A Case Study of How a Market Transforming Program Claims Spillover and Market Effects

Robert M Wirtshafter, Wirtshafter Associates, Inc., Rydal, PA Jennifer Fagan, Itron, Madison, WI Bobbi Tannenbaum, BTan Consulting, Madison WI

ABSTRACT

The New York State Energy Research and Development Authority (NYSERDA) Multifamily Performance Program (MPP) is a statewide market transformation program where building owners, and building managers can obtain turnkey services to save energy in their new or existing properties. A goal of MPP is to affect markets by creating a new type of service provider, referred to as a Program Partner (Partner), who will offer services previously unavailable to MF building owners and managers and developers.

The market transformation goals of MPP create a challenge for evaluators charged with identifying and quantifying spillover. The New York State Department of Public Service (NYSDPS) developed a set of guidelines to claim spillover, and the MPP evaluation is one of the first to test these guidelines. The evaluation team has identified characteristics of MPP Partner services that differentiate them from other widely available services provided to MF buildings. The key differentiating elements of MPP services are that Partners provide a *comprehensive energy audit* that addresses all energy efficiency measures, regardless of fuel type. The audit provides detailed information on costs and energy savings *based on building simulation modeling* that includes all recommended measures. This information is provided to the building owner in an *Energy Reduction Plan* (ERP) designed to achieve a minimum reduction of 15% in total building energy use. Using this logic and a more standard set of spillover questions, the evaluation has established an approach for claiming current spillover and establishing a baseline for future market effect claims.

Introduction

Spillover and market effects are increasingly important in energy efficiency evaluations. Some recently completed studies have made substantive spillover and market effect claims. Eto et al (1996) defined market effects as "a change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy-efficiency products, services, or practices and is causally related to market interventions." In their paper on market effects and market transformation, Rosenberg and Hoefgen (2009) clarify the differences between market change, market effects, and market transformation. According to this paper, market changes are evidenced by increased adoption of energy efficient products or services. In contrast, market effects are the market changes that are attributable to program interventions. Market transformation occurs when market effects continue to exist without program support. Although the term spillover is often used interchangeably with market effects, the authors of this paper make a distinction between the two consistent with the California Protocols (TecMarket Works 2006), in which market effects are measured at a market level and spillover is assessed at the level of individual (participant and non-participant) market interaction.

As a result of substantial spillover claims from prior New York evaluation studies, the NYSDPS recognized the need to develop a set of guidelines for how spillover studies are to be conducted. NYSERDA has championed programs designed to transform markets, and in doing so, created programs that should generate considerable spillover. MPP is one such program, designed to transform the market for energy efficiency in the MF sector by developing a new business model for providing services to MF building owners and managers and developers. This paper discusses the MPP evaluation approach to quantifying spillover consistent with the new NYSDPS guidelines (NYSDPS 2012) while establishing a means to measure broader market effects.

The paper begins by discussing the particular challenges facing MF energy efficiency programs. It then reviews MPP and how it is designed to serve the MF sector. The paper then describes the challenges in formulating a spillover and market effects approach for MPP, particularly while adhering to the guidelines established by the NYSDPS. The lessons learned in this study may help evaluators tackle future spillover and market effects studies, both in and outside of New York State.

Current Assessment of Multifamily Energy Efficiency Efforts

Barriers to Energy Efficiency in Multifamily Buildings

Nationally, programs targeted to the MF sector have been less successful at addressing and achieving comprehensive retrofits to these buildings. Three substantial barriers prevent many owners of MF properties from participating fully in energy efficiency efforts. The largest is the split incentive barrier. Landlords in apartments where the tenant pays the energy bills have little incentive to invest in energy-saving. Tenants may be interested in reducing their energy bills, but are generally unwilling to make long-term investments in property they do not own or control. Most publicly funded MF programs get owner participation for projects in common areas where the owner pays the energy bills and realizes the costs savings. In contrast, program measures installed in tenant spaces are generally limited to those fully-or nearly-fully-funded by the program.

A second barrier is accessing tenant spaces. Programs with a comprehensive approach to MF energy efficiency face the daunting task of gaining access to tenant spaces and scheduling installation throughout the building efficiently. Because of these factors, MF building owners seldom have the opportunity to do renovation of all spaces. Simply gaining access to each apartment can be difficult, though some programs have developed creative ways to overcome this barrier. For example, two similar Southern California third-party programs that install water saving devices in apartments have arranged to do the work in conjunction with building-wide replacement of smoke alarm batteries.

Another barrier to energy efficiency improvements in MF buildings is diverse ownership arrangements that can complicate decision making. Many investors in MF properties hold properties for short periods of time and thus are not interested in investing long-term capital in the buildings. For the investment to pay off, a measure needs to do one of three things: 1) save the owner directly via savings in their energy bills that are large enough to quickly recoup investment; 2) increase rental income by increasing occupancy rates or by supporting higher rental rates; or 3) raise the value of the property. In the current market for rental properties, the energy efficiency of the unit seldom plays an important role in the tenant selection process. Some renters may want to include relative efficiency in their rental selection criteria, but because they lack a definitive measure of a unit's efficiency, they cannot do so effectively. Tools for addressing this lack of information gap include home energy rating systems and benchmark reporting laws, which are in their infancy.

Public benefit program administrators often face a fourth barrier. Since it is ratepayers who provide the funding, regulators often require program funds to be allocated to sectors (based on rate codes) in relation to contribution into the funds. MF buildings may fall into two separate program areas, residential (for individually metered tenant usage) and commercial (for common area usage). These sectors may even be handled by different implementation firms. Developing a coordinated and comprehensive program in these situations introduces new challenges.

Programs Developed For the Multifamily Sector

The barriers discussed above prevent most MF energy efficiency programs from capturing reduction substantial portion of the estimated savings potential. A report by the Bennington Group (2009) estimated a national annual savings potential of \$9.2 billion nationally across all MF buildings in the US at current energy prices. A recent study by CNT Energy and ACEEE (McKibbin et al. 2012) describes MF programs in Illinois, California, Massachusetts, Vermont, and New York as examples of what can be done with MF efficiency programs. This study found that "at 2010 national average energy prices, the full expansion of efficiency upgrade programs such as those found in the four states reported in McKibbin et al. (2012) would translate into annual utility bill cost savings of almost \$3.4 billion for the MF sector, nationwide."

From the authors viewpoint, these MF programs often fall quite short of their full potential. In many cases, programs are picking off small elements of savings potential and not addressing buildings in a comprehensive manner. Most of the savings are achieved in common areas where the owner is responsible for the energy bills and the split incentive barrier is not a factor. Few programs have obtained substantial energy reduction in tenant spaces, especially those in market-rate buildings.

NYSERDA's Multifamily Performance Program

The NYSERDA's MPP is a unique effort to reach the MF market in New York State. Unlike many other MF efficiency programs, MPP is comprehensive in the types of MF buildings and projects, and that it addresses all end-uses, regardless of fuel type. MPP addresses MF retrofit and new construction projects, and targets Market Rate and Affordable Housing¹ for buildings ranging from five-unit walkups to several thousand-unit skyscrapers.

A vital element of MPP is the support provided by Program Partners (Partners) to owners, managers and developers of MF buildings. NYSERDA created the Partner role to serve the MF market in a similar way that Building Performance Institute (BPI) professionals serve the single-family market. According to the NYSERDA website, "NYSERDA Partners are an unbiased voice throughout the process, serving building owners and managers as advocates, experts and guides from application to project completion."² A goal of MPP was to create a

¹ NYSERDA defines Affordable Housing as projects in which at least 25% of the units are, or are expected to be, occupied by households earning not more than 80% of the State Median Income. All other properties are considered Market Rate.

² http://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs.aspx

market for Partners, so that a building owner/manager could find a consultant to provide energy efficiency advice as easily as they could find a painter or a HVAC contractor.

The goal of creating a network of Partners is important, however, creating Partners is by itself insufficient. MF building owners and managers must be both aware of their existence and recognize a value in employing their services. MF building owners/managers generally do not pay for energy efficiency advice. They may think they have in-house expertise or they rely upon vendors of equipment who do not normally charge a separate, up-front fee for their advice. Getting owners to pay for a Partner to provide efficiency services is a significant hurdle that the Program must overcome. To overcome this hurdle, MPP provides a substantial incentive to cover the cost of Partner services.

MPP has invested a large amount of time and effort promoting the potential energy savings that can be realized by participation. For example, NYSERDA has generated hard copy brochures and case study testimonials for distribution. However, the focus of marketing efforts has been the MPP website, which uses state-of-the-art marketing tools to attract MF owners/managers into the Program. The web site encourages visitors to complete a five question survey, which directs visitors to more tailored information. The MPP is also encouraging owners/managers to do a benchmarking exercise to gauge their current energy usage and model/simulate potential energy savings. At the same time, MPP supports Partners in their attempts to recruit buildings into the Program.

MF building owners and managers, either on their own or recruited by a Partner, enter MPP by completing an application and selecting an eligible Partner from NYSERDA's list. The building owner contracts directly with the Partner to supply energy advice and assist them in completing Program requirements. MPP offers incentive payments to building owners when certain milestones are achieved. Large buildings must submit an ERP that details how the building will achieve energy savings. To qualify, the ERP must show that installed measures will achieve a 15% reduction in the building's total energy use.³ This threshold normally forces projects to include savings in tenant spaces. A new version of the Program allows smaller buildings a "Fast Track" solution that simplifies the ERP and relaxes the 15% threshold. Once the ERP is approved, the Partner supports the owner in the project implementation. MPP provides QA/QC support and post-installation monitoring. Using the monitored results after one year, projects that show demonstrated savings above 20% receive a substantial, additional incentive payment.

Measuring Spillover and Market Effects

Specific Challenge of Establishing Spillover and Market Effects

The NYSDPS staff and their consultants, TecMarket Works, have established rules for the claiming savings due to spillover. NYSDPS (2012) defines spillover

"as the energy savings associated with energy efficient equipment installed by consumers who were influenced by an energy efficiency program, but without direct financial or technical assistance from the program. Spillover includes additional actions taken by a program participant as well as actions undertaken by nonparticipants who have been influenced by the program."

³ The 15% is calculated as source savings, which includes generation and line losses for electric savings.

The NYSDPS guidelines explicitly address spillover, in response to earlier program administrator spillover claims, and are silent on how to approach market effects claims. In separate conversations about these guidelines, NYSDPS emphasized that they were not expressing a preference for spillover over market effects approaches by not including market effects in the guidelines. They were simply not pressed to develop market effects guidelines because they were not receiving substantial market effects claims. NYSDPS further noted that a program could submit both spillover and market effects claims, as long as there was no double counting.

MPP evaluation planners, the authors of this paper, set out to assess both market effects and spillover. As a market transformation program, MPP should result in market effects and garner larger savings over time. Spillover savings are likely smaller than market effects, but more immediate.

Initial planning and design efforts focused on addressing spillover consistent with the NYSDPS guidelines. The plan included market actor surveys to capture non-participant spillover and also included questions to assess market effects. The initial plans were subsequently modified to address project constraints and direction from the NYSDPS. The authors found that budget and survey length constraints necessitated changes so that neither effort would be diluted to the extent that the results would not be credible. The authors reexamined the survey plans so that questions focused on the key data needs from each sample population. Discussions with NYSDPS regarding general expectations for market effects (discussed below) resulted in a refocus of the market actor surveys, the inclusion of a comparison state, and an increased sample size for one of the participant surveys.

The resulting evaluation plan follows the guidelines to claim current spillover, while also establishing a market baseline from which future market effects claims can be made.

Evaluation of MPP Spillover

The NYSDPS guidelines require that programs provide documented evidence of spillover with the same confidence and precision levels as gross savings estimates. This requirement was in response to the NYSDPS concern that large spillover claims in prior evaluation studies did not achieve the same level of reliability that gross savings and free-ridership adjustments had achieved. The guidelines specify that claims of spillover consider underlying program theory, establish causal mechanisms for spillover, confirm survey results using other data sources such as on-site verification, and validate self-reporting techniques. The overall requirement is for a 90/10 level of confidence and precision for final net savings, including spillover claims. The implication is that spillover verification will be based on sample sizes that are similar to those used in the gross savings and free rider estimates.

The guidelines lay out two levels of rigor for spillover claims. Because MPP is expected to claim a large amount of spillover, it is using the enhanced rigor approach. This requires evaluators to go beyond self-reported claims by end-users and market actors, and to include verified evidence from on-site surveys. Gross savings from spillover must be documented empirically. Evaluations must make plans to confirm self reports using a second source to measure market change, and program influence must be documented.

Instrumental to the guidelines is the development of a rigorous evaluation plan that must establish the theory and logic for causes of spillover, and must set in place the approach for conducting the evaluation. In the next sections, the authors lay out the plans for this specific spillover assessment. The plan begins by establishing the causes of spillover and methods for identifying its effects. This is followed by a comprehensive battery of data collection tasks to identify specific cases of spillover, and then to measure the amount of energy saved by the spillover event. The evaluation is using a two-stage approach, with a general survey to identify locations where spillover has occurred and then, for cases where a substantial spillover opportunity is indicated, an in-depth telephone interview and possible follow-up on-site visit to document and quantify energy savings that can be claimed as spillover.

Identifying Spillover Cases

The NYSDPS (2012) guidelines allow, but do not require, disaggregation of spillover into three commonly recognized sub-categories: inside spillover (ISO), which occurs when additional program-induced actions are taken at the participating site; outside spillover (OSO), which occurs when an actor participating in the Program (owners, managers, developers or Partners) initiates additional actions that reduce energy use at other sites that are not participating in the Program; and non-participant spillover (NPSO), which occurs when actors not participating in the Program are induced to take action.

Data Collection and Analysis Activities

Participant Inside and Outside Spillover. The evaluation team plans to complete multiple data collection activities to identify participant spillover using the NYSDPS enhanced rigor guidelines. They include:

- Phone surveys of participating building owner/managers and any other decision makers
- Phone surveys of participating market actors (i.e., contractors, equipment vendors, architect and engineering, design/build firms, etc.)
- Participant on-site spillover verification inspection (anticipated; limited provisional budget allocated)

Initially, the evaluation team anticipates investigating the following causal spillover mechanisms identified in the current program logic model, before proceeding to quantify savings:

- Positive experiences with Program installed measures lead participating building owners to seek out qualified measures on future jobs.
- Increased competition between program participant and non-participant design firms leads to changes in design practices and a potential drops in prices for energy efficiency measures.
- Increased cash flow and profitability for participating Partner firms allows them to expand their marketing and reach for new customers outside of their original markets.

The evaluation team will estimate the saturation and associated energy savings of selected high impact measures reported as spillover by respondents. In addition, a small number of on-site visits will be completed to verify self-reported spillover installations. Only the very largest spillover sites reporting high program influence will be further investigated.

In addition to MF owner or developer participant spillover, the Program may induce spillover through the Program Partners. MPP's claim to this spillover is predicated on the evaluation's ability to tie increased activity by Partners outside of Program to efforts made by MPP to support Partners' development and promote the benefits of MF energy efficiency. The evaluation will assess this form of spillover primarily through interviews with Partners. The team will also interview non-Partner allies and end-use customers to corroborate responses.

Non-participant Spillover. The evaluation team is using evidence from three data sources to estimate Non-participant spillover: non-participating customers (interviews and on-sites), nonparticipating market actors (surveys and on-sites for identified sites), and secondary market research. Non-participant survey questions focus on the firms' baseline energy efficiency practices both inside and outside NYSERDA's service area. Additional probing will be used to determine the existence and magnitude of influence of MPP on Partners' promotion of energy efficiency measures to customers. Because it is possible that end-users and allies each could speak of the same project when describing non-participant spillover, the analysis will attempt to identify overlap and eliminate double-counting. The basis for this adjustment will be information sourced from trade ally interviews on specific projects that they implemented through MPP.

In addition, the evaluation team is conducting secondary research to inform estimates of spillover. The key focus of this research is building energy intensity trends inside and outside New York State from 2009 to 2012 that are or are not attributable to MPP or utility programs in the State. Possible data sources for this research include the U.S. Energy Information Administration's Residential Energy Consumption Survey (RECS) and its Commercial Buildings Energy Consumption Survey (CBECS) as well as other data from the U.S. Environmental Protection Agency's (EPA) website Leadership in Energy and Environmental Design (LEEDTM) and ENERGY STAR[®] buildings. These estimates of total market savings observed in the general population will be sought to validate survey self-report-based spillover savings estimates and may also aid program designers, who must decide whether to reduce, increase, or eliminate financial incentives for specific measures over time or to specific groups of market actors.

The evaluation team will form a Delphi panel to validate and reconcile estimates and information from the three non-participant data sources into a single non-participant spillover estimate. The evaluation team will select a panel of experts by first identifying a wide range of individual experts in energy efficiency program evaluation and the issues surrounding net-togross, spillover and evaluation methodology. From this list, any persons with a stake in the results or a role in the evaluations will be eliminated. The Delphi process will include two rounds. In the first round, the evaluation team will provide the experts with a summary of the three data collection approaches, key tables and findings, and details of the analytical approaches to arrive at non-participant spillover estimates. Panelists will be asked to use these data to calculate a single non-participant spillover estimate, and to explain both their approach and rationale. In the second round the evaluation team will provide the experts with a summary of the results from the first round including the experts' collective results, approach and rationale. From these data, panelists will be asked to repeat the analytical task from the prior round. The results from the second iteration will be reported to the evaluation team (regardless of whether consensus is reached). At a minimum, the final results should provide a narrower band for nonparticipant spillover estimates.

MPP's Program Theory and Market Effects

The attempt to claim market effects takes the spillover argument to the next level. Instead of identifying individual projects influenced by MPP, the evaluation is establishing a baseline to

demonstrate that MPP fundamentally changed the market for energy efficiency services in MF buildings. Figure 1 show the logic behind MPP.



Figure 1: MPP Logic Model

The evaluation team updated the existing program logic model to further identify activities that could lead to spillover and market effects. The earlier logic model had identified two program activities that could contribute to increased energy efficiency activity outside the Program. The revised model identified a third. These three activities are:

- Development of Partners via recruiting, training, and support of their activities.
- Creation of a demand for Partner services via outreach, education and marketing
- Differentiation of Partner services from what had been available before MPP via development of protocols for analyzing, reporting, and implementing energy efficiency services for MF properties

The program logic for market transformation is that the creation of Partners *and* a market for Partners will result in services provided to the MF marketplace that were not offered before. This requires establishing not only that MPP was responsible for developing a Partner industry, but that this industry provides services not previously offered. Developing a case for this market effect requires strong evidence of a number of conditions. These are:

- That the Program created a new industry or a new service within an existing industry. Partner services are different in such a way that these services generate energy efficiency not previously captured, and that Partner services were not generally available to or utilized by MF owners/managers before the Program
- That the services have resulted in energy savings not tied directly to projects (market effects). The bulk of MPP market effects are likely to start occurring in the next 3 to 5 years. The time for establishing a baseline for market effects is now, before awareness and utilization of Partners becomes widespread, and evidence of MPP's contribution is lost.

The evaluation team is documenting and assessing the role of MPP in the development of Partners, the business opportunities made available to Partners, and the impact of MPP on the Partners' business outside the Program. To do this the authors are interviewing current and past Partners, current participants, and including questions in surveys of participant and non-participant building owners/managers; and surveys of non-Partner market actors.

The challenge in establishing the market effects is defining "new services." In prior surveys, owners have largely responded that they have access to information on energy efficiency. The challenge is differentiating advice from their existing HVAC contractor(s), who may consider a new unit that meets code to be energy efficient, from a Partner who is using the MPP protocols. In the latter case, the advice is aligned with the program objectives of promoting broad, deep savings, involving state-of-the-art equipment and energy control technologies. The strategy of the evaluation team is to designate a clear set of characteristics of MPP services to differentiate these from services more universally available to MF buildings.

Measurement of spillover for MPP involves a number of surveys and analysis tools across a variety of stakeholders. Some of the activities follow the established methods for estimating spillover that have been used by NYSERDA and in California (CPUC 2007).

Establishing Market Baseline

To establish causality, the evaluation team will complete surveys and interviews with participant and non-participant MF building owners; and surveys with non-participant market actors. The critical question to address is whether the Partner industry existed before MPP. In establishing the existence of the industry, the authors differentiate the new service from other energy efficiency services by the following four criteria.

- Does owner/builder have access to technical assistance and implementation support for energy efficiency?
- Had building owners and managers previously obtained a comprehensive energy audit? What percentage of total building energy use was to be saved by measures? Did audit cover lighting, HVAC, shell, and equipment? Did it consider new equipment and new behavioral changes?
- Was the audit conducted by an independent auditor as opposed to someone representing a product or service?⁴

⁴ The evaluation team initially thought that Partner independence was a program requirement, and that Program Partners could not have an interest in the sale of any energy efficiency equipment or services. Preliminary interviews with Partners found that, while they do not sell products, they may provide additional related services to program clients, and that the provision of these services may be necessary to be profitable in the Program Partner role.

• Did that audit have critical elements of comprehensiveness, detailed energy savings analysis, and step-by-step implementation plan?

Conclusions

MPP includes a unique market transformation goal to establish a new type of service to support energy efficiency goals for MF buildings. An objective of MPP is to create and support an industry of Partners who will provide independent energy efficiency advice and support not been previously offered in this market.

- Key challenges faced by evaluators in this study include: *The NYSDPS Guidelines require that 90/10 be the minimum standard for net savings at the program level.* The Guidelines explain that if an evaluator is estimating spillover at program level the overall net savings estimate must meet the 90/10 standard. This implicitly requires precision for spillover (and market effects), with greater precision required the larger the anticipated spillover impacts. It may prove difficult for evaluators to meet this standard for the spillover component of the net savings estimate.
- *Heavy reliance on survey findings and related challenges with survey length and respondent fatigue.* This evaluation relies heavily on phone surveys to provide key MPP spillover and market effects evidence. The spillover questions, in particular, require a long series of questions to learn of actions taken, and reasons for taking those actions. Many of the surveys serve other purposes, such as assessing free ridership, informing the process evaluation, and providing inputs into an assessment of jobs created by MPP. The resulting surveys tend to be long and respondent fatigue is a concern. The evaluation team is limiting interviews to 60 minutes and surveys to 30 minutes. This is forcing tradeoffs that in some cases limit the comprehensiveness of the spillover or market effects baseline investigation.
- *Translation of market effects into spillover estimates.* A key focus of MPP is on developing a new industry for Partners who serve as energy assessors for MF buildings. Translating the results of non-program projects associated with these new market actors into rigorous estimates of spillover savings is a major challenge. The NYSDPS guidelines support measurement of spillover by accumulating evidence as it occurs at the building specific level. Applying these guidelines for programs that concentrate their influence on developing changes in market actor services will be more challenging to document. Collecting evidence of these effects from even a sample of market actors will be invasive and time consuming.

For programs such as MPP, with a goal to create a new type of market actor, spillover and market effects from the supply side (i.e., Partners) are likely to be the most significant. In this situation using broader market based methods to establish market effects may be more cost effective and accurate. Therefore, the current evaluation strategy is to establish a baseline level of Partner type services. In subsequent years, the evaluations must demonstrate that the existence or increase of these services are due to MPP, that Partners are a substantial contributor to energy savings, and that Partner services outside the Program resulted in identifiable cases of savings.

The evaluation is currently underway. Once data collection is complete, the authors hope to have the need to address the issue of double-counting.

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