CONVERGING ON THE EFFECTS OF UTILITY LIGHTING EFFICIENCY PROGRAMS

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In recent years, evaluators and regulators have come to agree on a three-part test of market transformation programs.[1] According to this test, a successful program should produce: a) changes in the pertinent market that are b) attributable to the programs of the utilities or other interveners. In addition, c) those market effects should be durable—they should last beyond program changes, reductions, or withdrawals.

A number of authors have grappled with the problem of identifying and measuring pertinent market effects.[2] Others have addressed the problem of assessing the durability of observed effects.[3] Discussion about the problem of attribution appears to have received little attention thus far, however.

This paper is an effort to take the problem of attributing market effects beyond "an exercise for the reader." In it, we first describe the commercial lighting programs of several New England utilities and report the results of a recent evaluation of their market transformation effects. We next discuss common criteria for imputing Effect B to Cause A and the reasons for the difficulty of meeting these tests when evaluating market transformation programs such as those described. We close by presenting the approach we used to more clearly identify the role of utility programs in causing the market changes observed.

The Commercial Lighting Programs of New England Utilities, and Their Effects

Utility DSM programs in New England have worked to encourage adoption of energy-efficient lighting products since the late 1980s. The particular combinations of targeted customers and transaction types (emphasis on retrofit or on new construction) have varied among the different utilities, as have the incentive structures (whether prescriptive or custom). Taken as a group, however, the utility programs have expended several hundred million dollars on improvements in the C&I lighting market.

- Initially, the primary targets were large customers, because they offer the greatest return for the least effort. By 1991, however, a broad range of customer segments was involved, and eventually, customers whose demand requirements were 500 kW or less were being approached.
- Partly as a result of the macroeconomic situation in New England, lighting improvements in the retrofit market (as opposed to new construction or facility expansion) accounted for the majority of program expenditures.
- The mix of custom and prescriptive incentives has varied, but has been weighted toward custom projects.
- Investment by four of the largest utilities[4] peaked at $95 million in 1991. It was in the area of $40-45 million through the remainder of the early 1990s.

Our evaluation indicates that these programs directly affected both end-use customers and other actors in the C&I lighting market. We base this on data from structured interviews with 188 end-users, as well as 114 other market actors, including lighting designers, dealers, distributors, ESCO personnel and real estate management firms in four New England states.[5] Additional interviews contributing to our analysis were gathered from 25 manufacturers and lighting experts around the country and from 17 lighting distributors and designers in a comparison area outside New England. Other contributory information was developed from utility program descriptions, reports of the U.S. Department of Commerce and the Energy Information Administration, as well as manufacturers' brochures and distributors' catalogs. We now turn to the results of those interviews and related investigations.

[1] For a recent exposition of this test, see, for example, Eto, Prahl, & Schlegel (Reference 1). The original articulation of the test may be due to Schlegel (cf., e.g., Reference 6).

[2] See, for example, Feldman (References 2, 3) and Rosenberg (Reference 5).

[3] See, for example, Prahl & Pigg (Reference 4).

[4] The sponsors of the study (Commonwealth Electric, EUA, the NEES Companies, and Northeastern Utilities) made their data available. A fifth major utility, Boston Edison, also joined in many of the programs of this period, but declined to participate in this evaluation project.

[5] We used a quota sampling procedure to fill a complex study frame covering building type, facility size, ownership, and related firmographic factors.

Market Changes

Both available data bases and retrospective reports indicate that the New England C&I lighting market of the late 1980s and early 1990s was dominated by standard efficiency components and fixtures. For example, standard product specifications included 40 Watt T-12 fluorescent lamps, magnetic ballasts, mercury vapor HID lamps, and incandescent exit lamps. Few fixtures were designed to accommodate the relatively new energy-efficient lamps and ballasts; distributor stocking of energy-efficient lighting products was limited and purchase lead times were longer than many purchasers were willing to accept; use of lighting controls was rare; design specifications called for high footcandle levels; and prices for energy-efficient lighting products were considerably higher than those for standard alternatives.

In contrast, the reported saturation of energy-efficient lighting equipment is now estimated at 54% of C&I floorspace among end-users with demand of 50 kW to 500 kW. The T-8 share of fluorescent lighting sales (omitting simple replacements of burned-out lamps) is between 75% and 95%, and the electronic ballast share is between 75% and 87%. Mercury vapor lamps are used in only one of eight retrofits, facility expansions, or new construction projects. LED exit lamps appear to be the default standard.

Almost every distributor stocks energy-efficient lighting products, and many actively promote those products. In addition, some distributors have launched proactive energy service/marketing organizations to seek out equipment sales, using the benefits of energy-efficient equipment as their primary sales point. Moreover, lighting efficiency is now heavily encouraged by ESCOs, lighting management companies, and some electrical contractors.

Although lighting designers may have less direct influence than they did in earlier years,[6] it is noteworthy that their current standards are far more energy efficient than they had been. For example, they recommend T-8s instead of T-12s, three-lamp fixtures with one ballast instead of four lamps with two ballasts, and the use of lighting controls wherever practicable.

Prices for energy-efficient products are still higher than for standard products. However, price multiples have declined. For example, the difference between electronic ballasts and magnetic ballasts dropped from a ratio of 2.3 in 1991 to a ratio of 1.3 in 1996. Similarly, the ratio of prices for CFL-based exit signs to incandescent units dropped from 4.1 to 2.6 across those five years. Even for smaller purchases, such as four-foot fluorescent lamps (T-8s compared to T-12s), ratios dropped—from 2.5 to 2.2—in the same period.[7]

To close this portion of the paper, we illustrate the changes that have occurred in the New England C&I lighting market with Figure 1. In this figure, we have drawn two curves to represent the change in the saturation of energy-efficient lighting products from 1991 to 1996. Point A (at 23%) indicates the average saturation of these products in 1991, according to retrospective reports from our survey respondents. Point B (at 54%) represents the saturation of such products in 1996. We have drawn the solid curve, $\overline{AB}$, to represent the actual course of energy-efficient product saturation across that time span.

Point C (about 35%) represents the average 1996 saturation of energy-efficient lighting products in the absence of intervention programs, as estimated by other market actors. Thus, the hypothetical dashed curve, $\overline{AC}$, represents the best available estimate of the "naturally occurring" market—what would have developed in the absence of intervention in the New England C&I lighting market. Furthermore, the gap, B-C, represents the best available estimate of the total difference in current saturation that might be attributed to intervention efforts, and the area, ABC, represents the total effect of interventions over time.[8]

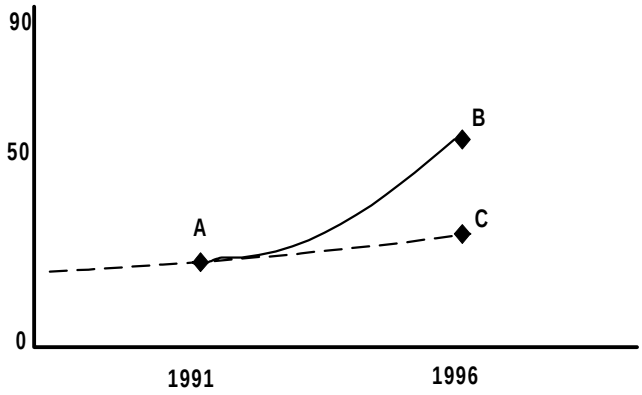

Figure 1. Hypothetical Market Saturation Curves

Utility Influences

Clearly, changes in the New England C&I lighting market have been impressive. What are some of the reasons that utility programs might be given some of the credit for those changes?

According to our data, utilities have been directly involved (through the provision of rebates) in the majority of lighting improvement projects over the past six years, at sites of all sizes. This has been particularly true for retrofits, about 90% of which have involved the local utility. Indeed, in 1991, about 85% of electronic ballasts sold in New England appear to have been subsidized by utilities. And while direct subsidies declined in subsequent years, they remained in the range of approximately 30-40% through 1995. Moreover, more than one-third of end-users interviewed name their lo-

[6] The reasons for this may suggest some unintended effects of lighting efficiency programs, as well as the broader economy. Space does not permit further discussion of this issue here.

[7] As found in Grainger catalogs.

[8] As drawn, the curves assume that either no earlier interventions occurred or that those that did were ineffective. In other words, it represents the minimum effects of intervention programs.

cal utility as a *primary* influence on their most recent lighting upgrade project.[9]

In addition, the utility programs appear to have induced other market actors to promote DSM lighting programs. For example, distributors stocked efficient components in anticipation of continuing demand, and they began to offer new efficiency-oriented services as a way of attracting business. Similarly, lighting designers began to specify energy-efficient components once they concluded that those components were reliable and cost-effective.

These activities by other members of the value chain appear to have resulted, at least in part, from deliberate utility program tactics. Utilities did not simply provide funding to end-users for lighting efficiency upgrades. They worked directly with manufacturers and distributors to promote sales; they worked with manufacturers to improve product quality; they adopted reduced power density standards in conjunction with ASHRAE and IES; and they promoted EPA's Green Lights program, for example. In other words, they recognized—at least implicitly—the importance of coordinated promotion and programs, not only to increase end-user awareness and interest, but also the involvement and commitment of potential partners.

Sustainability and Attribution Issues

At this time, we cannot say with certainty whether the observed market changes will last beyond the removal of direct utility support for energy-efficient lighting products in the New England C&I market. Some evidence suggests that market transformation has occurred for certain technologies. For example, LED exit lamps are being specified in almost all applications, even without utility subsidies. Similarly, T-8 lamps with electronic ballasts have captured approximately 90% of the new construction and retrofit markets—with little continuing rebate support. Indeed, as a result of recent reductions in DSM expenditures and the surrounding publicity, many of our interviewees believe that those programs have already been withdrawn—but most of these interviewees declare that they will continue to install energy-efficient lighting products. Moreover, the changes in standard practice and design specifications seem likely to persist, according to interviews with distributors, dealers, designers, and ESCOs. Still, these propositions remain to be tested further over time.

To summarize this section, then, we note that there have been considerable changes in the New England C&I lighting market over the past decade or so. Moreover, many of these changes appear likely to last beyond the withdrawal of the utility programs that may have helped to stimulate them. We turn now to the question of causality: What evidence or logic can help us to determine whether the market changes described can with confidence be attributed to the lighting efficiency programs of New England utilities, and what might be some of the complicating factors in making these judgments?

The Logic of Causality

When we say that some event or intervention, A, causes some observation, B, we are invoking both theoretical and empirical criteria. Theoretically, we are arguing that we have identified some reasonable mechanism that links the two; e.g., that the linkage between cigarette smoking and cancer is traceable to the action of certain components of cigarette smoke on the growth of lung cells. Empirically, we are claiming that:

- A precedes B in time.
- A and B covary in some systematic manner.
- There are not other plausible explanations, C_1, C_2, …, C_n, that can reasonably be expected to have caused *both* A and B.

The first two of these empirical criteria are relatively easy to meet. It is clear for example, that most of the market changes described above came after the utility C&I lighting programs were instituted. Moreover, the intensity and reach of the programs appear to be related to the extent of the observed effects. As evidence of this latter point, it may be noted that interviews with market actors in a control territory (with similar C&I electricity prices but no lighting DSM programs) found few market changes. For example, the penetration of T-8s, at less than 10% of fluorescent lamp sales, is no higher in the control area now than it was in New England in 1991.

The major difficulty in making the case for attribution of the observed market changes to utility programs lies in meeting the third empirical criterion. Are there other plausible explanations for the market changes? If so, what are they? Can they be rejected in favor of attribution—solely or in large part—to the utility programs?[10]

Other Influences

The C&I programs of New England utilities were far from the only efforts to increase lighting efficiency in that market during the early 1990s. Important concomitant events and programs included changes in standards, product offerings, and prices, as well as the activity of other market actors.

Changes in Standards, Product Offerings, and Prices. The efficiency of the lighting products available changed twice in ways that would affect the C&I market. Both NAECA and EPAct—as well as the anticipation of those standards going into effect—caused manufacturers to change their product mix and their supply chain support activities. In addition, ASHRAE standards for lighting densi-

[9] This is undoubtedly a lower-bound estimate. Customers are unlikely to recognize that a number of other factors they see as proximate causes of their behavior may, in fact, be outcomes of utility activities, as argued below.

[10] The issue is whether there are other plausible explanations; it is not to demonstrate that utility influence is the *only* explanation.

ties were tightened at the beginning of the 1990s and are being revised further at this time.

Manufacturers have greatly improved the reliability and other performance characteristics of electronic ballasts as well as lighting controls. In addition, they have broadened the range of energy-efficient product offerings, such as the styles of T-8s and of HIDs other than mercury vapor lamps, and they have introduced a wide range of fixtures for installing these products in new and retrofit applications. Other changes include the development and wide distribution of LED exit lamps in both new and retrofit kits. As described earlier, manufacturers have also lowered prices for many of these products, with the prices for energy-efficient models falling even faster than those for standard models.

Activities of Other Market Actors. Moreover, several other groups have addressed the efficiency of the C&I lighting market; some, groups that are essentially new entrants in that market, and some, interveners like the utilities. The latter group includes, most prominently, the U.S. EPA, with its Green Lights program. Although this program may not reach many smaller customers, it is widely promoted among larger corporations and those with multiple sites,[11] and appears to have achieved a high level of decision maker awareness in those segments and among other members of the value chain.

The former group of market actors includes not only ESCOs, but also lighting management companies and rebate brokers. ESCOs promoted their services aggressively and addressed segments well beyond their traditional target markets. Both ESCOs and new firms came into the market to provide lighting retrofit projects. Other entrepreneurs entered the market to profit by reducing the hassles of contracting by offering to centralize the initiation and implementation of lighting retrofit projects.

The Complexities of Attribution. Given these other potential influences on the C&I lighting market, can we argue decisively that utility programs were the major cause of the market changes observed? Referring back to Figure 1, can we conclude that the entire gap between points B and C (our best estimate of the difference between observed saturations and "naturally occurring" saturations) is attributable to utility programs?[12]

Among the difficulties we face in attempting to answer such questions are the following.

- Multiple interventions occurred.
- Programs and underlying change factors interact with one another.
- The effects of different programs are likely to have different lag times.
- Changes in different technologies are likely to proceed along different time paths.
- Changes are likely to differ among different target segments.

In fact, it is reasonable to suggest that the increase in efficiency over the "naturally occurring" baseline includes three components; specifically:

- Direct utility-induced effects: The (non-free-rider) projects and purchases completed as a specific result of incentive programs
- Other intervener-induced effects: The projects and purchases completed as a direct result of the activities of actors other than those who will benefit directly from market activity (e.g., EPA, as opposed to manufacturers or lighting designers)
- Secondary utility-induced effects: Projects or purchases completed because utility funding has induced other market actors to change their behavior

Figure 2 offers a more systematic picture of the flows of influence among market participants. Interveners include utilities, government agencies, and professional organizations such as ASHRAE. Intrinsic market actors include manufacturers, lighting designers, etc.

In examining Figure 2, we can see several ways in which utility programs may affect relevant end-user decisions, purchases, and usage. The first path involves direct promotion and financial support for purchases of energy-efficient lighting products.

The second path involves the market pull stimulated by the initial promotion and incentives. Changes in what end-users demand can result in changes by other market actors to meet that demand and thereby maintain or increase market share and profits. For example, it appears that the increased demand for energy-efficient lighting products has been at least partially responsible for the following effects:

- Stimulating distributors to increase stocks of energy-efficient lighting components and add efficiency-oriented services
- Drawing ESCOs into the market, expanding their range of expertise, and leading them to increase their marketing scope and efforts

The third path of interest is through working directly with other market actors in such a way as to provide more energy-efficiency options or improved options for end-users. Examples of this include the following:

- Providing feedback to manufacturers to stimulate product quality improvements that overcome the reliability problems of early electronic ballasts

[11] Interviews with end-users who are part of franchises or chains also note, in a number of cases, influences from utilities serving other members of their organization.

[12] We omit, for now, the even more vexing problem of estimating and allocating future differences.

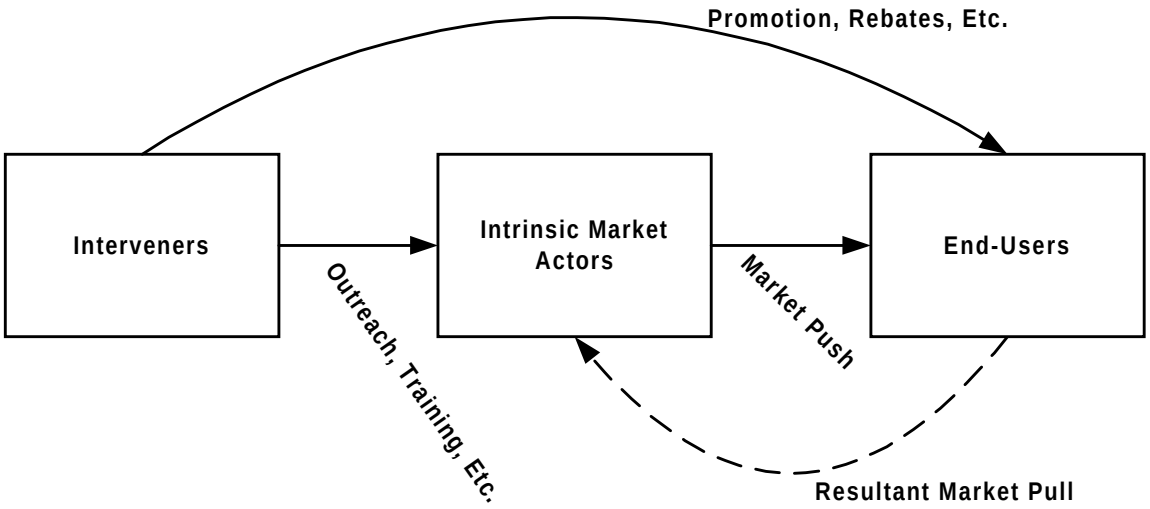

Figure 2. Direct and Indirect Effects of Intervener Activity

- Convincing the design community to adopt new component technologies and adopt more aggressive targets for lighting power densities

A fourth path (not shown in Figure 2) is through working with other interveners. Two examples illustrate this path.

- Utility incentives provided an opportunity for action on the part of customers sensitized to energy-efficiency needs by EPA's Green Lights program.
- Utility support for electronic ballasts and other newer technologies validated efforts to tighten lighting standards.

Perhaps some would argue for a "pure experiment"—the implementation of utility lighting efficiency programs in some service territory where no other influences are present—to answer these questions. Such an approach is not only impractical, but it also misses the point. Few, if any, would claim that utilities should receive all the credit for changes in the lighting market. Rather, almost all would argue that the involvement of utilities may be critical to the success of other programs. Indeed, the two sets of efforts are undoubtedly synergistic; each may be relatively ineffective without the other. Alternatively, can we determine *the degree to which* the utility programs influenced the market?

The Removal of Barriers to Lighting Energy Efficiency

Thus far, we have shown several reasons for assigning the cause of at least some observed market changes to utility programs. These reasons include direct attributions by end-users and by other market actors, the relative lack of market progress in a control area that lacked utility programs, and our ability to trace some changes to secondary effects of utility programs. In this section, we offer an additional argument for the belief that utility programs played a central role in increasing the energy efficiency of the New England C&I lighting market.

In brief, the evidence suggests that utility programs have been prime movers in removing, reducing, or bypassing barriers to energy efficiency in the C&I market. To illustrate this, we will first review some of the data described earlier from the perspective of the changes they indicate in barriers to the implementation of energy-efficient lighting. We will then assess which actors appear to have stimulated the changes in those barriers.

Barriers to Lighting Efficiency in the C&I Market

In what has rapidly achieved the status of a classic, Eto, Prahl, and Schlegel (Reference 1) described a set of barriers to the smooth functioning of energy-efficiency markets. Both the retrospective reports of our interviewees and other anecdotal evidence suggest that most of these barriers were in place in the New England C&I lighting market prior to implementation of the utility programs under consideration. Program descriptions show that utility activities addressed several of these barriers. Our data regarding the current market suggest that some have been

Table 1. Selected Utility Activities in Support of Lighting Efficiency

Activity	Market Barrier Addressed
• Encouraging distributor stocking of energy-efficient (EE) lighting components • Working with manufacturers to bring product improvements to market.	Product/Service Unavailability
• Educating customers through information programs and audits • Offering end-users lists of distributors and contractors offering EE products and services • Providing lists of "approved" equipment	Information/Search Costs
• Screening products for quality • Developing credible savings calculations • Creating performance monitoring guarantees	Performance Uncertainties
• Offering direct installation of equipment • Providing audits and some design services	Access to Financing
• Coordinating design, supply, and installation • Offering standardized contracts between end-users and contractors	Hassle/Transaction Costs

considerably reduced and some have been moderately reduced, while others remain. We review each of these points in turn.

Initial Barriers and Utility Tactics. Clearly, utility programs emphasized rebates during the DSM era. Nonetheless, those programs included various tactical components that addressed other market barriers. Several of these tactical components are shown in Table 1,[13] along with an indication of the key market barriers they address.

The Current Market. Table 2 shows that our data suggest several key barriers to lighting energy efficiency that have been effectively eliminated or removed. In particular, the current generations of T-8s, electronic ballasts, HIDs, and LED exit lamps appear to have no serious performance problems. Moreover, this judgment seems to be accepted by end-users and other market actors. Similarly, the distribution problems of those technologies and the difficulties of obtaining information about them are reported to be minimal.

Some progress has been achieved in changing corporate decision making with regard to EE lighting products and services. For example, more companies appear willing to select such products, so long as the premium is less than, say, 10%, rather than imposing strict "lowest first-cost" purchase rules. Furthermore, some companies appear to have created internal energy-efficiency champions, in recognition of the overall benefits to the firm.

However, some barriers appear to have changed little or to have been addressed on a temporary basis only. Our interviews with real estate management firms and with short-term renters suggest little progress in addressing the asymmetric information barrier as it pertains to lessors and lessees. And despite increases in end-user information, there remains some skepticism about the claims of EE contractors and others.

Of perhaps greatest import for future developments, we find no evidence that the barrier of access to financing has been reduced for those companies that are willing to proceed with lighting efficiency upgrades but have limited capital. Clearly, a major result of utility rebate programs was to overcome this barrier for interested companies. However, these activities may not have resulted in any new willingness to provide such funds among traditional financial institutions once utility DSM programs are withdrawn. The most optimistic scenario would seem to be that ESCOs will expand and improve their performance contracting services in such a way as to eliminate or reduce this barrier for more end-users, not just large end-users in certain segments.

Attributions. Table 3 displays our judgments as to which sets of activities addressed which of the market barriers, based on interview data and a review of various programs. For example, we have earlier noted that utilities provided feedback to manufacturers regarding product quality issues. So also did designers and managers of EPA's Green Lights program. Similarly, several utility programs as well as the Green Lights program made efforts to induce end-users to overcome their reliance on first-cost criteria. In contrast, we see no evidence that utility programs addressed significant attention to the hidden costs of lighting retrofits or worked with manufacturers to reduce the inseparability of lighting system features.

As shown in this table, utility programs are the only ones that directly addressed *all* the market barriers that showed at least some reductions in the New England C&I lighting market. Other market actors did address those same barriers, and we certainly cannot attribute advances entirely to the utility programs. Still, it is extremely unlikely that

[13] This list summarizes activities of different utilities over several years. We do not mean to imply that every activity was available throughout the program period in every service territory. Nonetheless, we believe that the volume and mix of these activities in a relatively small geographic area is significant.

Table 2. Changes in Market Barriers

Barrier	Degree of Change	Comments
Performance Uncertainties	Eliminated	• Earlier models of-EE components improved • Most customers believe EE components last longer and provide quality at least as good as that of standard components
Product/Service Availability	Largely eliminated	• A wide range of high quality EE components readily available • Several types of market actors provide energy-related services
Information/Search Costs	Largely eliminated	• Most customers aware the EE products offer large operating cost savings, good returns
Hassle/Transaction Costs	Largely eliminated	• Customers can generally obtain EE products with little added difficulty
Bounded Rationality	Reduced	• End-users appear to be moving away from first-cost rules of thumb
Organizational Practices	Reduced	• Champions for EE appear to have arisen in many organizations
Asymmetric Information	Some reduction	• Many end-users display better ability to determine what is appropriate for their applications • End-users remain suspicious of motives of market actors and utilities
Access to Financing	Bypassed	• When in effect, equipment rebates overcame this barrier
Hidden Costs	Some increase	• Environmentally safe disposal costs may have increased in importance
Inseparability of Product Features	Little change	• Lighting systems still largely interdependent • Specialized lighting products and controls require design assistance
Irreversibility	Little change	• Significant uncertainty regarding electricity costs and externalities remains in the market
Misplaced/Split Incentives	Little change	• Although some property managers upgrade lighting in spaces they acquire, the underlying differences between the interests of lessors and lessees remains

progress would have been as rapid or as great without the utility programs. These programs broadened and amplified the contracting activities of ESCOs and the educational activities of other market actors. Moreover, the spike in product demand created by the large infusion of incentives in 1991 was a major factor in convincing component manufacturers to increase production and improve product quality. No "naturally occurring" substitute for the magnitude of utility-stimulated activity appears to have been likely.

Not only did no other market actors or interveners address as many barriers, but also: a) Relevant utility expenditures have been considerably greater than those of other market actors. b) As described earlier, a number of the activities of others are not independent, but are a secondary effect of the utility programs.

Conclusions

This section provides a strong argument for attributing observed changes in the New England C&I lighting market to relevant utility programs. First, many barriers to the selection, purchase, and installation of energy-efficient lighting characterized the market when utility programs were in place. Second, utility programs not only provided rebates for EE products and services; they also addressed a number of those barriers directly. Third, several of the barriers that were addressed by utility programs have been eliminated or reduced. (And little change has occurred in those barriers that were not addressed.) Finally, a review of the activities of other interveners and market actors indicates that the utility programs were the broadest and most extensive, and that they were critical to the initiation and success of other efforts.

Implications

We began this paper by asking how evaluators can assess whether market effects can reasonably be attributed to utility programs.[14] It is clearly important to consider various market changes such as increased saturations of EE products and services, broader stocking patterns, and so forth. Additional confidence in our conclusions can be gained from the reports of end-users and other market actors. What is of critical value is the convergence of results using different methods with different strengths and different biases.

[14] The approach suggested here would be equally applicable to other market actors or interveners of interest; e.g., an independent market transformation agency funded by nonbypassable wires charges.

Table 3. Market Barriers Addressed by Activities of Market Actors and Interveners

Barrier	Utilities	Designers	Mfrs	Gov't	ESCOs	Distribs
Performance Uncertainties	●	●	●	●		
Product/Service Availability	●		●	●		●
Information/Search Costs	●	●	●	●	●	●
Hassle/Transaction Costs	●				●	
Bounded Rationality	●			●		
Organizational Practices	●			●		
Asymmetric Information	●	●	●	●		
Access to Financing	●				●	
Hidden Costs					●	
Inseparability of Product Features			●			
Irreversibility						
Misplaced/Split Incentives					●	

However, we believe that one of the most useful sources of additional evidence can and should be derived from examining the set of barriers that characterize the market of interest before and after intervention by the utilities. Such an analysis can and should provide additional convergent validation of the role of utility programs. In addition, it can and should show that the activities of others do not explain changes in the set of barriers nearly so well. Finally—and of the greatest importance—it can and should provide an explanation of the observed results: It should clarify the mechanism(s) by which the changes were achieved, by identifying the specific program tactics that addressed particular barriers. In so doing, this analysis can also provide important feedback as to which tactics are effective and which are not, thereby also contributing to improvements in future programs.

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