Moving Beyond Low Hanging Fruit: Successful Energy Efficiency Program Outreach Strategies for Commercial Facilities

Peter Serian, Bryn Samuel, Mark D'Antonio, Lucy Neiman, and Gary Epstein, ERS (Energy Resource Solutions)

ABSTRACT

As energy efficiency (EE) programs face substantially increased goals for MWh and Btu reductions, it has become imperative that commercial facilities be able to effectively identify and implement deeper-impact efficiency projects. As evidence of a plan that can effectively achieve very aggressive energy reduction goals, this paper presents a rigorous framework to guide an overall outreach strategy for commercial facilities.

As a key technical assistance provider to utility-sponsored EE programs, we have been deploying an approach that uses multiple channels to engage and educate commercial facilities. By coupling program outreach with deep-savings-focused energy studies, we can educate commercial customers on high impact opportunities in their facility and teach them the benefits of investing in higher impact projects that go beyond low hanging fruit.

This paper discusses an effort centered on effectively engaging with multiple stakeholders, trade allies, economic development entities, and customers to effectively identify opportunities, support project development, submit applications, and deliver program guidance. Successfully combining outreach efforts with energy studies and market actor support is imperative for customers who need more data to review an EE project's financial viability. Customizing the scope and level of detail in an energy study, in addition to connecting the dots between the customer's needs and the benefits of an EE project, are crucial to moving customers from design to implementation. As demonstration of program success, multiple examples will be cited that show the deployment of advanced-technology, higher-impact EE projects.

Introduction: Moving Beyond the Low Hanging Fruit

Efficiency program administrators are well aware of the considerable effort required to effectively market their programs. Simply declaring that incentives are available is not enough to drive participation from customers; thus effective outreach is required to identify and develop viable projects and generate applications. Outreach consultants can provide services to assess the market, identify potential customers, reach out through multiple avenues to contact customers, conduct site visits and scoping audits, and assist with measure identification and assessment and application submittal. The outreach team can also provide technical assistance during implementation of recommended improvements. This paper presents ERS's multi-pronged approach to identifying customers, marketing the EE program, and providing technical assistance.

ERS's outreach program is proficient at identifying and quantifying energy savings for projects classified as "low hanging fruit." However, the depth of technical assistance provided by the outreach is limited and most commercial facilities are not equipped with the necessary resources to mine for deep savings retrofit opportunities. Deep savings retrofits typically require short- or long-term metered data logging to identify and quantify opportunities. Energy savings calculations backed by metered data are often necessary to provide the accuracy needed for

executive staff to approve implementation. This paper further explains the benefits of coupling an outreach program with more in-depth forms of technical assistance that are needed to identify deep retrofit opportunities and gain executive approval.

Examples that show the success of in-depth studies at identifying deep savings retrofits in commercial facilities will be presented. First, we will consider the results from an evaluation of the New York State Energy and Research Development Authority's (NYSERDA's) energy study program, known as FlexTech. In addition, a case study from the Public Service of New Hampshire's (PSNH's) Commercial and Industrial (C&I) Retrofit program will be presented.

Outreach Approach for Commercial Facilities

The outreach approach is tailored to the specific sector and customers targeted by the program and should deploy multiple approaches to engage the customer. The following methods and strategies can be used in the outreach approach:

- Utilize experience with the commercial sector to identify efficiency opportunities.
- Engage customers in the EE opportunities that are specific and unique to the commercial sectors.
- Identify and engage the key decision-makers for each commercial customer early in the process including financial officers, facility managers, and sustainability managers.
- Approach the commercial customer with knowledge of and attention to linking energy usage to particular equipment improvements and the competitive advantages that greater operational efficiencies offer.
- Carefully relate discussions of energy usage to relevant financial metrics for the particular commercial sector, such as net cost of ownership, life cycle cost, savings-to-investment ratio, and modified internal rate of return.
- Act as an "account executive" for commercial customers willing to take action. Convey value to the customer and the ability to help them realize EE savings and provide access to the full array of available incentives and technical assistance.

Identifying EE project opportunities in a utility territory requires more than just working with customers. Figure 1 depicts the "targeted parallel path" approach that consists of three categories: direct customers, market partnerships, and program marketing. We use direct customer outreach for existing accounts, which entails directly engaging customers. Existing accounts are those facilities that have participated in EE programs in the past, have a large annual utility expenditure and are classified as key accounts, or contact the outreach team with project opportunities. However, there remains a large pool of typically smaller commercial customers with high value EE opportunities that do not fit into this category. Engaging this pool of customers requires strategically expanding the outreach team through market partnerships. Partnering with market actors with mutual goals allows the outreach team to extend their reach and engage the entire population in a given utility territory.

The outreach team pursues a collaborative approach with economic development corporations (EDCs), federal programs such as DOE and EPA, trade allies including vendors, trade associations, and project development organizations, EE financing firms, and through participation in a variety of industry-related or utility-sponsored events. The collaborative relationships, in particular with EDCs and with vendors, have provided numerous introductions

and project opportunity leads with accounts that would have otherwise been difficult to penetrate.

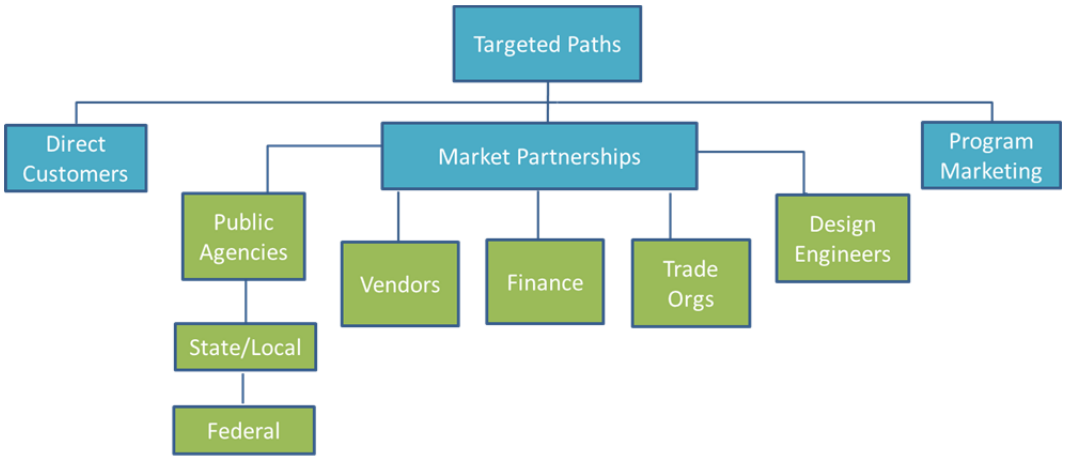

Figure 1. Outreach approach pursues parallel paths to reach all commercial customers.

ERS employs an outreach method that is multifaceted, targeted, and success-focused to ensure high-level customer participation. Our approach involves persistent but supportive marketing, high quality technical services, and knowledgeable representation of the portfolio of representative EE programs that serve the commercial facilities. Some of the key features of our approach include:

- Effective mix of customer interaction services – Interactions include basic marketing, program support, technical guidance, relationship development, and supportive "hand-holding."
- Support to customers from marketing through implementation – The outreach team develops long-term relationships with the customers, introducing all parties to the benefits of EE and the EE programs, identifying and developing measures and projects, and providing support through the implementation process. These relationships ensure that the customer is continuously engaged in future rounds of potential energy saving projects.
- Effective support for all applicable customer staff – Efforts focus on the customer's facility management and engineering staff to identify and develop specific measures and on corporate executives, including financial officers, to better understand the cost-saving benefits and economic advantages of participation. These efforts help to motivate corporate mandates for EE project implementation.
- Comprehensive leverage of market actors – A greater number of projects will ultimately develop if the distributor/vendor, consultant, economic development corporation, trade ally, and engineering community all understand the benefits of the programs and effectively act as an extension of the outreach team working with customers to get measures and projects developed and installed. Significant focus and effort to reach out to these players and provide education on EE programs is critical.
- Subsector customized approaches – Approaches are adjusted to accommodate variations between the major commercial sectors including unique regions, corporate personalities, characteristics, and organizational types found in the different sectors. The outreach team

should incorporate a wide variety of creative, value-added features, leveraging extensive relationships in the various sectors to achieve high levels of program participation.

Limitations of the Outreach Program

The goal of the outreach team is to successfully identify and engage commercial customers. However, because the breadth of customers that require engagement throughout a typical territory is so great, the depth of technical assistance that can be provided is limited. Thus, standard EE projects that can be readily quantified with a high level of accuracy are often programs' primary targets. These projects are considered to be low hanging fruit and typically include:

- Re-lamping and re-ballasting light fixtures
- Installing occupancy-based controls to turn on/off light fixtures
- HVAC equipment replacements including air- and water-cooled chillers, furnaces, boilers, heat pumps, unitary and split system HVAC units, air- and water-source heat pumps, and packaged terminal heat pumps and air conditioners.
- Commercial refrigeration equipment upgrades
- Unoccupied space temperature setback
- Pipe and duct insulation
- Motor replacements
- Programmable thermostats

Such opportunities can be identified through a combination of staff interviews and a walk-through of the facility. Load profiles, especially for commercial facilities with predictable occupancy patterns, can be constructed with limited facility data and extrapolated out to a calendar year with accuracy. Baseline equipment capacity and efficiency, acquired from equipment nameplates or facility staff, are compared to higher efficiency options available on the market.

Some customers, particularly larger accounts, have in-house engineering staff trained in energy management, EE measure identification, data logging, and complex energy modeling. In such cases, outreach staff work hand in hand with facility staff to prioritize projects, review recommendations and key assumptions, and complete all the paperwork associated with submitting incentive applications.

However, there remains a large pool of facilities that lack the technical resources to identify deep savings retrofits that go beyond the low hanging fruit. Because of the large quantity of customers in the outreach team's territory, the depth of technical assistance for any single customer is limited. The need for an in-depth technical assistance program is needed to pursue retrofits that go beyond standard efficiency projects.

Energy Studies for Deeper Savings Retrofits

Capturing the deeper saving retrofits that go beyond the typical EE measures mentioned above often requires more in-depth studies to identify, characterize, quantify net benefits, and then sell the project to the customer. Short- or long-term metering of energy-consuming systems, in-depth interviews and data collection on-site, and complex energy models are required to accurately identify and quantify energy savings.

The majority of deep savings retrofits in commercial facilities are related to optimizing equipment and control of HVAC systems. According to the United State Commercial Buildings Energy Consumption Survey (CBECS), after lighting, HVAC represents the largest customer in a commercial facility (EIA 2014). While lighting retrofit opportunities are typically identifiable with limited baseline data, deep saving retrofits associated with the optimized control of HVAC systems require a more in-depth level of study. Some examples of deep savings retrofit projects associated with HVAC systems include:

- Reset static pressure in an air handling unit according to real-time variable air volume (VAV) damper positions.
- Reset supply air temperature based on time-of-day or real-time outside air temperature.
- Install single-point or differential air-side enthalpy economizer controls in air handling units.
- Reset outside air percentage and air change rate based on time of day.
- Reset supply chilled or heating hot water temperature based on real-time outside air temperature.
- Reset condenser water temperature based on real-time outside air temperature.
- Increase cycles of concentration in cooling tower systems using side-stream filtration, sunlight covers, ozonation, and conductivity-based chemical feed systems.

A high priority goal of an outreach team is to identify the potential for deep savings retrofit opportunities related to optimized control of HVAC systems. There are common baseline conditions that are favorable to recommending deep savings retrofits. Many of these common baseline conditions are identified during a walk-through or facility interviews. However, further metering and analysis are still required to fully vet the opportunity and uncover additional opportunities. The complex dependency of energy use on outside air conditions and occupancy causes key metrics to vary over time. Metering the key metrics in energy-consuming systems over a statistically valid period of time – ranging from 1 week to 2 months – allows the annual baseline energy use to be determined with a level of accuracy needed for investment grade decision-making. Metering durations are dependent on a variety of variables including, but not limited to, outside air conditions, time of day, production schedules, and occupancy.

When the opportunity for deep savings retrofits is identified during the outreach phase, the outreach team should work closely with facility staff to understand the benefits of moving forward with a comprehensive energy study. Tailoring the scope of the energy study to the needs of the facility is critical in bridging the gap between identifying and implementing deep savings retrofits.

Types of Energy Studies to Couple with Outreach

In many cases, the interactions with an interested customer result in the determination that an in-depth evaluation of a system, or even the entire facility, is warranted to accurately quantify the potential opportunity for savings and cost-effectiveness. There are several types of studies that can be conducted to effectively address this need based on the customer's specific interests, as outlined in Table 1.

Table 1. Types of Energy Studies

Type of Energy Study	Length of Study (Months)	Study Description	Equipment Metering Duration
Single measure energy study	1 to 2	An in-depth study of one energy savings project	Spot measurements or short-term metering for < 1 month
Focused energy study	4 to 6	An in-depth study of one end-use (e.g., HVAC, compressed air, lighting)	1-2 months
Comprehensive energy study	4 to 8	An in-depth study of all major electric systems	1-2 months
Continuous commissioning	N/A	Continuously monitor end-use systems to identify low-cost/no-cost projects	Ongoing

The outreach team needs to identify an appropriate approach in line with the facility's energy goals, capital budget, project timeline, and investment criteria.

- Single measure energy study – One or more specific measure(s) are comprehensively studied for feasibility. Baseline metering of the EE measure's boundary ensures accurate savings estimates. This approach is taken when the customer requires the study to be delivered in a short time frame or is only interested in pursuing a specific, identified opportunity. The role of the outreach team is to work with the customer in identifying a specific project(s) that is in line with their energy goals and capital budget. The scope of work is spelled out and includes identifying barriers to implementation, unanticipated costs, and system interoperability. Cost savings and implementation cost are also determined with the accuracy and precision necessary for a capital investment.
- Focused energy study – A major end use, like HVAC or controls, is studied for deep savings retrofit opportunities. A focused energy study is recommended if the identified end use provides a high savings potential relative to other end uses, other end uses are fully vetted or lack savings potential, or the facility cannot outlay additional capital for a comprehensive study. Retrocommissioning studies fall under this category because the EMS and the associated HVAC equipment are the primary candidates for such studies in commercial facilities. As more energy-consuming systems are added to the scope of work – as compared to a single measure study – the length of the study increases and is factored in to the facility's budget cycle and time line for project implementation.

- Comprehensive energy study – All energy-consuming systems are studied for a given fuel type – usually natural gas, electricity, or both. A comprehensive study is recommended for facilities with many savings opportunities identified across multiple end uses. Facilities with minimal in-house engineering staff, newly formed energy goals or a recent infusion of funds for EE projects are good candidates for a comprehensive study. A comprehensive study is the most time-consuming and costly study type, but offers the greatest potential for identifying deep savings retrofits.
- Continuous commissioning – Continuously monitor energy-consuming systems, predominately HVAC equipment, through the facility's EMS or specialized data logging equipment. Implement deep savings retrofits, included no-cost/low-cost opportunities. Evaluate savings and adjust baseline energy to include implemented measures. Continuous commissioning is an ongoing effort, whereas energy studies are traditionally finite in length and end with a report of findings. Large commercial facilities with complex HVAC systems that are controlled through a central EMS are well suited for a continuous commissioning plan.

Throughout the energy study or continuous commissioning process, the outreach team should work with the customer to accomplish the following goals:

- Promote the projects internally to gain executive staff approval.
- Use the relevant financial metrics to connect the dots between energy savings and the facility's objectives. Evaluating an EE project the same way as any other investment is key to leveling the playing field with competing investment opportunities. Metrics such as modified internal rate of return, savings-to-investment ratio, and life cycle cost are the most favorable metrics to use in evaluating the lifetime benefit of EE investments.
- Handle the administrative task of submitting custom incentive applications on behalf of the customer.

Case Study: NYSERDA Sector Focused Outreach and FlexTech Program

NYSERDA couples comprehensive sector focused outreach strategies with in-depth technical assistance to support their efficiency programs. This approach has proven essential in moving beyond low hanging fruit and driving program participation to deeper levels. NYSERDA has contracted with engineering firms (including ERS) that were competitively selected through an RFP process, to provide a variety of outreach and technical assistance services to New York State companies, custom-tailored to their energy-related needs. NYSERDA's Flexible Technical Assistance (FlexTech) Program provides New York State commercial, industrial, institutional, government, and not-for-profit sectors with objective and customized information to help customers make informed energy decisions. FlexTech's goal is to increase the productivity and economic competitiveness of participating facilities by identifying and encouraging the implementation of cost-effective EE, technical evaluations, process improvement analysis, energy master plans, retrocommissioning, and development of peak load curtailment plans (PLCPs) as well as combined heat and power (CHP) projects (NYSERDA 2014). Cost-sharing incentives are available to eligible participants to support a variety of targeted activities including:

- Engineering feasibility and technical assistance studies

- Energy studies
- Detailed analysis of specific EE projects
- Energy manager services
- Peak-load reduction and load management
- 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 EE measures in existing buildings
- Carbon management
- CHP studies

The pool of FlexTech consultants consists of many firms that have significant EE experience and provide the best possible service for New York State commercial customers. Many of New York's major commercial facilities have developed long-term relationships with the highly qualified energy consultants under contract to NYSERDA to provide technical support and guidance on development of creative and cost-effective EE.

NYSERDA funds 50% of the cost for eligible services, up to a maximum of $1M per facility per year (NYSERDA 2014). The remaining 50% of the cost is paid by the customer to the FlexTech consultant. Sharing the cost of FlexTech services provides incentive for customers to move forward with such a valuable service, while ensuring they have "skin in the game." If a customer outlays capital, albeit discounted capital, for an energy study, they are motivated to recover that upfront cost through implementation of the recommended projects.

An evaluation of the FlexTech program was recently concluded that considered energy studies completed between 2003 and 2009 (Maxwell 2013). The evaluation determined which EE measures were implemented and how soon they were implemented after the energy study. The overall results of the study are shown in Figure 2. By the fourth year following the study, over 80% of the measure savings related to controls were implemented by the customer.

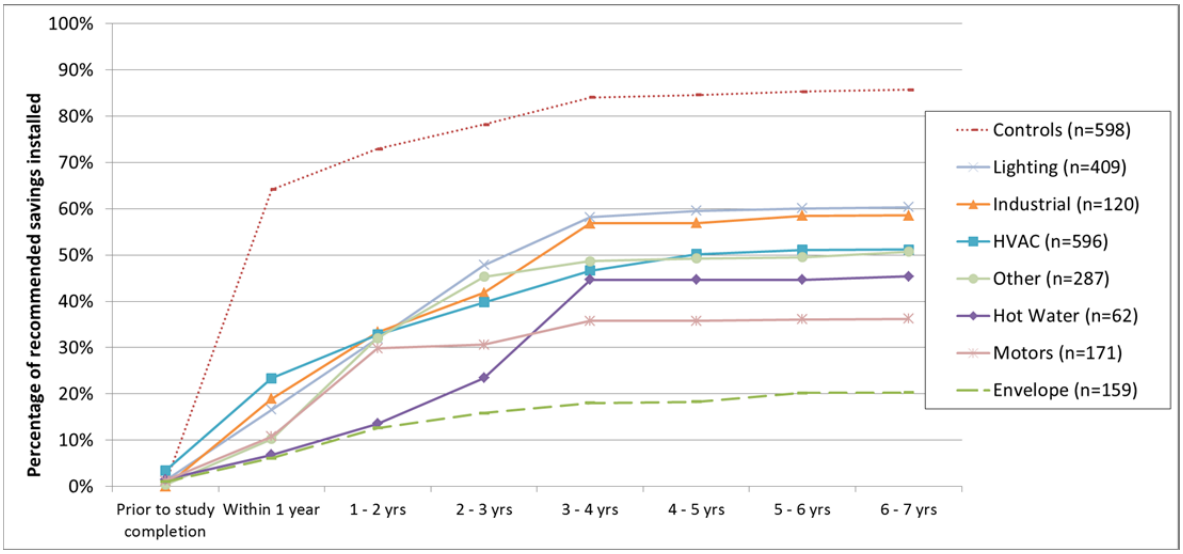

Figure 2. FlexTech measure adoption rate over time.

As mentioned previously, deep savings retrofits are primarily related to the optimized control of HVAC systems for commercial facilities. Such measures require in-depth studies beyond the outreach phase to identify and assess feasibility. Figure 2 shows that the FlexTech program was successful at identifying controls measures that met the operational requirements of the facility, reduced overall operating costs, and fell within their investment criteria. The results shown in Figure 3 demonstrate the effectiveness of an energy study program at identifying deep saving retrofits.

NYSERDA's outreach staff worked closely with many of the customers engaged with FlexTech studies, both before and after the study. In fact, the FlexTech studies are considered value-added resources for NYSERDA's outreach campaign. They allow the outreach team to promote investment-ready projects that go beyond the low hanging fruit. The results of the FlexTech evaluation are a credit to the study itself and the outreach program's ability to bridge the gap from project discovery to implementation. Coupling NYSERDA's outreach program with the FlexTech program is a sterling example of engaging the breadth of customers in a geographic territory and providing the depth of technical assistance necessary to implement deep saving retrofits.

Case Study: Public Service of New Hampshire Commercial and Industrial Retrofit Program

Since the mid-1990s Public Service of New Hampshire's (PSNH's) C&I Retrofit Program has effectively integrated outreach and energy studies to achieve program targets for energy savings. The program outreach utilizes multiple approaches including technology training to customers, marketing collateral, and most successfully, direct customer outreach. Direct customer outreach is one of the parallel paths of ERS's outreach strategy, as shown in Figure 1. PSNH couples their outreach initiatives with a comprehensive energy study program in mining for deep savings retrofits in commercial facilities.

As an example of program success, ERS completed an energy study for a multi-tenant, three-story, 66,000 ft^2 commercial facility in New Hampshire. Through comprehensive data logging, staff interviews, reviews of as-built drawings, and other site data sources, the end-use profile for the facility was established as shown in Figure 3. Consistent with the CBECS end-use profiles stated above, HVAC accounted for the second largest end use in the facility – a close second to lighting.

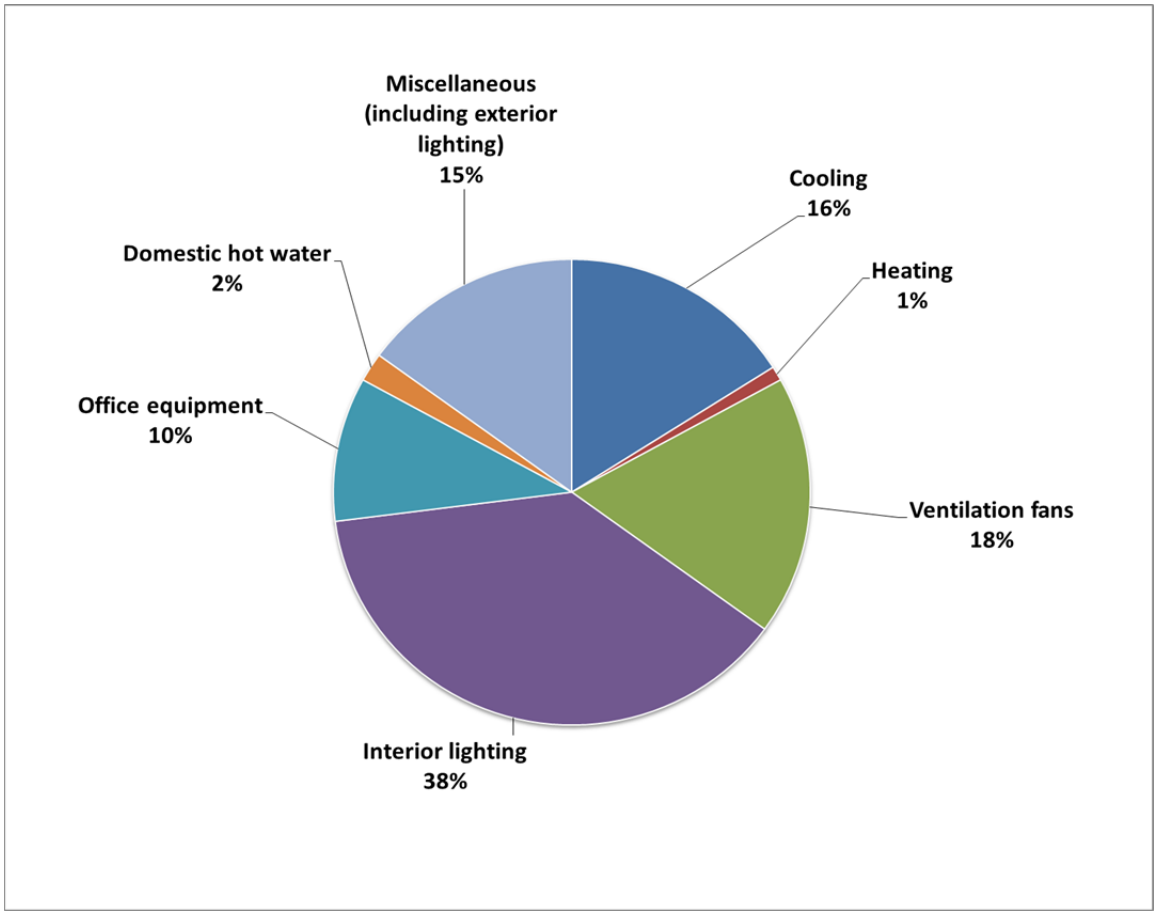

Figure 3. End use profile – commercial facility in NH.

Through a combination of no-cost, low-cost, and capital intensive deep savings retrofits, as shown below in Table 2, multiple measures were recommended that had an overall simple payback of 3.1 years. These improvements represented 29% of the facility's $120,000 annual electric utility cost.

The facility implemented every recommended EE measure within 6 months and realized first-year cost savings of approximately 36% (B. Abel, Senior Project Manager, Colliers International, pers. comm., March 12, 2014)), exceeding the study's estimated savings. This project was mined through PSNH's outreach program; the subsequent energy study identified deep saving retrofits, and continuous engagement with the facility ensured project implementation. ERS communicated the realization rate to stakeholders following the audit to bolster energy efficiency as a credible investment vehicle. Connecting the dots between energy efficiency and realized dollar savings is one of the keys to ensure follow-on program participation. Also, delivering an investment to stakeholders that exceeded its ROI projections built trust with the customer. This study served as a foundation to engage this particular customer, a commercial building manager, in a long term relationship to implement similar deep saving retrofits in their other buildings.

Table 2. Deep saving retrofit opportunities for commercial facility in NH

Energy Efficiency Measure	Annual Energy Savings (kWh)	Summer Demand Reduction (kW)	Fuel Oil Savings (Gallons)	Total Annual Cost Savings^	Installed Cost	Simple Payback (Years)^	Total Cost Savings Over 5 Years^	CO_2 Reduction Over 5 Years (lbs)*^
EEM-1: Turn Off Space Heating Pumps During the Summer	1,474	0.5	0	$167	$0	0.0	$833	8,161
EEM-2: Set Back Temperatures in Unoccupied Spaces	10,015	7.9	1,741	$5,976	$0	0.0	$29,880	251,244
EEM-3: Optimize Supply Air Temperature Reset in RTU #1 and RTU #2	10,766	1.0	1,236	$4,510	$0	0.0	$22,548	198,615
EEM-4: Install Demand Control Ventilation in RTU #1 and RTU #2	2,041	7.6	3,061	$8,375	$2,700	0.3	$41,873	355,683
EEM-5: Shut Down Old RTUs at Night and on Weekends	66,323	-5.4	1,674	$11,303	$4,400	0.4	$56,517	555,428
EEM-6: Upgrade to High Efficiency RTUs and Optimize Controls on Old RTUs	100,242	24.5	3,744	$21,944	$105,300	4.8	$109,718	976,088
Totals**	120,700		7,471	$34,505	$108,000	3.1	$172,527	668,077

*Using 1.107 lbs/kWh and 22.5 lbs/gallon of oil

**This total is a sum total of all the measures and does not take into account the interactive effects.

^Includes electricity and fuel oil savings - See Appendix G for electric only savings, simple payback, and CO2 reductions

Summary

Coupling an outreach program with a more in-depth form of technical assistance allows commercial facilities to dig deeper for cost-effective EE measures. Scaling the implementation of this model is critical for utility-sponsored energy efficiency programs to meet year-over-year energy goals. To drive this type of engagement with customers, outreach teams should employ a multi-pronged approach of effectively engaging with multiple stakeholders, trade allies, economic development entities, and customers to identify opportunities, support project development, submit applications, and deliver program guidance.

In commercial facilities, lighting is typically the target for EE projects; however deep savings are achievable by addressing specific HVAC system approaches. HVAC represents the second largest customer (second only to lighting) and thus considerable opportunity for deep savings retrofits in commercial facilities stems from optimizing HVAC equipment and systems control.

The first case study illustrated program success through successful coupling of an outreach program with an energy study program. An evaluation of NYSERDA's FlexTech program showed that 65% of the controls measures were implemented within the first year and 80% were implemented by the fourth year following the FlexTech study. Such results point to the effectiveness of NYSERDA's outreach program at funneling opportunities to the FlexTech program, which identified deep savings retrofits that met the operational requirements and investment criteria of the facilities. NYSERDA's outreach team was instrumental in bridging the gap from project discovery to implementation.

The second case study showed an example of a successful project that coupled outreach with an in-depth energy study to identify and implement deep saving retrofits. Through PSNH's C&I Retrofit Program, ERS identified various measures related to optimizing the control of the

commercial facility's HVAC system. ERS then employed a continuous outreach campaign to encourage and assist the customer in implementing all of the identified retrofits and realizing savings of 36% compared to their baseline annual electric utility cost. The realized savings exceeded the energy study's projections by 7%.

Coupling a technical assistance program with a successful outreach campaign is one of the keys to moving beyond low hanging fruit to identifying deep savings retrofits that will meet the increasing energy goals of utility-sponsored EE programs and their commercial customers. .

References

Abel, Brad. March 12, 2014. Colliers International. *RE: 43 Constitution Drive*.

EIA (U.S. Energy Information Administration). 2014. *Commercial Buildings Energy Consumption Survey (CBECS).* http://www.eia.gov/consumption/commercial/data/2003/.

Maxwell, Jon and Moray, Satyen. 2013. ERS, Inc. *Auditing Audits: Big Savings Found in Long Term Assessment.* International Energy Program Evaluation Conference (IEPEC), August 13-15, 2013.

New York State Energy and Research Development Authority (NYSERDA). April 29, 2014. FlexTech Program. http://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Commercial-and-Industrial/CI-Programs/FlexTech-Program.aspx.