In It for the Long Haul: The Challenges of a Seven-Year Effort to Assess the Market Effects of a Non-Residential New Construction Program

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Abstract

This paper discusses the challenges encountered during the performance of a three-phase, five-year evaluation of a non-residential new construction and major renovation program. It also outlines the approach that was taken to overcome these challenges while still allowing the objectives of each phase of the evaluation to be met. Ultimately, the approach taken was able to report on meaningful market changes and the role of Long Island Power Authority (LIPA) in those changes. The Commercial Program was found to have a significantly influential role in the adoption of efficient practices in the market place among particular actors and measure types, although this was not able to be well assessed through conventional comparison to a baseline study. Rather, the evaluation team used the practices explored among market actors in the baseline study to craft specific questions about changes to elicit information to gauge the success of the LIPA Commercial Construction Program in the marketplace.

This paper will prove valuable to anyone facing the challenge of evaluating the hypothesized effects of a 7 year long market transformation program. This study will help answer a question that confronts more and more evaluators: How do evaluators assess the influence of a large complex market transformation initiative in the non-residential new construction and major renovation market over a long duration despite the challenges intrinsic in even the most soundly planned approach?

Introduction

Evaluating a non-residential new construction and major renovation market transformation program comes with a multitude of challenges that may be inherent in even the most well designed approach. This task becomes particularly challenging when designing a long-term, multi-phase evaluation of a program model hypothesized to influence a broad cross-section of market actors over a seven year span.

The authors experienced such challenges while performing a three-phase, five-year evaluation of the Commercial Construction Program for Long Island Power Authority (LIPA). This program sought to influence design and construction practices on Long Island to achieve greater energy efficiency, as well as promote greater efficiency among the remodeling and equipment replacement markets. This program offers technical and financial assistance to cover the extra time and effort to incorporate efficient designs in the design and construction process. LIPA rebates cover 75-90% of the price premium paid for energy-efficient HVAC, lighting, and other equipment that meets LIPA's high efficiency standards. The program also offers technical and financial help with remodeling projects. Primary program interventions also include one on one marketing and education and professional seminars.

From 2000- 2001, LIPA sponsored a baseline study of a non-residential construction and major renovation in conjunction with the launch of its commercial construction initiative. This study commenced just after launch, but the data on buildings construction characteristics and of market actor practices were collected based upon the period of time before the program launch. This study was regarded as one of the first systematic studies of baseline practices among commercial and industrial market actors. The baseline study included in-depth market actor interviews as well as on-site visits to newly constructed sites and sites that had undergone major renovations and was used to inform the development of a program theory. The

baseline was also anticipated to be used as the point of reference for all subsequent evaluation work. The subsequently implemented Commercial Construction Program theory hypothesized that once in place, the program would influence market actors (architects, HVAC engineers, lighting designers, builder/developers, HVAC contractors, and lighting contractors) to adopt certain efficient practices and behaviors in less than a year and others in 1-3 years, 3-5 years, and 5-10 years. As mentioned above, the program stimulus intended to influence these changes include incentives, expert design assistance (including auditing and commissioning), education on benefits of energy efficiency and to raise awareness, and links to other regional and national initiatives.

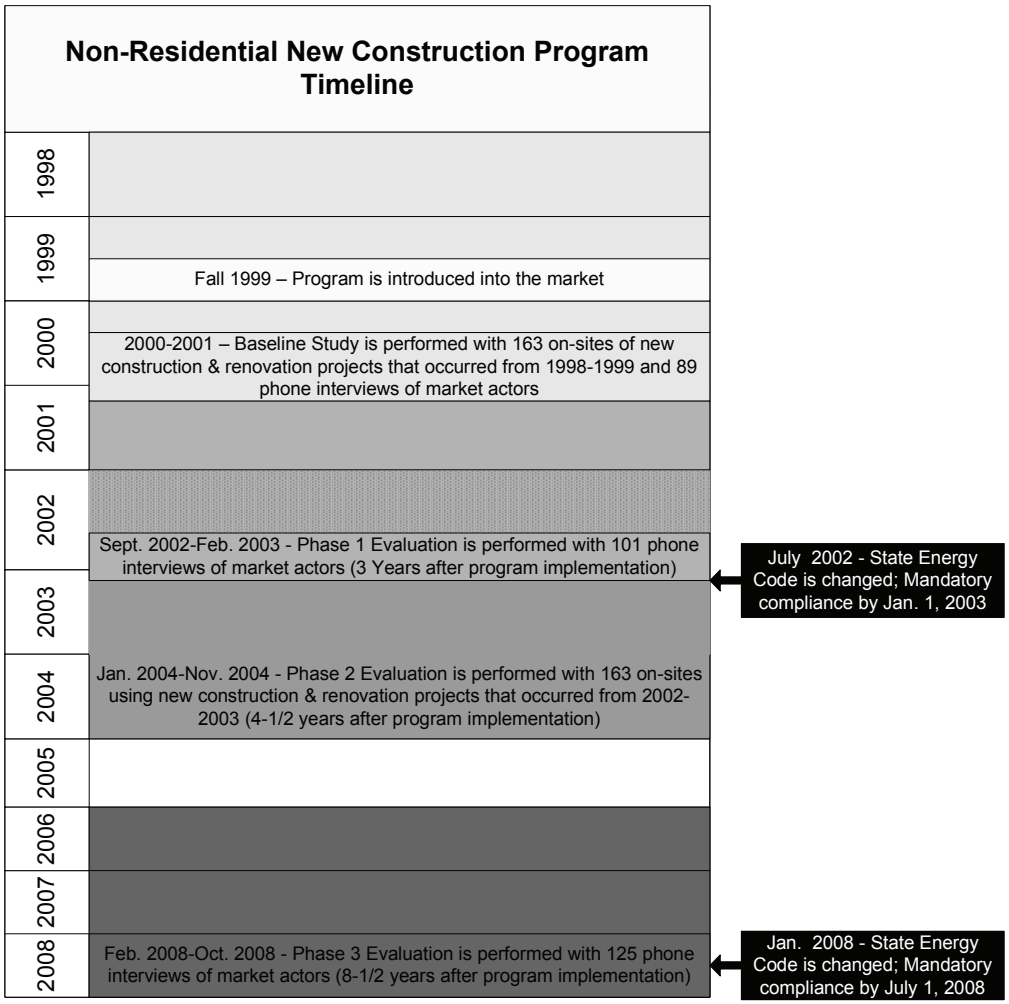
A paper[1] was drafted by LIPA and other consultants in 2000 that provides a complementary companion piece to this paper. This paper discusses the challenges and overall process of developing the program theory for the LIPA Commercial Construction Program. It also provides context for understanding the relationship between market effects and market indicators as well as the overriding rationale that drove the evolution of the Commercial Construction Program theory and structure.

In 2002, a three-phase evaluation began in order to identify the early influences of the initiative and compare the observed changes in each study stage to the baseline and underlying program theory. Each evaluation phase sought to test the program theory within one of these specific spans of time since program inception and identify program-induced changes in efficient construction practices, as opposed to those that were caused by other market forces. Figure 1 below shows when each of these phases was performed. We also indicate changes in state energy code in this figure. The timing of several evaluation activities was strategically placed around changes in energy code to further isolate the influence of the program in observed changes in efficiency practices.

The figure also provides more detail on the activities performed in each phase of the evaluation. The baseline study included the performance of on-site and phone based market actor interviews. The Phase I work comprised of phone interviews with market actors in contact with the program while Phase II included on-site visits and data collection. The final phase, Phase III, included phone interviews of design professionals including architects, lighting designers and HVAC engineers. The shaded areas indicate the period that was being studied during each phase. It is important to note that 2002 was part of the period of interest in both Phase I and Phase II. This overlap was allowed because the Phase I work was strictly phone interviews, while Phase II consisted exclusively of on-sites.

1 "A Systematic Application of Theory-Based Implementation and Evaluation of Market Transformation Programs," Hastie, Et al., 2000 ACEEE Summer Study on Energy Efficiency in Buildings, Panel 6, Market Transformation.

Figure 1: Program and Evaluation Timeline



The three phases of work were designed to provide regular updates of program progress relative to the baseline study, with varied levels of comprehensiveness depending on the phase. Phase I was designed to estimate values of key indicators of market changes expected to have resulted early in the program as gathered from market actors in contact with the program. We targeted actors in contact with the program as it was believed that the first signs of permanent, significant change due to the program were likely to be seen among actors that directly experienced the program. A total of 101 surveys were performed randomly to achieve completion quotas among architects, HVAC engineers, lighting designers, builder/developers, lighting contractors and HVAC contractors. Much of the formal reporting of market actor results were weighted by reported project activity level to reflect LIPA's influence within a particular technology on Long Island by market actor group. In determining rates of influence among particular market actor groups, we considered a market actor to be influenced if they reported a desired change due to LIPA for any single technology or behavior of interest. Key findings from Phase One were that of those interviewees in touch with the program, nearly 35% of respondents reported at least one desired behavioral change and attributed that change to the initiative. Project level weighted results suggested LIPA influence in the promotion of HVAC, lighting and Motor/VSD measures on Long Island. Program outreach in the form of one on one contact was identified as the most successful means of influencing respondents. Lighting designers, HVAC engineers and architects were found to have the highest proportion of their population to be influenced.

Phase II similarly sought to update values for key indicators of market changes, but focused on measuring these indicators from installation practices observed at on-sites and was further intended to confirm or disconfirm the results from the Phase One work. A total of 163 on-sites were performed (81 new construction and 82 renovation), with a focus on retail buildings, schools, and offices. The sample was selected through use of a Dalenius-Hodges stratification technique[2]. Along with data gathering on building characteristics, surveys were also completed with the decision-maker at each site to assess LIPA influence on the decision to install the observed equipment. Phase Two results suggested encouraging and meaningful movement of most metrics toward positive outcomes, with LIPA frequently cited as an influence in the choice of efficiency. Lighting measures generally moved in a positive direction and motors and HVAC both experienced fairly substantial movement since the baseline study as well. All three technologies had modest attribution to LIPA Commercial Construction Program influences. These results were broadly consistent with the fact that lighting designers and HVAC engineers reported the highest level of behavioral change due to the program in Phase One. So while not designed to provide direct support for the Phase I results, Phase Two was found to provide some degree of confirmation that the Phase I self reports of increased use of efficient technologies was evident among the technologies observed and business types visited. A paper at the 2005 IEPEC conference details much of the Phase One and Two results[3].

Phase III sought to assess behavioral changes that could be attributed to LIPA among firms in the marketplace and to update and compare the metrics from the baseline study. This activity was undertaken 8-½ years after the baseline study and was comprised of the performance of 125 in depth interviews with architects (25), HVAC engineers (35) and lighting designers (28). These three groups were focused on in Phase III as they were identified in previous phases as most likely to adopt more efficient behaviors as a result of the initiative. The data collected in this phase suggested that in varying degrees among the groups contacted there was evidence of increased adoption of many energy efficient practices and equipment from the baseline, with a reasonable level of attribution to the LIPA initiative. The table below presents these results at a high level by placing each queried technology or behavior into one of three areas of classification. The first are those technologies and behaviors that we found to have increases both in the metric update as compared to baseline as well as high levels of desired changes that were attributed to LIPA. The second are those technologies and behaviors that we found to remain about the same or have marginal decreases in the metric update as compared to baseline, despite evidence that LIPA is making significant inroads in influencing actors to adopt those desired behaviors or technologies. The third group is those technologies and behaviors that had downward movement with respect to the metrics and in which actors have further cited little LIPA influence in their use of the behavior or technology.

2 *Sampling Techniques.* William Cochran, John Wiley and Sons. 1977. This technique calls for sorting by the field of interest (in this case, annual energy consumption) in ascending order and determining the strata cut-points so that the standard deviation in each strata is approximately the same.

3 "LIPA's Commercial Construction Program: Demonstrating Influence along the Road to Transformation," Ledyard, et al., IEPEC Conference Proceedings, August, 2005, Brooklyn, NY.

Table 1: Phase III Summary of Results

Classification	Technology or Behavior
Technologies and behaviors that have increases both in the metric update as well as high levels of desired change that were attributed to LIPA.	• Efficient linear fluorescent use, • Lighting installations compared to code, • Chiller installations compared to code.
Technologies and behaviors that remain about the same or have marginal decreases in the metric update, despite evidence that LIPA is making significant inroads in influencing actors to adopt those desired behaviors or technologies.	• Lighting control use, • CFL Use, • HVAC installations compared to code, • Building Commissioning and familiarity, • Motors more efficient than NEMA standards, • VFD use with Motors.
Technologies and behaviors that have negative movement with respect to the metrics and in which actors have further cited little LIPA influence amid minimal reported changes.	• Windows, • Use of Simulation or Load Calculations in HVAC Sizing, • HVAC Testing, • HVAC training and documentation.

Challenges Encountered

The theory of market transformation is a powerful, relatively complex theory to implement and evaluate when compared to other programmatic approaches. The premise of market transformation is that existing market product channels and the flow of information among individuals within a market can be understood and leveraged to change the manner in which the market operates. This approach can be viewed as targeting desirable systematic market changes through the injection of discrete points of stimulus. Such programs, such as the Commercial Construction Program take significant time to mature and become realized in the market. They can have intended as well as unintended outcomes, and are generally focused on 'upstream' market actors that are theorized to 'push' the desired changes into the market structure. A powerful feature in market transformation theory is that once the desired market effects are achieved they become lasting even after stimulus is removed.

However, the very elements that make the implementation of a market transformation effort so compelling also introduce complexities and challenges. Table 2 below outlines the features of a market transformation initiative and the challenges that have a tendency to flow from each feature and were encountered in this study. Each of these challenges was encountered in the evaluation of the Commercial Construction Program. The remainder of this paper discusses these challenges in more detail and relates the approach taken to mitigate them.

Table 2: Mapping of Market Transformation Features to Evaluation Challenges

Feature/Characteristic	Challenge
Longitudinal effort over years	Program theory and program operations may diverge, causing baseline indicators to be less meaningful and misleading for comparisons than planned.
	Isolating and attributing market effects to the initiative becomes confounding as other factors influence the behaviors of actors in the marketplace and the timing of those changes may not be aligned with the evaluation effort or program theory.
Market layers and breadth of stimulus	The range of stimulus targeted to a diverse set of market actors can cause cross-actor influence, which can be confounding when attributing change.
Focuses on upstream actors	The stimulus is focused on upstream actors that are often not tracked nor directly touched by the initiative.

Developing a program theory is a critical part of the design of a market transformation initiative, particularly one with a wide scope of targeted non residential new construction and major renovation ambitions. Often, program theory is also referred to as a program logic model; although the latter is generally considered more of an illustrative mapping of the activities, targets, causal flow, and expected outcomes than the former, which often lays out program intent and design but with less granularity.

The program theory used to guide the direction of this initiative targeted 5 groups of market actors among both the new construction and major renovation sectors, as summarized in Table 3 below. The table below over-simplifies the scope of the program for the sake of providing an overall context for understanding the challenges presented in this paper. The full magnitude of the initiative undertaken by LIPA was significant and would take multiple, larger tables to present.

Market effects can be characterized as those effects that the program seeks to induce in the marketplace as a result of targeting stimuli to specific market participants. For example, a market effect the program design anticipated to occur in the first years of program operation for HVAC engineers was to increase technical ability to perform sophisticated energy analyses, considering interactions between end-uses. Within each effect there were discrete metrics – or performance indictors - that were developed to measure that change. Each metric had a baseline established via an aforementioned comprehensive study in which data collection of actor practices was performed before program implementation. For example, a baseline (and update) metric associated with the HVAC engineer market effect above was to assess the percentage of HVAC engineers that offer and promote sophisticated energy analyses such as the use of load calculations or building simulations to calculate HVAC sizing in their new construction and major renovation design work.

It should also be noted that within some of these actor groups, there were sub groups. For example, design professionals included architects, HVAC engineers and lighting designers. For each market actor type there were specific program interventions planned[4] along with the market effects targeted for change. The types of equipment and behaviors assessed in the baseline and measured among the actors as part of the update study work were very broad. Behaviors and equipment targeted among these actors included heat load calculations in designing building shell and HVAC systems, glazing, lighting controls (including

[4] Stimuli exercised in this program includes financial incentives, technical assistance to identify and analyze opportunities, design professional support services (including 1:1 interactions and seminars), outreach to vendors and manufacturers about the program, and linkages to regional and national initiatives, among others.

dimming), CFL specification, efficient linear fluorescent specification, building commissioning, use of VFDs with motors, and installed HVAC and lighting compared to code.

Table 3: Summary of Targeted Market Actors and Effects

Market Actor	Less Than 1 Year	1-3 Years	3-5 Years	5-10 Years
Number of New Construction Targeted Market Effects				
End Users	3	4	3	3
Vendors	1	3	2	3
Manufacturers	1	1	2	1
Builder/Developers	1	2	3	2
Design Professionals	0	3	3	2
Number of Major Renovation Targeted Market Effects				
End Users	4	4	3	3
Contractors	1	2	2	2
Vendors	1	2	1	1
Manufacturers	1	2	1	2
Gov't & Industry Associations	0	0	1	1

Challenge: Program Theory Evolution

The purpose of having a baseline is to facilitate the measurement of changes over time. Therefore, as part of launching this initiative, LIPA ensured the alignment of baseline measurements with the targeted market effects anticipated from each market actor. The overarching paradigm is that the program theory can set the stage for framing an action plan for program implementers to target the market actors with stimulus that are intended to produce the theorized market effects. These effects are anticipated as being realized over time and intermittent studies performed within any particular window can be targeted to measure metrics associated with the market actor of interest.

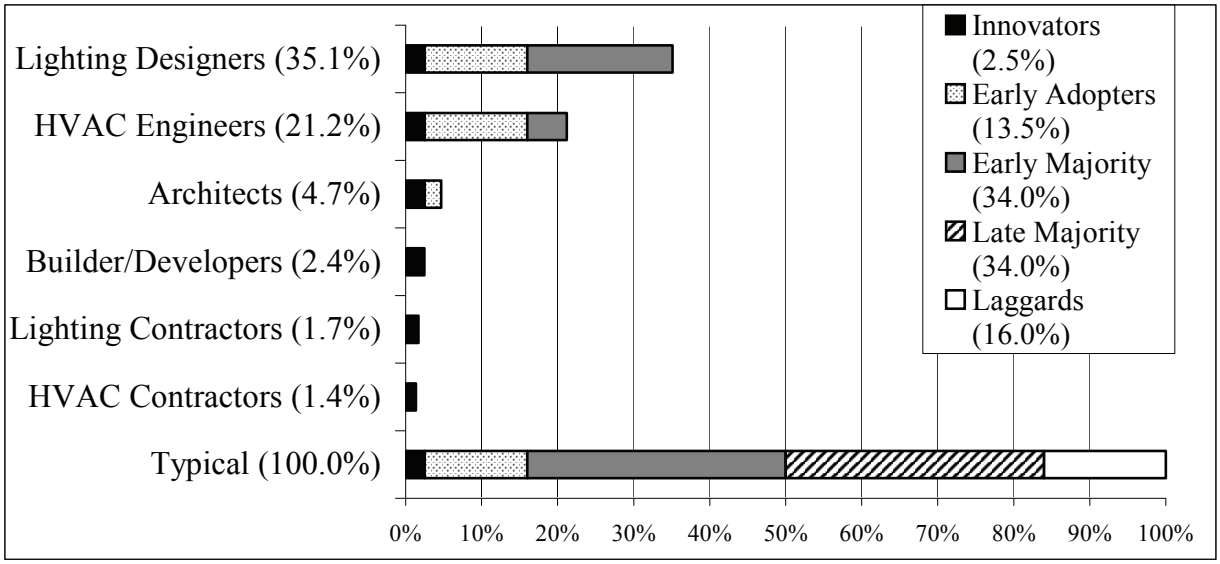
As part of this study, however, it became apparent that revisiting the program theory to be sure it remained aligned with actual program implementation was critical to the evaluation's success. During implementation, any multitude of issues might cause a divergence from the original program theory. These might include funding changes, redirection of program focus based upon new opportunities or revisions to the program approach based upon evidence that program stimulus is not eliciting the desired change, among other possibilities. On a practical level, it then becomes paramount for the program theory to evolve to better capture the scope of the initiative in terms of the market actors and market effects actually targeted. This is done to ensure that subsequent evaluation activities are focused on capturing the actual changes being promoted by the program among those actors. Some baseline metrics may no longer be appropriate, and some referential points of data collection may need to be added despite the absence of a baseline from which it can be measured. As discussed above, the baseline and update metrics included specific metrics for each market actor type as well as specific behaviors and equipment of interest to LIPA.

LIPA integrated two efforts into the evaluation work to mitigate the risk of a possible divergence in program theory from program operations. The first was the performance of an early evaluation phase in which initial program influences were assessed among market actors in contact with the program (Phase I). This stage of work was used to assess which actors targeted in the program theory and in contact with the program during its early stages was showing behavioral changes that could be reasonably attributed to the initiative.

Figure 2 illustrates the approximate level of behavioral change attributed to the program among each of the market actor types contacted in this early phase of work. The bottom bar of the figure presents, in linear form, a standard product or behavior adoption curve as formalized by Everett Rogers[5]. The first 2.5% of a given market to adopt a particular behavior or product are called 'Innovators', the next 13.5% are called "Early Adopters", and so on. The remaining six bars show the approximate level of influence of the program among the actor type population on Long Island, dissected by the thresholds of each adoption phase. The bars indicate the percent of each group's population on Long Island that are estimated to have changed at least one metric targeted for them and further attribute that change to the LIPA initiative. The values in this figure were determined using the proportion of Phase I market actor respondents who reported a change in any metric that was attributed to LIPA, along with the proportion of each market actor population that participated in the LIPA initiative. As the figure illustrates, HVAC Engineers, architects, and lighting designers were the three actor groups that showed the most desired changes in behavior. This figure illustrates the evidence gathered that suggested the program theory and program operations were reasonably aligned at that point in the program operations among these three market actor groups.

Using these results as evidence that program theory and program operations were not diverging among these groups, the third phase of the study was focused on these three groups. In interpreting this figure, it can be observed that at the time of the early evaluation phase, the initiative had already influenced the 'Innovators' and was influencing the 'Early Adopters' among the lighting designer, HVAC engineer, and architect market actor groups. At that time, noting these early affects among these actor types was not surprising as the program theory had generally anticipated early market changes to be among niche markets and market players.

Figure 2: Phase I Level of Program Influence on Participant Behavior



The second effort taken by LIPA and the evaluation team was a review of the program theory with staff members from both the implementation and evaluation side of program operations. This occurred following the Phase II on-site work and prior to Phase III and contributed to an assessment of how best to focus evaluation resources. This process included a review of the HVAC engineer, architect, and lighting designer metrics and an assessment of the program stimulus activities being undertaken toward each group. While no formal adjustments were made to the program theory, this process did reassure the evaluation team

[5] Rogers, Everett. (1995). Diffusion of innovations. Fourth edition. New York, NY: The Free Press.

that the program was operating near design and that an assessment of these specific groups was a viable mechanism to assess the influence of the program since the baseline study.

Challenge: Assessing and Attributing Change

Another challenge encountered in this study was the attribution of market effects to the initiative, despite the existence of many other factors that may influence the behaviors of actors in the marketplace. Comparing the results of the evaluation to the long-term program theory and baseline and defensibly quantifying the impact of the program among market players ultimately required a two-pronged approach to data collection and analysis. Specifically, our theory-based approach to overcoming this challenge included the use of carefully designed data collection instruments that assessed and attributed self-reported behavioral changes from actors in the marketplace over an established period of time that was selected in consideration of code changes and likely participant recollection ability. In addition, we sought to assess updates to the baseline on a formal basis that required the weaving of questions used in the original baseline study into the update instrument to maximize comparability.

These questions specifically probed whether they had changed a discrete targeted behavior during express windows of time and went on to assess the cause of those changes. The behaviors explored were consistent with those from the baseline study. This was an important battery of questions to the extent that it was designed specifically to assess the role of the program in the noted changes. The window we used for the reported change began on January 1, 2005 as we felt it was soon enough to allow respondents to provide reliable answers on those factors that contributed to any reported change and yet far enough out for respondents to have undergone a notable change in behavior. This date also provided a reasonable detachment from a significant New York State Energy code change[6], which was intended to make it easier for respondents to isolate other influences in their responses. In addition, the use of a 2 year window was consistent with the window depth of the baseline and previous study phases.

Cutting off the window within which a change in behavior was explored to after the code change was felt to make it easier for respondents to isolate other influences in their responses. However, it was acknowledged by the evaluators that despite efforts to isolate influences on behavioral changes, these code modifications were still likely to have influenced behaviors after the window of inquiry. In fact, in some ways, the change in code limited the ability to compare the code questions to the responses gathered in the baseline. The clear challenge was that the code was going to increase the incidence of desired behaviors and that attribution of those changes were likely to be cited as due to the code change itself. LIPA had in fact sponsored seminars on the code, but the code itself was driving increases in efficient behaviors that were initially targeted in the commercial construction program theory. Therefore, we also employed questions that inquired about levels of activity among respondents in which they specified equipment that were approximately 5% more efficient than that specified by the new code. This distinction was intended to gather changes beyond code that may have been influenced by LIPA. This approach worked well and ascertained levels of efficiency beyond code attributable to LIPA, although this shift in the marketplace made these changes largely incomparable to the baseline study.

The use of windows of time in which behaviors are assessed introduced another significant challenge to the overall study insofar as it limited the ability of the evaluators to fully account for all initiative influences in the market place. Specifically, this approach does not account for change that could have occurred before the window of inquiry but since the baseline study had been conducted. Such an occurrence would be a positive outcome for the initiative but would not be picked up by the study methodology. The advantages to using a specific window of time in this study were that it helped respondent's better isolate influences and it provided a window of time during which respondents would be able to recollect changes

[6] 2002 Energy Conservation Construction Code of New York State, effective July 3, 2002.

and the reason for those changes. Ultimately, it was decided that the benefits of this approach outweighed this analytical limitation. The implication of this approach likely resulted in an estimate of program influence attributable to LIPA that was conservatively biased. It also limited comparability to the baseline insofar as all changes in behavior, regardless of when they occurred, were not fully explored.

Challenge: Market Interaction Layers

Another challenge encountered in this study, and one that is likely to be experienced in other similar studies is that when an initiative targets a multitude of levels within a market like the new construction market and major renovation (e.g., end-users, market actors, builders, etc.), it becomes increasingly difficult to isolate the cause of any reported change among one particular layer of actors and behaviors. For example, in this study, many actors reported desired increases in the specification of more efficient equipment in the construction projects they were involved in. However, when asked about why they had undertaken these changes, many actors cited customer or client request as factors that caused those changes. It is possible, perhaps even likely, that the LIPA program may have indirectly contributed to these other factors, although the extent of such impacts is unable to be ascertained.

For instance, the program may have generated more awareness of the benefits of energy efficient lighting among end users resulting in more end users requesting that market professionals install energy efficient lighting. However, when lighting design professionals are asked about what influenced their increased use of energy efficient lighting in their jobs, they are likely to claim that their customers are requesting it more often. However, if the LIPA program had influenced these customers to request it more often, LIPA may in fact, be indirectly influencing the professionals increased use of energy efficient lighting. To the extent that LIPA may be indirectly influencing the market in this way, the study was unable to account for it in the market actor level data collection and analysis. This challenge in determining full attribution from self reports also suggests that the results of the study were conservative.

Challenge: Baseline Replication and Assessing Comparability

Because market transformation studies take place many years after the baseline, it is imperative that the methodology of the baseline is well defined. One reason for this is clear: the institutional memory of methodologies is often lost over time. The second is that, unlike resource acquisition program studies in which a participant group is known, market transformation studies need to replicate the same sample frame development and selection process as the baseline to ensure an appropriate comparison of results. To the extent that the baseline is representative, of the marketplace, any subsequent update work needs to understand the manner in which the baseline groups were selected both as part of developing the update samples and as part of the overarching need to assess the comparability of the results.

To assess how comparable update studies are to baseline metrics, key general and demographic information should also be gathered and analyzed in both efforts. For those questions, responses that were preliminarily determined to be appropriate for comparison between the update and baseline efforts, we sought to examine other factors to further assess their comparability. As part of this exercise, we found it desirable to have access to median characteristics for both the baseline and update samples as well key descriptors from which we could establish confident comparisons. These downstream study needs should be considered as part of any baseline effort that is intended to be the foundation from which future assessments of change are measured.

Conclusions

Evaluators undertaking the effort of performing a baseline study and subsequent update efforts in

support of assessing the performance of a market transformation initiative in a non-residential market are certain to encounter challenges. We have sought to highlight several of these and to provide the actions we employed to overcome them. In our experience, the development of a robust program theory and planned use of a baseline study with regular updates has been a unique and enterprising endeavor that has resulted in a multitude of challenges that we believe may be largely unavoidable in even the most well designed approach.

Ultimately, the approach taken was able to report on meaningful market changes and the role of LIPA in those changes. The Commercial Construction Program was found to have a significantly influential role in the adoption of efficient practices in the market place, although this was not able to be well assessed through conventional comparison to a baseline study. Rather, the evaluation team used the practices explored among market actors in the baseline study to craft specific questions about changes within windows of time to elicit information to gauge the success of the LIPA commercial construction initiative in the marketplace. Comparisons to the baseline were still possible, however, we also found that being able to examine patterns of reported behavior changes and their self reported influences within specified spans of time often provided compelling evidence of initiative success. Taken as a whole, the pattern of market effects observed over the three phases of work provides a preponderance of evidence that the LIPA Commercial Construction Program is inducing a positive change in the new construction and major renovation market place on Long Island. Over the long haul of the study we further found the approach taken to provide a means to overcome many of the challenges of the study while remaining true to the spirit of the baseline study comparison model.

The usefulness of a baseline for comparison purposes becomes tested over long periods of time, particularly when the marketplace is as dynamic and complex as the commercial construction and major renovation market. While such an approach is laudable, we question the practical usability of baseline indicators in general evaluation practices of this nature. We would encourage others who are undertaking similar endeavors to consider limiting the scope of the baseline to be more focused on select metrics among key groups that can be rigorously examined over time. We would also ask others to consider employing an evaluation approach that relies as much on assessing desired changes anticipated in the program theory as it does on gathering information that is comparable to the baseline. Given the limitations we experienced in the usability of baseline information and the general complications encountered in the study, we believe others may find significant value in assessing changes against hypothesized program impacts than in comparing updated metrics to a baseline study.

The conclusion that the Commercial Construction Program is imparting a meaningful influence on the market through market actors is based upon evidence supported through the data gathered in each phase of work and taken as a whole. In a brief secondary review, we have found two white papers that provide further evidence and context for understanding the influence of new construction programs on market actors. One such study explored the influence of a new construction program on architects in the Pacific Northwest in 2003[7]. Another study[8] examined the influence of an initiative in New York designed to encourage energy-efficient new construction design and building practices among architects and engineers with a further objective of urging owners to consider the long-term advantages of such designs. Each study found similar evidence to that gathered in this study. Namely, that properly designed non-residential new construction initiatives can successfully channel influence to specify and adopt energy efficiency in a non-residential new construction market through market actors.

7 "How Architects Do and Do Not Drive New Construction Decisions," Peters, Jane, et al., 2005 IEPEC conference proceedings, NewYork.

8 "New York Energy Smart Program Evaluation and Status Report," New York Energy Public Service Commission, p 76-99.

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