Achieving Corporate Financing for Energy Efficiency Projects: Considerations to Maximize Approval Rates

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ABSTRACT

Achieving corporate approval is often cited as a key component of implementing industrial energy efficiency projects. However, securing this approval is a constant challenge for manufacturers regardless of industry. Sherwin-Williams' Richmond, Kentucky facility was able to overcome this obstacle and continues to achieve notable success in terms of securing corporate support for implementing no-capital, low-capital, and capital-intensive energy efficiency projects. The plant achieved so much success that Sherwin-Williams decided to make a corporate-wide pledge to achieve a minimum energy intensity reduction of 2.5% annually over a 10-year period at 30 domestic plants.

This paper will share Sherwin-Williams, Richmond's lessons learned as the facility worked to overcome the plant's energy efficiency challenges. The paper will also present suggestions for other companies to consider that may help them achieve similar success.

Introduction

The implementation of capital-intensive energy efficiency projects constitutes a major component of an effective energy management program. However, procuring corporate financing for these projects is often challenging. Nevertheless, obtaining company support for capital-intensive energy efficiency projects is critical to the achievement of large-scale operational cost reductions. As such, it is worth exploring the associated challenges of securing corporate capital. By doing so, industry can enhance its understanding of what measures companies can take to maximize approval rates for corporate financing, thereby increasing the number of capital-intensive energy efficiency projects.

One company that has experienced great success with corporate-backed energy efficiency projects is The Sherwin-Williams Company. The company's Richmond, Kentucky, manufacturing site has experienced great success. Over the past five years, the site's energy management agenda has taken distinct shape, demonstrating how quickly meaningful energy efficiency improvements can occur on a plant level. The successes in Richmond have spurred a corporate mandate, requiring 30 of the company's manufacturing facilities to reduce their energy intensity by 2.5% annually over the next 10 years.

Through the implementation of multiple projects, the Richmond site has greatly increased its energy performance and notably reduced its operating costs, while accruing other benefits including gaining valuable insight on what factors help maximize approval rates for corporate financing. This paper will analyze examples of no-capital, low-capital, and capital-intensive projects implemented at the Sherwin-Williams' Richmond site, identify some of the inherent challenges in achieving corporate financing, explore key lessons learned, and offer some considerations for other companies seeking to acquire corporate financing for energy efficiency projects.

Demonstrated Success: Financing Lean, Low-capital, and Capital-intensive Projects

Sherwin-Williams' Richmond site is a 90-acre campus consisting of three facilities—a 220,000-square-foot paint manufacturing plant (built in 1976), a 30,000-square-foot resin manufacturing plant (built in 1985), and a 275,000-square-foot distribution facility (constructed in 1994). The site employs 353 people. In 2008, Sherwin-Williams decided to form the Richmond site's energy team. This group quickly identified potential energy efficiency improvements and began implementing projects.

The site team initiated its energy efficiency efforts with no-capital projects. These projects are funded through the maintenance portion of the site's budget. The team was able to identify a number of projects that involved waste heat recovery, the demolition of old equipment, and recycling.

The first waste heat project involved redirecting excess heat created by an air compressor. The main 200 horsepower compressor typically released heat that was 50–70 degrees warmer than the outside air temperature. The team was able to divert this heat indoors during the winter months to help warm the facility. This small, no-capital project reduced the site's natural gas heating costs and opened up the door for more opportunities by venting the boiler room's heat to other parts of the facility. Prior to the project, the boiler room's temperature was normally 100 degrees. After cutting a hole in the wall and installing a fan to exhaust the hot air, the boiler room's average temperature dropped to 80 degrees. Not only did the project further reduce the facility's heating costs by redistributing the boiler room's heat, but it also created a more comfortable work environment for employees, increasing morale on site.

Next, the energy team focused on the venting of the boiler room's steam condensate returns. Normally, a portion of the steam is returned to the boiler. However, the group identified a large percentage of steam from the facility's boiler escaping into the atmosphere. To reduce losses, the team installed a small heat exchanger that cools the steam slightly and increases the percentage of water returned to the boiler. The boiler condensate return now operates at 75% efficiency, an improvement from 50%, saving natural gas and using less water. The facility has a long-term goal of achieving 90% condensate return efficiency by adding steam traps throughout the entire facility's steam systems.

Another no-capital project pursued by Sherwin-Williams' Richmond site involved the demolition of old equipment. In many ways, older equipment often uses energy without anyone realizing it. This is due to the failure of a specific part. In addition, demolishing old equipment removes clutter and provides more free space, improves the work atmosphere, increases safety, and provides a more productive environment. Sherwin-Williams' energy team identified out of service items and then decided whether the equipment would be stored, or disposed of at a recycling facility. Sometimes, older equipment is salvaged for scrap parts if it contains valuable parts. If an older piece of equipment carries or is perceived as a safety hazard, demolition will take place.

The final no-capital energy efficiency project carried out by Sherwin-Williams is recycling. The company's Richmond site not only views recycling as an environmental and social responsibility, but also as a practical form of generating money. The recycling of some materials is more profitable than others. The site currently recycles 83 different material types including scrap steel, aluminum, wire, drums, pallets, corrugated boxes, strapping on materials, and used gloves. In 2010, the Richmond site recycled 92% of potential trash.

The site energy team then turned its efforts to lean—or low-capital—improvement opportunities. First, Sherwin-Williams' team opted to pursue lighting efficiency improvements. Lighting alone accounted for 15% of the site's energy consumption. To reduce this percentage, the facility switched from using high-pressure sodium bulbs to the substantially more efficient T-8 florescent lighting. Lighting fixtures were upgraded in the Richmond site's manufacturing facilities and distribution center. Additionally, specialty lighting was installed around the site's parameter and in parking lots. About 1,800 new lighting fixtures were installed, replacing old, high-pressure sodium and metal haloid lighting. LED lighting was used in hard-to-reach exterior areas and was favorable for the longevity of the bulbs. These improvements provided a higher quality, safer, and more productive work environment. It improved productivity because less internal resources were needed to service older lighting fixtures, and personnel were able to focus on tasks that are more productive. In addition, the site experienced general productivity improvements because the bright environment served to reduce manufacturing deficiencies associated with poor-quality lighting. This low-capital project was also an excellent opportunity for the team to establish a positive project track record while building the team's experience with more aggressive energy efficiency projects.

Next, the energy team identified a low-capital energy efficiency strategy—generating new energy efficiency ideas through financial incentives for employees. Financial incentives were provided to employees if their ideas materialized into projects that were successfully implemented. This new approach dramatically increased the number of energy efficiency ideas generated and increased employee morale.

One noteworthy concept is the use of variable frequency drives (VFDs) for pump and fan applications initially implemented on cooling tower pumps and also retrofits of existing air handling systems with VFDs and applied this concept over facility-wide pump and fan applications.

With valuable experience gained from past projects, the Sherwin-Williams' Richmond energy team shifted its focus to projects that required the greatest level of commitment, but would yield the greatest return: capital-intensive opportunities. Guiding this focus was a vision which entailed the deployment of a building automation system in all three facilities, highly integrating it with the site's major power-consuming equipment. Each new piece of major equipment must also fulfill the compatibility requirements of the automation system. Major power-consuming equipment includes air compressors and chillers comprising 19% and 17% of the site's electricity costs. Heating, ventilating, and air conditioning (HVAC) represented 10% of the site's electricity costs. Through careful planning and project analysis, the team identified capital-intensive projects that secured corporate-backed financing—replacing HVAC units, purchasing an infrared thermography device, and upgrading the site's chiller compressor.

Upgrading the site's HVAC units were the easiest projects. Prior to the upgrade, the site's 25- and 15-ton units were running constantly. The team identified substantial annual energy savings associated with upgrading to new, more efficient units. In addition, the older units required many service calls, which were very costly. This issue was an important factor in justifying the upgrade. The company worked with a vendor to select the most suitable HVAC solution. The decision was made to install more efficient units of the same tonnage, but with the added benefit of an economizer. The economizer was an important element in the purchasing decision of this equipment. Even though it added roughly $1,000 to the purchase price and was not easy to integrate into a programmable system, it entitled the facility to free cooling for several months during the spring and fall. The project paid for itself in less than one year.

The team then turned its attention to the thermal efficiency with the purchase of a capital-intensive infrared thermography device. The purchase price of $18,000 was justified by several different factors. The device identified specific areas in the building envelope in need of thermal efficiency improvements. By retrofitting select areas with foam or fiberglass insulation, the site was able to achieve annual savings between $8,000 and $10,000. In addition, rental costs were extremely high for this equipment, and a one-time contractor visit would cost between $3,000 and $5,000. Furthermore, the thermography device provides additional benefits. The energy team identified the device as an effective tool for ensuring that equipment—such as electrical switchgear, bearing, and motors—does not overheat.

Encouraged by the results, the Sherwin-Williams team shifted its focus to a more ambitious capital-equipment upgrade of the chiller compressor system to reduce the number of units. This investment was also justified by substantial energy savings and reduced contractor service costs. This project was the site's biggest one-time energy intensity reduction and represented a milestone for the site’s energy management efforts. At the same time, the project represented the site's most difficult investment in energy efficiency, which was partially guided by the U.S. Department of Energy's *Save Energy Now* LEADER initiative, to drive a 25% reduction in industrial energy intensity over 10 years. The LEADER initiative created momentum when the difficulties of implementation may have adversely affected project costs and the expected payback period. The message is simple: we are saving energy and reducing costs for the long run, and this investment will still pay for itself. In addition, the 10-year time frame of the LEADER initiative has reinforced a long-term way of thinking that has evolved to become a key component of the site’s energy management approach, and has been in line with the site's goals of reducing operating costs without impacting safety.

A fully implemented building automation system initially launched to enhance troubleshooting capabilities of HVAC equipment and manage peak electricity demands, quickly evolves into an operations-solution platform for all major equipment. The initial scope only included the integration of HVAC-related equipment in the interest of funding. However, the implementation team benefited from training provided by the vendor, and quickly learned the workings of the system. By engaging in vendor-provided training, the team utilized less external resources which freed up funding for integrating additional equipment. The team integrated 40 HVAC, 3 air handlers, 25 steam heaters, and 35 rooftop vents. The Richmond site is currently in the process of integrating major equipment from other mechanical areas, such as its boilers and air compressors. At this time, the site has integrated more than 100 pieces of equipment into the system.

The purchase justifications of this system are numerous. This now provides a quick method of verifying nuisance calls with valid maintenance requests. For example, when an issue was reported such as, "it's too hot in here"—the system provides a simple way to verify if HVAC equipment was running properly to assess whether action was necessary and whether complaints were based on valid maintenance requirements. The system also has the ability to provide and summarize live data from many equipment items, which includes reporting boiler efficiencies. The next major equipment addition to the system will be the site's air compressor—a project currently in the planning phase. This will allow the wattage and electricity use of the air compressor to be automatically adjusted, as well as remotely monitored and controlled. Equipment-specific energy usage for integrated equipment, including building lighting equipment, will also be reported by the system. Further, the system reports aggregate energy usage and transfers information across departments. The system's impact has evolved beyond its initial implementation scope to now provide a nearly comprehensive electricity demand management tool and building management system.

The future of energy efficiency projects at Sherwin-Williams' Richmond site will be built on past successes. The site's energy team expects utility usage and costs to drop in 2011, in spite of increased production and a 10% annual increase in utility rates. The team currently has 75 open projects, many of which are utility-related. The team will continue to leverage energy efficiency and reliability projects, integrate building and equipment components into its building automation system, and move the facility closer to operational and technical standardization. Through these efforts, the site implementation team has effectively created an environment where capital finance decisions are now approved with no hesitation from corporate headquarters. Sherwin-Williams, Richmond has demonstrated that such results are attainable even in the presence of rising utility rates.

Overcoming Barriers

The insight gained by Sherwin-Williams, Richmond, from its history of successful project implementation invites a discussion on the lessons learned from these experiences, including identifiable hindrances to achieving corporate financing for energy efficiency projects, as well as considerations and possible solutions for others seeking to maximize approval rates of corporate financing requests. There are numerous challenges associated with achieving financing for energy efficiency improvements and Sherwin-Williams, Richmond, has identified the following as having hindered energy efficiency investment decisions, and offers proposed solutions.

Maintaining Production Capacity and Protecting the Status Quo. Energy efficiency projects are often placed as lower-priority items than allocating capital for asset preservation. In addition, economic conditions make capital-allocation decisions more difficult, as more priority is placed on providing continued operations as opposed to energy efficiency improvements. As engineering resources are consumed to maintain the status quo, fewer personnel resources are available for energy efficiency projects.

The Richmond site's energy team supports the notion that if properly executed, energy efficiency project implementation can actually improve the status quo, and production can be maintained. If energy efficiency projects are properly justified through a comprehensive project analysis, and if the implementation capabilities of the team are clear and the effort is well planned, the projects should sell themselves to corporate because all of these efforts will pay for themselves. The Richmond site also views energy efficiency efforts and related results as a differentiator from competition.

Overemphasis on Short-Term Performance

One reason why energy efficiency projects may not be approved is if at any point excessive value is placed on short-term managerial performance at the expense of long-term priorities, such as those contained in an energy management program. Although this factor was not experienced by Sherwin-Williams, Richmond, and the company's corporate culture rewarded the attainment of long-term goals and objectives, this is not the case for some companies. As such, an overemphasis on short-term objectives can adversely affect corporate-financing-approval decisions for energy efficiency projects.

As previously indicated, corporate leadership at Sherwin-Williams has mandated that 30 of its facilities develop a plan to reduce energy intensity by at least 2.5% each year. In addition, the company ties incentives to facility performance. Corporate leadership gives four main awards each year for facilities that have demonstrated exceptional performance. The first award is called Site of the Year, which is given to the site that performed best that year in terms of cost, production, and safety. The second award is called Housekeeping, which is given to the cleanest site that looked the most favorable. The third award is called Sustainability Site of the Year, and is given to a site that exhibits exemplary energy performance and a strong commitment to recycling. During 2010, the Richmond site received the Sustainability Site of the Year award for its superior execution of capital-intensive projects and its very successful recycling program.

Technical and Operational Barriers, Vendor-Related Conflicts of Interest

Most likely, energy efficiency projects will not be funded if technical or operational barriers associated with new technology implementation may threaten production capacity and the status quo. Technical barriers include any uncertainty as to whether or not a project-implementation team can provide the appropriate level and type of training, as well as the fear that upgrades may not meet expectations and result in potential harm to the professional reputations of those involved. This is especially true when upgrades relate to mission-critical and energy-intensive processes. As a result of such barriers, corporate financing requests for energy efficiency improvements have been forgone by plant personnel. Furthermore, the issue of technical barriers can be compounded by the tendency of new equipment vendors to place more importance on the sale of equipment, rather than on the interests of the purchaser. As such, technical barriers to investments in new energy efficient technologies can be coupled with vendor-related conflicts of interest.

The Sherwin-Williams' Richmond site has benefited from a strong project-implementation team that has enabled the site to achieve corporate financing in the presence of technical and operational barriers. The foundation of these barriers, most frequently comprising a shortage of skilled personnel on the implementation team, was accounted for in the site's energy management and operations plans. To overcome this barrier, the Richmond site has hired staff with strong backgrounds in operations, or operations and engineering, as opposed to only engineering. The energy team offers insight on how to handle situations when the expertise needed to evaluate the appropriateness of capital-intensive energy efficiency investments is not possessed by the company in-house: seek solutions in the form of a third-party consultant or engage publically available technical assistance. In the absence of the latter, the best defense against possible vendor-related conflicts of interests is utilizing a contractor you trust, as well as being as familiar as possible with the product or equipment.

Incomplete Project Analysis

A company will be less likely to approve a request to fund an energy efficiency project if it is believed that the return on investment (ROI) has been miscalculated, if it is unrealistically overstated, or if there are components or considerations that have been excluded from a ROI analysis. In addition, best practices have dictated the need for life cycle costing and Net Present

Value (NPV) when conducting project analysis. The problem is that ROI rates are frequently miscalculated, and unrealistic ROI percentages stifle the momentum of implementing other energy efficiency projects when expectations are not met. In addition, it is often the case that components of a ROI analysis are unintentionally excluded, causing the ROI to be overstated.

Sherwin-Williams' Richmond uses and recommends life cycle costing with NPV considerations for project analysis. Additionally, the site recommends paying extreme attention to detail so factors that have the potential to affect ROI are not excluded from analysis. The site considers projects with returns of 50% or larger to be great, returns of 40% to be good, and projects with returns of 30% or less are usually not pursued. Given the NPV component of the Richmond site's project analysis, it has benefited greatly from longer equipment life of new equipment, which translates into a higher absolute return. For instance, the company cites its investments in LED lighting as an example. The expected absolute return on the Richmond site's LED lighting is significant, which is partly explained by the long life of this equipment. By and large, longer equipment life produces a higher absolute return because such a return is accrued over a longer period of time.

Sherwin-Williams' Richmond accounts for several frequently overlooked costs when conducting project analysis. Primarily, the reduction of costs in the form of foregone contractor expenses should always be accounted for. This is because service calls are expensive and newer equipment requires less contracted maintenance. In addition, the site recommends including an adjustment factor for equipment reliability in project analysis. This helps reduce the frequency of operations interruptions. For example, the site was experiencing air moisture leakage from one of its air compressors, which was leading to the compressor's intermittent failure. The resulting moisture in the air used to require weekly replacements via internal maintenance. Now, these parts only have to be serviced once a year. Further, a project analysis should contain an adjustment for improved work conditions and associated productivity improvements. Normally described as process improvements resulting from better working conditions, the benefits of energy efficiency upgrades can have the effect of shifting resources from less productive work (fixing nuisances) to more productive work. Noise issues associated with older equipment also hinder productivity. When the Richmond site replaced its compressor, noise disturbances decreased dramatically, communication improved between workers, and productivity increased. This factor is often overlooked in ROI analysis because it is difficult to measure. However, in retrospect, it can cause a ROI to be understated. Additionally, the site recommends accounting for employee morale improvements in a project analysis. Executive leadership places substantial value on how investment decisions affect employee morale. Higher employee morale translates to higher dedication and productivity. Therefore, projects that are likely to increase employee morale have a better chance of achieving corporate financing.

Sequence of Projects and Consistency of Success

Corporate executives are often reluctant to approve financing for capital-intensive projects if other, less expensive opportunities exist. Typically, corporate leaders will look at project-implementation trends across the company's facilities. If a request to implement a project is out of sequence with the implementation sequence of projects at other facilities, it is less likely that the project will be funded. In addition, valuable experience is gained by implementing less difficult energy efficiency upgrades first. Corporate financing decisions are in part based on the experience and track record of the project-implementation team. The Sherwin-Williams'

Richmond site started with small, digestible projects to gain experience. In addition, the site did not set unrealistic goals with regard to the initial implementation scope of its building automation system. The site benefited from heeding attention to all possible project analysis considerations in light of progressively increasing complexities. Consistently demonstrating success in project implementation was important for Sherwin-Williams' Richmond site, and was a key factor in creating an environment where energy efficiency financing decisions are approved quickly and easily.

Training Requirements

Corporately backed investments in energy efficiency improvements are often coupled with changes in process. Unless a training program is implemented, such changes can be difficult to adjust to. Also, they can adversely affect productivity and the bottom line of a facility. Creating and maintaining end-user acceptance of changes in equipment-related processes is challenging, and corporate-financing-approval decisions often take this into account.

Sherwin-Williams' Richmond site takes the costs of training requirements into account when conducting project analyses. Many equipment vendors and mechanical, electrical, and plumbing contractors provide onsite training for investments in new equipment, and include this service in their general scope of services. In addition, the site sends its maintenance team to classes every year to learn about functionality additions to modern compressed air and boiler systems. The energy team indicated that as it makes improvements, such as those aforementioned, it also improves the caliber of its employees. Sherwin-Williams Richmond has built an excellent workforce. Recently, it shifted its focus from mechanical skill sets to electronic skill sets when making hiring solicitations and decisions.

Communication between Plants and Corporate

Requests for corporate financing are more likely to be approved if there is effective communication between a plant and the corporate level of an organization on the subject of energy efficiency projects and past implementations. Sherwin-Williams' Richmond site acknowledges that communication is often an issue, and that there is a tendency to worry about passing along too much information because it will increase the risk of criticism or that someone will second guess you. The site has overcome many communication issues via routine updates on project statuses of all sizes and scopes. In addition, it has benefited from involving executive leadership in project successes, like the time it showcased the Richmond site's new boiler room to the company's Chief Executive Officer. Corporate also helped facilitate communication on energy efficiency by creating a database of general energy projects, making it accessible to employees on the company intranet. This allowed each site to report where it stands compared to other plants in the company. It also allows employees to participate in the process. This capability allowed Sherwin-Williams' corporate executives and plant staff to exchange ideas about various energy efficiency projects.

Conclusion

The energy management plan put in place by Sherwin-Williams' Richmond site barely existed five years ago. The fact that the site was able to create an environment where requests for corporate financing rarely go unfulfilled has been a key element in its energy management success. The time period within which the site created this environment also demonstrates how quickly meaningful change can occur. In spite of all the non-energy-related costs companies must seek to reduce in order to remain competitive, Sherwin-Williams' efforts exemplify the importance of prioritizing energy management and the significance of procuring corporately-backed funding to implement capital-intensive energy efficiency projects. While doing so, Sherwin-Williams, Richmond, has demonstrated how the benefits of capital-intensive energy management programs can transcend improvements to energy performance.