities to continue to do so. It has initiated new program elements recently, and has been conducting many pilot studies to investigate new areas to influence the market.

The program has challenges to meet growing expectations. Meeting the challenges will require expanding resources and obtaining new resources, including staff, to meet the increased demand. It is expected that demand for industrial energy efficiency products and services is going to increase. Energy Trust program will have to respond to these increasing demands and prioritize their expanding goals.

As mentioned in the previous section, the PE Program recently added many features, including the SII program and agricultural program. In 2008, they began a new high-tech initiative. This was identified as a large gap previous to 2008, and staff believe that so far they have done a good job in this market. They added a high-tech PDC who is figuring out a strategy toward this market. Additional efforts will need support in budgets for the programs and PDCs.

Opportunities for the PE Program to increase its influence are discussed, by category, below.

Target Non-Participants

Energy Trust Industrial Sector Market Penetration report revealed the sectors with the lowest Energy Trust penetration rates, based on the percentage of sector electrical consumption represented by Energy Trust participating firms (Taylor, 2009). The following sectors have been identified as having large energy savings potential:

- The Chemical Manufacturing (NAICS 325) and Computer and Electronic Product Manufacturing (NAICS 334) sectors are two of the largest electricity consumers, as well as two of the least-penetrated industrial sectors. There are 82 and 168 non-participating facilities in Oregon in the Chemical Manufacturing and Computer and Electronic Product Manufacturing sectors, respectively.
- Participating facilities in the Primary Metal Manufacturing sector have historically shown a high level of savings, and there are still tremendous savings to be realized from the 83% untapped portion of this sector. Non-participating facilities in the Primary Metal Manufacturing sector represent over 2 million MWh of annual electric consumption (16% of total annual industrial consumption in Oregon).
- The Paper Manufacturing and Wood Product Manufacturing sectors are of interest due to their potential for projects that generate large energy savings. Although facilities representing over 33% of the Wood Product Manufacturing industry's annual electrical consumption have already participated, there are still 290 non-participating facilities in this high potential sub-sector.

Build Upon Existing Customer Relationships

The PE Program marketing is largely built around individual relationships with customers. The typical mass market channels that are appropriate for residential or commercial sectors (e.g., advertising or media promotion) are not as appropriate for industrial.

The one-on-one relationship is usually offered by a PDC and not an Energy Trust staff member. The relationship usually begins by having a customer engage in a small project to gain trust. Energy Trust staff or PDCs get involved in the customer planning process as part of the relationship building process. When the PDCs conduct scoping walk-throughs, they try to look at multiple opportunities at the facility. The relationship with the customer needs to be maintained because oftentimes the customer will not think of energy efficiency or Energy Trust after they leave. For all customers, Energy Trust does hope that the customers will pursue other capital projects after their first one is complete. But, Energy Trust has learned that you cannot expect them to call.

When checks to customers are hand delivered by PDCs, it increases the PR value and is an opportunity to identify new projects. Most PDCs work to develop relationships with their customers and try to be more proactive than reactive. They often ask customers about their needs and what options might work for them. Many PDCs try to develop personal relationships with customers by giving them Christmas gifts (e.g., LED flashlights, stainless steel water bottles). Customers appreciate the services PDCs offer, especially how they complete forms for their customers.

Continue to Assess New Prescriptive Measures

The PE Program has adopted all of their planned prescriptive measures in 2008 and is considering having a few compressed air and agricultural measures going to prescriptive. Energy Trust staff and PDCs believe there to be plenty of opportunities still within the small industrial market. The SII program is working to create additional measures. These small customers are hard to reach because it is not economical to spend time with all of these customers. It is more effective to spend time with larger customers. One ATAC suggested offering small industrial customers a prescriptive direct install program and another recommended offering greenhouses and small refrigeration measures.

Continue Pilot Program Initiatives

Several pilot program initiatives are being conducted to explore areas for influencing the market for energy efficiency equipment. These pilot programs are also a good start for encouraging customers to implement energy saving techniques. Energy Trust is exploring performance-based and behavioral-based incentives through the Kaizen and IEI pilots. NEEA's Industrial Initiative is running food process and pulp and paper pilots around taking initiatives through top management. Energy Trust is working on ways to improve plant performance through their pilots. The PE Program should continue to support a variety of pilot programs, especially ones that assist customers with tracking their energy usage.

SII and lighting help round out the program by offering participation opportunities to smaller industrial plants and help the vendor supply network to incorporate energy efficiency into their sales and services.

Expand PDC Role

Energy Trust has given PDCs support to expand their reach to influence more projects. This support needs to continue. Energy Trust should consider ways to change or expand PDCs roles. A PDC's first visit to a customer could be an exploratory visit to look at their energy bills and where they are using energy. PDC's could have an increased role in educating the customer.

Expand Geographic Reach in Oregon

At times the program can seem to be "Portland-centric." Energy Trust recognizes this and is making attempts to make the program more geographically diverse. Nexant is operating in central Oregon and RHT is in southern. The PDC is southern Oregon commented that southern Oregon is socially-cohesive and that the networks of "who talks to who" and who they listen to is different than the rest of the state. This PDC is a part of the community and therefore is expected to be effective.

Continue to Monitor Incentives and Modify When Appropriate

The PE Program has been proactive on incentive increases and supported increasing incentives in 2008. The per-kilowatt hour incentive was raised to $0.25 (up from $0.20). Also, the maximum incentive amount for projects committed by December 31, 2009, was temporarily increased to 60% of project cost (up from 50%). The program needs to continue to monitor incentives and respond to changing demands and opportunities.

Strengthen Relationships with Other Entities

Continue to build and develop relationships with other entities may increase opportunities. The following entities were discussed:

- ***Federal Entities.*** A customer could potentially have one site survey instead of two or more, if any programs could be offered jointly with federal agencies (e.g., EPA, DOE).
- ***Federally-Funded Manufacturing Extension Partnerships.*** These partnerships work with small industry on manufacturing processes (reducing scrap, etc) and could promote PE Program services.
- ***Industry Associations and Vendor Trade Associations, Electrical Trade Associations.*** It was recommended for Energy Trust staff to expand relationships with trade associations. Energy Trust could potentially expand its reach through relationships with the National Electrical Contractors Association and International Brotherhood of Electrical Workers (IBEW).

- ***Regional Associations (e.g., NEAA and BPA):*** Regional training and market research can bring about more progress than one utility can do on their own. Energy Trust could work with equipment manufactures through NEAA and BPA. Collectively, regional efforts could have a stronger influence on emerging technologies.
- ***PacificCorp and PGE:*** There is potential for stronger relationships with PacificCorp and PGE, particularly in regards to partnering opportunities and data sharing. One staff member pointed out that not being able to share customer names is a direct barrier and that Energy Trust is proposing to open this up.

Explore Marketing through Sales Channels

Energy Trust has made attempts to enter a few markets through sales channels (e.g., process cooling and motor manufacturers). Supply chains tend to be national so it is difficult to tap into these channels. Energy Trust could provide resources and develop plans for marketing sales channels, to be proactive and consistent in their interactions with them. Specific personnel could be appointed to be responsible for each entity, conduct onsite training, and make first points of contact (e.g., account executives). Sales channels accessed through the following entities are recommended:

- High-tech companies;
- Independent electrical contractors (non-union associations); and
- Electrical distributors.

Increase Program Awareness and Energy Efficiency Awareness

While ETO is meeting their goals, several staff members and PDCs mentioned increasing marketing of PE offerings and services so it is mentioned here. The program can leverage industry groups and trade associations to promote the program. Also, these parties can promote the program to their customers. This could be a more effective use of funds than advertising.

Educating customers on energy waste was suggested. The following items were suggested:

- Initiate an awareness campaign to encourage customers to look for creative ways to save energy;
- Increase advertising to commercial and production facilities to convince them their usual approach results in a lot of waste and is not acceptable; and
- Promote training for compressed air so that customers are more knowledgeable about the need for increased efficiency.

Offer Energy Management Services

Energy Trust is initiating the prospect of offering operations programs and attempting to work more with people at the executive level of the customer organization. It currently has three pilots with an energy management focus (Kaizen Blitz, IEI, and Compressed Air). Getting involved in a customer's annual budget process would offer the opportunity to identify projects for the next year.

PDCs could be offered training on comprehensive energy management techniques. While some PDCs know a little about some aspects of energy management, they could all gain from comprehensive training. It was recommended that all PDCs practice a consistent and complete approach, and set a standard for energy management.

Hire Specialists

The semi-conductor industry is an area that was suggested for influence. There may be opportunities in the new solar semi-conductor industry (solar manufacturers) as well. Energy Trust has not had a lot of work in this area yet because this industry is said to “move fast” and be “driven by their internal process people.” “Unless Energy Trust brings in specialists, they are not going to make progress in this area.” While Energy Trust may not be able to hire specialists for all industrial sectors, it could be worthwhile for the large ones. The food processing industry has also been identified as a sector where specialists could have influence, and in this industry, it was recommended that representatives have extensive refrigeration expertise. Recruiting appropriate expertise may require bringing in experts from out of state.

Complete Entry Into the Gas Market

In 2008, Energy Trust began offering gas incentives for small and commercial accounts that pay the Public Service Charge. In 2009, they received funding from Northwest Natural Gas for piloting a gas incentive for industrial customers who were on non-transportation rates. Energy Trust would benefit if Cascade Natural Gas also provided funding to the program.

PDCs need training to manage it and ATACs need to be recruited. Energy Trust is modifying PDC contracts to add gas incentives, goals and delivery budgets. It was pointed out that if the industrial rate schedule restrictions lift, there will be more eligibility for gas measures.

As the gas program starts, the program will discover many opportunities. In the past years, several customers have urged Energy Trust to offer incentives for gas projects. Transport customers are explicitly not eligible for participation, but many other customers who do not currently pay public purpose charges will be eligible. Initially, it is expected that Energy Trust will have a reasonable budget of incentives for Firm customers and a small budget for Interruptible. According to Energy Trust analysis, there is technical potential for approximately 48,000,000 therms of Firm efficiency in the Industrial sector in NWN territory and an additional 45,000,000 therms in Industrial Interruptible.

Continue Training

Energy Trust staff members pointed out that there are opportunities to take advantage of training opportunities (e.g., NEAA classes). PGE offers free classes in their territory: these classes could be offered to Pacific Power customers as they do not have many training opportunities.

Explore Renewables

There is interest in integrating renewables into the PE Program. There may be opportunities in the solar manufacturing industry and in cogen-type generation support with renewable resources. Customers have asked about windmills and solar water heating. In the past, renewables have not been marketed well, and PDCs have not been armed with renewable information. Energy Trust added budget to give PDCs funding to research and report back about opportunities.

Investigate Options for Obtaining Federal Stimulus Money

The American Recovery and Reinvestment Act (Recovery Act) supports energy efficiency improvements in major industrial sectors across the American economy. Funding is targeted at reducing the energy consumption of America's manufacturing and information technology industries, while creating jobs and stimulating economic growth. Where possible, the Energy Trust can explore possible projects under “Combined Heat and Power (CHP), District Energy Systems, Waste Energy Recovery Systems, and

Efficient Industrial Equipment." This funding is targeted toward projects that represent proven and effective near-term energy options that can be deployed in industrial and residential settings to improve efficiency, control costs, and limit greenhouse gas emissions.

Another recent announcement of a federal funding opportunity includes "Industrial Energy Efficiency Grand Challenge (DE-FOA-0000113)." This FOA seeks projects to develop transformational industrial processes and technologies that reduce the energy intensity or greenhouse gas emissions of the system by a minimum of 25 percent, while providing a return on investment of 10 percent or greater.

Vendor Suggestions

A survey of vendors revealed that vendors would like the program to offer more information and more networking opportunities. One vendor desires regional standardization on the projects that qualify and the incentives. This vendor also would like to have list of organizations and contacts at each organization.

Large Customer Suggestions

In a survey of three large customers, one customer said they would like to have the ability to conduct audits on-site: "I want to have audit capabilities on site." Another stated they would like more technical training and cross-pollination with the other groups and vendors, since some groups are stronger in some areas and in certain technologies. They would like to be able to select from a variety of vendors who could best meet their specific needs: "Right now, contractors are based on geography. The Energy Trust should make it easier for us to reach out for a specific skill offered by another contractor."

Participant Suggestions

Table 3-45 displays services that the Custom and SII participants would like to see offered from the program. 35% of Custom participants surveyed said "More facilitation." (Further explanations for this response were not given.) The one Custom participant that suggested more training said that education in energy efficiency was needed for customers to facilitate communication, especially in the Agricultural sector. The Custom participants that requested more information would like to have a place to look and see what other people are doing and would like to see information about changes and new programs.

10% of the SII participants surveyed would like more information, and 7% would like more facilitation. The SII participant that would like Energy Trust to offer more training said that the contractor should be better informed. The SII participants that would like more information said that they would like:

- Cost saving ideas
- Clearer information needs on the forms
- Energy tax credit guidelines (which programs are covered)
- More information on how to get the federal tax rebates
- More information upfront about overall process
- Outline of options and how to maximize incentives

3.5.2 Market Barriers

Every customer has their own barriers and some of those barriers are common to market segments. Various market barriers are identified by category.

Capital

Capital has been identified as a huge barrier to effectiveness. Aside from the current economic conditions, many companies do not have the internal resources to implement a project. Energy Trust does a good job with capital costs, but they could pay more upfront costs instead of at the end.

Economic Downturn

In the current economic uncertainty, companies are cautious about the future so they are holding on to their capital. Even for items that do not require much investment, people are not focused on them. Uncertainty of the future hinders customers' abilities to plan projects in advance. Many capital projects are budgeted for a year in advance and are being postponed because of the economy. One ATAC fears that the legislature is planning to tap into the public benefits money to help fund state operations.

Eleven customers included in the 2007 impact evaluation claimed that they had some reduction in output because of the economy.

Some of these companies reported that they have reduced production and staff, while a few stated they have not yet reduced production. One claimed that they are currently running at capacity, but may close the whole business later this year.

Risk

A market barrier to many industries is performance or technology risk. Customers need to know that the technology is accepted and reliable. PDCs stated that they try to build confidence in their knowledge of their industry. The customer has confidence that the PDC understands their needs and risks and is not going to recommend anything that will add risk to their operations. For instance, PDCs do not take any actions with wastewater customers that could compromise their permitting requirements.

Skilled Labor

Qualified technical staff is also difficult to ensure. It is difficult to serve communities when you don't have people located there to do the work. Most PDCs think the pool of vendors is sufficient, but are concerned about the future. One PDC indicated that they cannot hire enough engineers to keep up with demand. Finding mechanical engineers with energy experience is a challenge. There could be more opportunities for energy training and efforts for recruitment of those seeking a second career (especially in the building industry). Universities could offer more focused programs. Energy Trust could be involved with training programs.

Low Energy Costs

The high incremental cost between energy efficiency and standard equipment and low energy costs combine to create unacceptable paybacks. If energy costs would increase, the demand for energy efficient service and products would increase.

In some cases, bundling of measures may be cost-effective. If Energy Trust determines some measures to be worthwhile, then perhaps the measures that are unable to stand on their own (cost-effectively) could be bundled into a project with other, cost-effective measures, or bundle smaller measures into larger projects.

Hesitance to Change Production Processes

Many customers may be hesitant to make alterations to their production process (for fear of adversely affecting the system) or may lack the knowledge to manage complex control systems.

Vendor Loyalty

Vendors frequently have contractual agreements to maintain equipment in their product line and will naturally tend to dissuade the customer from installing the most energy efficient equipment sold by another vendor. Vendors are seen as quite knowledgeable about energy efficient equipment but are likely to see their particular equipment as THE solution to the current problem.

Competing Programs

NEEA is charged with market transformation in the Northwest and is encouraging customers to make energy efficient choices on their own. Customers may not be aware they even qualify for an Energy Trust incentive.

3.5.3 Opportunities to Improve the PE Program

The processes of the PE Program function with effective data tracking, project processing and payment activities, and quality control and quality assurance procedures. The opportunities that were discussed for improving the systems include the following:

- ATACs recommended keeping up with overall program efficiency as they pointed out that sometimes the program can have an image of being cumbersome and slow.
- It was recommended to have programs more transparent to each other internally. It would be helpful for different entities for each program to know what contacts and history the other programs have had with a customer. Energy Trust could explore the potential of there being a "one-stop" shop for the customer.
- Participants suggested streamlining and speeding up the application/approval process and having more transparency in the savings and rebates calculations process. These suggestions and more are discussed in further detail in the participant section.

3.5.4 Financial Incentives

The goal of the Production Efficiency Program is to achieve energy savings and help transform energy use in the industrial marketplace. This is accomplished through the Program's financial and service incentives. Financial incentives are defined as cash payments made to the participant at the time of project completion and verification. Service incentives include all payment s made to engineering study contractors for technical services such as Short Studies, Detailed Technical Analysis Studies, and pre and post inspections.

Incentive Levels

The Production Efficiency Program offers customized financial incentives based on estimated annual energy savings with limitations on a percentage of the incremental cost of implementing energy efficiency measures, cost-effectiveness, energy savings payback period, and total incentive amount. The Program also offers prescriptive incentives on energy efficient lighting equipment, NEMA Premium® motors, and efficient heating equipment as well as semi-prescriptive solutions for small industrial systems.

Incentive offers must be generated and pre-approved by the Production Efficiency Program before equipment is purchased (except for prescriptive motors and heating incentives). Requirements for each type of incentive offered by Energy Trust are summarized below.

Table 3-45. Production Efficiency Program Financial Incentives

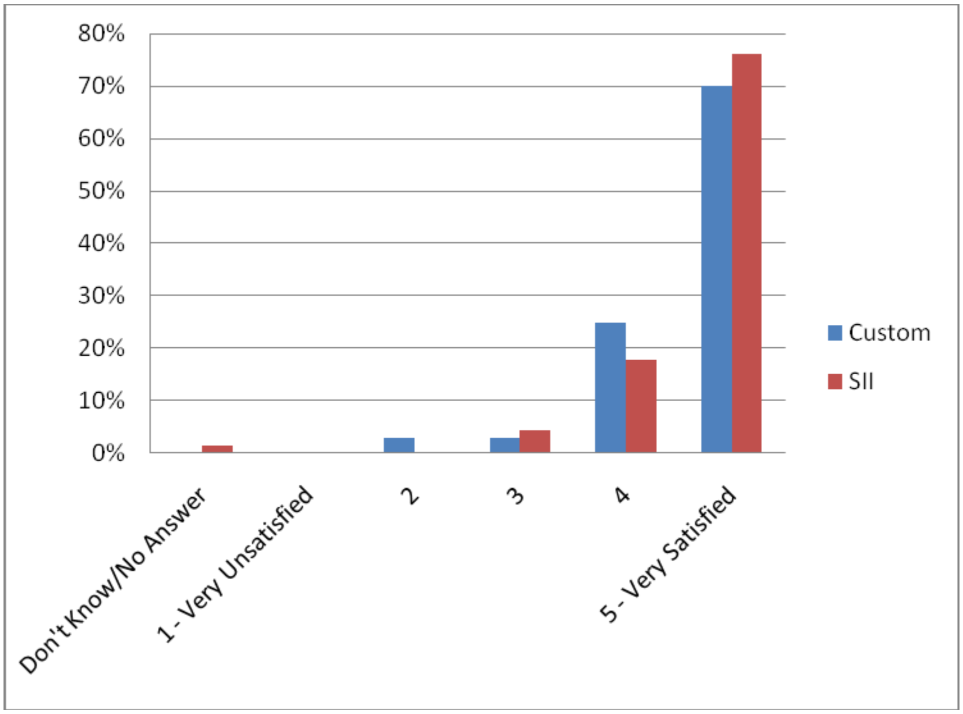
Project	Incentives	Maximum incentive per site per year
Custom Process Related Electric Energy Project Incentives	Incentives for process equipment or measures are 15¢/kWh, not to exceed 50% of the total approved project cost, with a payback greater than 18 months. Incentives for process projects with a payback less than 18 months are 2¢/kWh, not to exceed 50% of the total approved project cost.	Entire facility or campus: $500,000 including process, lighting and/or natural gas incentives.
Lighting Project Incentives	Custom incentives for lighting projects are based on first-year energy savings at 15¢/kWh, not to exceed 30% of the total approved project cost, with a payback greater than 12 months. Total lighting project incentive must not exceed 50% of total approved project costs Lighting projects must provide at least 25% energy savings compared to existing equipment or relative to standard lighting equipment on new installations.	$500,000 including lighting, process and/or natural gas incentives
Natural Gas Project Incentives	Incentives for custom natural gas projects are $1.00/therm, not to exceed 50% of the total approved project cost, with a payback greater than 18 months.	$500,000 including natural gas, lighting, and/or process incentives.
Custom Water and Wastewater Project Incentives	Incentives for municipal wastewater or water treatment projects are 26¢/kWh, not to exceed 50% of the total approved project cost, with a payback greater than 18 months. Incentives for municipal projects with a payback less than 18 months are 2¢/kWh, not to exceed 50% of the total approved project cost.	$500,000 including natural gas, lighting, and/or process incentives.
Prescriptive NEMA Premium® Energy Efficient Motor Incentives	Motor incentives are based on $10 per horsepower for motors sized 1hp to 200hp; custom incentives of 15¢/kWh, not to exceed 50% of the incremental cost of the project, may be calculated on NEMA Premium® motors	na

Project	Incentives	Maximum incentive per site per year
	larger than 200hp. Motor incentives do not apply to incentive caps on energy efficiency projects.	
Prescriptive Lighting Equipment Incentives	Incentives range from $2 to $75 per fixture, depending on type of fixture. Participants may receive both prescriptive and custom incentives on a lighting project.	na
Service Incentives	Service incentives include all payments to ATACs for technical review and engineering services related to identifying and implementing energy efficiency projects. Service incentives are provided at no charge to the participant upon implementation of at least one cost-effective energy-efficiency measure.	na

Assessment of Incentive Levels

Based on customer feedback, incentive levels are at appropriate and motivating amounts. Exhibit X displays a chart of Custom and SII participant satisfaction with incentives levels. 95% of Custom participants are satisfied or very satisfied with the incentive amount they are receiving (25% are satisfied and 70% and very satisfied). Similarly, 94% of SII participants are satisfied or very satisfied with the incentive amount they are receiving (18% are satisfied and 76% and very satisfied).

Figure 3-13. Participant Satisfaction with Incentive Levels



In a survey of three large customers, they all reported being satisfied with the incentive amount. One respondent indicated they were more satisfied with the current incentive amount compared to previous incentive amounts.

The SII program has had a successful year. While incentive levels appear to be at appropriate levels, the success of participation in the SII program is believed by at least one staff member to have less to do with the increase in incentives and more to do with Cascade's work including developed tools, identification of the best delivery method, customer outreach, and streamlined application and participation processes. Incentive levels need to work in conjunction with operational procedures. One SII participant stated that the incentives were not big enough or in a reasonable enough timeframe to complete some of the larger projects they would have liked to.

A few wastewater facilities claimed incentive levels are too low for them to participate. An Energy Trust staff member pointed out that they have a high incentive in the program. Water and wastewater projects receive $0.32, compared to the $0.20 average.

PDCs think the incentive amounts are adequate, but note that because of the economy right now, money plays a bigger role than it already does. One PDC commented that it is too soon to know if incentive levels are too low.

One Energy Trust staff member claimed their incentives are not high enough in some cases, or not in line with BPA's incentives or caps. This staff member said that they do not pay as much because they are getting the level of program savings they need with the program budget they have, and customers have the BETC incentive to supplement the Energy Trust's incentive.

As with most programs offering incentives, participants are typically more satisfied and motivated with more money. Customers often ask for higher incentives, but many of these who ask participate with the current rates. It is believed that PDCs sometimes ask Energy Trust to raise incentives because it would be easier for them to meet their goals, rather than because of necessity of the market. It is common for parties to ask and Energy Trust considers it to be a normal part of the process.

Cost-Effectiveness Tests

Before an incentive offer for a custom project can be issued, the cost-effectiveness of the proposed project must be determined. The screening tool used to calculate the benefit-cost ratio (BCR) of each measure and/or project was developed by Energy Trust.

While at this point, Energy Trust does not share the cost-effectiveness information with customers, a few customers said they would appreciate viewing the information. One customer commented that the program "needs concrete estimates for complex systems to justify the incentive." Customers would like to understand the underlying algorithm. In response to one customer's request to view this information, Energy Trust sent a letter to the customer explaining the policy and gave a rule of thumb to determine their cost-effectiveness.

One self-directed customer said they would like to understand the way Energy Trust determines whether a project is cost-effective and qualifies for an incentive. This qualification appears to have an issue with PUC requirements. There is a new PDC for this customer and they plan to work proactively to explain the test more thoroughly so the customer understands the requirement, and engage in the customer's project development planning sooner to let them know whether or not they qualify for an incentive earlier in the process.

3.5.5 Other Utilities' Experiences with Industrial Energy Efficiency Programs

Utilities across the country are becoming aware of the energy-saving potential of industrial energy efficiency programs. While many utilities claim to have programs available to industrial customers (frequently combined into a single C&I program), only about 10% of utilities nationwide have programs that effectively target the industrial sector (Personal communication, N. Elliott, ACEEE, June 2, 2009). Common energy-savings measures savings for the commercial sector, such as HVAC and lighting, often only address a small fraction of a facility's load.

ACEEE states that program tailoring to meet the specific needs of the industrial sector is critical for program success. ACEEE has also found that dual-fuel programs are much better received and utilized than programs promoting only electricity savings. They have found that key program elements in the nation's most successful industrial programs include the following:

- Industry expertise;
- The ability to support on-site assessments; and
- Technical assistance with implementation.

Effectively coordinating local organizations and entities able to partake in program efforts is another emerging key program element. If workforce availability is an issue, a potential solution is to partner with other organizations, such as a local Industrial Assessment Center (IAC), for additional staff and financial resources.

Along these same lines, a significant trend in successful industrial programs is the support of specific industry sectors through targeted partnerships and resources, particularly for industry sectors with a high penetration in the region. Industries with existing inter-plant networks, such as trade associations, are particularly good candidates, since these networks facilitate deployment efforts.

In addition to a list of select industrial energy efficiency programs included in Appendix C, the characteristics and results of several noteworthy programs are briefly discussed below:

Wisconsin's Focus on Energy – Focus on Energy Industrial Program

Focus on Energy, a public-private partnership funded by the state public benefits charge, has led Wisconsin's industrial energy efficiency program since 2001. Since that time, 13% of the state's eligible industrial customers have participated in the program with the following results:

- Annual energy savings of 141 GWh and 15.1 million therms;
- Peak summer demand savings of 20.7 MW; and
- A benefit-cost ratio of 11.9 (net benefits, total resource cost test).

Named the "Industrial Process Efficiency Exemplary Program" of 2008 by ACEEE, the Focus on Energy program has a number of model characteristics:

- Readily-available information and trained staff, including a team of ten energy advisors working across the state. Focus on Energy also offers best practice training for customers and business allies, as well as half-day workshops on Practical Energy Management (PEM). 61% of the customers that attended a PEM workshop said they have since used PEM in some way.
- Resources and program aspects targeting specific industrial clusters (e.g., paper, metalcasting, food/dairy, plastics, and water/wastewater), such as best practice guidebooks for each industry and strong relationships with local trade associations and industry leaders to access industry-specific customers.
- Core program funding through a highly cost-effective custom grant process, supplemented by prescriptive grants for well-known, yet under-used, technologies and project feasibility grants for up to 50% of the study.
- Support for emerging technologies through concept development, customer demonstration with M&V, and streamlined financial incentives for some applications.

West Virginia – Industries of the Future

West Virginia was the first state to initiate a state-level Industries of the Future ("IOF-WV") program. Since that time, at least 20 other states have formed similar IOF collaborations with the DOE, state industry partners, and state research institutions. Among other things, IOF-WV provides technical assistance, energy assessments, information on energy efficiency vendors, sponsorship of U.S. DOE BestPractices workshops, and monthly newsletters. The IOF-WV program does not offer financial assistance, but it does present up-to-date information on where funding is available.

The Industries of the Future program in Texas is another successful example of this program structure.

NYSERDA – Industrial Process & Product Innovation Program

NYSERDA's Industrial Process & Product Innovation Program ("IPPI") program encourages manufacturers to improve their process efficiency through cost-shared feasibility studies, technology demonstrations, and technology commercialization. With an average of $1.75 million in annual funding, NYSERDA has contracted 23 projects since July 2006: 9 research studies, 11 process improvement demonstrations, and 3 product development projects. These projects have yielded cumulative energy savings of almost $20 million, over $41 million in non-energy benefits, and approximately 85 new jobs.

NYSERDA's current incentives for this program are $0.12/kWh for upstate New York and $0.16/kWh for the Con Edison territory. Project applicants are eligible to receive up to $5,000,000 per facility, not to exceed 50% of the project cost. A two-year M&V period is required.

Southern California Edison – Industrial Energy Efficiency Program

Through Industrial Energy Efficiency Program ("IEEP"), Southern California Edison ("SCE") offers a range of services to industrial customers, such as development of customized Energy Analysis Reports outlining the steps towards maximum energy savings, facilitation meeting SCE program requirements, coordination of the incentives applications and payments, and implementation assistance. Industry and technology experts are under contract by SCE to provide these services directly to customers. The experts under contract for 2009 specialize in a variety of industrial sectors, including manufacturing, water and wastewater, oil and gas, food processing, and warehousing. Incentive levels range from $0.05/kWh for lighting to $0.14/kWh for air-conditioning and refrigeration, with process improvements receiving $0.08/kWh. In 2008, SCE reported this program as one of their 16 high-impact programs with a benefit-cost ratio of 2.34

3.5.6 References

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EEI, 2008. Highlights of EEI Member and Non-Member Residential/Commercial/Industrial Efficiency and Demand Response Programs for 2008, Prepared by: Edison Electric Institute, Last updated on August 1, 2008.

3.6 Program Marketing Communication and Outreach Strategies and Tactics

Energy Trust wants to maximize energy savings achieved based on the amount of investment available to fund projects in the industrial sector. As part of this effort, the team reviewed the role of marketing and communications within the industrial sector to determine if marketing, outreach, and communication efforts are reaching the desired audience and desired sectors. Currently, marketing is a joint activity shared by Energy Trust and the PDCs. As part of this evaluation, we determined the effectiveness of the current marketing strategies and messaging and also identified areas for improvement. This assessment was based on a review of the findings from the interviews with program staff, PDCs, trade allies and partners, and participants and nonparticipants of the program.

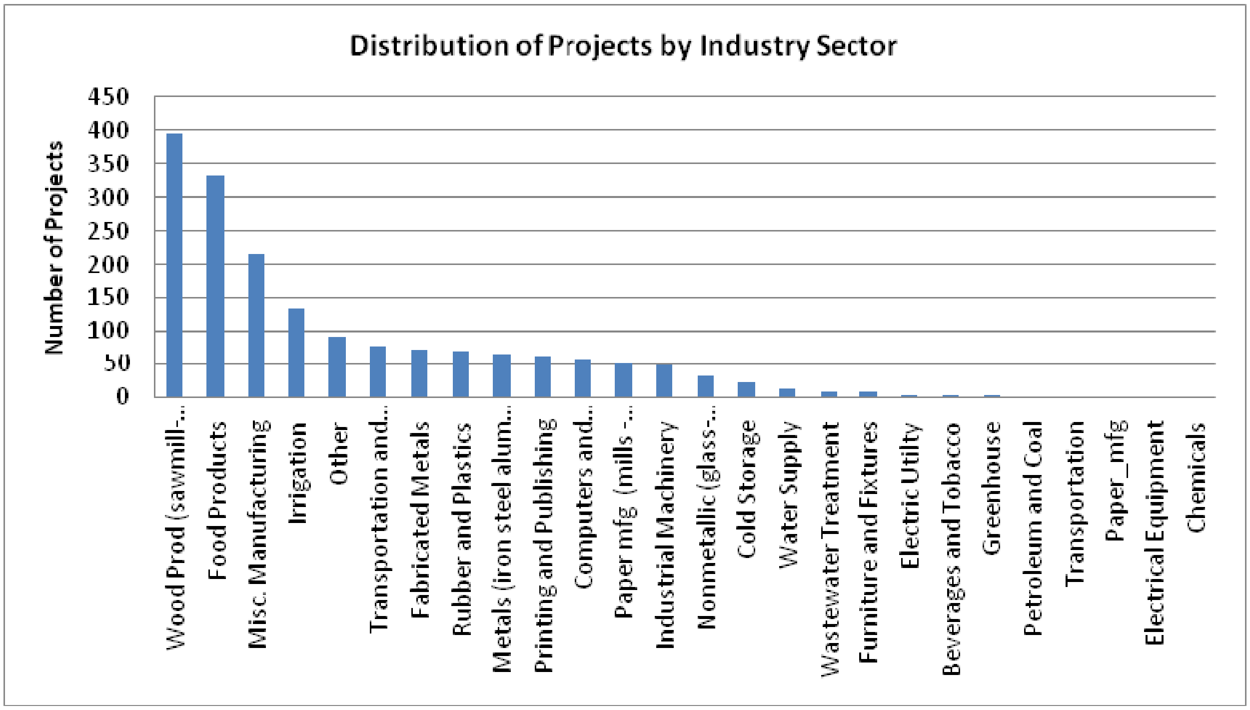
This evaluation also determined the effectiveness of the marketing plans developed by each PDC and also the level of communication between the various program players including the following combinations: Energy Trust and the PDCs, the PDCs and the ATACs, and Energy Trust, the PDCs, the ATACs and the customer.

Assessment of the PDC's Marketing and Communication Plans

Three custom PDCs submitted a marketing plan and each one was significantly different. These differences made it harder to compare the approaches proposed by each PDC against the marketing and communications activities already in place by Energy Trust. However, the most active PDC did not submit a marketing and communications plan, which suggests a severe gap in the overall marketing activities in this program.

Figure 3-14 displays the distribution of completed projects by industry type. As this figure shows, the majority of the projects were dominated by a few industry sectors, including pulp and paper, food products and manufacturing.

Figure 3-14. Distribution of Projects by Industry Sector



The targets for the marketing and communication plans were prioritized in the three plans submitted by the PDCs. However, their approaches in targeting the same industries were not consistent. For example, one PDC developed a targeted approach for each industry sector and identified the most appropriate trade shows to support, and collateral materials to develop such as case studies. The other marketing plans were vague about specific actions these organizations would take to reach the targeted customers. Neither of the other two marketing plans listed these types of activities. These findings suggest that the PDCs need to develop a more standardized approach to marketing that will be able to leverage Energy Trust's current marketing activities to these industry sectors.

Table 3-46 illustrates two major shortcomings with these marketing plans. First, the marketing plans did not target directly some of the most active industry sectors, such as irrigation and transportation, even though these segments represented a large number of completed projects in 2008. Secondly, Energy Trust case studies are not targeting the most common industry sectors, such as manufacturing and irrigation, but instead are focusing on industry segments with fewer completed projects such as nursery/greenhouses and wastewater treatment plants. Energy Trust should consider developing additional case studies on different types of manufacturing and irrigation to provide a broader perspective and more representative sample of the types of projects currently in place through this program.

Table 3-46. Assessment of Industry Sectors Targeted in Marketing Activities

Industry Sector	Addressed in Marketing Plans?	Featured in Case Studies?
Wood Prod (sawmill-veneer-plywood)	Yes	Yes
Food Products	Yes	Yes
Misc. Manufacturing	Yes	
Irrigation	No	
Transportation and Aerospace	No	
Fabricated Metals	Yes	
Rubber and Plastics	Yes	
Metals (iron steel alum foundry)	Yes	
Printing and Publishing	Yes	
Computers and Electronic Mfg	Yes	Yes
Paper mfg (mills - converting)	Yes	
Industrial Machinery	Yes	
Nonmetallic (glass-concrete)	Yes	
Cold Storage	No	
Water Supply	No	
Wastewater Treatment	No	Yes
Furniture and Fixtures	No	
Electric Utility	No	
Beverages and Tobacco	No	
Greenhouse	Yes	Yes
Petroleum and Coal	No	
Transportation	No	
Paper Manufacturing	Yes	
Electrical Equipment	No	
Chemicals	Yes	

The overall finding and conclusion from this review indicated that Energy Trust staff has taken a "hands off" approach to developing the PDCs marketing plan. This finding is confirmed in the interviews with the PDCs. Based both on this review and the previous recommendations from other evaluations, Energy Trust needs to become more proactive in helping the PDCs develop and implement realistic, consistent, and achievable marketing and communications plans.

Overall Findings – Effectiveness of Energy Trust's Marketing and Communications

Key Findings- Staff Interviews

Energy Trust staff also commented on the current marketing activities used by Energy Trust to promote the PE Program. The staff said that the most effective marketing activities are the program brochures (leave behinds), case studies, and participating in targeted industry events. The staff members believed that the more mass market approaches, such as the Web site and advertising, were not effective for the more specialized needs of the industrial market.

Table 3-47. Staff Assessment of Energy Trust Marketing Activities

Approach Indicated:	How effective is this approach? Staff Comments	How could it be improved? Staff Comments
Energy Trust Web site	"It's tailored toward the end user. There's not a lot there except for 'if you have a project, call us.'"	"Very hard to tailor to all the different market types within industrial." "Could add more tools. System and equipment sizing calculators or analysis. Like the SII tools that the vendors have." "Make it more interactive."
Other Energy Trust advertising (e.g. radio/print/mail)	"Ads don't work well for industrial."	
Case studies	"Has been effective. People like to hear about what others have done." "Thinks they're effective especially about showing customers what their competitors did. Do have a good variety for each market sector."	"As new technologies like streaming video, etc come about they should use these medium. Would be more effective than the paper case studies." "They should do mailings to customers or potential customers. ID customers who are likely to have these end uses. Maybe send to trade association membership. The association could get the info out under their name."

Approach Indicated:	How effective is this approach? Staff Comments	How could it be improved? Staff Comments
Program brochures (“Leave Behinds”)	“Have these; they help.” “Has been done and has been successful.” “Largely a tool to help the PDCs. They do mailings to smaller-sized market sectors, like irrigators. Thinks these are effective. He’s been getting more calls.”	“It’s good that Energy Trust produces these so they have the same message instead of being individually produced by PDCS.”
Trade ally networks/industry associations		“Could do a better job of targeting industrial associations and working with them more. Going to meeting and being involved rather than just placing ads in their newsletters.”
Northwest Food Service Show	“Have had good results at this one.”	
Industry Events	“Outreach at industry events has been done and is important.”	

PDC Marketing Plans

Energy Trust staff commented on the marketing plans developed by the PDCs. The process for developing these marketing plans has become more formalized in the past year, which the staff believed led to an overall improvement in the information presented. The staff believed that this formalized process provided a greater level of thinking about how it was possible to reach customers in their specific market territories as well as identifying other marketing opportunities such as trade shows. The staff believed by developing formal plans, this benefited both the actions that the PDCs needed to take and where they wanted Energy Trust to help.

However, the staff also recognized that these marketing plans were created by engineers rather than marketing experts. Therefore, the staff recommended involving Energy Trust’s marketing department and resources more closely in developing these plans.

Other Marketing Areas to Consider

Their suggestions for making improvements to the program included increasing activities targeting special events as well as continuing to promote the case studies and program brochures to a wide range of industrial customers.

Another staff member suggested materials to eliminate the customers' misconceptions and confusion about the PE Program and the BETC tax credit. The staff members also believe that Energy Trust should coordinate its marketing activities on both a regional level, using trade industry groups and associations, as well as on a Federal level with the Department of Energy and the Environmental Protection Agency.

Communication - Customers

Staff interactions with customers varied depending upon their duties and responsibilities. However, most of the staff interaction is focused on the large customers—either to respond to questions, address complaints, or assist with the incentive payment process. The staff members also indicated they are more likely to interact with large customers rather than specific organizations, such as BPA, NEEA, or PacifiCorp.

Communication – PDCs

Currently, Energy Trust staff communicates with the PDCs in the following ways: daily contact, on the telephone or via email; through quarterly meetings; and via newsletters. Occasionally, the program manager would meet with PDCs informally to build relationships and facilitate communication.

The level of direct interaction with the PDCs varies according to the staff member's responsibilities. Some staff interacts very frequently, even daily, with PDCs while other staff members may have less frequent interactions. The preferred means of these interactions is via email and these discussions focus primarily on program operations.

In 2008, PDCs were required to send in a monthly project report. This information is then entered into the program database. The process appears to be effective.

Energy Trust staff also holds quarterly staff meets with representatives from each PDC. These meetings provide a forum to discuss program policy issues, marketing, outreach, as well as discuss problems and share experiences. These meetings last slightly longer than one-half day.

Energy Trust staff also sends out newsletters every week or so that provides general information about the program and the broader scope of Energy Trust activities. The staff report that these newsletters are "well received" by the PDCs.

Overall, Energy Trust staff is satisfied with the level of communication with the PDCs and do not believe there are any areas for improvement. They believe that the PDCs try to give accurate information about their program status, but recognize that can be difficult to know at time.

Communication- ATACs

Only a few staff members had any direct communication with the ATACs. But most communication was done via the new annual ATAC Summit first held in 2008. This was a new event and designed to provide the ATACs with annual training and an overall introduction to the PE Program. The staff believed that this Summit should be continued in the next year.

The staff also began a Technical Forum where the participating ATACs could discuss and "reach consensus" on the technical approach for certain aspects of their studies.

The ATACs also work from a common report template and also must follow prescribed allowable cost and baseline equipment requirements.

Communication- Vendors

Most staff members have limited interaction with the vendors. A few staff members did report that they communicated most frequently with the compressed air vendors. However, most vendor communication is handled through the PDCs.

Since the launch of the SII program, two staff members reported that they have had increased communications with those vendors. However, the staff viewed these vendors more as customers rather than as vendors.

Key Findings- PDC's

This section summarizes the results from the in-depth interviews conducted with the PDCs, specifically regarding their assessment of Energy Trust's communication and marketing activities.

Communication between PDCs and Energy Trust

Overall, the PDCs are pleased with the level of communication with Energy Trust staff. This has been an area of improvement during the past year, with the PDCs especially pleased that Energy Trust staff now led the quarterly meetings. The PDCs said these meetings were much better organized compared to the previous structure. However, the PDCs also appreciate the opportunity for feedback and sharing among each organization.

The PDCs also are pleased with the interaction and availability of Energy Trust staff. The staff communicates frequently with the PDCs via telephone and email. The PDCs described the staff as "very accessible and easy to work with." Moreover, the PDCs said Energy Trust staff makes them feel like "part of a team" rather than outside vendors.

The PDCs had a clear understanding of each Energy Trust's staff member's responsibility regarding communication needs and knew whom to contact for specific questions. They also liked receiving the periodic emails with updates and additional information from Energy Trust staff.

The PDCs also mentioned they had an opportunity to provide content to the monthly newsletter.

Areas for Improvement

The PDCs did mention one area of improvement for Energy Trust to consider, which was providing more routine feedback regarding their performance. The PDCs want more substantive and timely input regarding how well the PDCs are performing relative to their benchmarks and Energy Trust's overall expectations.

Communication between Vendors and PDCs

Each PDC has developed its own method of handling communications with the vendors. For example, one has instituted a practice to respond to vendor questions within 24 hours while another has a more informal approach of responding to vendors on an as-needed basis. One PDC mentioned that he believed the "vendors are a left out a bit" regarding the communications.

The PDCs reported that they are very busy trying to manage the workload associated with the projects and to ensure good communication with the vendors. They said that they have daily contacts with vendors via telephone and email. But overall, they report that communications are satisfactory with the vendors—from their perspective.

Communicating Program Changes

The PDCs indicated that Energy Trust was clearly in charge of both developing internal program procedures and communicating those procedures effectively to the PDCs. Their assessment of Energy Trust's performance in this regard was mixed. One PDC mentioned that there was some initial ongoing confusion about program changes, until the processes were standardized later in the year.

PDC Marketing Plan Process

The biggest issue of concern for the PDCs was that they did not receive any feedback or guidance regarding their marketing plans. This is significant since the PDCs approached the markets with different targets and strategies. Overall they would have liked to receive more feedback from Energy Trust staff. Of note, those PDCs that actually followed through with their marketing plans were much more pleased with program results. But since the marketing plans that were developed were inconsistent, it is hard to determine if the PDCs were successful because of their marketing plans or because of the overall way in which they support customers.

Assessment of Customer Marketing

The PDCs also provided some information regarding the ways in which customers learn about the program. These methods included direct contact, through utility account managers, word-of-mouth, and trade association marketing. However, the PDCs agreed that most customers learned about the program from referrals or direct customer contacts. Very few leads are from Energy Trust Web site, according to these PDCs.

Program Marketing – Existing

Most of the PDCs had difficulty identifying the most effective marketing and communication strategies used by Energy Trust. None of the mass market media seemed particularly effective while the most effective marketing outreach was based on cultivating industry contacts through participation in trade shows, industry associations, and developing effective brochures and case studies about the program.

Key Findings- ATACs

The findings from in-depth interviews with the ATACs revealed the following key findings:

- Communications were viewed as adequate between PDCs and the ATACs although it is limited to project related issues, with some ATACs finding less communication and one finding more communication with the new program structure. The amount of communication has been reduced as the number of projects assigned to ATACs has decreased the need for communication. One ATAC said while the amount and quality are the same, he is now communicating directly with Energy Trust rather than Lockheed Martin.
- There were also differing degrees of interaction between the ATACs and PDCs. For example, two ATACS work directly with Energy Trust staff while the others work with a PDC. One ATAC never works with a PDC. One PDC (Cascade Engineering) was seen as taking the lead on most of projects with little input from the ATACs.

3.7 Process Conclusions and Recommendations

The following section contains key conclusions from the process evaluation and recommendations from the Summit Blue Team. Although the evaluation focused on the 2008 program, especially the transfer of program administration to Energy Trust and the resulting changes, it should be noted that is it sometimes difficult to constrain the stakeholder feedback to an isolated timeframe. Some of the comments describe old program requirements or policies and were clearly based on outdated experience with the program. Given the evolving nature of the program and the Energy Trust's continuing efforts to improve, some of the recommendations made by stakeholders may already be underway.

Conclusions

Economy

The effect of the downturn in the economy was a pervasive theme across both the impact and the process evaluations. Companies do not have funds to spend on energy efficiency projects and frequent staff layoffs mean that they also do not have the human resources to pursue.

Program Administration

The change in program administration has had the desired effect of bringing the Energy Trust closer to large customers than they were in the past. The Energy Trust's familiarity with the customers and the program has increased dramatically and has allowed the Energy Trust to identify and remedy issues around energy savings estimates, technical studies, and quality control and quality assurance.

Expanding program participation is a recognized challenge that Energy Trust has initiated steps to address, including pilot initiatives, prescriptive measures and the SII, and expanded and focused efforts in the high tech, agricultural, and water and waste water segments.

PDCs

PDC concept is sound as developing relationships and trust is key to targeting the industrial segment.

- It is important to keep energy efficiency out in front with the customer, because it tends to fall by the wayside amid other concerns. The PDC concept supports this.
- The PDCs are serving the customers well, as evidenced by the lack of confusion about the program on the part of the custom participants.

ATACs

There remains a perception that being both an ATAC and a PDC poses a conflict of interest. Energy Trust's assignment of ATACs to projects is reasonable and even-handed. There are areas of dissatisfaction around agreeing on the scope of a project with the PDC, repeated, minor changes required to their TAS reports, and rework that cannot be billed.

Vendors

Overall, most vendors are familiar with the program and have been involved with it for five years or more. However, given that vendor employee turnover is high, it is important for Energy Trust to periodically provide its participating vendors with information about the program. The vendors indicated they wanted more information about the program, especially regarding program changes in incentives and other requirements.

On the whole, the contractors seemed pleased with the PE program and said it has positively affected their businesses. However, they would like to have the application process accelerated, especially regarding rebate payments. Two vendors said that the delays in payment processing by Energy Trust has affected their business' finances. Several contractors reported that the energy savings estimates and other information required to receive approval have become too burdensome for the customers.

Program Satisfaction

Program participants rated their satisfaction with the program as high across a variety of aspects from timeliness of incentive payment to the quality of work conducted by the vendor. They also experienced low rates of confusion over the program, although there were some exceptions.

Controlling Energy Use

Both participants and non-participants indicate taking steps to control energy usage. They most commonly indicate purchasing energy efficient equipment, but many track energy use or have energy assessments conducted plant-wide or on specific energy systems. The most common interval for tracking energy use is monthly.

Additional Program Support

Participants did not show a strong desire to receive training or information services from the program. Non-participants indicate that training in equipment systems and operations is most frequently done on the job rather than through format training. Tight budgets and the unique nature of the equipment at a facility are the primary reasons for this.

Business Energy Tax Credit

PE program participants are largely taking advantage of the BETC program as well, but the PE program tends to be more influential than the BETC in the decision-making for all customer types.

Generally, participants felt that the PE program was easier to work than with than the BETC, but there were some exceptions.

The PE program supports the BETC as vendors indicate that the program has been very influential in encouraging them to include the BETC in their bids to customers.

Issues customers have with participating in the BETC are that the payments are spread over time, which is not helpful in offsetting first costs, customers without tax burdens have to find a pass-through partner, and projects with large BETC incentives require the assistance of an accountant.

PDCs, ATACs, and vendors all promote BETC to their customers to a large degree, because the added incentive helps to sell the projects; the PDC applications are set up for both programs automatically. All admit to having been negatively impacted when a project they were selling didn't qualify for a BETC. Some vendors express frustration over the BETC applications process, indicating that they are not familiar with recent PE program changes that incorporate the BETC application.

There are instances when projects qualify for the PE program, but not for BETC:

- In one example given, BETC characterized an old but working piece of equipment as a burn-out and the energy savings was calculated from the new equipment instead of the old.
- BETC requires that a project saves 10% of baseline energy while the Energy Trust program has cost effectiveness standards.
- BETC recognizes diesel as a qualifying fuel source while PE program does not.

Marketing and Communications

New communication channels to PDCs, ATACs, and SII vendors have been successful and well received. Efforts should be expanded to inform all vendors about the program as they also have influence with customers.

Case studies, and especially video case studies, are an effective way to promote the program and relax customer fears about technology performance. They should be expanded to include a broader range of technologies in industries representing the population.

Some market segments with good potential are not represented in PDC marketing plans and case studies.

Trade industry events and publications are an excellent avenue for providing the kind of detail and background necessary when describing complex technology improvements. Being active in these associations allows for access to industry players and creates legitimacy.

The quarterly PDC meetings have been a meaningful and effective way to communicate with the PDCs. They allow for the exchange of information in a time-effective manner. Quarterly is the right frequency to conduct them.

The annual ATAC Forum was also well received and appreciated. It was a good opportunity to bring the new ATACs up to speed on the program. There was no indication that these should be conducted more frequently than annually.

The SII has done an excellent job in their outreach to participating vendors, but efforts to promote the program should be expanded to include all vendors in the market. Vendors have significant influence with the customer and they can easily discourage participation by citing time and hassle factors. Dissatisfaction with the program by non-participating vendors seems to be a result of bad past experiences that have been remedied or misunderstandings about the program so education will be important to gain their support.

Communication with other regional market actors is limited to a few Energy Trust staff.

Recommendations

PDCs

The PE program should maintain regional PDC assignments with industry specialties. The regional aspect should be leveraged to move the program from being “Portland-centric.” The PDCs should continue to develop their expertise within their industry specialties. This should extend across common technologies and processes, competitive challenges, and unique regulatory issues.

Future PDC contracts should be clear on the consequences of and remedies for not meeting energy savings targets. Goals should continue to include committed projects given that the long-term nature of the project cycle makes it difficult to pinpoint completion dates with much accuracy.

Future contracts should also expand the definition of "conflict of interest" to include other business units that provide goods or services to the industrial market. The contract does not prohibit conflicts of interest, but requires that they be disclosed. Energy Trust should require clear divisions within each PDC organization between employees who support the PE program and employees who market other goods and services to the industrial market. For instance, non-PDC staff should not be able to accompany the PDC to meetings or site visits and would not be allowed to deliver incentive checks.

When pursuing program enhancements such as technical requirements, application processing changes, and pilot initiatives, the Energy Trust must carefully balance the benefits of PDC involvement with the time burden of this participation. To minimize the time burden on the PDC's, the PE program could:

- Partially develop plans and concepts before presentation to the PDCs for feedback; or
- Assign a single PDC to each initiative to represent the PDC perspective.

Additional PDC responsibilities or expectations, such as marketing and administrative responsibilities, must be accompanied by commensurate increases in PDC budgets, as these activities require additional labor resources to implement.

ATACs and Industry Specialists

The Energy Trust should pursue adding more ATACs or other specialists to support the program.

- Industry segments and end uses that span multiple industries should be well represented by the ATAC pool.
- Industries with unique competitive or regulatory challenges may require that industry specialists be brought in to alleviate customer fears that energy efficiency recommendations may adversely affect their operations. It is reasonable for Energy Trust to bring in out of state resources to meet these needs.
- ATACs with experience with gas measure will need to be added as these measures are added to the program.

Energy Trust should consider a pricing structure for conducting technical studies that allows the flexibility to accommodate extra time spent on a project to encourage follow up and support.

PDC/ATAC Conflict of Interest

Energy Trust should communicate their policies and processes for assigning ATACs to studies, pointing out instances where the PDC was not also assigned as an ATAC. The Energy Trust administration is fair and lingering perceptions are likely to be dispelled through familiarity with the process.

Additional Program Services

Continue pilot efforts that support operations, work with executives of the customer organization at the planning level, encourage energy-use tracking, and provide facility-specific, on-the-job training. However, expectations for the pilot efforts should be kept realistic until the economy rebounds and more customers are able to allocate staff time to participate.

Combining energy management improvements with general quality management programs such as ISO and Six Sigma may be helpful, but may get somewhat overshadowed by those programs' other requirements.

BETC

Energy Trust should continue regular communications with ODOE. Efforts should be made to better understand BETC measure eligibility and application process and to communicate these to PE PDCs, ATACs, vendors, and participants.

Energy Trust should enhance PE program materials to include the BETC. PE program process descriptions and flow diagrams should include key milestones in the BETC application process, especially emphasizing that equipment cannot be purchased prior to the BETC application. BETC should be an ongoing topic at the quarterly PDC meetings and the annual ATAC forums, possibly with an ODOE staff member in attendance to answer questions and receive feedback.

Energy Trust should develop materials to make participants with no tax liability aware that they can transfer the BETC tax credit. Energy Trust should also support creative solutions for tax-neutral participants to take advantage of BETC such as:

- Identifying or sponsoring an entity to buy or broker the sale of pass-through credits; and
- Engaging a tax authority to develop other options, such as granting credits to employees or project champions.

Application Process

The following summarizes the recommendations to the application process. Further detail is provided in Section 3.4:

- Develop an online application system;
- Allow for digital signatures;
- Improve form appearance;
- Finalize improvements to custom forms;
- Improve W9 form process; and
- Require supporting documentation for energy savings assumptions, calculations, and baselines.

Data Collection, Tracking, and Storage

The following summarizes the recommendations to the application process. Further detail is provided in Section 3.4:

- Conduct data entry through electronic forms;
- Include forecasting elements in FastTrack;
- Resolve contact issue in GoldMine;
- Improve search capabilities in GoldMine;
- Increase linking and reporting capabilities of databases; and
- Seek PDC coordination on data process improvements being mindful that this involvement takes time away from customers.

Payment Process

The following summarizes the recommendations to the application process. Further detail is provided in Section 3.4:

- Conduct imports more than once a week; and
- Eliminate double review of checks or allow for electronic review.

Quality Assessment and Quality Control

The following summarizes the recommendations to the application process. Further detail is provided in Section 3.4:

- Conduct additional site visits;
- Define the of scope and rigor of PDC QA/QC plans;
- Include the PDC QA/QC plans in contract;
- Include PDC audit specifications in contract;
- Include additional conflict of interest specifications in PDC contracts; and
- Improve quality of ATAC studies.

Market Assessment

Expand efforts to high-potential market segments. The following market segments show high potential for program participation and energy savings:

- Chemical Manufacturing (NAICS 325);
- Computer and Electronic Product Manufacturing (NAICS 334);
- Primary Metal Manufacturing;
- Paper Manufacturing; and
- Wood Product Manufacturing.

The program should ensure that it has adequate resources to influence these key segments, including the addition of ATACs or other industry specialists to meet unique customer needs. Case studies should be developed featuring these industries.

The program should leverage opportunities to partner with regional or federal entities.

Marketing and Outreach

Energy Trust marketing department should guide PDC market plan development by:

- Developing a marketing and communications outline for each PDC to follow. This outline should include marketing elements and activities to be addressed in each plan, such as industry trade associations and shows, and industry case studies or other items needed from the Energy Trust; and
- Reviewing and providing feedback to the PDCs to refine and finalize their marketing plans.

Marketing efforts and plans should be customized to each key industry and rely heavily on direct contact. This includes developing a more standardized approach to becoming involved with trade associations, making presentations at industry events, and publishing case studies in industry journals and newsletters.

The Energy Trust should establish benchmarks in order to guide marketing efforts toward industries with the greatest market share and program potential. These should not be punitive but rather meant to identify areas of untapped potential.

Case studies have been well received and Energy Trust should continue to develop them on a broader range of industry sectors, including manufacturing and irrigation. The case studies should be representative of the industries in Energy Trust territory rather than just focusing on a few niche markets. Where possible, case studies can be developed highlighting end uses that span a number of industries. Energy Trust should be mindful of industries with unique competitive or regulatory needs and develop case studies that address these circumstances specifically.

Energy Trust should leverage their marketing activities to match more closely with proposed marketing by other groups, including the PDCs and market actors, including the Oregon Department of Energy and its BETC program.

Communications

Energy Trust should continue quarterly PDC meetings and the annual ATAC Forum. These activities are viewed as meaningful and effective communication channels. They are appreciated by the PDCs and ATACs and considered a good use of their valuable time. During these events, Energy Trust should continue to include time for the parties to share their issues, challenges, and perspectives.

The ATAC Forum should:

- Update the ATACs on the technical study assignment process in order to dispel a lingering perception that the PDCs who are also ATACs are identifying projects to benefit their own organizations;
- Clarify the ATAC and PDC roles in the PE program process and set expectations about communication and collaboration between the two parties;
- Review of the baseline, eligible cost, and TAS requirements;
- Availability and use of PE program forms and calculators, including the PE program process flow diagram; and
- BETC measure eligibility and limitations, and the application requirements and process.

Program communication channels should be expanded to include vendors. Although vendors indicate that they understand the program requirements, they also report challenges with moving projects through the program in a timely manner and some difficulties with project documentation.

4 IMPACT ANALYSIS

4.1 Impact Summary

The Energy Trust's 2007 Production Efficiency Program ("PE Program") working estimate of savings totaled 121,692,994 kWh across 149 participant sites. Within this participant universe, 27 sites were selected through the evaluation sample and comprised 109,318,571 kWh, or 90% of working savings. The single Mega Project accounted for 54,634,752 kWh, or roughly 45% of the PY 2007 working savings. Although numerous attempts were made to schedule verification activities with this site, participant staff were in the process of making site operating decisions and could not support the impact evaluation effort in time for the release of this report. Evaluation results for the Mega Project site will be submitted as an amendment to this report at a later date.

Impact evaluation results were calculated at the end-use measure and industry[19] levels, yielding a realization rate of 94%, respectively. Demand savings were calculated at the program level using the Energy Trust's Cost-Effectiveness calculator.[20]

Table 4-1 provides an impact summary of program performance:

Table 4-1. Impact Summary of the 2007 Production Efficiency Program

Indices of Program Savings Value	Value
Non-Mega Project Savings	
Working Estimate of 2007 Non-Mega Project Savings	67,058,242 kWh
Realization Rate	94%
Gross Savings Estimate	63,098,466 kWh
Demand Savings Estimate	7,379 kW
Net-to-Gross Ratio	73%
Net Savings Estimate	46,061,880 kWh
Net Savings as a Percentage of Working Savings	69%
Mega Project Savings	
Working Estimate of 2007 Mega Project Savings	54,634,752 kWh

Project level Net-to-Gross ratios were developed through comprehensive interviews with the participants in the impact evaluation sample. Summit Blue used the Energy Trust's approach to calculate a program

[19] North American Industry Classification System codes (NAICS)

[20] ETO C-E Calculator Production Efficiency_021408

level Net-to-Gross ratio by averaging the project level Net-To-Gross ratios and applying this un-weighted factor to all other participant sites in the PY 2007 Product Efficiency Program.

Appendix A provides additional information on the models that were developed to estimate free-ridership, which accounted for:

1.) Budget: Whether participant budgets could accommodate the project;

2.) Influence: How influential participants believed the program and its services were in the decision to install the incentivized measures; and

3.) Intention: Participants' (retrospectively) stated intentions in the absence of program intervention.

It should be noted that a subset of participants reported taking actions that constituted program spillover, generating both electricity and natural gas savings. However, the analysis of spillover savings was outside the scope of this study's research objectives.[21]

4.2 Impact Evaluation Methodology

The impact evaluation of the Energy Trust's 2007 Production Efficiency Program was designed to address several key research questions, including:

- Were measures installed as reported in the project application files?
- Were working savings estimates consistent with evaluation verified savings?
- What percentage of verified savings was attributable to free-ridership?

Evaluation, Measurement & Verification (EM&V) strategies varied across end-use categories and site-level characteristics. However, the resources used to verify working savings estimates generally included:

- *Program Records* – A thorough review of available program participant data across all installed projects. This included identifying program specific measures installed, date of measure installations, availability of pre-installation data, and an understanding of unique participant operating characteristics.
    - Baseline assumptions (i.e., pre-existing conditions) were reviewed and commented on for each project investigated.
- *Project Level Engineering Calculations* – An engineering review of assumptions and methodologies used to estimate measure-level energy and demand savings. Findings were used to identify measure performance parameters and variables for supplemental data collection and analysis.
- *On-Site Measurement & Verification (M&V)* – On-site M&V efforts included the verification of measure installations, collection of key energy performance variables, and confirmation of assumptions used to develop working saving estimates. Recorded parameters included:
    - Measure presence and appropriate installation. If a measure was missing, determine if it was installed and/or removal date and reason.

[21] Appendix A provides a list of equipment that respondents to the spillover survey implied had been installed.

- o Key energy performance variables of installed measures that typically fall into three categories:
  - Quantity of installed measures,
  - Capacity (e.g., Amperage, Wattage, Tons) of installed measures, and
  - Efficiency of installed measures.
- o Key facility performance data, such as daily schedules, seasonal variations in schedules, occupancy, and control strategies.
- o A limited set of behavior and demographic questions.
- o Spot measurements and interval metering of a sample of installed measures to confirm pre-/post- installation performance characteristics.

- *Billing/Metered Data* – Where available, billing data was collected and used to benchmark working savings estimates for measures that represented a substantial portion of site energy use.
- *Secondary Literature* – Resources included Program documentation (e.g., Energy Trust work papers, implementation contractor tools) and representative studies (e.g., DEER[22], ASHRAE[23]).

Evaluation findings were used to adjust measure installation counts, performance variables, input assumptions, and realized savings at the end-use category and industrial sector. Net savings were also estimated and details on the Net-to-Gross methodology are provided in Appendix A.

4.2.1 Sampling Approach

The impact evaluation sample was drawn from the 2007 PE Program participant universe. A stratified sampling methodology with a 90% confidence and 15% precision goal was used to ensure that evaluation findings were representative of overall program performance. Strata based on expected energy savings were defined by:

1.) Ordering projects according to their respective working savings, and

2.) Specifying a set of certainty sites to be included in the evaluation sample – that is, the standalone Mega Project site and other sites that represented a large portion of PY 2007 savings.

This approach yielded a subset of 26 participant sites to undergo evaluation activities. One additional "certainty" site was introduced into the sample, increasing the final impact evaluation sample to 27 participant sites. Projects within the sample were later adjusted to improve the percentage of working savings evaluated through the impact evaluation process. Sample adjustments included:

- The ten project sites with the greatest working savings in 2007 were included in the evaluation sample. These were the certainty sites.
- The single gas project in 2007 was excluded from the sample. Prior to 2007 there were no gas projects.

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[22] Database for Energy Efficient Resources, (DEER)

[23] American Society of Heating, Refrigerating and Air Conditioning Engineers, ASHRAE Standard, ANSI/ASHRAE/IESNA Standard 90.1-2004

- An effort was made to ensure a proportional relationship between the evaluation sample and the overall distribution of aggregated end-use measure working savings:
    - Compressed air measures represented approximately 15% of the 2007 program working savings at non-certainty sites. However, within the original evaluation sample, compressed air measures accounted for only 10% of verifiable savings. It should be noted that in the 2005 and 2006 program years, compressed air measures accounted for an even larger portion of program working savings. Due to both the historical significance and the complexity of compressed air systems, additional compressed air project sites were introduced into the evaluation sample based on the relative size of project working savings.
    - Within the original evaluation sample, the distribution of lighting end-use savings was representative of the participant universe. However, a number of project sites within the sample produced their full savings through lighting retrofits. Because lighting projects tend to perform consistently and are being studied in thorough evaluations of the Energy Trust's other efficiency programs, only the three project sites with the largest working savings were included in the final evaluation sample.
    - One site within the original evaluation sample claimed savings through prescriptive motors offered through the 2007 Production Efficiency Program. However, the project site was located in a remote geographic region. Due to the low variability of prescriptive measure savings, coupled with the logistical resources required to evaluate the site, the evaluation team decided that the site would not receive on-site verification activities.

The final impact evaluation sample is provided by Table 4-2. Similarly, Figure 4-1 provides perspective on the impact evaluation sample verifiable savings relative to the participant universe of 2007 and excludes the Mega Project site's standalone process measure which accounted for 45% of PY 2007 working savings.

Figure 4-1. Comparison of Sample Verifiable Savings to 2007 Participant Universe, Excluding the Mega Project

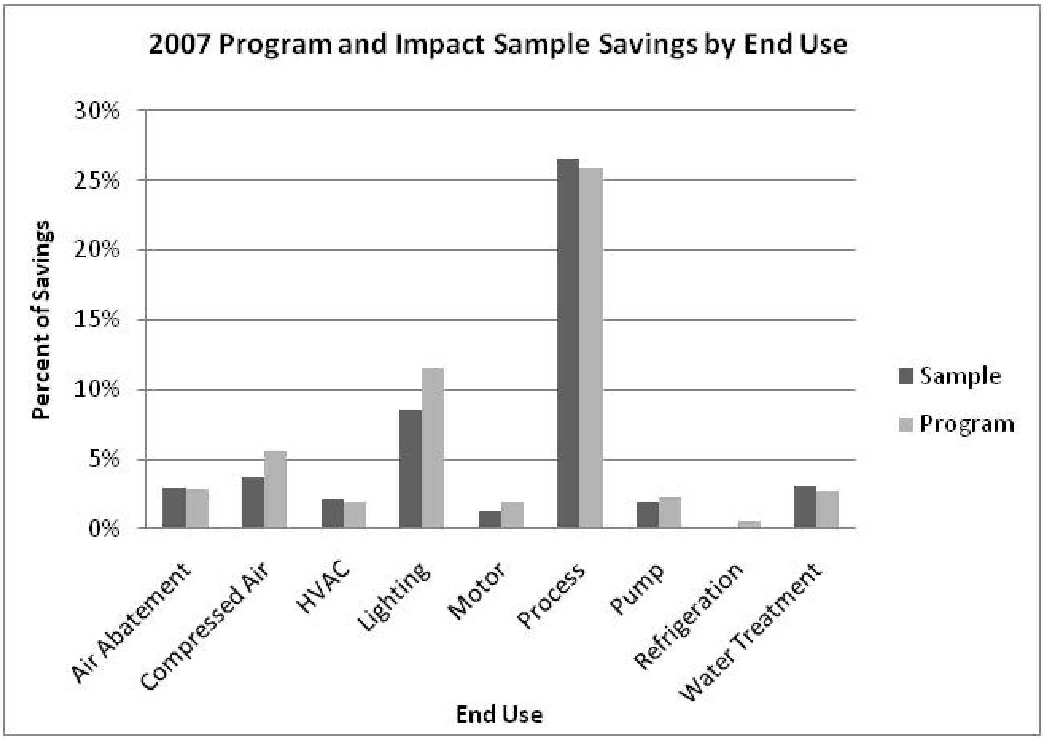
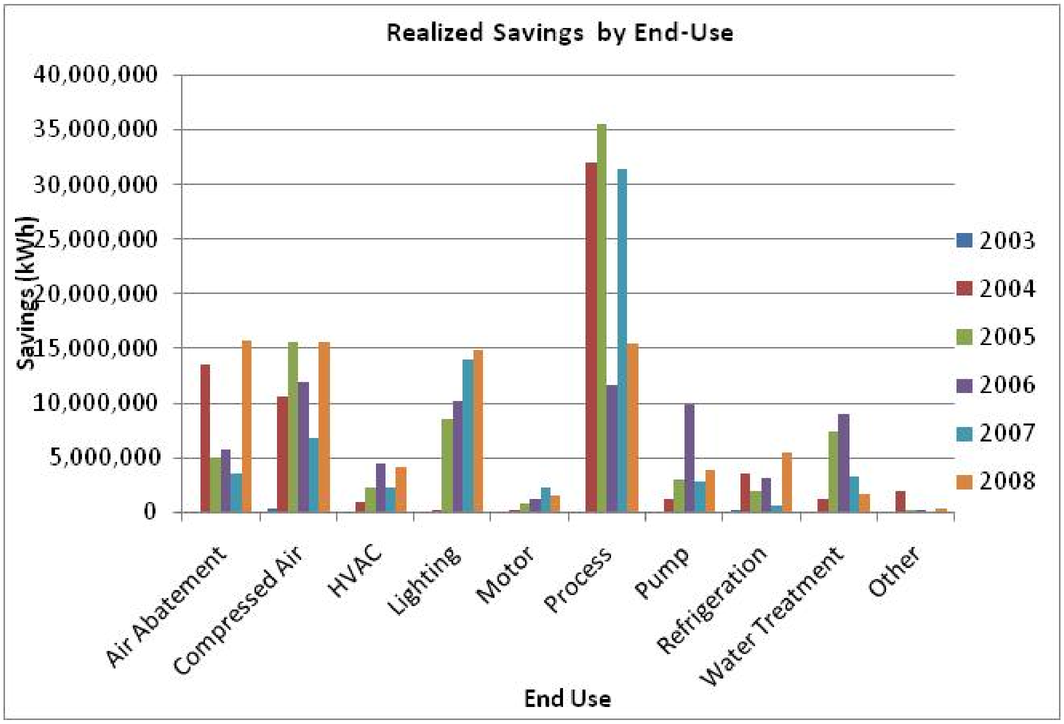


Figure 4-2 illustrates working savings by program year, dating back to 2003. Excluding the Mega Project sites, the distribution of working savings by end-use category has remained fairly consistent throughout the history of the PE Program and supports the final impact evaluation sample.

Figure 4-2. Distribution of Production Efficiency Program Cumulative Working Savings by Program Year, Excluding Mega Project



4.2.2 Evaluation Site Visits

The evaluation team met with participant staff on-site and completed EM&V activities for 26 of the 27 projects chosen in the impact evaluation sample prior to May 12, 2009. Of this subset, Site 13 was unable to provide data to support the evaluation process in a timely manner.

Numerous attempts were made to schedule verification activities with the remaining site, the standalone Mega Project site (i.e., Site 27). However, the participant staff was in the process of making site operating decisions and could not support the impact evaluation effort. Evaluation results for Sites 13 and 27 will be submitted as an amendment to this report.

4.2.3 Data Gathering & Evaluation Approach

Prior to on-site meetings with participant staff, the evaluation team thoroughly reviewed all project level documentation to develop an understanding of project characteristics. An evaluation plan[24] was developed for each site and approved by senior engineering staff prior to deployment. This plan served to:

1.) Identify base and installed measures included in the final evaluation sample

2.) Identify performance influencing parameters and assumptions used to develop project-level working savings estimates

3.) Outline and M&V approach that included[25]:

    a. Quantity and type of measurement equipment to be used on-site

    b. A prioritization of evaluation supporting data elements

    c. Key variables and uncertainties to be resolved with participant staff

Throughout this process, Summit Blue remained cognizant of each site's unique operating characteristics, sensitivity of program installed equipment, and availability of participant staff to support M&V activities. The final evaluation strategy used to characterize project and measure level impacts made the most of available resources. Various examples of unique site-level characteristics that constrained the final evaluation approach chosen include:

- Site 15: Only a small subset of program incentivized motors were in operation throughout the facility with varying loads and end-use metering would not provide representative results for the population of installed measures. Instead, spot-measurements were taken and combined with prescriptive input assumptions to develop gross savings estimates.
- Site 21: Water treatment equipment was physically inaccessible on-site due to safety protocols. However, because facility energy use was representative of overall project-level savings, billing data was used as a proxy to support evaluation efforts.
- Site 23: Equipment was fed from 4,160 Volt lines, rendering spot measurements and end-use metering impractical. Instead, the evaluation team obtained daily production and system power use data from facility personnel to support the evaluation efforts.

Table 4-2 details the final evaluation approach used to develop gross savings estimates at the measure and project levels. Detailed site evaluation reports have also been developed and are included in Appendix B.

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[24] Appendix F: On-Site M&V Template

[25] Appendix E provides the template used to develop M&V plans for each project site.

Table 4-2. 2007 Production Efficiency Program Impact Evaluation Sample Details

Site ID	End-Use Category	Evaluation Date	Evaluation Approach	Working Savings (kWh)	Percentage of Program Working Savings
1	Lighting	12/11/2008	Lighting On/Off Logging	2,373,254	2.0%
2	Lighting	3/5/2009	Lighting On/Off Logging	5,546,793	4.6%
3	Lighting	3/5/2009	Lighting On/Off Logging	769,219	0.6%
4	Compressed Air	3/10/2009	End-Use Metering	124,052	0.1%
	Lighting	3/10/2009	Lighting On/Off Logging	82,484	0.1%
5	Compressed Air	3/5/2009	End-Use Metering	486,660	0.4%
	Lighting	3/5/2009	Lighting On/Off Logging	351,199	0.3%
6	Compressed Air	1/15/2009	End-Use Metering	90,612	0.1%
7	Compressed Air	1/14/2009	End-Use Metering	55,587	0.0%
	Lighting	1/14/2009	On-Site Verification	179,678	0.1%
8	Compressed Air	3/3/2009	End-Use Metering	222,251	0.2%
9	Compressed Air	3/4/2009	End-Use Metering	336,829	0.3%
10	Compressed Air	3/5/2009	End-Use Metering	35,361	0.0%
11	Compressed Air	4/6/2009	End-Use Metering	500,517	0.4%
12	Compressed Air	5/8/2009	End-Use Metering	12,556	0.0%
13	Compressed Air	4/14/2009	TBD	618,286	0.5%
	Motors	4/14/2009	TBD	1,094,907	0.9%
	Process	4/14/2009	TBD	223,224	0.2%
14	Water Treatment	1/15/2009	End-Use Metering	1,189,928	1.0%
15	Motors	3/5/2009	Spot-Measurements	86,689	0.1%
16	Air Abatement	5/12/2009	End-Use Metering	1,784,094	1.5%
	Compressed Air	5/12/2009	End-Use Metering	1,590,360	1.3%
	Motors	5/12/2009	Spot-Measurements	71,917	0.1%
17	Air Abatement	3/4/2009	End-Use Metering	1,428,805	1.2%
18	HVAC	3/6/2009	Visual Inspection	2,299,244	1.9%
19	Pumps - Industrial	3/6/2009	End-Use Metering	2,084,400	1.7%
20	Water Treatment	3/4/2009	End-Use Metering	1,480,968	1.2%
21	Water Treatment	3/4/2009	Billing Analysis	396,449	0.3%
22	Water Treatment	3/3/2009	Billing Analysis	261,801	0.2%
23	Process	3/23/2009	End-Use Metering	2,050,015	1.7%
24	Process	1/12/2009	End-Use Metering	22,214,150	18.3%
25	Process	1/29/2009	End-Use Metering	1,449,000	1.2%

Site ID	End-Use Category	Evaluation Date	Evaluation Approach	Working Savings (kWh)	Percentage of Program Working Savings
26	Motors	4/6/2009	End-Use Metering	101,422	0.1%
	Process	4/6/2009	End-Use Metering	3,091,108	2.5%
		Site Total		***54,683,819***	44.9%
27	Process	TBD	TBD	54,634,752	44.9%
		Mega Project Total		***54,634,752***	44.9%

4.3 Impact Evaluation Results

The collected data and evaluation analyses were used to develop realized gross savings for each unique end-use measure (e.g., lighting, motors, HVAC, etc.) and industry (e.g., wood products, utilities, etc.) represented within the impact evaluation sample. Gross savings, relative to working savings, were aggregated to form end-use measure and industry level realization rates across the complete 2007 PE Program participant universe:

$$Realization\ Rate = \sum_{i}^{N}\left({kWh_{verified,i}}/{kWh_{working,i}} \right) x \left({kWh_{working,i}}/{kWh_{Total}} \right)$$

Where:

- $kWh_{verified,i}$ = Verified savings for end-use or industry *i*
- $kWh_{working,i}$ = Working savings for end-use or industry *i*
- kWh_{Total} = Total 2007 Production Efficiency Program Working Savings

4.3.1 Ex-Post Adjusted Estimates by End Use

Reported Cumulative Program Savings by End-Use

Table 4-3 provides gross realized savings and realization rates across each unique end-use measure category within the 2007 PE Program participant universe:

Ex-post estimates by industry type (NAICS) are provided in Appendix G.

Table 4-3. Program Year 2007 Production Efficiency Savings by End-Use Category

End-Use Category	Program Project Count	Evaluation Sample Project Count	Percentage of Total Program Working Savings	Percentage of Evaluation Sample Working Savings	Evaluation Sample Working Savings (kWh)	Evaluation Sample Verified Savings (kWh)	End Use Category Realization Rate	Total Program Working Savings (kWh)	Total Program Verified Savings (kWh)
Air Abatement	3	2	3%	3%	3,212,899	2,989,566	93%	3,496,706	3,253,645
Compressed Air	31	11	6%	3%	3,454,785	3,374,918	98%	6,770,571	6,614,050
HVAC	1	1	2%	2%	2,299,244	2,299,244	100%	2,299,244	2,299,244
Lighting	63	7	11%	9%	9,302,627	10,707,036	115%	13,950,393	16,056,471
Motor	55	16	2%	0%	260,028	235,865	91%	2,290,330	2,077,502
Process	16	7	26%	27%	28,804,273	27,572,988	96%	31,444,126	30,099,996
Pump - Industrial	1	1	2%	2%	2,084,400	851,543	41%	2,084,400	851,543
Pump - Irrigation[26]	14	0	1%	0%	0	0	100%	712,586	712,586
Refrigeration[27]	7	0	1%	0%	0	0	97%	680,740	658,956
Water Treatment	4	4	3%	3%	3,329,146	474,472	14%	3,329,146	474,472
End-Use Total	***195***	***49***	***55%***	***49%***	***52,747,402***	***48,505,632***	***92%***	***67,058,242***	***63,098,466***
Mega Project									
Process	*1*	*1*	*45%*	50%	54,634,752	TBD	TBD	54,634,752	TBD
Mega Project Total	***1***	***1***	***45%***	***50%***	***54,634,752***	***TBD***	***TBD***	***54,634,752***	***TBD***

[26] In the event that a particular end-use was not included in the evaluation sample, Summit Blue used the realization rates developed from the *2006 Production Efficiency Program: Process and Impact Evaluation* to estimate Total Program Verified Savings

[27] 2006 Production Efficiency Program: Process and Impact Evaluation, Research Into Action, Inc., August 12th, 2008

As illustrated in Figure 4-3, "Process" measures, including primary and secondary process, have historically accounted for the majority of program working and realized savings relative to other end-use measure categories. In 2007, process measures accounted for 71% of working savings, 45% of which are attributed to the standalone Mega Project site.

Figure 4-3. Cumulative End-Use Working Savings from PY 2003 – 2008, Excluding the Mega Project

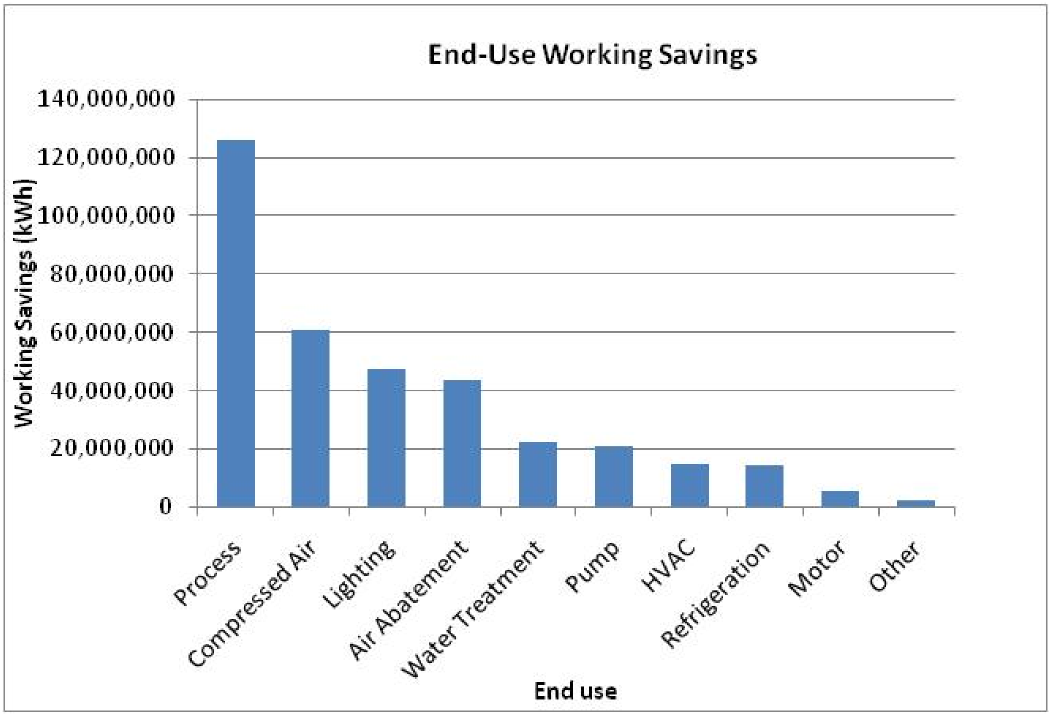
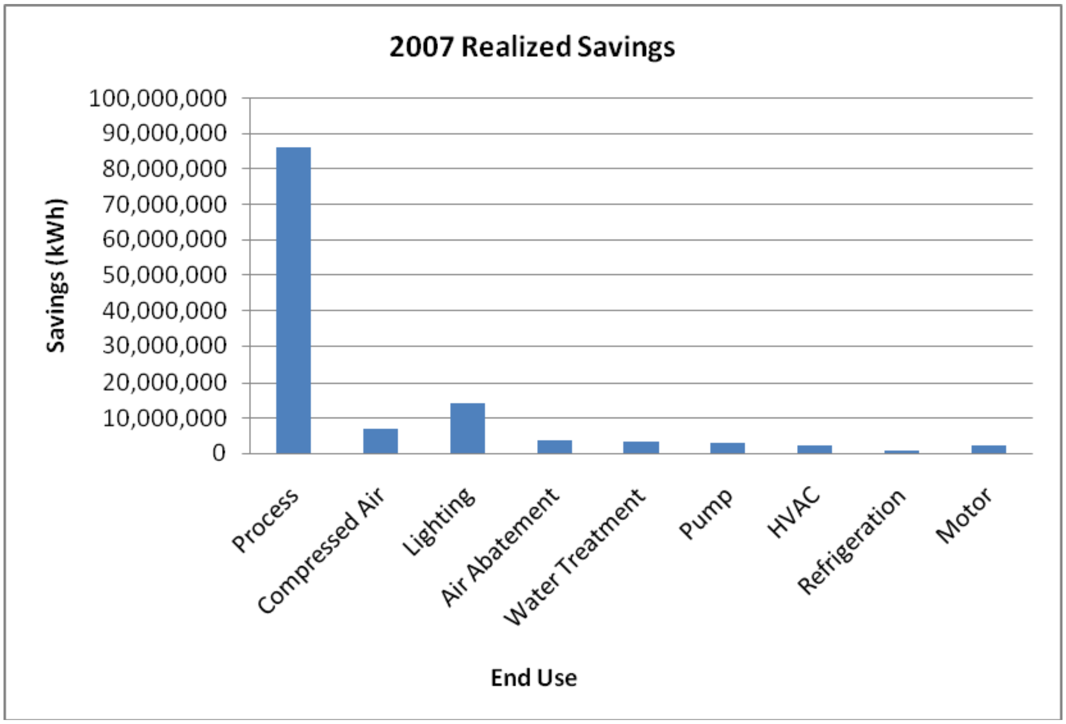


Figure 4-4 details working savings for PY 2007, showing a clear trend between current and past program implementation characteristics:

Figure 4-4. 2007 End-Use Working Savings, Excluding the Mega Project



Collectively, process, lighting, and compressed air measures represented 78% PY 2007 working savings, 79% of evaluation sample working savings, and 83% of verified end-use measure savings when excluding the Mega Project. The evaluated end-use program level realization rate totaled 94%.

Verified Cumulative Program Savings by Measure Type

The following is a brief summary of findings for each end-use category investigated through the impact evaluation process.

Air Abatement Measures

The Energy Trust's 2007 PE Program included three projects that implemented air abatement measures, two of which were included in the impact evaluation sample. In both cases, direct measurements of the systems were used to estimate the current system usage. However, both facilities were experiencing a decline in production schedules due to economic conditions at the time of the verification. This necessitated some adjustments to the baselines at the project sites.

Air abatement realization rates were found to be 93% at both of the sites included in the evaluation sample. It should be noted, however, that both of these locations would have achieved higher realization rates if production levels had remained consistent with past records. Overall, these projects were found to be accurately analyzed, although a more thorough explanation of previous study findings may serve to improve the accuracy of savings estimates in the future.

Compressed Air Measures

In general, the compressed air projects matched the descriptions in the site reports well. In most cases, there was difficulty providing baselines from measured data for several reasons:

1.) Although some of the files contained plots of metered data prior to the installation, it was generally not possible obtain the raw data for calculations.

2.) Many of the systems had been reconfigured, or loads had changed since the initial study.

Overall, compressed air measure realization rates were fairly high. Lower realization rates were attributed to decreased production levels which limited achievable savings. Aside from economic influencers, the savings estimates and assumptions used in the site reports were found to be technically astute and provided reliable savings estimates at the project level.

HVAC Measures

Site 19 was the only participant to claim HVAC measure savings through the Energy Trust's 2007 Production Efficiency Program and is classified as a computer and electronics manufacturing facility. By reducing air-handling unit (AHU) fan speeds by 10%, the site expected to achieve savings through:

1.) Reduced fan power consumption

2.) Reduced heat load on the existing HVAC system

The methodology provided by the project application to estimate savings were deemed accurate and corresponded to the range of fan power spot measured on-site. The realization rate for the single HVAC measure installed through the program was calculated to be 100%.

Lighting Measures

Because the Energy Trust had extensive documentation and findings from previous lighting studies, along with standard wattage data, evaluation staff did not confirm power draw on pre-existing and retrofit fixtures during the on-site verifications. Instead, evaluation efforts focused on confirming that measure counts and retrofit model numbers correlated with the individual project applications.

Additionally, lighting on/off loggers were deployed at project sites that installed occupancy sensors to verify the reduction in lighting operating characteristics. Realization rates for this technology generally exceeded 100% high because the verified reduction in operating hours exceeded the program application assumption of 25%.

Motor Measures

The Energy Trust provided prescriptive rebates for NEMA premium efficiency motors purchased by participants of the 2007 PE Program. The evaluation process for this technology included an interview with site personnel to determine the deployment status of incentivized motors. With only two exceptions, all verified motors were found to be installed and operating as intended. In one case, the participant ordered motors to replace ones taken from spares. As such, only half of the motors rebated were installed at the time of inspection. In the other case, a motor application appeared to have been mistakenly submitted and processed twice. This appeared to be an oversight on the part of both the customer and program administrator and served to reduce the realization rate for motors at that site by a third.

Process Measures

Primary and secondary process savings, including the standalone Mega Project, comprised almost three quarters of the 2007 Program working savings and was represented proportionally in the impact evaluation sample. On-site verification efforts confirmed that process improvements had been implemented as noted in the project application files. However, in most cases, the verified savings were much lower than the expected savings. Low realization rates were generally attributed to:

1.) Decreased production levels due to economic conditions

2.) An overestimation of achievable savings

3.) Permanent removal of equipment

Due to the magnitude of process measure working savings, the evaluation team recommends a more rigorous review of the process improvement applications made to the Energy Trust under the Production Efficiency Program.

Pumping Measures

The original impact evaluation sample included several pumping projects. However, the majority of these projects used the pumping measures for irrigation purposes. Due to the timing of this study, none of the irrigation projects were operating during the evaluation timeframe and could not be verified for the 2007 Program year. Summit Blue is arranging to ensure that irrigation pumping projects are included in the 2008 program sample to provide realization rates for this end use measure category.

It should be noted that one pumping project at a power plant and was included in the 2007 impact evaluation sample. This project was confirmed to be installed and operating as intended. Due to the presence of medium voltage motors, the facility logging system was used to obtain over a year of pre- and post- installation power data for the system, allowing for a rigorous analysis of site level savings.

Refrigeration Measures

Refrigeration measures made up only one percent of program savings in 2007 and were not reviewed as part of the impact analysis sample.

Water Treatment Measures

The Energy Trust employs a single ATAC for water treatment projects. Studies at these sites involve a comprehensive review of equipment and controls. The ATAC performs the studies and aids the customer in selecting equipment. All four of the water treatment projects implemented in 2007 were included in the final impact evaluation sample.

Due to the fact that the installed measures constituted a majority of site energy usage, a billing analysis was used to verify savings estimates at three of the four participant sites. At the fourth site, savings were calculated using site recorded measurements and consumption data.

Similar to the process measures, water treatment plants generally had lower realization rates than the other end use categories. The control savings, in particular, were found to be highly overstated. Additionally, the applications reports were found to be poorly organized, difficult to follow, and in multiple cases, included incorrect assumptions. It is recommended that a third party or internal Energy

Trust review be required for these projects in the future, as they are currently scoped, analyzed, and reviewed by the same ATAC.

4.3.2 Baseline Adjustments

The Energy Trust's baseline[28] guidelines currently state a preference for measured baselines. However, calculated baselines are deemed acceptable in simple cases or where measurement is not practical due to capacity increases, equipment removal, or the presence of medium and high voltage systems. Theoretical baselines use industry standards for new construction or equipment and a combination of the discussed methods is used where appropriate. The Energy Trust's guidelines also require any assumptions to be clearly stated and the methodology summarized.

In some cases the baselines stated on the applications showed some discrepancies. Technical studies did not always directly relate to the savings claimed on applications and, in some cases, were completely absent from application files. Furthermore, in some cases there are printed plots of vendor measured baselines but the logged data is not available. The lack of availability is, in some cases, simply due to the length of time since the initial study was performed and the choice of paper records by the Energy Trust. In other cases, however, vendor performed studies were considered proprietary if the customer did not fund the analysis and the logs were not provided for this analysis.

Summit Blue reviewed applications for baseline conditions and adjusted baselines using several criteria. Where pre-installation measured data was available and the system usage had not significantly changed since the time of its measurement, Summit Blue used this data to confirm baselines given in the project files. Where pre-installation measurements were not available or applicable, Summit Blue used specifications of baseline equipment to calculate usage. In a number of cases Motors listed on prescriptive applications were verified to be installed and operating, but no calculations were performed on these projects. Lighting projects were also generally prescriptive in nature and standard wattages were used for calculations. Occupancy logging was performed at some locations with sensors to determine the reduction in operational hours.

Production data was collected from sites whose projects claimed production dependent savings. When possible this data included both pre- and post-installation figures. The pre-installation values were used along with pre-installation equipment information to calculate per-production unit energy use. This was then used to estimate how much energy would have been used to produce the current amount of product and this value was used as a baseline.

Compressed air systems' current power usage was logged and the compressor curves or CAGI data was used to calculate air consumption from power usage. If initial baseline data was available and the system had not changed appreciably, this was used as the baseline. If there had been changes in use since the initial baseline was measured, or if the system had been completely reconfigured or was new, the air usage was used to estimate usage with the previous or an equivalent standard efficiency system using compressor data for that system. Control strategies were taken in to account in the calculations.

Projects involving both fans and pumps included air abatement, water, and HVAC projects, among others. These projects were generally treated in a similar manner to compressed air. If pre-installation logged data was available and applicable, it was used to confirm or adjust the baseline provided in the application. Where this was not the case, fan and pump curves were used to estimate the capacity of the

[28] Baseline Assumptions -Final rev 3.2.doc

current system from power logging. This was then used along with specifications for the pre-installation system to calculate a baseline usage. In several cases, production slowdowns had significantly impacted the current usage and the baseline had to be adjusted for current conditions.

Water treatment plant projects included pumping, aeration, and controls upgrades. In several cases billing data was used to calculate savings. This was done only where the project savings comprised a significant portion of the facility usage and could clearly be discerned on the bill. In these cases, at least one pre- and one post-installation year of billing data was used to estimate savings. The baseline usage was adjusted for any weather dependencies using BIN data for the area. Where billing analysis was not appropriate and the individual equipment could be reliably logged, a combination of measured data and facility monitoring data was used to create a baseline as with other project types.

4.3.3 Economic Factors

Throughout the evaluation process, Summit Blue technical staff distinguished between reduced consumption achieved through improved controls and efficient measure installations, relative to a decrease in production throughput as a result of economic influencers. Reductions realized through the latter case were not considered to be "savings" because they would not have been realized under normal conditions. Evaluation staff discounted savings from a reduction in site production activities using the following approach:

1. If the site is closed, then achieved savings were considered null.
2. If the changes in production levels are semi-permanent, then the savings were prorated and two sets of realization rates were calculated – the current, reduced realization rate and the realization rate under normal operating conditions. The final site level realization rate was then calculated to be the average of the two realization rates.
3. If the changes in production levels are short term, then the realization rate was calculated using the site's normal operating characteristics.

Although this methodology oftentimes reduced a project's verified savings, it ensured that savings were appropriately allocated to program activities, independent of external conditions. Table 4-4 provides a tabular illustration of project and program level realization rates by economy adjusted, full capacity, and average production schedules. Even though the overall program realization rates only shifted by approximately 1.3%, the realization rates within particular projects varied considerably (e.g. Site ID 6). In the future, if larger sites representing a substantial portion of Program working savings are affected by economic factors, we would expect larger deviations in achieved realization rates.

Summit Blue recommends future evaluation efforts to remain cognizant of differences between the *ex-ante* assumptions and *ex-post* operating conditions.

Table 4-4. 2007 Production Level Realization Rates

Site ID	End Use Category	Working Savings (kWh)	Economy Adjusted		Full Capacity		Average Production Levels	
			Verified Savings	Realization Rate	Verified Savings	Realization Rate	Verified Savings	Realization Rate
1	Lighting	2,373,254	2,416,041	102%	2,416,041	102%	2,416,041	102%
2	Lighting	5,546,793	6,745,923	122%	6,745,923	122%	6,745,923	122%
3	Lighting	769,219	866,339	113%	866,339	113%	866,339	113%
4	Compressed Air	124,052	148,032	119%	148,032	119%	148,032	119%
	Lighting	82,484	133,172	161%	133,172	161%	133,172	161%
5	Compressed Air	486,660	200,108	41%	486,692	100%	343,400	71%
	Lighting	351,199	365,883	104%	365,883	104%	365,883	104%
6	Compressed Air	90,612	29,120	32%	75,600	83%	52,360	58%
7	Compressed Air	55,587	28,940	52%	45,400	82%	37,170	67%
	Lighting	179,678	179,678	100%	179,678	100%	179,678	100%
8	Compressed Air	222,251	200,199	90%	200,199	90%	200,199	90%
9	Compressed Air	336,829	351,295	104%	351,295	104%	351,295	104%
10	Compressed Air	35,361	52,232	148%	52,232	148%	52,232	148%
11	Compressed Air	500,517	614,607	123%	614,607	123%	614,607	123%
12	Compressed Air	12,556	20,834	166%	20,834	166%	20,834	166%
13	Compressed Air	618,286	TBD	TBD	TBD	TBD	TBD	TBD
	Motors	1,094,907	TBD	TBD	TBD	TBD	TBD	TBD

Site ID	End Use Category	Working Savings (kWh)	Economy Adjusted		Full Capacity		Average Production Levels	
			Verified Savings	Realization Rate	Verified Savings	Realization Rate	Verified Savings	Realization Rate
	Process	223,224	TBD	TBD	TBD	TBD	TBD	TBD
14	Water Treatment	1,189,928	79,400	7%	79,400	7%	79,400	7%
15	Motors	86,689	86,689	100%	86,689	100%	86,689	100%
16	Air Abatement	1,784,094	1,544,964	87%	1,784,094	100%	1,664,529	93%
	Compressed Air	1,590,360	1,519,218	96%	1,590,360	100%	1,554,789	98%
	Motors	71,917	47,754	66%	47,754	66%	47,754	66%
17	Air Abatement	1,428,805	1,325,037	93%	1,325,037	93%	1,325,037	93%
18	HVAC	2,299,244	2,299,244	100%	2,299,244	100%	2,299,244	100%
19	Pumps	2,084,400	851,543	41%	851,543	41%	851,543	41%
20	Water Treatment	1,480,968	256,879	17%	256,879	17%	256,879	17%
21	Water Treatment	396,449	37,993	10%	37,993	10%	37,993	10%
22	Water Treatment	261,801	100,200	38%	100,200	38%	100,200	38%
23	Process	2,050,015	1,805,281	88%	1,805,281	88%	1,805,281	88%
24	Process	22,214,150	24,105,388	109%	24,105,388	109%	24,105,388	109%
25	Process	1,449,000	-	0%	-	0%	-	0%
26	Motors	101,422	101,422	100%	101,422	100%	101,422	100%
	Process	3,091,108	1,662,319	54%	1,662,319	54%	1,662,319	54%
Site Total		***54,683,819***	***48,175,734***	***91.3%***	***48,835,530***	***92.6%***	***48,505,632***	***92.0%***
27	Process	54,634,752	TBD	TBD	TBD	TBD	TBD	TBD
Mega Project Total		***54,634,752***	***TBD***	***TBD***	***TBD***	***TBD***	***TBD***	***TBD***

4.4 Large Project Results

The PY 2007 Energy Trust Production Efficiency Program yielded a single participant (Site 27) that represented 45% of working savings. This project was identified as a Mega Project and received additional M&V rigor to quantify measure impacts. And although not considered a Mega Project, Project Site 24 constituted approximately 20% of PY 2007 working savings. A description of these two projects, the M&V methodology employed, and measure level evaluation findings are provided below.

4.4.1 Project Site 24

Project Site 24 is a large paper mill project that has been in operation for more than one year. This project implemented a process measure to consolidate two productions lines into one to improve plant efficiency. Summit Blue evaluation staff interviewed the process engineer in charge of these projects on-site, and visually confirmed the measures were completed as described in the application. Due to the size and complexity of the production line, coupled with the operating voltages of the refiner machines, evaluation staff were unable to make independent measurements on equipment to confirm operating characteristics. However, the plant is extensively sub-metered by process and data from those tracking systems were given to the evaluation team for analysis.

EEM1 - Pulp Mill Fiber Line Consolidation

Prior to implementation of this measure the site had two main production fiber lines for converting wood chips and sawdust into paper pulp. One line was used exclusively for hardwoods and the other for softwoods. Due to different feed-stock consistencies and additives needed in the pulp-making process, the different wood types had to be handled separately given the existing controls and production configuration. Both lines were significantly oversized for the current production requirements, but production was required to be continuous *and* at a minimum rate; therefore, plant operators could not turn down the process throughput sufficiently to match site needs. Excess material was trucked to other paper making facilities or it was discarded.

Table 4-5. Pre-Implementation Fiber Line Production Data

Process Area	Connected HP	Pulp Produced (Tons/Day)	MWh/Year	kWh/Ton
Hardwood Fiber Line	9,254	248	35,579	393
Softwood Fiber Line	15,146	380	53,044	382
Total	**24,400**	**628**	**88,623**	**387**

The process measure implemented controls and infrastructure changes so that one line could handle both types of feed-stock in sequence and in continuous feed operation so that the second line could be shut-down completely. The remaining production line could operate to match site demand without over-producing and wasting product. After implementation the line produced 13% less pulp than the two original lines with 31% less energy on a per ton produced basis. When data are adjusted to production changes, the measure achieved more than 24,105 MWh of savings, or 108% of anticipated savings.

Table 4-6. Project Site 24 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Line consolidation	22,214,150	24,105,388	109%
Total	**22,214,150**	**24,105,388**	**109%**

4.4.2 Project Site 27

As noted in *Section 2 - Evaluation Site Visits,* participant staff at Project Site 27 were in the process of making numerous site operating decisions and could not support the impact evaluation effort in a timely manner.

Evaluation results will be provided as an amendment to this report once available.

4.5 Impact Conclusions and Recommendations

Despite the impact of economic influencers on achieved savings, the 2007 PE Program yielded a 94% savings realization rate. Discrepancies between program level working and net savings estimates were attributed primarily to higher than expected free ridership rates among participant projects. More detailed program performance metrics, along with recommendations to improve the process and accuracy of findings in future impact evaluation cycles are provided in the sections below.

4.5.1 Conclusions

Program Impacts

Excluding the standalone Mega Project, the impact evaluation yielded an end-use program realization rate of 94% and corresponding gross savings estimate of 63,098,466 kWh.

Table 4-7. Impact Summary of the 2007 Production Efficiency Program

Indices of Program Savings Value	Value
Working Estimate of 2007 Savings	67,058,242 kWh
Realization Rate	94%
Gross Savings Estimate	63,098,466 kWh
Demand Savings	7,379 kW

Interview efforts with impact evaluation sample participants yielded a free-ridership estimate of 27% and a net-to-gross ratio of 73%. The final 2007 Production Efficiency Program Net Savings Estimates amounted to 46,061,880 kWh, or 69% of 2007 Program working savings.

Table 4-8. Free-Ridership Summary of the 2007 Production Efficiency Program

Indices of Program Savings Value	Value
Net-to-Gross Ratio	73%
Net Savings Estimate	46,061,880 kWh
Net Savings as a Percent of Working Savings	69%

4.5.2 Recommendations

The Summit Blue evaluation staff thoroughly documented the impact evaluation process in an effort to capture and assess program feedback based on discussions with participants, program data, and auxiliary reports, evaluation observations. This information has been used to develop recommendations that will improve future Program and impact evaluation cycles.

Recommendation 1: Standardize Participant Data Requirements

The accuracy of impact evaluation findings is limited by the availability and quality of relevant participant measure data. Throughout the evaluation, Summit Blue staff encountered numerous challenges in collecting supporting evaluation data from various participants due to:

1.) Lack of available project documentation and supporting savings methodologies, and

2.) Lack of participant support for the impact evaluation process.

As an example, Project Site 17 claimed savings for various secondary effects, but did not clearly delineate savings. In an effort to improve the efficiency of future impact evaluations, Summit Blue recommends standardizing data requirements on project application forms to support M&V activities.

Recommendation 2: Evaluate the Quality of Project Documentation and Review the Technical Analysis Study (TAS) Guidelines

Summit Blue has found the TAS guidelines to be both informative and comprehensive. In many cases, however, the project level documentation does not clearly identify input assumptions and explain the rationale or resources used to justify them. Although the guidelines do request this level of fidelity, Summit Blue recognizes that it is difficult to enforce.

In order to leverage the guidelines to their full potential, Summit Blue recommends future evaluation efforts to closely monitor the quality of project level documentation provided to support the impact evaluation effort, along with the corresponding realization rates of measures installed. Using this information, measure-specific guidelines may be developed and enforced when low realization rates intersect with high-volume measures.

Recommendation 3: Incorporate a Plant Closure Study Component to Future Evaluations

As noted in section *4.3.4 Economic Factors*, Summit Blue technical staff distinguished between reduced consumption achieved through improved controls and efficient measure installations, relative to a decrease in production throughput as a result of economic influencers. Due to a significant number of sites that that had lower than expected post-installation production schedules, and a few that were planning to close completely, Summit Blue recommends adding a Plant Closure Study to future evaluation cycles to more accurately characterize the impact of these changes on realized savings.

Recommendation 4: Ensure that Participants are Aware of M&V Activities as Early as Possible

As with most evaluations, Summit Blue faced challenges in recruiting participants to support the impact evaluation process – particularly the on-site verification activities. This is generally attributed to a number of factors including:

1.) Lack of participant staff and/or resources during the evaluation time frame; and

2.) Lack of familiarity with the purpose of M&V activities. For example, Summit Blue staff assured a number of participants that the results of the evaluation would not impact their incentive payments.

Summit Blue recommends informing Program participants of M&V activities and their value in future Program planning efforts as early as possible in the project cycle. This will help ensure that participants are receptive to, and supportive of, post-installation evaluation efforts. Moreover, it will encourage the participants to improve the quality of project documentation to support future evaluation activities.

APPENDIX A: DOCUMENTATION OF PROGRAM HISTORY

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Intent of this Document

The Energy Trust of Oregon has requested that a documentation of program history be completed as part of this evaluation (Task 2), including:

- Document the history of the program with a focus on the changes that have occurred since the last evaluation; and
- Gather and review relevant program documents and databases, marketing collateral, monthly PMC reports, measure tracking reports, past evaluations, and other relevant studies.

The following document is intended to support this task. The primary objective of this program history review is to inform the research design for the 2008 program year process evaluation, and the 2007 and 2008 impact evaluations. As such, this document is divided into four primary sections:

1. Review of Process Related Conclusions and Recommendations from Past Evaluations;
2. Analysis of the Program Resource Acquisition Tracking Database;
3. Review of Resource Acquisition Related Conclusions; and
4. Recommendations from Past Evaluations.

Program History and Milestones

Key milestones in the history of the Production Efficiency program include:

2003

- Program moves from Utility Transition Programs to Energy Trust. Lockheed Martin gets contract as PMC.
- Energy Trust program Manager is Managing PE and Commercial existing and Commercial New programs.
- 4 PDCs selected (PGE (north of Eugene), Cascade Energy Engineering (refrigeration and east of Mount Hood and north of Bend), Harris Group (Pulp and Paper), and RHT (south of Eugene Bend and south).
- One semi PDC, Evergreen, for trade ally delivered lighting.
- Lockheed Martin slowly reduces number of ATACS and the number of studies done. For example, initially there were three to four ATACs capable of water and wastewater treatment analysis, but this number was whittled to one, BacGen, by 2006.
- First of the Mega projects initiated (completed in 2004) and development of procedures for dealing with Self Direct customers (these are customers that have more than 8,760 MWh of consumption a year).

2004

- Program expansion.
- Further reduction in the number of ATACS active in the program.

2005

- Program expands further and becomes oversubscribed. (This is due to the program carrying over projects commitments from earlier years and assuming that the budget for these projects was also being carried over which was not the case.) Energy Trust budget year on a calendar year cycle conflicted with contract budget cycle of July-June added to confusion.

- Program Management Contractor contract RFP issued.
- Lockheed Martin selected to continue as PMC and receives two year extension on contract.

2006

- Reservation system was instituted. Projects are now entered into a queue and tracked on a quarterly basis. Many projects not completed or underway were informed that Energy Trust financial commitments would end if no action was taken.
- Incentives and PDC budgets were reduced. Some marketing activities were curtailed.
- New Energy Trust Program manager (August 2006) allowed to focus on PE only, commercial program managed by another manager.
- Initiated Program Contracting and Delivery Assessment to clarify program delivery issues.
- Decision was made to perform separate evaluations of Megaprojects.

2007

- Decision was made to take role in-house based on Program Contracting and Delivery Assessment Report recommendations and on need for Energy Trust customer outreach. Lockheed Martin contract ends in December 2007.
- Energy Trust hires two additional FTEs to manage existing PDCs.
- Energy Trust contracts directly with all ATACs at the end of 2007 to prepare for 2008 program administration changes.
- Increased custom incentives to 15c/kWh.
- Decision to institute development of evaluation plans for Megaprojects.
- Kaizen initiative started.
- Gas measures included for gas customers paying the gas public purpose charge.
- Small Industrial Initiative was developed to meet the needs of small and medium Ag, Dairy, and industrial customers. RFP issued and Cascade Energy Engineering selected to implement the SII program.
- Variety of spreadsheet tools developed.

2008

- Energy Trust takes over the management of PDCs and contracts directly with ATACs.
- Guidelines developed for baseline studies (both savings and costs).
- PDC RFP issued:
    - PGE (only PGE customers)
    - RHT (PacifiCorp customers west of the Cascades south of the Columbia and Klamath Falls region and NWN Gas customers)

    - Cascade Energy Engineering (PacifiCorp customers along the Columbia River, Small Industrial Initiative, Kaizen, refrigeration and Pulp and Paper [Blue Heron, SP News Print, Boise St Helens, International Paper (formerly Weyerhauser) Albany, West Linn Paper]
    - Strategic Energy Group (improving energy management practices),
    - Nexant (Bend and Redmond region and High Tech (semiconductors)).
    - Small compressed air market assessment performed
- Added part-time project engineer for PDC role for water and wastewater treatment.
- Small Industrial Initiative Program implemented.

Process Related Conclusions and Recommendations from Past Evaluations

The following outline is based on these documents:

- Production Efficiency Program: End-of-First-Year Progress Evaluation, June 22, 2004
- Production Efficiency Program: Process Evaluation and Impact Evaluability Assessment, December 30, 2005
- Production Efficiency Program 2003-2005 Impact Evaluation, June 2007
- Assessment of Energy Trust of Oregon's Contracting and Delivery Models, June 19, 2007
- 2006 Production Efficiency Program: Process and Impact Evaluation, August 12, 2008

A full list of documents reviewed in preparation of this report can be found in Appendix B. Conclusions and recommendations from the Production Efficiency process and impact evaluations are divided into the following topic areas: Marketing, Communications, Program Data Collection, Tracking, and Processing Activities/Procedural Issues, 2006 Funding Limitations, and Technical Studies.

Topic Area: Marketing

Summary of conclusions and recommendation from past evaluations:

1. 2004 Progress Evaluation Recommendations: Prepare written materials detailing the steps for program participation for potential participants.
2. 2004 Progress Evaluation Recommendations: Clarify for ATACs the current process for selecting an ATAC for a project. Continue to investigate the experiences of ATACs in marketing the program and bringing customers in.
3. 2006 Process and Impact Evaluation Conclusion: Since program inception, the numbers of PDCs and ATACs have decreased; funding for individual PDCs has also decreased, while their territories have expanded. At the same time, the success of the program's marketing strategy has made that strategy more challenging, as the program has already gained entry in the more welcoming facilities and has identified the most pressing projects for those facilities.
4. 2006 Process and Impact Evaluation Conclusion: While the number of ATACs has increased, the Program appears successful in appealing to equipment vendors and contractors. Most equipment vendors and contractors interviewed for this evaluation initiate conversations about program participation with their customers. However, this component of program marketing can continue

to be strengthened, as less than one-half of 2006 participants learned of the program from these market actors.

5. 2006 Process and Impact Evaluation Conclusion: PGE customers were:
   a. Significantly more likely than were PacifiCorp customers to be uncertain about whom to call with questions, and
   b. Significantly less likely than were PacifiCorp customers to have called, or to contemplate calling, their program representative when considering an additional equipment purchase, suggesting a need for more aggressive marketing in PGE territory.
6. 2006 Process and Impact Evaluation Recommendation: For maximum effectiveness of program marketing, program staff should take steps to increase program understanding and augment the skills of those expected to market the program, including PDCs, ATACs, and vendors. To provide the greatest opportunities to obtain program savings, program staff should review the allocation of PDC resources, and the marketing roles of PDCs and ATACs.
7. 2007 Assessment Study: This study concluded that Energy Trust could consider operating the PE Program internally. It stated that: The PMC model primarily provides support capability and substantial stability to the program, which is an important program benefit. However, since communication with large customers and with large technical services firms such as the PDCs is very important and has been at risk at times with the PMC model, shifting to more internal control would provide better connection to customers and would be consistent with the manner in which most other energy efficiency administrators manage their large commercial and industrial programs.

Program Changes Implemented by Energy Trust

In response to the above evaluation findings, Energy Trust implemented numerous changes to the PE Program in 2008. Program administration responsibilities were transferred to Energy Trust and two program managers were hired to oversee the program. In 2008, Energy Trust contracted directly with all Program Delivery Contractors and Allied Technical Analysis Contractors.

Implications for the 2008 Process Evaluation

During follow up actions for the 2007 – 2008 program evaluations, we will:

- Evaluate the effectiveness of collateral material – both online and offline.
- An imbalance was found previously between PGE and PacifiCorp – PGE customers contribute about 60% of the funds and receive only 40% of the program funding, while PacifiCorp customers contribute about 40% of the funds and receive 60% of the program funding. Changes were made to the marketing of the program to help balance program funding levels with program contribution levels. Determine whether this change in marketing was successful in reducing this inequity.
- Verify the role of equipment vendors and contractors. Note that while market actors may not be the first source of program information, they may still play a pivotal role in the decision to install the energy efficient equipment.
- Measure the effectiveness of the new roles for Energy Trust staff, the PDC’s and the ATAC’s for increasing program marketing opportunities and explore whether these new opportunities have increased program understanding among the PDCs who are expected to market the program.

- Measure the effect of the newly implemented contractual relationship between Energy Trust and the ATACs.

Topic Area: Communications

Summary of conclusions and recommendation on the topic of communications from past evaluations are presented in this section.

1. 2004 Progress Evaluation Conclusion: Program contractors report they are struggling to make appropriate decisions in the absence of clear direction from the Energy Trust regarding the numerous program goals and distinguishing features that are in tension with each other.
2. 2004 Progress Evaluation Recommendations: Provide increased technical guidance for PDCs and ATACs.
3. 2005 Evaluability Assessment Recommendation: Energy Trust staff should meet more frequently with program participants to further build relationships with customers and should meet periodically with the PDCs to obtain feedback and discuss lessons learned.
4. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: Knowledge and use of the Oregon Business Energy Tax Credits (BETC) program is not universal and there is uneven awareness that it can be used for projects that save natural gas.
5. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: Not all customers understand that the PE Program can help with efficiency projects beyond their current effort. A communications plan could help resolve this issue. Some of these concerns are historical and relate to early program revisions and the budget limitations of 2006. A uniform communications plan would help clarify Energy Trust's policies, procedures, and program offerings.
6. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: This study notes that some customers have concerns with variations in Energy Trust programs and policies. Some of these concerns were historical and related to early program revisions and the budget limitations of 2006. In addition, some customers were reluctant to participate in the impact evaluation. Energy Trust is considering options to make it clearer to these customers that evaluation is part of the program and has made recent efforts to improve communications regarding the importance of evaluation. A uniform communications plan would help clarify Energy Trust's policies, procedures, and program offerings.
7. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: From the customer viewpoint, a number of different people are representing Energy Trust interests. As Energy Trust programs were contracted rather than administered directly by Energy Trust employees, customers were required to work with a number of different people and organizations. This extended to the evaluation process, adding *one more* entity and person that a customer needs to work with. Although this is part of the program, it might be addressed through a strategic communications plan where customers are educated about what to expect in terms of program partners.
8. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: For "major accounts," a regular and formal review of project opportunities should be undertaken. This was a suggestion from a customer. Working with customers to consider a long-term strategic approach to energy management would improve on the often used project-based approach.
9. 2006 Process and Impact Evaluation Conclusion: Energy Trust staff acted on a recommendation from a previous evaluation and now hold quarterly meetings with the program management and delivery contractors (the PMC and PDCs). All parties interviewed viewed this as "moving in the

right direction" and an improvement in communications. Nonetheless, gaps in communications with PDCs remain. In addition, vendors reported a desire for additional program information.

10. 2006 Process and Impact Evaluation Recommendation: To minimize uninformed speculation among program contractors about PE activities and procedures, program staff should continue to expand its ongoing communications with PDCs. Specifically, the details of the reservation system and the cost-effectiveness payback threshold should be explained to those contractors and to the other market actors expected to market the program. ATACs should be given the opportunity to attend PDC meetings by receiving notice of agendas for those meetings.
11. 2006 Process and Impact Evaluation Recommendation: Ensure PDCs convey to their not-for-profit and municipal clients that they can benefit from the BETC tax credits using the pass-through mechanism. Increase communication with vendors and their program-related training, and pursue ways to make program eligibility requirements and incentive calculations more transparent. Encourage vendors to promote BETC tax credits to their customers.

Implications for the 2008 Process Evaluation

During follow up actions for the 2007 -2008 program evaluation, we will:

- Evaluate whether the quarterly meetings and other informal communication between Energy Trust program managers and PDCs, and possibly vendors, has met the PDC and vendor's needs for additional program information on topics such as the reservation system and the cost-effectiveness payback threshold or whether additional steps need to be taken to communicate more effectively.
- Explore if PDC and vendor awareness levels have increased for the following topics due to Energy Trust administering the program internally:
    - The benefits of the BETC to not-for-profit and municipal clients,
    - Vendors promotion of the BETC to their customers,
    - Program related training participation by vendors, and
    - Program eligibility requirements and incentive calculations.
- Evaluate the awareness of and participation in the BETC program and ability of PDCs to market gas savings.

Topic Area: Program Data Collection, Tracking, and Processing Activities/Procedural Issues

Summary of conclusions and recommendation from past evaluations:

1. 2004 Process Conclusion: Program procedures have several times undermined customer-ATAC relationships. The RFP for ATACs specified that ATACs were expected to market the program.

   Yet all four interviewed ATACs who had worked to interest customers in the program and then referred the customers to a PDC had lost at least one customer in the process. At stake for the ATAC is not simply the facility study to be conducted, but the ongoing relationship with a customer that might lead to numerous jobs over time. At stake for the Production Efficiency program is the loss of marketing opportunities and resources to the extent that ATACs hesitate to bring customers to the program.

2004 Process Conclusion: The Energy Trust's decision-making and contracting processes do not keep pace with the needs of the program and result in the undermining of program staff authority and program stability.

2. 2004 Process Recommendation: Seek ways to expedite contracts, communications with the market, and program policy decisions.
3. 2005 Evaluability Assessment Recommendation: The Energy Trust should ensure the adoption of procedures, formats or standards that will improve the quality of project analyses and documentation and facilitate impact evaluation.
4. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: This impact evaluation found that project data had been inconsistently recorded and recommended that the database be redesigned to accommodate all program needs, including evaluation. The study also found that project evaluability was an issue: key information for impact evaluation was not uniformly present in project documents.
5. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: There is inconsistency in project energy savings between different versions of energy studies, verification reports, program forms, and the Energy Trust database.
6. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: Project identification represents a challenge. The PDC Lockheed-Martin uses PE numbers, Energy Trust uses Measure ID, and ATAC sometimes use its independent project identification number without citing a PE number. There can be multiple Measure IDs for the same project (multiple studies performed, for example), but they may not be tied together to indicate the same project. A single consistent project identification number should be used and Energy Trust should display this identification, as well as a date, on a project cover page.
7. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: This study observed that much of the variance in project realization rate was not due to performance, but to baseline assumptions, measure operating assumptions and inappropriate analysis approaches and recommended that Energy Trust establish standards for level of effort, documentation, and analysis of project savings.
8. Production Efficiency Program 2003-2005 Impact Evaluation, June 2007: Very large projects should have evaluation oversight assigned early in the design and development process. We recommend that Energy Trust document baseline conditions while the existing equipment is in place. The evaluation of large projects could justify new installation, upgrades, or verification of existing metering systems.
9. 2006 Process and Impact Evaluation Conclusion: In the course of this evaluation, inconsistencies between data obtained by the evaluation team from different sources, and even from the same source (Energy Trust), were noted. The evaluation team does not believe these inconsistencies are program critical. However, improvements in data collection, data tracking, and data processing activities will add credibility to program reporting and enhance program marketing efforts.
10. 2006 Process and Impact Evaluation Recommendation: To address data and list discrepancies, we recommend a review of program data collection and entry procedures internal to Energy Trust and with program contractors. In particular, specific and consistent definitions of data-entry categories (such as project and site) should be developed and used. Energy Trust should identify one of the several date variables, which reflect different steps in the conclusion of a project, as the default date to be consistently used to report program activity by year, with any exceptions to this selection carefully identified and justified. Further, Energy Trust needs to clarify that some reported numbers will differ due to the factors used.

Implications for the 2008 Process Evaluation

Follow up actions for the 2007–2008 program evaluation will include:

- Follow up on the relationship between PDCs and ATACs to determine if the new program management structure resolved the marketing issues between these two groups of market actors.
- Evaluate the existence and extent of improvements in data collection, data tracking, and data processing activities, since Energy Trust began managing the program, especially as it related to consistency between and among data sources in the areas of definitions of data such as project and site and date variables.
- Through the evaluability assessment, explore the adoption of procedures, formats, or standards that improved the quality of project analyses and documentation and facilitated impact evaluation.

Topic Area: 2006 Funding Limitation

Summary of conclusions and recommendation from past evaluations:

1. 2006 Process and Impact Evaluation Conclusion: There was evidence from all groups contacted for the research – program contractor staff, vendors, and participants – that the 2006 funding limitation and the resulting incentive-level changes were setbacks for the program, creating confusion among some participants and vendors as to whether there was funding and, among all groups, the method used to allocate it. Decision making for complex industrial projects can be protracted and sometimes span several years; when project incentives change or appear to be in jeopardy partway through firms' internal deliberations, efficiency projects can be scuttled.
2. 2006 Process and Impact Evaluation Recommendation: Program funds should be managed and accounted for in a way that provides steady, dependable funding for projects. Any changes in funding and funding allocation procedures need to be clearly communicated to all parties several months in advance of the change.

Implications for the 2008 Process Evaluation

Follow up actions for the 2008 program evaluation will include:

- The "reservation system" was implemented in 2008 to prevent a reoccurrence of the shortfall of fund experienced in 2007. We will want to look at the reservation system to confirm that the reservation procedure and the allocation procedures are working as intended and that changes in either are communicated to the PDCs and the ATACs in a clearly and in a timely manner.

Topic Area: Technical Studies

Summary of conclusions and recommendation from past evaluations:

1. 2004 Progress Evaluation Conclusion: PDCs and ATACs request greater technical guidance.
2. 2006 Process and Impact Evaluation Conclusion: A prior evaluation recommended the adoption of procedures or guidelines for technical studies. While the current research found an improvement in the quality of technical studies, nonetheless, no written procedures or guidelines have been produced. The evaluation team believes such guidelines are still warranted.
3. 2006 Process and Impact Evaluation Recommendation: To simplify the program review and oversight function, and to enhance quality control of technical studies, program staff should

promulgate and implement uniform procedures and standards or guidelines for both the technical studies and the review of those studies.

Baseline and study guidelines are now available.

Implications for the 2008 Process Evaluation

Follow up actions for the 2007 – 2008 program evaluation will include:

- Evaluate the success of the technical standards adopted in 2008 to enhance the quality of the technical studies performed by PDCs and ATACs.

Analysis of the Program Resource Acquisition Tracking Database

The annalysis of program reseource acquistion[29] is based on the following documents and sources:

1. The "Fast Track" database that has impact information by participant. The version analyzed includes the full history of participation from inception through November 7, 2008.
2. Prior program evaluations including:
    a. The 2006 program year impact evaluation published August 2008, and
    b. The 2004 / 05 program year impact evaluation published December 2005.

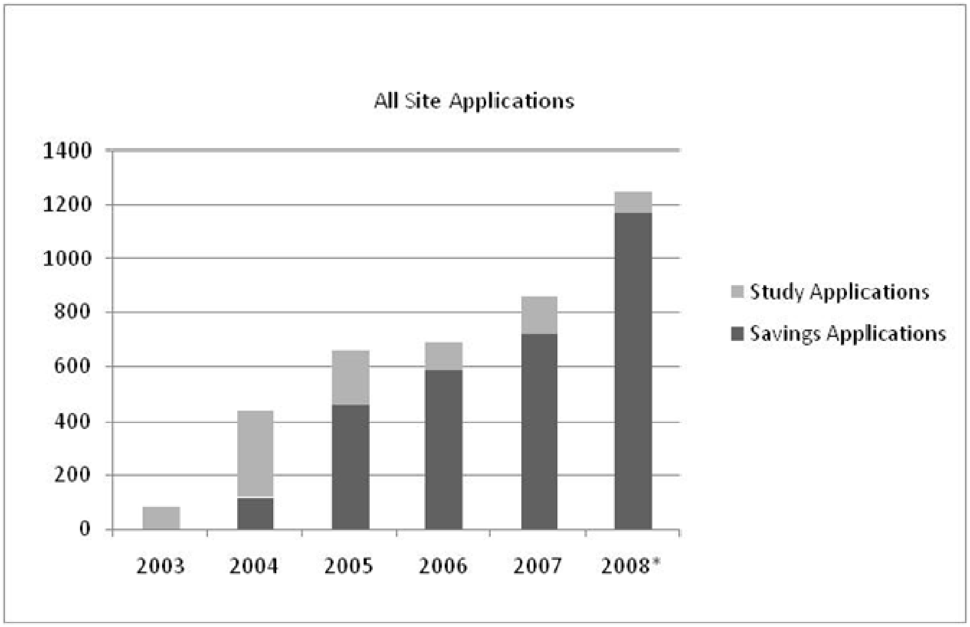
Much of the following analysis of realized savings will focus on 2007 program year performance, as these projects are currently under review for the first evaluation report due in April 2009. Note that the following discussions that reference cumulative program savings from inception to date refer to the period from January 2004 to November 2008.

Realized Savings by Year

From inception in 2003 to November 7, 2008, the programs has approved 3,064 applications resulting in energy savings and an additional 915 applications for studies As shown in Figure A-1., the number of applications has generally increased each year, with the approximately 1,250 site applications process to date in 2008.

[29] The term resource acquisition refers to energy (kWh and therm) and demand (kW) savings acquired by the program.

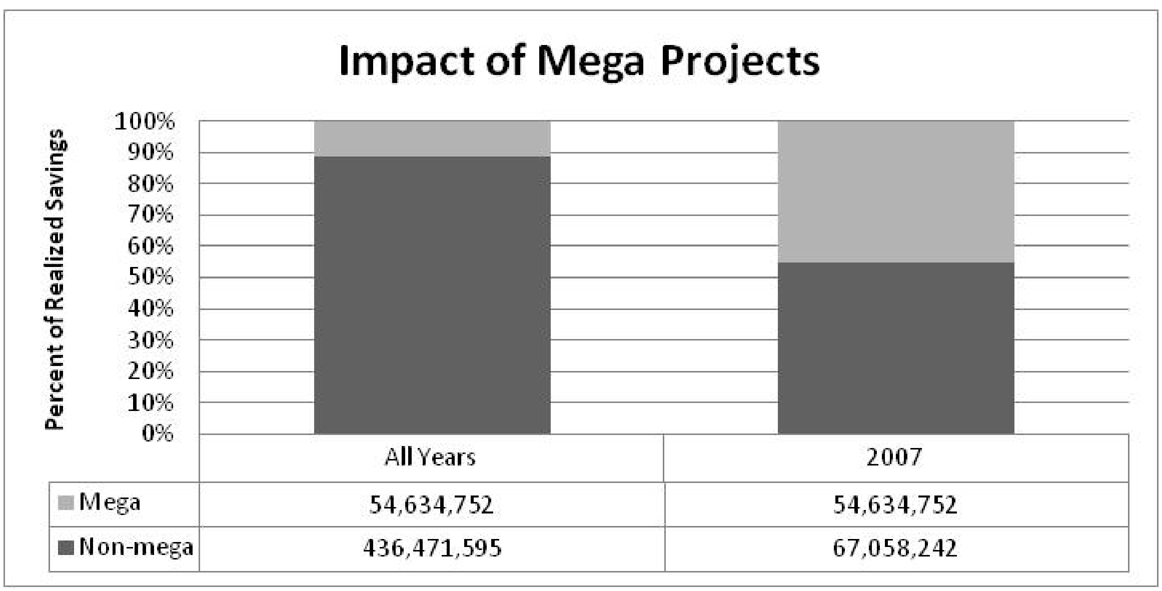
Figure A-1.Total applications processed by year



*Through November 7, 2008

Cumulative realized program savings as of November 7, 2008 are 491.1 MWh, including 54.6 MWh from mega projects and 436.5 MWh from non-mega projects. 100% of all mega site savings occurred in 2007. Mega site savings accounted for roughly 45% of the approximately 122.4 MWh of realized project savings in 2007, as shown in Figure A-2..

Figure A-2. Cumulative* realized program kWh savings* by project size category



*All years includes data from 2004 through November 7, 2008.

As shown in Figure A-3., the greatest level of program savings occurred in 2005, followed by 2007. As noted previously, 45% of 2007 savings were realized through one mega project, while there were no mega projects contributing to 2005 savings. Figure A-4. provides a summary of realized program savings from 2004 onward excluding mega projects.

Figure A-3. Realized kWh savings by year including mega projects.

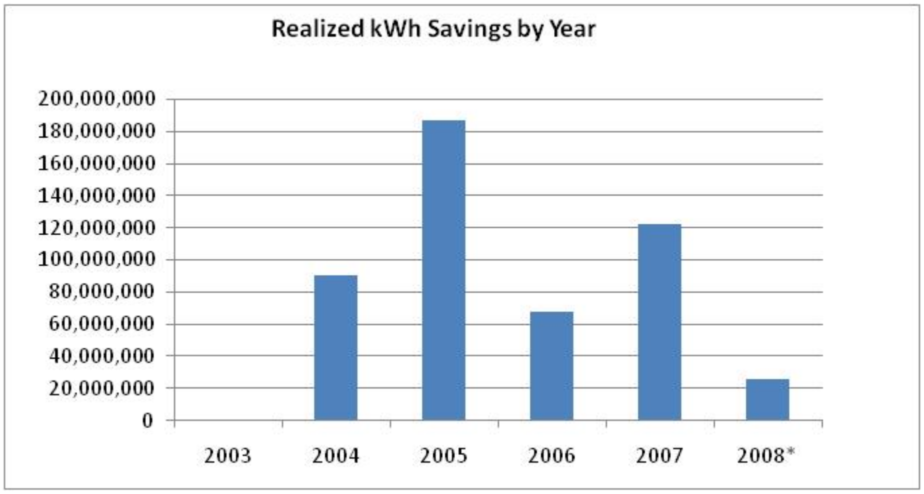
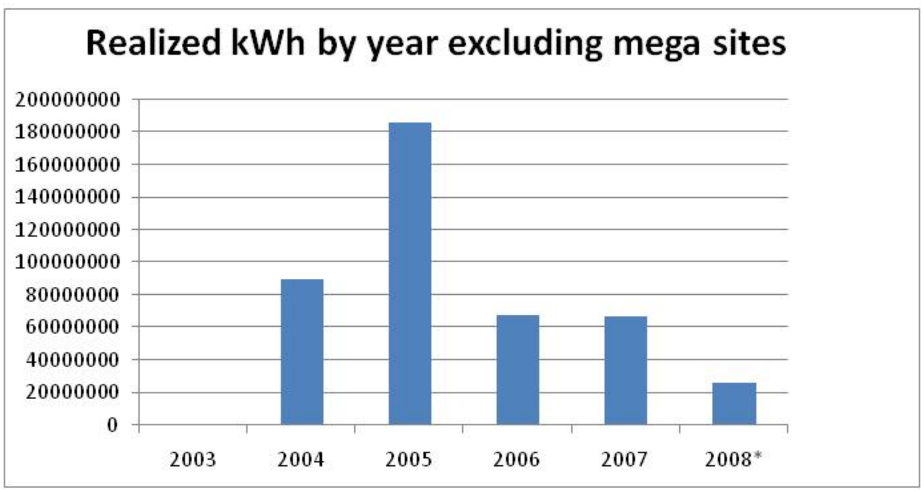


Figure A-4. Realized kWh by year excluding mega sites



*Through November 7, 2008

Realized Savings by Market Sector

Figure A-5. shows from which industry sectors program savings are being realized, as defined by NAICS codes. This includes savings realized from mega projects. From inception to date, savings have tended to be concentrated in the paper manufacturing and wood products industries, which collectively account for 70% of realized kWh impacts. When the single mega project is excluded, 83% of cumulative program savings originate from the paper manufacturing and wood products industries. In 2007, savings from the paper manufacturing sector accounted for over 66% of program savings, due largely to one mega project, as shown in

Figure A-6. Figure A-7. shows that 2007 savings are more evenly distributed across a large number of industry sectors when mega project is excluded.

Figure A-5. Distribution of cumulative program kWh savings realized from inception to date by market sector

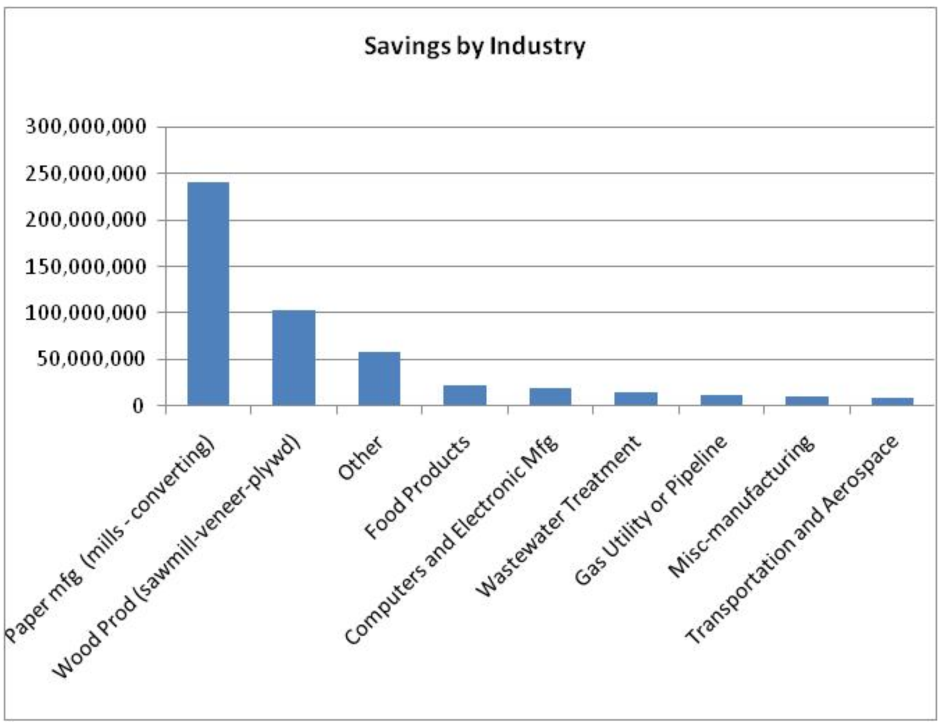


Figure A-6. Distribution of kWh savings realized in 2007 by market sector

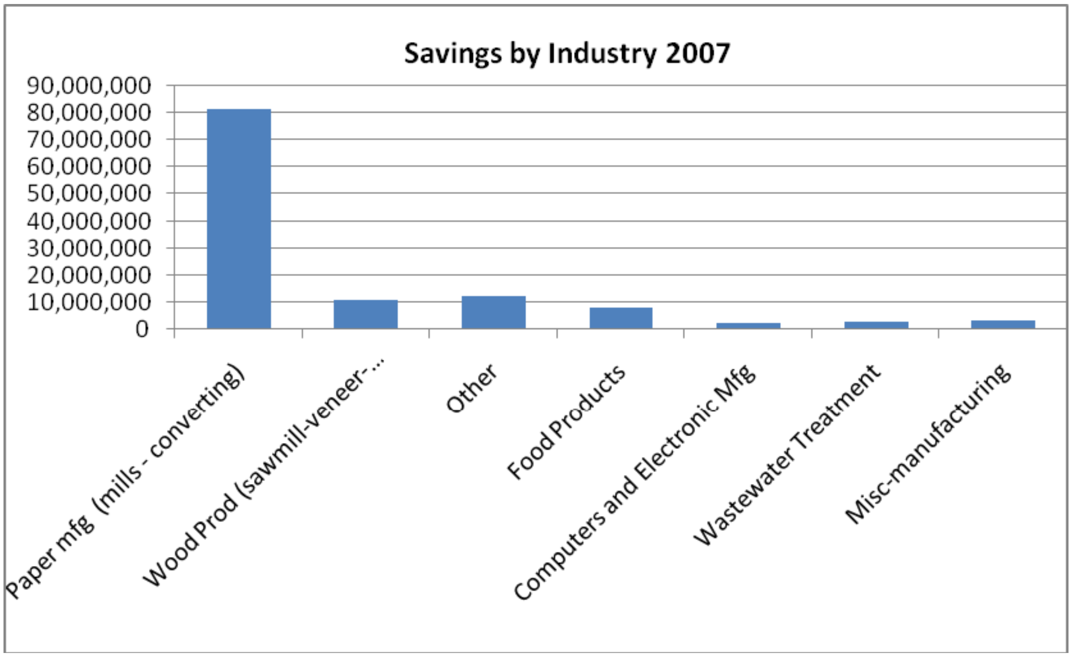


Figure A-7. Distribution of realized kWh savings by market sector excluding mega sites for 2007

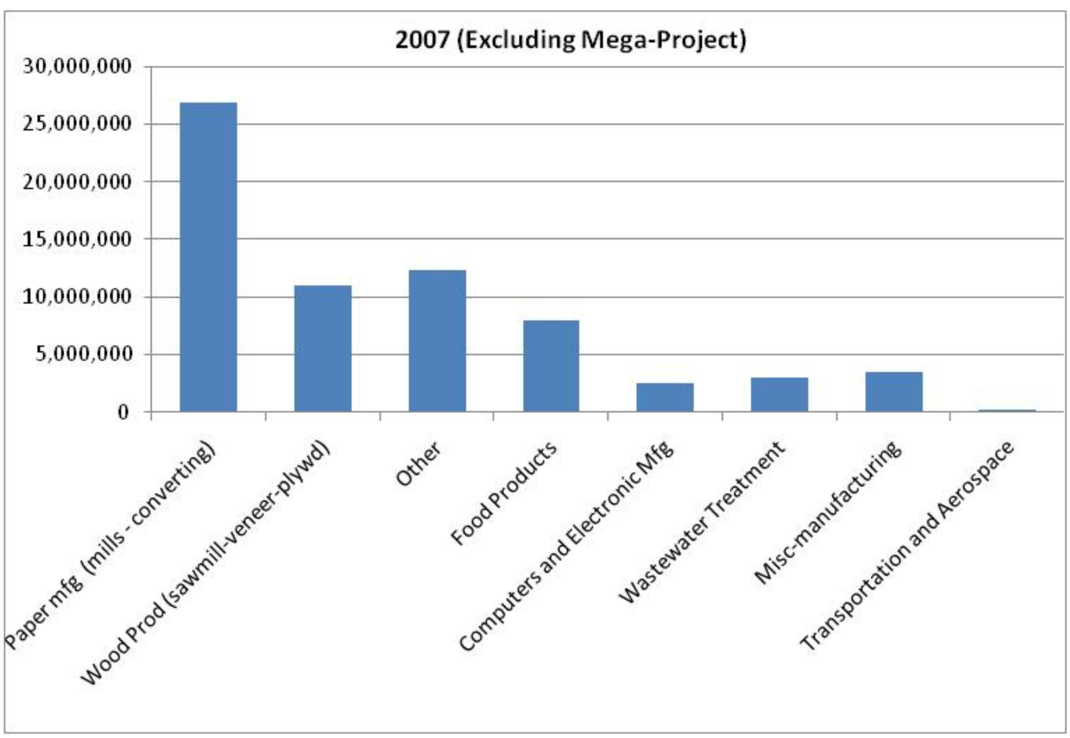


Table A-1. shows the expected industrial sector technical potential saving in 2027 (average MW) by segment from the Energy Efficiency and Conservation Measure Resource Assessment for the Years 2008-2027 report.[30] This study is intended to provide the Energy Trust with the amount and cost of potential energy efficiency and renewable energy measures that could provide electricity and natural gas demand-side savings for Oregon consumers by 2027 within the Energy Trust service territory. *At present, the 2007/2008 evaluation team has not analyzed the PE database for demand (kW) impacts, so a direct comparison of the savings by sector referenced in Figure A-5. is not available at this time. The evaluation team will establish during the course of the evaluation how closely the program is tracking to the sector potential estimated by Resource Assessment study.*

Table A-1. Expected industrial sector technical potential saving in 2027 by segment screened by BCR from the Energy Efficiency and Conservation Measure Resource Assessment for the Years 2008-2027 report, Table 2.

Segment	Consumption, aMW[31]	Potential Savings, aMW	Savings Fraction
Electronics	465	153	33%
Wood Products	112	48	43%
Paper	239	16	7%
Food	62	4	6%
Other	242	10	4%
Primary Metal	145	26	18%
Fabricated Metal	31	2	6%
Agriculture	74	39	53%
Street and Area Lighting	36	7	20%
Total	1405	305	22%

Cumulative Program Realized Savings by Measure Type

Measure types designated as "Primary Process" have historically accounted for the majority of all program realized savings when compared to other energy efficiency measure types, as shown in Figure A-8. As discussed earlier, approximately 11% of cumulative program savings are attributable to mega projects, and 100% of mega project savings are designated as primary process.

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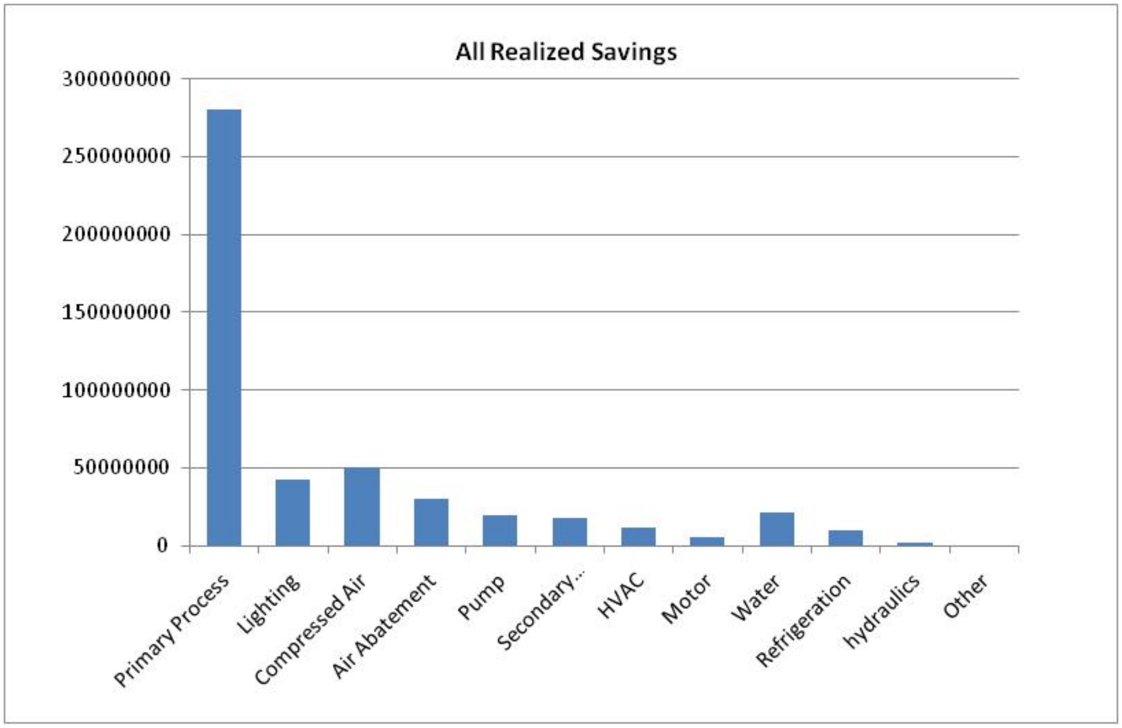
[30] Energy Efficiency and Conservation Measure Resource Assessment for the Years 2008-2027, Prepared for the Energy Trust of Oregon, Inc. by Stellar Processes and Ecotope, Draft Final Report, October 31, 2008.

[31] aMW stands for average mega-watt.

Appendix A-A provides more discussion on the distribution of program savings by measure type and industry sector.

Figure A-8. Distribution of cumulative realized kWh savings from inception to date by measure type, including mega projects



Impacts by Measure Type for Savings Realized in 2007

When savings realized in 2007 from all project types are considered, primary process measures accounted for nearly 70%, as shown in Figure A-9. When mega projects are excluded, Figure A-10. shows that primary process, lighting and compressed air measures accounted for more than 85% of realized savings for the 2007 program year.

Figure A-9. Distribution of all realized kWh savings for program year 2007 by measure type, including mega projects

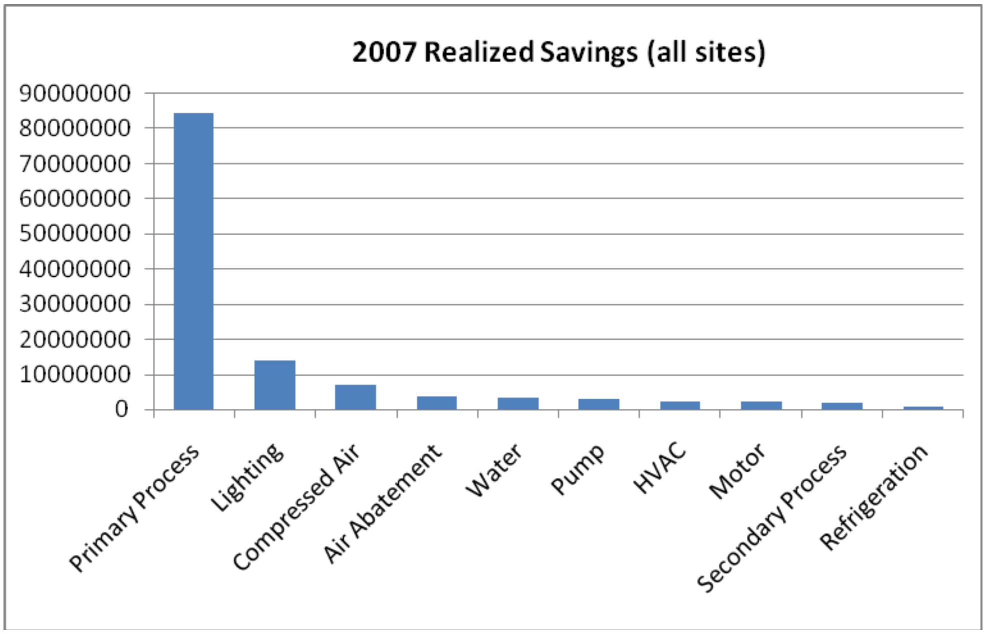
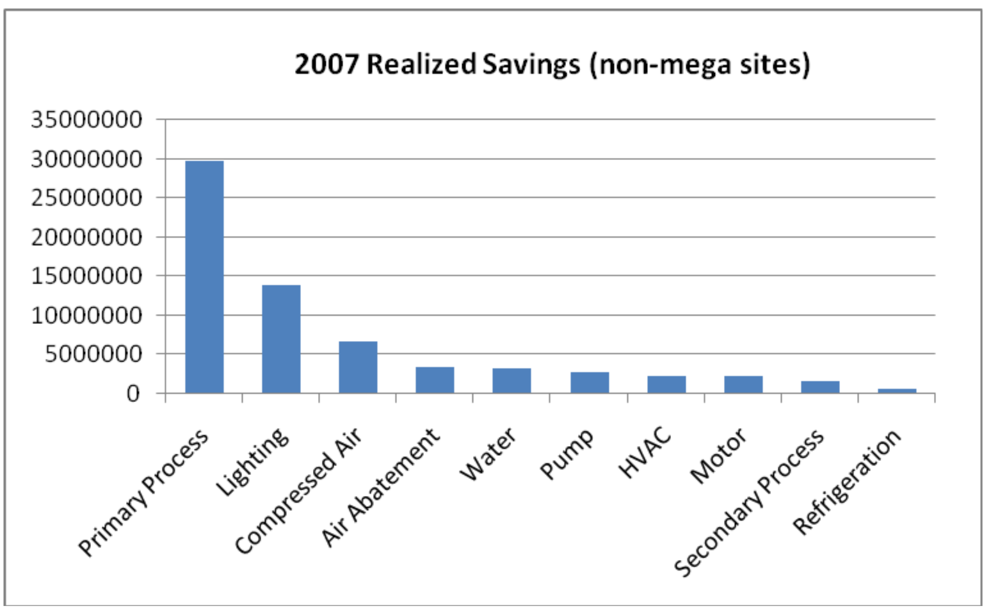


Figure A-10. Distribution of savings for program year 2007 by measure type, excluding mega projects



Review of Resource Acquisition Related Conclusions and Recommendations from Past Evaluations

Review of the 2006 program year impact evaluation published August 2008

Table A-2. provides a summary of indices of program savings for the 2006 program year from the August 2008 report.

Table A-2. Summary of program year 2006 indices of program savings

Free-Ridership Estimate*	17.60%
Net-to-Gross Ratio	82.40%
Net Savings as a Percent of Working Savings	83.70%
Realization Rate	101.60%
Gross kWh Savings Estimate	73,136,251
Working Estimate of 2006 kWh Savings	71,984,735
Net kWh Savings Estimate	60,242,106

The following are select excerpts from the August 2008 report that will help guide the focus of the 2007 and 2008 program year evaluations.

Baseline efficiency practices:

- 52% of program participants said one of the reasons they made their equipment purchase was because efficiency features are part of common practice for that application. However, only 6% of participants included this motivation among their top three reasons for their equipment purchases, suggesting that efficient equipment is the standard equipment in a very small proportion of applications.
- Nearly one-quarter (24%) of interviewed participants said one of the reasons they made an energy-efficient equipment purchase was because of a corporate policy, but only 7% of them reported this as one of their top three reasons for buying their equipment.

Interaction with Oregon Business Energy Tax Credits:

- Only one program participant respondent had never heard of Oregon Business Energy Tax Credits and 78% of program participant respondents had applied for BETC. Seventy percent of surveyed program nonparticipants had heard of BETC and 19% had applied for BETC.[38]

Conservation versus Efficiency:

- The Production Efficiency program focuses on projects that improve the overall efficiency of delivered services – for example, reduced kWh per cubic foot of compressed air or kWh per gallon of water pumped. Conservation – that is, operational changes that do not reduce facility output – can also be considered. However, conservation must be distinguished from operational changes made to modify production output. For a number of projects in this evaluation, the latter kind of operational change contributed to apparent savings. For example, plants previously operating two shifts had experienced decreased demand for their products and were operating just one shift when studied.

We differentiated projects with changes in operating hours, identifying the energy savings as resulting from conservation or from market forces, rather than from efficiency. Adjustments were made for those few situations where customers reported changes in shifts or hours of operation that changed savings estimates. Savings on eight projects were adjusted (seven downward and one upward) due to changes in production hours. Besides their presentation in Table 7.4, no other changes were made to the savings or realization rates in the evaluation database. To recalculate the current savings, the baseline and savings estimates were redone. However, for the working kWh (a given from the Energy Trust FastTrack database), we did not include these changes in the program results summary. The total savings adjustment is about 3.4% of the total program savings.

Negative Savings:

- It is possible that the energy use of an installed energy efficiency measure would be equal to or greater than the baseline energy use for that project. Typically, this is because the baseline is inappropriate or because the measure operating parameters (for example, hours of operation) were misjudged in the original analysis, or because operations are different than assumed.

Baseline Adjustments:

- There were nine instances where evaluation staff judged that the baseline used in the original energy analysis may not be appropriate. In four instances, this was because of reductions in shifts and plant operations, often due to reductions in market demands. In another five instances, the baseline appeared to be inconsistent with the installed equipment or described operations. Impact evaluation for this effort compares measured energy savings to the energy savings that are documented in Energy Trust records. Because energy savings are part of formal program documentation, no modification of energy savings or, in turn, baseline energy use can be made. However, in order to help explain the (high or low) realization rates for these nine situations, evaluation staff developed alternative baseline energy use and used the resulting alternative realization rate to describe possible reasons for savings variance. If included in program results, these baseline alternatives would not affect total program savings, since energy savings were not adjusted. However, the alternative baselines could be viewed as potentially reducing the overall program realization rate by 0.04 – a small impact on program results, corresponding to a change in the realization rate from 1.02 to 0.98.

Review of the 2004 / 05 program year impact evaluation published December 2005

Table A-3. provides a summary of indices of program savings for the 2006 program year from the August 2008 report.

Table A-3. Summary of program year 2004 / 05 indices of program savings

Realization Rate	Estimated kWh Savings	Adjusted kWh Savings	kWh Realization Rate
>1	5,428,967	7,825,268	1.44
1	8,124,972	8,124,972	1.00
<1	4,550,056	3,672,711	0.81
0	858,908	0	0.00
Total	18,962,903	19,622,951	1.03

During this study, an evaluability assessment was conducted to identify whether data gaps existed in program documentation that could make it difficult to assess program resource acquisition accomplishments. The evaluation team indicated that significant challenges were encountered because pre- and post-energy and demand values were not clearly stated. Table A-4. provides a summary of the availability and source of energy and demand values for the 2004/05 program impact evaluation.

Table A-4. Availability and source of energy and demand values for the 2004 / 05 program impact evaluation

DATA SOURCE	PRE-ECM		POST-ECM			OVERALL
	KWH	KW	KWH	KW	KW Savings	
Available	57%	27%	53%	27%	30%	39%
Calculated by Evaluator	43%	33%	47%	33%	33%	38%
Not Available	0%	40%	0%	40%	37%	23%
TOTAL	100%	100%	100%	100%	100%	100%

Appendix A-A: Additional Impact Metrics

Figure A-11. Comparison of savings by measure type for projects completed by participants from the wood products industry

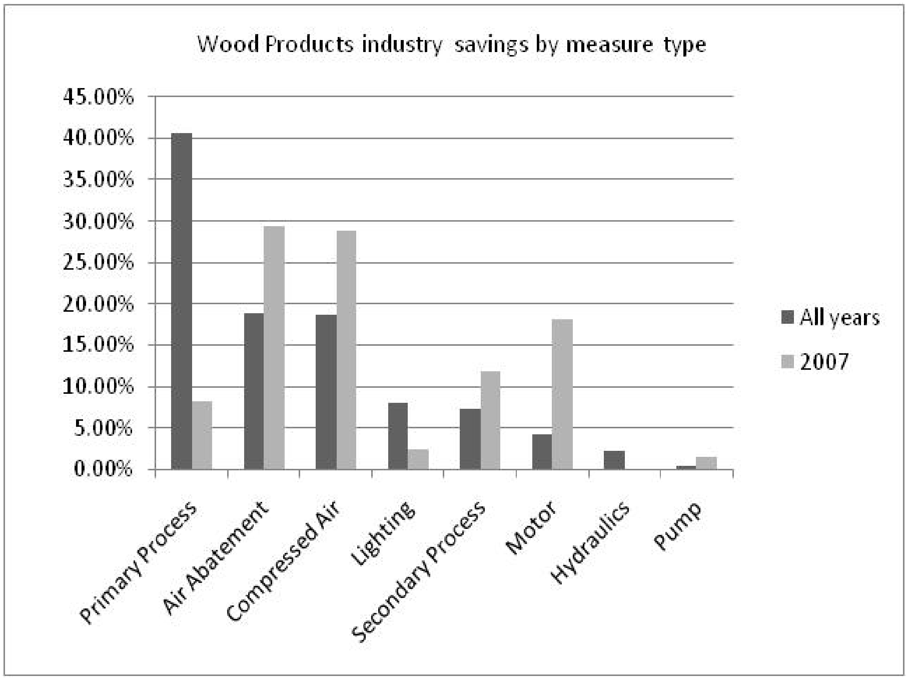


Figure A-12. Comparison of savings by measure type for projects completed by participants from the paper manufacturing industry

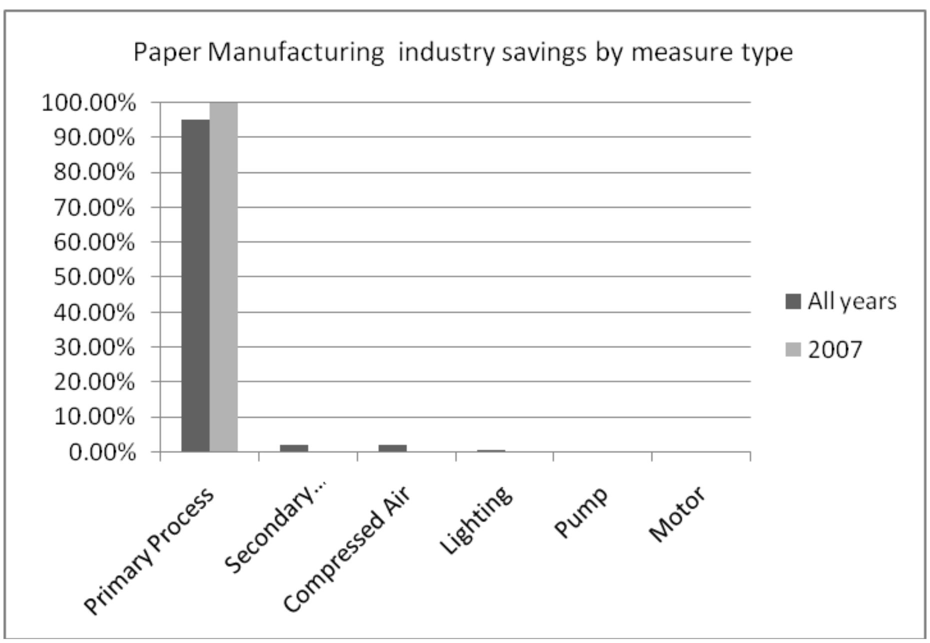


Figure A-13. Distribution of realized kWh savings by measure type for participants from the paper manufacturing sector, excluding mega project

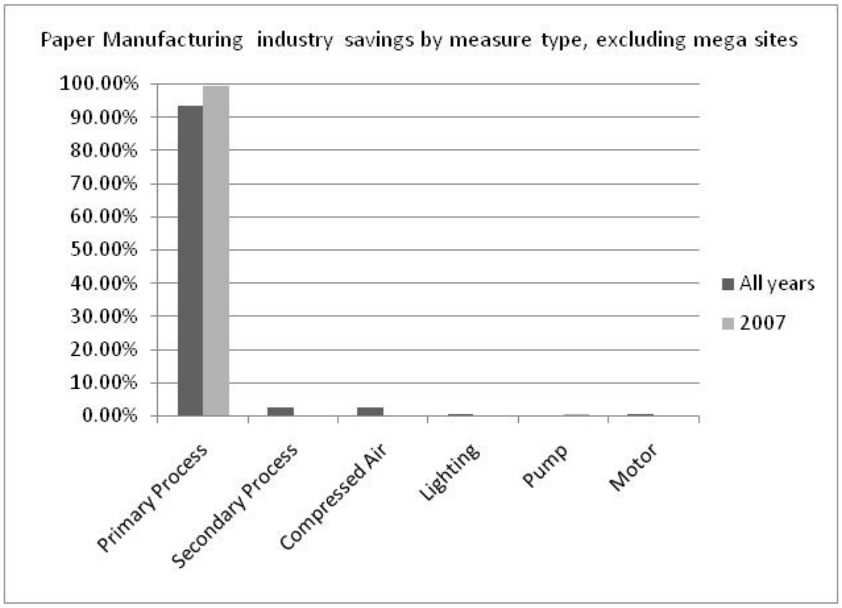


Figure A-14. Distribution of realized kWh savings by measure type for participants from the food products sector.

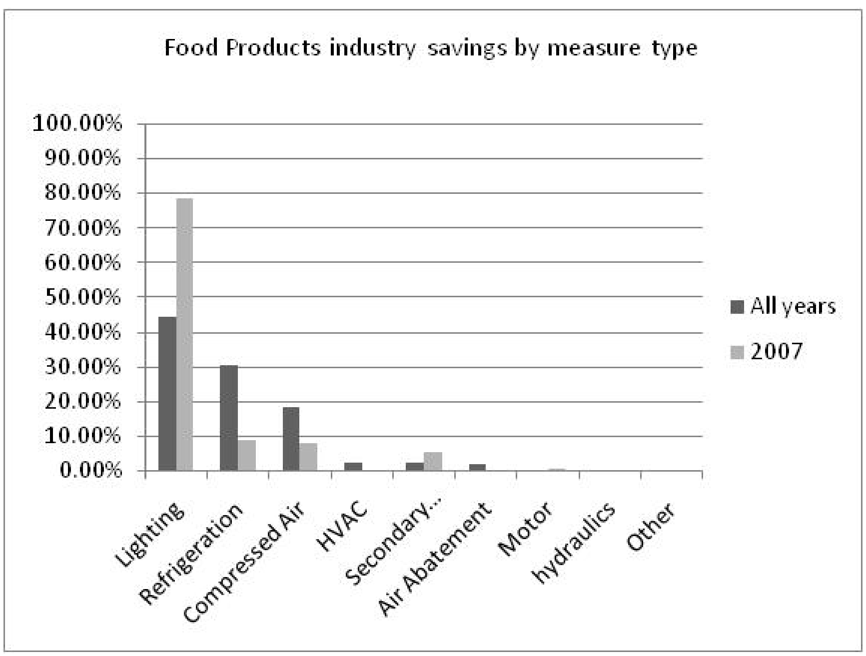


Figure A-15. Distribution of realized kWh savings by measure type for participants from the wood products sector.

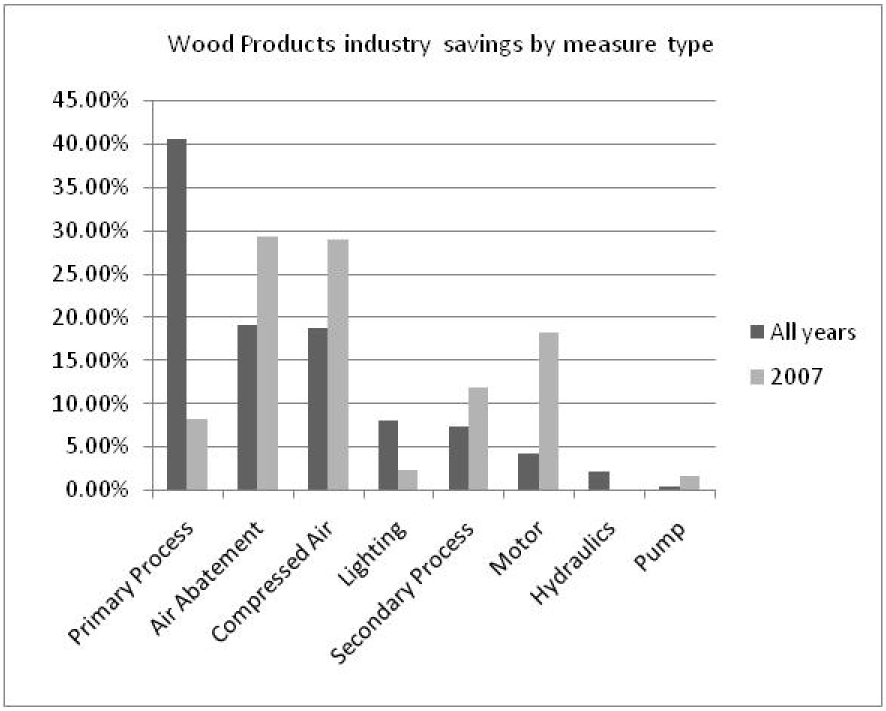


Table A-5. Distribution of realized kWh savings by NAICS market sector

Industry Name (Based on NAICS code)	2007 kWh	2007 %	2003-2008* kWh	2003-2008* %
Paper mfg (mills - converting)	81,490,432	67.18%	241,385,939	49.24%
Wood Prod (sawmill-veneer-plywd)	10,953,795	9.03%	103,167,669	21.04%
Food Products	7,979,507	6.58%	23,101,553	4.71%
Computers and Electronic Mfg	2,470,028	2.04%	19,498,032	3.98%
Wastewater Treatment	3,059,279	2.52%	14,678,133	2.99%
Gas Utility or Pipeline	0	0.00%	11,849,450	2.42%
Misc-manufacturing	3,437,207	2.83%	10,701,563	2.18%
Transportation and Aerospace	182,949	0.15%	8,853,667	1.81%
Irrigation	552,228	0.46%	8,405,168	1.71%
Water Supply	489,243	0.40%	6,925,886	1.41%
Printing and Publishing	1,387,081	1.14%	5,912,239	1.21%
Cold Storage	2,710,083	2.23%	5,660,024	1.15%
Metals (iron steel alum foundry)	367,604	0.30%	5,568,247	1.14%
Nonmetallic (glass-concrete)	1,381,370	1.14%	5,408,830	1.10%
Fabricated Metals	125,901	0.10%	4,977,361	1.02%
Beverages and Tobacco	1,020,336	0.84%	2,431,241	0.50%
Electric Utility	2,084,400	1.72%	2,168,496	0.44%
Electrical Equipment	0	0.00%	1,968,440	0.40%
Industrial Machinery	644,768	0.53%	1,784,411	0.36%
Chemicals	0	0.00%	1,164,035	0.24%
Furniture and Fixtures	483,287	0.40%	1,098,902	0.22%
Wood_Products	0	0.00%	1,052,446	0.21%
Rubber and Plastics	22,233	0.02%	1,033,277	0.21%
other	231,810	0.19%	565,639	0.12%
Coating, Engraving & Heat Treating M	0	0.00%	435,019	0.09%
Wood Office & Store Fixtures & Shelv	235,265	0.19%	235,800	0.05%
Correctional Institution	0	0.00%	210,800	0.04%
Apparel products	23,481	0.02%	198,377	0.04%
Plastics Material and Resin Manufact	0	0.00%	179,137	0.04%
Transportation	105,742	0.09%	105,742	0.02%
Metal coating	93,545	0.08%	93,545	0.02%
Postal Service	0	0.00%	65,300	0.01%
Printed Circuit Boards	56,466	0.05%	56,466	0.01%
Farm Supplies	55,141	0.05%	55,141	0.01%
Computer and software stores	0	0.00%	50,468	0.01%
Audio and Video Equipment Manufac	0	0.00%	27,530	0.01%
Nursery and Farm Supply	21,141	0.02%	21,141	0.00%
Public Administration	0	0.00%	17,319	0.00%
Construction	12,214	0.01%	12,214	0.00%
Nursery and Tree Production	9,950	0.01%	9,950	0.00%
Textile Product Mills	6,508	0.01%	6,508	0.00%
Sporting goods and music stores	0	0.00%	5,637	0.00%
Petroleum and Coal	0	0.00%	3,277	0.00%

*through November 7, 2008

Appendix A-B: Energy Trust PE Evaluation Document Log

Reference No.	Reference Name	Author/s	Date Published	Summary Comments (type of document, etc)	Type
1	2006 Evaluation.doc/pdf	Research into action	8/12/2008	2006 PE impact evaluation	report
2	05123_2003_2004_PE_Evaluation.pdf	Research into action	12/30/2005	2004 PE impact evaluation	report
3	080812_Production%20Efficency.pdf	Research into action	8/12/2008	Duplicate #1	report
4	070619_Assesmentofdeliverymodels.pdf	Research into action	7/19/2007	2003-2007efficnecy and renewable energy programs focus on program administration	report
5	081112 PE Program Update_Slideshow.ppm	Energy Trust	11/12/2008	2008 PE Program description	program document
6	Blue Heron Deink Upgrades 20080430		4/30/2008	Blue Heron before/after energy data	data
7	draft_102803	Stellar Processes	10/31/2008	potential for efficiency and renewable energy measures through 2027	report
8	DRAFT_10	Stellar Processes	10/31/2008	Duplicate #8	report
9	BASELINE	Energy Trust		TAS report requirements: Baseline calculations	program document
10	Blue Heron Savings Methods Discussion			Blue Heron calculation methods	data
11	Data Request for Billing Data DRAFT 2008-11-18	BPA	11/18/2008	letter requesting billing data	program document
12	Baseline Assumptions - Final Rev 3.2	Energy Trust		duplicate #9	program document
13	ETO PE Evaluations Final Report .pdf	Strategic energy group	6/28/2007	2003-2005 Impact evaluation PE	report
14	ETO-PE-E.pdf	Strategic energy group	6/29/2007	duplicate #13	
15	ETO-PE-Implementaion-Manual-2008	Energy Trust		Description and instructions for PE Program	program document
16	Project cost - Final rev 3.2	Energy Trust		TAS report requirements: Project cost estimates	program document
17	ETO 081112 PE update	Energy Trust		Duplicate # 5	
18	081023_TradeAllySurvey Evaluation	Energy Trust	10/23/2008	2008 Trade Ally Survey results	report
19	081002_2008_TrueUp_Summary	Energy Trust	10/2/2008	2002-2007 efficiency and renewable energy generation impact results	report
20	080812_2007_Impacts.pdf	ECONorthwest	8/12/2008	2007 efficiency and renewable energy generation impact results	report

Reference No.	Reference Name	Author/s	Date Published	Summary Comments (type of document, etc)	Type
21	ATAC_PE_Program Guide.pdf	Energy Trust	6/2/2008	Instructions for ATAC's participation in PE Program	program document
22	2008-2009_Action_Plan.pdf	Energy Trust	12/12/2007	Description of 2008 programs for efficiency and renewables	program document
23	2007_annual_report-p	Energy Trust		2007 PE results	report
24	2008-09_Action_Plan_Program_Details.pdf	Energy Trust	12/1/2008	2008 Energy Trust Programs description details	program document

APPENDIX B:
SURVEY AND INTERVIEW GUIDES

2008 Production Efficiency Program: Process and Impact Evaluation Draft Interview Guide – Energy Trust of Oregon Staff

February 17, 2009

Introduction

Hi, my name is _________. Energy Trust is evaluating the program and has hired my firm to conduct a survey of Energy Trust Staff. We want to discuss your experiences with the PE Program during 2008, especially relating to the changes implemented on January 1, 2008. Is now a good time to discuss your participation in the program?

[Unless otherwise indicated, ask each question of all respondents.]

Energy Trust Program Administration

1. In 2008 Energy Trust began administering the PE Program internally. In your opinion, how has the program changed in 2008? How will the change affect you in the future?

2. What positive effects has this change had on the PE Program? What negatives effects, if any, has this change had on the PE Program? On balance, has the change positively or negatively impacted the success of the program?

3. Do you think the goals of the program were reached?

Program Role

4. Describe your role in the 2008 PE Program. How has your role changed in 2008?

5. Some PDCs also perform the function of the ATAC. Do you see any conflict of interest in this dual function?

6. Have the new contract arrangements (between Energy Trust and PDCs and ATACs directly) caused any problems for PDCs or ATACs? How?

7. Did your perception of the relationship between Energy Trust and customers change in 2008?

8. Did customers perception of their relationship with Energy Trust change in 2008? Have participants ever expressed comments or concerns about their program participation? [If so] What comments or concerns? How were these concerns addressed?

Relationship with Other Organizations

9. What interactions do you commonly have with the Northwest Energy Efficiency Alliance's Industrial Initiative? How would you characterize your interactions with NEEA's Industrial Initiative? Is there a potential for stronger relationships between Energy Trust and NEEA's Industrial Initiative?

10. What interactions do you commonly have with PacificCorp staff? How would you characterize your interactions with PacificCorp? Is there a potential for stronger relationships between Energy Trust and PacificCorp?

11. What interactions do you commonly have with Bonneville Power Authority staff? How would you characterize your interactions with BPA? Is there a potential for stronger relationships between Energy Trust and BPA?

Communication

12. Do you interact directly with any customers? [If yes] What types of interactions do you have and in what types of circumstances?

13. Please describe the frequency of communications between Energy Trust and PDCs? What works well? What areas need improvement? Why do you say that?

14. Please describe the frequency of communications between Energy Trust and ATACs? What works well? What areas need improvement? Why do you say that?

15. Have you had any issues with the quality of the project proposals or applications completed by the ATACs? Did they meet the written guidelines?

16. Please describe the frequency of communications between Energy Trust and vendors. What works well? What areas need improvement? Why do you say that?

17. Have you had any issues with the quality of the project proposals or applications completed by the vendors? Did they meet the written guidelines?

18. Have any program contractors made comments or expressed concerns about the program? [If so] What comments or concerns?

19. What conversations have occurred between Energy Trust and the PDCs or ATACs about becoming involved with customers' capital planning processes and projects? How have the PDCs and ATACs responded?

20. How is the coordination between the PE Program and the Efficient Buildings Program, the New Building Program and the Renewables Program? How could this be improved?

21. Are there any communication issues you haven't mentioned?

Program Marketing

22. How well did the marketing planning process with the PDCs work? What changes would you like to see to that process?

23. What are the main ways that the Energy Trust markets the PE Program? [DO NOT READ, BUT PROBE.]

    a. Energy Trust Web site

    b. Other Energy Trust advertising (e.g. radio/print/mail)

    c. Trade ally networks/industry associations

    d. Program brochures ("Leave Behinds")

    e. Case studies

    f. Energy Leader Award

    g. Energy Guides

    h. Industry Events

        a. Northwest Food Service Show

        b. ACWA Annual Conference

        c. AWWA Waterworks School

        d. Oregon Dairy Farmers Conference

    i. Utility referrals

    j. Economic Development Coordination

    k. Equipment Vendors

    l. Cross-Promotion with Other Energy Trust programs

24. For each marketing activity indicated find out:

    a. How effective is this approach?

    b. How could it be improved?

25. What other types of marketing activities should be considered?

26. How successfully has the Energy Trust marketed the Renewables Program? What changes could be made?

Market Assessment

27. What is the PE Program's role in the market?

28. What are the key points in the functioning of the market where the PE Program has, or could have, significant influence on the level of efficiency in industrial process equipment?

29. Are you aware of any key players in the market that Energy Trust is not currently working with (not PDCs, ATACs, or Vendors already participating in the PE Program)?

30. Are there any market barriers to the adoption of efficient equipment?

31. Have any customers refused to participate in the PE Program because the incentives levels are too low?

32. In 2008 Energy Trust has been committed to targeting hard to reach markets. Are there customer segments that are currently not participating in the PE Program? Which customer segments? What program changes do you think would make the program more attractive to hard to reach customers?

Program Evolution

33. How happy are PDCs with their contracts with Energy Trust? Did the PDCs object to setting a savings goal? Did the PDCs meet their savings goals in 2008?

34. Excluding the participants of the Small Industrial Initiative, have you seen any changes in the numbers, sizes or types of projects or in the companies (by sector, by size) participating in the program since 2008? If so, what changes?

Type of change	Description of change
Number of projects	
Size of projects	

Types of projects	
Type of company	
Size of company	

Reservation Process

35. How is the reservation system design for:

Meeting goals?	
Forecasting projects?	
Reducing over subscription for rebates?	

Future Program Developments

36. What program changes would you most like to see in 2009?

37. Are there any measures that should be rebated on a prescriptive bases rather than a custom basis? Any measures that should be dropped because they would be installed without the program?

38. What steps have you taken to increase participation by:

Question	**Record Open Ended Response**
Expanding the scope of a particular project	
Increasing the efficiency of the equipment	
Encouraging repeat participation	
Improving the program implementation rate (rate at which studies become projects)	

39. In your opinion, are customers more motivated to participate in the program by the technical studies, the information or the cash incentives? Should more training opportunities be offered to customers?

40. A number of energy management techniques can be implemented by industrial customers to save money and energy. How many of your customers implement any energy management techniques? What steps can Energy Trust take to encourage customers to implement energy management techniques?

Quality Control

41. What quality control and assurance activities are you responsible for? What quality control activities are PDCs responsible for? How did these activities change in 2008?

42. Do you believe the current quality control and quality assurance procedures are effective?

43. Do you see any opportunities for improvement?

Technical Studies

44. Another change implemented in 2008 concerns the assignment of ATACs to specific projects. Is this new process working well?

45. (Tricia ONLY) What factors do you consider when these assignments are made?

46. Overall, how would you assess the quality of the technical studies in 2008 compared to 2007?

Kaizen Pilot

47. In your opinion, is the Kaizen Pilot meeting participation goals? What is the projection of participation for 2009?

48. Is the Kaizen pilot meeting their energy savings goals? What are the savings goals for 2009?

Data Processing and Payment

The Application Process

49. Is the application process efficient? How could the process be improved?

Data Collection Process

50. Are forms easy to complete? Is the data requested easily accessed by the customer?

51. Are the data collection systems reliable?

52. How could the systems be improved?

Tracking and Storing Databases

53. Are FastTrack and Gold Mine meeting all your data reporting needs?

54. How could FastTrack be improved?

55. How could Gold Mine be improved?

The Incentive Payment Process

56. How long do incentive payments typically take to reach the customer after a project is complete?

57. Have there been any complaints on the length of time to receive a payment?

58. Do you see any opportunities to shorten the length of time for payment delivery?

Summary Remarks

59. What areas of the PE Program are particularly effective? What change has worked best in 2008?

60. What additional program opportunities/areas for improvement do you see? How can they be taken advantage of?

61. What are the greatest challenges now facing the program? How can they be overcome?

62. Are there any specific issues you would like addressed in the 2008 process evaluation?

Any final comments?

2008 Production Efficiency Program: Process and Impact Evaluation Draft Interview Guide – Program Delivery Contractors

February 18, 2009

Introduction

Hi, my name is _________. Energy Trust is evaluating the program and has hired my firm to conduct a survey of Program Delivery Contractors. We want to discuss your experiences with the PE Program during 2008, especially relating to the changes implemented on January 1, 2008. Is now a good time to discuss your participation in the program?

[Unless otherwise indicated, ask each question of all respondents.]

Energy Trust Program Administration

1. In 2008 Energy Trust began administering the PE Program internally. In your opinion, how has the program changed in 2008? How will the change affect you in the future?

2. What positive effects has this change had on the PE Program? What negatives effects, if any, has this change had on the PE Program? On balance, has the change positively or negatively impacted the success of the program?

3. Do you think the goals of the program were reached?

Program Role

4. Describe your role in the 2008 PE Program. How has your role changed in 2008?

5. How has your role changed in relation to the customer during 2008? What might be done differently?

6. Have the new contract arrangements (between Energy Trust and PDCs directly) caused any problems for you? How?

7. Do participating customers perceive they have an ongoing relationship with Energy Trust and the Production Efficiency Program? What data or anecdotes do you base your impressions on? In your opinion, has the relationship between Energy Trust and customers changed in 2008?

8. Have participants ever expressed comments or concerns about their program participation? [If so] What comments or concerns? How were these concerns addressed?

9. Have any program contractors made comments or expressed concerns about the program? [If so] What comments or concerns?

10. How has the role of ATACs changed in relation to the customer in 2008? What might be done differently?

11. Have any customers misunderstood the separate roles of PDCs and ATACs?

12. Do you feel there is any conflict of interest in serving in the dual role of PDC and ATAC? Is it sufficient that different people within your organization conduct the different functions?

Communication

13. Please describe the frequency of communications between PDCs and Energy Trust? What works well? What areas need improvement? Why do you say that?

14. Please describe the frequency of communications between PDCs and vendors. What works well? What areas need improvement? Why do you say that?

15. Did you receive training before the new program changes were implemented in 2008? Was the training adequate? What additional support/training would you like for the program?

16. Are there any communication issues you haven't mentioned?

Program Marketing

17. How well did the marketing planning process work? What changes would you like to see to the marketing planning process? How did your 2008 marketing plan work out?

18. Which of the following situations describe how your customers enter the PE Program?

	Yes	No
We initiate with contact with customers and introduce the possibility of participating in the program		
The customer or someone else approaches my organization with program opportunities		
The possibility of installing qualifying equipment arises as we discuss equipment needs with customers		
Other: <Describe>		

19. How else do customers become interested in participating?

20. What are the main ways that you've seen the PE Program marketed? [DO NOT READ, BUT PROBE.]

    m. Energy Trust Web site

n. Other Energy Trust advertising (e.g. radio/print/mail)

o. Trade ally networks/industry associations

p. Program brochures ("Leave Behinds")

q. Case studies

r. Energy Leader Award

s. Energy Guides

t. Industry Events

    a. Northwest Food Service Show

    b. ACWA Annual Conference

    c. AWWA Waterworks School

    d. Oregon Dairy Farmers Conference

u. Utility referrals

v. Economic Development Coordination

w. Equipment Vendors

x. Cross-Promotion with Other Energy Trust programs

21. For each marketing activity indicated find out:

    c. How effective is this approach?

    d. How could it be improved?

22. What other types of marketing activities should the Energy Trust consider?

23. How successfully has the Energy Trust marketed their Renewables Program? What changes could be made?

24. Did you receive training, information, or support before the new program changes were implemented in 2008? Was the training, information, or support adequate? What additional training, information, or support would you like for the program?

Serving Oregon Industry

25. How are you targeting specific market segments? Are some market segments or markets harder to reach than others? What are the barriers? What strategies, outreach activities or messaging are you using to overcome these barriers?

26. What are you doing to target markets that have not traditionally implemented energy efficiency projects? Examples include small customers and beverage manufacturing. Agricultural customers, compressed air. Are there other markets that should be considered 'under-served'?

27. How successful do you think these efforts have been? What other marketing approaches might be used to reach underserved markets?

28. What steps have you taken to increase participation by:

Questions	Record Open Ended Answer
Expanding the scope of a particular project	
Increasing the efficiency of the equipment	
Encouraging repeat participation (PROBE FOR: whether they are involved in customer planning processes)	
Improving the program implementation rate (rate at which studies become projects)	

Role of Energy Efficiency with Customers and Vendors

29. How many of your customers implement any energy management techniques?

30. What steps can Energy Trust take to encourage customers to implement energy management techniques?

31. How many projects are occurring at locations where previous program projects were done? How do repeat customers' projects compare with their previous projects? What at are the causes for repeat business?

Program Evolution

32. How were your goals developed for 2008 and 2009? Are you satisfied with this process? What are the challenges in meeting the goals?

33. Did you meet your goals for 2008? How many 2008 projects carried over to 2009? How does the pipeline for 2009 look? Do you see any challenges for meeting the goals for 2009?

34. How happy are you with the terms of your contract with Energy Trust? Are the remunerations for the program appropriate?

35. Have you seen any changes in the numbers, sizes or types of projects or in the companies (by sector, by size) participating in the program since 2008? If so, what changes?

Type of change	Description of change
Number of projects	
Size of projects	
Types of projects	
Type of company	
Size of company	

Reservation Process

36. How is the reservation system for:

Meeting goals?	
Forecasting projects?	
Reducing over subscription for rebates?	

Measures and Incentives

37. In your opinion, are customers more motivated to participate in the program by the technical studies, the information or the cash incentives? Should more training opportunities be offered to customers?

38. Are there any measures that should be rebated on a prescriptive bases rather than a custom basis? Any measures that should be dropped because they would be installed without the program?

39. Are there lessons from measure or process changes in one industry that can benefit other industries?

BETCS

40. Have you had any projects that qualify for PE Program but not BETC? Are you aware of any measures that qualify for one program but not the other?

41. What steps could Energy Trust take to facilitate participation in both the PE Program and BETC?

Kaizen Pilot – Cascade Energy Only

42. How is the Kaizen Pilot going?

43. What are the objectives of the pilot? What has been the progress toward these objectives?

What were your pilot targets for the following areas and what is the progress toward each?	2008 Goals	What have you reached to date?
For marketing contacts		
For developing studies		
For implementing the program		

Technical Studies

44. Another change implemented in 2008 concerns the assignment of ATACs to specific projects, now handled by the Energy Trust Technical Manager. Are you satisfied with this new process of assigning ATACs to projects? Why or why not? Are you following the guidelines for technical studies?

45. Are ATACs following the guidelines for technical studies?

46. Are vendors who develop project proposals following the guidelines for technical studies?

47. Overall, how would you assess the quality of the technical studies in 2008 compared to 2007?

Market Assessment Questions

48. Are there any market areas that the PE Program should include and how could these areas be targeted?

49. How do the key industry players influence customers' decisions to participate in the PE Program? [DO NOT NEED TO ASK ALL PDC's THIS QUESTION BUT WOULD LIKE A FEW ASKED.]

50. What do you think is the largest market barrier to the adoption of efficient equipment? (customer barriers, industry, vendor, technology, etc.)

51. Is the pool of vendors offering energy efficiency products and services adequate for meeting program goals and supporting energy efficiency in Oregon? What could be done to increase the pool of vendors?

52. Have you worked with any customers who refused to participate in the PE Program because the incentives levels are too low?

Data Processing and Payment

The Application Process

53. Is the application process efficient? How could the process be improved?

54. Have you had any issues with the quality of the project proposals or applications completed by the ATACs? Did they meet the written guidelines?

55. Have you had any issues with the quality of the project proposals or applications completed by the vendors? Did they meet the written guidelines?

Data Collection Process

56. Are forms easy to complete? Is the data requested easily accessed by the customer?

57. Are the data collection systems reliable?

58. How could the systems be improved?

Tracking and Storing Databases (PDCs)

59. Do you use Gold Mine to record customer contact information? If not, what tracking system do you use?

60. How could Gold Mine be improved?

Summary Remarks

61. What change has worked best in 2008?

62. What additional program opportunities do you see? How can they be taken advantage of?

63. What are the greatest challenges now facing the program? How can they be overcome?

64. What program changes would you most like to see in 2009? What are your challenges to meeting 2009 goals?

65. What other support would you like from the program?

66. Any final comments on the PE Program?

Closing

As a final request, would also like to talk to a small number of Energy Trust customers who planned to participate in the program but did not follow through. Could you provide us with the name of four or five customers who meet these criteria? You may email me the customer names and contact information (if available), if you prefer.

Thank you so much for your time.

2008 Production Efficiency Program: Process and Impact Evaluation Draft Interview Guide – NEW Program Delivery Contractors

February 17, 2009

Introduction

Hi, my name is _________. Energy Trust is evaluating the program and has hired my firm to conduct a survey of Program Delivery Contractors/Energy Trust Staff. We want to discuss your experiences with the PE Program during 2008. Is now a good time to discuss your participation in the program?

[Unless otherwise indicated, ask each question of all respondents.]

Program Role

1. Describe your role in the 2008 PE Program. How would you characterize the program start up? (NEXANT ONLY) What was your interaction with the other PDCs during the transition of the projects?

2. Do participating customers perceive they have an ongoing relationship with Energy Trust and the Production Efficiency Program? What data or anecdotes do you base your impressions on?

3. Have participants ever expressed comments or concerns about their program participation? [If so] What comments or concerns? How were these concerns addressed?

4. Have any program contractors made comments or expressed concerns about the program? [If so] What comments or concerns? Have any customers misunderstood the separate roles of PDCs and ATACs?

Energy Trust Program Administration

5. Do you think the goals of the program were reached?

Communication

6. How else do customers become interested in participating?

7. What are the main ways that you've seen the PE Program marketed? [DO NOT READ, BUT PROBE.

    y. Energy Trust Web site

    z. Other Energy Trust advertising (e.g. radio/print/mail) aa. Trade ally networks/industry associations

bb. Program brochures (“Leave Behinds”)

cc. Case studies

dd. Energy Leader Award

ee. Energy Guides

ff. Industry Events

    a. Northwest Food Service Show

    b. ACWA Annual Conference

    c. AWWA Waterworks School

    d. Oregon Dairy Farmers Conference

gg. Utility referrals

hh. Economic Development Coordination

ii. Equipment Vendors

jj. Cross-Promotion with Other Energy Trust programs

8. For each marketing activity indicated find out:

    e. How effective is this approach?

    f. How could it be improved?

9. What other types of marketing activities should the Energy Trust consider?

10. How successfully has the Energy Trust marketed their Renewables Program? What changes could be made?

11. Did you receive training, information, or support when you began as a PDC? Was the training, information, or support adequate? What additional training, information, or support would you like for the program?

Serving Oregon Industry

12. How successful do you think these efforts have been? What other marketing approaches might be used to reach underserved markets?

Role of Energy Efficiency with Customers and Vendors

13. How many of your customers implement any energy management techniques?

14. What steps can Energy Trust take to encourage customers to implement energy management techniques?

15. What steps have you take to increase participation by:

	Yes	No
Expanding the scope of the project		
Increasing the efficiency of the equipment		
Encouraging repeat participation (PROBE FOR: whether they are involved in customer planning processes)		
Improving the program implementation rate (rate at which studies become projects)		

Program Evolution

16. Did you meet your goals for 2008? How many 2008 projects carried over to 2009?

17. How happy are you with the terms of your contract with Energy Trust? Are the remunerations for the program appropriate?

BETCS

18. Have you had any projects that qualify for PE Program but not BETC? Are you aware of any measures that qualify for one program but not the other?

19. What steps could Energy Trust take to facilitate participation in both the PE Program and BETC?

Market Assessment Questions

20. Are there any market areas that the PE Program should include and how could these areas be targeted?

21. How do the key industry players influence customers' decisions to participate in the PE Program? [DO NOT NEED TO ASK ALL PDC's THIS QUESTION BUT WOULD LIKE A FEW ASKED.]

22. What do you think is the largest market barrier to the adoption of efficient equipment? (customer barriers, industry, vendor, technology, etc.)

23. Is the pool of vendors offering energy efficiency products and services adequate for meeting program goals and supporting energy efficiency in Oregon? What could be done to increase the pool of vendors?

24. Have you worked with any customers who refused to participate in the PE Program because the incentives levels are too low?

25. Any final comments?

Closing

One final request. We would also like to talk to a small number of Energy Trust customers who planned to participate in the program but did not follow through. Could you provide us with the name of four or five customers who meet these criteria? You may email me the customer names and contact information (if available), if you prefer.

Thank you so much for your time.

2008 Production Efficiency Program: Process and Impact Evaluation Draft Interview Guide – NEW Program Delivery Contractors - 2

February 17, 2009

Introduction

Hi, my name is _________. Energy Trust is evaluating the program and has hired my firm to conduct a survey of Program Delivery Contractors/Energy Trust Staff. We want to discuss your experiences with the PE Program during 2008. Is now a good time to discuss your participation in the program?

[Unless otherwise indicated, ask each question of all respondents.]

Program Role

1. Describe your role in the 2008 PE Program. How would you characterize the program start up? (NEXANT ONLY) What was your interaction with the other PDCs during the transition of the projects?

2. Do participating customers perceive they have an ongoing relationship with Energy Trust and the Production Efficiency Program? What data or anecdotes do you base your impressions on?

3. Have participants ever expressed comments or concerns about their program participation? [If so] What comments or concerns? How were these concerns addressed?

4. Have any program contractors made comments or expressed concerns about the program? [If so] What comments or concerns? Have any customers misunderstood the separate roles of PDCs and ATACs?

Energy Trust Program Administration

5. Do you think the goals of the program were reached?

Communication

6. Please describe the frequency of communications between PDCs and Energy Trust? What works well? What areas need improvement? Why do you say that?

7. Please describe the frequency of communications between PDCs and vendors. What works well? What areas need improvement? Why do you say that?

8. Are there any communication issues you haven't mentioned?

Program Marketing

9. How well did the marketing planning process work? What changes would you like to see to the marketing planning process? How did your 2008 marketing plan work out?

10. Which of the following situations describe how your customers enter the PE Program?

	Yes	No
We initiate with contact with customers and introduce the possibility of participating in the program.		
The customer or someone else approaches my organization with program opportunities.		
The possibility of installing qualifying equipment arises as we discuss equipment needs with customers.		
Other?: <Describe>		

11. How else do customers become interested in participating?

12. What are the main ways that you've seen the PE Program marketed? [DO NOT READ, BUT PROBE.

kk. Energy Trust Web site

ll. Other Energy Trust advertising (e.g. radio/print/mail)

mm. Trade ally networks/industry associations

nn. Program brochures ("Leave Behinds")

oo. Case studies

pp. Energy Leader Award

qq. Energy Guides

rr. Industry Events

a. Northwest Food Service Show

b. ACWA Annual Conference

c. AWWA Waterworks School

d. Oregon Dairy Farmers Conference

ss. Utility referrals

tt. Economic Development Coordination

uu. Equipment Vendors

vv. Cross-Promotion with Other Energy Trust programs

13. For each marketing activity indicated find out:

g. How effective is this approach?

h. How could it be improved?

14. What other types of marketing activities should the Energy Trust consider?

15. How successfully has the Energy Trust marketed their Renewables Program? What changes could be made?

16. Did you receive training, information, or support when you began as a PDC? Was the training, information, or support adequate? What additional training, information, or support would you like for the program?

Serving Oregon Industry

17. How are you targeting specific market segments? Are some market segments or markets harder to reach than others? What are the barriers? What strategies, outreach activities or messaging are you using to overcome these barriers?

18. What are you doing to target markets that have not traditionally implemented energy efficiency projects? Examples include small customers and beverage manufacturing. Agricultural customers, compressed air. Are there other markets that should be considered 'under-served'?

19. How successful do you think these efforts have been? What other marketing approaches might be used to reach underserved markets?

20. In your opinion, what program changes would make the program more attractive to hard to reach customers?

Role of Energy Efficiency with Customers and Vendors

21. How many of your customers implement any energy management techniques?

22. What steps can Energy Trust take to encourage customers to implement energy management techniques?

23. What steps have you take to increase participation by:

	Yes	No
Expanding the scope of the project		
Increasing the efficiency of the equipment		
Encouraging repeat participation (PROBE FOR: whether they are involved in customer planning processes)		
Improving the program implementation rate (rate at which studies become projects)		

Program Evolution

24. How were your goals developed for 2009? Are you satisfied with this process? What are the challenges in meeting the goals?

25. Did you meet your goals for 2008? How many 2008 projects carried over to 2009? How does the pipeline for 2009 look? Do you see any challenges for meeting the goals for 2009?

26. How happy are you with the terms of your contract with Energy Trust? Are the remunerations for the program appropriate?

Reservation Process

27. How is the reservation system for:

Meeting goals	
Forecasting projects?	
Reducing over subscription for rebates?	

Measures and Incentives

28. In your opinion, are customers more motivated to participate in the program by the technical studies, the information or the cash incentives? Should more training opportunities be offered to customers?

29. Are there measures you believe should have prescriptive rather than custom incentives? Any measures that should be dropped because they would be installed without the program?

30. Are there lessons from measure or process changes in one industry that can benefit other industries?

BETCS

31. Have you had any projects that qualify for PE Program but not BETC? Are you aware of any measures that qualify for one program but not the other?

32. What steps could Energy Trust take to facilitate participation in both the PE Program and BETC?

Technical Studies

33. Are you satisfied with the process of assigning ATACs to projects? Why or why not?

34. Are you following the guidelines for technical studies?

35. Are ATACs following the guidelines for technical studies?

Market Assessment Questions

36. Are there any market areas that the PE Program should include and how could these areas be targeted?

37. How do the key industry players influence customers' decisions to participate in the PE Program? [DO NOT NEED TO ASK ALL PDC's THIS QUESTION BUT WOULD LIKE A FEW ASKED.]

38. What do you think is the largest market barrier to the adoption of efficient equipment? (customer barriers, industry, vendor, technology, etc.)

39. Is the pool of vendors offering energy efficiency products and services adequate for meeting program goals and supporting energy efficiency in Oregon? What could be done to increase the pool of vendors?

40. Have you worked with any customers who refused to participate in the PE Program because the incentives levels are too low?

Data Processing and Payment

The Application Process

41. Is the application process efficient? How could the process be improved?

42. Have you had any issues with the quality of the project proposals or applications completed by the ATACs? Did they meet the written guidelines?

43. Have you had any issues with the quality of the project proposals or applications completed by the vendors? Did they meet the written guidelines?

Data Collection Process

44. Are forms easy to complete? Is the data requested easily accessed by the customer?

45. Are the data collection systems reliable?

46. How could the systems be improved?

Tracking and Storing Databases (PDCs)

47. Do you use Gold Mine to record customer contact information? If not, what tracking system do you use?

48. How could Gold Mine be improved?

Summary Remarks

49. What additional program opportunities do you see? How can they be taken advantage of?

50. What are the greatest challenges now facing the program? How can they be overcome?

51. What program changes would you most like to see in 2009? What are your challenges to meeting 2009 goals?

52. What other support would you like from the program?

Any final comments?

Closing

One final request. We would also like to talk to a small number of Energy Trust customers who planned to participate in the program but did not follow through. Could you provide us with the name of four or five customers who meet these criteria? You may email me the customer names and contact information (if available), if you prefer.

Thank you so much for your time.

2008 Production Efficiency Program: Process and Impact Evaluation Draft Survey Instrument – Allied Technical Assistance Contractors

March 9, 2009

Changes Made for Data Collection

Introduction

Hi, my name is _________. I am calling on behalf of Energy Trust of Oregon. In 2008, your firm participated in Energy Trust's Production Efficiency Program. As part of its commitment to continuous improvement and providing value to Oregon ratepayers, Energy Trust is evaluating the program and has hired my firm to conduct a survey of **Allied Technical** Analysis Contractors ATACs. Is now a good time to discuss your participation in the program?

Program Role

1. **Describe your role in the 2008 PE Program. How has your role changed in 2008?**

2. **About how many studies have you conducted for the Production Efficiency (PE) program?**

3. **About how much of your time did PE technical studies occupy in 2008?**

4. **How do your activities for the PE Program coordinate with the rest of your professional work? [PROBE FOR: complements/competes, similar/different]**

5. **What aspects of the PE Program have worked well for you in 2008? What has worked well for the customer? What needs improving from your perspective?**

6. **Have the new contract arrangements (between Energy Trust and ATACs directly) caused any problems for you? How?**

7. **How do customers perceive the roles of ATACs vs. the PDC?**

Program Evolution

8. **(ONLY ASK IF INVOLVED WITH THE PROGRAM IN 2007.) Have you seen any changes in the numbers, sizes or types of projects participating in the program during 2008? If so, what changes?**

Type of change	Description of change
Number of projects	
Size of projects	
Types of projects	
Type of company	
Size of company	

9. **Did you find those changes mostly positive, mostly negative or mixed? Why?**

10. **How much repeat business are you seeing from customers who previously participated in the program?**

11. **How do repeat customers' projects compare with their previous projects?**

Technical Studies

12. **How are technical studies assigned to you?**

13. **(ONLY ASK IF INVOLVED WITH THE PROGRAM IN 2007.) How has this process changed between 2007 and 2008? Are you satisfied with the new process?**

14. **Did the number of projects you were assigned in 2008 meet your expectations?**

15. **Have you received a copy of the Energy Trust's guidelines for the reports/studies you prepare?**

16. **Have you found the guidelines helpful in preparing the technical studies/reports?**

17. **Do you use the calculators for presenting savings calculations to your customers?**

    a. **How could the calculators be improved?**

    b. **What additional calculators would be helpful to you?**

18. **What feedback have you received from Energy Trust on your 2008 technical reports?**

Communication and Coordination

19. **What has been your experience working with the other program actors? [PROBE FOR: problems/solutions]**

20. **How would you characterize communications between you and the other program players? Is there enough communication? Do you have suggestions for improving program communication?**

21. **Would you say that contracting directly with Energy Trust has improved communications between the program players? Why or why not?**

Program Marketing

22. **Which of the following situations describe how your customers come into the program:**

	Yes	No
a. We initiate contact with customers and introduce the possibility of participating in the program,		
b. The customer initiates the possibility of participating in the program		
c. The customer or someone else approaches you with program opportunities		
d. The possibility of installing qualifying equipment arises as you and your customers are discussing their equipment needs		
e. Customers are assigned to me by the program		
f. Other?: <Describe>		

23. **How else do customers become interested in participating?**

24. **How does your firm generate new business?**

25. **What are the main ways that you've seen the PE Program marketed? [DO NOT READ BUT PROBE FOR:]**

	Yes	How effective	How improved
a. Energy Trust Web site			
b. Other Energy Trust advertising (e.g. radio/print/mail)			
c. Trade ally networks/industry associations			
d. Program brochures ("Leave Behinds")			

e. Case studies			
f. Energy Leader Award			
g. Energy Guides			
h. Industry Events			
a. Northwest Food Service Show			
b. ACWA Annual Conference			
c. AWWA Waterworks School			
d. Oregon Dairy Farmers Conference			
i. Utility referrals			
j. Economic Development Coordination			
k. Equipment Vendors			
l. Cross-Promotion with Other Energy Trust programs			

26. What other types of marketing should Energy Trust consider?

27. How successfully has the Energy Trust marketed their Renewables Program? What changes could be made?

28. Did you receive training, information, or support before the new program changes were implemented in 2008? Was the training, information, or support adequate? What additional training, information, or support would you like for the program?

Role of Energy Efficiency with Customers

29. How many of your customers implement any energy management techniques?

30. What steps can Energy Trust take to encourage customers to implement energy management techniques?

31. What is the potential for energy efficient products and services with your customers? Would you say it is:

Close to zero

Minimal

Moderate

Great

NA to my business

32. [IF CLOSE TO ZERO OR MINIMAL.] Why do you think there is so little potential? [DO NOT READ; MARK ALL THAT ARE MENTIONED]

Energy costs are unimportant

Customers are already quite efficient

Customers have little interest in energy efficient equipment

Customers will not pay the added up-front costs

Customers are experiencing financial problems that preclude investments in energy efficiency

Other [specify]:

33. In general, how important are energy costs to your customers? [DO NOT READ.]

Not at all important

Not very important

Somewhat important

Very important

Don't know/not sure

34. To what extent do you promote energy efficiency in your customer transactions? Would you say energy efficiency is:

Always a part of my presentation (SKIP TO Q37)

Sometimes a part of my presentation (SKIP TO Q37)

Rarely a part of my presentation (ASK Q36)

Never a part of my presentation (ASK Q36)

35. [IF "NEVER" OR "RARELY"] Why are you not promoting energy efficiency?

36. How often do you give customers a range of choices based on energy efficiency?

Always

Sometimes

Seldom

Never

Don't know

37. Thinking of all of your work (with and without Energy Trust) over the last year, when your budget proposals or bids include energy efficiency options, how often did your customers select those options?

Never (0%)

Infrequently (1-10%)

Sometimes (11-25%)

Often 25-%-50%)

Very often (over 50%)

Always (100%)

38. Has this increased, decreased, or stayed the same in the past year?

Increased

Decreased

Stayed the same

Don't know

Measures and Incentives

39. Are there any measures that should be rebated on a prescriptive basis rather than a custom basis?

40. Are there any measures that should be dropped because they would be installed without the program (have become baseline)?

41. Are there any changes that should be made to the baselines used in the program?

42. **Do you believe financial incentives overcome barriers and promote program participation?**

43. **Do you think incentives are sufficient to motivate the customer to act?**

Oregon Industry

44. **Do participating customers perceive they have an ongoing relationship with Energy Trust and the Production Efficiency Program?**

45. **We are trying to learn more about the market in Oregon for industrial process equipment and services – who do you think the key players are? [PROMPT FOR: COMPANY NAME AND INDIVIDUAL NAME.]**

46. **Describe a few of the items that you think influence a customer's decision-making process.**

47. **What is the level of knowledge in vendors with respect to energy efficiency equipment, services, and opportunities?**

48. **Are there any barriers to adoption of efficient equipment?**

Spillover

49. **Please indicate whether you agree or disagree with the following statements.**

	Agree	Disagree	Don't Know
Our past experience specifying or installing energy efficiency equipment through the program has convinced us this equipment is cost effective or beneficial even without a program incentive.			
Because of what we have learned by installing energy efficient equipment through the program, we are better able to identify opportunities to improve the energy efficiency of equipment systems.			
Because of our experience with the performance of energy efficient equipment installed through the program, we are more likely to discuss energy efficient options with all of our customers when developing project plans for equipment.			

50. **How many of your customers install energy efficient projects but don't apply for an incentive?**

None

A few (1 to 5)

Some (6 to 10)

Many (More than 10)   Don’t know

51. What are the reasons those projects didn’t receive an incentive? [All that apply]

Not in trust territory

Gas projects

Would not be covered by incentive

Too much hassle

Incentive too small

Timing

EE option was part of the specification

EE bid was already accepted without incentive

Other [Specify]:

Don’t know

52. What were the top three types of projects that were installed but did not receive an incentive?

Process improvements

Gas process

Steam/boiler

Refrigeration

Motors

VFDs

HVAC

Lighting

Compressed air

Pumps

Fans/blowers

Other [Specify]:

53. How influential has the Production Efficiency program been on:

Influential:	Not at all	Somewhat	Very	Don't know
1. Our past experience specifying or installing energy efficiency equipment through the program has convinced us this equipment is cost effective or beneficial even without a program incentive.				
2. Because of what we have learned by installing energy efficient equipment through the program, we are better able to identify opportunities to improve the energy efficiency of equipment systems.				
3. Because of our experience with the performance of energy efficient equipment installed through the program, we are more likely to discuss energy efficient options with all of our customers when developing project plans for equipment.				

BETC

54. Do you promote the Oregon Business Efficiency Tax Credit (BETC) to your industrial customers?

55. What steps could Energy Trust take to streamline or facilitate participation in both the PE Program and BETC?

56. Have you had any projects that qualify for the PE Program but not BETC? Are you aware of any measures that qualify for one program but not the other?

57. Do your industrial customers tend to take advantage of BETC? Why or why not?

Customer Satisfaction

58. What positive feedback have you received about the program?

59. Have you heard of any participant dissatisfaction with the program? [If so] What comments or concerns have you heard about?

Firmographics:

60. Please indicate which of the following best describes your role:

Owner

Business Manager

Engineer

Contractor

Sales Manager/Business Development

Other [Specify]:

61. How many people are employed by your firm?

62. How many people work on PE Program projects?

63. What percent of your total business do PE Program projects represent?

0-25%

26-50%

51-75%

75-100%

64. What types of industries do you serve?

65. What proportions of your business do each of those industry types represent?

66. What are the end uses of the equipment you most frequently install?

Summary Remarks

67. What has worked best about the program during 2008?

68. What are the greatest challenges now facing the program?

69. What program changes would you most like to see in 2009?

70. What aspects of the PE Program have worked well for you in 2008? What has worked well for the customer? What needs improving from your perspective?

71. Any final comments?

PRODUCTION EFFICIENCY PROGRAM: PROCESS AND IMPACT EVALUATION SURVEY INSTRUMENT – PARTICIPATING VENDOR

Hi, my name is _________. I am calling on behalf of Energy Trust of Oregon. In 2008 your firm participated in Energy Trust's Production Efficiency Program. As part of its commitment to continuous improvement and providing value to Oregon ratepayers, Energy Trust is evaluating the program and has hired my firm to conduct a survey of ATACs. Is now a good time to discuss your participation in the program?

How Heard about the Program

1. About how long have you been aware of the Production Efficiency Program? (Probe to code):

- ☐ During 2008
- ☐ Two years or so (2006-07)
- ☐ Two to four years (2005-04)
- ☐ Five years or more (or utility program)
- ☐ Don't know

2. Do you recall how you *first* heard of the Production Efficiency Program?

- Program contact
- Program Web site
- Another vendor/contractor
- ☐ Customer
- Other (describe)
- Don't know

Decision to Participate

67. Which of the following situations describe how your customers enter the PE Program?

	Yes	No
We initiate with contact with customers and introduce the possibility of participating in the program		
A program representative approaches you with a		

program opportunity		
The customer or someone else approaches my organization with program opportunities		
The possibility of installing qualifying equipment arises as we discuss equipment needs with customers		
Other?: <Describe>		

68. Have your customers ever chosen to modify one of their projects so that it qualifies for an incentive?

69. Have your customers ever chosen against installing an available energy-efficient alternative that could have qualified for Energy Trust incentives?

70. Have you ever lost a project because you were not able to deliver an Energy Trust incentive?

71. What kinds of equipment do you provide to Energy Trust customers? (CHECK ALL THAT APPLY)

1. HVAC
2. Refrigeration
3. Lighting
4. Motors and VSD Drives
5. Pumps
6. Other (Specify

ASK Q6MORE THAN ONCE IF NECESSARY:

72. Can you estimate what percent of all the (INSERT FROM ABOVE QUESTION) equipment you supply to your customers qualifies for a rebate through the Energy Trust Program?

Equipment Type	Percent
1. HVAC	
2. Refrigeration	
3. Lighting	
4. Motors and VSD Drives	
5. Pumps	
. Other (Specify	

73. When a customer first presents you with a project idea, do you generally know whether it is likely to qualify for incentives?

74. Would you change anything about the types of projects that qualify for incentives?

Yes: What would you change?

No

DK

75. Has your participation in the program improved your business in any of the following ways?

increased size of projects

Increased repeat business?

increased number of projects

increased number of customers

increased sales in other areas

other (specify)

76. Are you aware that Energy Trust also provides incentives for renewables such as biogas projects, PV, and wind?

77. Is your firm interested in participating in the Renewables program?

78. What information/support regarding the Renewables program do you and your customers need from the Energy Trust?

BETC

79. Do you promote the Oregon Business Efficiency Tax Credit (BETC) to your industrial customers?

80. Do your industrial customers tend to take advantage of BETC?

Questions/Concerns/ program suggestions

81. Have you ever had a customer who started to participate in the program and then did not continue for some reason?

82. [IF YES] Roughly what year was that?

2004

2005

2006

2007

2008

don't know

83. Why did they not continue? Would you say: [CHECK ALL THAT APPLY]

Equipment didn’t qualify

Incentive wasn’t sufficient to meet their firm’s investment criteria

Incentives were not available at that time

Participating in the program would have resulted in an unacceptable delay

Participating was too much of a hassle because (describe)

Reasons internal to their company that don’t pertain to the program

Other (describe

Don't know

Comments:

84. Other than customers who discontinued participation, have any customers called you with comments or concerns about their program participation? Please, elaborate:

85. Did you feel that you were supplied with adequate and accurate program information to deliver to your customers? Please, elaborate:

86. Please rate the extent to which you have had any confusion about the program. Would you say:

No confusion

♠ome confusion, not at all a problem

A small problem

A medium problem

A significant problem

Problem so significant it nearly stopped the project from going forward

[IF MEDIUM OR HIGHER PROBLEM, ASK Q21]

87. What problem did you experience? (CODE INTO ONE OF THE CATEGORIES BELOW OR TAKE NOTES)

Uncertainty about who to call

Difficulty reaching a program representative

Difficulty getting a sufficient answer to a question

Confusion about whether a project would qualify for an incentive

Uncertainty about the program (e.g., policies, procedures) as a result of different program contacts telling you different things

Confusion when you thought you were dealing with someone capable of making application decisions and yet it turned out the decision was made by someone else

Confusion about what incentive amount Energy Trust was paying for estimated electricity savings (price per kWh)

Uncertainty about whether Energy Trust had run out of incentives for the year and your customer would have to wait until the next year

88. What would you improve about the Energy Trust Program?

89. Is there anything you think the Program should stop doing?

90. Are there any other offerings or service you like to see from the program (don't read)

a. Training

b. Energy manager position

c. More facilitation

d. Networking

e. Information

91. How often do time constraints ever keep a customer from considering applying for an incentive? Would you say…

Always

Sometimes

Never

Spillover

92. Would you agree or disagree that…your past experience specifying or installing energy efficient equipment through the program has convinced you that equipment is cost effective or beneficial even without a program incentive.

Agree

Disagree

Don't Know

93. Would you agree or disagree that…because of what you have learned by installing energy efficient equipment through the program, you are better able to identify opportunities to improve the energy efficiency of equipment systems.

Agree

Disagree

Don't Know

94. Would you agree or disagree that…because of your experience with the performance of energy efficient equipment installed through the program, you are more likely to discuss energy efficient options with all of your customers when developing project plans for equipment.

Agree

Disagree

Don't Know

95. How many energy efficient projects that you do don't get an incentive?

None (GO TO Q32)

A few (1 to 5) (CONTINUE)

Some (6 to 10) (CONTINUE)

Many (More than 10) (CONTINUE)

DK (GO TO Q32)

96. What are the reasons those projects didn't receive an incentive? [ALL THAT APPLY]

Not in trust territory

Gas projects

Would not be covered by incentive

Too much hassle

Incentive too small

Timing

EE option was part of the specification

EE bid was already accepted without incentive

Other [Specify]:

Don't know

97. In your experience, what kinds of projects did not receive an incentive? (DO NOT ASK, CODE IF POSSIBLE.)

Process improvements

Gas process

Steam/boiler

Refrigeration

Motors

VFDs

HVAC

Lighting

Compressed air

Pumps

Fans/blowers

Other [Specify]:

98. How influential has the Production Efficiency program been on:

a. Including energy efficiency in your sales approach/pitch?

1-Not at all influential

2-Somewhat influential

3-Very influential

b. Including energy efficiency options in your bids?

1-Not at all influential

2-Somewhat influential

3-Very influential

c. Including the BETC in your bids?

1-Not at all influential

2-Somewhat influential

3-Very influential

Firmographics

99. Please indicate which of the following best describes your role:

Owner

Business Manager

Engineer

Contractor

Sales Manager/Business Development

Other [Specify]:

100. How many people are employed by firm?

101. How many people work on Energy Trust projects?

102. What percent of your total business do Energy Trust projects represent?

0-25%

26-50%

51-75%

75-100%

103. Do you have any final comments on the Production Efficiency Program that you would like to pass on to Energy Trust?

Thank you very much!

2008 Production Efficiency Program: Regional Market Actor Process Interview Guide – Bonneville Power Authority April 16, 2009

We would like to discuss BPA's relationship with the Energy Trust of Oregon and your experience with the Production Efficiency Program during 2008.

Energy Trust Program Administration

1. In 2008, Energy Trust began administering the PE Program internally. Were you aware of this administrative change? From your viewpoint, has the change positively or negatively impacted your relationship with Energy Trust? How?

2. How can Energy Trust and BPA cooperate to improve service to gas customers in BPA territory (usually small industrials with small gas load)?

3. How can Energy Trust and BPA cooperate to improve service to electric customers with multiple plants that are in both BPA and Energy Trust territory?

Communication

4. What interactions do you commonly have with Energy Trust Staff? In general, how would you characterize your interactions with Energy Trust staff?

5. Some Energy Trust large industrial customers have multiple facilities in BPA and Energy Trust service areas and are participating in both Energy Trust and BPA programs. In these instances, how would you characterize BPA's interactions with Energy Trust staff?

6. What steps could Energy Trust take to improve interactions with BPA? What steps could BPA take to improve interactions with Energy Trust?

7. Are there regular meetings scheduled between Energy Trust and BPA parties? Would regularly scheduled meetings help you achieve your program goals?

8. What is your opinion of cooperatively marketing Energy Trust and BPA energy efficiency programs to joint customers? Do you think cooperatively marketing the programs would help you achieve your program goals?

9. In general, what communication channels between Energy Trust and BPA work well? What areas need improvement? Why do you say that?

Relationship with Energy Trust

10. What would you change to strengthen your relationship with Energy Trust? Where are the best opportunities for coordination? Where are the best opportunities for cooperation?

11. What are the barriers to a more cooperative relationship with Energy Trust? What program changes would foster a more cooperative relationship between BPA and Energy Trust?

12. Would a better relationship with Energy Trust strengthen industrial energy efficiency efforts in the Northwest?

13. How would you describe the PE Program's success in delivering EE to Oregon industry? What are the program's strengths? What are its weaknesses? What opportunities should it take advantage of? Any there any major barriers? How could the program be improved?

Any final comments?

2008 Production Efficiency Program: Regional Market Actor Process Interview Guide – Northeast Energy Efficiency Alliance April 16, 2009

We would like to discuss NEEA's relationship with the Energy Trust of Oregon during 2008.

Energy Trust Program Administration

1. In 2008, Energy Trust began administering the PE Program internally. Were you aware of this administrative change? From your viewpoint, has the change positively or negatively impacted your relationship with Energy Trust? How?

2. How can Energy Trust and NEEA cooperate more effectively to transform markets in Oregon to increase energy efficiency?

Communication

3. What interactions do you commonly have with Energy Trust Staff? In general, how would you characterize your interactions with Energy Trust staff?

4. Some Energy Trust large industrial customers participate in NEEA and Energy Trust programs. In these instances, how would you characterize NEEA's interactions with Energy Trust staff?

5. What steps could Energy Trust take to improve communication with NEEA? What steps could NEEA take to improve communication with Energy Trust?

6. How can NEEA and Energy Trust coordinate to prevent double counting of savings with joint customers?

7. Are there regular meetings scheduled between Energy Trust and NEEA staff? Would regularly scheduled meetings help you achieve your strategic goals?

8. In general, what communication channels between Energy Trust and NEEA work well? What areas need improvement? Why do you say that?

Relationship with Energy Trust

9. What would you change to strengthen your relationship with Energy Trust? Where are the best opportunities for coordination? Where are the best opportunities for cooperation?

10. What are the barriers to a more cooperative relationship with Energy Trust? What program changes would foster a more cooperative relationship between NEEA and Energy Trust?

11. Would a better relationship with Energy Trust strengthen industrial energy efficiency efforts in the Northwest?

12. How would you describe the PE Program’s success in delivering EE to Oregon industry? What are the program’s strengths? What are its weaknesses? What opportunities should it take advantage of? Any there any major barriers? How could the program be improved?

13. Any final comments?

2008 Production Efficiency Program: Regional Market Actor Process Interview Guide – Oregon Department of Energy Business Energy Tax Credit April 16, 2009

We would like to discuss Oregon Department of Energy's relationship with the Energy Trust during 2008.

Energy Trust Program Administration

1. In 2008, Energy Trust began administering the PE Program internally. Were you aware of this administrative change? From your viewpoint, has the change positively or negatively impacted your relationship with Energy Trust? How?

2. How can Energy Trust and BETC cooperate more effectively to transform markets in Oregon and increase energy efficiency?

Program Coordination

3. Many Oregon Trust industrial customers also apply for the ODOE Business Energy Tax Credit. What interactions do you commonly have with Energy Trust staff in these instances? In general, how would you characterize your interactions with Energy Trust staff?

4. How might Energy Trust and ODOE work together to streamline both our application and documentation processes?

5. Are there any issues with Production Efficiency technical documents or studies?

6. On occasion, ODOE and Energy Trust differ when classifying specific projects as a retrofit or new construction project. Is this an issue with the ODOE? What steps might ODOE and Energy Trust take to coordinate their project definitions to reduce customer confusion and uncertainty?

Communication

7. What steps could Energy Trust take to improve communication with the Oregon Department of Energy? What steps could ODOE take to improve communication with Energy Trust?

8. Are there regular meetings scheduled between Energy Trust and ODOE? Would regularly scheduled meetings help you achieve your mission?

9. What is your opinion of cooperatively marketing Energy Trust and ODOE energy tax credit to Energy Trust customers? Do you think cooperatively marketing the industrial program and the tax credit would help you achieve your mission?

10. In general, what communication channels between Energy Trust and ODOE work well? What areas need improvement? Why do you say that?

Relationship with Energy Trust

11. What would you change to strengthen your relationship with Energy Trust? Where are the best opportunities for coordination? Where are the best opportunities for cooperation?

12. What are the barriers to a more cooperative relationship with Energy Trust? What program changes would foster a more cooperative relationship between ODOE and Energy Trust? What other steps could be taken to develop a more cooperative relationship with the Energy Trust?

13. Would a better relationship with Energy Trust strengthen industrial energy efficiency efforts in Oregon?

14. How would you describe the PE Program's success in delivering EE to Oregon industry? What are the program's strengths? What are its weaknesses? What opportunities should it take advantage of? Any there any major barriers? How could the program be improved?

Any final comments?

2008 Production Efficiency Program: Process and Impact Evaluation Draft Interview Guide – Utility Staff February 16, 2009

We would like to discuss your experiences with the Production Efficiency Program during 2008, especially relating to the changes implemented on January 1 by Energy Trust.

Program Role

1. Describe the role of PGE/PacifiCorp in the 2008 PE Program. In your opinion, how has the role of PGE/PacifiCorp changed in 2008 compared to the earlier program years?

Energy Trust Program Administration

2. In 2008, Energy Trust began administering the PE Program internally. In your opinion, what positive effect has this change had on the PE Program? What negatives effects, if any, has this change had on the PE Program? On balance, has the change positively or negatively impacted the success of the program?

3. Another change implemented in 2008 concerns the assignment of ATACs to specific projects, which is now handled by the Energy Trust Technical Manager. In your opinion, how has this change impacted customer satisfaction with the process?

Communication

4. Please describe the frequency of communications between your organization and Energy Trust? What works well? What areas need improvement? Why do you say that?

5. What regular forms of communication occur between PGE/PacifiCorp and Energy Trust?

6. Are there regular meetings between various parties? Please describe.

7. Do you attend these meetings? Are the meetings useful? How could the meetings be improved?

8. How would you characterize communications with and between the various program players (Energy Trust, PDCs, and ATACs)? Is there enough communication? Too little? Too much? Do you have any suggestions for improving program communication?

9. [IF NOT ADDRESSED:] Have you experienced any difficulties working with any of the other parties? [If so] What difficulties?

Program Marketing

10. Do you market the PE Program to your industrial customers? How do you market the program to customers?

Serving Oregon Industry

53. Overall, how would you rate the success of the Production Efficiency Program?

54. How would you describe the PE Program's success in delivering EE to Oregon industry? What are the program's strengths? What are its weaknesses? What opportunities should it take advantage of? Any there any major barriers? How could the program be improved?

11. In 2008, Energy Trust has been committed to targeting hard-to-reach markets. Are there customer segments that are currently not participating in the PE Program? Which customer segments? What can Energy Trust do to attract the hard to reach markets?

12. What interactions do you commonly have with Energy Trust Staff? How would you characterize your interactions with Energy Trust staff?

13. Is there a potential for stronger relationships between Energy Trust and Pacificorp? Is there potential to strengthened your relationship with Energy Trust? Would a better relationship with Energy Trust strengthen industrial energy efficiency efforts in Oregon?

Perspective on Relationship of Customers and Energy Trust

14. What issues have your customers had with the Production Efficiency Program? Were these issues successfully resolved? How? If they were not resolved, how do you think they should have been resolved? Have you noticed more misunderstandings occurring in 2008 compared to previous program years?

Summary Remarks (IF NOT COVERED IN PREVIOUS QUESTIONS)

15. What change has worked best in 2008?

16. What additional program opportunities do you see? How can they be taken advantage of?

17. What are the greatest challenges now facing the program? How can they be overcome?

18. What program changes would you most like to see in 2009?

19. Any final comments?

PRODUCTION EFFICIENCY PROGRAM: 2008 PROCESS AND IMPACT

EVALUATION SURVEY INSTRUMENT – CUSTOM PROGRAM PARTICIPANTS (PHONE)   March 3, 2009

Contact Information

Interviewer (Phone survey only) ___________________________________

Field staff name (Field survey only) ___________________________________

Date ___________________________________

Firm ___________________________________

Contact ___________________________________

Master Site ID ___________________________________

PE Project Number ___________________________________

Introductory Statement [Phone Interviewer]

Hi, my name is _________. I am calling on behalf of Energy Trust of Oregon. In 2008 your firm received an incentive through the Energy Trust's Production Efficiency Program. The Energy Trust is evaluating the program and has hired my firm to conduct a survey of selected participants. The survey will take about 20 minutes. Is now a good time to discuss your experience with the program and the project for which you got the incentive last year?

If now is a good time, proceed, otherwise ask to schedule an appointment:

Date: __________________

Time: __________________

Awareness

My first set of questions concern program awareness.

1. **When did you first become aware of the Production Efficiency Program?**

 During 2008

 Sometime in the past 2 years or so [2006-2007]

 2-4 years [2004-2005]

 5 years or more, or answer refers to a 'utility program' [before 2004]

 don't know

Additional comments: ____

2. **Was the vendor who provided the equipment for which you got an incentive familiar with the Production Efficiency Program?**

 Yes

 No

 Mostly

 Somewhat

 DON'T KNOW

Additional comments: ____

3. **Did the vendor who provided the equipment...?**

 Encourage participation

 Neither encouraged nor discouraged participation

 Discourage participation

 DIDN’T WORK WITH A VENDOR OR CONTRACTOR

 NO OPINION

Additional comments: ____

4. **Please rate your level of knowledge with the following items, both before and after program participation, where a rating of "1" =very unaware, a rating of "3" =neither aware nor unaware, and a rating of "5"=very aware.**

	1 =Very Unaware	2	3 =Neither Aware Nor Unaware	4	5 =Very Aware	Don't Know/No Answer/Na
a. Equipment installed **(<u>prior</u> to program participation)**						
b. Equipment installed **(<u>after</u> program participation)**						
c. Energy efficiency services offered by utility **(<u>prior</u> to program participation)**						
d. Energy efficiency services offered by utility **(<u>after</u> program participation)**						

Free Ridership - Decision-Making

The next set of questions addresses the decisions your firm made regarding the equipment installation.

5. What reasons did you have for installing the equipment for which you received an incentive?

[READ LIST BELOW. CHECK ALL THAT APPLY]

6. **You said, [READ CHECKED LIST BELOW]. Among them, could you tell me the 3 most important reasons?**

	Q4: Reasons for installing the equipment	**Q5: Top 3 Reasons**
Code or regulations		
Safety		
Incentive Amount		
Replace failed equipment		
Support a change in production level		
Product quality		
Improved reliability		
Energy cost savings		
Improve production/process efficiency		
Other cost savings (labor, O&M, improved scheduling)		
Program representative recommended		
Vendor/contractor recommended		
Efficiency features are part of common practice for this application		
Technical study recommended		
Corporate policy		
Other (describe):__________________		
DON'T KNOW		

7. About when did you first consider a project that would address these circumstances you just described? Would you say…?

- During 2008
- Sometime in the past 2 years or so [2006-2007]
- 2-4 years [2004-2005]
- 5 years or more [BEFORE 2004] [UTILITY PROGRAM]
- DON'T KNOW

Additional comments: ____

8. Had your firm not been able to participate in the Energy Trust Production Efficiency Program, how would your plans have changed, if at all? I will read several phrases, each starting with "We probably would have...". For each phrase, please tell me if the statement is true or false to your firm. So, for the first one, would you say "We probably would have...

Question	True	False	No Answer
a. Made no changes; would have installed the identical equipment within that same year			
b. Postponed the project to another year			
c. Scaled back the project in scope **(ASK Q9)**			
d. Project proposed by Energy Trust – would not have existed			
e. Cancelled the project altogether			
f. Repaired existing equipment			
g. Kept using existing equipment			
h. Changed the project design			
i. Purchased less expensive equipment			
j. Reduced the energy efficiency features **(ASK Q10)**			
k. Other (please specify)			

9. You said, 'you would have scaled back the project in scope'. On a scale where 0 is 'no scaling back of efficiency' and 10 is 'a significant scaling back of efficiency,' how would a change in project scope affect the efficiency level of the project? (NOTE: THIS IS INTENDED TO BE A PERCENT CHANGE)

No Change — Complete Removal

0	1	2	3	4	5	6	7	8	9	10

99 Don't know/No answer

10. You said, 'you would have reduced the energy efficiency features of your project'. On a scale where 0 is 'no change in efficiency' and 10 is 'a complete removal of energy efficiency,' how much would you have reduced the energy efficiency features of your project?

No Change — Complete Removal

0	1	2	3	4	5	6	7	8	9	10

99 Don't know/No answer

11. On a scale of 0 to 10 where 0 is 'no influence' and 10 is 'a critical influence,' how influential was the overall program in your decision to install the energy efficient equipment? (IF THEY ASK, THIS INCLUDES MINI-AUDIT, STAFF FACILITATION, HELPING THEM FILL OUT THE FORMS.)

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don't know/No answer

12. On a scale of 0 to 10 where 0 is 'no influence' and 10 is 'a critical influence,' how influential was the technical study that was paid for by Energy Trust in planning for this equipment installation?

☐ DID NOT HAVE A TECHNICAL STUDY

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don't know/No answer

13. On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘a critical influence,’ how influential was the Production Efficiency incentive in planning for this equipment installation?

□ DID NOT RECEIVE AN INCENTIVE

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

14. On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘a critical influence,’ how influential was the vendor in planning for this equipment installation?

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

Programming Logic – Use Maximum of Q11, Q12, Q13

Q8. Had your firm not been able to participate in the Energy Trust Production Efficiency Program, how would your plans have changed, if at all?	Q11. Critical Influence of Program		Q12. Critical Influence of Technical Study (skip if no technical study was received)		Q13. Critical Influence of Incentive	
		Then Consistency =		**Then Consistency =**		**Then Consistency =**
a. Installed the identical equipment (True)	0-7 8-10	Consistent Not	0-7 8-10	Consistent Not	0-7 8-10	Consistent Not
b. Postponed the project to another year (True)	3-10 0-2	Consistent Not	3-10 0-2	Consistent Not	3-10 0-2	Consistent Not
d. Cancelled the project altogether (True)	3-10 0-2	Consistent Not	3-10 0-2	Consistent Not	3-10 0-2	Consistent Not
c. Scaled back the project in scope (True)	0-2 3-7	Not Consistent	0-2 3-7	Not Consistent	0-2 3-7	Not Consistent

Q8. Had your firm not been able to participate in the Energy Trust Production Efficiency Program, how would your plans have changed, if at all?	Q11. Critical Influence of Program		Q12. Critical Influence of Technical Study (skip if no technical study was received)		Q13. Critical Influence of Incentive	
	8-10	Not	8-10	Not	8-10	Not
e. Repaired existing equipment (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not
f. Kept using existing equipment (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not
g. changed the project design (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not
h. Purchased less expensive equipment (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not
i. reduced the energy efficiency features (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10	Not Consistent Not
j. Other (please specify)						

If consistency = ‘Not’ ASK Q15; If consistency = ‘Consistent’ GOTO Q16

15. Considering the questions we just discussed, please summarize your view of the role the program played in your decision to install this energy efficient equipment. (IF INCONSISTENCY NOT EXPLAINED CONTINUE) When you answered the question about the influence of the (program/technical study/ incentive, I would interpreted your answer to mean that the rebate was (quite/not) important to your decision to participate in the PE Program. But, when you answered the earlier question for what you would have done without the program, it sounds like the (program/technical study/incentive) was (not very/very) critical to your installation decision. I want to check to see if I am misunderstanding your answers or if the questions may have been unclear.

16. At that time of the installation, could your budget have accommodated the full cost of the equipment installation without the incentives, or would it have not covered the full equipment cost?

- ☐ Yes
- ☐ No
- ☐ DON'T KNOW

Additional comments: ____

Spillover

17. Has your company installed any energy efficient equipment for which it did not receive an incentive from Energy Trust in the last two years?

18. What equipment did your company install?

19. Did you discuss with your program contact whether you would be eligible for an incentive if you specified energy efficient equipment?

- ☐ Yes
- ☐ No
- ☐ DON'T KNOW

20. Why not? [DO NOT READ, BUT PROBE TO CODE] [CHECK ALL THAT APPLY]

- ☐ Didn't think about it
- ☐ Not aware energy efficient options were available for the equipment
- ☐ Didn't think energy efficient options would work for the application
- ☐ Thought financial incentive likely was too little to bother with
- ☐ Thought incentives were not available at that time
- ☐ Not enough time to participate

□ Reasons internal to your company that don't pertain to the program

□ DON'T KNOW□

Other (please specify)

Additional comments: ____

21. On a scale of 0 to 10 where 0 is 'no influence' and 10 is 'very influential,' how influential was your experience participating in the Production Efficiency (PE) Program on your decision to install this energy efficient equipment (that you did not receive an incentive for)?

No Influence Critical Influence

0	1	2	3	4	5	6	7	8	9	10

Additional Comments: ____

Program Satisfaction

The next set of questions focuses on your experiences as a program participant.

22. Please rate your satisfaction with the following items, where a rating of "1" =very unsatisfied, a rating of "3" =neither unsatisfied nor satisfied, and a rating of "5"=very satisfied.

	1 =Very Unsatisfied	**2**	**3 =Neither Unsatisfied Nor Satisfied**	**4**	**5 =Very Satisfied**	**Don't Know/No Answer/Na**
a. Performance of equipment installed						
b. Electricity Savings						
c. Incentive amount						

	1 =Very Unsatisfied	2	3 =Neither Unsatisfied Nor Satisfied	4	5 =Very Satisfied	Don't Know/No Answer/Na
d. Timeliness of incentive payment						
d. Application process						
e. Quality of the work conducted by contractor/vendor						
f. Overall program experience						
g. With any program issue that needed resolution						

22a_1 TO 22g_1. [IF UNSATISFIED WITH ANY ITEM--RATING OF 1 OR 2] How could Energy Trust improve the [INSERT 22A TO 22G]?

23. Please rate the extent to which you had any confusion about the program. Would you say you experienced…?

- ☐ No confusion (GO TO Q25)
- ☐ Some confusion, not at all a problem (GO TO Q25)
- ☐ A small problem (GO TO Q25)

☐ A medium problem (ASK Q24)

☐ A significant problem (ASK Q24)

☐ Problem so significant it nearly stopped the project from going forward (ASK Q24)

24. What, if anything, was confusing to you? (CODE ANSWERS DURING SURVEY AND RECORD DETAILS IF NEEDED)

☐ **Energy Trust Had Run Out of Incentives**

☐ **Whom To Call**

☐ **Areas of Expertise of Program Contacts**

☐ **Incentive Amount**

☐ **Different Information Received from**

☐ **Different Program Representatives**

☐ **Who Makes Program Decisions**

☐ **Self-Direct Policies and Procedures**

☐ **Accuracy of Information from Program Contact**

☐ **Feel Vendor Gave Incorrect Information**

☐ **Other ___________________________**

____

25. Are there any other offerings or services you like to see from the program(don't read)

f. Training (ASK Q26- THEN Q28)

g. Energy manager position

h. More facilitation

i. Networking

j. Information (ASK Q27 – THEN Q28)

26. What type of training would you find most useful?

____

27. What type of information would be helpful?

____

28. What features of the program could be improved? How might the marketing materials be improved? How could the forms be improved? (OPEN-ENDED QUESTION)

29. Would you participate in the Production Efficiency program again?

- ☐ Yes (GO TO Q30)
- ☐ No (ASK Q29A)
- ☐ DON'T KNOW (GO TO Q30)

29a. What program changes would encourage you to participate in the program again?

Program Contact

30. Can you name a specific person that you would contact to discuss the PE Program?

Enter Contact Name___________________________________ (CONTINUE)

☐ **Cannot name a specific contact person/do not have a specific contact person (GO TO Q32)**

31. Since participating in the program, is your program contact someone you would consider calling when you are contemplating an equipment purchase or facility change? [DO NOT READ, BUT PROBE TO CODE]

- ☐ Yes, and have called them/about to call them
- ☐ Yes, but have not called them
- ☐ Never thought of it, but might do so
- ☐ Would rather they contacted me periodically
- ☐ No, see no reason to call/wouldn't want to call (ASK NEXT QUESTION)
- ☐ Other (please specify)

If you selected other please specify:
Q31A: ____

32. **Please rate how well you think your program contact understands the challenges you face in operating your specific facility?**

No understanding — High level of understanding

0	1	2	3	4	5	6	7	8	9	10

Additional comments: ____

BETC

33. Did you apply for an Oregon Business Energy Tax Credit (BETC—"betsy") on the equipment you installed through the Production Efficiency Program?

- ☐ Yes **(ASK Q34 TO Q36 AND GO TO Q37)**
- ☐ No **(ASK Q33 AND GO TO Q37)**
- ☐ DON'T KNOW **(GO TO Q37)**

34. Why didn't you apply? [DO NOT READ, BUT PROBE TO CODE] (Multiple answers)

- ☐ Didn't know about BETC
- ☐ Didn't think of applying
- ☐ Didn't know my equipment might qualify
- ☐ Knew equipment didn't qualify
- ☐ Thought BETC not available for municipalities, nonprofits
- ☐ BETC application seemed too difficult or time consuming
- ☐ Was too late to apply
- ☐ For reasons internal to your company that don't pertain to the program
- ☐ DON'T KNOW
- ☐ Other (please specify)

If you selected other please specify:

Additional comments:____

35. When considering the influence of the BETC and the Energy Trust incentive on your decision to install the energy efficient equipment, would you say…?

- ☐ BETC had the most influence
- ☐ Energy Trust incentive had the most influence
- ☐ BETC and Energy Trust incentive had equal influence
- ☐ it was the combination of BETC and Energy Trust incentive that was so influential
- ☐ DON'T KNOW

Additional comments: ____

36. When considering the ease of participating in the program, would you say:

- ☐ BETC was easier than the PE Program
- ☐ The PE Program Trust was easier than the BETC
- ☐ BETC and the PE Program were equally easy to participate in (GO TO Q37)

□ BETC and Energy Trust incentive were equally difficult to participate in

□ Unsure/don't know (GO TO Q37)

37. Why do you say that?

____

Energy Management

38. Which of the following has your organization engaged in during the past two years to control energy consumption? [READ EACH ONE.]

□ Purchased energy efficient equipment

□ Hire or assign a staff member who is responsible for energy use and efficiency

□ Sent staff to energy management training (ASK Q39)

□ Create a committee or team that addresses energy

□ Develop an energy plan (ASK Q40)

□ Use an energy scorecard to track key performance indicators for energy

□ Develop corporate policies for energy efficiency regarding procurement or operations

□ Track energy use (ASK Q41)

□ Conduct a plant-wide energy assessment (audit, engineering review)

□ Conduct an energy assessment of specific equipment systems

□ Manage motors through procedures to repair or replace critical motors when they fail

□ An asset management system

ASK Q39, IF Q38B=YES

39. Were energy management practices implemented in your facility as a result of this training?

□ Yes

□ No

□ DON'T KNOW

ASK Q40, IF Q38D=YES

40. You said your organization has an energy plan. Does your energy plan include numerical goals for its energy savings objectives?

- □ Yes (ASK Q40A)
- □ No
- □ DON'T KNOW

Q40A. What are the goals? [IF 'TRACK ENERGY USE' NOT CHECKED, SKIP TO Q46]

____

ASK Q41, IF Q38G=YES

41. You said your organization has engaged in "tracking energy use". How often do you track energy use?

- □ Annually
- □ Bi annually
- □ Monthly
- □ Daily
- □ Hourly
- □ DON'T KNOW
- □ Other (please specify)

____

____

42. Have you heard of any of the following quality improvement methods?

	Yes (Ask Q43)	No
a. ISO (9000, 14000 and 14001 etc)	□	□
b. Six Sigma	□	□
c. TQM (Total Quality management)	□	□

43. **For each of these quality improvement methods, please let me know if you are doing it or are planning to do it, have tried it or are not considering it. How about...**

	Are Doing It	**Are Planning On Doing It**	**Tried It**	**Are Not Considering It**
a. ISO (9,000, 14,000 and 14,001 etc)	☐	☐	☐	☐
b. Six Sigma	☐	☐	☐	☐
c. TQM (Total Quality management)	☐	☐	☐	☐

Conclusion

44. **Do you have any final comments on the Production Efficiency Program?**

That's all of my questions. Thank you very much!

PRODUCTION EFFICIENCY PROGRAM: 2008 PROCESS AND IMPACT

EVALUATION SURVEY INSTRUMENT – SMALL INDUSTRIAL INITIATIVE PROGRAM PARTICIPANTS (PHONE)   March 24, 2009

Contact Information

Interviewer (Phone survey only) ___________________________________

Field staff name (Field survey only) ___________________________________

Date ___________________________________

Firm ___________________________________

Contact ___________________________________

Master Site ID ___________________________________

PE Project Number ___________________________________

Introductory Statement [Phone Interviewer]

Hi, my name is _________. I am calling on behalf of Energy Trust of Oregon. In 2008 your firm received an incentive through the Energy Trust's Small Industrial Initiative Program. The Energy Trust is evaluating the program and has hired my firm to conduct a survey of selected participants. The survey will take about 100 minutes. Is now a good time to discuss your experience with the program and the project for which you got the incentive last year?

If now is a good time, proceed, otherwise ask to schedule an appointment:

Date: __________________

Time: __________________

Awareness

My first set of questions concern program awareness.

1. **Do you recall how you first heard of the Energy Trust Program? [DO NOT READ, BUT PROBE TO CODE]**

    - ☐ Program representative
    - ☐ Utility company representative (PGE, Pacific Corp)
    - ☐ Equipment vendor or contractor
    - ☐ Architect, engineer or energy consultant

☐ Firms that had participated in the program

☐ Professional association, friend or colleague, word of mouth

☐ Other (please specify)

If you selected other please specify:

Additional comments:

2. **Who first proposed your company participate in the Energy Trust Program? [DO NOT READ, BUT PROBE TO CODE]**

☐ Program Representative (i.e., Cascade Engineering)

☐ Vendor/Contractor

☐ Utility (PGE, Pacific Corp)

☐ Self

☐ Employee

☐ DON'T KNOW

☐ Other (please specify)

If you selected other, please specify:

Additional comments:

3. **Was the vendor who provided the equipment for which you got an incentive familiar with the Energy Trust Program?**

☐ Yes

☐ No

☐ DON'T KNOW

Please rate your level of knowledge with the following items, both before and after program participation, where a rating of "1" =very unaware, a rating of "3" =neither aware nor unaware, and a rating of "5"=very aware.

	1 =Very Unaware	2	3 =Neither Aware Nor Unaware	4	5 =Very Aware	Don't Know/No Answer/Na
a. Equipment installed **(prior to program participation)**						
b. Equipment installed **(after program participation)**						
c. Energy efficiency services offered by utility **(prior to program participation)**						
d. Energy efficiency services offered by utility **(after program participation)**						

Free Ridership - Decision-Making

The next set of questions addresses the decisions your firm made regarding the equipment installation.

4. **What reasons did you have for installing the equipment for which you received an incentive? [READ LIST BELOW. CHECK ALL THAT APPLY]**

5. **You said, [READ CHECKED LIST BELOW]. Among them, could you tell me the threemost important reasons?**

	Q5: Reasons for installing the equipment	**Q 6. Top 3 Reasons**
Code or regulations		
Safety		
Incentive Amount		
Replace failed equipment		

Support a change in production level		
Product quality		
Improved reliability		
Energy cost savings		
Improve production/process efficiency		
Other cost savings (labor, O&M, improved scheduling)		
Program representative recommended		
Vendor/contractor recommended		
Efficiency features are part of common practice for this application		
NA		
Corporate policy		
Other (describe): ________________________		
DON'T KNOW		

6. When did you first consider a project that would address these circumstances you just described? Would you say…?

- ☐ During 2008
- ☐ Sometime in the past 2 years or so [2006-2007]
- ☐ 2-4 years [2004-2005]
- ☐ 5 years or more [BEFORE 2004] [UTILITY PROGRAM]
- ☐ DON’T KNOW

Additional comments: ____

7. **Had your firm not been able to participate in the Energy Trust Small Industrial Initiative, how would your plans have changed, if at all? I will read several phrases, each starting with "We probably would have..." For each phrase, please tell me if the statement is true or false to your firm. So, for the first one, would you say "We probably would have...**

Question	**True**	**False**	**No Answer**
a. Made no changes; would have installed the identical equipment within the same year			
b. Postponed the project to another year			
c. Scaled back the project in scope **(ASK Q9)**			
d. Project proposed by Energy Trust – would not have existed			
e. Cancelled the project altogether			
f. Repaired existing equipment			
g. Kept using existing equipment			
h. Changed the project design			
i. Purchased less expensive equipment			
j. Reduced the energy efficiency features **(ASK Q10)**			
k. Other (please **specify**)			

8. **You said, 'you would have scaled back the project in scope'. On a scale where 0 is 'no scaling back' and 10 is 'a significant scaling back of scope,' how much scale back would you have made?**

No Change — Complete Removal

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

9. On a scale where 0 is ‘no change in efficiency’ and 10 is ‘a complete removal of energy efficiency,’ how much would you have reduced the energy efficiency features of your project?

.No Change — Complete Removal

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

10. On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘a critical influence,’ how influential was the overall program in your decision to install the energy efficient equipment?(IF THEY ASK, THIS INCLUDES MINI-AUDIT, STAFF FACILITATION, HELPING THEM FILL OUT THE FORMS.)

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

11. **On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘a critical influence,’ how influential was the Energy Trust incentive in planning for this equipment installation?**

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

12. On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘a critical influence,’ how influential was the [program contact] in planning for this equipment installation?

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

13. On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘a critical influence,’ how influential was Cascade Engineering in planning for this equipment installation?

No Influence — Critical Influence

0	1	2	3	4	5	6	7	8	9	10

99 Don’t know/No answer

Programming Logic – Just Use Maximum of Q11, Q12

Q8. Had your firm not been able to participate in the Energy Trust Small Industrial Initiative Program, how would your plans have changed, if at all?	Q11. Critical Influence of Program		No technical study for SII Program		Q12. Critical Influence of Incentive	
		Then Consistency =				**Then Consistency =**
a. Installed the identical equipment (True)	0-7 8-10	Consistent Not	0-7 8-10		0-7 8-10	Consistent Not
b. Postponed the project to another year (True)	3-10 0-2	Consistent Not	3-10 0-2		3-10 0-2	Consistent Not
d. Cancelled the project altogether (True)	3-10 0-2	Consistent Not	3-10 0-2		3-10 0-2	Consistent Not
c. Scaled back the project in scope (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10		0-2 3-7 8-10	Not Consistent Not
e. Repaired existing equipment (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10		0-2 3-7 8-10	Not Consistent Not
f. Kept using existing equipment (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10		0-2 3-7 8-10	Not Consistent Not
g. Changed the project design (True)	0-2 3-7	Not Consistent	0-2 3-7		0-2 3-7	Not Consistent

Q8. Had your firm not been able to participate in the Energy Trust Small Industrial Initiative Program, how would your plans have changed, if at all?	Q11. Critical Influence of Program		No technical study for SII Program		Q12. Critical Influence of Incentive	
	8-10	Not	8-10		8-10	Not
h. Purchased less expensive equipment (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10		0-2 3-7 8-10	Not Consistent Not
i. reduced the energy efficiency features (True)	0-2 3-7 8-10	Not Consistent Not	0-2 3-7 8-10		0-2 3-7 8-10	Not Consistent Not
j. Other (please specify)						

If consistency = ‘Not’ ASK Q15; If consistency = ‘Consistent’ GO TO Q16

14. Considering the questions we just discussed, please summarize your view of the role the program played in your decision to install this energy efficient equipment. (IF INCONSISTENCY NOT EXPLAINED, CONTINUE) When you answered the question about the influence of the (program/incentive, I would interpreted your answer to mean that the rebate was *(quite/not)* important to your decision to participate in the PE Program.

But, when you answered the earlier question for what you would have done without the program, it sounds like the (program/incentive) was *(not very/very)* critical to your installation decision. I want to check to see if I am misunderstanding your answers or if the questions may have been unclear.

15. At that time of the installation, could your budget have accommodated the full cost of the equipment installation without the incentives, or would it have not covered the full equipment cost?

□ Yes, would have covered the full cost

□ No, would not have covered the full cost

□ DON’T KNOW

Additional comments: ____

Spillover

16. **Has your company installed any energy efficient equipment for which it did not receive an incentive from Energy Trust in the past two years?**

    ☐ Yes (CONTINUE)

    ☐ No (GO TO Q22)

    ☐ DON'T KNOW

17. **What equipment did your company install?**

18. **Did you discuss with your program contact (Cascade Engineering) whether you would be eligible for an incentive if you specified energy efficiency equipment?**

    ☐ Yes

    ☐ No

    ☐ DON'T KNOW

19. **Why not? [DO NOT READ, BUT PROBE TO CODE] [CHECK ALL THAT APPLY]**

    ☐ Didn't think about it

    ☐ Not aware energy efficient options were available for the equipment

    ☐ Didn't think energy efficient options would work for the application

    ☐ Thought financial incentive likely was too little to bother with

    ☐ Thought incentives were not available at that time

    ☐ Not enough time to participate

    ☐ Reasons internal to your company that don't pertain to the program

    ☐ DON'T KNOW

    ☐ Other (please specify)

    If you selected other please specify:

    Additional comments: ______________________________

20. **On a scale of 0 to 10 where 0 is ‘no influence’ and 10 is ‘very influential,’ how influential was your experience participating in the Energy Trust Program on your decision to install this energy efficient equipment (that you did not receive an incentive for)?**

No Influence Critical Influence

0	1	2	3	4	5	6	7	8	9	10

Additional Comments: ____

Program Satisfaction

The next set of questions focuses on your experiences as a program participant.

21. **Please rate your satisfaction with the following items, where a rating of "1" =very unsatisfied, a rating of "3" =neither unsatisfied nor satisfied, and a rating of "5"=very satisfied.**

	1 =Very Unsatisfied	**2**	**3 =Neither Unsatisfied Nor Satisfied**	**4**	**5 =Very Satisfied**	**Don't Know/No Answer/Na**
a. Performance of equipment installed						
b. Electricity Savings						
c. Incentive amount						
d. Timeliness of incentive payment						
d. Application process						

	1 =Very Unsatisfied	2	3 =Neither Unsatisfied Nor Satisfied	4	5 =Very Satisfied	Don't Know/No Answer/Na
e. Quality of the work conducted by contractor/vendor						
f. Overall program experience						
g. With any program issue that needed resolution						

22a_1 TO22g_1. [IF UNSATISFIED WITH ANY ITEM--RATING OF 1 OR 2] How could Energy Trust improve the [INSERT 22A TO 22G]?

22. Please rate the extent to which you had any confusion about the program. Would you say you experienced…?

- ☐ No confusion (GO TO Q25)
- ☐ Some confusion, not at all a problem (GO TO Q25)
- ☐ A small problem (GO TO Q25)
- ☐ A medium problem (ASK Q24)
- ☐ A significant problem (ASK Q24)
- ☐ Problem so significant it nearly stopped the project from going forward (ASK Q24)

23. Please tell us about the circumstances the caused your confusion about the program. (Probe for details)

24. Are there any other offerings or services you would like to see from the program(DON'T READ)?

a. Training (ASK Q26)

b. Energy manager position (GO TO Q28)

c. More facilitation (GO TO Q28)

d. Networking (GO TO Q28)

e. Information (ASK Q27)

f. Other Specify_________________

ASK Q26 IF Q25A = YES.

25. What type of training would you find most useful?

____

ASK Q27 IF Q25E = YES; ELSE GO TO Q29.

26. What type of information would be helpful?

____

27. What features of the program could be improved? How might the marketing materials be improved? How could the forms be improved? (OPEN ENDED QUESTION)

28. Would you participate in the Energy Trust Program again?

☐ Yes (GO TO Q30)

☐ No (ASK Q20A)

☐ DON'T KNOW (ASK Q30)

29A: What program changes would encourage you to participate in the program again?

Program Contact

29. Who was your vendor/contact for the Energy Trust Program? (MAY REPLACE PRIMARY CONTACT WITH 'ANSWER' IN THIS SECTION)

IF DON'T KNOW GO TO Q39 EVALUATION OF TOOLS

30. Was your [vendor] knowledgeable about the program?

☐ Yes

☐ No

☐ DON'T KNOW

31. Did your [vendor] assist with the program paper work?

☐ Yes

☐ No

□ DON'T KNOW

32. Was your [vendor] easy to contact?

□ Yes

□ No

□ DON'T KNOW

33. Since participating in the program, is your [vendor] someone you would consider calling when you are considering an equipment purchase or facility change? [DO NOT READ, BUT PROBE TO CODE]

□ Yes, and have called them/about to call them
□ Yes, but have not called them
□ Never thought of it, but might do so
□ Would rather they contacted me periodically
□ No, see no reason to call/wouldn't want to call
□ Other (please specify)

If you selected other please specify:

---

34. Did [your vendor] clearly explain :

	Yes	**No**	**Don't Know**
a. The overall participation process			
b. Energy savings			
c. Project costs			
d. Program incentives			

35. Would you recommend [your vendor] to others?

□ Yes

□ No

□ DON'T KNOW

36. **On a scale of 1 to 5 where 1 is ‘very unsatisified’ and 10 is ‘very satisfied,’ how satisfied were you with your [primary program contact]?**

1 =Very Unsatisfied		3 =Neither		5 =Very Satisfied	Don't Know/No Answer/Na

Evaluation of Tools that Estimate Energy Savings

37. **Are you familiar with the tools your [program contact] used to estimate the energy savings for the equipment you installed?**

 Yes (ASK Q40)

 No (GO TO Q39)

 DON'T KNOW (GO TO Q39)

38. **How were you presented the savings information? (OPEN ENDED QUESTION) (GO TO Q42)**

39. **On a scale of 1 to 5 where 1 is ‘not familiar’ and 5 is ‘very familiar,’ how familiar was the vendor who provided the equipment with the Tools used to calculate the program incentive and savings?**

1 =Not famiiar		3 =Neither		5 =Very familiar	6 Don't Know/No Answer/Na

ADD IN COMMENT BOX

ASK ALL RESPONDENTS Q41 TO Q45

40. **Were the energy savings estimates accurate?**

 Yes

 No

 DON'T KNOW

41. **Were the energy savings estimates generated easy to understand?**

 Yes

 No

 DON'T KNOW

42. Did the savings analysis support your decision to invest in the energy efficient equipment? (Open ended question)

43. Please rate your satisfaction with the estimate of savings, where a rating of "1" =very unsatisfied, a rating of "3" =neither unsatisfied nor satisfied, and a rating of "5"=very satisfied.

	1=very unsatisfied	2	3=neither	4	5=very satisfied	dk
Satisfaction with program tools used to calculate energy savings						

44. Any suggestions for improving the savings and incentive calculations? What would have made the savings calculations clearer, easier to understand?

BETC

45. Did you apply for an Oregon Business Energy Tax Credit (BETC—"betsy") on the equipment you installed through the Small Industrial Initiative?

- ☐ Yes **(ASK Q48)**
- ☐ No **(ASK Q47 THEN SKIP TO Q512)**
- ☐ DON'T KNOW **(GO TO Q51)**

46. Why didn't you apply? [DO NOT READ, BUT PROBE TO CODE]

- ☐ Didn't know about BETC
- ☐ Didn't think of applying
- ☐ Didn't know my equipment might qualify
- ☐ Knew equipment didn't qualify
- ☐ Thought BETC not available for municipalities, nonprofits
- ☐ BETC application seemed too difficult or time consuming
- ☐ Was too late to apply
- ☐ For reasons internal to your company that don't pertain to the program
- ☐ DON'T KNOW
- ☐ Other (please specify)

If you selected other please specify:

Additional comments:____

47. When considering the influence of the BETC and the Energy Trust incentive on your decision to install the energy efficient equipment, would you say…?

- ☐ BETC had the most influence
- ☐ Energy Trust incentive had the most influence
- ☐ BETC and Energy Trust incentive had equal importance
- ☐ it was the combination of BETC and Energy Trust incentive that was so influential
- ☐ DON'T KNOW

Additional comments: ____

48. When considering the ease of participating in the program, would you say:

- ☐ BETC was easier than the PE Program (ASK Q50)
- ☐ The PE Program Trust was easier than the BETC (ASK Q50)
- ☐ BETC and the PE Program were equally easy to participate in (GO TO Q51)
- ☐ BETC and Energy Trust incentive were equally difficult to participate in (GO TO Q51)
- ☐ Unsure/don't know

49. Why do you say that?

____

Energy Management

50. Which of the following has your organization engaged in during the past two years to control energy consumption? [READ EACH ONE]

a. Hire or assign a staff member who is responsible for energy use and efficiency

b. Create a committee or team that addresses energy

c. Develop an energy plan (ASK Q53)

d. Use an energy scorecard to track key performance indicators for energy

e. Develop corporate policies for energy efficiency regarding procurement or operations

f. Track energy use (ASK Q55)

g. Conduct a plant-wide energy assessment (audit, engineering review)

h. Conduct an energy assessment of specific equipment systems

i. Manage motors through procedures to repair or replace critical motors when they fail

j. An asset management system

IF NO, SKIPS TO Q55

51. **You said your organization has an energy plan. Does your energy plan include numerical goals for its energy savings objectives?**

- ☐ Yes (ASK Q53)
- ☐ No [GO TO Q54 OR Q55]
- ☐ DON'T KNOW [GO TO Q55]

52. **What are the goals?**

____

[IF 'TRACK ENERGY USE' NOT CHECKED, SKIP TO Q55]

53. **You said your organization has engaged in "tracking energy use". How often do you track energy use?**

- ☐ Annually
- ☐ Bi annually
- ☐ Monthly
- ☐ Daily
- ☐ Hourly
- ☐ DON'T KNOW
- ☐ Other (please specify)

ASK EVERYONE THESE QUESTIONS

54. **Have you heard of any of the following quality improvement methods?**

	Yes (Ask Q57)	No
d. ISO (9000, 14000 and 14001 etc)	☐	☐
e. Six Sigma	☐	☐
f. TQM (Total Quality management)	☐	☐

55. **For each of these improvement methods, please let me know if you are doing it or are planning to do it, have tried it or are not considering it. How about...**

	Are Doing It	**Are Planning On Doing It**	**Tried It**	**Are Not Considering It**
a. ISO (9,000, 14,000 and 14,001 etc)	☐	☐	☐	☐
b. Six Sigma	☐	☐	☐	☐
c. TQM (Total Quality management)	☐	☐	☐	☐

Conclusion

56. Do you have any final comments on the Small Industrial Initiative Program?

That's all of my questions. Thank you very much!

PRODUCTION EFFICIENCY PROGRAM: PROCESS AND IMPACT EVALUATION SURVEY INSTRUMENT – NONPARTICIPANTS

March 5, 2009

Contact Information

ID ___________________________________

Name of Contact ___________________________________

Name of Organization ___________________________________

Phone Number ___________________________________

Interviewer ___________________________________

Introduction

Hello, my name is ______. I'm calling on behalf of Energy Trust of Oregon. I work for an independent consulting firm that the Energy Trust has hired to assist in its continuous improvement efforts. Your responses to a short survey will enable Energy Trust to better serve

Oregon's industrial customers through its Production Efficiency program, which offers customers technical assistance and incentives. Can I speak with someone who knows the most

about energy use at this facility?

[IF THIS IS THE PERSON] I need about 12 minutes of your time. Is now a good time?

[WHEN THE PERSON IS REACHED] [RESTATE THE INTRO STATEMENT] I need about

12 minutes of your time. Is now a good time?

Firmographic Questions

1. **Please indicate which of the following best describes your role in your organization.**

    ☐ Plant or corporate engineer

    ☐ Plant manager

    ☐ Facilities manager

☐ Owner/President

☐ CEO, COO

☐ CFO, other financial executive

☐ Other (please specify)

If you selected other, please specify:

2. Does your company have facilities in more than one location in Oregon?

☐ Yes

☐ No [SKIP TO Q4]

☐ DON'T KNOW [SKIP TO Q4]

3. Approximately how many locations are there?

Heard of Energy Trust and PE

4. Prior to today, have you heard of Energy Trust of Oregon?

☐ Yes

☐ No

☐ DON'T KNOW

(RECORD ANSWER TO DETERMINE WHETHER YOU ASK Q14 (NO/DK) OR Q15 (YES) ON PAGE 4)

5. Have you heard of the Production Efficiency Program, the Energy Trust's incentive program for industrial process improvements?

☐ Yes

☐ No [SKIP TO Q8]

☐ DON'T KNOW [SKIP TO Q8]

6. When did you first become aware of the Production Efficiency Program?

☐ During 2008

☐ Sometime in the past 2 years or so [2006-2007]

☐ 2-4 years [2004-2005]

☐ 5 years or more, or answer refers to a "utility program" [before 2004]

☐ Don't know

7. **Do you recall how you first heard of the Production Efficiency Program? [DO NOT READ, BUT PROBE TO CODE]**

- ☐ Program representative
- ☐ Utility company representative
- ☐ Equipment vendor or contractor
- ☐ Architect, engineer, or energy consultant
- ☐ Firms that had participated in the program
- ☐ Professional association, friend or colleague, word of mouth
- ☐ Other (please specify)

If you selected other please specify:

Potential for Program Participation

8. **Has your company applied for or received any incentives or tax credits for energy efficiency improvements during the last two year?**

- ☐ Yes
- ☐ No [SKIP TO Q11]
- ☐ DON'T KNOW [SKIP TO Q11]

9. **What incentives or tax credits has your company applied for? [OPEN-ENDED: PROBE TO CODE]**

- ☐ Energy Trust of Oregon's Production Efficiency Program
- ☐ Portland General Electric programs
- ☐ Pacific Power programs
- ☐ BETC
- ☐ Northwest Energy Efficiency Alliance
- ☐ Federal Government
- ☐ Other (please specify)___________________________

10. **Have you heard of Oregon Business Energy Tax Credits?**

- ☐ Yes
- ☐ No

□ DON’T KNOW

11. Can you describe the most recent time you participated in this program? [PROBE: DID THEY RECEIVE $$, PROJECT TYPE, YEAR]

12. Have you purchased any energy efficient equipment in the past two years?

□ Yes [SKIP TO Q14]

□ No [ASK Q13]

□ DON’T KNOW [SKIP TO Q15]

13. Why not? [DO NOT READ LIST. PROMPT IF NECESSARY]

□ Haven’t made any equipment purchases

□ I wasn’t thinking of energy efficiency

□ Not aware that energy efficient options were available for the equipment

□ Didn’t think energy efficient options would work for the application

□ Production cuts prevent any investments in energy efficient equipment

□ DON’T KNOW

□ Other (please specify)______________________

14. Why didn’t you apply for a financial incentive on that equipment? [DO NOT READ LIST. PROMPT IF NECESSARY]

□ Didn't know about financial incentives

□ Didn't think of applying

□ Didn't know my equipment might qualify

□ Knew equipment didn't qualify

□ Thought incentives not available

□ Application seemed too difficult or time consuming

□ Was too late to apply

□ For reasons internal to your company that don't pertain to the program

□ Thought financial incentive likely was too little to bother with

□ DON'T KNOW

☐ Other (please specify) ____

Questions and Concerns about Program

IF Q4 = NO OR DK, ASK Q15 THEN SKIP TO Q21.

15. The Energy Trust's Production Efficiency Program offers technical assistance, incentives for energy efficiency improvements, and post-installation inspections. Based on what you have heard of the Production Efficiency Program, what questions or concerns come to mind regarding potential participation?

IF Q4 = YES, ASK Q16 THEN GO TO Q17.

16. You mentioned you were aware of the Energy Trust's Production Efficiency Program. You may not know that it offers technical assistance, incentives for energy efficiency, and post-installation inspections. Based on what you have heard of the Production Efficiency Program, what questions or concerns come to mind regarding potential participation?

Partial Participants

17. Has your firm ever started to participate in the Production Efficiency Program, but did not continue for some reason? And by "starting to participate," I am thinking about anything from seeking out information about the program to planning an ENERGY EFFICIENT equipment purchase.

☐ Yes

☐ No [SKIP TO Q21]

☐ DON'T KNOW [SKIP TO Q21]

18. Why did you not continue? Would you say…

☐ Equipment didn't qualify (GO TO Q20)

☐ Incentive wasn't sufficient to meet your firm's investment criteria (GO TO Q20)

☐ Incentives were not available at that time (GO TO Q20)

☐ Participating in the program would have resulted in an unacceptable delay (GO TO Q20)

☐ Participating was too much of a hassle (ASK Q19)

☐ Reasons internal to your company that don't pertain to the program (GO TO Q20)

☐ DON'T KNOW (GO TO Q20)

☐ Other (please specify) (GO TO Q20)

18a. If you selected other please specify:

19. **You said you didn't continue because "participation was a hassle." What program changes would reduce the hassle factor and encourage you to participate in the program again?**

20. **When was it that you tried to participate but did not? [PROBE TO CODE]**

- ☐ During 2008
- ☐ Sometime in the previous 2 years [2006-2007]
- ☐ 2-4 years [2004-2005]
- ☐ 5 years or more [BEFORE 2004] [UTILITY PROGRAM]
- ☐ DON'T KNOW

20a. [IF THE RESPONDENT APPEARS TO HAVE EXPERIENCE, ASK ANY ADDITIONAL DETAIL REGARDING THEIR EXPERIENCE WITH THE PROGRAM OR ENERGY TRUST]

Corporate Energy Management

21. **Which of the following best describes your company's approach to controlling electricity costs? Would you describe your organization as…**

- ☐ Actively engaged in controlling costs
- ☐ Planning to implement cost controls
- ☐ Talking about it, but have not taken action to control costs
- ☐ Haven't addressed
- ☐ Do not use enough electricity to warrant controlling costs
- ☐ Don't know

22. **And which of those response options best describes your company's approach to controlling natural gas costs? [IF NECESSARY, READ LIST WITH PREFACE:] Would you describe your organization as…**

- ☐ Actively engaged in controlling costs
- ☐ Planning to implement cost controls
- ☐ Talking about it, but have not taken action to control costs
- ☐ Haven't addressed controlling costs

□ Do not use natural gas

□ Do not use enough natural gas to warrant controlling costs

□ DON'T KNOW

IF Q21 = "ACTIVELY ENGAGED" OR Q22 = "ACTIVELY ENGAGED," ASK Q23 TO Q27; OTHERWISE GO TO Q28.

23. How much opportunity do you believe there is to reduce energy usage at your facility in the coming years? Would you say…

□ Significant opportunity

□ Some opportunity

□ Little opportunity

□ No opportunity

□ DON'T KNOW

24. Which of the following has your organization engaged in during the past two years to control energy consumption? [READ EACH ONE]

□ a. Purchase energy efficient equipment

□ b. Hire or assign a staff member who is responsible for energy use and efficiency

□ c. Sent staff to energy management training (ASK Q25)

□ d. Create a committee or team that addresses energy

□ e. Develop an energy plan (ASK Q26)

□ f. Use an energy scorecard to track key performance indicators for energy

□ g. Develop corporate policies for energy efficiency regarding procurement or operations

□ h. Track energy use (ASK Q27)

□ i. Conduct a plant-wide energy assessment (audit, engineering review)

□ j. Conduct an energy assessment of specific equipment systems

□ k. Manage motors through procedures to repair or replace critical motors when they fail

□ l. An asset management system

ASK Q25 IF Q24C=YES

25. Were energy management practices implemented in your facility as a result of this training?

☐ Yes

☐ No

☐ DON'T KNOW

ASK Q26 IF Q24E=YES

26. You said your organization has an energy plan. Does your energy plan include numerical goals for its energy savings objectives?

☐ Yes (ASK Q26A)
☐ No
☐ DON'T KNOW

Q26A. What are the goals? [IF "TRACK ENERGY USE" NOT CHECKED, SKIP TO Q27]

____

ASK Q27 IF Q24H=YES

27. You said your organization has engaged in "tracking energy use." How often do you track energy use?

☐ Annually
☐ Bi annually
☐ Monthly
☐ Daily
☐ Hourly
☐ DON'T KNOW
☐ Other (please specify) ____

28. In general, what do you see as the primary barriers to improving energy management practices in your firm?

29. **To improve your firm's energy efficiency, which two of the following types of external support would you find most valuable other than incentives?**

☐ Specialized technical training in system or facility operations

☐ Technical studies of equipment or processes

☐ Information on emerging technologies and energy management best practices in your industry

☐ Technical assistance and training on site to optimize your facility's operations.

☐ Forums on energy efficiency at industry events

30. Is there any external support I did not mention that you would find valuable?

Training

31. **What types of formal training does your company offer staff related to energy using equipment and processes? [DO NOT READ: PROBE TO CODE]**

- None [SKIP TO Q33]
- Compressed air systems
- Controls
- Electrical generation (e.g., turbines, generators)
- Fan systems
- Heating (process heating, e.g., kilns)
- Motor management
- Pump
- Refrigeration
- Steam systems practices
- Energy accounting
- Energy simulation
- OSHA/safety
- Emergency preparedness
- DON'T KNOW
- Other (please specify)

32. **How important is it that training provided to your employees on facility and equipment operations include an energy use and efficiency component? Would you say…**

- Very important
- Somewhat important
- Not very important
- Not at all important
- Don't know

Quality Improvement Methods

33. **Have you heard of any of the following quality improvement methods?**

	Yes (Ask Q34)	No
g. ISO (9000, 14000 and 14001 etc)	□(Ask Q34a)	□
h. Six Sigma	□(Ask Q34b)	□
i. TQM (Total Quality management)	□(Ask Q34c)	□

34. For each of these improvement methods, please let me know if you are doing it or are planning to do it, have tried it or are not considering it. How about...

	Are Doing It	**Are Planning On Doing It**	**Tried It**	**Are Not Considering It**
d. ISO (9,000, 14,000 and 14,001 etc)	□	□	□	□
e. Six Sigma	□	□	□	□
f. TQM (Total Quality management)	□	□	□	□

Impact of Current Economy

35. What impact has the current economy had on your ability to invest in energy efficiency? (OPEN ENDED ANSWER) (PROBE FOR IMPACT ON PLANNED PROJECTS, FUTURE PROGRAM PARTICIPATION, ETC)

Conclusion

36. **Over the years, industrial customers have told us about many of their concerns, such as increasingly being called on to do more work with less resources. What are some of the concerns that are on your mind currently?**

Thank you very much for your time!!

APPENDIX C: SUMMARY OF OTHER UTILITIES' PROGRAMS

Summary Table of Select Industrial Energy Efficiency Programs in the U.S. (Source: EEI, 2008)

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Alliant Energy Iowa Illinois Minnesota Wisconsin	-Shared Savings (WI and MN), Performance Contracting (IA)	Repayment program to lessen or eliminate upfront installation costs of energy efficiency measures for C/I customers.	http://www.alliantenergy.com/Environmental/EnergyConservation/014421
AmerenCIPS AmerenUE Illinois Missouri	-Ameren Abacus -Compressed Air and Motor Miser	For large customers, a comprehensive analysis of lighting and HVAC usage. For all C/I customers, Abacus provides wireless metering for facilities, equipment, or processes. The compressed air and motor program provides analysis for customers with motors using over 100 kW of demand.	https://www2.ameren.com/business/psProdSvcBus.aspx https://www2.ameren.com/business/psAirMotorBus.aspx
American Electric Power Indiana Kentucky Michigan Ohio Tennessee Texas Virginia West Virginia	-Commercial Energy Systems -C/I Energy Audits -Standard Offer Program (Texas)	On-line information and energy audits for C/I customers, along with a standard offer incentive program for facilities in Texas.	www.aepefficiency.com http://www.aepefficiency.com/cisop/intro/index.htm

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Avista Idaho Washington	-Energy Efficiency Incentives -Business Services -Business Energy Analyzer	Incentives for hard-wired improvements made at commercial and industrial facilities. Incentives are fixed for specific technologies or are capped at 50% of total project cost. Information on E-Tools, power quality, and preventative maintenance programs. On-line tool for customized energy savings advice and analysis.	http://www.avistautilities.com/business/pages/default.aspx http://www.avistautilities.com/business/rebates/pages/default.aspx http://www.avistautilities.com/business/services/pages/default.aspx http://www.avistautilities.com/business/conservation/pages/analyzer.aspx
Black Hills Power Montana South Dakota Wyoming	-Business Enhancement Program	Assist C/I Customers gain a competitive edge in their area of business through the use of energy efficient electric solutions, such as energy storage and lighting.	www.blackhillspower.com/ (click on "Commercial Customers" then "Commercial Rebates")
CenterPoint Energy Texas	-Commercial and Industrial Standard Offer Programs	On-line information about C/I energy efficiency and demand response programs.	http://www.centerpointcisop.com/ http://www.centerpointressop.com/customer.shtml
CenterPoint Energy Texas	-Commercial and Industrial Standard Offer Programs	On-line information about C/I energy efficiency and demand response programs.	http://www.centerpointcisop.com/ http://www.centerpointressop.com/customer.shtml
Central Hudson Gas & Electric New York	-Commercial/Industrial Energy Solutions -Energy Manager service	Services offered to C/I customer to assist them in using energy more efficiently, such as low-cost financing and free on-site energy audits.	http://www.centralhudson.com/business/index.html http://www.centralhudson.com/business/commercial.html

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Commonwealth Edison (Exelon) Illinois Pennsylvania	-Innovative Energy Solutions -Energy Insights Online -Consulting / Energy Efficiency	C/I Programs for the business customer to better manage energy consumption.	http://www.exeloncorp.com/ourcompanies/comed/comedbiz/energy_savings_products_and_services/
Connecticut Light and Power Connecticut	- Process Reengineering for Increased Manufacturing Efficiency (PRIME)	Promotion of lean manufacturing techniques to industrial customers through trainings and vendor support.	http://www.cl-p.com/Business/SaveEnergy/Services/PRIME.aspx
Empire District Electric Company Missouri Kansas Oklahoma Arkansas	-Commercial / Industrial Rebate programs	Prescriptive and custom rebates for business customers that improve efficiency at their facilities.	http://www.empireprograms.com/
Focus on Energy Wisconsin	-Industrial Program	Provides technical information, energy advising, and funding grants to support industrial projects.	http://www.focusonenergy.com/Business/Industrial-Business/
Idaho Power Idaho Nevada Oregon	-Industrial Efficiency Incentive Program -Irrigation Efficiency Rewards -Customized Assistance	Programs for business and industrial customers. Efficiency and demand response programs for the agricultural sector.	http://www.idahopower.com/EnergyEfficiency/Business/Programs/CustomEfficiency/default.cfm http://www.idahopower.com/EnergyEfficiency/Irrigation/Programs/EfficiencyRewards/default.cfm

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Keyspan Energy (National Grid) New York	-C/I Services	Energy management services for C/I customers.	www.keyspanenergy.com/psbusiness/index_ny_kedli.jsp
Madison Gas & Electric Wisconsin	-Business Services	Energy analysis, project financing, and consulting services for C/I customers.	www.weccusa.org www.mge.com/business/services/index.htm
MidAmerican Energy Illinois Iowa South Dakota	-EnergyAdvantage ® for Your Business -BusinessCheckSM -Efficiency Bid ®	Energy solutions for managing energy for lighting, heating and cooling for C/I customers. This includes energy analysis, financing, and a rebate program. Includes prescriptive and custom measures. C/I customers compete for energy efficiency funds, which are awarded based on the customer's bid.	http://www.midamericanenergy.com/html/energy6.asp http://www.midamericanenergy.com/html/energy6d.asp http://www.midamericanenergy.com/html/energy6k.asp
Minnesota Power Minnesota	-Business Energy Audit -C/I Loan and Incentives -PowerGrant Program	On-line energy analysis, and loan and incentive programs for C/I customers.	http://www.mnpower.com/powerofone/one_business/powergrant/index.htm
Montana Power (NorthWestern Energy) Montana South Dakota	-E+ Business Partners Program -E+ Commercial Lighting Rebate Program	Businesses submit proposals to Montana Power for energy conservation and load management programs. The program is open to commercial, industrial, agricultural, institutional, and multi-family facilities.	http://www.northwesternenergy.com/display.aspx?Page=Energy_Management_Solutions&Item=103 http://www.northwesternenergy.com/display.a

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Nebraska	-E+ Irrigation Program	Montana Power provides incentives for lighting upgrades in commercial and industrial facilities. Equipment rebates and energy audits for irrigation customers (Montana only).	spx?Page=Rebates_Business_Owners&Item=103 http://www.northwesternenergy.com/display.aspx?Page=Irrigator_Program
Nevada Power Nevada	-Nevada Sure Bet Program	Incentive program for C/I customers.	http://www.nvenergy.com/saveenergy/business/incentives/surebet/
New Jersey's Clean Energy Program New Jersey	-Pay for Performance	Large existing facilities with peak demand of greater than 200 kW can receive incentives based on an individual Energy Reduction Plan, facility size, and actual savings achieved.	http://www.njcleanenergy.com/commercial-industrial/programs/pay-performance
Northern States Power (Xcel Energy) Michigan Minnesota North Dakota South Dakota Wisconsin	-Conservation Rebates and Incentives (CO, MN, NM) -Process Efficiency Program (MN)	Incentive programs for C/I programs to install high-efficiency lighting, motors, air conditioners, and compressed air systems.	http://www.xcelenergy.com/Business/Programs_Resources/ConservationRebates_Incentives_Business/Pages/Save_on_energy_bills_earn_our_rebates.aspx http://www.xcelenergy.com/SiteCollectionDocuments/docs/ConservationProgramsSummariesCO.pdf http://www.xcelenergy.com/Business/Programs_Resources/ConservationRebates_Incentives_Business/Pages/Process_Efficiency.aspx

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
NSTAR Massachusetts	-New Construction Program -Construction Solutions -Business Solutions -Compressed Air Efficiency -Energy Advisor -Engineering Services	Incentive programs for HVAC, motors, lighting, transformers, new construction, retrofits, motors, and other equipment. Also, technical services are offered to C/I customers.	http://www.nstaronline.com/business/Default.asp?menu=business_energy_efficiency& http://www.nstaronline.com/business/energy_efficiency/electric_programs/ http://www.nstaronline.com/business/Default.asp?menu=energy_advisor&
NYSERDA New York	-Industrial Process and Product Innovation Program	Cost-sharing of feasibility studies, technology demonstrations, and technology commercialization for industrial customers.	http://www.nyserda.org/programs/Existing_Facilities/industrial.html
Orange & Rockland New Jersey New York	-C/I services	Program for business customers, such as information on saving on energy bills, economic development financial incentives for large C/I.	http://www.oru.com/programsandservices/incentivesandrebates/
Otter Tail Power Minnesota North Dakota South Dakota	-Conservation Improvement Program -Commercial and Industrial Services	Conservation Improvement Program with rebates, grants, energy audits, and education that focus on energy-saving improvements and technologies.	http://www.otpco.com/SaveEnergyMoney/ConservationImproveProg.asp http://www.otpco.com/SaveEnergyMoney/Rebates.asp

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Pacific Gas & Electric California	-C/I Incentives and Rebates -C/I Efficiency Services -Pacific Energy Center -Incentives by Industry -Agricultural and Food Processing Program	Incentives and information for lighting equipment, cooling systems, and rebates for energy-efficient appliances. Efficiency program for commercial and industrial customers Education center that provides technical information, design tools, an advice for energy efficiency. Details on efficiency incentives for specific industries Incentive programs and services for agricultural customers.	http://www.pge.com/mybusiness/ http://www.pge.com/mybusiness/energysavingsrebates/ www.pge.com/pec http://www.pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/ http://www.pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/agriculture/
PECO Energy (Exelon) Pennsylvania	-Custom Business Services - e-VALUATOR	Information on energy solutions for C/I customers, and a Web based energy analysis program for commercial customers.	http://www.exeloncorp.com/ourcompanies/peco/pecobiz/energy_savings_products_services_and_rebates/
Public Service Electric & Gas Company New Jersey	-Large Business Programs	Programs and services for larger C/I customers.	http://www.pseg.com/customer/business/industrial/overview.jsp http://www.pseg.com/customer/business/industrial/rebate/overview.jsp

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Sempra Energy (San Diego Gas & Electric) California	-Express Efficiency Rebates -Standard Performance Contract Program -C/I Rebates -High Tech Rebates	Incentives to C/I customers for lighting, air conditioning, agriculture, refrigeration, and other equipment. Also, programs for IT and industrial facilities.	http://www.sdge.com/business/esc/promo_rebatessavings.shtml http://www.sdge.com/business/esc/large/largemain.shtml
Sierra Pacific Power California Nevada	-Nevada Sure Bet -Agricultural Irrigation Program -Business Services	Information for C/I customers, and incentives for businesses and farms. Programs for commercial customers being offered in Nevada.	http://www.nevadasurebet.com/ProjectCenter/ http://www.sierrapacific.com/conservation/commercial/programs/
Southern California Edison California	-Industrial Energy Efficiency Program -Express Efficiency -Standard Performance Contract -Savings by Design -Online Business Energy Survey -Innovative Designs for Energy Efficiency Activities (IDEEA) -Equipment Guide -SCE Energy Manager	Cash incentives for process modifications and equipment retrofits. Demand response and efficiency programs for the residential, small business, large business, and industrial customers. Incentives and information for all types of electric equipment. Some programs are targeted to customers over 500 kW. Other products and services for large or small to medium customers.	http://www.sce.com/b-rs/industrial/

Member or IOU Company Name, and States served	Program Name(s)	Program Description(s)	Web Site(s)
Southern Company Alabama Power Georgia Power Gulf Power Mississippi Power	-Earth Cents - Energy Direct: Industrial Outdoor Lighting Program -Technology Application Center (AL)	Earth Cents program includes a Technical Energy Checkup of HVAC, lighting, and some process efficiency. Outdoor lighting services for commercial and industrial customers. Alabama Power Technology Applications Center (TAC) assists facilities with energy and process efficiency.	http://www.southerncompany.com/corporateresponsibility/electricity/championing.aspx www.energydirect.com http://www.alabamapower.com/commercial/tac.asp
Tampa Electric Company (TECO Energy) Florida	-C/I Energy Saving Programs -C/I Energy Audits	Rebates for chillers, high efficiency indoor lighting, air conditioning equipment, and others.	http://www.tampaelectric.com/business/saveenergy/
Texas New Mexico Power Company New Mexico Texas	-Commercial and Industrial Standard Offer Program (Texas)	Efficiency programs and rebates offered to commercial and industrial customers in Texas.	http://www.tnpeefficiency.com/CI/ciindex.shtml
TXU Electric Delivery (Oncor) Texas	-TXU Energy Efficiency Markets (TEEM)	Information on energy efficiency programs and incentives for C/I customers. Includes a Targeted Industrial Program.	http://www.txuelectricdelivery.com/electricity/teem/business/default.aspx http://www.txuelectricdelivery.com/electricity/teem/business/industrial.aspx
Unitil New Hampshire	-Large Business Energy Efficiency Services	Retrofit and new construction programs for C/I customers with monthly demands greater than 100 kW.	http://services.unitil.com/ceco/bus_energy_efficiency_programs.asp

APPENDIX D: FREE-RIDERSHIP AND SPILLOVER

Free-Ridership

Overview

For evaluation of the Energy Trust Production Efficiency program, Summit Blue Consulting worked with the Energy Trust evaluation staff to refine a set of survey questions and a model for estimating free-ridership at the program level based on:

- **Budget:** Whether participants' budgets could accommodate the project;
- **Influence:** How influential participants believe the program and its services were in the decision to install the project; and
- **Intention:** Their (retrospectively) stated intentions in the absence of the program.

The free-ridership estimation method used for Production Efficiency is detailed in this appendix and is based on a memo prepared by Phil Degens and Sarah Castor of Energy Trust, dated June 4, 2008, entitled *Energy Trust Free-Ridership Methodology*.

Background

The California Evaluation Framework states:

> "Free-riders are project participants who would have installed the same energy efficiency measures if there had been no program. How free-ridership is handled is a critical component of making the evaluations cost effective and accurate. Uncertainty surrounding free-ridership is a significant component of net energy and demand savings uncertainty."

Free-rider rates are also important inputs in program planning and redesign. Free-rider rates provide important information that signals when program changes should be made in such aspects as incentive levels, target markets, efficiency levels, eligibility requirements, or when the program should be terminated. This information helps programs evolve, retain their impacts, and remain relevant in the market.

Methods for calculating and adjusting for free-ridership have changed over time. Estimation techniques vary from simple self reports to elaborate econometric decision models, as well as the use of comparison groups to adjust for, but not directly estimate, free-ridership. With self-reports, the initial, simple yes /no question of *Would you have done it without the program?* has evolved into a battery of questions that attempt to model the nuances of the decision-making process and extract the influence of the program. Multiple questions with a range of answers for each question require methods for weighting and scoring, as well as an algorithm to arrive at a final estimate of free-ridership.

Energy Trust has utilized an assortment of different methods to estimate free-ridership using participant self-reports. These methods have been shown to have a various weaknesses and biases. Suggested approaches developed in other parts of the country to address these shortcomings have tended to increase data collection requirements.

To address both shortcomings and increased data requirements, Energy Trust staff has developed a method for calculating free-ridership that is simple, transparent, and unbiased. A goal in developing this method was the ability to apply it to all programs and their markets. An added goal was the ability to obtain the self-reported results through a reduced set of survey questions. These questions can be incorporated in a short program feedback survey administered online or on paper at the time of participation. The timing of the survey, as well as its brevity, should increase participant response rates. In addition, having the survey administered at the time of participation may yield more accurate information, since the program is still fresh in the respondent's mind and the chances are greater that the person most directly involved in the project is the survey respondent.

Survey Questions

Table D-1 presents the survey questions used and the abbreviated label for the question shown in subsequent tables for the PE Custom Participants.

Table D.1: Survey Questions Related to Free-Ridership and Corresponding Chart Abbreviations

QUESTION ASKED	CHART ABBREVIATION
Had your firm not been able to get an Energy Trust incentive for the installation, how would your plans have changed, if at all? *(Specific alternatives queried, plus "anything else?")*	Intention
How influential was the technical study in planning for this <measure> installation? *(11-point scale)*	Influence: Study
How influential was the Production Efficiency Incentive in planning for this <measure> installation? *(11-point scale)*	Influence: Incentive
How influential was the Production Efficiency Program in planning for this <measure> installation? *(11-point scale)*	Influence: Program
At that time, could your budget have accommodated the full cost of the equipment installation without the incentive? *(Yes/No/Don't Know)*	Budget

The PE Small Participant methodology substituted the influence of the vendor for the influence of the technical study as studies were not conducted for the Small Participants.

Methodology

As a starting point for developing the methodology, Energy Trust evaluation staff has used the belief that the key question to be answered is whether the participant was influenced by the program. This is relatively easy to determine if only a few yes/no questions are asked and answers are consistent (e.g., "The program had no influence" and "I would have taken the action if the program had not existed," or "The program had a critical influence on my decision" and "The action would not have taken place without the program"). If a more nuanced approach is used, such as allowing for degrees of influence, providing a "don't know" option or increasing the number and scope of the questions, the calculation becomes more difficult and requires a set of rules and algorithm.

The set of rules and algorithm that Energy Trust has developed use as their basis the *Laplace Criterion*. The *Laplace Criterion* states that "in the absence of any prior knowledge, we must assume that the events have equal probability," assuming, of course, that the events are mutually exclusive and collectively exhaustive.[32] This means that if it is not absolutely clear if the program had an influence on the participant's action or decision, equal odds are given to the outcome that the program had an influence and the outcome that the program did not have an influence. In these cases, the probability of the program having influence is 50% and the probability of it NOT having an influence is 50%. In other words, the participant has a 50% chance of being a free-rider.

The 50% free-rider outcome is only an outcome in a subset of the cases, as both influence and participant intent in the absence of the program might have a range of possible answers. To address all possible outcomes, a set of assumptions was developed that create the framework for calculating unbiased free-rider scores.

- Assumption 1: Respondent is truthful.
  - **Implication 1:** Consistent responses have easily calculated free-rider rates of 0% and 100%.
  - **Implication 2:** Participants that provide inconsistent or contradictory responses are viewed as having answered questions truthfully. With no additional information, both answers are given equal validity.
- Assumption 2: Inconsistencies between stated program influence and stated intentions of what would have happened in absence of the program can be resolved. The 2008 Program evaluations will ask participants follow-up clarifying questions when contradictory answers are given.
- Assumption 3: Equal probabilities are given to inconsistent answers.
  - **Implication:** Event probabilities are additive, since the two possible events being considered are "project went through with program influence" and "project went through without program influence."
- Assumption 4: In cases where the answer is "don't know," all of the possible answers have equal probabilities of being true.
  - **Implication 1:** This will create a range of possible free-rider estimates for all participants that answer "don't know" for either the intent or influence questions but provided a valid answer for the other question.
  - **Implication 2:** If no information is available to any of the questions, the observation is not included in the analysis, as it is deemed equivalent to a participant that was not interviewed and thus not included in the analysis.

Assumption 2 might be considered by some as limiting in that it only focuses on the inconsistencies around the influence of the program and the stated intentions of how, if at all, the project would have changed in the absence of the program. Factors such as experience with the program, length of time the project was planned, or experience with energy efficiency are often factored into the free-rider estimation. However, they are not used to resolve inconsistent answers, as their relationship to the project in question

[32] The *Laplace Criterion* is based on *Bernoulli's Principle of Insufficient Reason* which states that if we are ignorant of the ways an event can occur (and therefore have no reason to believe that one way will occur preferentially compared to another), the event will occur equally likely in any way. Keynes referred to the principle as the principle of indifference, formulating it as follows: "If there is no known reason for predicating of our subject one rather than another of several alternatives, then relatively to such knowledge the assertions of each of these alternatives have an equal probability."

is not clear and their inclusion in any weighting scheme or use in adjusting probabilities is not straightforward.

Participation in the program in the past is not sufficient to determine that the project under consideration would have gone through without the program's help, incentives, or studies. Past participation may have involved an end-use technology that has little relevance to the current project. On the other hand, past participation may have involved incentives and other type of program assistance that were needed to move the current project forward. Therefore, past program participation might be a good predictor of future participation, but cannot be considered a clear indicator of free-ridership. Even past experience with the same technology for which no incentive was received may not be a clear indicator that the participant is a free-rider. To make this assumption, the participant's economic conditions and investment criteria would need to remain unchanged, a reasonable assumption for only a short period of time. Over longer periods, economic conditions and investment criteria both change. Also, "comparable" equipment and technologies might not, in fact, be comparable and past experience with the program may not have been positive. For example, installation of additional VSDs through the program would be a sign of program success if the customer had poor experiences with VSDs in the past. Since past participation and past experience do not have a straightforward interpretation without further investigation, their use in calculating free-ridership is inappropriate.

Application

One of the ways that Summit Blue modified the Energy Trust methodology was to begin the process with stated intention rather than program influence. In Summit Blue's experience, most free ridership methods use stated intention as the bedrock of their free ridership score. This change will have little impact on the final free ridership estimate as state intention and influence are added together to create the unadjusted free ridership score. The 2008 PE Impact Evaluation provides another example of how flexible the Energy Trust scoring algorithm is.

Participant Intention in Absence of the Program

For stated changes in the project in absence of the program, there are three different levels of change:

1. No change in the program measure – would have installed identical measure
2. The program measure would have changed, but retained some energy efficiency features
3. No energy efficient equipment would have been installed

To determine the level of change, participants were asked how the project would have changed in absence of the program. A variety of answers could be given, from "No change," to "Change in scope," to "Postponing the project more than a year" to "Cancelled the project altogether." These answers were then allocated to one of the three options above. Changes that might have retained some of the energy-efficient features of the project were scored at the midpoint, as no reliable information on the efficiency level was available. Table D-2 provides the schema for scoring intent.

Table D-2: Free-Rider Scoring of Stated Intent in Absence of Program

STATED INTENT IN ABSENCE OF PROGRAM	FREE-RIDER SCORE	PROBABILITY ASSOCIATED WITH STATED INTENT	FREE-RIDER RATE ASSOCIATED WITH STATED INTENT
NO CHANGE IN PROJECT	1.00	50%	.50
CHANGE WITH SOME ENERGY EFFICIENCY RETAINED	0.50	50%	.25
SIGNIFICANT CHANGE WITH VIRTUALLY NO PROGRAM ENERGY EFFICIENCY RETAINED	0.00	50%	.0

Program Influence

As stated above, the second question to be answered is whether the program had an influence on the energy efficiency equipment installation. The algorithm is quite flexible and can include multiple program influences and allow for a range of answers for the participant's intent in absence of the program.

Participants rated program influence for three major factors:

4. Incentive
5. Technical Study/Vendor or Contractor
6. Program Assistance In General

The scoring algorithm was changed from a five-point scale influence scale to an eleven-point scale anchored only at the end points. Participants rated each influence on a 0 to 11-point scale, from "critical influence" (10) to "no influence" (0). The maximum value given for any of the three program factors is used as the indicator of program influence. This results in eleven scores that are equally distributed across a potential range from 0 to 10.

Table D-3 provides the schema for scoring program influence.

Table D-3: Free-Rider Scoring of Program Influence

PROGRAM INFLUENCE	FREE-RIDER SCORE	PROBABILITY ASSOCIATED WITH PROGRAM INFLUENCE	FREE-RIDER RATE ASSOCIATED WITH PROGRAM INFLUENCE
10-CRITICAL INFLUENCE	.0	50%	0.0%
9	.10	50%	5.5%
8	.20	50%	10.0%
7	.30	50%	15.5%
6	.40	50%	20.0%
5	.50	50%	25.0%
4	.60	50%	30.0%
3	.70	50%	35.0%
2	.80	50%	40.0%
1	.90	50%	45.0%
0 – NO INFLUENCE	1.00	50%	50.0%

Budget

Participants that reported they would have completed the project without the program were assumed to be free riders. However, participants that reported not having sufficient budget to undertake the specific project would not have been able to undertake the exact project with "no change." They perhaps would be able to undertake the project "partially" or not at all ("change"). Thus, participants that reported both "no change" and "no budget" were treated for the free-rider calculation as if they had reported "partial" change. So, in Table D above, instead of a free-rider stated intent score of 0.50 (corresponding to "no change"), they were assigned a free-rider stated intent score of 0.25 (corresponding to "partial"). These adjustments are shown in the next section for the Production Efficiency participants.

Free Ridership Calculation

With the outcomes of being influenced or not being influenced by the program having equal probabilities, the free-rider rates associated with each outcome are additive. The equation below can be used to calculate the free-rider rate given participant responses and scores:

Free-rider rate =0.5*(program influence FR score) + 0.5*(stated intent FR score)

In cases where information is lacking (e.g., participant stated that they did not know if they were influenced), all of the outcomes associated with that question have equal probability of being true. This will result in the participant having a range for the free-rider rate. The range is estimated for all respondents with indeterminate answers by calculating the maximum and minimum values for each participant. The resulting high and low estimates will then delineate the range of free-ridership. To calculate a program level free ridership rate, each participant must have a specific free ridership score. For these program participants, the high and low estimates are averaged to calculate their score. This algorithm had little impact for the free ridership rates in this study as very few program participants were found in this category.

Table D-4 shows the different permutations of the free-rider rates that are calculated using the above algorithms.

Table D-4: Weights and Free-Rider Rates

STATED INTENT (FROM WHAT WAS DONE)	FR RATE: STATED INTENT	PROGRAM INFLUENCE	FR RATE PROGRAM INFLUENCE	PURE FREE RIDER RATE	BUDGET FACTOR ADJUSTMENT-	ADJ. FREE RIDER RATE
CHANGE	0	10	0.00	0	NOT APPLICABLE TO FREE RIDER CALCULATION	0%
CHANGE	0	9	0.05	5%		5%
CHANGE	0	8	0.10	10%		10%
CHANGE	0	7	0.15	15%		15%
CHANGE	0	6	0.20	20%		20%
CHANGE	0	5	0.25	25%		25%
CHANGE	0	4	0.30	30%		30%
CHANGE	0	3	0.35	35%		35%
CHANGE	0	2	0.40	40%		40%
CHANGE	0	1	0.45	45%		45%
CHANGE	0	0	0.50	50%		50%
PARTIAL	0.5	10	0.50	25%	NOT APPLICABLE TO FREE RIDER CALCULATION	25%
PARTIAL	0.5	9	0.55	30%		30%
PARTIAL	0.5	8	0.60	35%		35%
PARTIAL	0.5	7	0.65	40%		40%
PARTIAL	0.5	6	0.70	45%		45%
PARTIAL	0.5	5	0.75	50%		50%
PARTIAL	0.5	4	0.80	55%		55%
PARTIAL	0.5	3	0.85	60%		60%
PARTIAL	0.5	2	0.90	65%		65%
PARTIAL	0.5	1	0.95	70%		70%
PARTIAL	0.5	0	1.00	75%		75%
NO CHANGE	1	10	0.50	50%	IF THEY HAVE THE BUDGET, NO CHANGE IS	50%
NO CHANGE	1	9	0.55	55%		55%
NO CHANGE	1	8	0.60	60%		60%
NO CHANGE	1	7	0.65	65%		65%

STATED INTENT (FROM WHAT WAS DONE)	FR RATE: STATED INTENT	PROGRAM INFLUENCE	FR RATE PROGRAM INFLUENCE	PURE FREE RIDER RATE	BUDGET FACTOR ADJUSTMENT-	ADJ. FREE RIDER RATE
NO CHANGE	1	6	0.70	70%	MADE. IF THEY HAVE NO BUDGET, MAKE THEM A PARTIAL FR (25% TO 75%)	70%
NO CHANGE	1	5	0.75	75%		75%
NO CHANGE	1	4	0.80	80%		80%
NO CHANGE	1	3	0.85	85%		85%
NO CHANGE	1	2	0.90	90%		90%
NO CHANGE	1	1	0.95	95%		95%
NO CHANGE	1	0	1.00	100%		100%
DK		10	0.00/.5	25%	NOT APPLICABLE TO FREE RIDER CALCULATION	25%
DK		9	0.05/.55	30%		30%
DK		8	0.10/.6	35%		35%
DK		7	0.15/.65	40%		40%
DK		6	0.20/.70	45%		45%
DK		5	0.25/.75	50%		50%
DK		4	0.30/.80	55%		55%
DK		3	0.35/.85	60%		60%
DK		2	0.40/.90	65%		65%
DK		1	0.45/.95	70%		70%
DK		0	0.50/1.0	75%		75%
CHANGE	0/.5	DK	0	25%	NOT APPLICABLE TO FREE RIDER CALCULATION	25%
PARTIAL	.25/.75	DK	0	50%		50%
NO CHANGE	0.5/1.0	DK	0	75%		75%
DK	NA	DK	NA	NA		NA

Production Efficiency Free-Rider Results

Table D-5 presents the results on a case-by-case basis for the surveyed Production Efficiency participants.

Table D-5: Free-Rider Case Assignment for Production Efficiency

STATED INTENT (FROM WHAT WAS DONE)	PROGRAM INFLUENCE	BUDGET FACTOR ADJUSTMENT-	ADJ. FREE RIDER RATE	2007 CUSTOM PARTICIPANTS (FIRST MEASURE ONLY)	2008 SMALL PARTICIPANTS	2008 CUSTOM PARTICIPANTS
CHANGE	10	NOT APPLICABLE TO FREE RIDER CALCULATION	0%	5	8	6
CHANGE	9		5%	1	2	7
CHANGE	8		10%	1	5	1
CHANGE	7		15%	0	2	0
CHANGE	6		20%	0	1	0
CHANGE	5		25%	0	1	0
CHANGE	4		30%	0	0	0
CHANGE	3		35%	0	0	0
CHANGE	2		40%	0	0	1
CHANGE	1		45%	0	0	0
CHANGE	0		50%	0	0	0
PARTIAL	10	NOT APPLICABLE TO FREE RIDER CALCULATION	25%	6	9	4
PARTIAL	9		30%	3	8	8
PARTIAL	8		35%	1	8	5
PARTIAL	7		40%	0	3	3
PARTIAL	6		45%	0	3	1
PARTIAL	5		50%	0	1	0
PARTIAL	4		55%	0	0	0
PARTIAL	3		60%	0	0	0
PARTIAL	2		65%	0	0	0
PARTIAL	1		70%	0	0	0
PARTIAL	0		75%	0	0	0
NO CHANGE	10	IF THEY HAVE THE BUDGET,	50%	2	3	1
NO CHANGE	9		55%	1	1	2
NO CHANGE	8		60%	1	3	0
NO CHANGE	7		65%	0	3	0

STATED INTENT (FROM WHAT WAS DONE)	PROGRAM INFLUENCE	BUDGET FACTOR ADJUSTMENT-	ADJ. FREE RIDER RATE	2007 CUSTOM PARTICIPANTS (FIRST MEASURE ONLY)	2008 SMALL PARTICIPANTS	2008 CUSTOM PARTICIPANTS
NO CHANGE	6	NO CHANGE IS MADE. IF THEY HAVE NO BUDGET, MAKE THEM A PARTIAL FR	70%	0	1	0
NO CHANGE	5		75%	0	0	1
NO CHANGE	4		80%	0	0	0
NO CHANGE	3		85%	0	1	0
NO CHANGE	2		90%	0	0	0
NO CHANGE	1		95%	0	0	0
NO CHANGE	0		100%	0	1	0
DK	10	NOT APPLICABLE TO FREE RIDER CALCULATION	25%	1	0	0
DK	9		30%	0	0	0
DK	8		35%	0	0	0
DK	7		40%	0	1	0
DK	6		45%	0	0	0
DK	5		50%	0	1	0
DK	4		55%	0	1	0
DK	3		60%	0	0	0
DK	2		65%	0	0	0
DK	1		70%	0	0	0
DK	0		75%	0	0	0
CHANGE	DK	NOT APPLICABLE TO FREE RIDER CALCULATION	25%	0	0	0
PARTIAL	DK		50%	0	0	0
NO CHANGE	DK		75%	0	0	0
DK	DK			0	0	0
TOTAL OF COMPLETED SURVEYS				22	67	40

To determine the estimated free-rider rate for the Production Efficiency programs, the gross savings of each participant was multiplied by the measure-specific free-rider rate to calculate net savings. Summing gross and net savings across all participants and then dividing total net savings by total gross savings produces the savings weighted free ridership rate. The unweighted free-rider rate is a simple average of the measure-specific free-rider rates across the sample.

Table D-6: Production Efficiency Program Free Ridership Rates

	FREE RIDERSHIP	NET-OF-FREERIDER RATE
2007 CUSTOM PARTICIPANTS – WEIGHTED	.275	.725
2007 CUSTOM PARTICIPANTS – UNWEIGHTED	.281	.719
2008 CUSTOM PARTICIPANTS – WEIGHTED	.25	.75
2008 SMALL PARTICIPANTS - WEIGHTED	.24	.76

Spillover

Spillover Method

Participants were asked if they had installed any energy-efficient equipment for which they did not apply for an incentive. Spillover rates varied by participant type. Over 50% of Custom participants reported installing energy efficient equipment compared to only 25% of Small participants.

We asked these participants to rate the influence of the program on their decision to install the equipment, using an eleven-point influence scale ranging from "No influence" to "Critical influence." These preliminary results suggest that the program may assume more importance as time passes. The 2008 program participants rated the influence of the program around a "5" rating on the influence scale compared to a rating of "7.00" from 2007 participants.

Table D-7: Spillover and Impact of the Program on Decision to Install Energy Efficient Equipment

	SPILLOVER RATES	IMPACT OF PROGRAM
2007 ENERGY TRUST CUSTOM PARTICIPANTS	57.1	7.00
2008 ENERGY TRUST CUSTOM PARTCIPANTS	65.0	4.88
2008 SMALL PARTICIPANTS	25.4	5.76

Spillover Results

Table D-8 identifies the efficient equipment participants reported installing without an incentive by program and program year. Lighting, motors, variable speed drives, pumps, and compressed air systems were the most reported equipment installed without an incentive. Many of the projects described were custom applications that may or may not have qualified for a program incentive.

Respondents were asked how influential the program was in their decision to install the energy efficient equipment without a rebate using a scale of 0 to 10 where 0 indicated low influence of the program and 10 indicated high influence of the program. The 11-point scale was divided into a high (7-10), a medium (4-6) and a low (0-3) influence category. No strong relationship was found between the type of energy efficient equipment and the level of influence of the Energy Trust PE Program.

Table D-8: Spillover Equipment Installations

STATED EQUIPMENT INSTALLED WITHOUT AN INCENTIVE	LEVEL OF INFLUENCE
2007 CUSTOM PROGRAM	
Lighting, engineered air nozzles, premium efficiency motors	High
Lighting system, 5 ton AC unit VFD	High
Big milling machine	High
Spent in the last two years about $3m for thermal projects that did not receive an incentive. Typically lighting and process control modifications.	High
Lighting and motion sensors	High
Motors and stuff that would be an expense item. Individual replacement parts.	High
VSDs , Process control upgrade, motors, process changes to reduce energy	High
Downstream joint product system.	Medium
Updates to natural gas heaters. Installed low flow and water free toilets and urinals. Stopped air leaks.	Low
VFD drives for different pumps and pumps	Missing
Manufacturing plant. All kinds of equipment. Boiler system and dust collection system.	Missing
2008 CUSTOM PROGRAM	
Drives on boiler fan	High
Compressors, sanders	High
Lighting	High
VFD's	High
High-efficiency burn-out oven	High
Small VFD's	High
EE motors and lighting	High
Pump upgrades	High
Several premium efficiency motors and additional lighting projects.	High
Lighting sensors	High

STATED EQUIPMENT INSTALLED WITHOUT AN INCENTIVE	LEVEL OF INFLUENCE
High-efficiency motors	High
Lighting	High
Motors	Medium
Solar power panels for remote monitoring	Medium
VFD on 500HP motor	Medium
VFD's	Low
Premium motors	Low
Remote control for vacuum pumps	Low
Lighting	Low
Lighting	Low
Lighting and compressed air	Low
Dust collector	Low
Lighting and other minor jobs	Low
High efficiency motors	Low
Motors	Low
Premium efficiency motors	Low
2008 SII PROGRAM	
Same equipment	High
Took out one out of three light bulbs because this program got us started.	High
Electrical soft-starts. Like giant capacitors. Reduces power sags.	High
New motors- always replace with more energy efficient equipment	High
More lighting	High
Electric motors that had to be replaced and we went with an efficient model.	High
Lighting	High
Incorporated energy elements in our new building	High
Soft starter- variable speed drive for 50 hp motor	Medium
unsure - air conditioners, heaters	Medium
Idle timers on our trucks.	Medium
Motor - 150 hp	Medium
Installation, generators,	Medium
Motors	Medium

STATED EQUIPMENT INSTALLED WITHOUT AN INCENTIVE	LEVEL OF INFLUENCE
Low maintenance forklift battery, LED lights	Low
More lighting. T5 in just one area.	Low
Motors, controls, many things.	Low

Findings from Previous Evaluation

The current study addressed a number of ways to improve the free rider methodology that were identified in the previous study. They included a method for accounting for inconsistent answers, an expansion of the range of answers for the influence questions and providing measure-specific free ridership estimates. Each of these issues is discussed here.

Inconsistent Answers

Asking clarifying questions when inconsistent answers are given to free-rider questions has also been suggested as a way to arrive at a consistent result.

Summit Blue implemented a consistency check in the 2008 Custom Participant and 2008 Small Participant surveys when the free ridership intent questions and the influence questions did not agree with each other. There are three ways to use a consistency check.

1. If an inconsistency is found give the respondent an opportunity to correct it by modifying their earlier answers.

2. Use the consistency check in the algorithm – that is calculate a free rider rate then adjust it up or down if the consistency check shows inconsistent answers.

3. Use the consistency check to help indicate whether the final result is more likely to err on the high side or the low side.

In most cases, the inconsistency was detected when the customer reported they would have installed the energy efficient equipment at the same time and that the program had a significant influence on their decision. The inconsistency was pointed out to the customer and they were asked to explain their answers. Respondents were allowed to change their answer if they asked but they were not prompted to do so (option 1 above). Given the desire to maintain reasonable consistency with prior implementation of the free rider approach, option 3 was used.

For the Custom and Small Participants, most of those answering the consistency question gave answers that supported a low free rider rate. However, among those with the highest free rider rate and inconsistent answers, most of the answers to the open-ended consistency question were reasonably aligned with the free rider rate (that is the answer indicated that the measure would have been installed without the program). Although the consistency check tracked well to the free ridership scores using option 3, in future surveys, using the consistency check in the algorithm (option 2) is recommended.

Greater Range of Answers

Providing a greater range of possible answers, such as an 11-point influence scale or a percent efficiency reduction might provide a more realistic, continuous range of free-rider estimates, rather than the step-like found in the last evaluation.

Summit Blue implemented this change to all the surveys. For all influence questions, such as the following example, respondents were asked to provide a rating from “0 where 0 means no influence to 10 where 10 means a critical influence.” In recent years, it has become a generally accepted standard in the industry that eleven point scales have some advantages over five point scales, especially for gauging customer satisfaction. An eleven point scale makes more intuitive sense to the respondent than a five point scale.

> **How influential was the Production Efficiency incentive in planning for the lighting improvements?**

Measure-Specific Free-Rider Rate Estimation

Energy Trust’s approach has typically been to survey a sufficient number of participants that have installed each of the measures of interest. Instead of repeating the same questions for each type of equipment installed, the free-rider questions are asked once. In the future, Energy Trust anticipates that we will experiment with a variety of approaches to test what methods best capture measure-specific data.

All program participant surveys were changed to incorporate a specific measure of interest. For the 2007 survey of program participants, respondents were asked about two measures when they reported that different decisions making criteria were used. The 2008 Custom Survey and the 2008 SII Survey, project sites were randomly selected and measures were selected within the site with preference shown for measures with larger savings and non-lighting measures.

APPENDIX E: SITE-LEVEL ENERGY SAVINGS EVALUATION SUMMARIES

Project Site 1

Project Site 1 consisted of two large warehouses and several small office spaces covering approximately 900,000 square feet. The buildings were built in 1997. One of the warehouse buildings is refrigerated, including areas at -10, -20 and 55 °F. The site was in continuous operation, twenty-four hours a day, seven days a week. Occupation of most areas is on an intermittent basis, with forklifts entering areas at random intervals.

Base Measures

In the warehouse areas, the original site lighting consisted of a combination of 400 watt metal halide and 400 watt high pressure sodium high bay fixtures. All of these lights operated continuously, regardless of area occupancy.

Project Measures

Previously existing high bay metal halide and high pressure sodium lights were removed and replaced with 6-lamp and 4-lamp high output T5 fixtures on a one-for-one basis. Lights in the coldest refrigerated areas were not retrofitted for this project because of poor operation of T5 lamps at these temperatures. The 4-lamp high output T5 fixtures were installed with occupancy sensors throughout the warehouse areas. For safety, the occupancy sensors on a quarter of the lights only controlled two of the lamps in those fixtures. Lights in the highest traffic areas such as forklift staging areas and loading docks do not have sensors.

The application listed that there were 70 metal halide fixtures to be removed and replaced with 70 six-lamp T5 high output fixtures as well as 980 high pressure sodium fixtures to be removed and replaced with 821 four-lamp and 159 six-lamp T5 high output fixtures. The count performed during the site visit located 159 six-lamp and 803 four-lamp T5 high output units. The difference in fixture count is believed to be due to a transcription error on the application, and the counted value has been accepted as correct and is used as the base case as well as the retrofit number.

The application indicated 8,760 hours of operation annually in all areas, corresponding to 24 hours per day, every day of the year. Facility personnel indicated that these hours are correct and that the lights are never manually turned off, including during holidays.

Occupancy sensors were installed on all the four-lamp fixtures. The Energy Trust of Oregon's lighting worksheet assumes occupancy sensors result in a 25% reduction in hours, yielding 6570 hours annually. Data collected from lighting loggers indicates an actual reduction of 37%. Site personnel indicated that two lamps remain lit continuously for 200 of these units for reasons of safety and employee productivity; in this state, each fixture consumes half the standard power.

Project measure installations were completed on February 22, 2007.

Measurement & Verification Methodology

IPMVP Option B was employed to determine the savings due to occupancy sensors. Onset HOBO on/off lighting data loggers were installed next to ten randomly selected high bay fixtures for a period of three weeks. During the site visit, Summit Blue personnel counted the new light fixtures. Site personnel were interviewed to verify that the installation was a one-for-one replacement of 400 W metal halide and high pressure sodium previously existing fixtures.

Standard wattages used in the Energy Trust's lighting worksheets were used to calculate energy use, baseline, and savings. These wattages are summarized in Table E- 1.

Table E- 1 Project Site 1 Lighting Fixture Wattages

Fixture	Standard Wattage
400W Metal Halide Fixture	461 W
400W High Pressure Sodium Fixture	469 W
4-Lamp T5 HO Fixture	234 W
6-Lamp T5 HO Fixture	352 W

Evaluation Results

With the exception of the missing eighteen fixtures (believed to be a transcription error), all of the fixtures listed on the application were confirmed at the site during the site visit on December 11, 2008. The overall project at Site 1 realized 101% of expected kWh savings, as shown in the table below. This is primarily because the occupancy sensors on the new high bay fluorescent lights reduced lighting hours by 37% instead of 25% as assumed in the application.

Table E- 2 Project Site 1 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
High bay lighting retrofit	1,919,912	1,882,857	98%
Occupancy sensors	453,342	533,184	117%
Total	**2,373,254**	**2,416,041**	**101%**

Project Site 2

Project Site 2 consists of two large warehouses and several office spaces spanning 1,600,000 square feet. The site is in continuous operation, twenty-four hours a day, seven days a week with a standard holiday schedule. Occupancy within most warehouse areas is on an intermittent basis, with forklifts entering aisles at random intervals. The office space is generally occupied 10 to 12 hours per day.

Project Site 2's operating schedule has remained the same in the pre-/post-installation case.

Base Measures

The base lighting technologies installed within the warehouse areas consisted of 400-watt metal halide, 400-watt high pressure sodium, and 100-watt high pressure sodium high bay fixtures. Fixtures operated continuously, independent of occupancy characteristics. Office areas were equipped with T-12 fixtures on a manual switching schedule.

The project application indicates 8,134 annual hours of operation for all lighting fixtures. However, facility personnel claimed that the lights are consistently on at all times for 8,760 hours per year.

Project Measures

Through the Energy Trust's Production Efficiency Program, Project Site 2 replaced warehouse fixtures with 5-lamp T-8 high performance fixtures. Office fixtures were replaced with T-8 fixtures of various wattages and ballast factors. Occupancy sensors were installed on all fixtures to reduce lighting load during periods of inactivity.

Occupancy sensor characteristics varied by application area. Within the refrigerated zones, one 2-lamp ballast remained on during periods of inactivity to keep light fixtures warm enough to function properly. During periods of inactivity in the non-refrigerated warehouse zones, one 2-lamp ballast remained on within each three fixture aisle to ensure the safety of employee navigation. Office fixtures turned off completely during unoccupied periods.

Claimed savings were based on Energy Trust of Oregon's Lighting Worksheet, which assume occupancy sensors reduce operating hours by 25%, or 2,190 hours for Project Site 2.

The project file closed on September 7, 2007.

Measurement & Verification Methodology

On March 5, 2009, Summit Blue staff visually confirmed the quantity and installation of lighting fixture retrofits. The participant contact was also interviewed to confirm baseline operating characteristics and fixture replacement assumptions.

Energy usage characteristics and savings for new lighting fixtures were calculated using the following algorithm:

$$Retrofit\ Fixture\ Annual\ Savings\ (kWh) = \sum (\Delta Wattage_i)*(BHours_i) \div 1{,}000$$

Where:
$\Delta Wattage_i$ = *Difference Between Fixture$_i$ Base and Retrofit Wattage*
$BHours_i$ = *Fixture$_i$ Annual Operating Hours*
1,000 = Conversion Factor (W/kW)

Standard fixture wattages used in the Energy Trust's Lighting Worksheets compared favorably with observed fixture wattages and were used for evaluation purposes. The Worksheet wattages are summarized below:

Table E- 3 Project Site 2 Fixture Wattages

Fixture	Standard Wattage
400W Metal Halide Fixture	461 W
400W High Pressure Sodium Fixture	469 W
1000W High Pressure Sodium Fixture	1090 W
4' 1 lamp T12 Fixture	48 W
4' 2 lamp T12 Fixture	82 W
4' 4 lamp T12 Fixture	164 W
2' 2 lamp T12 U Bent Fixture	82 W
8' 2 lamp T12 HO Fixture	227 W
4' 1 lamp T8 High Performance Fixture	32 W
4' 1 lamp T8 High Performance NLO Fixture	29 W
4' 2 lamp T8 High Performance LLO Fixture	48 W
4' 2 lamp T8 High Performance NLO Fixture	55 W
4' 2 lamp T8 High Performance HLO Fixture	74 W
4' 4 lamp T8 High Performance HLO Fixture	148 W
4' 4 lamp T8 High Performance NLO Fixture	108 W
4' 5 lamp T8 High Performance Fixture	190 W
2' 2 lamp T8 F17 NLO Fixture	34 W

IPMVP Option A: Partially Measured Retrofit Isolation was employed to evaluate occupancy sensor savings. Lighting On/Off Loggers were deployed on 12 randomly selected fixtures controlled by occupancy sensors for a period of three weeks. The operational characteristics collected from these loggers were used to develop savings for occupancy sensor measures:

$$\textit{Occupancy Sensor Annual Savings (kWh)} = \sum (RWattage_i)*BHours_i*(1 - Occ_i) \div 1{,}000$$

Where:

$RWattage_i$ =*Retrofit Fixture*$_i$ *Wattage*

$BHours_i$ = *Base Fixture*$_i$ *Annual Operating Hours*

Occ_i = *Average Occupancy Rate for Fixture*$_i$ *(%)*

1,000 = Conversion Factor (W/kW)

Data collected from lighting loggers indicate a reduction in lighting hours by 57% in the office areas and 39% in the warehouse areas.

Evaluation Results

All fixtures listed in the project application were visually confirmed. In aggregate, Project Site 2 yielded a realization rate of 122%. This is primarily because occupancy sensors reduced lighting operating hours by an average of 42%, as compared to the base assumption of 25%.

Table E- 4 Project Site 2 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Lighting fixture retrofit	4,629,933	5,134,337	111%
Occupancy sensors	911,861	1,611,586	177%
Total	**5,546,793**	**6,745,923**	**122%**

Project Site 3

Project Site 3 is comprised of a medium-sized warehouse and several office spaces. The warehouse area is approximately 120,000 square feet, including two refrigerated areas totaling 1,500 square feet. Measures replaced through the Energy Trust's Production Efficiency Program include interior and exterior lighting technologies. The site has since changed ownership and modified the site-level operating characteristics. It is now operating under reduced hours and some areas of the warehouse are less frequently accessed and one small building has been demolished. The warehouse currently operates 19 hours per day, seven days per week and observes standard holidays.

Base Measures

The baseline was developed through the standard fixture wattages found in the Energy Trust's lighting spreadsheet and fixture quantities listed in the application. Interviews with site personnel confirmed that prior to the retrofit, interior lights were never manually turned off, including during holidays, so 8,760 hours were assumed in the baseline calculation. Exterior lights are on a timer and are lit an average of 12 hours per day throughout the year. These hours differ from those used in the application, which assumed a continuous, year-round operating schedule. A small building has been demolished since the retrofit. The lights in that building have been removed from the baseline.

Project Measures

In the main warehouse areas, previously existing high bay 400 watt metal halide fixtures were removed and replaced with high bay 6-lamp T8 high output fixtures. Four-lamp T8 low bay fixtures were de-lamped, making them 2-lamp T8 low bay fixtures. Additionally 250 watt metal halide fixtures were removed and replaced with 2-lamp T8 high output fixtures in refrigerated areas. Incandescent exit signs were replaced with LED exit signs.

Occupancy sensors were installed on all 6-lamp fixtures.

In exterior areas, high pressure sodium fixtures at various wattages and 400 watt mercury vapor fixtures were replaced with pulse start metal halide fixtures at 250 and 350 watts.

Project measure installations were completed on June 5, 2007.

Measurement & Verification Methodology

Measurement and Verification option B was employed to determine the savings due to the lighting retrofit and occupancy sensors.

During the site visit on May 5, 2009, Summit Blue personnel counted the new light fixtures. Site personnel were interviewed to verify that the installation was a one-for-one replacement in most areas, which confirms baseline quantities. Standard wattages used in the Energy Trust's lighting worksheets were used data to calculate energy use.

$$\textit{Retrofit Fixture Annual Savings (kWh)} = \sum (\Delta Wattage_i)*(BHours_i) \div 1,000$$

Where:

$\Delta Wattage_i$ = *Difference Between Fixture$_i$ Base and Retrofit Wattage*
$BHours_i$ = *Fixture$_i$ Annual Operating Hours*
1,000 = Conversion Factor (W/kW)

Due to the small size of the warehouse, the layout of the aisles and the location of the sensors, lights in most area are triggered by any motion in the main aisles and loading areas. This leads to most lights being lit throughout operating hours. Based on discussion with site staff, Onset HOBO on/off lighting data loggers were installed next to four high bay fixtures, one in each of four traffic-cases. The occupancy sensor findings were averaged to develop standard occupancy rates for the project site.

$$\textit{Occupancy Sensor Annual Savings (kWh)} = \sum (RWattage_i)*BHours_i*(1 - Occ_i) \div 1,000$$

Where:

$RWattage_i$ =*Retrofit Fixture$_i$ Wattage*
$BHours_i$ = *Base Fixture$_i$ Annual Operating Hours*
Occ_i = *Average Occupancy Rate for Fixture$_i$ (%)*
1,000 = Conversion Factor (W/kW)

Table E- 5 Project Site 3 Lighting Fixture Wattages

Fixture	Standard Wattage
400W Metal Halide Fixture	461 W
400W High Pressure Sodium Fixture	469 W
1000W High Pressure Sodium Fixture	1090 W
400 W Mercury Vapor Fixture	450 W
Incandescent Exit Sign	27 W
4’ 6 Lamp High Output T8 Fixture	222 W
4’ 4 Lamp T8 Fixture	148 W
4’ 4 Lamp High Output T8 Fixture	222 W
4’ 2 Lamp High Output T8 Fixture	74 W
250W Pulse Start Metal Halide Fixture	275 W
350W Pulse Start Metal Halide Fixture	375 W
175 W Metal Halide Fixture	210 W
LED Exit Sign	3 W

Evaluation Results

The overall project at Site 3 realized 113% of expected kWh savings. As shown in Table E-6, savings to the lighting retrofit were slightly lower than expected, while savings from the occupancy sensors was double the expected amount.

Summit Blue found that several of the fixtures listed on the application were incorrect or had been removed from the site. Additionally, an incorrect assumption on the application that exterior lights were on 24 hours per day, rather than 12 hours per day, overestimated savings due to the exterior retrofit. These factors contributed to a change in baseline and savings and a realization rate of 98%.

Occupancy sensors in the main areas of the warehouse reduced lighting by 39%. Overall, occupancy sensors reduced lighting loads by 50%, which is double the expected occupancy sensor savings. The company was involved in a merger in 2008, resulting in changes to the function of this facility including reduced operating hours. However, because this was not considered to be an economy induced reduction in production schedules, realized savings were not pro-rated.

Table E- 6 Project Site 3 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Lighting fixture retrofit	646,453	631,922	98%
Occupancy sensors	122,766	245,897	200%
Total	**769,219**	**866,339**	**113%**

Project Site 4

Project Site 4 is classified as a manufacturing facility for large metal piping. A single 32,000 square foot building consists of several bays and a small office area. The facility operates from 6:00 AM until 2:45 AM five days a week and twelve hours on weekends.

Base Measures

The facility was moved to its current location in 2007. At the same time, the compressed air load was expected to increase. At the old facility, three air compressors supplied the system. Two 50 HP inlet modulating rotary screw compressors supplied the majority of the load, with a 25 HP unit that could be manually turned on when the load required it. According to the application, the compressors were left on 24 hours a day, five days a week. It was assumed that if a new compressor was not purchased, these three units would be used at the new facility. A 500 SCFM Zeks 600NCEA400 non-cycling refrigerated air dryer was also used on the system.

Originally, the facility bays were illuminated with 14 1,000 Watt metal halide (MH) high bay fixtures in the Middle Bay. Additionally, the Middle, Machine Ship, and South Bays contained 68 400 Watt MH high bay lights. The lights were on during all operating hours.

Project Measures

A new 100 HP Ingersoll Rand IRN100H-CC variable frequency drive air compressor was purchased. The old 50 HP Ingersoll Rand SSR-EP50SE inlet modulating compressor was kept as backup to be turned on manually when load required it. The non-cycling air dryer was kept with the new system. The project file for this replacement closed on March 15, 2007.

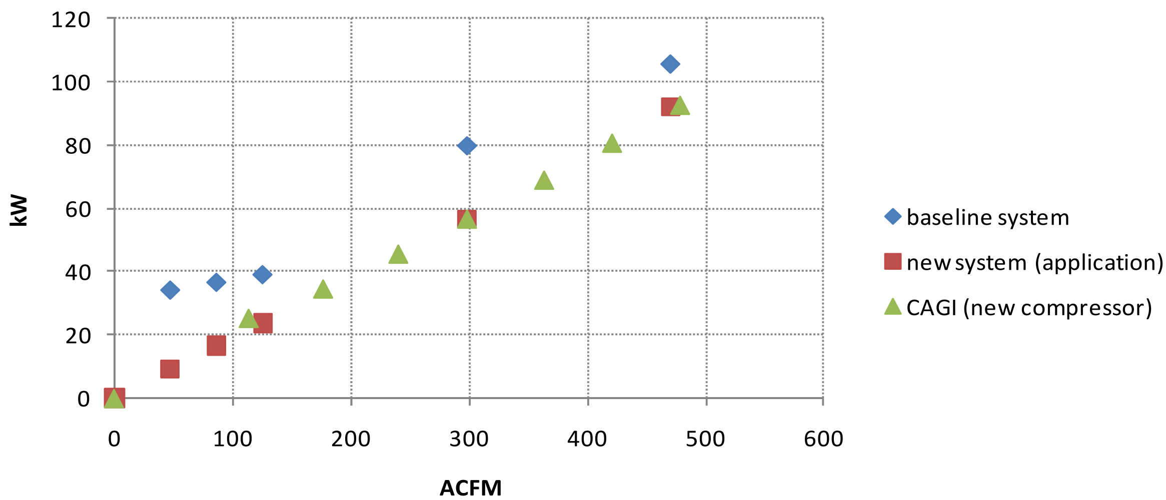
The metal halide lights were retrofitted with high bay T-5 units. According to the application, all of the 400 Watt MH fixtures were replaced with 6-lamp high output (HO) T-5 units on a one-for-one basis and the 1,000 Watt MH fixtures were replaced on a two-for-one basis. However, the 400 Watt MH fixtures were actually replaced with 4-lamp HO T-5 units. The application indicated 6,507 hours a year of operation. The project file for the lighting fixture replacements closed on September 12, 2007.

Measurement & Verification Methodology

On March 10, 2009, Summit Blue discussed the use and installation of the air compressors with facility personnel. A three-phase Power logger was installed on the new 100 HP variable speed air compressor and a single phase CT was left on the backup 50 HP unit. Spot measurements were taken on both compressors and the air dryer. The backup 50 HP air compressor was off during the site visit, but facility personnel turned it on briefly to permit measurements. Separate spot measurements were taken on the compressor in its loaded and unloaded states to determine power factor. The loggers were left in place for ten days, as facility personnel indicated consistent week-to-week operation.

CAGI data was used to calculate air demand from the logged power of the new 100 HP compressor. Although the 50 HP backup compressor was turned on twice during the logging period, it was never loaded, so no addition was made to the calculated SCFM air flow. Compressor curves were not available for any of the older units, however, specifications for the compressors were compared to the loading curve used in the original study and found to be consistent. Consequently, the loading curve from the original study was used to estimate power usage for the old system under the new loading conditions.

Figure E- 1 Project Site 4 Compressor Curves



Summit Blue counted all the high bay light fixtures in the manufacturing areas. In addition to the 28 6-lamp T5 HO fixtures which replaced the 1,000 W metal halide units, 69 4-lamp T5 HO fixtures were found to have replaced the 68 400 Watt MH units. Additionally, since the 2007 retrofit, 42 6-lamp T-5 HO high bay fixtures have been added in the Parts and North Bays of the facility. According to facility personnel, these lights operate from 6:00 AM until 2:45 AM five days a week and 12 hours on weekends, 52 weeks a year. This corresponds to 6,643 hours a year if there are no holidays and compares well to the 6,507 hours listed on the application. Consequently, the operational hours listed on the application were maintained for calculations. The table below illustrates the wattages used to calculate lighting savings.

Table E- 7 Project Site 4 Lighting Fixture Wattages

Fixture	Standard Wattage
400W Metal Halide Fixture	461 W
1000W Metal Halide Fixture	1080 W
6 Lamp High Output T5 Fixture	352 W
4 Lamp High Output T5 Fixture	234 W

Evaluation Results

The air compressor system was present and operating as expected. The backup compressor came on only twice during the evaluation period and operated unloaded for both intervals. The main unit was turned off twice during the evaluation period. Logger findings yielded 148,032 kWh in annual savings. This resulted in a realization rate of 119% relative to the 124,052 kWh/year projected on the application.

All of the fixtures listed on the application were believed to have been retrofitted, but most of them were 4-lamp instead of 6-lamp T-5HO fixtures. One additional 4-lamp T-5HO fixture appeared to have been added. Because of the reduction in the total number of lamps, savings of 133,172 kWh/year were found instead of the 82,483 kWh/year listed on the application. This resulted in a realization rate of 161% for the lighting project.

Table E- 8 Project Site 4 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
New 100 HP Variable Speed Air Compressor	124,052	148,032	119%
Replaced MH Lights with High Output Fluorescents	82,483	133,172	161%
Total	**206,535**	**281,204**	**136%**

Project Site 5

Project Site 5 is classified as a manufacturing plant that produces construction materials. The facility includes manufacturing lines, material storage, machine shops, equipment bays, offices, and a warehouse comprising approximately 60,000 square feet. Measures installed through the Energy Trust's Production Efficiency Program include lighting retrofits, occupancy sensor installations, and compressor replacements. Compressed air is used for a number of application, including tool operation and conveyance systems and utilizes a 1,100 gallon receiver.

Due to the current economic downturn, the site is running at approximately 55% of the 2006 production levels that were estimated through the Ally Technical Assistance Contractor (ATAC) study to develop baseline savings estimates. Site 5 currently operates 16 hours per day, five days per week.

Base Measures

The site's base lighting system included a combination of metal halide, T-12 linear fluorescent and incandescent fixtures of various wattages. Energy consumption for these fixtures was calculated using the following equation:

$$\textit{Base Fixture Annual Usage (kWh)} = \sum (BWattage_i)*(BHours_i) \div 1{,}000$$

Where:

$BWattage_i$ = *Base Fixture$_i$ Wattage*
$BHours_i$ = *Base Fixture$_i$ Annual Operating Hours*
1,000 = Conversion Factor (W/kW)

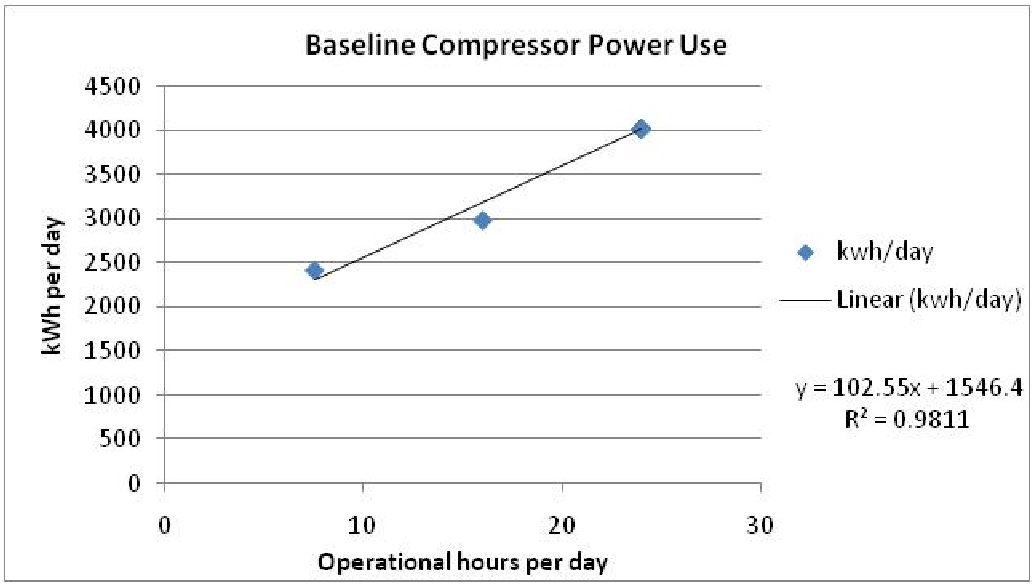
Standard fixture wattages from the Energy Trust's lighting tool were used in this calculation. Conversations with site staff confirmed that the lighting system was always in operation, even during non-production periods, yielding 8,760 annual operating hours.

The existing compressed air system included a 125 HP Gardner Denver compressor, a 100 HP Kaeser CS212 Compressor, and a 60 HP Worthington Rollair compressor. As noted in the previous section, the site is now running at approximately 55% of the 2006 production levels, which necessitates a re-calculated baseline.

Logged data in the 2006 ATAC study was used as a proxy for the full production baseline. This data was disaggregated by day of the week and includes one day per week when production matched current levels. A regression analysis was used to extrapolate a baseline consistent with the current production level of five 16-hour days and two non-operational days per week:

$$\text{Daily kWh} = 103\ (\text{hours/day}) + 1{,}546$$

Figure E- 2 Measured Power Use of Base Air Compressor System



A non-cycling refrigerated air dyer was also used in the base system. This dryer operated at all times and was not affected by the reduced production schedule. Baseline consumption was derived from measured kWh in the ATAC study.

The full production baseline, along with the economy-adjusted baseline for all measures is provided by Table E-9, below:

Table E- 9 Project Site 5 Full Production and Economy-Adjusted Baselines

Measure	Full Production Baseline (kWh)	Economy-Adjusted Baseline (kWh)
Lighting Fixture Retrofits	661,242	661,242
Occupancy Sensors	153,952	153,952
Air Compressor	1,277,424	472,456
Air Dryer	79,661	79,661

Project Measures

In manufacturing areas, existing metal halide and incandescent fixtures were replaced with T-5 high output, linear fluorescent fixtures. Similarly, T-12 fixtures were replaced with 2-lamp and 4-lamp T-8 fixtures. Halogen flood lights were replaced with hard-wired CFLs and occupancy sensors were installed on most T-5 fixtures to reduce energy usage in areas with lower usage characteristics.

The site installed a new Ingersoll Rand 200 HP VFD air compressor in place of the three existing compressors. The Kaeser compressor remains at the site as a backup and is only used at times when the new VFD compressor is undergoing maintenance. An Ingersoll Rand VFD refrigerated dryer replaced the existing non-cycling refrigerated dryer.

Project measure installations completed on December 11, 2007.

Measurement & Verification Methodology

Measurement and Verification Option B: Retrofit Isolation was used by evaluation staff to develop savings estimates for project installed measures.

During the site visit on March 5, 2009, Summit Blue confirmed lighting installations and interviewed site personnel to verify the base and project-installed measures. Energy usage characteristics and savings for new lighting fixtures were calculated using the following algorithm:

$$\textit{Retrofit Fixture Annual Savings (kWh)} = \sum (\Delta Wattage_i)*(BHours_i) \div 1{,}000$$

Where:

$\Delta Wattage_i$ = *Difference Between Fixture*$_i$ *Base and Retrofit Wattage*

$BHours_i$ = *Fixture*$_i$ *Annual Operating Hours*

1,000 = Conversion Factor (W/kW)

Savings for lighting fixture retrofits assumed 8,760 annual operating hours. Standard fixture wattages used in the Energy Trust's Lighting Worksheets compared favorably with observed fixture wattages and were used for evaluation purposes.

Savings for occupancy sensor measures were calculated independently of lighting fixture retrofits. HOBO Lighting On/Off Loggers were deployed on eleven randomly selected fixtures controlled by occupancy sensors for a period of three weeks. The operational characteristics collected from these loggers were used to develop savings for occupancy sensor measures.

$$\textit{Occupancy Sensor Annual Savings (kWh)} = \sum (RWattage_i)*BHours_i*(1 - Occ_i) \div 1{,}000$$

Where:

$RWattage_i$ =*Retrofit Fixture*$_i$ *Wattage*

$BHours_i$ = *Base Fixture*$_i$ *Annual Operating Hours*

Occ_i = *Average Occupancy Rate for Fixture*$_i$ *(%)*

1,000 = Conversion Factor (W/kW)

Summit Blue utilized a similar approach to develop savings estimates for compressed air measures. A WattNode power meter with a Madgetech data logger was deployed on the newly installed 200 HP VFD air compressor for a period of three weeks. HOBO 4-channel data loggers were installed on the VFD refrigerated air dryer during the same period. The energy usage measured by these devises was compared to the economy-adjusted baseline to determine savings. The verification report, completed in 2007 at Site 5, included logged power usage at full production levels after the VFD air compressor and VFD air dryer were installed. Table E-10 summarizes verified and full production energy use and savings.

Verified savings (kWh) = Economy-Adjusted Baseline Usage – Verified Usage

Full Production savings (kWh) = Full Production Baseline Usage – Full Production Usage

Evaluation Results

All retrofit equipment listed in the application was verified on-site. The lighting analysis in the application did not include fixture locations. In the interest of more thorough and efficient evaluation efforts, it is suggested that this field be required in future program tracking efforts.

Occupancy sensors in manufacturing areas reduced lighting hours by 46% .This yielded a significant increase in savings, as the application assumed a reduction of only 25%. The site's Full Production Capacity Gross Verified Savings are shown in Table E-10, below:

Table E- 10 Project Site 5 Estimated & Evaluated Savings (Full Production Levels)

Measure	Estimated Savings (kWh)	Full Production Savings (kWh)	Full Production Realization Rate (%)
Lighting fixture retrofit	312,712	312,712	100%
Occupancy sensors	38,488	53,171	138%
Air Compressor	446,625	440,309	98%
Air dryer	40,035	46,383	115%
Total	**837,860**	**837,892**	**100%**

As expected, Site 5 is using significantly less energy to power the newly installed 200 HP VFD air compressor. However, the site's current production schedule has been reduced due to economic influencers. This has caused the current measure level savings to be lower than the *ex-ante* estimates. The Gross Verified Savings at current economic conditions are shown in Table E-11:

Table E- 11 Project Site 5 Estimated & Evaluated Savings (Economy Adjusted)

Measure	Estimated Savings (kWh)	Economy Adjusted Savings (kWh)	Economy Adjusted Realization Rate (%)
Lighting fixture retrofit	312,712	312,712	100%
Occupancy sensors	38,488	53,171	138%
Air Compressor	446,625	135,676	30%
Air dryer	40,035	64,432	161%
Total	**837,860**	**565,991**	**68%**

The overall site level realization rate was calculated as an average between the full production capacity and economy adjusted realization rates, yielding 84%.

Project Site 6

Project Site 6 is a manufacturing and assembly facility. Building loads are dominated by lighting and shop tools. Many hand and shop tools use compressed air as the energy source. The measures for this site seek to improve the compressed air system efficiency of the expanded plant with efficient air compressors and a cycling air dryer.

Base Measures

The compressed air system at the facility was a 40 HP compressor producing approximately 150 acfm compressed air at 115 psig. The facility anticipated increased production and compressed air use, which would exceed the capacity of the 40 HP compressor. Facility personnel sought to install a larger compressor (75 HP) capable of handling the entire plant load. The compressed air system operates 11 hours per day, five days per week, plus five hours Saturday. The 40 HP machine remained integrated with the compressed air system as back-up. This site also needed a new air dryer with capacity for the increased load. The base air dryer is on-line continuously, according to site personnel.

The 40 HP machine *fully loaded* would draw approximately 29.8 kW and consume about 89,500 kWh, *but it would not be capable of meeting future loads*. A proposed upgrade to a modulating 75 HP compressor would operate at about 53.4 kW on average with the anticipated compressed air load for annual consumption of 160,253 kWh. The poor part-load performance of screw compressors with slide valve modulation contributes to significantly poorer system efficiency on a cfm/kW basis.

This modulating 75 HP screw compressor was the anticipated project baseline, since the 40 HP machine would not be capable of meeting loads. In Summit Blue's estimate of full production savings, the modulating 75 HP compressor is the base system operating at 160,700 kWh annually.

For the baseline air-dryer, the application assumes a new non-cycling dryer. The proposed non-cycling drier consumes about 3.6 kW and the application claims the unit would run continuously at this load, even when the air compressor is shut down.

Air Dryer Energy = 3.6 kW x 8760 hours = 31,448 annual kWh

Project Measures

EEM 1 is a 75 HP air compressor with a variable frequency drive on the compressor motor. The variable speed machine has superior part-load performance. EEM2, the cycling air dryer, will turn off after hours and will cycle off during light compressed air demand.

The application predicts the following *ex ante* annual savings:

Table E- 12 Ex Ante Annual Savings

EEM	Description	Estimated Savings (kWh)
EEM1	Variable Frequency 75 HP Air compressor	76,049
EEM2	Cycling Air Dryer	14,915
Total		**90,964**

Project measure installations completed on September 6, 2007.

Measurement & Verification Methodology

During the site visit on January 15, 2009, the installing engineers conducted a follow-up to their compressed air audit following measure installation. Some assumptions in the initial application were incorrect and they re-estimated savings. Summit Blue verified the nameplate information of the installed equipment, conducted spot measurements of power consumption of the compressor and the air dryer and logged power consumption of both machines for a period of five weeks. We re-estimated savings based on reported lower air flow.

Evaluation Results

All equipment listed on the applications was found at the site. The compressor speed modulated during our inspections and the air dryer cycled many times. The following assumptions had to be revised:

- Compressed air demand did not increase 60% as predicted. Rather it fell about 60%.
- The estimated existing compressor power is too high, in excess of the compressor nameplate.

Spot measurement of the compressor showed it operating at about 10% load with a measured power of 5.0 kW. Trend logs over the next five weeks showed average compressor power of 16.32 kW when operating. These measurements are consistent with the engineer's re-estimation of post-installation energy consumption with the reduced air flow. Fortunately, the new compressor with the VFD has very good part load performance, however, the baseline must be shifted from the 75 HP modulating machine back to the original 40 HP modulating machine, since the original smaller compressor would consume roughly 55%

as much energy as the modulating 75 HP machine at low loads. For comparison, Summit Blue prepared the following table of alternate equipment operation at *current* compressed air loads.

Table E- 13 Alternate Equipment Operation at Current Compressed Air Loads

Compressor	Estimated Annual kWh
40 HP modulating	84,400
75 HP Modulating	151,500
75 HP variable frequency	55,700

With respect to the cycling air dryer, Summit Blue has grave doubts about the assumption of continuous operation when there is no compressed air flow. Every air dryer we have inspected shuts off its compressors when there is no air flow. Failure to do so might send liquid refrigerant into the refrigerant compressor suction line and cause compressor failure. Machines might be on-line continuously in order to maintain power to sensors and control boards, but the refrigeration cycle is not on when there is no load.

The overall project at Site 6 realized 32% of expected kWh savings, as shown in Table E-14. This is primarily because the air compressor baseline must shift from the new large compressor to the smaller original compressor with reduced plant compressed air demand. Furthermore, the assumption of continuous full load operation of the non-cycling dryer cannot be verified. Summit Blue also notes that in the current economic conditions, further drops in production will result in less compressed air demand; however, project savings will *increase* due to the superior part-load performance of the 75 HP variable speed compressor when compared to the 40 HP modulating compressor at lower loads.

Table E- 14 Project Site 6 Estimated & Evaluated Savings (Economy Adjusted)

Measure	Estimated Savings (kWh)	Full Production Savings (kWh)	Full Production Realization Rate (%)
Variable speed compressor	74,079	23,800	32%
Cycling Air Dryer	16,533	5,320	32%
Total	**90,612**	**29,120**	**32%**

The full production capacity at the site is compared to the base system including a modulating 75 HP air compressor. Extrapolating the verified energy use to full production levels yields annual savings on the order of 71,400 kWh. At full production capacity, Site 6's realization rate is 83.4%.

Table E- 15 Project Site 6 Estimated Savings (Full Production Levels)

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Variable speed compressor	74,079	71,400	96%
Cycling Air Dryer	16,533	4,200	25%
Total	**90,612**	**75,600**	**83%**

Project Site 7

Project Site 7 is a manufacturing and assembly facility for commercial furniture. Building loads are dominated by lighting and shop tools. Many hand and shop tools use compressed air as the energy source. The measures for this site seek to improve the compressed air system efficiency with a new smaller compressor with speed control for improved part-load performance. In addition, a new cycling air dryer will replace the old one.

Base Measures

The compressed air system at the facility was a 30 HP compressor producing approximately 70 acfm compressed air at 115 psig. The compressed air audit identified that approximately 33% of all compressed leaks from underground pipes. After fixing the leaks, the compressed air load will be much lower, but the existing compressor operates at nearly full power regardless of the air flow. Compressor power is confirmed by 14 days of baseline data logging.

The existing 30 HP machine draws approximately 22.2 kW and consumes about 66,300 kWh based on monitored operating hours. Extrapolating monitored data to a full year yields an estimated 3000 hours of operation for the compressor. The application cites additional hours (1,780) from seasonal second shift work, but there has been no second shift in the past two years.

For the baseline air-dryer, the application assumes a new non-cycling dryer. A non-cycling drier consumes about 1.3 kW and the application claims the unit would run continuously at this load, even when the air compressor is shut down.

Air Dryer Energy = 1.3 kW x 8760 hours = 11,388 annual kWh

Project Measures

EEM 1 is a 25 HP air compressor with a variable frequency drive on the compressor motor. The variable speed machine has superior part-load performance.

EEM2, the cycling air dryer, will turn off after hours and will cycle off during light compressed air demand.

Project measure installations completed on July 11, 2007.

Measurement & Verification Methodology

During the site visit on January 14, 2009, Summit Blue verified the nameplate information of the installed equipment, conducted spot measurements of power consumption of the compressor and the air dryer, and logged power consumption of both machines for a period of four weeks. Summit Blue re-estimated savings based on the data staff collected and compared the results with the installing engineers

Evaluation Results

All equipment listed on the applications was found at the site. The compressor speed modulated during Summit Blue's inspections and the air dryer cycled many times.

Spot measurement of the compressor showed it operating at about 65-75% load with a measured power of 11.9 kW. Trend logs over the next four weeks showed average compressor power of 14.3 kW when operating. These measurements are consistent with the application *ex ante* estimation of post-installation energy consumption.

With respect to the cycling air dryer, Summit Blue has grave doubts about the assumption of continuous operation when there is no compressed air flow. Every air dryer Summit Blue has inspected shuts off its compressors when there is no air flow. Failure to do so might send liquid refrigerant into the refrigerant compressor suction line and cause compressor failure. Machines might be on-line continuously in order to maintain power to sensors and control boards, but the refrigeration cycle is not on when there is no load.

Project Site 7 also implemented prescriptive lighting technologies. Fixture counts aligned with project installation records and were operating as intended. The overall project at Site 7 realized 89% of expected kWh savings, as shown in Table E-16. Unrealized savings are almost exclusively due to the incorrect assumption about operating hours.

Table E- 16 Site 7 Estimated & Evaluated Savings (Economy Adjusted)

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Variable Speed Compressor	49,831	26,200	53%
Cycling Air Dryer	5,750	2,740	48%
Prescriptive Lighting	179,678	179,678	100%
Total	**235,259**	**208,618**	**89%**

Summit Blue notes that if the facility eventually does add a second shift, Variable speed compressor savings will increase to 82% as shown in Table E- 17.

Table E- 17 Project Site 7 Estimated & Evaluated Savings (Full Production)

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Variable Speed Compressor	49,831	41,100	82%
Cycling Air Dryer	5,750	4,300	75%
Prescriptive Lighting	179,678	179,678	100%
Total	**235,259**	**225,078**	**96%**

Project Site 8

Project Site 8 is a manufacturing, research, and development complex consisting of multiple buildings. The site manufactures medical equipment and uses compressed air for various manufacturing applications including the operation of tools and conveyer systems.

Base Measures

Site 8 originally utilized four air compressors, including:

1. 75 HP Load/Unload Compressor
2. 125 HP VFD compressor
3. 75 HP Load/Unload Compressor
4. 75 HP Load/Unload Compressor

According to the project application, the compressors were left on 24 hours a day, 7 days a week, 50 weeks per year to accommodate production needs.

Project Measures

In the interest of redundancy and capacity for future growth, Project Site 8 purchased and installed a new 200 HP load/unload air compressor. The new compressor and two existing 75 HP compressors operate on the "high pressure" side of the campus, and the existing 125 HP VFD and fixed speed 75 HP compressor operate on the "low pressure" side. The high pressure side is set to 105 psig and the low pressure side is set for 92 psig. The four existing compressors are controlled by a PLC-based control system. An automatic valve opens between the two systems for backup.

Savings were expected to be realized through load-unload cycling by allowing the compressor to idle when air consumption allows. The new compressor was also expected to eliminate the inefficient modulation of the existing 75 HP load/unload lagging compressor.

The 200 HP load/unload air compressor was installed on January 18, 2007.

Measurement & Verification Methodology

On March 3, 2009, Summit Blue met with participant staff to evaluate the new 200 HP load/unload air compressor. The measure was visually confirmed and operating. A SCADA system was available, but the trending capabilities were not configured to record data for more than a 2-hour period.

A three-phase Power logger was installed on the new 125 HP variable speed air compressor, and single phase current loggers were deployed on the three existing compressors and new 200 HP load/unload compressor. Spot measurements were taken on compressors to confirm power factor for current readings. The loggers were left in place for fifteen days, as facility personnel indicated consistent week-to-week operation.

A linear regression model was developed for consumption data over the logging interval and extrapolated over a one year time frame to estimate annual savings.

Evaluation Results

The air compressor system was present and operating as expected. Linear regression results compared favorably with the application savings estimates, yielding 200,199 kWh in annual savings. Figure E- 3 provides an example of logged amperage data for the new 200 HP load/unload compressor.

Figure E- 3 Logged 200 HP Load/Unload Compressor Amperage

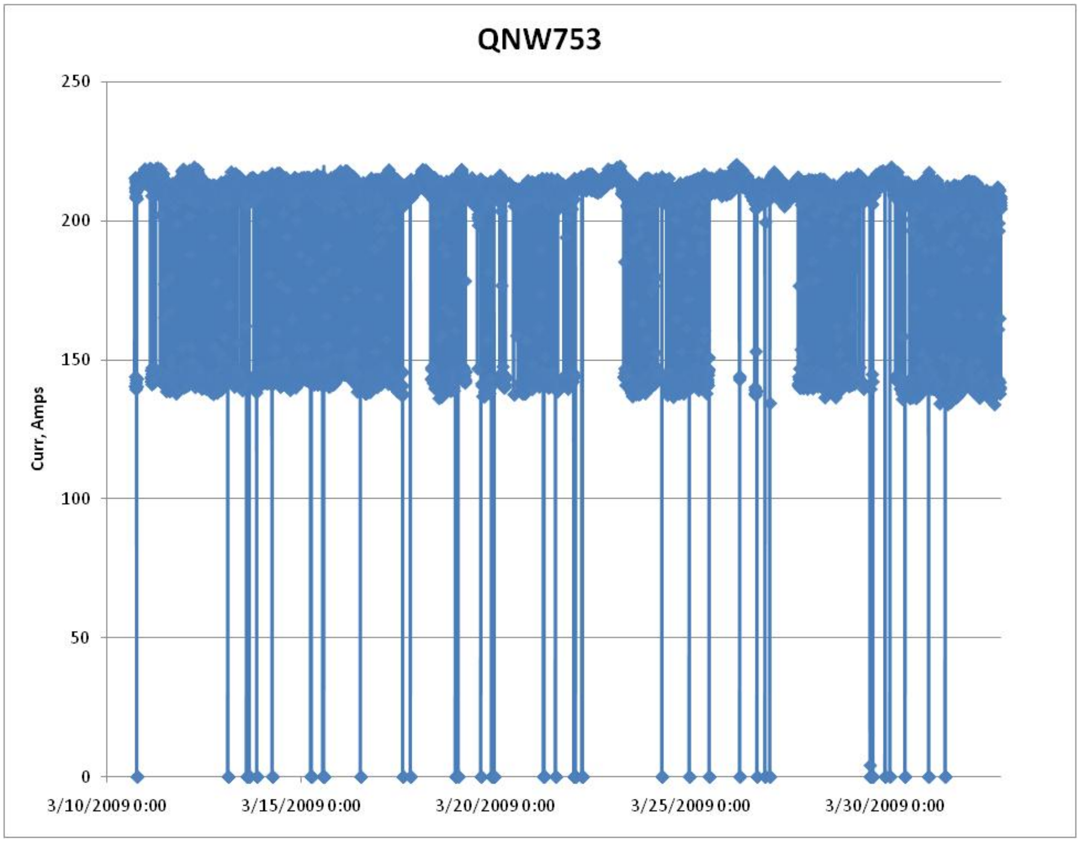


Table E- 18 Project Site 8 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Air compressor	222,251	200,199	90%
Total	**222,251**	**200,199**	**90%**

Project Site 9

Project Site 9 is a commercial food processing plant that produces non-perishable goods. The business's NAICS prefix code is Food Products. The facility includes manufacturing lines, freezers, ingredient storage, and product warehouse.

Base Measures

Project Site 9 originally utilized four air compressors, including (3) 75 HP fixed speed compressors, and (1) 40 HP fixed speed compressor. Two of the 75 HP fixed speed compressors were alternated to meet planned demand. All compressors operated using inlet modulation to match compressor output to system demand. Additionally, the 40 HP fixed speed compressor was always in operating. Participant staff confirmed that the system remains pressurized 24 hours a day, 7 days a week.

Project Measures

Project Site 9 installed a new 150 HP water-cooled variable frequency drive (VFD) compressor. The new compressor is anticipated to adjust its speed to match system demand to achieve energy savings. Inefficient modulation control is no longer used and head pressure is controlled.

Of the existing four compressors, (2) 75 HP fixed speed compressors are used as a backup in case the new compressor fails. One 75 HP fixed speed compressor is in storage, and the remaining 40 HP fixed speed compressor has been sold.

The 150 HP water-cooled VFD compressor was installed on October 30, 2007.

Measurement & Verification Methodology

On March 4, 2009, Summit Blue met with participant staff to evaluate the new 150 HP water-cooled VFD compressor. The measure was visually confirmed and operating. A SCADA system was not installed and the baseline consumption study was based on short-term monitoring data extrapolated for a given time frame.

While on-site, evaluation staff installed a three-phase Power logger on the new compressor. Spot measurements were unable to be taken due to site safety protocols which required full body suits in the presence of operating machinery. The logger was left in place for 21 days to capture any variations in site operating characteristics and production schedules.

A linear regression model was developed for consumption data over the logging interval and extrapolated over a one year time frame estimate post-installation consumption. And because the existing system was no longer in operation, the baseline consumption study findings were used as a proxy for pre-installation energy use. Energy savings represented the delta between pre- and post- installation consumption.

Evaluation Results

The air compressor system was present and operating as expected. Linear regression results compared favorably with the application savings estimates, yielding 351,295 kWh in annual savings.

Table E- 19 Project Site 9 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Air compressor	336,829	351,295	104%
Total	**336,829**	**351,295**	**104%**

Project Site 10

Project Site 10 was a small metal fabrication facility occupying a single building on a one and a half acre lot. The manufacturing area is divided into several sections used for different operations. A small office area is also in the building. The facility operates approximately fifty weeks a year, accounting for holidays.

Base Measures

Prior to installation, there was no air compressor in use for this area. Since a 40 HP Sullair 3009PV was purchased for the project, a 40 HP Sullair 3009P was used as a baseline. This is the constant speed version of the unit that was purchased. The initial project estimate also used this system as a baseline.

Project Measures

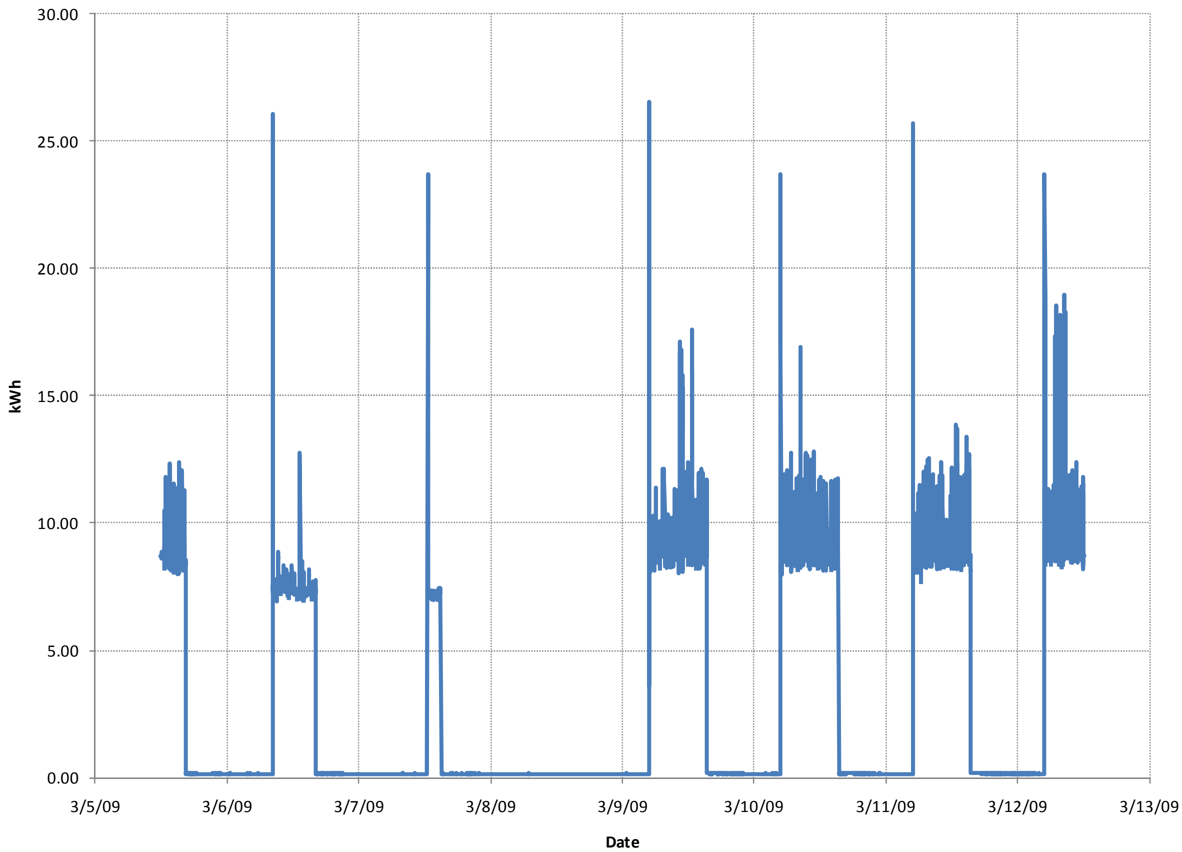
The facility installed a new Sullair 3009PV variable speed 40 HP air compressor for the sheet metal area. A Great Lakes Air GRF-150A-116 non-cycling refrigerated dryer and 240 gallon air tank were also installed, but were not eligible for incentives. The unit operates between 40 and 60 hours per week, according to facility personnel. Logged data indicated 54 hours of operation, which is consistent with this estimation.

Project measure installations were completed on August 14, 2007.

Measurement & Verification Methodology

During the site visit on March 5, 2009, Summit Blue discussed the use and installation of the variable frequency air compressor and associated system with facility personnel. Spot measurements were taken on both the air compressor and refrigerated dryer to determine power use. Current draw was logged on the air compressor for a one-week period. The power factor observed during the spot measurement was used to convert this to power use. Discussions with facility personnel indicated that operation was fairly consistent on a week-to-week basis. Logged usage is shown in Figure E-4. Spot measurements indicated 11.6 kW with a power factor of 0.74 and balanced phases. The system operated on 480 V three phase power. The dryer was on a single phase 120 V circuit and used 1.15 kW continuously when on.

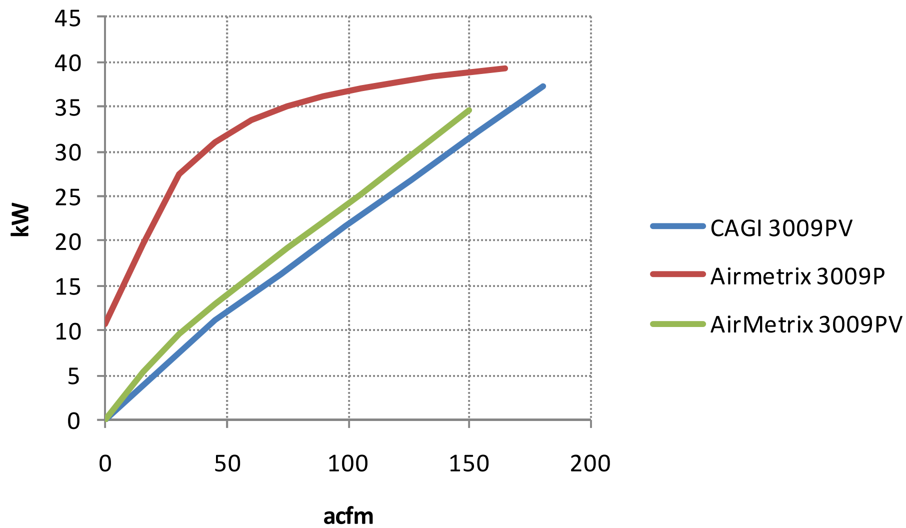
Figure E- 4 Logged Compressor Power



Compressor curves were obtained for both the Sullair 3009PV and Sullair 3009P. The CAGI data was used for the variable speed unit but was not available for the base unit. Consequently, the manufacturer's Airmetrix data was used for this. As can be seen in Figure E-5, the Airmetrix and CAGI data is similar for the 3009PV, but the CAGI data was used as it is an industry standard measurement.

A linear fit was used to estimate airflow from compressor power consumption using the CAGI data. A logarithmic fit was used for the 3009P curve. The airflow estimate was used in conjunction with the curve to project power consumption of a 3009P under these circumstances.

Figure E- 5 Compressor Curves for Sullair 3009PV and 3009P



Evaluation Results

Using 50 weeks per year of operation, measured data indicated 25,399 kWh/yr of power consumption by the new air compressor. Calculations indicated that an equivalent constant speed compressor would have used 77,631 kWh/yr under the same circumstances. This results in 52,232 kWh/yr in savings. The application claimed only 35,361 kWh/yr in savings, resulting in a 147% realization rate.

Table E- 20 Site 10 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
New 40 HP Variable Speed Air Compressor	35,361	52,232	147%
Total	**35,361**	**52,232**	**147%**

Project Site 11

Project Site 11 is a commercial bakery that produces baked goods for distribution across the region. The business's NAICS prefix code is Food Products. The facility includes manufacturing lines, baking ovens, ingredient storage, and product warehouse. The site comprises approximately 150,000 square feet, including 60,000 square feet of baking space. The facility operates 24 hours per day, seven days per week.

Project Site 11 uses compressed air at 96 psig for a variety of processes, including operating air valves and cylinders, product packaging, sanitation, and conveyance systems. They facility has an ongoing leak detection program which was already in place when the production efficiency measures were installed.

Base Measures

The compressed air base system included one 150 HP Quincy Northwest air compressor and two 100 HP Quicny Northwest air compressors. Since production levels and operational hours at the facility have not changed since the ATAC study was completed, logged data from the 2006 ATAC study was used as the baseline power consumption.

The base system also relied on two non-cycling refrigerated air dryers. Since production levels and operational hours at the facility have not changed since the ATAC study was completed, logged data from the 2006 ATAC study was used as the baseline power consumption.

Project Measures

The site installed a new Quincy Northwest 200 HP VFD air compressor, fitted with a Toshiba VFD cooling fan in place of the three existing compressors. The original 150 HP compressor remains at the site as a backup. It is only used at times when the new VFD compressor is undergoing maintenance.

Additionally, a Zekes cycling refrigerated dryer replaced the baseline non-cycling refrigerated dryer.

Project measure installations completed on August 23, 2007.

Measurement & Verification Methodology

During the site visit on April 6, 2009, Measurement and Verification Option B was employed to determine the savings for the VFD air compressor. A Wattnode power meter with a Madgetech data logger was installed on the 200 HP VFD air compressor for a period of two weeks. The electricity usage measured by these devises was compared to the baseline to determine savings.

Verified savings (kWh) = Baseline - Verified Usage

The cycling air dryer and FVD cooling fans were inaccessible for power logging, so Measurement and Verification Option B was employed to determine the savings for these measures. Spot measurements of voltage, amperage, and power factor were all within the expected range in as listed in the ATAC study. Since operational hours and air use has not changed since the time of the study, the verified savings for these measures are equal the estimated savings.

Evaluation Results

Logged power use for the VFD air dryer revealed a significant increase in savings compared to the predicted savings. The power use of the cycling air dryer and cooling fan were not able to be logged. Spot measurements indicate they are operating in the estimated range; therefore, the verified savings is equal to the estimated savings for those measures. Overall, the verified savings at Site 5 realized 123% of expected kWh savings, as shown in Table E- 21.

Table E- 21 Project Site 11 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
compressed air	451,039	565,129	125%
air dryer	26,877	26,877	100%
air cooling fan	22,601	22,601	100%
Total	**500,517**	**614,607**	**123%**

Project Site 12

Project Site 12 is a manufacturing facility that produces construction materials. The business's NAICS prefix code is non-metallic manufacturing. The site includes manufacturing lines, material storage, machine shops, and offices. Site 12 completed one production efficiency projects in 2007, a variable speed (VFD) air compressor. The site uses compressed air for a number of applications, primarily tool operation.

The facility's business is seasonal, and they normally are at peak production in the spring and summer months. Due to the current economic downturn, the site is running at approximately 50% its peak production capacity. However they expect business to pick up later this year due to the stimulus bills inclusion of products that they make, as well as because one of their key competitors is expected to go out of business. Site 12 currently operates 10 hours per day, 4 days per week. This is reduced from 10 hours per day 5 days per week during normal peak season. Off-season hours are typically 8 hours per day 5 days per week. Total operational hours are 2350.

Base Measures

The compressed air base system included a 25 HP Ingersoll Rand SSR load/unload rotary screw air compressor. In 2006 an ATAC study was conducted estimating a baseline energy use of the compressor at 37,721 kWh based on peak load and unload conditions for the compressor and a measured energy use. Annual hours are based on off-peak hours of 10 hours/day, 5 days/week 4 months/year and peak hours of 18 hours/day, 5 days/week 8 months of the year. The ATAC report produced the data in Table E- 22.

Table E- 22 Project Site 12 ATAC Baseline Operating Conditions

Load Profile	ATAC Time at loading	Air Flow (% of capacity)	kW	kWh
High load	5%	100%	20.2	2,372
Medium load	60%	61%	17.4	24,475
Low Load	35%	25%	13.2	10,874
Total	**2,350 hours**	**-**	**-**	**37,721**

Measured data collected by Summit Blue corresponds well to the time at each loading profile. Summit Blue did measure a lower air flow use during the low load profile than the 25% estimated in the original study, however, due to the low efficiency of the baseline compressor at low airflow, the baseline is believed to correspond very well.

Project Measures

The site installed a new Ingersoll Rand 20 HP VFD air compressor in place of the original 15 HP compressor.

Project measure installations completed on March 13, 2007.

Measurement & Verification Methodology

Measurement and Verification Option B was employed to determine the savings.

An Onset HOBO data logger was installed on the VFD air compressor for a period of one week. The resulting data demonstrated that the compressor was not in use for the majority of the week. Four days during the week, the compressor operated at variable speeds. Data demonstrated that during operational hours, the compressor's loading followed the patterns shown in Table E- 23.

Table E- 23 Project Site 12 Measured and Full Production Operating Conditions

Load Profile	Time at loading	% of Capacity	kW	Measured kWh	Full Production kWh
High load	2%	100%	18.3	732	860
Medium load	58%	60%	11.0	12,760	14,993
Low Load	40%	6%	1.1	880	1,034
Total	**-**	**-**	**-**	**14,372**	**16,887**

Table E- 23lists both measured kWh as well as expected kWh. Measured kWh is a scenario in which the business continues to be affected by the economic downturn and runs at the current reduced schedule of 2000 hours per year. The expected kWh assumes 2350 hours per year.

During the site visit on May 8, 2009, personnel were confident that their production would return to normal levels by the end of the summer, so full production energy use is assumed. Savings were calculated based on the following formula

Savings (kWh) = Baseline (kWh)- Full Production kWh

Evaluation Results

Site 12 will achieve a realization rate of 165%. The larger than expected savings is due to the very low air use in the low load profile. The VFD switches frequency very fast and spends approximately 40% of operational hours below 1.5kW, during these times the compressor averages 6% of capacity. This is significantly lower than the 35% loading assumed in the ATAC study.

Table E- 24 Project Site 12 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Air Compressor	12,556	20,834	156%
Total	**12,556**	**20,834**	**165%**

Project Site 13

To be in included as an amendment to the Final Report

Project Site 14

Project Site 14 is a wastewater treatment plant. Site loads are dominated process motors. The aeration blowers and the digester blowers combined account for 62% of site electric consumption. The measures for this site seek to reduce energy use by improving the controls on the process blowers.

Base Measures

Two different systems are affected by Energy Efficiency Measures at this site: the aeration blowers and the digester blowers.

The aeration blower baseline consumption is poorly documented by the project engineer and installer. The ATAC study author concludes the aeration blowers consume 1,541,760 kWh per year or 50% of site total electricity consumption. They reach this conclusion by asserting that two 125 HP blowers operate nearly continuously. Historic run time data shows that slightly less than 1.5 blowers operate on average.

The study's estimate assumes operation of two blowers at roughly 92% of full load continuously. Historic data show that blowers are loaded above 92% only five hours per year and average 65-75% loaded.

Summit Blue analyzed the data and concluded that these blowers consume about 821,000 kWh, annually.

The digester blower baseline is based on continuous full load operation of one 100 HP digester fan. Historic trend data support this estimate:

$$\textit{Baseline Consumption} = 75\ kW \times 8{,}760\ hours = 657{,}000\ kWh.$$

Project Measures

EEM 1 involved the installation of improved controls on the digester blower. The measure designer and installer assert this process is greatly over-aerated. Operators run the digester blower at 100% load continuously, unless the product starts to foam. When foaming occurred, operators would close a discharge damper to reduce airflow and blower power. The digester would continue to operate in this manner for a day or so until the foam subsided. The measure description claims "with proper monitoring and controls, it is anticipated that, at a minimum, 30%, or 197,000kWh/year …may be conserved." The measure installs no monitoring or controls. Only the air volume control method is changed. Vortex dampers on the fan inlet were installed to improve the efficiency of the reduced flow. Operators have changed nothing to achieve savings other than selecting inlet rather than discharge control dampers. Reduced digester aeration reportedly is used one day per week, on average.

EEM 2 involved upgrading automatic controls on the aeration blower with more and better sensors, along with a PID control loop. This system already had automatic control to maintain minimum dissolved oxygen; however, there was some instability in the system and it did not track well to the control setpoints – frequently over- aerating the system. The measure designer and installer asserts that optimizing the fan control will permit full-time operation of the process with one fan 65% loaded rather than two fans 90+% loaded.

Project measures completed installation on December 12, 2007.

Measurement & Verification Methodology

Summit Blue staff inspected the site and verified that proposed changes were indeed installed on January 15, 2009. Vortex dampers were installed on the digester blowers and additional sensors were installed for the aeration tank blowers. Operators demonstrated that the aeration blowers are better controlled and the system tracks very closely to the set points. Evaluation staff also reviewed charts of energy use with the operators to see if savings were discernable.

Analytical verification focused on end-use monitoring with data loggers and use of data collected by the automation systems. Spot measurements of the operating aeration blowers and digester blower were taken to support evaluation efforts. For the digester blower, functional tests were conducted with the operator changing each of the dampers in the manner that he typically would when foaming is present. WattNode data loggers were installed on each of the major blowers to measure power for a one month period from mid-January to mid-February.

Daily influent and effluent volumes, temperatures, rainfall, and energy were downloaded from the automation system along with historic fan operation and runtimes. This data was analyzed to discern any energy savings for the aeration blowers when comparing pre-/post-installation data.

Evaluation Results

EEM 1 - Digester Volume Control. Summit Blue's functional test with the operator showed that the new vortex dampers reduced power consumption by 20.1 kW more than volume control with the discharge dampers. This test is accurate since it shows accurate operator behavior. Unfortunately, there is no instrumentation to see if the increased savings with the vortex dampers is because of inherent efficiencies with these dampers or if air volume was actually reduced more with the vortex dampers so that savings were higher. These dampers are only used about 1250 hours per year, and there are no sensors or feedback loops that can be used to optimize blower air volume.

EEM 2 – Aeration Tank Blower Control. The *ex ante* savings for this measure was estimated to be 993,000 kWh per year. This estimate is roughly 32% of total site energy, 64% of ATAC's estimated baseline for this equipment and 120% of the baseline that Summit Blue estimated with data loggers and historic trend data. Not only is the measure designer's baseline savings in error, but there is minimal discernable savings from this measure in the data. When normalized to weather, production, and rainfall the measure savings are smaller than expected.

Table E- 25 Project Site 14 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Digester Blower dampers	196,884	25,100	109%
Aeration Blower Controls	993,044	54,300	11%
Total	**1,189,928**	**79,400**	**7%**

Project Site 15

Project Site 15 is a lumber mill occupying 20 acres and contains several large buildings. Production is currently slowed due to the economy, but much of the facility equipment remains in operation continuously for most of the work week. Operation is currently 110 hours per week.

Base Measures

The facility uses a large number of motors. The majority of the motors are totally enclosed fan-cooled units operating at 1800 RPM. The baseline is assumed to be a new, standard efficiency EPACT motor. As this is a prescriptive measure, standard savings values have been used for the savings calculations.

Project Measures

Through the Energy Trust's Production Efficiency Program, Project Site 15 purchased a large number of premium efficiency motors. All of these measures were treated as prescriptive rebates. The following table illustrates the incentivized motor purchases during PY 2007.

The project files for these measures closed on December 18, 2007.

Table E- 26 Project Site 15 Prescriptive Motors

HP	Efficiency	RPM	Quantity	kWh Savings
3	90.0%	1800	1	498
5	89.5%	1800	3	1,821
5	89.5%	3600	1	607
20	93.0%	1800	1	1,783
25	94.0%	1800	2	5,518
40	94.1%	1800	1	4,653
50	94.5%	1800	1	5,328
60	95.0%	1800	1	8,029
125	95.8%	1800	1	16,113
150	96.0%	1790	1	17,155
498			**13**	**86,689**

Measurement & Verification Methodology

During the site visit on March 5, 2009, Summit Blue personnel discussed the use and installation of the premium efficiency motors with facility personnel. The intent had been to obtain spot measurements of motor loading to determine actual savings associated with their installation. However, discussions with site personnel revealed that standard practice was to order a new motor when a unit was replaced from the spares supply. The new motor is then placed in the spare supply room. Consequently, very few of the recently purchased motors were actually in service during the site visit. Additionally, the facility tracking system was not designed to locate individual motors. Evaluation staff spot measured a 125 HP unit to confirm loading estimates. Similarly, the spare motors were examined to determine how many were premium efficiency units.

Evaluation Results

All of the motors listed on the applications were visually confirmed on-site; however, many of them were not in operation. The facility’s policy to purchase premium efficiency replacement motors had been in place for about five years. The decision to buy new motors instead of rewinding is based on a NEEA em2 software analysis. Approximately half of the motors in the spare supply room appeared to be premium efficiency units. Similar results were seen in the facility, although a detailed count was not conducted.

Due to the fact that the measures installed received prescriptive incentives and because all measures were visually verified, the savings have been deemed acceptable and the realization rate is determined to be 100%. However, it should be noted that there is a delay in actual realization at the site due to the policy of taking motors out of spares for replacement rather than placing new units into service immediately.

Table E- 27 Project Site 15 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Premium Efficiency Motors	86,689	86,689	100%
Total	86,689	86,689	**100%**

Project Site 16

Project Site 16 was a lumber mill occupying around 25 acres constructed in the 1940s. The facility processes fir and hemlock into lumber. In April 2009, operation returned to a 24-hour a day, 7 day a week schedule; however, the dimension mill remains shutdown for the present. Due to periodic maintenance days, total operation is around 8,000 hours per year.

Base Measures

The facility had five air compressors and two dryers in three separate areas of the mill. The main compressor room contained three Gardner Denver reciprocating compressors (GD1, GD2, and GD3). In addition the mill was adding two dryers to this system, which were assumed to be heatless units with 3,750 scfm capacity for the baseline. The dimension mill had a separate compressed air system with a Quincy Northwest QNW740 and QNW360 rotary screw compressors and a Zeks 1000DHB0U0 heated desiccant dryer. The planers and sorter mill were separately supplied by a Quincy Northwest QNW1000 rotary screw compressor and another Zeks 1000DHB0U0 heated desiccant dryer. The baseline study estimated total use of 5,557,532 kWh/year for the compressed air system.

According to the project file, prior to this project the facility dust collection system consisted of "a variety of fans, cyclones, and baghouses." An energy analysis performed in 2005 determined that the baseline system used 3,140,000 kWh per year, however although the study was referenced no breakdown of this usage was provided in the file.

The facility also uses a large number of motors. The majority of the motors are totally enclosed fan cooled units operating at 1800 RPM. The baseline is assumed to be a new, standard efficiency EPACT motor. As this is a prescriptive measure, standard savings values are used for calculations.

Project Measures

The facility implemented three separate efficiency measures in 2007. In addition to adding a loop and new controls to the compressed air system and replacing their dust collection system, they purchased a number of energy efficient motors under the prescriptive program.

The existing air compressors at the facility were reconfigured and two dryers were added. A new loop system connected the three formerly separate compressed air systems and new controls provided staging of the air compressors. The smallest rotary screw compressor, the QNW360, was removed from the system completely and the other two rotary screw compressors, the QNW1000 in the planer mill and the QNW740, were programmed to run continuously as base load units. The three Gardner Denver reciprocating compressors were programmed to stage on as needed by the system. The two new dryers were Airtek regenerative blower purge units.

All of the old fans, cyclones, and baghouses were removed and a new, single baghouse was installed. The new system included ten separate loads fed from a single, dedicated MCC in the facility.

The facility purchased a number of premium efficiency motors, and filed three separate applications for prescriptive incentives during 2007. Table E- 28 shows the incentivized motor purchases during 2007, grouped by application.

Project measure installations were completed by August 2, 2007.

Table E- 28 Project Site 16 Prescriptive Motors, Listed by Application

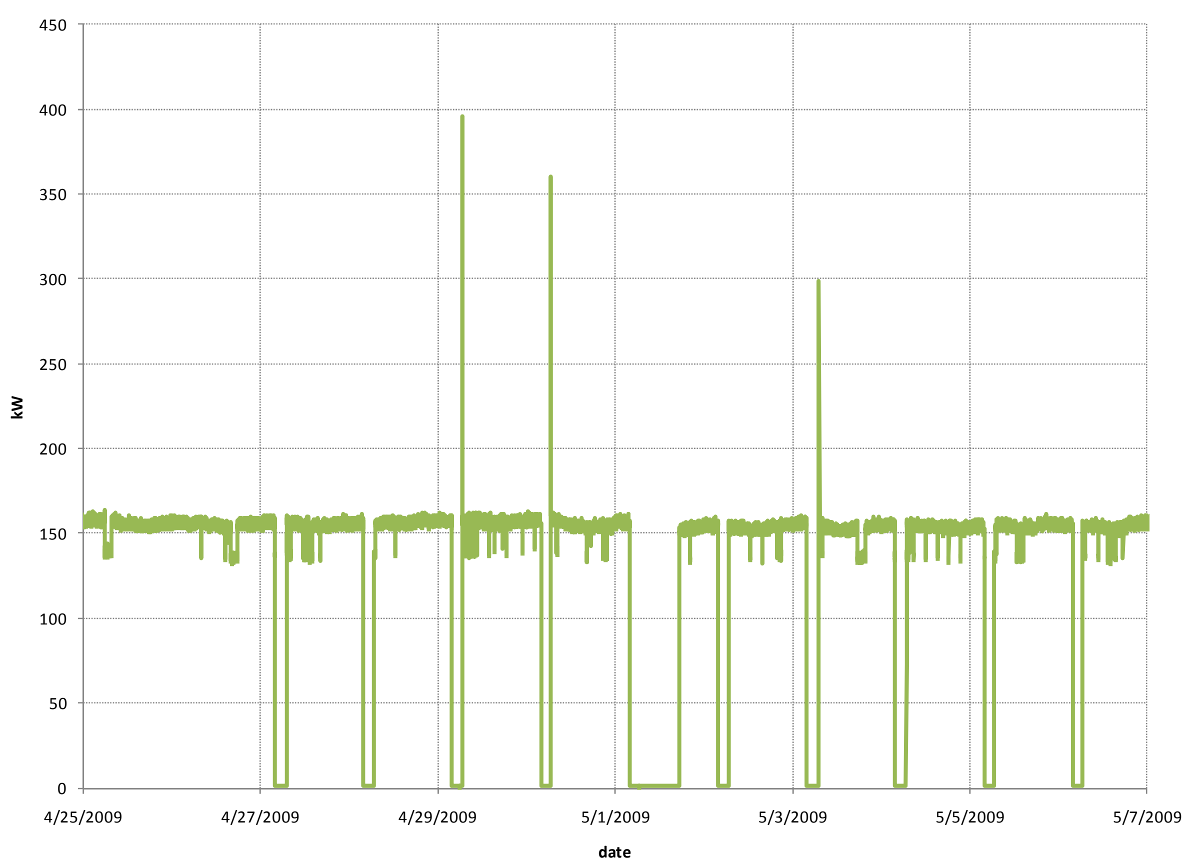
HP	Efficiency	RPM	quantity	kWh Savings
1	82.5%	1140	1	195
3	86.5%	1800	2	998
3	89.5%	1750	1	498
40	94.1%	1800	2	9,306
100	95.4%	1800	1	13,166
1	82.5%	1140	1	195
3	86.5%	1800	2	998
3	89.5%	1750	1	498
40	94.1%	1800	2	9,306
100	95.4%	1800	1	13,166
3	90%	1800	1	498
5	90%	1800	2	1,214
7.5	92%	1800	1	1,116
10	92%	1800	2	2,440
15	92%	1800	2	3,374
20	92%	1800	1	1,783
100	95%	1800	1	13,166
570.5			**24**	**71,917**

Measurement & Verification Methodology

Summit Blue took spot measurements and logged the compressors and dryers on the system. During the time of the visit and verification on May 12, 2009, the dimension mill was shut down. The QNW751 air compressor and Zeks dryer associated with this portion of the facility were also shut off because of this. However, the baseline documentation provided a breakdown of usage by mill area, and the usage of this area of the mill was also subtracted from the baseline. This reduced baseline use for the compressed air system from 5,557,532 kWh/year to 4,749,993 kWh year, a 14.5% reduction.

The current on the baghouse system had been recently logged by a third party. Summit Blue obtained a copy of this data and took spot measurements to confirm that it was consistent with current operation. Spot measurements indicated 153 kW, which is consistent with the average operational system usage of 154 kW from the logged data. Figure E- 6 shows the results of the logging for the entire MCC including all loads on the system. The system appears to be shut off for around two and a half hours a day in the early hours of the morning for much of the logging period. However, this was estimated to be consistent with the 8,000 hours of operation out of 8,760 annual hours due to shutdowns and the logged data was used to calculate current system usage, with adjustments for weekend versus weekday usage.

Figure E- 6 Project Site 16 Baghouse System Power



During the site visit, Summit Blue personnel discussed the use and installation of the premium efficiency motors with facility personnel. It was determined that motors were purchased for immediate installation and the new motors observed at the facility were premium efficiency units. However, as seen in Table E-28, the first five lines, including seven motors on the first application, are the same as the next five lines which are for the second application. Summit Blue noted this and, upon examination of the invoices determined that these two applications were for the same motor purchases. It appears that due to an oversight the same motors were incentivized twice.

Evaluation Results

The compressed air loop was installed and operating as planned, although the QNW751 and heated Zeks dryer in the dimension mill were shut down with that portion of the mill. Notably, this air compressor was also off during the post-installation inspection although at the time the remaining compressors were still supplying the dimension mill. However, this was the smallest section of the system and did not significantly affect savings realization. During the verification period, GD1 remained off the entire time, GD2 operated fully loaded, and GD3 had a varying load. As expected the QNW1000 operated at full load continuously. The realization rate was found to be 95.5%, a reduction primarily due to the temporary shutdown of the dimension mill.

The new baghouse was also installed and operating. It appeared to be using less energy than previously measured, however it is believed that the dimension mill shutdown contributed to this reduction significantly. The logged data indicated annual usage of 1,124,036 kWh, 17.1% less than reported in the post installation measurements. Since the baseline data provided did not provide a breakdown of usage by mill area, this reduction was compared to the 14.5% of compressed air power use in the dimension mill and a reduction due to the shutdown of 15% was used to estimate the effect on the baseline. This provides a reduced baseline use of 2,669,000 kWh and a resulting realization rate of 86.6%. However, the realization rate can be expected to rise when the dimension mill reopens. Since the baghouse savings were based upon post installation measurements, under fully operational conditions, the realization rate for this measure would be expected to be nearly 100%.

All of the motors listed on the first applications were believed to be at the site, however since the first and second applications were duplicates these seven motors were counted twice for savings. Since these were all prescriptive incentives and all of the unique motors appeared to be installed at the site, their savings were accepted and the realization rate was determined to be 66.4% once the duplicate motors were subtracted from the savings total.

Table E- 29 Project Site 16 Estimated & Evaluated Savings (Economy Adjusted)

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Install Loop and Controls on Compressed Air System	1,590,360	1,519,218	95.5%
New Baghouse	1,784,094	1,544,964	86.6%
Premium Efficiency Motors	71,917	47,754	66.4%
Total	**3,446,371**	**3,111,936**	**90%**

Site 16’s full production capacity savings are provided below. Overall, Site 16 achieved a 95% realization rate

Table E- 30 Project Site 16 Estimated & Evaluated Savings (Full Production)

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Install Loop and Controls on Compressed Air System	1,590,360	1,590,360	100.0%
New Baghouse	1,784,094	1,784,094	100.0%
Premium Efficiency Motors	71,917	47,754	66.4%
Total	**3,446,371**	**3,422,208**	**99%**

Project Site 17

Project Site 17 is a wood products facility occupying fifteen acres. The facility processes both hard and soft wood products and is currently operating at reduced production due to economic conditions. However, no equipment has been permanently removed, and production is expected to return to full capacity when market conditions permit it.

Base Measures

The facility used a 200 HP dirty air side material handling fan, 14' cyclone, and secondary bag house for dust collection from its hardwood sander. Additionally, a smaller 11' cyclone, 200 HP relay fan, and smaller purge and relay fans handled dust collection from the composer hog, core saw, and strip saw.

The hardwood sander system operated 4,000 hours per year and the baghouse relay system operated 7,488 hours per year. Prior to their removal, a study was done and the brake horsepowers provided for the system. All motors are assumed to have been standard efficiency units due to the age of the system. The baseline connected loads are provided below:

Table E- 31 Project Site 17 Baseline Motor Loads

Load	HP	BHP	Efficiency	Hours	kWh/year
Hardwood Sander Fan	200	156.5	0.95	4,000	491,575
WP Baghouse Purge Fan	20	18.8	0.91	4,000	61,647
WP Baghouse Sweep Arm	0.75	0.5	0.825	4,000	1,808
14' Cyclone Airlock	4	3.7	0.875	4,000	12,618
11' Cyclone Airlock	3.5	3.1	0.875	7,488	19,791
Carter-Day Purge Fan	25	20.9	0.924	7,488	126,351
Sweep Arm	0.75	0.5	0.825	7,488	3,385
Relay Fan	20	18.8	0.91	7,488	115,404

Airlock	3	3.1	0.875	7,488	19,791
Transport Relay Fan	200	166.8	0.95	7,488	980,792
Silo Airlock	5	3.1	0.875	7,488	19,791
Total	**482**	**395.8**			**1,852,954**

Project Measures

Through the Energy Trust's Production Efficiency Program, Project Site 17 replaced the entire dust collection system with a high efficiency Donaldson 376RFW10 baghouse and an AF-Forty Model 445-AF 100 HP high efficiency clean side fan with an inlet damper. A high pressure blower and feeder were added to connect the softwood sander to the new system. Additionally, a 60 HP high pressure blower was added to connect the new baghouse to the existsing sawline cyclone which was not removed.

These changes were expected to significantly decrease the total connected horsepower of the system and reduce the system's operating schedule to 4,000 hours per years. The main system fan was expected to run at two loading conditions, depending on whether the tongue and groove (TNG) system was operating. It was expected to spend 2,000 hours at each loading condition. The following table details the post-installation loads using standard motor efficiencies.

The project file closed on July 9, 2007.

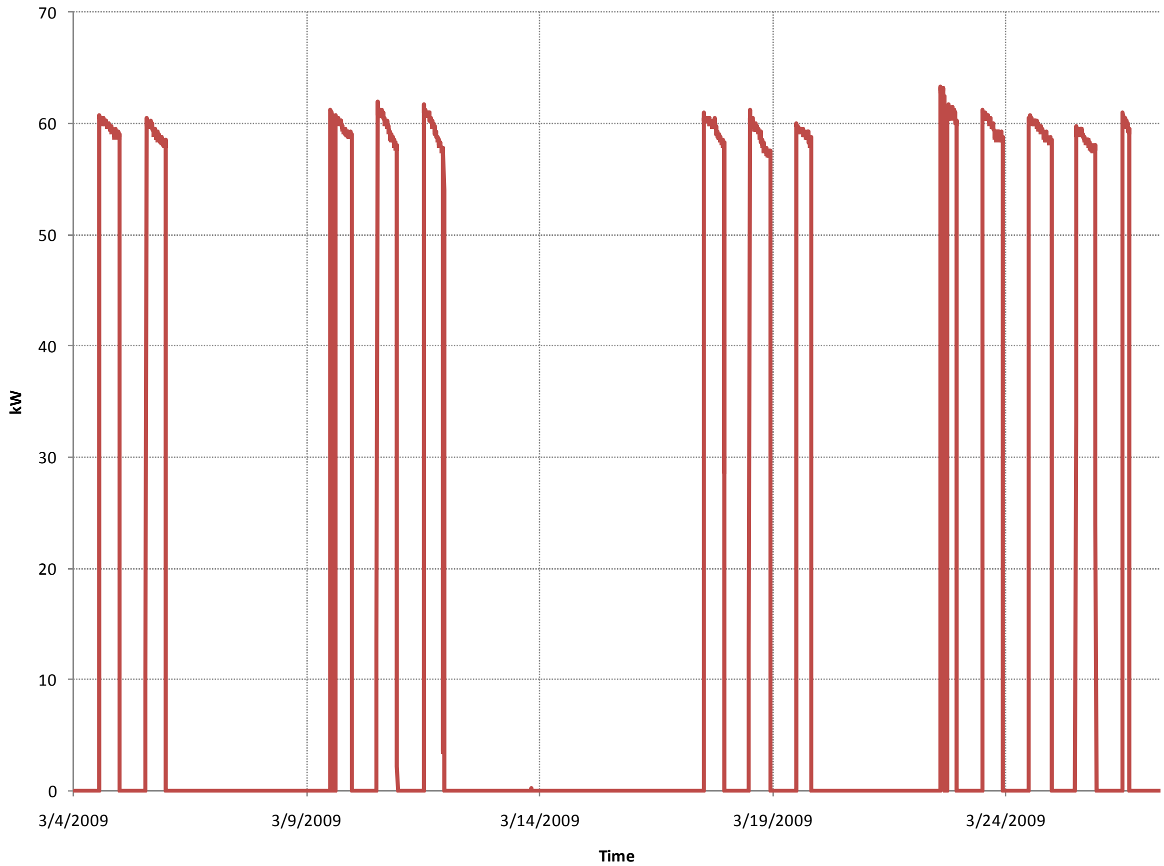
Table E- 32 Project Site 17 Post-Installation Motor Loads

Load	HP	BHP	efficiency	hours	kWh/year
Main System Fan (sander and TNG)	100	91.9	0.945	2000	145,095
Main System Fan (sander only)	100	76.7	0.945	2000	121,097
Filter Cleaning Blower	7.5	4	0.895	4000	13,336
Filter Manifold Arm	1/3	0.3	0.825	4000	1,085
Blower for Hardwood Relay	60	50.3	0.936	4000	160,358
Feeder for Hardwood Relay	5	3	0.875	4000	10,231
Blower for Softwood Relay	20	15	0.91	4000	49,187
Feeder for Softwood Relay	5	3.5	0.875	4000	11,936
Silo Bin Vent Fan	3	2	0.875	4000	6,821
Total	**200.83**	**154.8-170.0**			**520,507**

Measurement & Verification Methodology

On March 4, 2009, Summit Blue discussed the use and installation of the new system with facility personnel. Additionally, the new 100 HP main system fan was monitored over several weeks to verify its operation. Spot measurements of much of the new equipment power were not feasible as the system was not operating continuously. As a proxy, the provided brake horsepowers were used to calculate savings assuming standard efficiency motors. Based on measurements and logging of the large 100 HP fan, this appears to provide a conservative savings estimate. The trend data below effectively captures the main fan power consumption characteristics over several weeks:

Figure E- 7 100 HP Main Fan Power



Extrapolated logger findings reveal that the system operates approximately 1,935 hours per year at 58.8 kW, rather than 60.6 kW which would correspond to 76.7 BHP at 94.5% efficiency. Measurements taken when the project was originally verified showed 65.8 kW, lower than the 72.5 kW expected for 91.9 BHP at 94.5% efficiency. Both of these measurements indicate that the BHP estimates are conservative, but reasonable. The spot measurement readings have been used for the main system fan, but BHP estimates were used for the other motors.

Evaluation Results

A visual inspection confirmed that the equipment listed in the project application file had been installed. Operational hours were found to be only about half of what was expected, mostly due to current economic conditions. However, because the old relay system would have been expected to continue operating at 7,488 hours per year, this does not significantly affect savings. Assuming 2,000 hours of operation, all without the TNG, results in 244,092 kWh for the new system and 1,569,129 kWh for the base system. At 4,000 hours of operation, the new system would consume 502,169 kWh and the base system, 1,852,954 kWh. Similarly, the annual savings at 2,000 hours of operation is 1,325,037 kWh - a 92.7% realization rate. At 4,000 annual hours of operation, the annual savings are calculated to be 1,350,785 kWh - a 94.5% realization rate compared to the 1,428,805 kWh predicted by the study. These values are not significantly different, but the current 2,000 hour value has been used to retain a conservative savings estimate.

Table E- 33 Project Site 17 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
New Dust Collection System with Inlet Damper	1,428,805	1,325,037	93%
Total	**1,428,805**	**1,325,037**	**93%**

Project Site 18

Project Site 18 is a high-tech facility with spaces for both manufacturing and research and development. The energy saving measure was limited to the air handling system in a semiconductor manufacturing space. The manufacturing line, known as a fabrication line or "fab," is a clean room environment requiring dust-free air handling with predictable and limited disturbances in air flow or drafts. The site is cooled with a chilled water system that spans the facility.

This production line *may* close in the coming months.

Base Measures

A semiconductor fabrication line at Site 18 has 208 fans to support air handling. The baseline assumes fans were originally operating with an average of 18,000 CFM with a total static pressure of 1.5 inches. Nameplate information on the fans and their motors indicate 75% and 90% efficiency respectively. The air handling system operates 24 hours per day without holidays.

For fan power savings, the application assumes a baseline consumption of 8,563,776 kWh/year based on:

kW = (CFM*TSP*.764kW/HP)/(6362* Fan Eff* Motor Eff) = 4.7 kW

kWh/year = kW* hours/year * number of fans = 8,563,776 kWh/year

It was also assumed that fan power was released as heat that placed an additional 2,026,787 kWh of demand on the HVAC system per year.

Project Measures

The overall need for air was reduced. Fan speeds were not uniformly adjusted slowed, but the average fan speed was reduced by 10%. The application uses fan laws to estimate power savings of 27%, yielding expected savings of 1,880,870 kWh/year.

The application also estimated additional savings of 418,375 kWh/year in reduced cooling demand in the fan motor room due to reduced motor heating. This was estimated assuming a 27% reduction from the baseline cooling power.

Project measure installations were completed on November 16, 2007.

Measurement & Verification Methodology

During the site visit on March 6, 2009, Summit Blue personnel counted the fans and verified that 208 25HP fans were operating. Site personnel were interviewed to verify that fan speeds had been reduced overall, although the need for laminar air flow in the fab required each fan to be set to a unique speed.

Spot measurement of fan power showed fans operating in the range of 3.3 kW to 1.36 kW, with an average power of 1.81 kW. This was well below the estimated use of 3.431 kW. The calculation methodology provided in the application was reviewed for accuracy and corresponds to the range of fan power use measured. The current savings from fan speed reduction are found to be the same as estimated.

Evaluation Results

Project measures were visually confirmed on-site. As the site is still open, the project's realization rate is calculated to be 100%

Table E- 34 Project Site 18 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Fan Motor Savings	1,566,729	1,566,729	100%
HVAC Savings	732,515	732,515	100%
Total	**2,299,244**	**2,299,244**	**100%**

Project Site 19

Project Site 19 was a natural gas turbine cogeneration power plant providing wholesale power to utilities and steam to a nearby industrial facility. The facility was constructed in 2000. Two 150 MW gas fired turbines produce power and drive a three-stage waste heat steam turbine, working at high, intermediate, and low pressure to produce power.

Base Measures

The facility contained two 600 HP condensate pumps, designed to handle 2,300 gpm of water leaving the condensers, raising the pressure to 300 psia. Both units used 1760 RPM motors designed fro 4160 V three phase power. One unit ran continuously with the second as a backup unit.

The primary pump was designed for continuous operation, although some downtime is expected at the facility, particularly in the spring and early summer. The application indicated 7,110 hours of operation and 3,030,400 kWh/year of energy use for the condensate pumps.

Project Measures

The facility purchased two Toshiba T300MVi VFDs to drive the condensate pumps. Prior to this project, no speed control was included on the system. The condensate pumps are part of the cogeneration system driving the three-stage waste heat turbines. They were designed for continuous operation, with one unit running with the second as a backup.

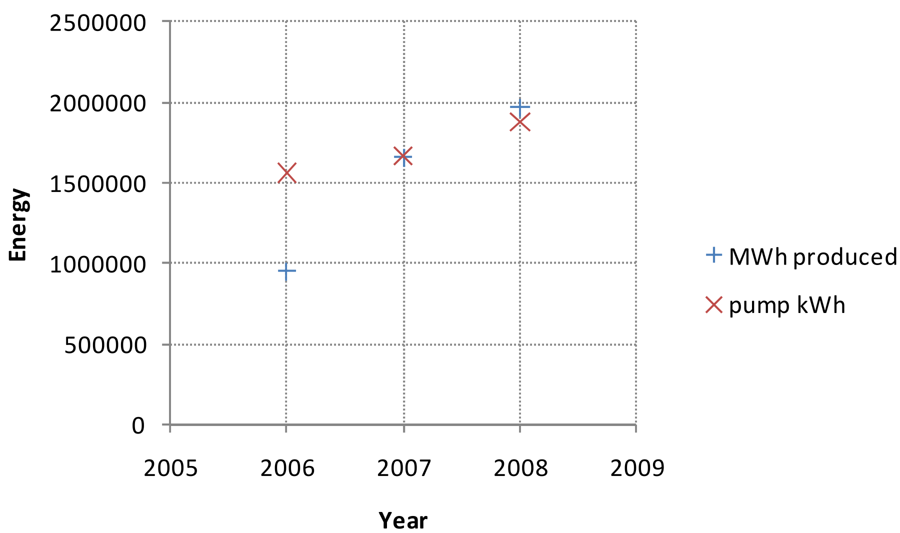
Project measure installations completed on June 27, 2007.

Measurement & Verification Methodology

During the site visit March 5, 2009, Summit Blue discussed the use and installation of the variable frequency drives with facility personnel. Actual system operation was around 4,400 volts instead of 4,160 volts since power was being generated onsite and was adjusted for transmission losses. Due to the use of medium voltage motors, the facility logging system was used to obtain power data for the system.

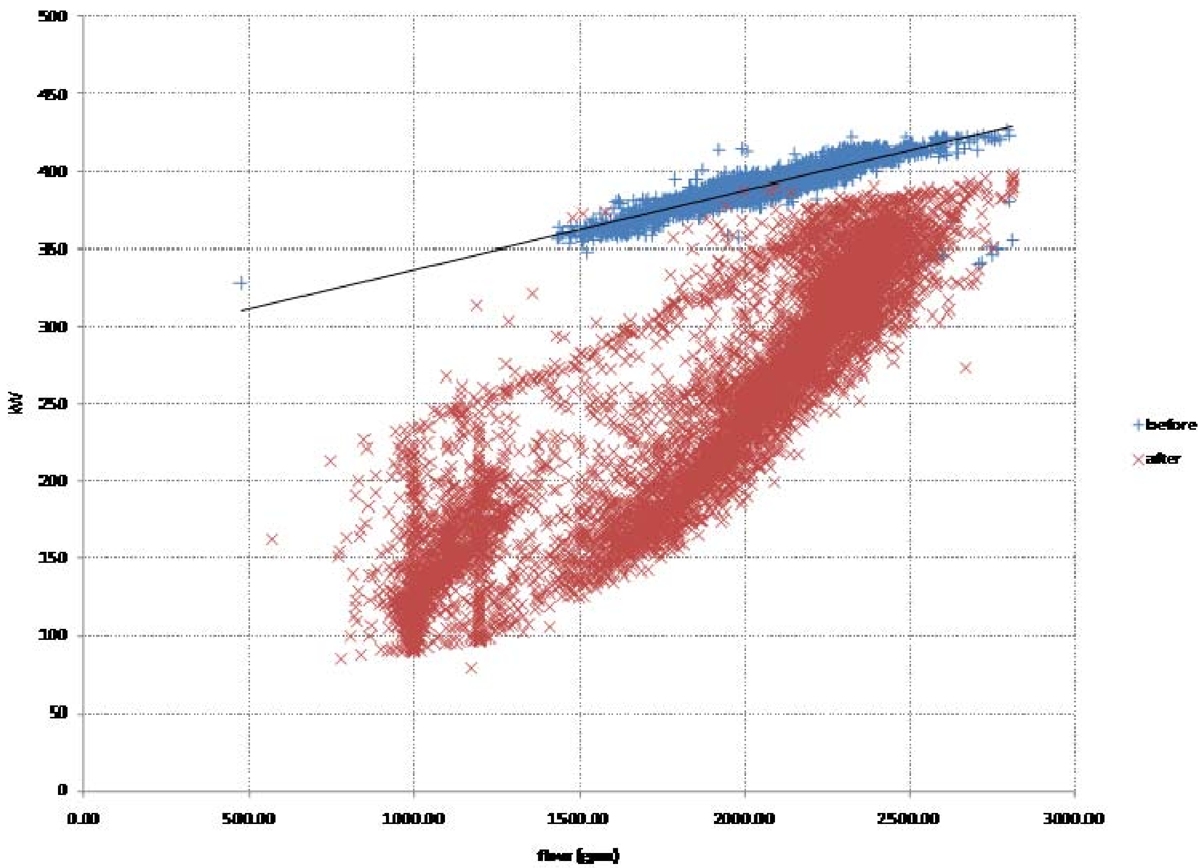
The facility recorded voltage and current for each condensate pump along with MW produced in the two main turbines and flow through the pumps. The system was designed to record kW consumed by the pumps, but this logging did not always record and for data points where it was not available a power factor of 0.8 was used along with voltage and current information to calculate power. Records indicated less than the expected 7,110 hours of operation in 2006 and 2007, but slightly higher in 2008. It was unclear how much of the hour reduction was simply a lack of recorded data in 2006, where only 5,488 hours of operation were reported. However, in 2008, 7,498 hours of operation was recorded by the system indicating that no ongoing reduction in operation was taking place.

Figure E- 8 Annual Power Production and Pump Power Use



Internal monitoring records were used to calculate pump power as a function of flow. As Figure E- 9 shows, there is a clear difference between usage before and after installation of the VFDs. A linear regression was used to estimate pump power as a function of flow prior to installation of the VFDs. The results of this were used to project power use of the pumps without VFDs based on the post-installation flow records. This calculation was used to adjust for the variation in operation between 2006 and 2008. The project was installed in mid-2007.

Figure E- 9 Pump Power Use as a Function of Flow Before and After Retrofit



Evaluation Results

The two VFDs were found to be installed and operating correctly. One of the two units was assigned as a backup and so was not in use during the evaluation, but this is representative of normal operation. Internal monitoring records clearly showed a decrease in power usage by the pumps after the project. However, savings of 851,543 kWh were substantially less than the projected 2,084,400 kWh, resulting in a realization rate of only 41%.

The projected savings calculations were based upon 2004 data, which indicated 7,110 hours of operation and a total of 3,030,400 kWh/year energy use. Although the hours of operation are similar to those found for 2006-2008, the power data supplied by the facility systems indicated a substantially lower baseline usage of less than 2,000,000 kWh/year as shown in Figure E- 8. Conversely, the energy use projected by the study was 946,000 kWh/year, around 11% more than the verified amount. The project file indicated that the baseline energy use had been determined based upon equipment specifications, as the detailed monitoring system used for this analysis was not yet available.

It should be noted that although the realization rate is low, the incentive for this project was limited to 50% of project cost and the resulting incentive was substantially lower than it would have been based solely on estimated savings. The resulting incentive amounted to $0.22 per verified kWh savings.

Table E- 35 Project Site 19 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
VFD addition to condensate pumps	2,084,400	851,543	41%
Total	**2,084,400**	851,543	**41%**

Project Site 20

Project Site 20 was a small waste water treatment plant treating an average of 3.8 Mgd. A total of 870 HP of pumps and blowers are connected for operation. The facility operates 24 hours per day, 365 days a year, so some of the connected horsepower provides backup capacity.

Base Measures

The facility operated two 200 HP blowers with 20 HP for pond aeration during the seven summer months. During the operational season, the blowers ran continuously, 24 hours a day, seven days a week.

Neither the project file nor the facility could provide loading information for the blower motors prior to the retrofit. The file did not include either measurements of blower power consumption or of airflow and pressure differential.

Project Measures

The facility purchased one 75 HP Neuros blower and switched from coarse to fine bubble aeration. The Neuros blower is designed with air bearings and provides a higher level of efficiency and reliability than a standard blower. It can aerate two of the three aeration basins and provides an alternative to a standard 125 HP blower. When the third basin is brought online, one of the older 200 HP blowers is brought online as a backup, however, this is a rare occurrence.

The project file indicated two efficiency measures. In addition to replacing the blower, installing fine bubble diffusers, and adjusting the controls, a retrofit of the two 50 HP influent pump motors with premium efficiency units is listed. However, this would typically be a prescriptive measure and no indication that this was actually done is included in the file.

Project measures completed installation on December 1, 2007.

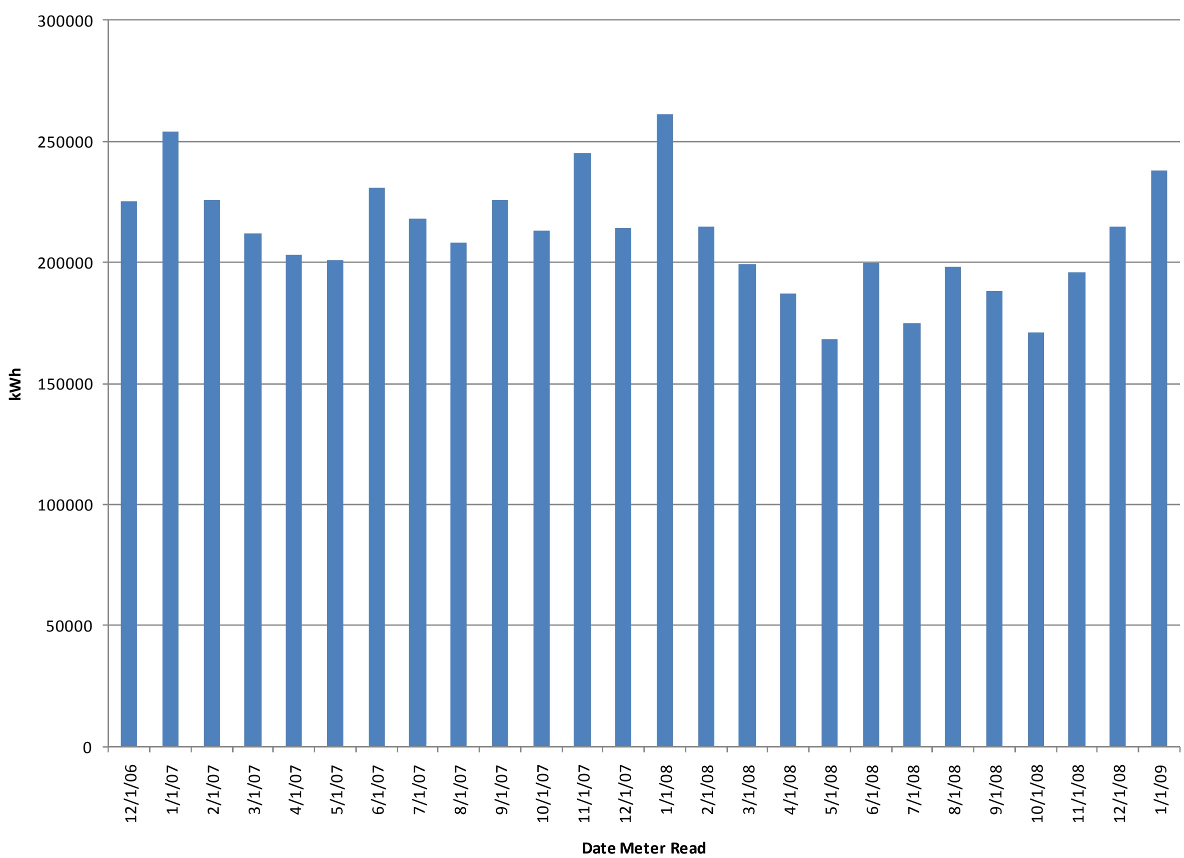
Measurement & Verification Methodology

During the site visit, Summit Blue discussed the use and installation of the new blower and aeration system. Spot measurements, internal monitoring equipment, and three weeks of logging all indicated the blower motor was consuming around a constant 27 kW of power. These activities took place on March 4, 2009, before the claimed seasonal use of the unit.

Although no loading information is available prior to the installation, if the previously existing 200 HP motors were 70% loaded at 90% efficiency, they would consume 265 kW if both were operating. This would amount to 190,800 kWh in a month of continuous operation, which would amount to almost the entire facility usage based on billing information. Given the presence of four 75 HP influent pumps, a lift station with two 75 HP and one 125 HP pumps, and two smaller 20 HP blowers, this is not realistic. The two 200 HP motors constitute only a quarter of the total connected horsepower and will not account for 90% of facility usage.

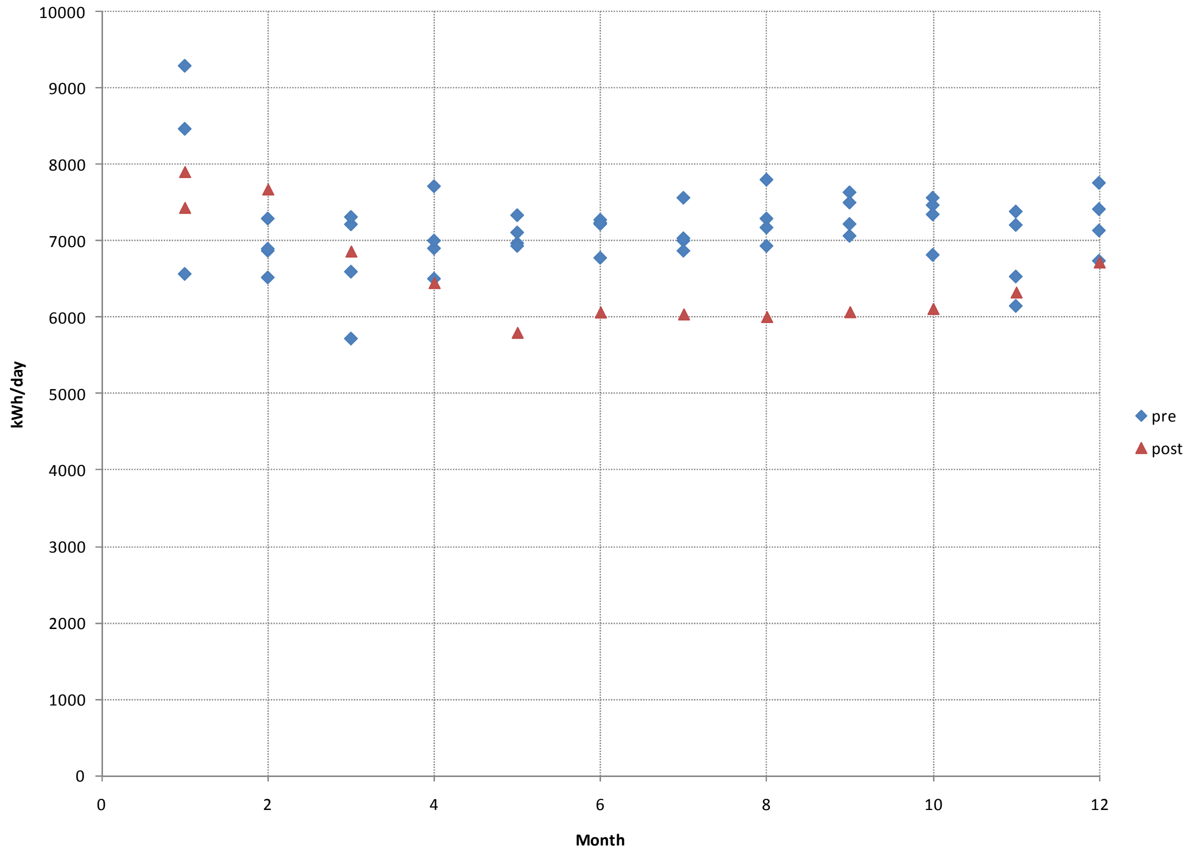
The application indicated annual savings of 1,425,295 kWh over eight months, or 178,162 kWh per each non-winter month. As shown in Figure E- 10, however, this is over eighty percent of the pre-installation seasonal average usage for the facility - which was 218,125 kWh/month between April and November in 2007. The calculation used for this savings was reviewed and several issues were noted. No loading factor or efficiency was included and both blowers were assumed to operate continuously, although facility personnel indicated that only one unit operated full time, with the second on only part time.

Figure E- 10 Project Site 20 Monthly Billing History



As seen in Figure E- 11, a notable drop in summertime usage did take place at the facility between 2007 and 2008 when the new aeration system was installed. Billing data from 2004 through 2007 was averaged to provide a baseline and compared to 2008 in the absence of available measurements of motor usage prior to the project installation. Since the blower was found to be operating in March, despite application indications to the contrary, and facility personnel did not indicate that it was typically shut off, the entire year of billing data was used for comparison. However, the old system's seasonal operation clearly contributed to the seasonal drop in usage at the facility. Since the old system was not operating in the winter, the savings is not seen in those months. However, no notable increase takes place either during that time.

Figure E- 11 Project Site 20 Monthly Power Use Before and After Installation



Evaluation Results

The new blower and aeration system save a substantial amount of power, and this is clearly seen on billing records. However, the 256,879 kWh of savings seen post installation is only 17% of the total expected savings. Additionally, there is no indication that the two 50 HP premium motors listed in savings calculations were actually included as part of this project.

Table E- 36 Project Site 20 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Replace Aeration Blowers	1,425,295	256,879	18%
Install Two 50HP Premium Efficiency Motors	55,673	0	0%
Total	**1,480,968**	**256,879**	**17%**

Project Site 21

Project Site 21 is a water treatment plant consisting of eight intake pumps which feed the plant, and six high service pumps which moves the treated water from the clear well out to the end users. The intake pumps range from 50 to 150 HP. Intake pumps #1 and #2 pump into a chamber. Intake pumps #4, #5, and #6 then pump from the chamber up to the treatment plant. Intake pumps #7 and #8 pump directly from the river up to the plant. The intake pumps delivery approximately 2 billion gallons of water to the plant annually.

The high service pumps range in size from125 – 500 HP, all of which pump from the clear well out into the system. The high service pumps deliver approximately 2.6 billion gallons of water into the distribution system and consume over 2.4 million kWh per year. All pumps are controlled through a SCADA system via pressure and clear well level set points.

Base Measures

Prior to participation in the Energy Trust's Production Efficiency Program, Site 21 operated with the following pumping system configuration:

Table E- 37 Pre-Installation Intake Pump Summary

Pump #	Pump HP	VFD (Y/N)	Age
Intake #1	50	No	1971
Intake #2	50	No	1971
Intake #3	60	No	1949
Intake #4	60	No	1949
Intake #5	100	No	1971
Intake #6	150	No	1971
Intake #7	150	No	1996
Intake #8	150	Yes	2004

Table E- 38 Pre-Installation High Service Pump Summary

Pump #	Pump HP	VFD (Y/N)	Age
High Service #1	125	No	1949
High Service #2	125	No	1949
High Service #4	250	No	1949
High Service #5	450	No	1971
High Service #6	450	No	1991
High Service #7	500	Yes	1996

As a secondary water treatment facility, Project Site 21 does not run continuously throughout the year. Interviews with site staff yielded the following operating schedule:

- Winter Schedule: 7:00 AM – 4:00 PM (Monday – Sunday)
- Summer Schedule: 4:00 AM – 9:30 PM (Monday – Sunday)

Project Measures

Through the Energy Trusts' Production Efficiency Program, Project Site 21 implemented the following measures:

1. Replaced High Service Pump #5 with a more efficient 450 HP Soft Start Pump
2. Added High Service Pump #8 with a VFD.
3. Re-configured pumping stages to optimize system performance.
4. The more efficient High Service Pump #8 is now used as a lead pump. High Service Pump #7 has been allocated as a lagger pump.

The primary objective of program participation was to prioritize facility upgrade elements for maximum energy efficiency. Because the demand for fresh water remains fairly consistent within each season, the operating schedule has not changed pre-/post-installation. The new pump configuration is as follows:

Table E- 39 Post-Installation Intake Pump Summary

Pump #	Pump HP	VFD (Y/N)	Age
Intake #1	50	No	1971
Intake #2	50	No	1971
Intake #3	60	No	1949
Intake #4	60	No	1949
Intake #5	100	No	1971
Intake #6	150	No	1971
Intake #7	150	No	1996
Intake #8	150	Yes	2004

Table E- 40 Post-Installation High Service Pump Summary

Pump #	Pump HP	VFD (Y/N)	Age
High Service #1	125	No	1949
High Service #2	125	No	1949
High Service #4	250	No	1949
High Service #5	450	No	2007
High Service #6	450	No	1991
High Service #7	500	Yes	1996
High Service #8	350	Yes	2007

The project completed installation on March 1, 2007

Measurement & Verification Methodology

On March 4, 2009, the evaluation staff met on-site to inspect the installed pumps. Summit Blue recognizes that Measurement & Verification strategies are dependent upon the accessibility of installed measures, and the availability of performance influencing data. Due to the high voltage characteristics of the equipment installed, spot measurements and run-time metering of the system components were deemed impractical. As a proxy, evaluation staff employed the following M&V approach:

1.) Visually confirm incentivized measures and pump staging configurations
2.) Assess billing data from the pre-/post- installation periods
3.) Assess water consumption data from the pre-/post-installation periods and correlate with billing data
4.) Investigate additional equipment/operational modifications to that may have affected system performance in the pre-/post-installation periods.

Through a review of the site's billing and water production data, it became clear that the kWh/Gallons Produced varied across each month. This can be attributed to the following factors:

- Amount of mud in the river water being pumped to the facility for processing (Turbidity)
- Reservoir capacity / demand from other plants (e.g. efficient pumps during low demand vs. efficient/non-efficient pumps at peak demand)
- River water height. Lift pumps operate more efficiently when the river is higher

Energy consumption was normalized to account for variations in demand across each year. First year savings were calculated by the following equation:

$$Energy\ Savings\ (kWh) = \Delta kWh_{gal}\ x\ Gal$$

Where:

ΔkWh_{gal}: Average difference between pre- and post-installation kWh/Gal

Gal: System demand for 2007

Evaluation Results

When normalized, billing data yielded savings that were lower than expected. Conversations with participant staff revealed that the optimization of pump sequencing is iterative and has not been completed since the retrofit measures were installed.

Table E- 41 Project Site 21 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Add High Service Pumps and Optimize Sequencing	396,449	37,993	10%
Total	**396,449**	**37,993**	**10%**

Project Site 22

Project Site 22 is a waste water treatment plant. A majority of site level energy consumption is attributed to the operation of aeration and digester blowers.

Base Measures

Prior to participation in the Energy Trust's Production Efficiency Program, Project Site 22 had (3) 10 HP, (3) 25 HP PD blowers for aeration in the activated sludge treatment, and (1) 30 HP PD blower for digester aeration. No process logic or automatic control functionality was available for the system. Flow and load pattern was diurnal, and facility management operated the system for air flow requirements at the highest loading period of the day (2-4 hours). This resulted in exaggerated aeration of the facility for the remaining hours.

Project Measures

Through the Energy Trusts' Production Efficiency Program, Project Site 22 implemented the following measures:

1. The facility aeration blower capacity was upgraded from (3) 10 HP positive displacement (PD) blowers by the addition of (3) 25 HP Roots/Sutorbilt PD blowers. Air delivery optimization was achieved by installing a locally controlled variable frequency drive on the most efficient 25 HP blower, and allowing the other (5) PD blowers to operate as lagging blowers with optimized and differing gear ratios.
2. Communication and control features were implemented on the existing 30 HP PD blower used for digester aeration. The blower was also re-sheaved to allow for a reduction in air output and power consumption.

The primary objective of program participation was to improve facility functionality, maintainability, and resource use profile.

Measure installation and controls implementation completed on December 1, 2007.

Measurement & Verification Methodology

On March 3, 2009, the evaluation team met with participant staff on-site to visually confirm installed equipment and controls, as well as to request facility usage and production records to support the evaluation effort. At that time, evaluation staff also confirmed that there were no major renovations or modifications to plant operating characteristics that would influence evaluation findings.

Spot measurements of installed equipment were not practical due to site level safety protocols. However, because these measures influence site-level energy consumption characteristics, a billing analysis was deemed practical for the purposes of evaluation. Pre- and post- installation consumption characteristics were compared to develop project savings estimates.

Evaluation Results

When normalized, billing data yielded annual savings amounting to 100,200 kWh. This value was lower than the expected savings due to an overestimation of reduced fan power consumption in the application.

Table E- 42 Project Site 22 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Add (3) 25 HP Blowers.	261,801	100,200	38%
Total	**261,801**	**100,200**	**38%**

Project Site 23

Project Site 23 was a metal shredding facility. There are a small office building and an industrial building used to house motors and equipment associated with the shredding process, but the actual shredding mechanism is not enclosed. The facility typically operated five days a week, for eight hours a day, although some days have longer operating hours.

Base Measures

The facility had a 110 ton/hour shredder and was looking to expand its capacity. The baseline option was to purchase a second, similar shredder with a 6,000 HP motor to double the plant capacity. Three electric meters were connected at the plant and 11,215,055 kWh/yr was being used by the facility at the time.

Prior to this project, the facility did not monitor shredder power. For the project study, energy use per ton processed was estimated by subtracting the two small meters from facility power use and 150,000 kWh/month from the main meter to account for non-shredder equipment such as lights. This was based on the non-production load of 200 kW and a peak load of 5,500 kW. The study determined the resulting energy use associated with the shredder was 7,904,815 kWh/year corresponding to 28.9 kW/ton for the 273,248 tons processed annually.

Project Measures

Instead of adding a second shredder, the facility replaced the existing unit with a 7,000 HP energy efficient unit. The new system included internal power use monitoring. Production was expected to increase to 336,000 tons/year, less than the doubled capacity used as a baseline, but a significant increase nevertheless.

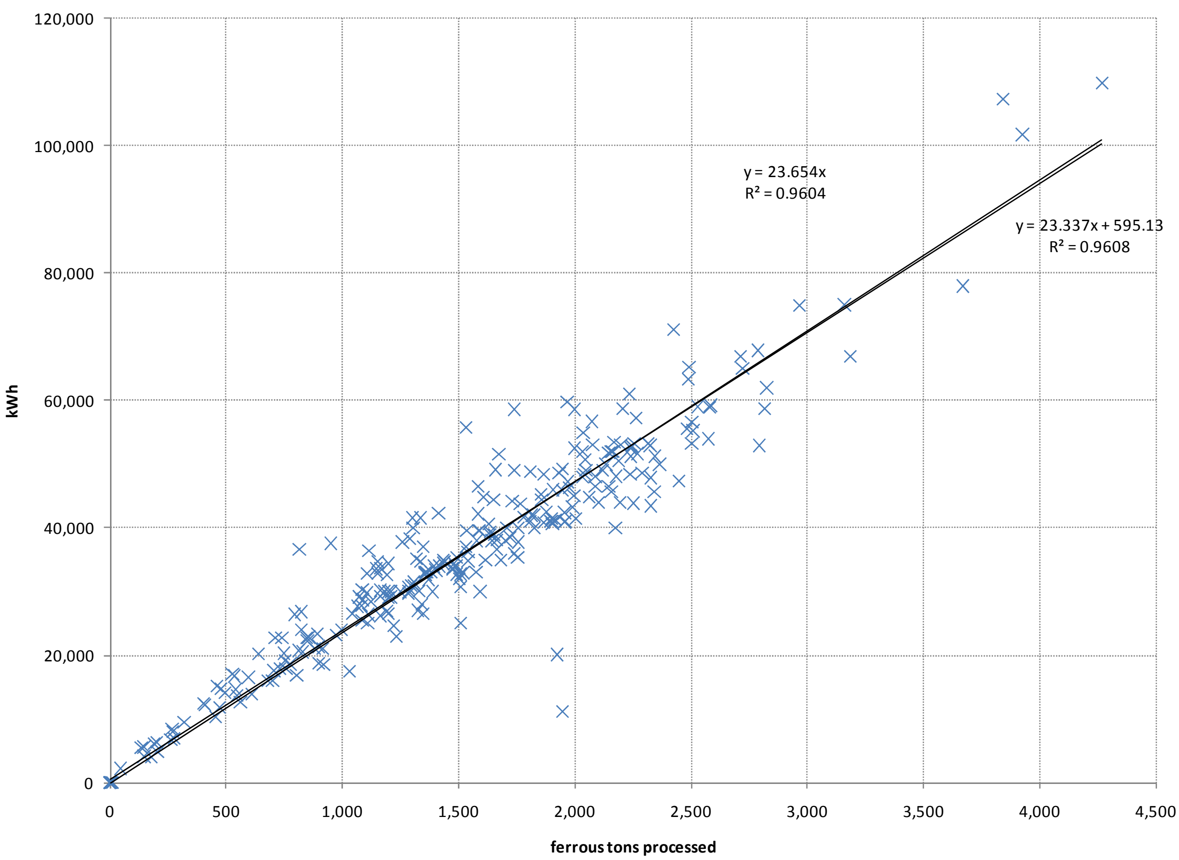
Project measure installations were completed on September 13, 2007.

Measurement & Verification Methodology

During the site visit on March 23, 2009, Summit Blue discussed the use and installation of the new shredder with facility personnel. Nameplate data from the shredder motor indicated it was the unit listed in the project file. The new system operated on three phase 4,160 V power so spot measurements and logging were not possible. However, an internal monitoring system was included in the system and Summit Blue obtained daily production data and system power use data from facility personnel. Pre-installation production and power data were not available from the system; however, Summit Blue reviewed the pre-installation report methodology and found the 28.9 kW/ton estimate of baseline power use to be reasonable.

Production for 2008 was found to be 344,129 tons, reasonably close to the predicted 336,000 tons used for project estimates. There were six days that showed significant power use but no production and these were removed from the sample and assumed to be associated with equipment maintenance or testing. Additionally, a few days either showed minimal power use and no production or, in the case of two recent days, production with no power use. These were also removed from the sample for calculation purposes. The remaining 440 days were used for a linear regression as shown in Figure E-12. As can be seen, a standard linear regression comes very close to a zero intercept, as would be expected. A straight average of the same data gives an average of 23.96 kWh/ton processed.

Figure E- 12 Shredder Power per Ton



The linear regression with the forced zero intercept was used to estimate power per ton for the new system. This was assumed to be the most accurate estimate, since zero shredder power for no operation should be expected and is seen on days with no production. This results in energy use of 23.65 kWh/ton, slightly more than the 22.8 kWh/ton predicted by the pre-installation study, but still significantly less than the baseline 28.9 kWh/ton. This was combined with the 2008 production of 344,129 tons to estimate new shredder energy use of 8,140,048 kWh. It should be noted that the actual 2008 use without the zero production days was 8,130,179 kWh and with them is 12,188,373 kWh. The six zero production days all showed significant usage, further implying testing was taking place.

Evaluation Results

The new shredder was found to be installed and operating as expected. Production hours for 2008 were slightly higher than projected but energy use per ton was slightly higher. The estimated energy use of 8,140,048 kWh was used for savings calculations as the longer term average was determined to be more representative of typical operation than simply using the 2008 total. This was compared to 9,945,328 kWh for 344,129 tons at 28.9 kWh/ton and resulted in savings of 1,805,281 kWh/year or an 88% realization rate for the project.

Table E- 43 Project Site 23 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
New 7000 HP shredder	2,050,015	1,805,281	88%
Total	**2,050,015**	**1,805,281**	**88%**

Project Site 24

Project Site 24 is a large paper mill project that has been in operation for more than one year. This project implemented a process measure to consolidate two productions lines into one to improve plant efficiency. Summit Blue evaluation staff interviewed the process engineer in charge of these projects on-site, and visually confirmed the measures were completed as described in the application. Due to the size and complexity of the production line, coupled with the operating voltages of the refiner machines, evaluation staff were unable to make independent measurements on equipment to confirm operating characteristics. However, the plant is extensively sub-metered by process and data from those tracking systems were given to the evaluation team for analysis.

EEM1 - Pulp Mill Fiber Line Consolidation

Prior to implementation of this measure the site had two main production fiber lines for converting wood chips and sawdust into paper pulp. One line was used exclusively for hardwoods and the other for softwoods. Due to different feed-stock consistencies and additives needed in the pulp-making process, the different wood types had to be handled separately given the existing controls and production configuration. Both lines were significantly oversized for the current production requirements, but production must be continuous *and* at a minimum rate; therefore, plant operators could not turn down the process throughput sufficiently to match site needs. Excess material was trucked to other paper making facilities or it was discarded.

Project measure installations were completed on August 1, 2007.

Table E- 44 Pre-Implementation Fiber Line Production Data

Process Area	Connected HP	Pulp Produced (Tons/Day)	MWh/Year	kWh/Ton
Hardwood Fiber Line	9,254	248	35,579	393
Softwood Fiber Line	15,146	380	53,044	382
Total	**24,400**	**628**	**88,623**	**387**

The process measure implemented controls and infrastructure changes so that one line could handle both types of feed-stock in sequence and in continuous feed operation so that the second line could be shut-down completely. The remaining production line could operate to match site demand for product without over-producing and wasting product. After implementation the line produced 13% less pulp than the two original lines with 31% less energy on a per ton produced basis. When data are adjusted to production changes, the measure achieved more than 24,105 MWh of savings, or 108% of anticipated savings.

Table E- 45 Project Site 24 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Line consolidation	22,214,150	24,105,388	108.5%
Total	**22,214,150**	**24,105,388**	**108.5%**

The site visit was completed on January 12, 2009.

Project Site 25

Project Site 25 is a paper mill, with a NAICS classification of Paper mills and paper product manufacturing. They produce a range of paper products of various weights and qualities. The site has 4 paper machines; however they are currently only operating one. Project Site 25 operates 24 hours per day, 7 days per week. The site performed energy saving maintenance to refiners on two of the paper machines. One of the refiners that received the upgrade is no longer in use; however it remains at the site and could eventually be moved or otherwise used in the future.

Base Measures

Refiners are used in the paper making process to reduce wood pulp to a desired consistency. The consistency determines properties of the final product. Refiners are upgraded on a scheduled basis. Upgrades include sharpening and aligning blades and other components and installation of floating rotors to reduce friction. The floating rotors are believed to achieve a 20% energy savings when the refiners are 80% loaded.

The first refiner is no longer in operation, so its baseline is 0.

Project Site 25 provided Summit Blue with logged data from their records over a three year time span including before and after the upgrade to the second refiner. This data included kW, hours, and tons produced for each batch of pulp produced. These data was used to calculate a baseline to predict what the energy use would be had the refiner not been upgraded. The following equation was use, summing over the product types that were produced both before and after the upgrade.

$$kWh_{\text{before}} = kW_{\text{before}} * hours_{\text{before}}$$

$$\textbf{\textit{Baseline (kWh)}} = \sum kWh * \sum ton_{after} / \sum ton_{before}$$

$$\textbf{\textit{Baseline (kWh)}} = 2{,}557{,}965 \text{ kWh}$$

The project completed on October 29th, 2007.

Measurement & Verification Methodology

On January 29th, 2009, the evaluation team met with Project Site 25 facility staff to verify the installed measures. Measurement and Verification Option A was employed to determine the savings. Logged data provided by Project Site 25 was used to determine current kWh/ton. Only products that were produced both before the retrofit and after were used in this calculation.

$$(kWh/ton)_{after} = kW_{after} * (hours_{after} / ton_{after})$$

Some products had a higher $(kWh/ton)_{before}$ while others had a higher $(kWh/ton)_{after.}$ The resulting kWh/ton were summed across the range of products and compared to the baseline to calculate savings.

$$\textbf{\textit{Current (kWh)}} = \sum (kWh * ton_{after})$$

$$\textbf{\textit{Current (kWh) = 2,579,448 kWh}}$$

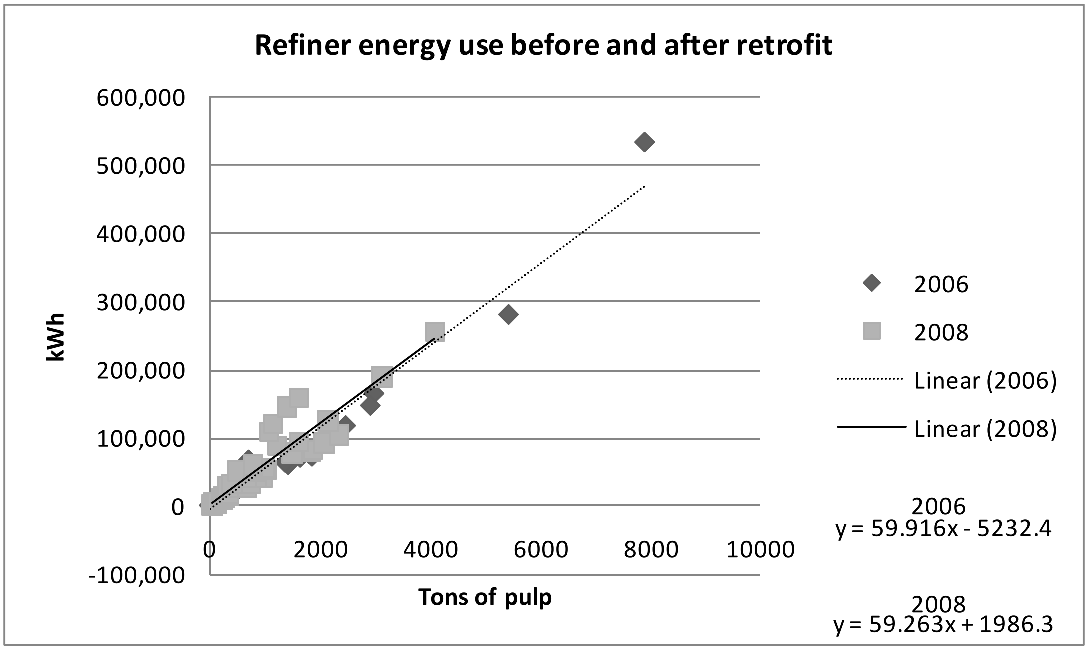
$$\text{Savings (kWh)} = \text{Baseline (kWh)} - \text{Current (kWh)}$$

$$\text{Savings} = 2{,}555{,}965 \text{ kWh} - 2{,}579{,}448 \text{ kWh} = -21{,}483 \text{ kWh}$$

The resulting savings is a negative value, indicating the refiner is using more energy to produce. This negative savings is within 1% of the overall energy use and is within the margin off typical power metering devices. Therefore it is assumed that the baseline and current energy use are equal and the savings for the second refiner project is 0 kWh.

If the expected 20% savings had been produced, it should be dramatic to be seen in energy calculations. In effort to further investigate possible errors in calculation, kWh is plotted as a function of tons of pulp produced across the full range of products, including those that were not produced both before and after the retrofit, in Figure E- 13. The data showed very little change before and after the retrofit. Energy use corresponds nearly linearly to tons. Figure E- 13 shows that the energy use per ton is negligibly changed from 2006 to 2008.

Figure E- 13 Project Site 25, Refiner project #2 energy for various products in 2006 and 2008



Evaluation Results

The first refiner project yielded 0 kWh savings, and thus a 0% realization rate because the refiner is no longer in use. If the refiner is moved or production is resumed on the paper machine that it provides pulp to, its savings may increase in the future.

The second refiner is not producing the expected savings. Its energy consumption before and after the retrofit and service is equivalent. It is unknown if there is another factor contributing to the poor performance. Table E- 46 provides a summary of the estimated and verified savings at Project Site 25. The final realization rate is 0%.

Table E- 46 Project Site 25 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Refiner #1	700,000	0	0%
Refiner #2	749,000	0	0%
Total	**1,449,000**	**0**	**0%**

Project Site 26

Project Site 26 was a paper production facility constructed in the late 19^{th} century. Three production lines are used to make different grades of paper. Two of these lines were affected by the Energy Trust project.

Base Measures

The facility operated a vacuum system for each paper machine. Paper machine 1 (PM#1) used six motors to operate its four vacuum pumps and two separators and paper machine 2 (PM#2) had five motors operating its five vacuum pumps. All the motors were designed to operate on 600 volt, three phase power system, although actual voltage was closer to 575 volts in most areas. The entire system totaled 2,188 HP.

The facility also uses a large number of motors. The majority of the motors are totally enclosed fan cooled units operating at 1800 RPM, although some are also 1200 RPM and they formerly used some open drip proof units as part of the vacuum system. The baseline is assumed to be a new, standard efficiency EPACT motor. As this is a prescriptive measure, standard savings values are used for calculations.

Project Measures

The facility performed an upgrade to the vacuum system in two stages. In stage 1four vacuum pumps, for the PM #1couch, PM#2 press and pick up roll, and PM#1 flatbox, and PM#2 couch , were installed and the old piping was demolished along with other site preparation work. The latter two pumps were not immediately demolished and tied into the system however. In stage 2, during the summer of 2007, the remaining old vacuum pumps were demolished and four more new pumps, two separators, and two new PM#1 Uhle boxes were installed. Additionally, the remaining two pumps from phase 1 were started up at this time. The ninth pump, for the PM#2 Uhle boxes, was left in place. Table E- 47 shows the list of vacuum pumps in the current system.

The project plan and post-installation verification reports both included savings from production increases and reduced compressed air as well as non-electric steam savings. The provided post-installation verification report included both phases 1 and 2, which were completed in 2007. Contrastingly, the summary page provided to support savings claims for the application did not include production and steam increases or compressed air savings. Instead it was based on only phase 1, including reduced seal water pumping to the new system but without production or compressed air savings, and used a significantly adjusted baseline to calculate savings.

Project measure installations were completed on November 15, 2007.

Table E- 47 Project Site 26 New Vacuum Pumps and Motors

Load	Measured kW	Annual kWh
PM1 1&2 Felts Uhle Pump	126	977,575
PM1 First Press Pump	110	909,469
PM1 Flat Box Pump	85.4	719,347
PM1 Couch Pump	253.7	2,461,643
PM1 Separator Pump #1	2.44	20,793
PM1 Separator Pump #2	1.8	16,505
PM2 First Press and Pick-up Roll Pump	219.3	1,781,059
PM2 1&2 Felt Uhle Pump (existing)	206.8	1,685,928

PM2 Flat Box Pump	60.7	454,533
PM2 Couch Pump Motor	346	2,461,093
PM2 Third Felt Pump	103.8	863,351
Total	**1,515.9**	**12,351,296**

The facility purchased a number of premium efficiency motors, and filed two separate applications for prescriptive incentives during 2007. Table E- 48 shows the incentivized motor purchases during 2007, grouped by application.

Table E- 48 Project Site 26 Prescriptive Motors

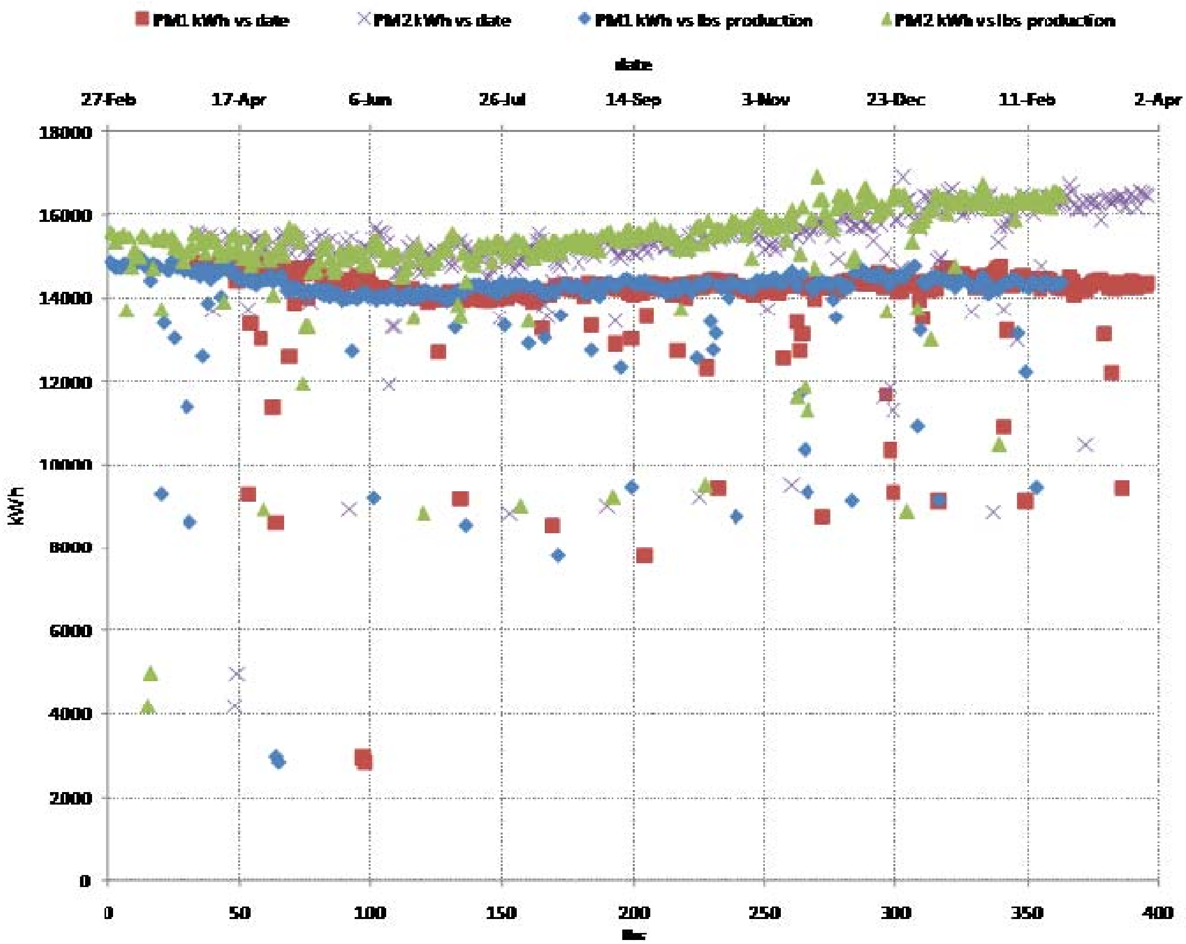
HP	Efficiency	Quantity	kWh Savings
1	86%	2	390
3	90%	3	1,494
5	90%	6	3,642
7.5	91.7%	3	3,348
10	92%	3	3,660
25	94%	4	11,036
30	93%	1	3,331
50	94%	1	5,328
75	95%	2	18,770
125	95%	1	16,113
150	95.8%	2	34,310
838.5		**27**	**101,422**

Measurement & Verification Methodology

During the site visit on April 6, 2009, Summit Blue discussed the use and installation of the new vacuum system with facility personnel. Summit Blue took spot measurements on all eleven of the currently installed loads at the MCC cabinets. The facility provided a year of daily average amperage measurements for the ten new loads in the system, however this was not available for the one older vacuum pump remaining in the installation. Instead a spot measurement was taken and usage was estimated using stated operational hours.

Facility personnel also provided production figures which were compared to energy use. However, as shown in Figure E- 14, there does not appear to be a significant change in power either with production or over time. Pre-installation production figures were not available beyond what was included in the reports provided to Energy Trust with the application. However, the reported pre-installation production speeds were compared to measurements taken occasionally over the past year to determine if any production increase had been achieved. Although there were inadequate data to determine this for PM2, PM1 showed a 2.7% increase in production. This was significantly less than the 6.4% claimed in the post-installation report, and has been taken as a conservative estimate. Production hours were also compared to claimed operational hours. Although production hours were slightly lower than the claimed 8,496 operational hours for the vacuum system or 8,640 for the compressed air system, since the equipment stays on during some downtime this appeared to be consistent and stated operational hours were accepted.

Figure E- 14 Power as a Function of Production and Date



Both compressed air and water pumping savings were estimated from data provided in the project file since on-site measurements were not practical. The main discrepancy noted in the file calculations was that motor loading was not accounted for in estimates. Summit Blue adjusted the calculations to include estimated motor loading. Typical pump loading of 70% was used for the water pumping and 80% was used for the compressed air system. Stated operational hours were reasonable based on production data.

Table E- 49 shows the summary of savings included in the verification by Summit Blue. Although neither the production increase nor the compressed air savings are included in the sheet used by the facility to provide savings on the application, they have been included here since they are documented in the project reports and are valid savings for the project. Additionally, although the application claims only phase 1 savings, all the verified numbers are for the combination of phases 1 and 2, since there was no way to separate the two during verification and no additional application had been filed for phase 2. The verification report included in the project file also estimates savings post-installation of both phases and so it is unclear why only phase 1 was included in the savings estimate on the application.

Table E- 49 Project Site 26 Vacuum System Upgrade Savings Breakdown

Savings Category	Baseline (kWh)	Verified Use (kWh)	Verified Savings (kWh)
Vacuum Pumps	13,296,655	12,351,296	945,359
Production Increase	based on vacuum pumps	2.7% production increase	360,121
Compressed Air Savings	1,085,548	814,161	271,387
Reduced Water Pumping	166,713	81,261	85,452
Total	**14,548,915**	**13,246,718**	**1,662,319**

Summit Blue personnel discussed the use and installation of the premium efficiency motors with facility personnel. It was determined that motors were purchased for immediate installation and new motors observed at the facility were premium efficiency units. Since this is a prescriptive measure, the standard savings were used for calculations.

Evaluation Results

All of the measures listed in the applications for 2007 were installed as expected. The overall projects at Site 27 realized only 57% of expected kWh savings, as shown in Table E- 50. This is primarily because the vacuum pump project realized only 54% of estimated savings. It should be noted that the application did not include the production increase, compressed air savings, or stage 2 of the project described in the file. All of these savings were included by Summit Blue in calculations since they were covered in the report, were verified at the site, and were not included in another rebate application to the Energy Trust. However, the baseline used by Summit Blue is primarily based on the original report instead of the summary sheet used for the final application savings values, which does not include supporting information.

All of the motors listed on both of the applications were believed to be at the site. Since these were all prescriptive incentives and all of the units appeared to be installed at the site, the savings were accepted at 101,422 kWh per year and the realization rate is determined to be 100%.

Table E- 50 Site 27 Estimated & Evaluated Savings

Measure	Estimated Savings (kWh)	Verified Savings (kWh)	Realization Rate (%)
Replace Vacuum Pumps	3,091,108	1,662,319	54%
Install Efficient Motors	101,422	101,422	100%
Total	**3,120,530**	**1,763,741**	**57%**

Project Site 27

To be included as an amendment to the Final Report

APPENDIX F: SITE-SPECIFIC MEASUREMENT AND VERIFICATION PLAN

SITE-SPECIFIC MEASUREMENT AND VERIFICATION PLAN

PROJECT SITE

DATE

SUMMARY INFORMATION

PROJECT

Program Being Evaluated	
Project ID	
Company Name	
Site Name	
Site Address	
Site Type	
Company Business/Product	

PRINCIPAL SITE CONTACT

Name		**Telephone**	
E-mail		**Title**	

ASSIGNED LEAD ENGINEER

Name	

AUTHOR

Name	

GOALS AND OBJECTIVES

This M&V Plan is part of the impact evaluation of the Production Efficiency Program. The primary goal of the impact evaluation is to assess the net program-specific energy and demand impacts for the various projects implemented in the 2007 Program Year

More specifically, the objectives of the impact evaluation are to:

- Determine the impacts of all retrofit measures and activities on annual gross energy and peak demand, while accounting for interactions among them.
- Establish post-implementation performance profiles for installed measures and activities.
- Account for the energy and peak-demand effects of spillover at this site, if applicable.
- Explain discrepancies between the results of this study and the ex-ante savings estimates.

MEASURE DESCRIPTION

Measures Included in the Evaluation

Program Measure Number	System	Measure Name	Measure Description
M1			

Annual Measure Savings

Project Measure Number	Electric		Gas		% of Total Savings
	kWh/Yr	Peak kW	Therms Input Cooling	Therms Input Heating	
M1					

Impact Type

Baseline Type

Sample Type

Pre-Installation Equipment and Operation

Program Measure Number	Equipment and Operation – Pre-installation
M1	

As-Built Equipment and Operation

Program Measure Number	Equipment and Operation – As-Built
M1	

Seasonal Variability in Schedule and Production

ALGORITHMS FOR ESTIMATING SAVINGS

Ex-Ante Algorithms

Evaluation Measure Number	Algorithm
M1	

Level of Rigor in Evaluation

Energy Savings Algorithms Used in the Evaluation

Evaluation Measure Number	Algorithm
M1	

Peak Demand Algorithms Used in the Evaluation

Evaluation Measure Number	Algorithm
M1	

DATA COLLECTION

Site-Specific Parameters and Data-Collection Methods

Evaluation Measure Number	Site-Specific Parameters
M1	

Sampling Strategy

Evaluation Measure Number	Sampling Strategy
M1	The evaluation will be based on a census of affected equipment.

Data Accuracy

Quality Assurance Procedures

Uncertainties

Data Products

Data Reporting Formats

Supporting Data for this Plan

All files referenced in this plan are attached.

APPENDIX G: EX-POST ADJUSTED ESTIMATES BY INDUSTRY (NAICS)

Ex-Post Adjusted Estimates by Industry (NAICS)

Realized Savings by Industry

Table G-1, below, provides gross realized savings and realization rates across each unique NAICS industry within the 2007 Product Efficiency Program participant universe.

Table G- 1. PY 2007 Production Efficiency Savings by Industry (NAICS)

Industry (NAICS)	Number of Program Participants by NAICS Code	Evaluation Sample Project Count	Percentage of Total Program Working Savings	Percentage of Evaluation Sample Working Savings	Evaluation Sample Working Savings (kWh)	Evaluation Sample Verified Savings (kWh)	Industry Realization Rate	Total Program Working Savings (kWh)	Total Program Verified Savings (kWh)
Cold Storage	4	4	7%	8%	8,689,266	10,028,303	115%	8,689,266	10,028,303
Computers and Electronic Manufacturing	5	1	2%	2%	2,299,244	2,299,244	100%	2,526,494	2,526,494
Food Products	25	2	2%	1%	837,346	965,902	115%	2,985,629	3,444,006
Other	82	10	7%	3%	3,599,843	3,285,881	91%	9,096,966	8,303,570
Paper Mills and Paper Product Manufacturing	8	7	22%	25%	26,855,680	25,869,129	96%	26,922,590	25,933,581
Utilities	9	5	5%	5%	5,413,546	1,326,015	24%	5,687,022	1,393,001
Wood Products	62	20	9%	5%	5,052,477	4,731,158	94%	11,150,275	10,441,158
Industry Total	***195***	***49***	***55%***	***49%***	***52,747,402***	***48,505,632***	***92%***	***67,058,242***	***62,070,114***
Mega Projects									
Paper Mills and Paper Product Manufacturing	1	1	45%	50%	54,634,752	TBD	TBD	54,634,752	TBD
Mega Project Total	***1***	***1***	**45%**	***50%***	***54,634,752***	***TBD***	***TBD***	***54,634,752***	***TBD***

As illustrated in Figure G-1, wood products and paper manufacturing have historically accounted for a majority of Program working and realized savings. In 2007, 67% of working savings were attributed to the “Paper Mills and Paper Product Manufacturing” industry, 45% of which was attributed to the standalone Mega Project.

Figure G- 1. Cumulative Industry Working Savings from PY 2003 – 2008, Excluding Mega Projects

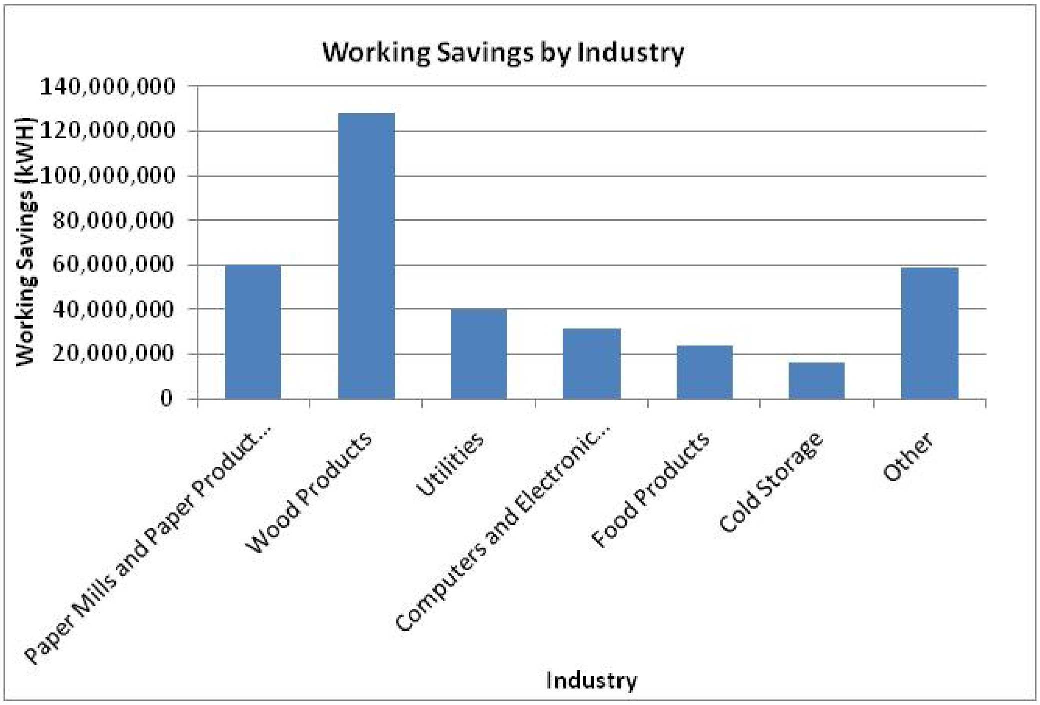
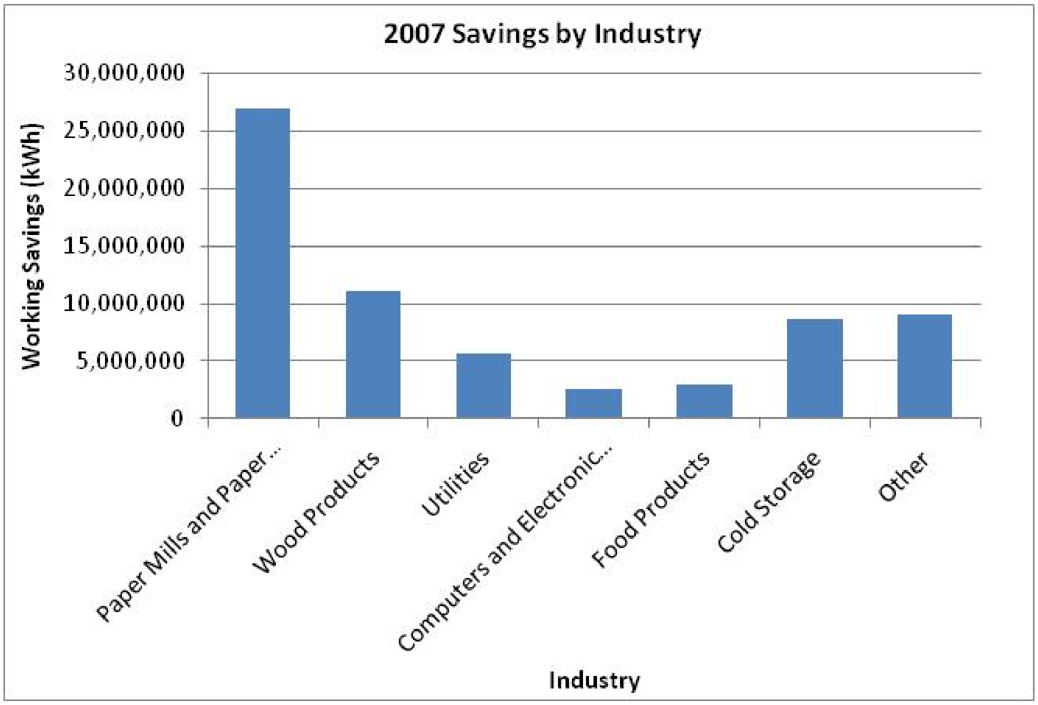


Figure G-2 details working savings for PY 2007, showing a clear trend between current and past program implementation characteristics:

Figure G- 2. Distribution of Working Savings in 2007 by Market Sector, Excluding the Mega Project



Excluding the Mega Project, the Paper Mills and Paper Product Manufacturing sector accounted for 40% of PY 2007 working savings, 51% of evaluation sample working savings, and 42% of verified industry savings. The overall evaluated industry realization rate totaled 93%.

Figure G-2 presents the expected industrial sector technical potential saving in 2027 (average MW) by segment from the *Energy Efficiency and Conservation Measure Resource Assessment for the Years 2008-2027* report[33]. This study was intended to provide the Energy Trust with the amount and cost of potential energy efficiency and renewable energy measures that could provide electricity and natural gas demand-side savings for Oregon consumers by 2027 within the Energy Trust service territory.

Although the industry segmentation differs from the NAICS codes used in the impact study, overall evaluation findings have not correlated closely with the distribution of potential savings by market segment. We recommend future evaluation efforts to continue reviewing the performance of each market segment relative to past and present evaluation findings to identify potential causes of discrepancy (e.g., barriers to adoption, lack of awareness, etc.).

[33] Stellar Processes and Ecotope, Energy Efficiency and Conservation Measure Resources Assessment for the Years 2008 – 2027, October 31, 2008

Table G- 2. Expected Industrial Sector Technical Potential Savings in 2027

Segment	Consumption, (aMW)[34]	Potential Savings (aMW)	Savings Fraction
Electronics	465	153	33%
Wood Products	112	48	43%
Paper	239	16	7%
Food	62	4	6%
Other	242	10	4%
Primary Metal	145	26	18%
Fabricated Metal	31	2	6%
Agriculture	74	39	53%
Street and Area Lighting	36	7	20%
Total	1405	305	22%

[34] Average Mega-Watt