# Leveraging Senior Executive Engagement, Long Term Performance Incentives And Energy Data Mining To Achieve Significant Savings And Sustainable Energy Management Practices For Large Customers

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**ABSTRACT**

Although the U.S. industrial sector has halved its energy intensity since 1970, there continues to be a huge opportunity for energy savings in this sector, as it still accounts for 30 percent of energy consumption in the U.S. There is potential to cost effectively reduce energy consumption by 21 percent from a 2008 baseline over the next decade. To tap this opportunity, the challenge for states and utilities is to design and deliver multi-fuel energy efficiency programs.

This paper explores Xcel Energy's Process Efficiency program as a customized, holistic approach that leverages partnerships and relationships throughout the customer's organization to achieve energy savings. The approach helps customers identify and overcome the unique barriers that large organizations typically face when developing and implementing energy efficiency plans. The phased program successfully balances customer commitment and resources to deliver one of the most cost effective programs in Xcel Energy's multistate portfolio.

The program's collaboration with customers, service providers and the utility starts by engaging and leveraging senior executives to explore core business practices and policies regarding energy. Energy data mining, energy mapping, and technical studies utilize data visualization techniques to help customers understand complex energy issues in a simple comprehensible manner. This helps to identify, explain, prioritize, and build support needed for a credible and continuous implementation plan for energy improvement. Ongoing performance incentives help ensure engagement as customers drive efficiency deeper into their processes and practices. Customizing the approach helps achieve high satisfaction levels and sustained program influence, as found during a 2012 program process and impact evaluation.

Energy reductions of 7-15% over multiple years in diverse industry sectors have been achieved with this program. Lessons learned from 7+ years of delivering this award winning, concierge style approach to energy efficiency for large, complex customers can be effectively transferred to medium and small customers as well as commercial and institutional markets.

## Introduction

As of 2011, the energy consumption from the US industrial sector represented about a third of the total US delivered energy at about 24 quadrillion Btu. Current expectations show growth of 16% to 27.35 quadrillion Btu in 2035 (US Energy Information Administration 2013). The potential to achieve cost effective energy savings in this sector has been estimated to be 21% from a projected 2020 baseline of 28.3 quadrillion Btu (McKinsey & Co 2009). However, even

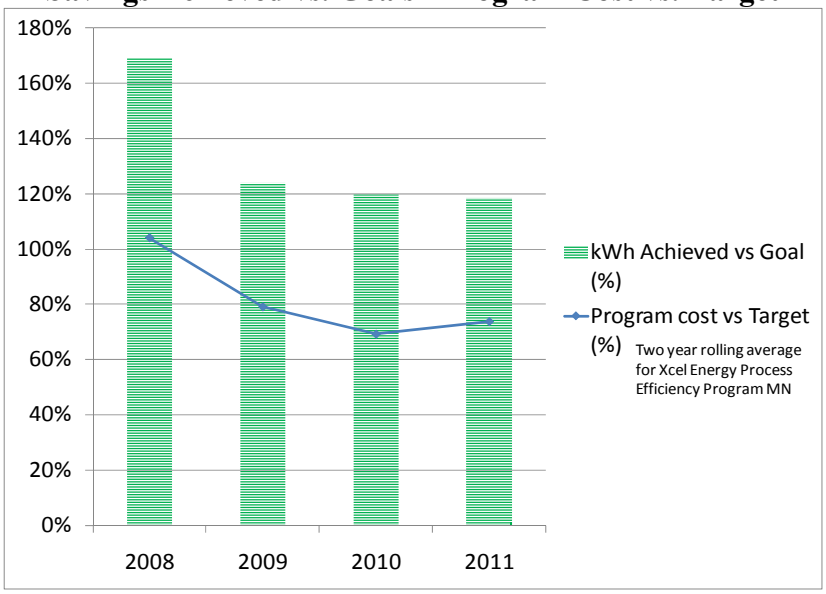
with potential of this magnitude, many utility energy efficiency programs are struggling to realize substantial savings from the industrial market.

This potential led Xcel Energy to develop a three-phased industrial program that successfully balances customer commitment and resources to design and deliver a very cost-effective program. The history of the program shows that this type of program offering is in high demand. In the first two years of the PE (Process Efficiency) program being available, DSM (demand side management) participation levels from the industrial customers more than doubled; both in new customers and increased activity from those customers already participating. The program works to build a pipeline of potential system optimization projects and then leverages those opportunities in a planned manner over a two to five year period. By using a continuous improvement model, Xcel Energy is able to provide a cost effective and robust approach to driving energy efficiency opportunities.

Graphet Inc. is the primary service provider for the three-phased program and additional resources can be made available to the customer through the program. The high level of customer engagement in Phase 1 is critical in gaining support for the detailed energy management plan and sustaining momentum throughout the entire 3-phased process. In Phase 2, resources are used to apply data mining techniques that transform volumes of monitored energy data into simple visual representations of energy performance. This is an effective means for operations and finance personnel to better assess the costs and benefits of multiple energy efficiency opportunities and drives well-informed decision-making. Implementing these opportunities is where the Phase 3 long-term incentives generate results and encourage ongoing sustainable energy management.

Providing whole facility study rebate programs is not a new concept. Utilities have traditionally supported this type of opportunity identification through technical energy audits, which then rely on the customer to make the opportunities fit into their energy management plan. The DSM team at Xcel Energy, however, found that this approach on its own does not often lead to sustainable energy or cost savings. Their research showed that while audits conducted at customer sites typically identified a wide range of energy efficiency improvements, the likelihood of customers committing to implement the opportunities varied widely.

**Figure 1. Xcel Energy's Minnesota Process Efficiency Program Savings Achieved vs. Goals - Program Cost vs. Target**




Source: Xcel Energy

The Xcel Energy PE program was designed to address shortfalls in the existing industrial DSM program approaches and was introduced in Minnesota in 2006. The success and cost effectiveness of this Minnesota program led to a similar offering being introduced to the utility's Colorado service territory in 2009. The program continues to exceed expectations for its ability to deliver value for its customers at a manageable cost. This value is best represented in Figure 1. The graph shows a ratio of kilowatt-hour (kWh) savings achieved by the Minnesota program over the goal set for each year from 2008 to 2011. The figure also includes the trend line for a two year moving average, indicating the sustainability aspect of this program in achieving the goals set by Xcel Energy year after year.

Xcel Energy continues to push for greater savings through the PE program and has assembled a team of internal and external resources that support the objectives. Over the years they have not only fine-tuned the message of the program and its benefits, but the delivery mechanism of the program services as well. In its seventh year in Minnesota and fifth in Colorado, the program now speaks for itself drawing both large and medium enterprise participants. This paper will detail the steps for implementing the Process Efficiency program, examine the main factors contributing to its success, provide metrics that demonstrate the results, and discuss lessons learned.

## Measures for a Successful Energy Efficiency Program Offering

This section provides an overview of the development and process of a highly cost-effective holistic approach. The process will be presented as a set of best practices, which align well with the recommendations of the National Action Plan (NAP) initiative for Energy Efficiency (US EPA, et al. 2006). Developed as a private-public initiative, NAP provides excellent insight into best practices for developing and implementing a successful energy

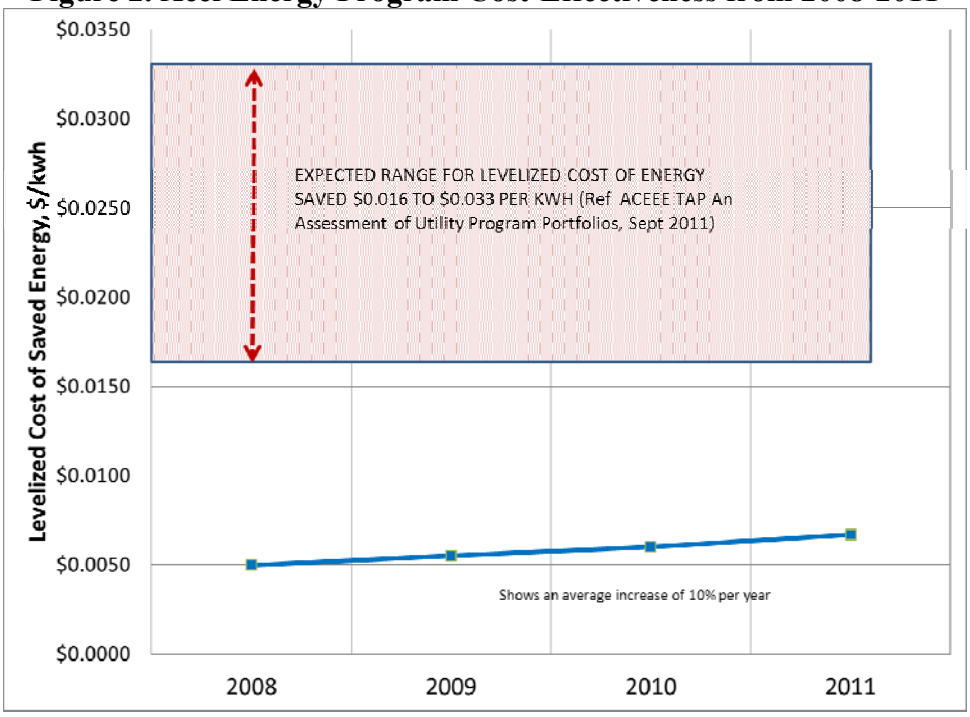
efficiency program. This initiative included a leadership group of more than 60 electric and gas utilities, state agencies, consumers, service providers, and other related entities.

### Targeting Cost-Effectiveness

As companies look for a competitive advantage and utilities work to upgrade infrastructure, the need to improve energy efficiency has more traction now than it has in the past decade. People, public policies, business processes, and technology have played a significant role in this increased momentum for energy performance improvement. The long-term vision for the NAP is to achieve all cost effective energy efficiency by the year 2025 (US EPA, et al. 2008). To deliver this vision, strategies to implement energy efficiency practices are recommended to be delivered through state and utility programs. Based on the NAP findings, energy efficiency programs across the country can be delivered at a total program cost of about 2 to 4 cents per life-time kilowatt-hour (kWh) saved (US EPA, et al. 2006). Process Efficiency performed extremely well relative to this goal in 2012 by delivering the program at a quarter of the cost of this benchmark – between 0.5 to 0.7 cents per lifetime kWh saved.

This Levelized Cost of Saved Energy (LCSE) is the total cost of achieving the conserved energy calculated in cents per kWh of expected lifetime energy savings. It can be applied in a consistent manner to all DSM programs nationally and is therefore useful for evaluating the effectiveness of the Xcel Energy program. The LCSE for Xcel Energy's Process Efficiency program between 2008 and 2011 is provided in Figure 2 as a rolling 2 year average. The figure also provides a range of values for comparable utility programs evaluated by ACEEE in 2011 (Neubauer, Max; et al, 2011).

**Figure 2. Xcel Energy Program Cost-Effectiveness from 2008-2011**




Source: Xcel Energy

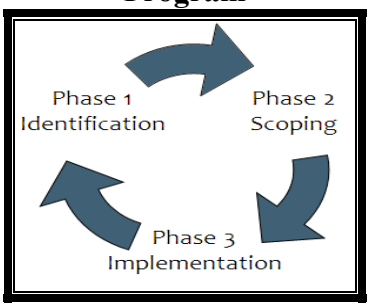
## Targeting Value to Customers

Market and competitive pressures require companies to develop and maintain a high level of coherence among business objectives, action plans, practices, and performance. A lot of effort has been put into identifying best practices to help companies realize operational excellence. Successful energy efficiency programs offered by utilities incorporate a common set of attributes as recommended in the National Action Plan. These are:

- Clear upper management support
- Well communicated program goals tied to organization goals
- Framework to support implementation
- Adequate resources
- Strong regulatory support and policies
- Commitment to improve business processes continuously

The Xcel Energy program approach exemplifies these attributes via its three-phased continuous improvement model shown in Figure 3. It works to facilitate sustainable energy management best practices and drive results. This is a data intensive, vendor neutral and consultative methodology that improves management effectiveness, sets energy goals, justifies projects for implementation, submits applications for funding and rebates, implements energy conservation projects, and tracks achievement and impacts on energy reduction. The activities in each phase builds on the results of the previous phase, while fully enhancing customer team competencies for decision making.

**Figure 3. Continuous Improvement Cycle Used by the Xcel Energy Process Efficiency Program**




Source: Graphet Inc.

A summary of the activities and desired outcomes from these three phases is detailed in Table 1. The process is initiated with a facilitator led energy management diagnostic session using a software tool called One-2-Five®, developed by EnVinta. Each phase represents a set of outcomes and ensures customer commitment to the process through a memorandum of understanding (MOU) for that phase. This MOU is signed by a representative from the customer's upper management and sets expectations and accountabilities for that phase. Key milestones along the way serve as opportunities to bring Xcel Energy account management, product management and customer teams together to ensure program value is delivered, communicated, and understood.

**Table 1. Xcel Process Efficiency Phases, Activities and Outcomes**

| Phase | Activity | People/Process/Technology Outcome |
|---|---|---|
| Phase 1 - Scope | • One-2-Five management diagnostic<br>• High-level audit to identify significant technical projects | • Upper management buy-in and internal champion identified<br>• Management practices benchmarking<br>• Technical benchmarking & high-level opportunities<br>• Present program resources to address management practices gap analysis and develop action plan |
| Phase 2 - Identify | • Detailed metering, monitoring and energy data mining analysis services to develop baseline & opportunities<br>• Engineering studies to understand current operations and define real energy saving opportunities<br>• Engage customer teams every step along the way to seek consensus and active participation | • Energy baseline usage for site<br>• Investment grade energy saving opportunities defined for short, medium & long term along with means for tracking improvements<br>• Schedule and cost estimates that align with business goals<br>• Program funding and resources details provided<br>• Improved awareness and training on setting energy performance targets |
| Phase 3 – Implement | • Support for project justification and management approval for energy conservation measures<br>• Pre- and post-monitoring; develop and present implementation plan including rebates, bonuses and support from Xcel Energy<br>• Repeat EnVinta diagnostic | • Energy measures approved and budgeted for implementation.<br>• Verify achievement of targets set for energy performance improvement<br>• Rebates & bonuses provided<br>• Initiate next cycle for scoping, identification, & implementation |
| Support & Coordinate | • Ensure issues and concerns are addressed proactively to develop an effective transition plan from phase to phase<br>• Provide data/project description/ baselines and input for custom rebate applications and monitoring plans | • Barriers understood and overcome<br>• Customer participation at the appropriate management level to achieve results<br>• Credibility as technical and management energy efficiency resource provider established |

Source: Graphet Inc.

## Strategy for a Sustainable Energy Efficiency Program

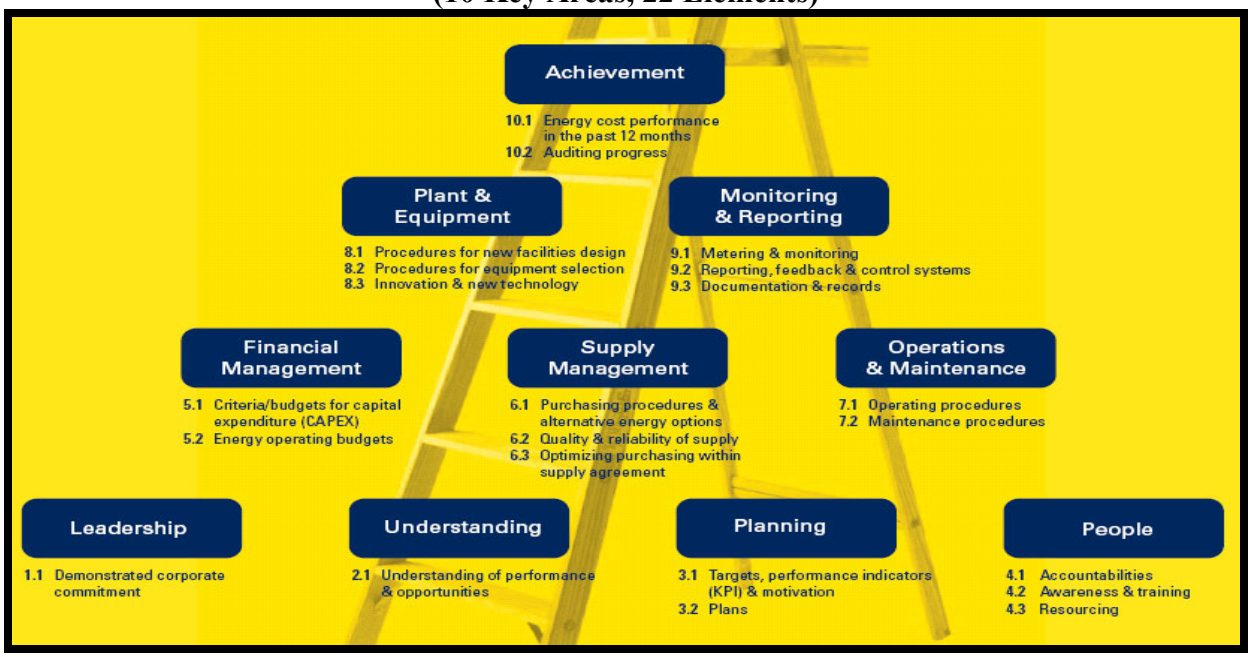
As mentioned previously, the team at Xcel Energy has found that the traditional, technically focused audit approach on its own does not often lead to sustainable energy or cost savings. In addition to the technical audit, a mechanism for ongoing engagement with the customer is critical if utility programs are to successfully drive sustainable energy conservation initiatives. The most important drivers of Xcel Energy's program are customer upper management buy-in, fact based solutions for energy conservation, improved energy awareness at all levels, and long term incentives for maintaining energy efficiency. This approach facilitates easier approval for implementation of energy conservation measures from upper management because it supports them the entire way through the identification, scoping, and implementation process.

## Leveraging Senior Executive Management

Xcel Energy's approach begins with engaging senior executives and key plant stakeholders in a one day, strategic planning workshop. The workshop requires attendance by a cross functional team, including management personnel. An established, objective framework is utilized to better understand current energy management issues and to discuss ideas for how the team can take their energy management efforts to the next level. A facilitated energy diagnostic session builds consensus around priorities that could result in enhanced operations and management systems for improving energy efficiency in a sustainable manner.

The EnVinta One-2-Five program (a management diagnostic tool) provides the framework to explore energy as a business management issue, rather than primarily a technical engineering issue. EnVinta has detailed the ten key areas and twenty two elements that are critical for developing sustainable energy management practices, illustrated in Figure 4. The primary objective of the self-diagnostic session is to evaluate the customer's current energy management practices and policies, and identify and prioritize management actions for improvement. A secondary benefit is the engagement and buy-in that it generates with key stakeholders.

**Figure 4. EnVinta One-2-Five Program Framework for Energy Management Benchmarking**
**(10 Key Areas, 22 Elements)**




Source: Envinta Corporation

The EnVinta One-2-Five session is most effective when the highest level of management attends. Quite often we see that the communication between the organization's top financial management team and the other areas of the organization involved in making energy management decisions is lacking. However, if we can connect the operations and finance groups, the energy management team's initiatives are more likely to get financial backing. Typical attendees include the business manager, operations manager, finance manager, maintenance, energy, and engineering managers.

### Outcome-Based Immediate Action Plan

The EnVinta One-2-Five software calculates the effective development path for the customer and recommends the top five management priorities. Importantly, the actions are achievable steps that can be implemented within a short-term timeframe – often less than 6 months. The actions are designed to guide the business to integrate energy into their existing management systems, such as environmental, quality, and occupational health and safety. The diagnostic action plan typically provides a balanced approach between technical, people empowerment, and accountabilities/tracking considerations. Using EnVinta's database (containing greater than 2,500 large energy users globally) the customer's current energy management practices in 22 elements are benchmarked against their respective peer group and other organizations globally. Facilitated team discussions allow for a common understanding of energy issues and consensus on setting of meaningful and effective priorities for driving sustainable energy conservation.

The one-day workshop also includes a high-level strategic technical walk-through of site operations with personnel knowledgeable about systems operations and requirements. Site utility billing and interval data for the most recent two years are analyzed to establish a preliminary baseline energy usage. Current and past efforts to improve energy efficiency are evaluated to bracket realistic targets for energy performance improvement and for recommending next steps. The results of the technical walkthrough combined with the utility data analysis provide the basis for developing a high-level understanding of highest energy users. Using tools like the Department of Energy's (DOE) QuickPEP for industries, the Environmental Protection Agency's EnergyStar Portfolio Manager, and engineering best practices, a set of preliminary energy saving measures are identified. This activity is the basis for generating the range of potential savings possible at the site.

The Phase 1 workshop concludes with a presentation to upper management of the benchmarking results, top management priorities and a range of achievable energy savings. The Phase 1 results are the single most important mechanism in winning support from upper management to drive energy efficiency within the organization. In the period since the program's inception, nearly 90% of customers have continued on to the next phase to develop an energy plan.

## Leveraging Energy Data Mining and Analysis

Energy data mining is the process of transforming energy data through analytics and visualization techniques to present useful insights that can drive energy efficiency in a simple and effective manner. It includes the processing of vast amounts of available energy and operational data, validating and eliminating data errors and noise, transforming the data to understand critical system requirements, operating modes, and potential energy efficiency impacts. This is a critical component of Xcel Energy's program for establishing:

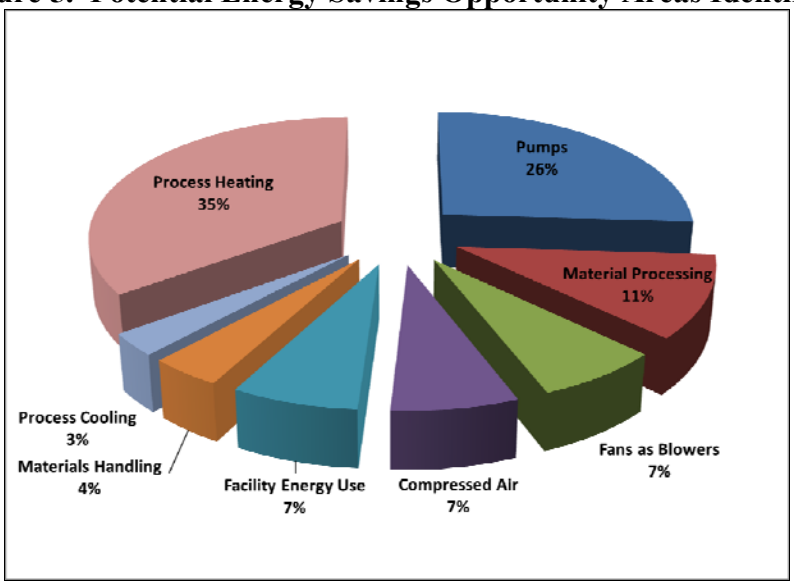
- a common language and understanding for sustainable results
- the support needed to present the "story" effectively and
- credibility for solutions proposed

Not only does data mining provide leverage for understanding customer information, it provides a mechanism for the team to focus efforts on cost effective options for delivering value

to customers. Results from data mining efforts are illustrated in Figure 5 as the percentage of savings potential possible within energy using systems from over 100 customers that completed Phase 1 of the program. The data represents a diverse group of industrial and commercial industries. Estimated dollar value for the annual savings potential for the total group exceeds $50 million per year.

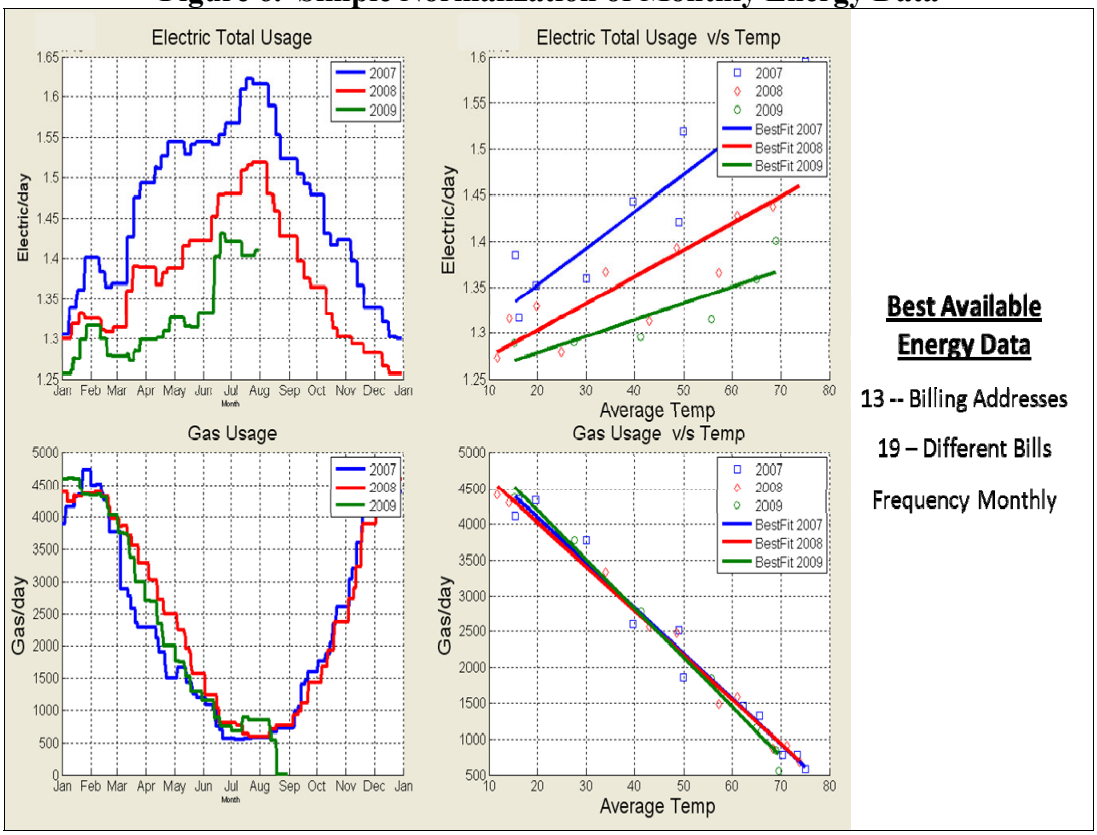
Effective reporting and feedback requires developing a method for understanding energy variation. Figure 6 illustrates, quantifies, and validates the impact energy efficiency improvements made as reflected in this customer's utility bill. It has been normalized as energy usage per day with a comparison to weather impacts based on average daily temperatures. Significant improvement in electric energy consumption per day is indicated over a three year period while during the same period gas consumption remained largely unchanged.

**Figure 5. Potential Energy Savings Opportunity Areas Identified**




Source Graphet Inc.

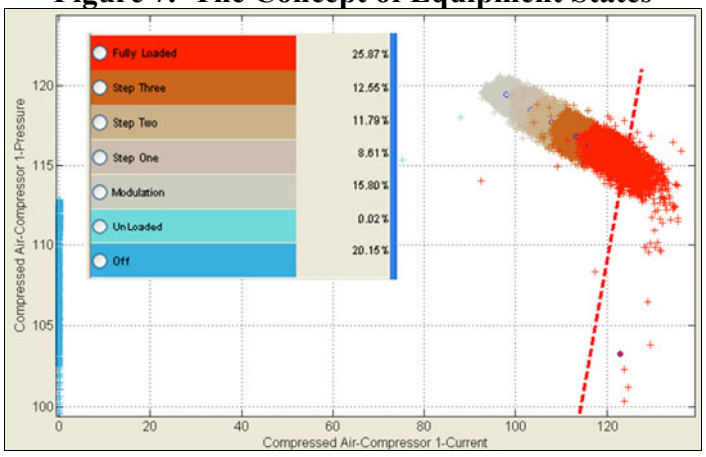
**Figure 6. Simple Normalization of Monthly Energy Data**




Source Graphet Inc.

Energy using systems are typically comprised of multiple pieces of equipment that supply the required end use application. Monitored data for this equipment can be analyzed to understand operating loads, modes, and efficiencies. For example, some compressors can operate in multiple levels of intensity, as shown in Figure 7, for a step unloading screw compressor. By gathering data to understand how often the compressor operates at a particular level throughout a monitored period, equipment operation can be managed to optimize its operation from an energy and production perspective.

**Figure 7. The Concept of Equipment States**



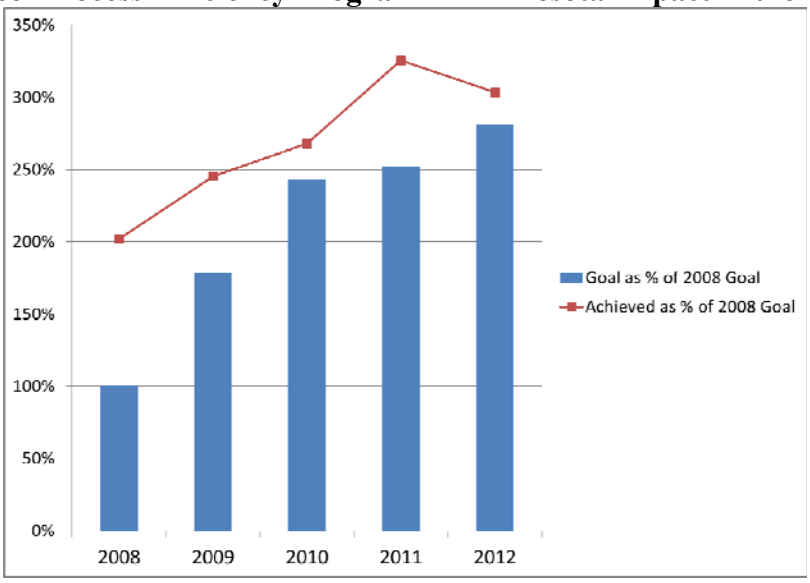

Source: Graphet Inc.

As seen in Figure 7, energy data mining establishes a credible process for gaining insights into current system inefficiencies. The improved understanding leads to a collaborative approach for finding the most effective opportunities for improving energy efficiency. Energy data mining lets the data drive the solutions, thereby establishing an objective means to drive realistic and achievable energy savings targets with accountability for results.

## Providing Long Term Performance Incentives

Historically, utilities have provided funding for engineering studies, but have found that there have been many barriers to moving these from the study phase to actual projects. Conversion rates (the percent of customers who implement a project identified in a technical assessment or audit) for some of Xcel Energy's other study based products can be as low as 50%, whereas conversion of identified opportunities through PE studies is approximately 90% (Tetra Tech, Xcel Energy, 2012). This discrepancy is not due to the customer's lack of interest in implementing opportunities identified through standard study programs, but rather the availability of resources (both labor and financial) to support implementation. Process Efficiency was one of the earliest programs to continually adapt to customers' needs, as well as integrate tools from EnVinta, DOE, and other resources to address these issues and increase the conversion rate. Figure 8 shows how the program goals and achievements, as a percentage of 2008 goals, have consistently achieved greater energy savings goals for each year.

**Figure 8. Xcel Process Efficiency Program in Minnesota Impact in the Last 5 Years**




Source: Xcel Energy

The PE program also provides incentives to reward customers for being goal oriented and for establishing a strategic energy planning process. Rebates are provided for qualifying end use technologies and bonuses are available for optimizing systems as well as for exceeding energy saving targets by implementing additional projects within a scheduled timeframe. These bonuses can be upwards of 30% in addition to the standard rebates.

Once customers get close to achieving savings levels that qualify them for rebate bonuses, they look to overachieve by pursuing projects that were previously sidelined. This drives efficiency by encouraging the completion of projects that otherwise would never make the shortlist. Because the opportunity for bonus dollars is short lived, these projects tend to work through the customers' approval and implementation cycles much faster.

## Program Results Examples

Companies that join the PE program leverage resources provided by Xcel Energy to justify project implementation and pre-qualify for rebates. This facilitates easier approval for implementation from upper management. A mechanism for ongoing engagement with the customer is maintained by the account manager and sales engineering role to support sustainable energy conservation initiatives. This can take the form of the Xcel Energy account manager (and support team) being a part of the customer's energy team. The account manager is a valued resource for the participating customers in providing input on energy issues. These can include strategic capital improvement decisions for developing and supporting the testing of new technologies that enhance production operations.

Table 2 shows the customization needed for three large industrial customers - a district cooling plant, a major research and manufacturing campus, and a large printing company. The key success factor common to all is achieving results while establishing processes and accountabilities to build on the successes. All three of these customers in the example are still actively engaged in the program and additional opportunities for energy efficiency are continuing to be explored.

**Table 2. Xcel Energy Process Efficiency Program Results**

| Practices | District Cooling Plant | Major Research Campus | Large Printing Company |
|---|---|---|---|
| Improve Management Effectiveness | Enhanced team technical competencies and data collection abilities with data mining, analysis, & reporting to quantify impact of savings initiatives | Developed an effective tiered approach to address the complex and interconnected energy systems in a large campus with diverse requirements. Engaged all (16) stakeholders in decision making | Found the right partner to achieve reduction and position as a leader in environmental responsibility among world class publishers |
| Set Energy Goals | Improved confidence in approach and energy conservation measures; Identified energy conservation potential of 8 to 10 GWH | First tier begun in 2008, second in 2011 and third tier scope now in development. Opportunities identified in Tiers 1 & 2 in various stages of planning, approval, implementation and review | Obtained best comprehensive answer to energy conservation with team Xcel Energy hired combined with internal personnel; data monitoring, mining, & analysis contributed to realistic goals for implementation |
| Achieve Sustainable Energy Conservation | Implementation results to date achieved approx 5 GWH in savings for chillers and pumps | Completed savings accounts for 12.5% (6.8 GWh) of the annual electric energy consumption and the planned savings accounts for 3% of the annual electric energy consumption | Xcel Energy Rebates of $185,000 For Lighting, Compressed Air, & VFD measures saved 7.3 million kWh. Reduced 10% of a $6 million energy bill |
| Review Energy Performance | Updated energy plan with additional priorities under evaluation for inclusion | Increased focus and momentum with enhanced monitoring resources for review of performance and rebate incentives for implementing additional measures | Have direction and a streamlined process for a future of continuous energy savings and environmental responsibility - best way to reduce their carbon footprint |

Source: Xcel Energy

## Conclusion

There are many reasons industrial customers have historically underutilized energy efficiency programs relative to other sectors. However, one of the main factors driving this low participation rate is that the complex and unique nature of customers' business operations - making it difficult for utilities to serve them using standard program offerings. Utility energy efficiency programs typically focus more on studies to identify opportunities but fail to support the implementation. Instead of forcing this customer group to participate in existing programs with limited capabilities, Xcel Energy designed a cost-effective program that would tackle these unique customer challenges head-on, and has realized great success in doing so. In 2012 the cost for delivering the program was 0.5 to 0.7 cents per life-time kWh saved. This is a fourth of the total cost of energy efficiency programs across the country estimated at 2 to 4 cents per life-time kWh saved as per the findings reported in the National Action Plan report (US EPA, et al. 2006).

While program design and structure has been critical in supporting the Process Efficiency model, it is only through the buy-in and engagement of all stakeholders that the return on investment is fully realized. The comprehensive, resource intensive offering is not right for every customer, so identifying potential participants who need implementation support starts with the utility account manager. By understanding and communicating the value of the program to this targeted customer they initiate the engagement and support the process. This support extends all

the way through to the customer's executive team who are instrumental in breaking down internal barriers. Account managers have realized success through the program and are therefore personally encouraged to sell the benefits to their customers as a way to participate in a program that makes their corporate initiatives achievable.

Even with the key stakeholders buying in to the concept of sustainable energy management, the right approach and controls are still needed to ensure identified projects are implemented. This is where data driven analysis and reporting to determine project feasibility, along with the customer support throughout the procurement process have reliably provided the biggest impact on the conversion rate. Providing the data as fact rather than perception is a non-threatening approach that enables building operators to be heroes with executives who are concerned about corporate image and the bottom line. As a third party that has no interest in selling the customer equipment, the process has established a credible relationship with customers so the analysis and data to support recommendations is respected and uncontested.

With ever increasing conservation goals, utilities need to find cost effective new offerings that move beyond standard study, prescriptive, and custom programs in order to be successful. Xcel Energy has found this "hero" program in Process Efficiency that not only increases portfolio achievement, but also improves customer satisfaction and engagement. By aligning our efforts with the customer's core business practices, Xcel Energy has been able to enhance its long-term relationship with their customers and realize a deeper level of energy savings and greater customer satisfaction.

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