

The Transformation of Commercial & Industrial Energy Efficiency Programs: A Whole-Building Approach to Energy Savings

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ABSTRACT

In May 2007, TRC and the New York State Energy Research and Development Authority (NYSERDA) released the Multifamily Performance Program, designed to achieve whole-building energy savings within New York's multifamily market. In March 2009, inspired by the success of the Multifamily Performance Program, TRC partnered with New Jersey's Office of Clean Energy to launch the similarly structured Pay for Performance Program, a whole-building energy efficiency incentive program aimed at achieving deeper levels of savings within the commercial and industrial building sector. After a few years of operation in New Jersey, TRC expanded Pay for Performance by partnering with New Hampshire's Public Utilities Commission and launched a similar program model in New Hampshire in February 2011.

This paper will discuss market transformation strategies, impacts, and lessons learned from the implementation of this program initiative, specifically focusing on Pay for Performance in New Jersey and New Hampshire. To date, these Programs have trained over 165 trade allies to develop and oversee large, comprehensive scopes of work, and have brought in more than 150 whole-building energy efficiency projects, with average annual savings of 1 million kWh and 4,000 MMBTU per project.

Additional discussions will include meaningful market interventions from both a macro and micro level, including partnership with EPA's Building Performance with ENERGY STAR pilot program, challenges, success stories, and next steps for further Program improvements and continued market transformation.

Introduction

The goal of market transformation programs is "facilitating the transformation of markets so that they effectively respond to customers' needs and public interests in increased energy efficiency; create long-term changes that reap continuous energy efficiency savings at low cost; and permanently transforming the market for energy efficient products and services or reducing market barriers, rather than achieving immediate or customer-specific savings" (Eto, Goldman, & Nadel 1998).

When assessing the New Jersey and New Hampshire energy efficiency program offerings in 2009 and 2011 respectively, they were predominantly in the form of prescriptive and custom equipment incentives/rebates. Other programs provided funding for education, outreach, and technical studies of energy projects. There was an opportunity to complement these offerings with a market transformation program that would combine educational and equipment incentives into one all-inclusive, whole-building program.

In designing the Pay for Performance (P4P) Program, the goal was to change the way contractors and end-users approached energy efficiency opportunities. Instead of providing

incentives to end-users to replace existing equipment with high-efficiency equipment, we sought to provide incentives that would encourage end-users to look for ways to lower their total energy consumption from a whole-building perspective in order to achieve deeper levels of savings, as well as continue to measure their facility's energy consumption and savings year after year. We hope the market learns to understand and value the financial and environmental benefits of reducing energy consumption through a comprehensive, whole-building approach.

Pay for Performance Program Model

In order to move the market towards whole-building energy savings, the P4P Program requires the development of a strategic energy plan (“Energy Reduction Plan”) for each facility, which guides a building owner in determining (1) where they are, (2) where they want to be, (3) how to get there, and (4) whether they have actually “arrived” relative to energy consumption.¹

Program participants must enter into a contract with an approved trade ally (“Partner”) to act as their energy expert and point of contact, along with the Program Administrator, throughout the project. The Partner is responsible for providing specific services, which include an energy benchmark, energy audit, building model, oversight of project design and construction, and post-retrofit monitoring and savings verification. Often, Partners will team with other Partners, or bring in sub-contractors, to provide the required services.

The Partner begins the Energy Reduction Plan development process by performing a building benchmark using ENERGY STAR® Portfolio Manager to establish existing energy consumption, followed by a whole-building energy audit. The results of the audit are then used to develop a calibrated energy model using ASHRAE-complaint modeling software (e.g. eQuest, Trane TRACE™) to assess energy savings from various recommended measures. The model accounts for the energy effects of recommended measures on the building, as well as on one another (i.e. interactivity). The Program requires a minimum reduction of 15% in total source energy consumption from the baseline benchmark, at least two unique measures where lighting makes up no more than 50% of total projected savings, and an Internal Rate of Return (IRR) of at least 10% for the entire project.

Following Energy Reduction Plan review and approval by the Program Administrator, the Partner moves his client into the installation phase. Upon installation completion the Partner continues to monitor post-retrofit utility data of the building, as well as other measure-specific metrics, for 12 months. This data is used to complete a post-retrofit benchmark in order to verify actual savings and determine final Program incentives.

Financial incentives are provided at each milestone as outlined in Table 1 and Table 2. Incentives vary slightly by state due to client preferences, budgets, and anticipated Program uptake:

¹ For additional information on P4P in New Jersey, please review ACEEE Summer Study 2010 paper “New Jersey’s Clean Energy Program- Pay for Performance: Integrating Performance Programs and ENERGY STAR.”

Table 1. New Hampshire Pay for Performance Incentives

Incentive #1	Building size: a] < 100K sf = \$0.18/sf b] 100 - 200K sf = \$0.15/sf c] > 200K sf = \$0.10/sf	capped at \$40,000	Paid upon review and approval of Energy Reduction Plan
Incentive #2	\$0.22/kWh and \$22.00/MMBTU saved	capped at 40% of project cost	Paid upon Installation completion. Based on projected savings outlined in the Energy Reduction Plan.
Incentive #3	\$0.08/kWh and \$8.00/MMBTU saved	capped at 10% of project cost	Paid upon completion of Post-Retrofit benchmark. Based on actual first-year energy savings.

Table 2. New Jersey Pay for Performance Incentives

Incentive #1	\$0.10/sf	capped at \$50,000	Paid upon review and approval of Energy Reduction Plan
Incentive #2	\$0.11/kWh and \$12.50/MMBTU saved	capped at 25% of project cost	Paid upon Installation completion. Based on projected savings outlined in the Energy Reduction Plan.
Incentive #3	\$0.11/kWh and \$12.50/MMBTU saved	capped at 25% of project cost	Paid upon completion of Post-Retrofit benchmark. Based on actual first-year energy savings.

Historical Resource Acquisition Programs

Within New Jersey and New Hampshire, variations of past and current resource acquisition programs focus on providing financial incentives for specific equipment replacement. For example, if an end-user is looking to replace an existing boiler, prescriptive incentive programs would provide a predetermined dollar amount to entice the end-user to install a high-efficiency boiler versus a standard-efficiency boiler. This method has proven successful in acquiring direct energy savings and has become a staple across many state and utility energy efficiency programs. Another variation on programs observed includes performance contracting, which fully funds the cost of measures and then directly meters equipment to collect repayments from measured energy savings. Table 3 demonstrates a high-level comparison of each program approach, including P4P.

Table 3. Resource Acquisition Program Structure Compared to P4P

	Prescriptive Equipment Rebates/Incentives	Standard Offer Performance Contracts	P4P Model
Initial Analysis	Observation of the condition of existing equipment to be replaced.	Walk through or audit of facility. Observation of the condition of existing equipment.	Energy benchmark, complete energy audit, and whole-building energy simulation.
Measure Selection	Selected equipment must meet certain minimum performance standards (e.g. AFUE, EER, etc.) to qualify for incentive.	Selected equipment must reduce energy consumption per guaranteed levels.	Selected equipment must meet minimum performance standards (e.g. AFUE, EER, etc.); minimum 15% energy savings from baseline; at least 2 unique measures; lighting accounts for ≤ 50% of energy savings projections; 10% IRR.
Up-front Costs	Cost of equipment plus labor.	Cost of equipment is fully covered by Energy Services Company.	Cost of initial analysis, equipment plus labor, and post-retrofit activities.
Incentives	Predetermined incentive amount based on equipment to be installed.	No incentive. Capital cost of equipment is repaid over 10-15 year contracts based on metered energy savings.	Incentives are paid upon: 1. Initial analysis (based on bldg. ft ²) 2. Installation completion (based on estimated savings) 3. Post-Retrofit savings verification (based on actual 1 st year savings).
Energy Savings and Verification	Stipulated energy savings based on predetermined protocols for each type of equipment replacement.	Equipment directly metered for energy savings.	Whole-building energy savings analysis based on weather-normalized pre and post-retrofit utility data. Calibrated Simulation, IPMVP Option D.
Trade Ally Relationship	Incentive typically tied to equipment. Limited interaction between participant and contractor.	Significant, long term relationship. Small pool of ESCOs nationwide.	Long term relationship from audit to post construction M&V. Variety of trade allies act as Partners, including A&E firms, efficiency consultants, ESCOs, and contractors.

Barriers to Meaningful Energy Savings: Breaking Bad Habits

Prescriptive equipment programs and performance contracting are designed as resource acquisition tactics and their ability to garner direct savings has proven effective. But, these programs have aided the C&I market in developing bad habits, such as investing in improvements without understanding the potential benefits, or missing energy savings opportunities by only investing in low hanging fruit. P4P is a market transformation initiative whose primary goal is to break these habits, change the way the market thinks about energy efficiency initiatives, and move towards deep energy savings. Table 4 summarizes the barriers of equipment incentives and performance contracting along with P4P Program solutions.²

² Barriers as observed by TRC as program administrator in New Jersey and New Hampshire.

Table 4. Resource Acquisition Program Barriers and P4P Solutions

	Prescriptive Equipment Rebates/Incentives	Standard Offer Performance Contracts	P4P Solutions
Measure Selection	Greater participation rates on the electric side, with lighting measures dominating. ³	Since the contractor pays for equipment up front and then collects payment through metered energy savings, it has led to “cream-skimming” of energy improvements that yield the highest and fastest return on investment.	In order to drive deep, whole-building savings, P4P requires: (1) minimum 15% savings, combination of electric and fuel; (2) at least two unique energy measures (e.g. lighting, HVAC); (3) lighting accounts for ≤ 50% of savings.
Incentives	Incentives often not large enough to really drive retrofit projects, stimulate early retirement, or achieve deep energy savings.	No incentives offered, but measures are fully funded upfront and capital investment is repaid through metered energy savings over 10-15 years. Long term commitment may limit further equipment upgrades/modifications during the repayment period.	Incentives are generous and are designed to be significantly greater than prescriptive equipment rebates/incentives in order to drive retrofits, early retirement, and deep energy savings. Incentives are directly linked to energy savings – more incentives for deeper savings.
Energy Savings and Verification	Stipulated, not actual, savings based on predetermined protocols.	Savings are measured at the equipment level.	Actual, whole-building energy savings is measure via pre and post-retrofit, weather-normalized, utility data.
Trade Ally Relationship	Incentive typically tied to equipment. Limited interaction between participant and contractor.	Significant, long term relationship but small pool of ESCOs nationwide.	Long term relationship from audit to post construction M&V. Variety of trade allies act as Partners.

One of the main barriers to participating in the P4P Program, especially when compared to prescriptive incentive programs and performance contracting, is the *cost* to the end-user. The whole-building approach is thorough and often comes with a higher up-front cost. Creative financing tools would assist with this issue but in a somewhat weak economy, business owners are hesitant to take on new debt, even with attractive terms. The ideal target customer is one who is already considering a retrofit project and the P4P Program influences them to more comprehensively address energy efficiency.

P4P has attributes that may be appealing to Program Administrators, end-users, and contractors. Program Administrators find value in: (1) leveraging Partners to drive the Program, thereby minimizing the need for additional staff; (2) funding installation of comprehensive scopes of work, which result in deeper energy savings; and (3) verification of projected energy savings. End-users enjoy: (1) the single-point-of-contact nature of the program; (2) generous incentives; and (3) for those end-users who do not know where to “start” when it comes to energy efficiency, the Program offers a great starting point, as well as an education regarding saving energy in their facility. Program Partners see added financial opportunity in providing a diverse suite of services through the Program. Many Partners provide all of the required services in-house, including energy auditing, modeling, design, construction management, and M&V.

³ In 2011, New Jersey’s Clean Energy SmartStart Program for Prescriptive and Custom Incentives received 3,899 program applications. Nearly 55% of applications were for lighting retrofits, and another 10% for lighting controls. Only 6% of all applications represented gas measures.

Strategies for Market Intervention and Program Implementation

In a recent American Council for an Energy-Efficient Economy (ACEEE) Summer Study paper, CLEAResult Consulting states that “market transformation programs are designed to address barriers beyond the first-cost of equipment...including need for education, lack of awareness, need for training, inexperience, poor communication, and bureaucracy of organizations” (McKay & Carson 2010). In designing and implementing the P4P Program we worked on overcoming these barriers through the strategies discussed below.

Standards, Tools, and Templates

Developing guidelines and standards is an integral first step in facilitating education and gaining experience, especially when introducing a conceptually new program to the market. A comprehensive program guide was developed for P4P so that all pertinent information was contained in one place. Technical standards within the Program drew heavily on accepted and familiar documents from the American Society of Heating, Refrigerating and Air conditioning Engineers (ASHRAE), EPA/DOE ENERGY STAR® programs, the International Performance Measurement and Verification Protocols (IPMVP), and local code agencies. Equally important was the development of standardized Excel and Word-based tools and templates to help Partners complete each Program deliverable.

Generous Incentives

The P4P whole-building approach is a significant departure from current energy-incentive programs in New Jersey and New Hampshire. Therefore, to raise awareness and stimulate participation, a generous incentive package was developed in order to entice both contractors and end-users. Incentive #1 is designed to cover roughly 50-75% of the Partner’s fees in developing the Energy Reduction Plan. Incentives #2 and #3, known as the performance incentives, are designed to cover approximately 30% - 35% of total project cost. Incentives cannot exceed 50% of total project cost and the incentive caps per project are \$2 million in New Jersey and \$300,000 in New Hampshire.

Marketing and Outreach

Marketing is critical to ensure success. P4P is a sophisticated Program that relies on Partners to provide the technical evaluations, financial guidance, and construction-related services necessary to achieve all the milestones of the Program. Some Partners are able to provide turn-key services, while others form teams to provide the required services based on their company’s strengths and areas of specialization. The first major marketing effort involved a “recruitment” process where interested companies applied to become Program Partners. The Partner selection process is ongoing, and Partnership applications are reviewed periodically. Once the Partners are selected, they provide Program marketing and outreach as they search for potential clients. Meanwhile TRC, NJ Board of Public Utilities, and NH Public Utilities Commission market to end-users through direct-mail campaigns, industry magazine advertisements, and website management.

Training and Education

The level of sophistication of P4P required TRC to develop and administer training and education events for both Partners and end-users. New Partners are not permitted to submit projects into the Program before first attending a Program orientation and training session, which provide an invaluable forum for explaining both the structure and value of the Program. TRC also hosts periodic meetings, conference calls, and webinars with interested end-users who are looking for additional information.

Communication and Feedback

A breakdown in communication can be a fatal mistake when implementing market transformation programs. Therefore, TRC holds monthly conference calls for all Partners in the Program. These conference calls, which average about 50 participants monthly, become a valuable opportunity for exchanging information, presenting Program updates and changes, troubleshooting common problems, and training in new tools. TRC also created a Partner Portal, which allows Partners to log-in with a specific password and find up-to-date Program guides, tools, templates, quick links, and conference call minutes all in one place. The broader NJ Clean Energy website, which is a separate URL, is updated with current information for end-users, but without the level of detail that is reserved for Partners. Additionally, a dedicated LinkedIn group for Partners was created to provide a forum for communication and collaboration.

The Program's comprehensive, "soup-to-nuts" design also requires ongoing communication between the Partner and the end-user over the life of the project. Traditionally, an energy auditor makes recommendations for saving energy but leaves the building owner to implement energy efficiency measures. This can often result in the installed scope of work widely varying from the auditor's recommendations. The P4P Program bridges the gap by keeping the Partner engaged from initial audit through construction and post-retrofit M&V. Since the Partner is directly contracted to the participant, rather than the Program, they have an obligation to serve their client. All formal Program documentation, including the Application and all incentive requests, must be signed by both the Partner and the participant.

Flexibility and Consistency

Like many initiatives, there needs to be a degree of flexibility as the Program transitions from a concept to practice. Although guidelines, templates, and tools were developed ahead of Program launch, TRC anticipated that there would be unique circumstances where rules would have to be modified to fit real-world situations. For example, P4P requires a minimum 15% energy savings, but it soon became clear that this posed challenges for energy-intensive facilities whose energy consumption is predominantly process driven. As a result, we lowered the threshold to 4% for all facilities where process energy loads accounted for more than half of total facility energy use. The 4% target was based on an analysis of large, NJ-based projects in the Department of Energy's Industrial Assessment Center database, along with stakeholder input. The absolute energy savings is significant due to large baseline energy loads. Typically, high energy-intensity facilities are projecting savings of 7-10%, inclusive of process loads.

Equally as important as flexibility, is consistency. As aspects of the Program evolved over time, it was critical to maintain as much consistency as possible. We found that periodic changes, unless absolutely necessary, deterred participation.

Results

Participation rates and associated metrics, such as savings, incentives, installations, etc. are tallied each month and presented on the monthly Partner conference calls. Select stand-out projects are profiled and advertised on Program websites and various conferences. This step is important to reinforce Program success, instill faith in both Partners and end-users, and drive higher participation rates. More information on results is presented in the following section.

Impacts & Accomplishments

Over the last three years, P4P has helped motivate the New Jersey and New Hampshire C&I market towards whole-building energy savings. By placing a greater emphasis on upfront analysis, providing generous incentives for installation of measures, and requiring an energy verification component, we are continuously striving to encourage the market to pursue deep, whole-building energy savings that go beyond short-term opportunities. Below are some notable accomplishments that TRC has observed from implementing this program.

Participation Metrics

P4P officially launched in New Jersey in March 2009. Since then the Program has received over 300 applications for potential projects. New Hampshire's P4P Program launched February 2011 and has roughly 23 projects underway.⁴ Table 5 shows participation metrics.

Table 5. Pay for Performance Participation Rates

Metrics as of 04/26/2012	New Jersey & New Hampshire
Applications Received	336
Applications Approved/Active	178
Energy Reduction Plans Approved	98
Installations Completed	34
Post-Retrofit Benchmarks Completed	5

Energy Savings Metrics

The energy savings metrics provided in Table 6 are projected savings based on work scopes approved in Energy Reduction Plans. In New Jersey, we are beginning to reach post-retrofit savings verification milestones on a number of projects. The first three reports received have demonstrated that the facility met or exceeded its whole-building energy savings

⁴ Program activity in NH was limited in the first six months due to a bill in the state legislature that called for NH to pull out of the Regional Greenhouse Gas Initiative (RGGI). While the future of RGGI was in question, Partners and building owners were hesitant to get involved in the Program because it was funded by RGGI proceeds.

projections, which is a promising indication. We are excited to see to what extent actual savings are matching projected savings and expect to have some additional data in time for the 2012 ACEEE Summer Study in August.

Table 6. Annual Average Projected Energy Savings

Metrics as of 04/26/2012	New Jersey & New Hampshire
Average kWh savings per project	776,450
Average kWh % savings from site baseline	24%
Average kW savings per project	148
Average MMBTU savings per project	4,936
Average MMBTU % savings from site baseline	25%
Average % source energy savings overall from baseline	26%
Total MWH Savings to date	76,000
Total MMBTU Savings to date	484,000

Incentive Metrics

Table 7 provides metrics on incentives paid under Pay for Performance.

Table 7. Incentive Metrics

Metrics as of 02/17/2012	New Jersey & New Hampshire
Average project cost (including material, labor, design, Partner fees and any Construction management fees)	\$1 million
Average incentive amount per project	\$350,000
% Incentive of total project cost	35%
Cost effectiveness ⁵ (Incentives / Annual Energy \$ Savings)	2.4 years
Cost effectiveness (Total Project Cost / Annual Energy \$ Savings)	7.6 years

Behavioral Changes

Behavioral changes arising from the P4P Program are the hardest to measure, but are arguably more valuable than the energy savings themselves when measuring success of a market transformation effort. In order to demonstrate the behavioral impacts of the Program, an interview was performed in New Jersey with one of our most active participants, Morgan Properties, who manages 121 properties (28,000 units) across 10 states, with 17 properties currently participating in the Program.⁶ They began looking into energy efficiency about three years ago in some of their oldest properties in order to cut energy costs and present a “green” image. They undertook a few heating, lighting, insulation, and water conservation measures on

⁵ Assuming \$0.12/kWh, \$10/MMBTU of natural gas, and \$20/MMBTU of oil #2.

⁶ Morgan Properties was also featured as a P4P Case Study at the 2012 Globalcon Conference on March 8th, 2012.

their own, but “knew that budgetary limitations would have a serious effect on how much [they] could accomplish and how quickly” (Gravina 2012). P4P provided the following solutions:

- Considerable financial incentives to help fund more measures across more properties.
- Whole-building approach that ensured projects were as energy efficient as possible; prevented cherry picking across entire portfolio by looking at each building/complex as a stand-alone energy consumer rather than performing the same upgrade across all properties.
- Independent validation and verification of expected energy savings and performance through Program review and approval.

Morgan Properties has had a positive experience with the Program, which “helped improve [their] knowledge of energy efficiency more broadly...to understand the whole project and what can be done.” In addition to a better understanding of what actually goes on within their properties from an energy perspective, they credit P4P with pushing them to “do many upgrades that would have been difficult to achieve in the absence of the Program” and noted that the “bulk of [their] investment is in New Jersey right now, and P4P is a big reason for that.”

What is even more notable is that Morgan Properties said that “these projects are also a great learning experience to continue energy efficiency in other areas where [they] are not eligible for P4P but still want to achieve the great energy reductions that P4P encourages.” Morgan Properties’ commitment to saving energy, amplified by the P4P Program whole-building approach and incentives, allows them to cross over to the next level of “whole-portfolio” energy savings.

Support for Innovation

Since the focus of P4P is deep, whole-building energy savings it easily accommodates various existing and emerging technologies. The Program does set minimum performance standards for common measures (e.g. lighting, boilers, etc.), but otherwise allows various technologies to be implemented. This gives Partners the freedom to implement common measures, such as lighting, and more creative solutions, such as heat recovery, that demonstrate energy savings – the focus is on the savings, not the equipment.

Workforce Development

The structure of the Program helps cultivate green-collar jobs and helps develop a workforce necessary to achieve ambitious energy savings targets. To date, the Program has approved 142 engineering, architecture, and energy consulting firms to operate within the New Jersey Program and 27 within the New Hampshire Program. Several firms participate in both Programs. In fact, one of our most active Partners in New Jersey, and the Partner for Morgan Properties, has said they “have been able to hire several new employees due to [their] P4P work” (Samuels 2012).

National Initiatives

The P4P Program aligns well with national efforts towards whole-building energy savings. New Jersey's Clean Energy Program was selected as one of eight organizations to participate in EPA's *Building Performance with ENERGY STAR* pilot program, whose goal is to "engage business customers and local trade allies in an ongoing relationship centered on strategic energy management and a path to continuous performance improvement" and "achieve deeper, more comprehensive energy savings in commercial buildings." P4P was also recognized as a 2010 ACEEE "Emerging Program" for excellence in energy efficiency program design and delivery, as well as being profiled in the Consortium for Energy Efficiency's (CEE) annual "Commercial Whole Buildings Program" publication.

Challenges & Lessons Learned

There have been a number of challenges involved with implementing this market transformation Program over the past three years, some of which are discussed below.

Cost

The P4P Program, by design, requires a high level of commitment from both Partners and participants. In order to successfully evaluate energy consumption from a whole-building perspective, the participant has to be prepared to incur up-front costs for the Energy Reduction Plan development, installation oversight, and post-retrofit M&V activities. Total project costs are also higher since scopes of work include multiple measures. Since the program incentives are paid upon approval of each deliverable, the participant has to lay out funds before the incentives are paid. In an attempt to alleviate some of these obstacles, we have advised Partners to charge for services in alignment with the incentive payment schedule. We have also collaborated with the New Jersey Economic Development Authority to offer low-interest financing for projects participating in the New Jersey Program.

Partner Network

The Program leverages existing energy firms to provide technical, financial, and construction-related services. Although TRC has trained over 165 Partners to date, only about 35% have submitted projects into the Program. This is a peculiar situation, which raises questions about what may be preventing some of the non-active Partners from bringing clients into the Program. What, if any, deterrents do they encounter in the field? Does the structure of the Program prove too inhibitive? Do they lack the necessary staff to execute projects in the Program? These and other similar questions still need to be addressed in order to overcome potential barriers to better penetrate the market. In an interview with the Partner for Morgan Properties, they found the P4P Program has "a sharp learning curve", but they were eventually able to turn it into a "smooth process."

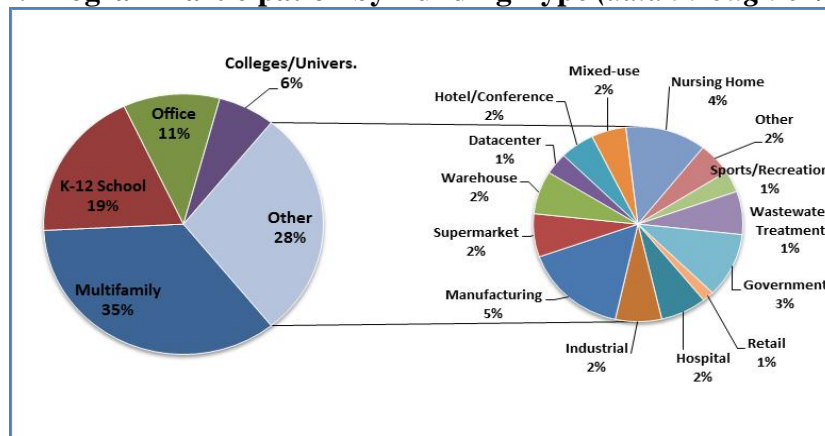
Another on-going challenge is ensuring that Partners are well-trained to work within the Program. An initial training and orientation session is critical in getting Partners off on the right foot, but it is often not enough to make a Partner comfortable with all elements of the Program. We found it necessary to devote extra time to Partners as they develop and submit their first

project. Helping a Partner troubleshoot their first project develops a better understanding of the Program and usually leads to high quality projects and increased participation. Additional time and effort may also be necessary to account for staff turnover.

Variety of Participating Facilities

There is a healthy diversity of facility types in the Program, but a few building types dominate the pipeline. As depicted in Figure 1, of the current projects in the Program, 35% consist of multifamily buildings. This may be partially accounted for by the success of NYSERDA’s Multifamily Performance Program, which was the basis for the design of P4P. Market studies will help to determine why other market sectors are not participating at higher rates.

Figure 1. Program Participation by Building Type (data through 04/26/2012)



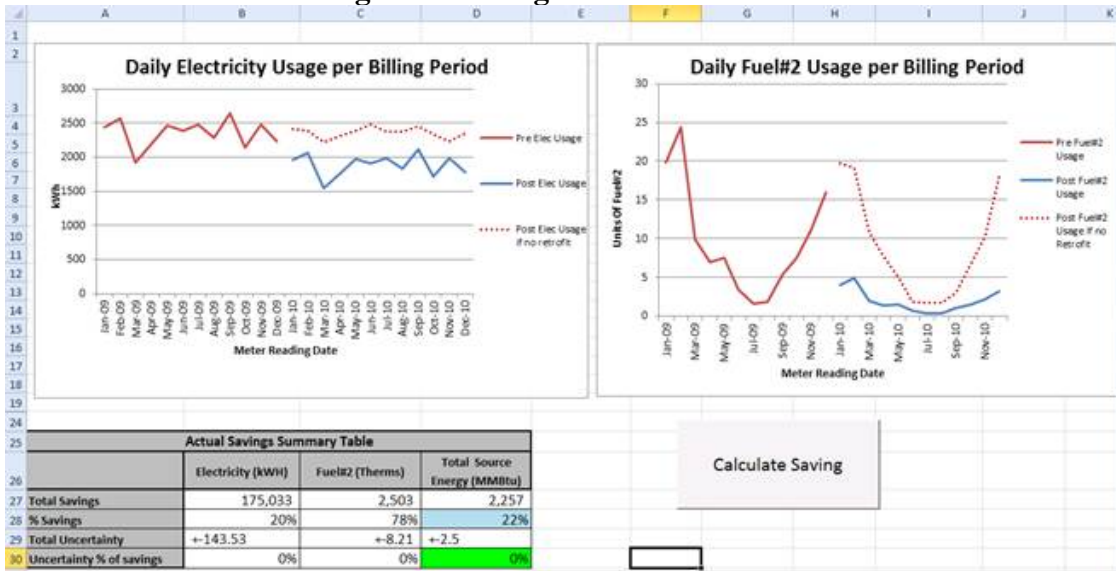
Post-Retrofit Energy Savings

The most interesting and unique aspect of the P4P Program model is the verification of projected savings. At the beginning of the project the Partner is required to develop a calibrated energy model as a component of the Energy Reduction Plan. This front-loads much of the M&V effort, which allows for reduced M&V after the project is built, as well as puts a premium on the validity of the energy savings estimates early in the process.

The Partner, on behalf of the participant, collects post-retrofit utility data and observes the performance of the installed equipment. At the end of the 12 months post-retrofit period, the Partner enters the utility data into ENERGY STAR® Portfolio Manager to establish a post-retrofit benchmark to determine actual energy savings. This requirement imposes accountability on the Partner, which is intended to result in more accurate savings estimates and reduce the instances of inflated savings projections.

While Portfolio Manager provides the percent source energy reduction for the facility, the Program requires monthly weather-normalized data in kWh and MMBTU energy units. This is necessary to better understand where the savings are coming from, as well as to accurately establish incentive levels. As a result, TRC, in partnership with Karpman Consulting, developed an Excel-based tool that weather normalizes pre- and post-retrofit utility bills and provides savings data in the required format. Figure 2 is a partial screen shot from this tool.

Figure 2. Savings Verification Tool

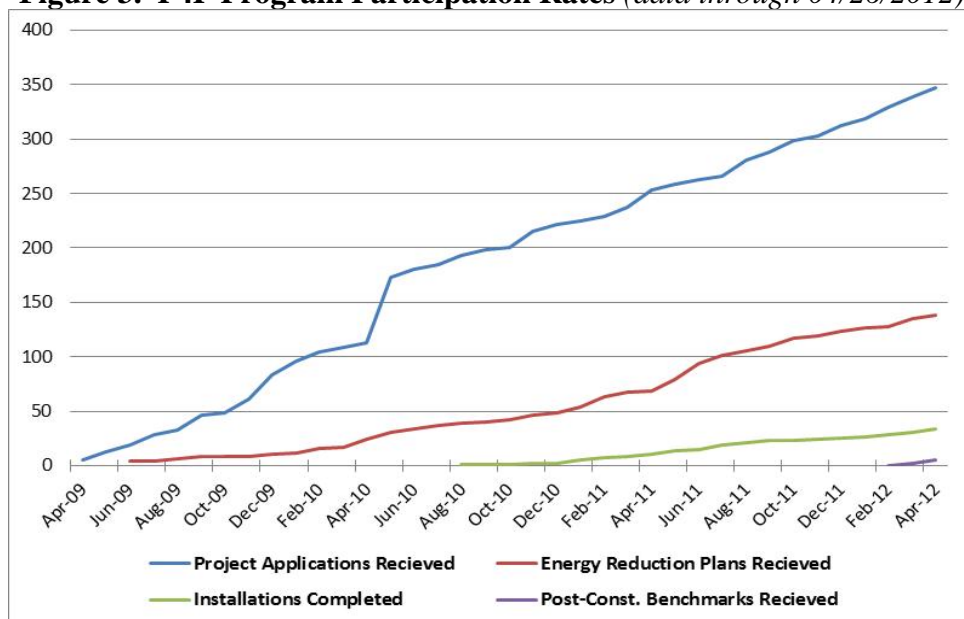


Additional challenges for post-retrofit M&V are anticipated to arise from unexpected changes in occupancy, production, or similar factors, which may affect energy consumption and post-retrofit energy savings. It is important to address these issues as soon as they occur so that a plan can be put into place to ensure energy savings comparisons are accurate relative to the revised energy load. One way to address this is to go back and revise the baseline benchmark and energy load to reflect revised occupancy conditions, production rates, shifts, etc.

Program Uptake

Due to the novelty and complexity of the P4P Program, participation rates were low during the first 12 months of the Program. Additional marketing and increased Partner participation eventually led to a steady flow of submittals. The Program design results in a lag between work scope approval and installation of energy efficiency measures, which is due to a number of observed reasons. First, the incentives are not guaranteed until the Energy Reduction Plan is thoroughly reviewed and approved. In many cases, this approval process exceeded two months for the first project from a Partner. Second, most projects involve 5 or more measures, resulting in additional time for design, bidding, and construction planning and management. Informal conversations with various Program Partners also indicated that lack of participation may be due to the complexity of the management structure in commercial facilities. In retail and hospitality sectors specifically, Partners found it challenging to reach top management to discuss energy savings opportunities and programs. Figure 3 shows cumulative participation rates for both New Jersey and New Hampshire:

Figure 3. P4P Program Participation Rates (data through 04/26/2012)



Conclusion

Despite the obstacles and challenges presented in this paper, we believe that the P4P Program model is an effective market transformation effort that changes the way contractors and end-users approach energy efficiency. As we watch the Program flourish in New Jersey and take root in New Hampshire we are confident that the market is beginning to better understand and appreciate the benefits of whole-building energy analysis and savings. With the help of our Program Partners we hope to continue to expand the P4P Program model and continue to drive the market towards deep, whole-building energy savings.

As the Program evolves and builds on past experiences to expand the reach and impact of whole-building energy efficiency programs, the following are a few areas of enhancement that may assist in expanding the Program to a wider audience.

- *Financing* – The New Jersey Economic Development Authority (NJEDA) now offers low-interest financing to P4P projects in New Jersey. In New Hampshire, P4P project can access energy efficiency financing through the NH Business Finance Authority. Further development of creative financing tools directly linked the Program would be beneficial in reducing up-front costs for the large energy projects, such as collaborating with state utilities in order to provide on-bill financing.
- *Continuous Energy Monitoring* – P4P currently measures and tracks first years savings through calibrated simulation. Continuous monitoring through an Energy Information System (EIS) would provide Partners and participants with real-time information at a detailed level allowing for correction of issues early in the process, before they can erode savings. Providing a bonus incentive for P4P projects that include an EIS could further enhance the Program and result in greater persistence of savings.

- *Program Evaluation and Survey*: An evaluation of the New Jersey P4P Program is scheduled to begin in 2012 and should help to identify some of the reasons for the inactivity of some Partners and why many early projects did not follow through with participation. We believe a survey of Partners, participating end-users, and underrepresented sectors will provide us with additional insight on how to further increase market penetration and move more facilities towards whole-building energy analysis and savings. This information may also lead to program modifications and upgrades that would increase ease of participation without compromising program goals.

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