The Importance of Consultation within Utility Rebate Programs

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ABSTRACT

Utility rebate programs attempt to reduce demand and energy usage by offering rebates for energy efficiency upgrades. Are rebates alone enough to maximize the success of these efforts or, does coupling financial and consultative services prove more effective?

Utility efficiency programs may utilize consultation and rebates to varying degrees, and programs often blend the two: "Both market transformation and resource acquisition efforts will have some mix of technical assistance that educates customers and financial assistance that influences investments" (Taylor, Trombley & Reinaud 2012, 4).

This paper examines five industrial case studies of energy efficiency projects administered in Ohio. They are projects of a utility efficiency program[1] utilizing a consultation-focused model. This paper defines the consultative services used and identifies the importance of consultative services to business customers (especially those in the industrial sector), the challenges facing implementation of consultative services, and the role of rebates within a consultation-focused program.

This paper is a qualitative examination of some of the central benefits of consultative services to industrial customers. This paper does not provide a comparative analysis between consultative effectiveness and rebate effectiveness, nor does it provide a cost-effectiveness analysis of consultative services.

Ultimately, consultative services achieve results that rebates alone cannot. Consultative services:

- Identify additional energy efficiency opportunities and generate additional projects
- Reduce wasteful investments, poorly implemented projects, and lost savings opportunities
- Overcome certain common obstacles to implementation

Within a consultative approach, rebates reduce net project costs and encourage the implementation of energy efficiency projects. Rebates also serve as an incentive to engage the consultative program. When used together, rebates and consultation play complementary and effective roles in achieving immediate and long-term success.

The Traditional Value Proposition

Conventionally, utility efficiency programs have had a financial focus: "Utility programs have focused on incentivizing customers to purchase energy efficient products over standard

[1] Efficiency Smart, a division of the Vermont Energy Investment Corporation, serves customers of American Municipal Power, Inc. in Ohio, Pennsylvania, and Michigan.

efficiency products" ("How CIP Works" 2012). These financial incentives allow the utility efficiency program to claim energy savings using the data collected during the rebate transaction.

Financial incentives are frequently perceived by both customers and vendors (suppliers and contractors) to be the primary value offered by the utility efficiency program. It may be this perception that drives many program designers to focus their services on financial incentives. Typical financial incentive programs rebate expenditures after the customer submits an approved application form.

Form-based rebate programs offer the perceived ease of a simple process. By design, the customer installs energy-efficient equipment, completes the paperwork, and receives his or her check. The proposed value to the customer and the utility is a simple process for both parties. The ease of the process allows the program to reach the largest possible number of customers, and thus capture the largest amount of savings.

But what if this simple process isn't so simple? Customers may find the amount of paperwork or the very subject matter daunting. A program that is too complicated risks alienating customers. A program that is too simple risks leaving savings behind or claiming unverifiable savings. Form-based rebate programs may invite customers or vendors to design the project around the rebate. Likewise, they can inadvertently encourage the installation of an unnecessary, but otherwise proven, energy efficiency measure.

Designing an effective utility efficiency program is a matter of carefully balancing the needs of utilities, customers, and the program. In the interest of exploring the effects of different elements at work within a utility efficiency program, this paper proposes to define and explore the influence of consultative services. These services are of particular importance to the industrial customer, whose technology, components, and processes are often complicated and interdependent.

The Consultative Service

In order to evaluate the consultative service, this paper must first define the services and roles involved.[2] Consultants provide technical assistance in assessing energy efficiency opportunities and potential financial incentives. Consultative utility efficiency programs are able to provide a variety of services based on the needs of the customer. Prior to installation of efficiency measures, technical assistance may consist of site and usage evaluations, savings opportunity identification, proposal evaluation, product and strategy recommendations, contract preparation, or authoring RFPs and RFQs. The consultant will calculate the energy savings of the proposed project and provide a rebate determination to the customer. After installation, the consultant may perform inspections, verification, and commissioning. The consultant is the energy efficiency expert who helps customers understand the proposed technology, the amount of energy savings they can expect to realize, and the economic implications of their decisions.

The consultative service extends to vendors, as long as that service remains objective. The consultant serves as an independent, third-party evaluator working on behalf of his customer. During the process, the consultant may work collaboratively with the vendor to determine the best solution for the customer. The consultant may also provide services to

[2] These are the services used by the utility program consultants in the case studies detailed in this paper.

vendors that are similar to those provided to customers, including product eligibility verification, instruction on program features, and suggestions for best practices.

The consultant also acts in the capacity of rebate broker within the utility efficiency program. The consultant manages the rebate process and paperwork on behalf of the customer and communicates necessary information between program administrative staff and external stakeholders.

For consultants to perform these services proficiently, they must take the time to understand the customer's business—its practices and processes, its desired outcomes, and any obstacles it has to implementing energy efficiency. Likewise, conducting an appropriate and accurate energy savings analysis is critical to the consultative model. The analysis must account for the financial dimensions and cost-effectiveness of the proposed project, as many utility efficiency programs and customers have required economic criteria. In order to properly measure the impact on the organization and its usage, the analysis must consider equipment downtime, changes in operations and behavior, and adjustments to maintenance requirements. The consultant must identify interactions between efficiency projects and existing systems. Appropriate analysis may also uncover indirect benefits. When evaluating potential projects, companies may also consider improvements to workplace safety, reduced environmental damage, and marketing and public relations opportunities. Many companies will consider these benefits just as important as the energy savings.

Early involvement with the customer is important, but not requisite. Early involvement affords access at the planning stage. As with cases of new construction, the consultant should be involved in the design phase—the stage during which there is the greatest opportunity to make energy efficiency recommendations. Involvement can occur at any phase, however, and it presents the opportunity to identify and influence future projects (see CS 3).[3] Even smaller projects, which may not appear significant in relation to overall energy usage, may allow the consultant to build trust with the customer and affect future projects.

In the case studies detailed in this paper, the consultant is a technical specialist or account manager employed by the utility efficiency program. In other programs, the consultant may be a contracted party. However, sub-contracting the consultative role to a vendor presents risks. The vendor might not be fully immersed in the utility efficiency program's approach or interests. The motivation to generate profits or sell preferred products can subvert objectivity. Even when the vendor is acting objectively, the customer may still associate the service with one that is sales-driven.

The Beneficial Aspects of Consultative Services

Cost and Objectivity

Consultative services offered as part of a utility efficiency program are free to the end customer—or at least they are provided at no cost beyond what the customer may already be paying for a program fee. Today's energy efficiency market offers a number of consultative service providers, including companies whose principal mission is to deliver consultation and implementation solutions (e.g., energy services companies and engineering consulting firms).

[3] Five numbered case studies are discussed later in this paper. In-text references to the case studies use "CS 1," "CS 2," and so on.

Many of the services offered by hired consultants can be delivered as part of utility efficiency program consultative services. In lean economic conditions or where cash funds may be scarce, free technical services are of immense value. One of the main reasons that cost-effective, viable projects are not implemented is the "lack of information and/or high transaction costs to obtain suitable information" (Taylor, Trombley & Reinaud 2012, 15). The consultative approach helps to nullify this obstacle.

Since the consultant is not selling products or services, the customer can feel confident that any recommendations are objective. Utility efficiency program consultants are motivated by the goal of providing cost-effective energy savings; their goals thus align with the customer's best interests. In contrast, vendors, installers, and suppliers are driven primarily by profit. Consultants are free from the motives of profit and commission. They are not rewarded by sales and suffer no financial loss by recommending against purchases which will save little or no energy (see CS 2).

Consultants may collaborate with vendors to identify the best solution for the customer. Consultants may also evaluate vendor proposals to validate or refine savings claims (see CS 1 and CS 2). When comparing multiple proposals, consultants can analyze them using the same calculation methodology, which creates a level playing field for evaluation. Validating a vendor's claims is a valuable service not only to the vendor in terms of helping with the sales process, but also to customers, who may be motivated to pursue a project they were not previously considering (see CS 1).

In a non-consultative utility rebate program, customers and vendors may look at a potential project in terms of installing products that generate the largest financial incentive. For example, if a rebate is based on the number of lamps installed, the customer or vendor may see this as an incentive to install more lamps. Installing more lamps increases the profit (and commission) for the vendor. This kind of project would ultimately result in an increase in energy usage while being rewarded with a larger financial incentive. The same phenomenon may occur with the ineffective application of an otherwise proven energy-saving measure. For example, rebates for variable frequency drives (VFDs) may encourage a customer to install one on a motor that runs fully loaded. In such an instance, the customer believes he or she has made an energy-saving purchase, the vendor is happy to sell the product, and the utility believes it has purchased energy savings—when, in reality, no significant savings have been achieved.

In these cases, the consultative service has the opportunity to improve the project, prevent poor implementation of a good technology, and prevent the customer from wasting money. An understanding of the most energy-efficient technologies and strategies is not among the core competencies of many customers, even for many large industrial customers with internal engineering staffs. The consultant brings the customer up-to-date information, knowledge of emerging technologies, and the ability to dispel myths regarding certain technologies. In this capacity, the consultant becomes the customer's consumer advocate.

Identifying Energy Efficiency Opportunities

Consultants can bring the program to the customer, instead of waiting for the customer to come to the program. Customers may not be aware of the existence of the utility efficiency program, even when marketing efforts are diligent and widespread. Many marketing efforts focus on residential markets or common technologies such as lighting. Thus, industrial customers may not recognize the opportunity for savings and incentives regarding process machinery.

Prescriptive form-based rebate programs may fail to address the needs of the industrial customer as well. Programs that offer incentives for common, verifiable energy-saving technologies may not have measures for the widely variable technologies and processes involved in industrial facilities.

Customers may be aware of the program, but not their own project's eligibility for rebates (see CS 3 and CS 4).

Consultation can create interest in a project where none may have existed. A customer who is not interested in, or who has not considered, an energy efficiency project is unlikely to be motivated by financial incentives. Consultants have the opportunity to generate that interest by surveying customer facilities and analyzing customer usage to identify savings potential. By translating the intangible concept of efficiency into a dollar value, the consultant can be instrumental in creating a project (see CS 3).

Consultation can identify qualifying components within ostensibly non-qualifying projects. For example, many single-fuel-source utility efficiency programs do not rebate fuel switching. However, when a consultant learns details about the manner in which fuel switching will be executed, he or she can identify potential rebate-eligible efforts (see CS 5).

Even in cases where the efficiency efforts are not rebate-eligible, a consultant can inform customers of the benefits of new equipment, operations, or behavioral strategies (see CS 1). In other situations, consultants may be able to advise the customer to perform no-cost or low-cost changes that will save energy and money. Although this consultation will not result in a rebate, it will deepen the partnership between consultant and customer.

Successfully partnering to complete the initial project generates trust with the customer and reveals the benefits of collaborating with the consultant. It also creates an opportunity for the consultant to identify additional potential projects at the facility (see CS 1, CS 2, CS 3, and CS 4) and perhaps revisit a potential project whose payback was earlier judged unacceptable, recommending different technical specifications that ultimately result in additional savings (see CS 1 and CS 4).

In addition to influencing multiple projects, consultants can work on similar projects at multiple facilities (see CS 3). Once customers see a project successfully implemented at one facility, they are more likely to explore those same options at additional facilities.

When evaluating the impact consultative services have on multiple projects, a corollary benefit emerges: bundling projects. Another reason viable projects are not implemented by customers is the "large numbers of scattered, relatively small projects, the individual net worth of which is small, even if returns are high" (Taylor, Trombley & Reinaud 2012, 15). Because the consultant manages the customer process and paperwork, he or she can bundle smaller projects (see CS 3). Bundling smaller projects into a single, larger project creates the added benefit of reducing the time involved in process and paperwork for both the program and the customer. For example, in addition to calculating energy and monetary savings for a lighting project, a consultant can calculate the aggregate results of lighting, compressed air, and cooling system upgrades. These aggregate totals can offer the customer a more compelling reason to proceed with the project.

The Consultant as Broker

Bundling projects to add visible value is not the only way in which the consultant acts as a utility efficiency program broker. Utility efficiency program paperwork requirements range

from streamlined to cumbersome. In many programs, much of the paperwork is required for external verification of savings claims. The consultant adds value to the customer by serving as both project manager and broker, because "business owners do not have the time and expertise to work through all these steps, and thus many worthy projects succumb to the 'hassle factor'" (National Action Plan for Energy Efficiency 2010, 6). Industrial plant managers focus their time on maintaining the equipment and facilities, which are responsible for manufacturing the company's products. By serving as a project broker, the consultant limits the time investment of the customer, eliminating a possible obstacle to project completion (see CS 3).

Since the consultant has identified, defined, and analyzed the measures, the customer no longer has to complete a form that would otherwise be needed to capture the upgrades. This also ensures that project data is recorded with a higher level of accuracy and prevents revisions on the part of the customer. The consultant is able to work with the vendor to ensure that qualifying products will be installed, thereby preventing the customer from filtering through prequalifying product lists. Since the consultant has brought extensive technical knowledge to the project, the customer is spared the work of researching possible energy efficiency solutions.

As much as a utility efficiency program consultant may champion the cause of efficiency to customers, projects require that customers themselves take on the role of internal champion. The internal champion serves as liaison to the utility efficiency program, completes any remaining paperwork, and stresses the project's importance to internal stakeholders

It is important for the consultant to identify and collaborate with the company's internal champion. Since decisions are often made by committee in large companies, champions may not be able to act on their own inclination without approval. Consultants can help frame or write the message for the internal champion, and deliver this message to other key stakeholders within the company (see CS 5). As the expert, the consultant can help identify and articulate the benefits of investing in an energy-efficient upgrade, or, in many cases, the drawbacks of not investing in the upgrade. He or she can speak to the many dimensions of a project: cost-effectiveness, payback, equipment downtime, and operational changes, as well as maintenance, safety, and liability ramifications. This information can prove critical to the deciding committee. In this capacity, consultants can influence the make-or-break moment of a project.

Access to Data

To perform the consultative role effectively, consultants must become intimately familiar with a customer's business operations and technology. This level of involvement allows for the energy savings analysis to be more accurate than a form-based rebate program can often be.

While working through the project process, consultants will gain access to product specifications, operating hours, and existing technology. They may have the ability to perform metering before and after installation of new efficient technologies. They will have access to proposals, invoices, and other project cost data. They will have the ability to do an on-site inspection to verify installation and to identify additional measures that may have been installed.

This level of detailed information may be obtained in a program without consultative services, but the burden is on the customer or vendor to provide it. In lieu of such detail, a utility efficiency program can choose to base project analysis on assumed values or market data, but it will not calculate savings as accurately.

The Educational Dimension of Consultation

The language of energy efficiency technology is foreign to many business decision-makers. Consultants serve as translators to present information in a more native form. Consultants can translate intangible benefits into concrete dollar amounts. Consultants have an opportunity to add a meaningful context for the customer. For a company that manufactures bottles, for example, the consultant can explain the benefits in numbers of bottles sold.

The consultant identifies the true financial benefit of the project, in terms of both net present value and lifetime costs and savings. In addition to energy and monetary savings, the consultant can define the secondary benefits, such as maintenance reduction, avoided costs, improved safety, lessened liability, and increased property value.

The expertise and analysis the consultant brings to the customer help generate consumer confidence. In a consumer world that is saturated with marketing claims and greenwashing, consultants can validate a product's performance and debunk product myths. A consultant might advocate using a less-expensive product in an application where it will perform as well as or better than a more expensive one. This expertise makes the customer more confident prior to, and after, the installation.

Fundamentally, consultants serve to educate their customers. Savvy customers learn there is a difference between a good energy efficiency project and a bad one. They learn that good products can have bad applications. Customers are shown examples of money well invested and poorly invested. Educating customers helps to shape future decisions even long after rebate money has been exhausted.

Challenges to the Consultative Approach

The challenges facing a consultative utility efficiency program are as varied as the customers in its market. They require a consultant to be creative, flexible, and patient. But even in most challenging cases, consultants still have opportunities to provide valuable services. Three common obstacles are discussed below.

One obvious roadblock to successful consultative efforts is unreceptive customers. Their resistance to consultation may have a variety of causes. Some may have an alternative source of consultation. In some cases, customers may have internal advisors and engineers on staff tasked with maintaining energy efficiency. These resources may be relied upon more heavily than external input. Some internal staff may resent competing advice from an external source. In other cases, there are corporate mandates with which the branch facilities are obligated to comply. Some customers may have already contracted a service provider to plan and execute energy efficiency projects in their facility.

The second common obstacle is that whether guided by an alternative source of consultation or not, some projects may be defined before the consultant makes contact with the customer. This predefinition may be as simple as a fixed idea in the customer's mind or as major as one that has already been installed. However, since few first projects exhaust the potential for energy efficiency opportunities, consultants can use these initial projects as a chance to educate the customer on how the utility efficiency program works. This guidance lays the groundwork for future interactions and projects.

The third obstacle is that some customers are reluctant to engage a consultant because of the strict disclosure or confidentiality conditions of the company or its facilities. Many companies mistakenly believe participation in a utility efficiency program will open them up to public disclosure regarding their proprietary operations, processes, or products. The consultant's role here is to assure the customer that confidentiality can be maintained throughout the process.

In these situations, consultants may still offer objective advice and calculations, serve as validator and broker, and identify additional opportunities for the customer, regardless of the reception those services receive. The consultant, by demonstrating the flexibility and willingness to work within a customer's limitations, may obtain respect and trust from the customer. By working with a customer in a limited role on the first project, the consultant may create an opportunity for greater influence on subsequent projects.

Rebates within the Consultative Approach

Rebates still perform their traditional functions within consultative programs. They function as a financial incentive to encourage the customer to install energy-efficient products. Rebates reduce the incremental cost that might otherwise discourage customers from purchasing efficient equipment. They also allow the utility to demonstrate influence, and thus claim savings for the project.

In the five case studies to follow, rebates were determined on a case-by-case basis. Rebate amounts were based on project economics, financial yields, energy savings, and budgetary allowances. Once the consultant had the information necessary to calculate those values, rebate estimates were conveyed to the customer. Although this approach lacks the immediacy and accessibility of an online rebate calculator, it compels the customer or vendor to engage the consultant in the project. This engagement, in turn, allows the consultant to bring services to the customer. So as much as the rebate is "buying energy savings," in these cases it is also "buying a seat at the table."

Incentives and Funding

The consultative process introduces additional incentives beyond the rebate. The knowledge imparted to the customer motivates him or her to implement energy efficiency upgrades. Proper guidance allows the customer to optimize savings. Since the savings potential for industrial projects dwarfs the rebate amount those projects might receive, optimizing the project's potential for the customer may be more financially rewarding to the customer than the rebate itself. By removing barriers to implementation, increasing the customer's knowledge of the value of the project, and optimizing a project's savings, consultation actually reduces the need for rebates. Furthermore, by offering smaller rebates, utility efficiency programs can afford to pay for more consultative services. The case studies detailed in this paper suggest the benefits of shifting funding from rebates to consultation.

Costs for consultative services are difficult to isolate and quantify. Programs considering consultative services will need to account for direct costs (e.g., salaries, travel, and training) and indirect costs (e.g., administrative support staff, marketing, database and software development and maintenance). These costs will vary by budget, region, and company structure.

Case Study 1: Thermoplastic Molding, Inc. (CS 1)

Thermoplastic Molding, Inc. (TMI)[4] is a custom injection molder of thermoplastic materials. Its 90 employees work three shifts performing assembly, welding, bonding, insert molding, and decorating tasks. TMI has 20 thermoplastic presses, each with a capacity greater than 75 tons, throughout its 55,000-square-foot facility.

TMI completed an Industrial Assessment Center (IAC) energy audit through a local university in 2010. Because of limited technical staff and strict financial requirements[5], TMI had not implemented many of the measures on the report. The report and its calculations relied on a substantial number of general industrial market assumptions. TMI required more accurate data to assess potential projects. The general opinion of the company's maintenance manager was that the experience helped the company see where some efficiency improvements could be made but leaders planned to address them as funds became available.

One of TMI's oldest and largest presses, a 250-ton injection molding machine (IMM), used hydraulic technology. IMM presses have a high level of variability in their operation, including manufactured part size, raw plastic material, and machine shot size. As a result, the load on the motor is variable. In systems using only one large motor (like this press), the motor spends more than half its cycle time in idle. Aware of the possibility of a rebate, TMI contacted the consultant. The consultant validated the energy audit's suggestion to replace this press with a 300-ton IMM that used a hybrid technology combining a 50-HP motor with a variable volume pumping package. Given the press's 6,000 annual operating hours, TMI pursued this project with confidence the savings would be substantial, production throughput would increase, and the project would be eligible for a rebate from the utility. The consultant validated the original audit's projected annual savings of 89,028 kilowatt-hours (kWh). This investment saved TMI $8,128 in annual energy costs and had a payback of 4.5 years. The maintenance manager was impressed that the consultant took the time to understand TMI's process and unique equipment. Without the consultant's validation, this project may have been delayed or never implemented.

While at the plant to perform the inspection for the IMM project, the consultant identified two more opportunities and provided recommendations for compressed air and lighting upgrades. TMI subsequently secured a vendor to perform an airflow study. By replacing two reciprocating compressors, at a combined 40-HP, with a single compressor including a variable-speed drive (VSD), TMI saved 95,092 kWh, or $8,682 annually. This resulted in a 2.7 year payback. The new machine requires less maintenance than two compressors. In addition, TMI purchased a waste heat recovery package to help it offset natural gas usage for its winter heating needs. Although natural gas savings were not rebate-eligible through the utility efficiency program, the consultant calculated TMI's estimated waste heat recovery savings at $600 annually.

TMI had not previously installed new lighting after price quotes came in higher than expected. The projects proposed failed to meet TMI's required three-year simple payback for facility-specific investments. During the compressed air inspection, the consultant revisited the discussion. He evaluated the previous quote for lighting, which suggested using high-output T5 fixtures to replace the existing high-intensity discharge and T12 lighting. The consultant

[4] Names of companies included in case studies have been changed.

[5] TMI required less than three years payback on facility-specific investments. Production-specific investments had more flexibility, allowing for projects with longer paybacks.

recommended using high-performance T8 fixtures and demonstrated the 6 percent additional savings that would result. He estimated savings of more than $11,000 annually and a lower cost of implementation. The combined effect would meet TMI's financial criteria. TMI is currently considering this project.

Case Study 2: Custom Compounds, Inc. (CS 2)

Custom Compounds, Inc. (CCI) is a manufacturer of fluoroelastomer custom-mixed compounds and extruded and cured sheet products that require sophisticated technology and special expertise to create. As a result of steady growth in sales and customer base, CCI recently constructed a new 25,000-square-foot facility. It employs more than 40 individuals to deliver products.

In 2011, CCI began its energy efficiency efforts when it partnered with a local electrician to replace lighting in its plant and warehouse. CCI installed high-bay high-performance T8 fluorescent lamps in place of older 400-watt metal halide fixtures, re-lamped and re-ballasted its existing T12 fixtures, and added occupancy sensors in low traffic areas. CCI's goal was to reduce energy consumption, operating costs, and heat, while also improving lighting quality and employee productivity. During the installation, CCI contacted the utility efficiency program to discuss rebate-eligibility. The consultant's analysis validated the savings and economics of the project, demonstrating an annual savings of 33,600 kWh, or $3,800. This initial interaction built trust between the customer and consultant and instilled confidence in the utility efficiency program's methodology. As a result, the president personally gave a thorough tour of the facility to the consultant.

While performing an inspection of the lighting project during plant downtime, the consultant noticed air compressors operating. The consultant discussed general air compressor operation and its impact on energy usage with the company president. The consultant suggested contacting a vendor, and the president subsequently pursued a leak inspection and compressed air flow study. CCI requested a vendor proposal for a new machine and contacted the consultant to review the proposal. A careful review of the proposal revealed the vendor had CCI manually operating the compressor during weekend hours for metering—atypical for CCI's standard operations—which produced additional operating hours at a low load. The consultant was able to show that the hours were inflated and the savings claims were overstated by 25 percent as a result. Initially, CCI did not proceed with the project because it did not meet the company's financial requirements and it had concerns regarding the vendor's measurements. CCI has engaged a second vendor to collaborate with the consultant. This project will yield an annual savings of 50,478 kWh, or $6,100. The second vendor's installed cost is lower than the original vendor's. As a result of the consultation, the customer was able to make a more informed decision with a more effective outcome.

The consultant also reviewed CCI's inventory of motors to evaluate additional possible savings opportunities. In its production process, extrusion machines are driven by a large direct current (DC) motor. CCI deduced that the motor was failing and sought out the consultant regarding the possibility of improving its energy efficiency through a replacement, rather than repairing the motor as it had traditionally done. This situation proved to be challenging. CCI could not afford to wait to fix or replace the motor—it needed a quick answer. DC motors occupy only a small share of the market, so rigorous standards of efficiency have not been implemented on a large scale. The consultant concluded that a retrofit to an alternating current

(AC) motor with a VSD held potential for savings. After researching the potential opportunity for CCI's process, the consultant determined an approximate savings of 10 percent, which would save $550 annually and would not meet CCI's payback criteria. Since the retrofit proved cost-ineffective, CCI chose to repair the motor. Although not able to identify a cost-effective project, the consultant offered the customer information regarding efficient best practices for extrusion processing.

Case Study 3: Hearthstone Brewing Company (CS 3)

Hearthstone Brewing Company (HBC) is a privately held, principle-centered, environmentally responsible, and socially conscious brewery dedicated to continuous improvement. It is one of the 30 largest breweries in the United States. HBC has undertaken a number of initiatives to promote sustainability, including recycling promotional materials to create fuel for heating an outdoor structure, the use of straw-bale construction, and the use of outdoor air for cooling during winter months.

HBC renovated the upper floors of a building that had previously been warehouse space. The renovation converted the abandoned warehouse into corporate offices. HBC was unaware that rebates were available for new construction or major renovation work, so it had not included the utility efficiency program in the design phase. However, it was during this renovation that the consultant made first contact and began a relationship with HBC.

Because HBC focuses on sustainability, and not specifically energy efficiency, the consultant was able to point out previously unidentified opportunities during a site visit. First, the consultant proposed installing a VFD system on a circulating pump at the brewery. The existing system worked on a cycling basis to fill a 7,000-gallon hot water storage tank. This system operated for 7,488 hours annually. Second, he proposed the installation of a water booster system on the domestic water line for the brewery. The existing system worked from a water loop with a bypass valve. The proposed new system was a water booster system with a VFD. Bundling the two projects resulted in a combined annual savings of 43,000 kWh, or $3,800, resulting in a simple payback of 6.4 years. The consultant's recommendations and analysis proved valuable to the brew master, who had neither the time nor expertise to achieve the results on his own.

HBC also operates a restaurant. While reviewing the first two installations with the environmental program manager for HBC over lunch at the restaurant, the consultant inquired about the possibility of installing light-emitting diode (LED) lighting in the restaurant to replace existing halogen lamps. The environmental program manager stated he had tried a selection of different LEDs but was not happy with their performance. He had given up looking—he simply had too many other things to do. The consultant suggested a number of prequalified lamps to try. A lamp that met both the performance and economic criteria of HBC was found, and 48 were installed. Annual savings for the lighting project came to 14,000 kWh, or $1,300, with a simple payback of a little more than a year. The consultant was able to influence a project to completion where it had previously stalled.

Case Study 4: Plastics Recycling Center (CS 4)

Plastics Recycling Center (PRC) is a full-service plastics recycler. PRC specializes in grinding, compounding, pulverizing, reclaiming, toll processing, and warehousing. PRC solicits

manufacturers of plastics products to turn postproduction scrap into various forms of reusable plastic. PRC's facility operates 24 hours a day, seven days a week.

PRC was expanding production by adding a new recycling line and deemed the existing chilled water system inadequate. The customer had contacted a vendor and received a proposal for a system before contacting the utility efficiency program. The consultant provided a detailed energy and cost analysis of three possible water cooling systems (including the proposed system) to allow the customer to make an informed choice. PRC selected and installed an air-cooled chiller with a water-side economizer and a VFD on the process circulation pump. The water-side economizer and VFD both contributed to energy savings. The vendor had originally proposed a lowest-initial-cost system that did not include either the economizer or the VFD. The upgrade resulted in an annual savings of 129,435 kWh, or $11,053, over the proposed baseline system. The payback was 4.2 years.

After his initial positive experience with the utility efficiency program, the owner was inspired to pursue other energy efficiency opportunities. After several site visits from the consultant, PRC solicited a bid from a vendor for a warehouse lighting retrofit. PRC leases its current facility, so it requires a payback of less than three years (the current term of the lease). Initially, the submitted proposal called for replacing the existing high-bay 400-watt metal halide fixtures with T5 fixtures. The preliminary energy savings analysis done by the consultant revealed the proposed solution would not meet the payback criteria. The consultant suggested soliciting multiple proposals and specifying T8 technology, which, in his experience, was a less costly option. All three subsequent proposals met the customer's payback criteria and the project was executed. The lighting retrofit resulted in an annual savings of 773,000 kWh, or $60,619, with a payback of slightly longer than one year.

While the lighting project was moving forward, the customer contacted the consultant in a panic, asking for advice about a burned-out motor. The customer had the option of buying a new, 300-HP inverter duty motor or rebuilding the old one. He needed to make a choice immediately. Because the consultant had educated the customer on energy-efficient options, the customer suspected a new motor could be found that was more efficient than the rebuilt old one would be. But he did not know if the added cost would be worth it. The consultant completed the analysis within hours, provided the customer with the results, and informed him of the rebate amount. The customer was not previously aware motors were rebate-eligible. PRC bought the new, 300-HP motor, which resulted in annual savings of 15,000 kWh, or $1,300. The payback was 3.6 years. Rebuilding the motor would have resulted in a cost with no savings.

PRC is currently soliciting bids to upgrade exterior and parking lights.

Case Study 5: Metal Forging, Inc. (CS 5)

Metal Forging, Inc. (MFI) is an international metal forging company with facilities throughout the United States and the world. MFI is a specialized provider of forged parts with components that range from one pound to 1,200 pounds. MFI offers forging, heat-treating, and precision component machining. MFI employs more than 550 employees.

One of the company's foundries used boiler steam to drive its hammers, but the repair and maintenance costs of this system were making it prohibitively expensive. MFI contracted with a vendor to design a new electric compressed air system. The vendor conducted a study to determine the compressed air needs of the foundry and provided the customer with a proposal. MFI requested that the utility efficiency program review the proposal. Under the program's

criteria, fuel switching is not eligible for rebate. Since the customer was switching from natural gas to electricity, the project might not have warranted the utility efficiency program's involvement.

But the consultant saw an opportunity to help, knowing there were more and less efficient methods of making this transition. The consultant reviewed the proposed system. Though it appeared to save the customer almost $924,000 in energy and maintenance costs, alternative systems would result in even greater savings. The consultant worked with both customer and vendor to evaluate and question every operating assumption.

The consultant analyzed six different system configurations to determine the system that provided the lowest cost of operation. At the request of MFI's operations manager and plant engineer, the consultant provided an executive summary and detailed report of the findings to MFI's CFO to assist him with making the business case for implementing the compressed air project. The consultant was also asked to make a presentation to MFI's executive board as the technical expert on the project. Additionally, the vendor has invited the consultant to review several proposals for other customers as a result of the positive collaboration.

The new air compressor system will result in a reduction of total annual operating and maintenance costs of $1,080,023 compared to the existing system. The consultant's advice had increased the electrical cost savings by $153,702 annually, and he ensured, through his presentations, that the project would move forward to the next phase of approvals. The project will save 1,801,897 kWh annually over a standard-efficiency system, resulting in a 2.3 year payback. MFI has not yet implemented the project owing to the perceived low cost of natural gas.

Conclusion

Consultation has particular importance to industrial customers of utility efficiency programs. It offers benefits that rebates do not address, provides motivation to customers to invest in upgrades, and improves the financial and energy savings of customer projects. Utility efficiency programs should not overlook the value of consultative services, even if implementing those results in reduced rebate amounts. Rebates have apparent and quantifiable benefits, but combining rebates and consultation may prove more effective for many programs. Utility efficiency programs should consider shifting funding from rebates to consultation, though the degree of this allocation may vary by program. Utility efficiency programs address a variety of needs, have varied budgets, and serve different markets. Thus, these programs will need to determine the degree to which consultation can be best utilized. Ultimately, consultation is important enough to overcoming market barriers to merit further quantitative examination.

Although the case studies described here reveal consultation's positive initial impact, it is important to monitor the success of consultation over time. Factors such as customer education may make consultation more effective in the long-term, as customers become more familiar with the program's process. It is likely that customers who have seen the impact of consultation on their projects will be more eager to involve the consultant in future projects and adopt the advice offered. The need for consultation may grow as the opportunity for easily accessible projects is exhausted. Consultants will need to conduct thorough investigations of facility usage in order to continue to identify savings opportunities. Consultative services require continuous improvement and evaluation in order to continue to deliver cost-effective savings.

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