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Large industrials: serious engagement for deep savings

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Abstract

The industrial sector is the most difficult sector to involve in the implementation of efficiency and renewable energy projects. Although it shares many facility-based end uses with the commercial sector, including lighting, HVAC, and potential measures, these areas are not industry's greatest concern. Typically the energy dollars spent on the production of product is dramatically higher than facility end-use system expenditure. Approaches to promote energy projects in the industrial sector necessitate an enhanced understanding of the site-specific production process involved and must address potential measures in a way that improves rather than detracts from reliability and productivity. Further, serious and meaningful engagement is necessary to achieve significant savings. The key is to engage customers in an efficiency planning process that secures savings through commitment to specific energy efficiency targets.

For large industrial facilities, the roadblock to energy project implementation is not always money or motivation; it is often more structural in nature. These facilities and organizations need an outside force to bring all the pieces together and secure agreement within and across the organization itself. Numerous examples in North America have shown that engagement of the organization by involving senior executives with facilities personnel and key stakeholders together in dialogue, supported by meaningful technical assistance provided by the contractor or intervening party, can yield committed long-term savings. Whether in the form of a (energy plan) Memorandum of Understanding (MOU) – or some form of master plan – such agreements often align with corporate sustainability mandates and provide a streamlined process for readily incorporating efficiency into corporate goals and methods.

This paper discusses some highly effective programmatic approaches that have demonstrated considerable success in promoting both energy efficiency and renewable energy projects in the industrial sector. Such success is realized through motivated project participation, supported and guided facilities, cost-effective projects, and an expanding base of energy efficiency. In demonstrating these approaches, we will discuss program models for multiple United States-based programs.

This paper also discusses industrial-targeted outreach, MOUs, master plans, and outside technical assistance designed to deliver meaningful value for all parties to achieve deep, persistent savings and effectively institutionalize efficiency efforts at the target account. Following a discussion of programmatic approaches, we will provide a key industrial example that demonstrates major success, with a continuous flow of large projects, using approaches outlined in the paper.

Introduction: Energy Use and Needs of the Industrial Sector

The industrial sector has remained one of considerable challenge to the United States energy efficiency program delivery organizations. Most of the general prescriptive measures that are applicable and available through efficiency programs, such as lighting, HVAC, and basic controls, do indeed have relevance and applicability at industrial sites. But the majority of energy at larger industrial sites is used by equipment that is associated with the manufacturing process. Significant efficiency oppor-

tunities have been demonstrated in these process realms, but specialized and focused programmatic approaches are necessary to gain both deeper interest and trust of industrial facility management, thereby facilitating implementation of process-focused measures.

Manufacturing facilities, in addition to basic facility end uses, have a number of very specialized energy systems. Some of these – known as cross-cutting technologies – are common to many or most industries while others are process- or industry-specific. The major cross-cutting technologies include compressed air, steam systems, fan and pump systems, process heating, process cooling, refrigeration, and specialized process space conditioning. Because of their prevalence and energy intensity these end-use systems have been the subject of considerable interest, and there are even some prescriptive measures that are applicable to these technologies. Still, due to their complexity, measures for these cross-cutting technologies largely fall into the custom category, and savings must be uniquely developed for each specific project.

The process-specific energy systems are incredibly diverse, in fact as diverse as the realm of different manufacturing industry and product types. The range of manufacturing processes addresses equipment used for food processing, primary metals development and fabrication, plastics forming, and specialized assembly of countless products. Depending on the industry, process, and product being manufactured, the energy used by these process systems, along with the cross-cutting technologies that serve them, can frequently dwarf that used by the basic facility lighting and space conditioning systems. Examples of some of these energy-intensive process systems include injection molding for plastics manufacturing, induction furnaces for metals processing, and process heating systems for chemicals production.

Beyond the diversity and energy intensity of many industrial operations, there are several other characteristics that make working with facility management at these buildings and sites different from management at basic commercial operations. First, there is always a primary focus on stability and integrity of their production systems. Industrial facility managers will not be inclined to pursue measures that they believe could jeopardize their operation, and they will be disinclined to work with energy consultants who are not sensitive to these issues. Further, they seek consultants who explicitly understand their processes and will work creatively with them to develop energy projects that do not adversely affect their production.

Taking all of these points into consideration, many energy programs have been highly successful in engaging the industrial sector. Industrial energy efficiency efforts have resulted in some of the most significant projects, demonstrating considerable energy savings, unique technologies, and great value for the customer. Programs that have been successful have taken care to consider the needs of the sector and bring value to these end users, from promotional, technical, and productivity bases.

The subsequent sections of this paper will provide a few examples of active programs that have had great effectiveness in serving industry. The examples presented – NYSERDA, Efficiency Maine, National Grid, and NSTAR – have taken steps toward sector-focused outreach approaches supporting demonstration and research efficiency projects, have worked with the vendors that support these industrial sites, and have used energy consultants that have a sound understanding of the specific industrial processes and facility needs. Following a basic description of the key elements of the programs that serve the industrial sector, we provide case study examples of projects that are unique and demonstrate both programmatic success and great value to the customer.

MOU Program Initiatives: A Large Industrial Facility Buy-in Approach

Program administrators all over the country are seeking new approaches to achieving significantly expanding energy reduction goals. Large industrial energy use customers represent a viable pool to target, and if engaged effectively, can yield a large percentage of the overall savings required for a successful, cost-effective program. This can be achieved by obtaining a commitment for intensive participation by the largest customers in a program's service territory. To secure such savings, it is necessary to develop excellent relationships with the decision-makers at candidate facilities and then to secure active agreements from that facility to set aggressive targets for energy efficiency implementation. Such agreements and targets can take the form of goal-setting Memorandums of Understanding (MOUs), which lay out energy and demand savings goals, targeted measure categories to be pursued, technical assistance and support to be provided, commissioning requirements, monitoring and verification requirements, and potentially enhanced incentive or rate structures. Exemplary programs that have pursued the MOU approach are evident in the leading initiatives of National Grid and NSTAR Electric and Gas in Massachusetts.

The development and implementation of a successful MOU program involves a number of steps. A flow diagram showing these major steps along with bulleted details is shown in Figure 1.

Figure 1 lays out the process flow into five major areas, which are further described below. The delivery model for the successful MOU program is straightforward and flexible, but requires intensive interaction and support of customer project development and implementation. Efficiency program administrators are different and capabilities vary widely. A complete turnkey program may be best for some entities, while a hybrid approach may be best for others. The best approach must be arrived at through comprehensive discussion with program management. Frequently, external consultants are retained with considerable industrial technical and operational experience to support engagement of targeted customers.

Key steps in the overall master planning process that require facilitation include the administrative efforts in the visioning process; performing the outreach or technical marketing to identify key accounts or industrial end users that are interested in engaging in rigorous efficiency endeavours; developing technical energy goals for that industrial customer; working on the development of an MOU agreement; and then working closely with the industrial site to achieve the agreed-upon goals.

An important benefit of the success of this approach is the positive impact that such a program has with major utility customers. Involving people in the planning process results in an increased focus on energy efficiency and very likely results in undocumented savings. As plans are developed organizations

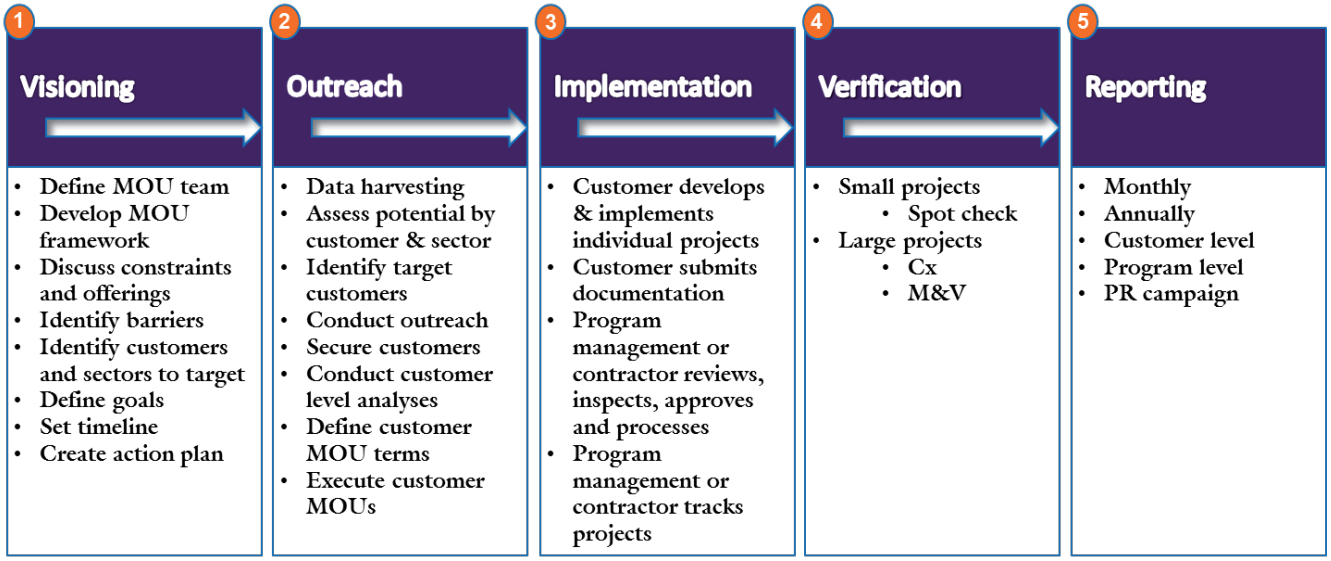

Figure 1. Steps for a Successful MOU Program.

are better able to include non-energy benefits in their investment decisions, which often results in more significant projects being able to surpass investment hurdles.

Generally, because the intensive time investment with customers in an MOU-type arrangement can be considerable, only large or very large industrial sites are targeted, and there may be very few facilities in a given region that match the desired size threshold. Candidate sites are generally extremely large customers with multi-building facilities, and each engaged site could represent potentially huge energy savings with associated comprehensive technical assistance requirements. Measures that could be the subject of MOU customer participation could cover the full breadth of energy efficiency, demand response, and renewable energy options.

The NYSERDA Approach for an Integrated Industrial-Focused Program

The New York State Energy Research and Development Authority (NYSERDA) has a comprehensive array of program offerings and service initiatives that have been very effective at serving industrial customers throughout the state. These program elements partly act as separate initiatives, though they also work in concert, with the objective of optimally serving their significant industrial base.

Existing Facilities Program (EFP) – The NYSERDA Existing Facilities Program (EFP) is the primary incentive program for both commercial and industrial customers in existing facilities. Projects can fall into prescriptive (prequalified) or custom categories. The prequalified category of incentives primarily addresses more standard commercial facility type projects (lighting, chillers, HVAC, motors, VFDs, commercial refrigeration, and assorted natural gas measures), so most cross-cutting technology or process-specific industrial measures would receive incentives on a custom path.

NYSERDA's EFP offers incentives for a variety of energy efficiency projects including prequalified measures and performance-based incentives. Prequalified incentives are provided for small energy projects and equipment replacement on a per unit basis for lighting, HVAC, chillers, motors, VFDs, and small gas efficiency projects. Projects must meet the minimum incentive threshold of $10,000 and are based on one year of savings. Performance-based incentives are offered to offset the project capital costs and are capped at either 50 % of the project cost or $5,000,000, whichever is the lesser of the two. The $5,000,000 cost cap was designed to encourage major facility energy saving projects that previously were limited by lower program caps.

For process efficiency measures, savings are calculated based on the energy saved per unit of production, so a plant that is expanding capacity can still receive incentives if they are increasing production with more energy efficient equipment. This incentive structure encourages New York companies to consider expansion in positive business climates and approach expansion with energy efficiency in mind. The $5,000,000 is an attractive financial incentive for companies that are in growth mode or that need support for retooling during down times.

FlexTech Program – The FlexTech program's (FlexTech) primary focus is to increase productivity and economic competitiveness by identifying and encouraging implementation of cost-effective energy efficiency measures. NYSERDA has contracted with engineering firms that were competitively selected through an RFP process, to provide a variety of technical assistance services to New York State companies, custom-tailored to their energy-related needs. These services are provided on a cost-shared basis, and include:

- Engineering feasibility and technical assistance studies.
- Detailed analysis of specific energy efficiency projects.
- Process improvement.
- Rate analysis, load shapes, and energy service aggregation.
- Engineering in support of project-financing proposals.
- Development of long-term capital budget strategies for the upgrade or replacement of energy-consuming equipment.
- Retrocommissioning of energy-efficiency measures in existing buildings.

With regard to providing the best possible service for New York State industrial customers, the pool of FlexTech consultants consists of many firms that have significant process and manufacturing energy efficiency experience. Many of New York's major industrial operations have developed long-term relationships with the highly qualified industrial consultants under contract to NYSERDA to provide technical support and guidance in the development of creative and cost-effective industrial energy efficiency.

ENGAGING THE INDUSTRIAL CUSTOMERS WITH INDUSTRIAL FOCUS OUTREACH

Supporting all of the NYSERDA programs that serve the industrial sector is the focus outreach service. The industrial sector is one of several sectors for which NYSERDA has achieved success through contracting with one or more firms to market, promote, and provide technical guidance to potential customers, particularly focused on larger end users. Unlike utility-run programs, NYSERDA's initiatives cannot rely on an in-house cadre of account representatives who have ongoing relationships with larger customers. To address this issue, NYSERDA has developed this pool of sector experts who can guide end users toward participation and technically and administratively assist those customers as they move through the implementation of complex projects.

For larger industrial facilities, it is critical that NYSERDA's selected outreach consultants have both marketing/promotional capabilities and industrial technology and measure expertise. Thus, the outreach team must have knowledge of the industrial site, cross-cutting systems, and the specific processes that are applicable to a given customer. The outreach consultant guides the industrial customer in the development of measures, recommends participation in the FlexTech study process (if applicable), and supports the effort as the customer investigates incentives and grants through programs such as the EEP or the R&D initiative.

To capture the vast process and production efficiency opportunities in the industrial sector, NYSERDA developed the Energy Smart Focus on Industrial and Process Outreach (Focus) program with a team of specialized contractors who provide the industrial sector with technical expertise, audits and assessments, and assistance with financial incentives to help implement energy efficiency projects. The outreach consultants assess the market, identify potential customers, reach out through multiple avenues to contact customers, conduct site visits and scoping audits, help with measure identification and assessment, and provide application assistance. The contractors also provide technical assistance during implementation of recommended improvements and help industrial customers locate contractors and vendors.

Technical Review

As part of the outreach effort, the Focus contractors provide assistance with calculations and savings estimates for proposed efficiency measures. The contractor can prepare and submit the application for the customer if requested. Once the application is submitted, NYSERDA assigns an engineering consultant to perform technical review of the proposed measures. The technical reviewer verifies existing conditions and equipment, calculates a baseline energy usage using on-site information and measurements, and then estimates the energy usage for the proposed measure based on established engineering methods and vendor supplied information. Focus contractor assistance and technical reviewer analyses are funded by NYSERDA at no cost to the customer.

Working with the full suite of NYSERDA industrial energy efficiency programs to help realize the state's goals, the Focus contractors engage the targeted Tier 1 and 2 customers using the following methods and strategies:

- Utilize experience with the industrial sector to address efficiency opportunities including industrial processes and data centers.
- Engage customers in the energy efficiency opportunities that are specific and unique to the industrial and data center processes in their sectors and facilities.
- Identify and engage the key decision-makers for each industrial customer early in the process including financial officers, production managers, facility managers, and data center managers.
- Approach the industrial customer with knowledge of and attention to linking energy usage to particular process improvements and the competitive advantages that greater operational efficiencies offer.
- Carefully relate discussions of energy usage to the particular industrial production and financial challenges of customer sectors and facilities.
- Act as an "account executive" for industrial customers willing to take action. Convey value to the customer and the ability to help them realize energy efficiency savings and provide access to the full array of available incentives (e.g., NYSERDA and others).

Figure 2 depicts the "targeted parallel path" approach that the Focus contractors follow to reach out to customers. The contractors use direct outreach for existing NYSERDA key Tier 1 accounts and accounts with which the team has prior relationships. For the other target accounts, the contractors pursue a collaborative approach with economic/industrial development organizations (IDA/EDCs), through federal programs such as DOE's Save Energy Now (SEN) Leaders, Manufacturing Extension Partnerships (MEPs), trade allies including vendors, trade associations, and project development organizations, and through participation in a variety of industry-related events. The collaborative relationships in particular with IDA/EDCs and with vendors have provided numerous introductions and project opportunity leads with accounts that would have otherwise been difficult to penetrate.

Summary

The Energy Smart Focus on Industrial and Process Efficiency program has resulted in substantial utilization of NYSERDA's offerings and has created strong customer partnerships that should drive continuous attention and long-term efforts to further reduce energy usage. The multi-faceted approach to identifying, recruiting, and engaging industrial facilities has created awareness of NYSERDA's programs throughout industry and with supporting organizations and provides a strong basis for

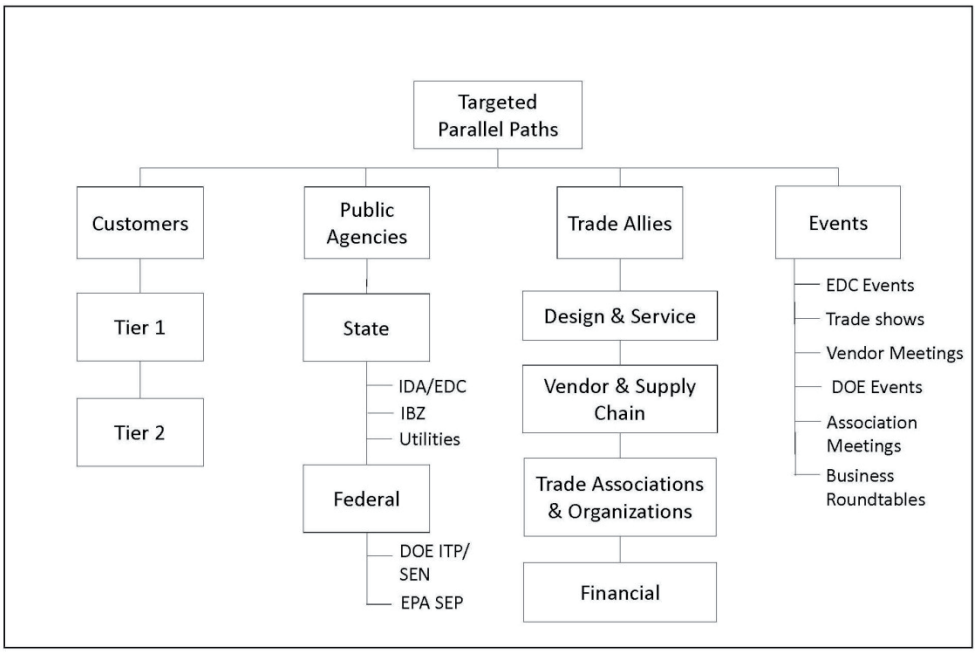

Figure 2. Industrial Outreach Approach – Parallel Paths.

ongoing participation in NYSERDA's programs. To date some of the notable impacts of this program are:

- Significant increase in program applications and encumbered savings since initialization of outreach efforts.
- Increased likelihood of achieving targeted program goals.
- Deeper engagement with end-use customers and strong, long-term partnerships.
- Greater market awareness of NYSERDA's programs.
- Deeper and closer relationships between NYSERDA and selected consultants, which result in a greater level of technical and outreach resources for the program.

The variety of activities conducted to support customers through the entire cycle of project development and implementation drives continuous efficiency improvements and ensures that efficiency measures are accurately analyzed and effectively implemented and result in achieved program savings. This effort requires considerable collaboration with NYSERDA, industry market actors, stakeholders, vendors, event coordinators and at multiple levels of customer organizations – providing positive results to reach the program MWh reduction goals.

Efficiency Maine's Industrial Focused Programs and Promotional Approach

The Efficiency Maine Business Program, which serves both commercial and industrial customers in the State of Maine, has had great success in working with the Maine industrial base. The Efficiency Maine team, a unique combination of the Efficiency Maine Trust and technical contractors, along with a network of trade allies, has developed successful, long-term relationships with many industrial customers who not only participate in efficiency efforts on a regular basis, but have made corporate commitments toward greater green practices and higher levels of sustainability.

There are several important elements of the Efficiency Maine Business Program that have been highly effective at serving industry. Certainly, the basic incentive structure and offerings have been instrumental in ensuring the success of the industrial efforts, and as with the NYSERDA EFP, most industrial efficiency measures are treated as custom projects. Other key features of the Efficiency Maine efforts that help to best serve the industrial base in Maine include a field staff network, an engineering staff network, and a trade ally network, all of which are described in more detail below.

FIELD STAFF NETWORK

A significant percentage of the Efficiency Maine contractor staff members are effectively serving in a nonengineering field capacity (in ways, similar to the NYSERDA outreach effort). Their primary responsibilities include working with customers to support their efforts to identify and develop projects and to find the resources to assess savings and providing basic "hand-holding" as the facility moves through the application and installation process. The field staff have also been instrumental in the development and training of an ally network (discussed below). In effect, the field staff are functionally comparable to a utility-run program's account executive network or perhaps a less-intensive variation of the outreach contractors who play a vital role for NYSERDA's industrial sector.

ENGINEERING STAFF NETWORK

Another major component of the Efficiency Maine programs are the engineering staff assigned for custom project development and review. These staff work very closely with the major industrial customers. They work with customers to identify projects, scope out best approaches, quantify savings, or review savings estimates developed by others. Later on, they work with the field staff and the customers to support the implementa-

tion process, inspecting key projects and deploying monitoring systems to best understand savings achievements. Lastly, the engineering staff serve as technical liaisons to the trade ally network, making sure they understand program technical requirements and specify systems that meet measure qualification criteria.

TRADE ALLY NETWORK

Efficiency Maine has built up a substantial infrastructure of program allies representing different kinds of firms, targeting different customer segments, and covering most regions of the state. Clearly, many of the major trade allies serve and focus on the significant industrial sector. It is noted that just a few program allies account for the majority of projects.

Efficiency Maine works with two different kinds of program allies. The first, and the majority, are traditional trade allies. These consist of contractors who deliver services directly to customers. The second are nontraditional allies that are market intermediaries such as associations and wholesalers.

The training of trade allies has evolved over time for the Efficiency Maine effort. Program staff found that breakfast/trade meetings did not work for trade allies. Now program staff are working with several different professional associations (electrical, HVAC, metalworkers, agriculture) to integrate recruiting and training of trade allies in pre-established forums such as annual meetings.

Program staff report that it has taken program allies awhile to see the benefit of the program. They now report, however, that allies are approaching program staff for training and even asking for program staff to go on joint customer calls with them.

With the increased importance of efficiency, rapid advances in technology, and growing demand for expertise with equipment and the programs, Efficiency Maine management has found it helpful to develop multiple levels of trade ally qualification. Companies earning their new designation – Qualified Partners – must meet some new requirements (minimum number of projects annually, attendance in partner trainings), but will also receive important benefits from Efficiency Maine (such as leads on key projects). A good many Qualified Partners have been developed to ensure appropriate levels of expertise and service to the industrial sector.

Demonstrating Deep Savings and Success: Steinway Pianos – Solar Industrial Cooling and Multiple Efficiency Projects

In order to illustrate some of the intensive approaches for motivating deep participation by industrial customers, we have included the following project summary. This industrial site and participant discussion, focused on an industrial client based in New York State, demonstrates the benefits gained when Steinway & Sons, the famed manufacturer of state-of-the-art, high-quality pianos, was approached and courted for a deeper level of participation in energy efficiency and renewable energy endeavours.

Through this process, Steinway has had a remarkable history of working closely with NYSERDA, participating in a number of their programs and gaining operational improvement, energy reductions, and cost savings. Steinway has regularly claimed that the vigorous outreach efforts, the network of supportive trade allies, and the industrial-focused array of programs have been instrumental in supporting and motivating their participation. They have participated on a regular basis in the Existing Facility Program, receiving incentives for a variety of projects, worked on the development of energy efficiency through the NYSERDA FlexTech program, and actively participated in NYSERDA's R&D program, developing innovative projects that are both cost-effective and models of sustainable development. The focus of this discussion is on their ongoing implementation of an expansive solar thermal cooling and dehumidification system.

Steinway & Sons manufactures their legendary pianos in the Queens borough of New York City. Their manufacturing facility was built in the 1870s and is not air conditioned. In their second-floor Action Department, employees build the hammer assemblies that strike the piano strings. The department's heating system consists of two 600 hp dual-fueled boilers that inject low pressure steam into the space as needed to manage humidity in the winter but there is no means of dehumidifying or otherwise conditioning the space in the summer. Maintaining consistent humidity is important in order to control moisture content of the wood components in the assembly.

Steinway embarked on a dehumidification project factory wide to ensure product quality and decided to begin with the Action Department. Installing a conventional packaged rooftop system was an option, but ultimately they decided to install an innovative solar-thermal cooling and dehumidification system in lieu of the more conventional approach. Figure 3 illustrates key components of the system being installed at Steinway.

Thirty-eight Abengoa Model PT-1 solar collectors mounted on the roof concentrate heat onto evacuated glass tubes, heating a pressurized water and glycol mixture from nominally 320 °F to 340 °F. Photographs of the collectors are shown in Figure 4. The actual temperature varies with solar availability but is limited to 350 °F maximum. When cooling is needed the diverting valve directs this hot water to a 99-ton double-effect absorption chiller. The chiller has a rated coefficient of performance (COP) of 1.39 and integrated part load value (IPLV) of 1.586. The dual-fuel chiller uses natural gas when solar is not available and cooling is needed. It can use gas to supplement solar-sourced energy or run entirely on gas. The Broad dual-fuel design (fossil fuel or hot water-fired) is relatively new, having been introduced in this country in 2005.

The absorption chiller operates like most conventional chillers, cooling chilled water for the air handling unit (the blue loop in Figure 3) and rejecting heat through a condenser to a cooling tower (the green loop in Figure 3). When dehumidification is not needed and the collectors can generate hot water above 275 °F, the hot water circulates through a vertical helical tube and shell steam generator heat exchanger and produces 15-psig process steam to offset a portion of the plant's constant 1,200 kBtu/hr load. A control system integrates the collector field and field circulator pump controls, chiller controls, and the steam generator diverting valve. The system is fully instrumented with flow meters, temperature sensors, a pyrometer, and a weather station to monitor and record the system performance. If there is a loss of power or load during daylight operation, the controls will instruct an emergency power pack to place the collector field in the stow position.

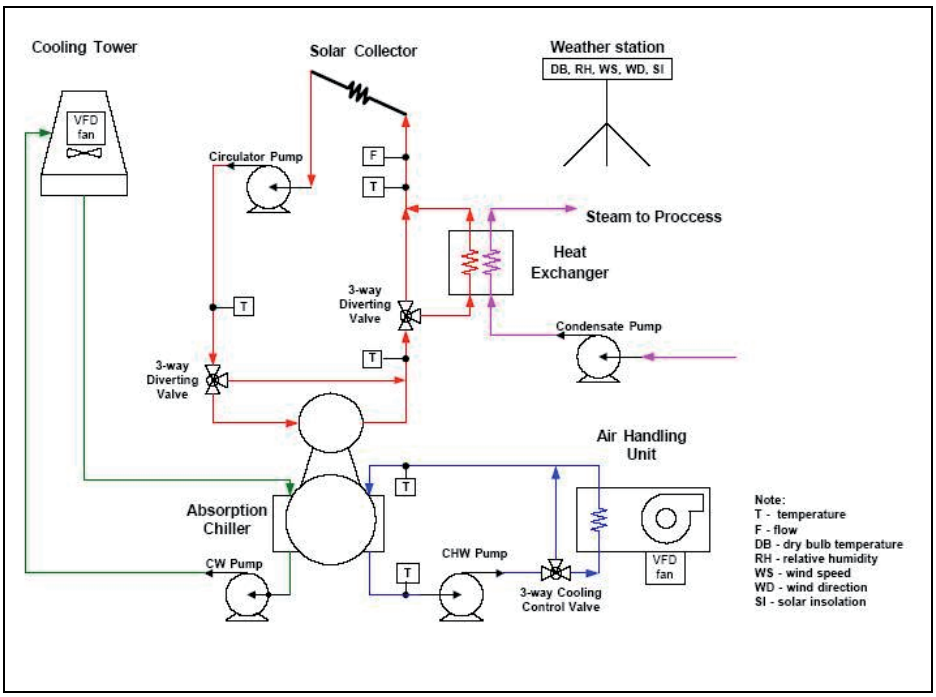

Figure 3. Solar Thermal System Components.

Figure 4. Abengoa IST Parabolic Solar Collectors (Stowed position).

Steinway & Sons is and has been a valued industrial participant in the broad array of the NYSERDA portfolio of programs, having participated in a wide variety of initiatives as they progressively adopt energy efficiency and renewable energy projects. For the solar thermal industrial cooling project, many program initiatives were of benefit to Steinway, particularly the cutting edge R&D program. This trendsetting project has already created considerable attention and good publicity for the program and for Steinway. It is also noted that a broad network of program contractors and allies, including energy consultants and equipment vendors (of solar and HVAC equipment) were instrumental in the implementation and success of the project.

Steinway is taking a number of other specific project steps as NYSERDA works to keep this industrial firm continually engaged in sustainability endeavours. Next steps include:

- Comprehensive energy efficiency site assessment – Steinway is embarking on an additional facility comprehensive energy study in an effort to identify previously unidentified efficiency measures.
- Wood waste reclamation and heat recovery – Steinway is moving on a second R&D project to recover wood waste material from their piano manufacturing operations. Some of the waste will be sent to a third-party recycling center, while other by-products will be burned on-site to support process heating operations.
- Consideration of other renewable projects – Steinway is considering other renewable projects, including roof parapet-mounted wind turbines and solar photo voltaic panels.
- Engagement of other Steinway facilities – Steinway has additional manufacturing facilities in Ohio, USA and Germany. Their efforts in New York have motivated corporate management to take similar steps in their other operations centers, thereby pursuing greater levels of company-wide sustainability.

Clearly, the combination of outreach, R&D, and technical support provided by NYSERDA has taken a previously less-involved industrial participant to aggressive, high engagement in energy efficiency. Steinway is anticipating many years of active involvement with NYSERDA as these organizations partner in a variety of energy projects.

Conclusion

This paper has presented information on the key program elements that effectively serve industrial customers and help to facilitate and enable continuing energy efficiency endeavours and deeper levels of savings. The industrial-targeted program features of the National Grid, NSTAR, Efficiency Maine, and NYSERDA programs have been highlighted to demonstrate their specific offerings that have resulted in significant and growing sector participation. A case study industrial participant – Steinway & Sons – that has actively pursued more and more aggressive efficiency projects using guidance and support through the NYSERDA programs is highlighted and described. The NYSERDA programs, as well as those of National Grid, NSTAR, and Efficiency Maine have motivated industrial efficiency implementation supported with high levels of quality control, ensuring that the customer does indeed achieve the savings and that the program does get credit for all of the kWh impacts sought. While the described programs may not be truly unusual or novel, it is the aggressive and integrated nature of the various program components that has led to their overall success. We are confident that similar approaches can be readily replicated in programs – whether offered and supported by utilities or governmental entities – that are seeking to more effectively reach and serve their industrial base.

References

Epstein, Gary, Mark D'Antonio, Chris Smith, Brian McCowan, 2010. *Engaging the Industrial Sector in Efficiency and Renewable Energy Programs,* AESP 2010.

Neiman, Lucy, Mark D'Antonio, Wendy MacPherson, Richard Rappa, Thomas Hudgens, 2011. *Capturing Savings in the Industrial Sector – NYSERDA's Approach to Industrial and Process Efficiency*, ACEEE, July 2011.