Realigning Utility Incentives for Industrial Customers: Using Strategic Energy Management to Increase Customer Participation in Energy Efficiency Programs

Jennifer Weiss, Southern Alliance for Clean Energy
Perry Stephens, Duke Energy
Michael Stowe, Advanced Energy

ABSTRACT

The industrial customer classes are energy-intensive sectors and represent a large energy efficiency resource opportunity. However, many utility non-residential programs have been unable to convince these large customers to participate in energy reduction incentive programs. In the Carolinas, for example, over half of industrial and large commercial customers have elected to opt out of Duke Energy's demand side management (DSM) and energy efficiency (EE) programs, instead electing to provide written notification that they have installed their own DSM/EE measures. Unfortunately, there is no formal mechanism to validate whether customers who opt out actually install their own EE measures at an equivalent rate. This results in a number of problems for program administration. At the basic level it can be argued that large opted-out customers are "free riders" that receive, at no cost, the system-wide benefit of energy efficiency savings produced by participating customers who are facing an increasing rider cost per kWh. For the utility, if opted out customers do pursue EE projects then it is a lost revenue scenario with no means of recovery. This paper will explore the options for integrating utility energy efficiency incentives into industrial facility management strategies in order to increase participation in utility programs and reduce the number of opt-outs. Using examples from specific industrial customers, this paper will investigate hybrid, measures-based, O&M and behavioral programs like Strategic Energy Management as tools to increase industrial staff capacity and reduce the upfront costs of industrial participation in utility programs.

Introduction

The industrial sector accounts for almost one third of all energy consumption in the United States (EIA 2017) and, in aggregate, the sector has made large investments into energy efficient equipment and facilities. However despite slight improvements in industrial energy intensity over the years, there is still significant potential for more comprehensive energy efficiency investment to achieve greater levels of energy use reductions and cost savings. Utility administrators have struggled to create energy efficiency programs that respond to the needs of this energy-intensive group of customers, particularly at utilities that allow industrial customers to opt-out of energy efficiency programs. Although the customers claim to have already done all of the efficiency upgrades possible at their facilities, this is difficult to track and could result in much lower efficiency investment in the sector. One potential solution to improve the efficiency partnership between the utility and the industrial customer is the implementation of a Strategic Energy Management (SEM) program, a continuous improvement approach to reducing energy intensity over time in industrial and large commercial facilities.

The Strategic Energy Management Continuum

SEM incorporates a structured methodology that guides large commercial and industrial facilities to achieve ongoing energy savings through the implementation of systematic business practices that focus on all aspects of energy. This can include sources, uses, consumption, wastes, costs, recovery, intensity, efficiency and other uses. Unlike other utility programs that focus solely on improving equipment and building performance, SEM focuses on business practice change and modifications to the organizational culture around efficiency and conservation. In this way, a well-designed SEM program can improves the company's capacity to successfully reduce energy use and improve energy intensity over a sustained period of time.

The Strategic Energy Management Continuum, summarized in Figure 1 below, broadly encompasses a hierarchy of three main components: (1) SEM Basics, the beginnings of continuous energy performance improvement; (2) ISO 50001, a formal, third party certified Energy Management System; and (3) Superior Energy Performance which builds on ISO 50001 for a robust energy data tracking and measurement system with third party certification and defined required levels of energy performance improvement. This paper will focus on basic SEM, or continual energy improvement approaches.

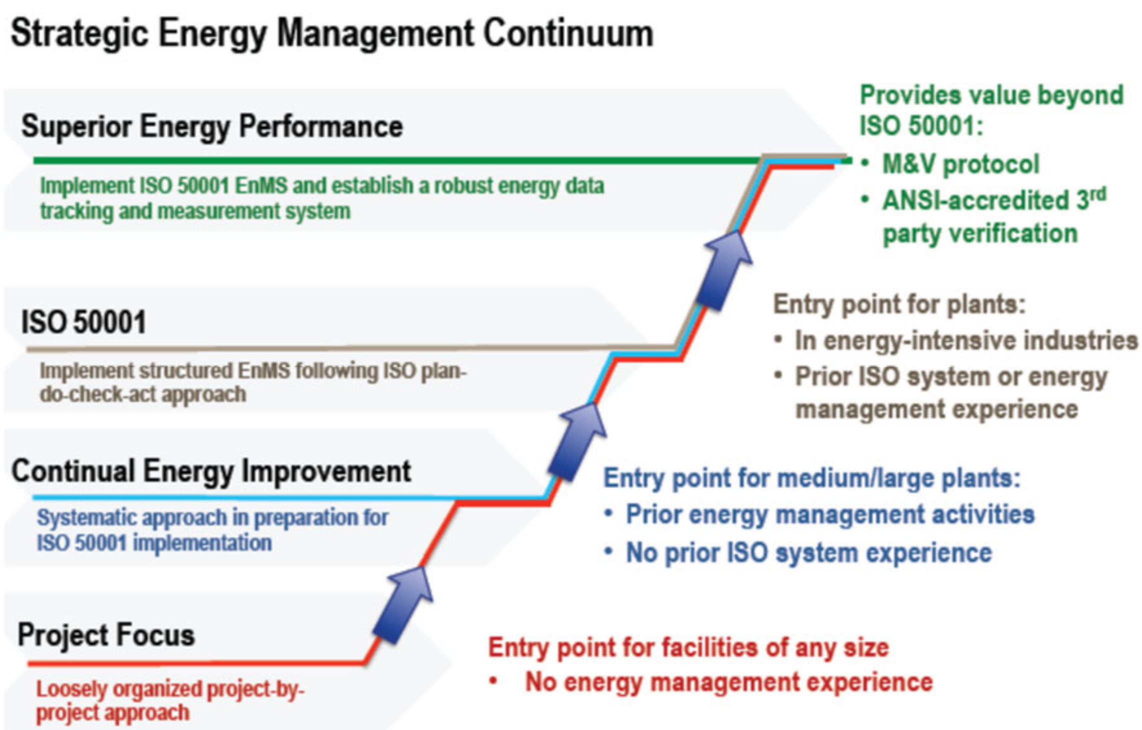

Figure 1: The Strategic Energy Management Continuum. *Source*: U.S. Department of Energy, https://www.energy.gov/sites/prod/files/2014/07/f17/SEP_Cost-Benefit_July2013PPT.pdf

CEE^{SM} Strategic Energy Management Minimum Elements

The Consortium for Energy (CEE) defines SEM as taking a holistic approach to managing energy use in order to continuously improve energy performance, by achieving persistent energy and cost savings over the long term (CEE 2014). CEE has established a simple and standard description of the minimum elements and conditions that an industrial company or facility should have in place in order to effectively and continuously improve their energy performance.

1. *Commitment from Senior Management* – Long range energy performance objectives (energy policy or energy reduction goals) and resources to achieve objectives (energy champion, energy team and/or employee engagement activities).
2. *Planning and Implementation Strategy* – A plan that includes an energy management assessment, energy map (end uses, consumption and costs), clear and measurable metrics based on baseline energy consumption, a project register with a description of actions (capital projects, education, operational improvements), an employee engagement plan to educate employees and encourage ideas for solutions, an implementation plan, and a periodic review of energy performance (reassessment of actual to expected results).
3. *System for Measuring and Reporting Energy Performance* – A process that includes the measurement of energy use, data collection, analysis of results, and regular reporting to internal and external stakeholders.

These three elements are the minimum conditions necessary to provide a solid basis for consistent communication between the customer, the utility, program administrators and implementers and clearly outline the objectives to be achieved by SEM.

Barriers to Increased Industrial EE Participation

Although industrial companies are likely aware of projects in their facilities that can reduce energy use and many have made investment into energy efficiency projects, many small- and medium-sized energy savings projects often cannot compete with other capital demands, even with similar or better paybacks. Therefore it is imperative that an SEM program be designed to help industrial customers overcome the multiple barriers associated with cost-effective energy efficiency investments.

Time, Money and Staff Capacity

The three main internal barriers to industrial customers engagement in energy efficiency programs are time, money and staff capacity. Most industrial facility staff are extremely busy with production initiatives and often report that it is difficult to effectively navigate corporate project decision-making systems to get management endorsement for even quick payback energy efficiency projects. In addition, industrial customers have restrictive financial hurdles and non-energy capital projects can take priority over less visible facility and equipment efficiency improvements. Finally, limitations on staff resources can further hinder implementation of even the most cost-effective energy efficiency measures.

A well-designed SEM program positions the utility as an energy partner to overcome these barriers. Utilities can offer personnel resources to assist the industrial customer through the SEM process, providing the industrial customer with some time relief via technical labor support. To ease the financial burden, utilities can provide incentives for energy savings performance to help lower the initial capital cost and reduce the payback period.

Opt-Out Catch 22

In addition to the internal barriers to energy efficiency investment described in the previous section, there is also an external barrier to industrial participation in utility efficiency programs. In some states, large commercial and industrial customers are allowed to opt-out of the utility's DSM and EE programs, choosing instead to make efficiency investments at their own expense. Opt-out provisions typically provide the industrial customer with a full exemption from energy efficiency program surcharges and riders and remove any requirements to achieve energy savings through efficiency.

At the basic level it can be argued that large opted-out customers are "free riders" that receive, at no cost, the system-wide benefit of energy efficiency savings produced by participating customers who are facing an increasing rider cost per kWh. For the utility, if opted out customers do pursue EE projects then it is a lost revenue scenario with no means of recovery. Finally, from an industrial customer's financial perspective, increased opt-in costs, even with the associated incentives, can drive up simple payback, possibly to a level that will negatively impact participation in utility programs. Therefore, despite the existence of utility incentives for DSM and EE projects that can help lower overall system costs for all customers, the higher opt-in cost for each industrial customer tends to have a polarizing impact on potential participation in utility DSM and EE Programs.

Cost-Effectiveness Tests

By statute and regulatory requirement, energy efficiency programs must be designed to meet one or more tests to ensure that funds collected from the ratepayers are being used cost-effectively such that the resulting benefits of the investment more than offset the costs. When programs are burdened with heavy up-front costs, a point is reached below which no reasonable level of anticipated energy savings at a given site could result in in a favorable (greater than 1.0) cost to benefit ratio. While there is a great deal that can be done to make the delivery of an SEM engagement as cost-effective as possible, the minimum elements described above must be present for SEM to deliver on its promise. A complete description of the minimum requirements of an SEM program as outlined by CEE can be found in their SEM Minimum Elements white paper (CEE 2014).

To maintain cost-effectiveness, an analysis must be performed to determine the cost of executing the CEE minimum elements at progressively smaller sites to establish an annual energy consumption floor below which a regulated SEM offering is not financially feasible for the utility to undertake. This analysis will differ by utility as the cost of electric service and the cost of SEM implementation will vary. It is an analysis that must be performed however, in order to develop the parameters within which the utility can construct an SEM program offer that will ultimately pass cost-effectiveness tests.

Feasibility Notch

When considering SEM program design, the utility must simultaneously evaluate the level of incentives necessary to attract participants who would otherwise opt-out, along with the need for the program to pass the overall cost-effectiveness test. For most utilities, this will result in a "feasibility notch," or range, of customers eligible for participation in the program. The "notch" is bounded on one end by the very high usage customers for which the DSM/EE incentive offered must exceed the net present value of the annual rider costs they will incur. At the other end of the spectrum are the smaller commercial and industrial customers for which there are insufficient energy cost savings to cover incentives plus program costs, resulting in poor cost-effectiveness for the utility. A utility should determine the size of this feasibility notch before launching a SEM program.

Blueprint for Success in a Regulated and Non-regulated Market

In contemplating SEM program design to overcome the barriers outlined above, several pros and cons should be discussed. Regardless of whether a utility is considering a comprehensive regulated offer or a less traditional, non-regulated approach, the SEM offering should have coordinated access to the more traditional suite of energy efficiency programs while folding in the SEM minimum elements.

Benefits of Program Participation

SEM offers induce participation through a combination of benefits. Among these are:

- Federal, state and utility incentives and subsidies in excess of stand-alone or combined traditional DSM/EE incentives or behavioral program support.
- Free or discounted expert training and technical support from federal or utility resources.
- Participation in SEM cohort groups for sharing of successes and challenges often organized and funded by the utility.
- Support in navigating and maximizing incentives offered.
- Access to utility trade ally networks for energy baseline and modeling, SEM benchmarking, assessments and ECM implementation.

Regulated SEM Program

For the utility, front-end loaded costs and the long sales cycle associated with encouraging industrial participation in a long term, technically complex agreement can be a daunting barrier. SEM participation requires customer commitment of both staff and financial resources over a two to five year period which may require 18 to 24 months of business development by the utility from awareness to signed agreement. Furthermore, the same benefits sought by the customer (assessments, SEM Plans, training, etc.) add program costs that must be absorbed ultimately by the value of the energy savings as calculated in the avoided cost or other models allowed by their respective regulatory commissions. Also, depending on the complexity and diversity of the industrial processes in play at a facility, there may be a need to install significant energy and other utility sub-metering and systems to gather and store other process data. Such systems may be required for data integration into the facility statistical model as well as to drive the rigorous continuous improvement ultimately needed to reach aggressive year-over-year energy intensity improvement targets to ensure program success. These are not insurmountable issues, but the program designer would be wise to carefully consider their potential impacts on the financial benefits of a program from both the utility and customer perspective.

On the positive side, when properly designed with a baseline regression model requirement, SEM offers a built-in, highly affirmative, 100 percent measurement and verification

(M&V) validation of actual energy savings that is statistically valid and indexed for any variable that might reasonably impact energy consumption (e.g. weather or facility production levels). With such high certainty of energy savings validation the utility can pursue a more formulaic or even flat rate approach to incentives offered by the program. This feature allows the utility to address both the smaller customer “cost effectiveness floor” and the larger customer “opt-out catch 22” problems described above. In order to do this effectively, the utility must derive the incentive rate that ensures that an opted-in customer will receive benefits in excess of their rider costs while also still passing the cost effectiveness test(s) based on kWh and kW savings achieved. Using this analysis, utilities should be able to define the size of the feasibility notch range within which customers are most likely to participate.

Last but certainly not least, through an SEM approach utilities can capture EE savings from all forms of measures in a single annual calculation. The regression model is indifferent as to the source of improved energy intensity; whether from a measure that would have deemed savings under a prescriptive EE product, engineering calculations under a custom product, pre/post M&V under a behavioral program, or process productivity-based energy intensity improvement under an O&M process energy efficiency program. All savings are captured and valued at the lowest common denominator – the avoided cost of the verified kWh and kW energy saved.

On this final point we must offer a cautionary note. SEM when approached in this holistic manner could be viewed internally at the utility as cannibalizing revenues and earnings that “belong” to other EE product lines. This has led some utilities to attempt to allocate these financial benefits to the various DSM/EE product lines through an attribution process that follows the analytic regimes for each program. This has two serious negative impacts. First, the utility loses a major benefit of the SEM approach – economic efficiency. With a regression model in place there is no need for any of the other deemed savings, engineering and M&V processes. The model established “actual savings” so going back to these other approaches to allocate internal financial results adds unnecessary costs, reduces the feasible cost effectiveness and limits the number of customers that could potentially participate. Secondly, sub-optimizing the maximum possible financial benefits allocated to each of the traditional EE product lines results in the extra costs associated with SEM having to be born solely by what is often a small remaining EE savings pool. The end result is extreme pressure to the perceived cost-effectiveness of SEM. The reality is that it is highly unlikely that the customer attracted to the principles of SEM would have ever undertaken all or any of the more traditional EE measures on a piecemeal basis and certainly would not have sustained a continuous improvement culture with respect to implemented measures over the course of three or more years. This is particularly true for the opted-out customer who must analyze the economics of a multi-year strategic energy plan with a legitimate possibility of goal attainment that will more than offset anticipated rider costs for the period of participation.

Non-Regulated SEM Program

Because the cost and benefit analysis of an SEM program is often uncertain and unfamiliar to program managers, utility rates and regulatory staff, utility executives and regulators, it is often met with initial skepticism within the utility’s new product development processes. Although there are pockets of success across the US, as demonstrated by the case studies cited in this report, there is also abundant uncertainty as to whether SEM models can be replicated at other utilities. In these situations, where the market has demonstrated potential for enhanced industrial EE programs, the utility can work through non-regulated programs partnering with state and federal agencies can help to demonstrate program feasibility.

Non-regulated programs can access the pieces of regulated EE programs that would naturally be developed within the context of a comprehensive SEM offer and combines them with state and federal programs, as well as their own marketing budgets, to achieve the majority of the SEM minimum elements. At the same time, the non-regulated unit can make business decisions on the amount of up-front costs they are willing to bear in pursuit of an energy-saving opportunity based on the potential efficiency projects identified. Throughout this process, the normal lead qualification techniques can be used to identify high potential customers with a high propensity and financial resources to adopt an energy management strategic plan. Furthermore, the deep engagement model envisioned in SEM allows the non-regulated business development manager to provide a continuity of services that connect the various regulated pieces into what appears to the customer as seamless high value service maximizing the incentives and other benefits obtained on the way to achieving their year-over-year SEM goals.

The payoff for the non-regulated program is the opportunity to deliver projects through turnkey contracts or via a managed services (own, operate and maintain) annuity contract with attractive margins that become simple operating expenses with net positive cash flow for the customer. The additional benefits of integrating utility financing, project management and long term asset service and maintenance with the utility EE incentive programs can create an attractive win-win scenario for the customer and utility. In this way the utility can increase industrial participation in SEM engagements and help customers achieve their cost savings and sustainability goals while evaluating the potential financial feasibility of SEM under a future regulated portfolio offer.

Case Study – Duke Energy SEM Pilot

The previous sections have discussed barriers to energy management participation and strategic energy management in general. To explore these topics in more detail, we will look at a specific site case study using a pilot SEM program at Duke Energy. Duke Energy does not currently have a regulatory framework that supports a full detailed SEM program approach, however there are tremendous energy saving opportunities within the Duke Energy industrial footprint. Unfortunately, approximately 50 percent of Duke's industrial and large commercial customers have elected to opt out of Duke Energy's DSM and EE programs, instead electing to provide written notification that they have installed their own DSM/EE measures.

To study the cost effectiveness of achieving energy efficiency impacts using SEM, Advanced Energy (AE) collaborated with Duke Energy and their trade ally vendor, Chicago Bridge & Iron Company (CB&I), on an SEM engagement with one of Duke Energy's North Carolina industrial customers that operates a wastewater treatment (WWT) plant. The WWT plant is the focus of this case study.

SEM Program Assessment Background at the WWT Site

The following sections describe the AE engagement with the WWT site and the sources of information for the case study (Stowe and Haggis 2016). Three fundamental energy efficiency programs were the focus of this study: SEM Basics, ISO 50001 and Superior Energy Performance (SEP). AE worked with the WWT site on SEM Basics and the first several steps of

ISO 50001 energy management system implementation, including an energy review, the establishment of an energy baseline, a review of energy performance indicators and the development of energy objectives, targets and action plans.

The primary energy source at the WWT site is electricity, with some diesel fuel used for a back-up generator. The significant energy users for the WWT site are two large blowers (60 horsepower each) and two lift station pumps (30 horsepower each). These four loads account for approximately 93 percent of the electrical energy consumed at the WWT site. The energy review revealed the following data about the WWT site:

- Electrical energy consumption: 529,000 kWh per year
- Electrical energy cost: $33,600 per year
- Electrical unit energy cost: $0.0635/kWh

The key energy performance indicator for the WWT site is kWh per million gallons of flow. Key electrical saving recommendations for these four electrical loads include the use of NEMA premium efficiency motors on the lift station pumps and blowers and the implementation of procedural or engineering controls for the operation of the blowers that can reduce the blower run hours or blower load while running.

An Analysis of Program Options

After reviewing the performance of the WWT site, the AE team worked with the WWT staff to set up specific objectives, targets and an action plan. When analyzing options for the Duke Energy WWT site, AE looked at several possibilities of what a Duke Energy SEM/ISO/SEP program might look like including:

1. Rollout of an SEM/ISO/SEP program offering as part of the existing Duke Energy Smart $aver program. This could be a prescriptive or a custom incentivized energy efficiency measure. As with the existing Smart $aver program, industrial companies would need to be opted-in to the energy efficiency rider to participate and gain financial incentive benefits from the program. This opt-in cost would then have to be considered in the evaluation of the simple payback model.
2. Create an SEM/ISO/SEP offering as part of the non-regulated Energy Services group's Energy Management Services program. The outstanding question in this scenario is how Duke Energy would get credit for the energy efficiency investment using a cost recovery mechanism like they currently do within the Smart $aver program. It may be that the financial benefits to Duke Energy selling SEM/ISO/SEP as a non-regulated offering may outweigh the need to get credit for the energy efficiency investment. In addition, this Energy Services SEM/ISO/SEP offering could offer a full range of support to industrial customers from basic foundational energy management up to a full scale ISO/SEP certification, and everything in between.
3. Make use of an energy consultant with certifications in both ISO 50001 and SEP in support of an SEM/ISO/SEP program offering.
4. Use the Department of Energy (DOE) SEP cohort process model, similar to that which is offered by BPA and VEIC (see case studies below). DOE started the SEP program in the

United States by recruiting industrial plants to participate in demonstration cohort programs.

An Analysis of SEM Implementation Costs at the WWT Site

To determine the best option for the company, the team analyzed the potential costs of each option. The average cost of a full ISO/SEP implementation is $180,000 with a range of $89,000 to $313,000 (Therkelsen et al. 2015). The cost of implementation can cause very high simple payback numbers and an unfavorable financial situation. On the other hand, energy management can be very beneficial to any manufacturing site that desires to implement any of the ISO/SEP principles, even on a small scale.

For very small sites, like the Duke Energy WWT site, the implementation costs for ISO/SEP certification will quickly override any energy savings or incentives. The opt-in cost is based on kWh consumption and will be small, but still the cost of implementation will drive the financial decision. In this case it may be better for smaller companies to implement ISO/SEP in principle, but not pursue formal third party certification.

For larger companies, the implementation cost will plateau at around $300,000, but the opt-in cost, based on kWh consumption, will become very high. Experience within Duke Energy shows that very large companies tend to opt out and stay opted out. Having said that, however, there are still good energy savings with SEM/ISO/SEP to offset these costs and with reasonable simple paybacks as outlined in Figure 2 below.

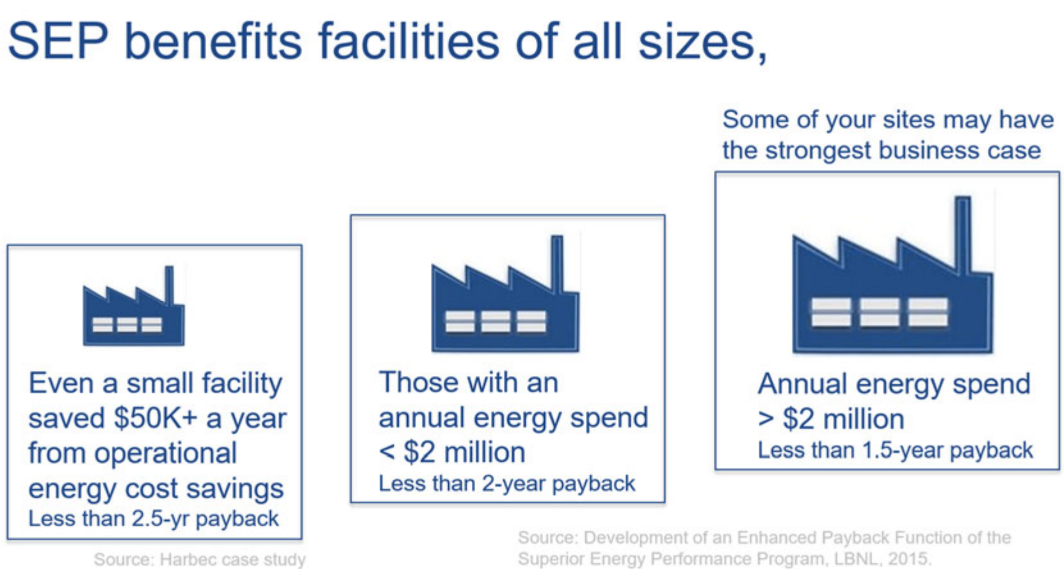

Figure 2 – SEM/ISO/SEP benefits companies of all sizes. *Source*: Development of an Enhanced Payback Function of the Superior Energy Performance Program (Scheihing 2016)

A Discussion of SEM benefits at the WWT Site

AE's conclusions from the WWT case study indicate that Duke Energy's industrial customer base has tremendous potential for energy performance improvement. SEM in any form, with any size industrial customer, will benefit both that customer and Duke Energy. Simple awareness efforts all the way up to complex capital projects to install a new energy efficient chiller plant and everything in between can have energy saving benefits. There is a continuum of end user skills and resources for energy management. Utility programs should be able to meet its customers where they are on this continuum with a flexible slate of offerings.

Nevertheless, the opt-in cost for an SEM incentivized program will have an impact on simple payback and may impact participation. Opt-in costs at Duke Energy are based on kWh usage. For smaller companies the opt-in cost is small, but also the potential savings is small. For larger companies the opt-in cost can become prohibitive. This creates a polarizing effect on both ends of the size range. There is likely a mid-range area where opt in costs and savings potential create feasible simple paybacks.

An SEM/ISO/SEP program can help a utility gain access to more industrial customers and Duke Energy can use these engagements to offer additional services for the improvement and benefit of the industrial customers. ISO/SEP certification requires the industrial customer to demonstrate verifiable energy performance improvements, which the utility can count on for cost recovery or incentive payouts. Helping Duke Energy's industrial customers make energy improvements via an SEM/ISO/SEP program will be an investment in the competitiveness of that industrial customer and will create long-term revenue benefits for Duke Energy. In other words, with the industrial customer base, saving energy with them now will allow Duke Energy to sell them more energy later, and longer.

Conclusions from the WWT site case study

Based on the initial analysis prepared by AE, it is clear that SEM basics will be very beneficial to the WWT site, with estimated energy savings in the range of 15 to 20 percent. The average implementation cost for ISO/SEP certification is $180,000 and the estimated cost for this small WWT site is approximately $50,000. Based on size and energy usage of the site, further certification to ISO 50001 or SEP, for the WWT site only, may be cost prohibitive because the certification costs may quickly outweigh the energy savings cost benefit. However this WWT site might consider ISO 50001 on an enterprise-wide basis, with SEP certification at selected sites as this may have a better cost benefit scenario because there will be more energy savings over multiple sites to help offset the certification costs. A Duke Energy incentive program could help WWT with implementation of SEM programs at the WWT and other sites. Possible options for what this incentive program may look like are discussed earlier in this paper.

Case Study – Bonneville Power Administration: Energy Smart Industrial

The Bonneville Power Administration launched the Energy Smart Industrial (ESI) program in 2010 to address many of the internal barriers outlined previously including organizational resistance to efficiency investment. The first Cohort included 13 industrial facilities in Washington and Oregon and after five years (through 2015), these 13 original facilities have saved 20 million kWh and $9 million (Tools of Change 2017). By April 2016, BPA added four additional cohorts (23 total industrial facilities) with an estimated 37.7 million kWh of savings each year. BPA currently offers three tiers of energy management programs (BPA 2017):

1. Energy Project Manager – A co-funded onsite staff member dedicated to energy improvements at one or multiple industrial end-user facilities.

2. Track and Tune – Low and no-cost operations and maintenance efficiency projects.
3. Strategic Energy Management – A multi-year, organizational approach to energy efficiency that teaches behavior-based and continuous improvement methods to drive ongoing savings.

As part of the program, BPA's Energy Performance Tracking (EPT) team developed monitoring, targeting, and reporting guidelines that include the methodology for M&V of energy savings for program participants A recent M&V evaluation has deemed this program cost-effective and summarized that the 31 sampled companies participating in BPA's SEM program have saved, on average, 2.3 percent of their annual energy consumption (SBW 2017).

Case Study – Efficiency Vermont / VEIC

In 2014 Efficiency Vermont (EVT) launched its Continuous Energy Improvement (CEI) Pilot Program, a holistic, long-term, and data-driven approach to enable customers to fully understand how they use energy. The CEI approach combines four components that can be applied by any business to take control of energy costs: capital upgrades, process improvements, maintenance, and employee engagement (Baker 2013). CEI uses these four components in a coordinated and deliberate way to integrate its EE solutions, driving towards each company's long term energy reduction goals.

Eight organizations enrolled in the pilot's first cohort in 2014, including six manufacturing facilities, one ski area and one hospital. This initial cohort focused on a generic SEM approach and engaged the companies in peer-to-peer exchanges as well as management and employee engagement. An independent evaluation prepared by The Cadmus Group, based on the first program year results of six of the eight participating facilities, revealed 3 percent energy savings from the CEI program (Cadmus 2016). Cadmus also calculated the cost-effectiveness of the CEI pilot and found that the program was not cost-effective for a measure life of one year or two years, however it did become cost-effective if the program could maintain persistence for three years (1.5 cost-to-benefit ratio) or five years (2.0 cost-to-benefit ratio). The evaluators noted that the organizations were still in the process of implementing CEI projects at the time of the one year evaluation which could account for the lower cost-effectiveness ratios.

Recognizing that industrial customers wanted to see more rapid energy savings and that the timeline for realizing the rewards from behavioral changes and employee engagement efforts would extend beyond the first year, EVT changed its recruitment strategy to a more technology-focused approach to recruitment for the second and third cohorts. In the second cohort, EVT targeted the dairy industry which has high energy requirements due to ammonia refrigeration systems. In the upcoming third cohort, EVT will target facilities with large chilled water systems. With this more technology-specific approach, EVT feels that the peer-to-peer discussions will result in more immediate energy savings, increased customer satisfaction and greater program cost-effectiveness.

Overall Conclusions

Despite the complexity of reaching large industrial customers with a comprehensive and cost-effective DSM/EE program offering like SEM, there is a great opportunity for utilities like Duke Energy and others to partner with these energy intensive customers to develop a comprehensive energy improvement solution. Successful programs at BPA, EVT and the Duke

Energy WWT pilot program indicate that a SEM program designed using CEE's SEM Minimum Elements can be cost-effective and increase participation in utility programs, especially when designed as a comprehensive, continuous improvement energy management process. Whether a regulated model, a non-regulated model or a hybrid of the two, utilities can use a continuous improvement SEM approach to improve the partnership between the utility and the industrial customer, increase participation in utility DSM/EE programs and reduce the energy intensity over time in industrial and large commercial facilities.

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