

An Effective Approach to Reaching Savings at Small Industrial Sites

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ABSTRACT

In 2008, the Energy Trust of Oregon, Inc. (Energy Trust) began to develop and implement an initiative targeted towards small industrial and agricultural sites. Energy Trust already had a well-established, successful program that built strong relationships with larger industrial sites by using engineers in the field to audit, identify, and study potential custom energy efficiency measures. This approach, however, was not a cost-effective approach to reaching energy saving opportunities at smaller sites where the energy usage and potential savings opportunities were proportionately smaller. Energy Trust wished to serve these sites and offer solutions across our service territory regardless of size or location, but needed a new approach to do so. The new approach relied upon compressed air and irrigation equipment vendors, who were already in the field working with these smaller sites, as well as a suite of simple prescriptive and calculation-based tools that integrated the vendor's sale process with Energy Trust's program needs. This initiative was previously presented in the 2009 ACEEE Summer Study after just over one year of development and implementation. This paper will expand upon that, discussing accomplishments to date, additional challenges and lessons learned, as well as the surprising role the small industrial initiative has played now that it has been a part of Energy Trust's industrial program for three years.

Background

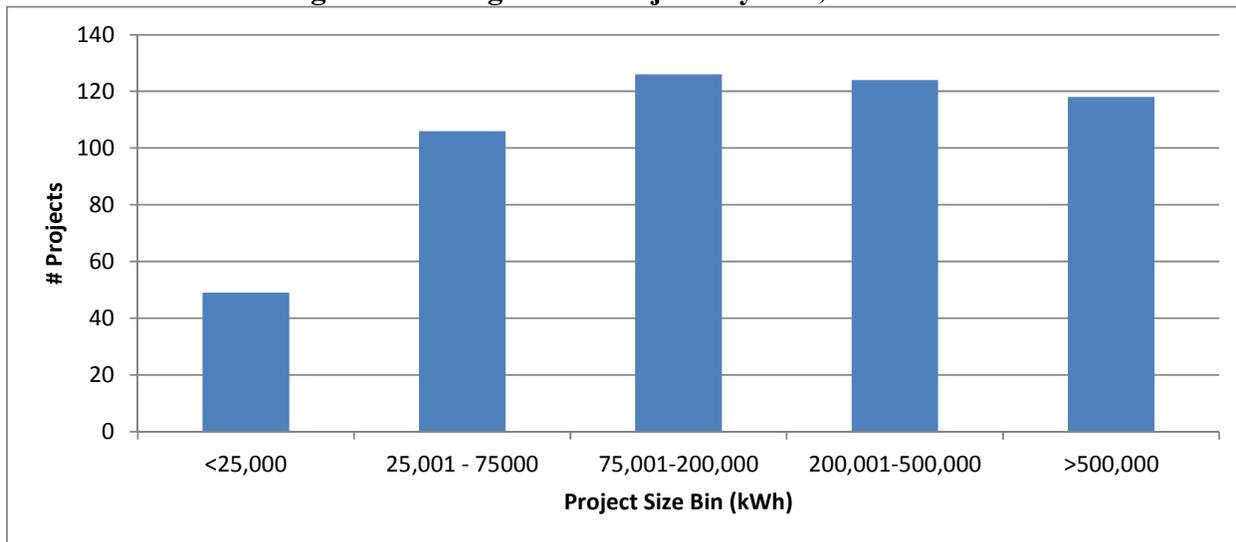
Energy Trust serves residents in Oregon who are customers of Portland General Electric, Pacific Power, NW Natural gas, and Cascade Natural Gas. Energy Trust consists of three distinct programs serving three distinct markets: Residential, Commercial, and Industrial.

Energy Trust divides its approach to capital industrial projects into two categories: Large and Small. Large projects involve things like refrigeration upgrades in 1,000,000 ft² warehouses or adding variable frequency drives to 1,000 hp motors. Small projects involve things like variable frequency drives on 50 hp air compressors, or replacing all the worn sprinklers in an irrigation system.

A large industrial project saves on average 400,000 kWh per year, valued at around \$30,000 per year in energy cost savings. For projects of this size and scope, it makes sense to employ a process involving detailed technical studies and data logging. The Energy Trust model employs delivery personnel who work closely with site personnel on an ongoing basis to identify potential projects within a facility and usher them through the administrative and analysis processes. Skilled engineers are contracted to accurately calculate energy savings. A typical project may take from four months to two years to complete. This mode of delivery has proven to be cost effective for such projects, with a levelized cost of about \$.016 per kWh saved. Levelized cost is defined as the cost per kWh divided by the average measure life. For most industrial measures, the measure life is ten years.

A small industrial project saves on average 40,000 kWh per year, valued at around \$3,000 per year. Small industrial projects are simpler than large projects, and owners expect them to happen quickly, too. Given the shorter timelines, and lower energy savings, small projects just can't be done cost-effectively using the model employed on larger projects. Not surprisingly, before the small industrial initiative began, small projects just didn't happen very often. See Figure 1 for a histogram of projects completed by size through 2007.

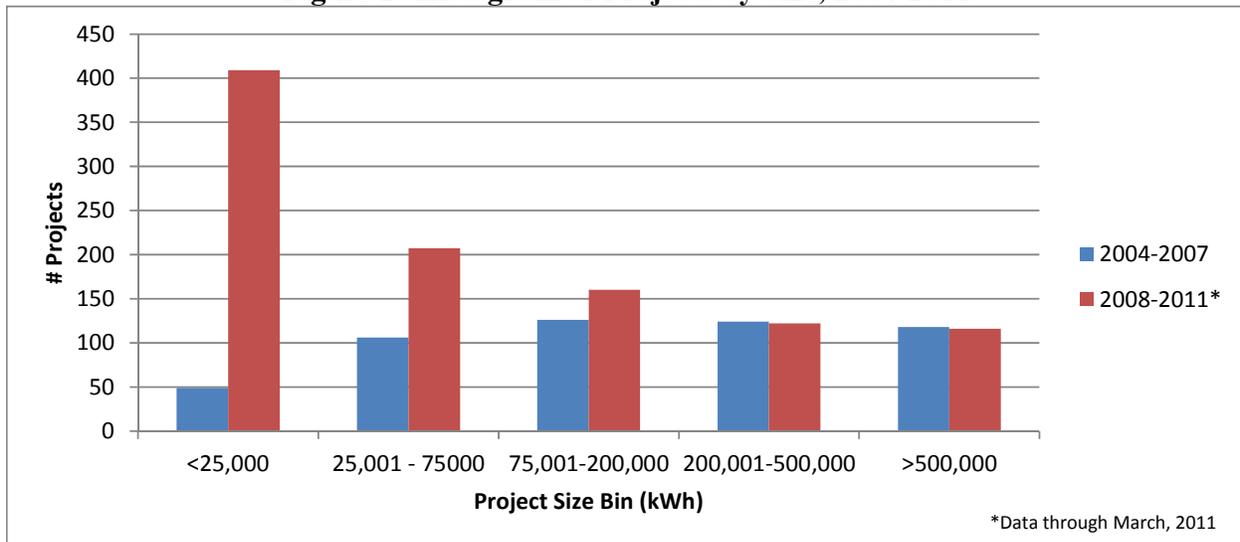
Figure 1: Histogram of Projects by Size, 2004-2007



Why do we care whether or not small projects happen? There are two reasons. First, it makes sense to pursue any cost-effective energy savings and significant savings can be achieved through large numbers of smaller projects. The second reason has to do with how the Energy Trust program is funded. Utility customers in the region pay a public purpose charge on their bill which funds Energy Trust's incentives. Even the smallest customers pay this charge and Energy Trust strives to serve all customers who help fund its program.

Since 2008, the Small Industrial Initiative has completed 700 projects, saving 16,000,000 kWh and 480,000 therms of natural gas. The initiative streamlined the administrative and analysis processes, and relies on vendors to find projects and gather most of the needed information. Projects can be approved very quickly, and the total average project length—from initial application to issuance of incentive check—is less than four months. This results in happy end-customers, and vendors who are eager to participate in the program. See Figure 2 for a histogram of projects since the Small Industrial Initiative began. These projects are also cost effective, with a levelized cost of about \$.024 per kWh.

Figure 2: Histogram of Projects by Size, 2004-2011



Offering

For custom projects -- those for which there are not deemed savings values and incentives -- Energy Trust offers incentives of \$0.25 per kWh saved and \$1.50 per natural gas therm saved, up to 50% of project cost. This applies to larger custom projects as well as projects in the small industrial initiative. Energy Trust also offers a number of prescriptive incentives, which are a fixed incentive per item.

The Small Industrial Initiative focuses on measures and markets which are common and relatively easy to access and analyze. The intention is to find measures which can be simplified - often after a fairly detailed analysis up front to fully characterize the measure. Once the measure is understood and the analysis simplified, then the analysis can be easily repeated for later projects. Often, only a subset of possible measures will become eligible for small industrial. For example, horsepower size limits are used to help separate complex VFD projects from simpler ones. Overly complex opportunities are passed on to “Large” industrial, or declined altogether due to not being cost-effective.

Calculated Savings incentives are available for:

- Variable frequency drives on air compressors up to 125 HP
- Variable frequency drives on irrigation pumps up to 150 HP
- System changeout of irrigation equipment (conversion to drip, etc.)
- Pump replacement or consolidation (replacing multiple pumps with fewer pumps)
- Welder replacement
- Greenhouse envelope upgrades

Prescriptive incentives are available for:

- Irrigation sprinkler and gasket replacement
- High efficiency boilers
- Greenhouse infrared polyethylene

- Greenhouse heating upgrades
- Roof, wall, attic, and pipe insulation
- Radiant heaters

Outreach and Marketing

To keep delivery costs lean, the Initiative relies primarily on other entities to find potential projects.

Vendors

Vendors have the most motivation to get out into the field and make contact with customers. They also recognize that anything they can do to reduce the cost of the item they are selling increases the likelihood of making a sale. Our incentives can make their products more affordable. We closely team up with vendors and rely on them to help us tweak our offerings to better fit customer needs.

Vendors receive training about the Energy Trust program, analysis tools, and administrative processes. Those who wish can sign up to become Energy Trust “Trade Allies.”- which gives them permission to use Energy Trust logos on their own advertisements and a listing on the Energy Trust website. We often co-participate with Trade Allies at trade shows, giving a presence in their booths and being on hand to answer questions from their customers about the Energy Trust program. Energy Trust offers a cooperative marketing program that pays for a portion of Trade Allies’ advertising costs if they include Energy Trust logos.

Trade Associations and Other Project Funding Sources

In addition to vendors, another way to reach end customers is through trade associations. Presentations at meetings of trade associations are a time-effective way to spread the word about the program, and are welcomed by associations as a way to provide a service to their members. Building relationships with other funders can be a good way to find projects as well. The Department of Agriculture, the Department of Energy, and local Conservation Districts can all identify projects, many of which will qualify for more than one source of funding, making projects more likely to happen.

Other Energy Efficiency Programs or Departments

We maintain a close relationship with regional personnel who are delivering other programs with Energy Trust. The commercial program often finds leads that fit well into Small Industrial, as does the program serving larger customers.

Process

Process in General

The key element needed for small projects to work is the right process. Because the value to the end customer of completing a project is relatively small, the process must be simple and

fast. At the same time, the process must conform to Energy Trust's procedural and cost-effectiveness policies. It is helpful to consider the process from three perspectives: the end customer, the vendor, and the program.

The Customer Perspective

The customer wants to save energy and participate in the program. However, they must consider the value of the incentive against the amount of time and effort required to participate. Since incentives for smaller projects tend to be small, the effort that the process requires of the customer should be minimized. In addition, the process must be timely. Customers are willing to wait days -- not months -- to find out if they are approved for an incentive.

The Vendor Perspective

The vendor's primary motivation is to sell his or her equipment. They are willing to collect necessary project information and help with analysis as long as these activities do not take too much time or effort. If they can package the incentive program as a service to their customer, then they are more likely to help their customers participate.

The Program Perspective

The primary goal of the program is to achieve energy savings, with a strong second priority of maintaining a good rapport with all customers. In addition, the program must adhere to various regulatory requirements and be cost-effective.

In short, the process should achieve:

- Satisfied end customers, who will consider participating in the program again
- Satisfied vendors, who will continue bringing in new projects
- Compliance with regulatory requirements
- Cost-effective energy savings – about \$.024 / kWh.

Energy Trust Process

Energy Trust projects generally begin with a vendor talking to a customer. The vendor gathers the information needed to complete the administrative and analysis elements of the project. The vendor enters this information into an Excel-based tool which is provided by Energy Trust. The tool determines eligibility, estimates energy savings, and provides payback information. Generally, the information needed to complete the tool can be gathered in person in one visit, or over a phone call or two. If the customer wishes to move forward, the vendor sends the tool to Energy Trust staff to review. Assuming everything looks good, Energy Trust staff can create an application from the Excel tool by running a simple macro. The application is pre-filled from information entered into the tool and signed by Energy Trust staff. Usually the end customer only needs to sign and return it. The project may then proceed. The entire process of data gathering, tool completion, and application completion can be done in just a few hours, though 3-5 days is more common.

When the project is complete, the customer or vendor informs Energy Trust staff, and a simple pre-filled project closeout form is generated from the Excel tool. The customer signs that and returns it with copies of their project invoices to Energy Trust, and an incentive check is mailed.

Analysis Philosophy

Simple, concise analysis is needed to allow small projects to work. It is not cost-effective to spend days or months logging data and developing analysis models for each individual project. Therefore, only project types which can be analyzed in a fairly simple manner are included in the small industrial initiative. Operating conditions are collected via simple observation or interviews with site personnel. Because this method of data collection allows for some uncertainty, values used in analysis are always chosen from the more conservative end of the spectrum. Baseline energy use estimates can be compared to recent power bills to make sure the savings analysis is in the right neighborhood.

Calculator tools are developed for the most common analysis types, such as air compressor VFD, irrigation pump VFD, or irrigation system change out. These tools are simplified as much as possible to allow vendors to easily complete them. Often, assumptions are made in the background to make the completion of the tool more appealing and less daunting.

Prescriptive measures are also employed where they make sense. Small, inexpensive items such as low pressure sprinkler heads are a great fit for prescriptive incentives.

Administrative Philosophy

Over the course of any project, it is necessary to gather information, get approvals, and close out projects. For small projects, these elements must be simplified and relatively painless for all parties in order to maintain customer and vendor involvement, keep delivery cost effective, and attract new projects.

Completing long, confusing applications can be a major obstacle to getting projects done. Customers often cannot find the time for this effort. In the Small Industrial Initiative, end customers encounter paperwork just twice; once at the beginning of the project to sign an application and complete a W-9 for tax purposes, and once at the end of the project to close the project and send invoices. Since most of the paperwork is pre-filled, the total time required by the end customer can be less than 15 minutes.

Approvals are quick, too. For projects with incentives less than \$10,000, only one approval is needed. Larger projects get two approvals, which could add up to a day to the process. There are very few applicable regulatory conditions for small projects, which also helps speed approvals.

Measurement and Verification is also simplified for smaller projects. About 10%--randomly chosen-- get inspected at closeout. The inspection for smaller projects usually involves verification that the upgrade is installed and working, and verification of a few key setpoints. Generally, data-logging is not required. Some projects are also inspected at a later date as part of an overall program evaluation.

An important element of success is that the administrative process fits with the vendors' sales process. This makes the vendors more likely to participate in the program.

Results

Since 2008, the Energy Trust small industrial initiative has completed over 300 calculated-savings projects, and processed over 400 prescriptive rebate applications. The initiative has helped save over 16,000,000 kWh in electricity. Figures 3 and 4 offer some more detail about the results.

Figure 3: 2008-2011 kWh Savings, Calculated Savings vs. Prescriptive

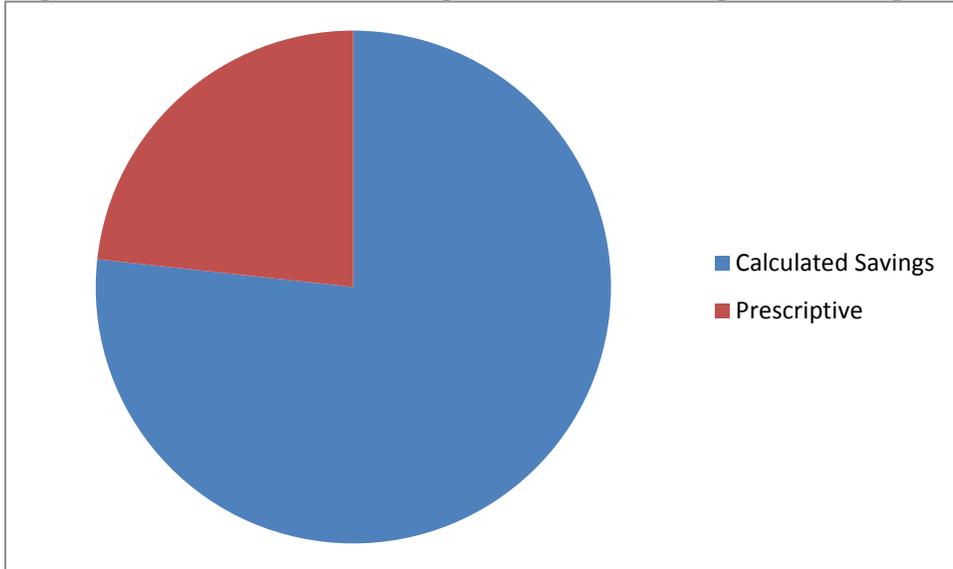
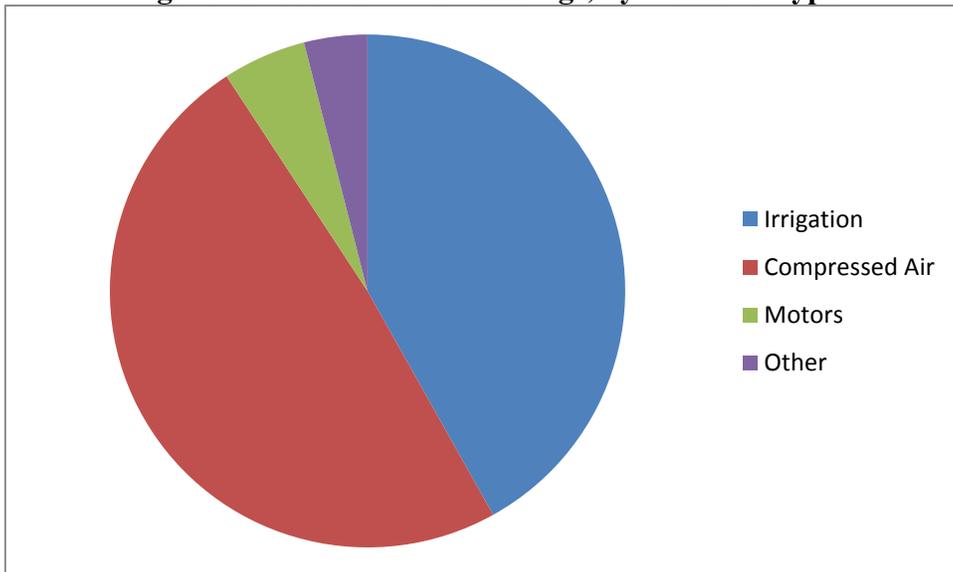


Figure 4: 2008-2011 kWh Savings, by Measure Type



Lessons Learned

The small industrial initiative is ever-evolving. We are always looking for ways to achieve more savings in current markets and to achieve new savings in new markets. It may be helpful to look at what elements of the program have been successful, and where challenges may still exist.

Successes to Date

- A simplified administrative process
- Savings in compressed air and irrigation markets
- Trade ally-focused marketing and relationship building
- Greenhouse/nursery market for natural gas
- Prescriptive measures for irrigation sprinklers

The compressed air market has been relatively easy to address because the vendors already think in terms of energy, and they are also more technically savvy, allowing them to more easily utilize the Energy Trust calculator tool to estimate savings and incentives. In addition, there are simply many cases where air compressors can operate at partial load, taking advantage of VFD technology.

Calculated savings projects in irrigation have been popular. Again, there are many opportunities where partial load operation could take advantage of VFDs. In addition, irrigation is usually the biggest electricity cost for a farm. The owner of the farm is usually the project owner, and they are motivated to save energy and money. Here, it is most important for the application process to be simplified, since the farm owner is often too busy to spend much time completing it. Program staff need to speak the language of the farmer to most effectively gather relevant system information.

Prescriptive savings in irrigation have been very popular, accounting for half of all irrigation savings in 2010. These measures have worked well because they are applied to very common items such as sprinklers, gaskets, regulators, and pipe repair. These are items that are generally easy to replace, and it's often visible to the grower when they wear out and start leaking.

Challenges

- Finding savings in dairies, wineries, or welders
- Prescriptive measures for compressed air
- Less savvy vendors

While we have served the irrigation and pumping needs of dairies, it has been more difficult to serve their other needs, including refrigeration, lighting, and ventilation. This has been partly due to the poor dairy market in recent years and also partly due to limited interest from dairy vendors in the region.

Although we offer a tool for calculating savings for upgrading from transformer to inverter welders, there has been few new welder projects. This is because very long welding hours are required to qualify for savings, and few projects have qualified.

We offer prescriptive measures for air compressor systems for increased receiver capacity, zero loss drains, cycling refrigerated dryers, and low pressure loss filters. However, these measures have not been popular. This may be due to the fact that the vendors are not pushing these items. Their focus is on larger, capital sales. In addition, these items are often installed once and not regularly replaced -- a big difference from the successful irrigation measures which deal with items that are more likely to be replaced due to wear.

In several markets, we deal with vendors who are less technically savvy. These vendors may not understand the fundamentals of energy use in their systems. In addition, they are less likely to use Excel, or even E-Mail. These vendors tend to require more hand-holding to complete projects. However, they also offer a great opportunity to help educate and transform that market by producing more knowledgeable vendors.

Summary

The Energy Trust program is funded by a public purpose charge paid by all utility customers of Portland General Electric and Pacific Power. The program has traditionally been very good at serving residential, commercial, and very large industrial customers. However, Energy Trust staff recognized in 2007 that small industrial and agricultural customers were underserved by the offering at that time.

In 2008, the Small Industrial Initiative kicked off and since then, the program has served over 650 customers and saved 16,000,000 kWh and 480,000 therms of natural gas. One key success of the program has been the ability to cost-effectively serve smaller customers -- something that wasn't happening before.

Lean operation allows the program to remain cost-effective. Vendors are used to identify projects and provide information needed for administration and analysis. Program staff review analyses, generate paperwork, and continuously work on new measures and finding new markets. The program employs around 3 full time employees—Some in-house and some contracted.

Energy Trust is very happy with the savings results the initiative has generated to date, and even happier with the role that the initiative plays in a portfolio of offerings that allows Energy Trust to serve *all* potential customers.