

Low-Income Programs for Single Family, Multi-Family, and New Construction Sectors as Seen Through the NSTAR Evaluation

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ABSTRACT

Many utilities support low-income energy efficiency efforts. The efforts supported by NSTAR Electric, however, may be somewhat unique. The low-income effort described here consists of three distinct programs that were designed to address the specific needs of single family dwellers, multi-family (large apartment complex) dwellers, and affordable new single family construction. The process evaluation that assessed each of these three programs across two utilities (Boston Edison and ComElectric merged in August 1999 to become part of NSTAR Electric) presented a unique look across various types of efforts. The programs themselves were also of a new breed of utility-sponsored efforts in that they were operated by local weatherization agencies. This paper presents lessons learned through comparisons across sectors, as well as discussing issues for program design and marketing efforts for these three sectors.

Serving Low-Income Customers Across Housing Types

The Massachusetts Restructuring Act of 1997 established funding provisions and a requirement for using local weatherization agencies as part of its designated support for low-income energy efficiency. In order to meet these requirements, along with meeting statewide energy efficiency goals, new low-income programs were established or modified by the electric utilities operating in Massachusetts. The Low-Income Single Family Program (LISF) began in December 1997 for Commonwealth Electric Company and Cambridge Electric Light Company (ComElectric) and in May of 1998 for Boston Edison Company (BECo). BECo and ComElectric both began operating a Low-Income Multi-Family Program (LIMF) and a Low-Income New Construction Program (LINC) in 1999. NSTAR Electric (the Company) was formed in August 1999 through a merger of BEC Energy (parent of BECo) and Commonwealth Energy System (parent of ComElectric). NSTAR Electric had a process evaluation conducted for all of these low-income programs in 2000. This evaluation examined each of the programs from both utilities (six programs overall), and did so in a way to facilitate comparison across the two utilities by housing type, and also provide useful information for the work being done to develop a uniform statewide effort for low-income energy efficiency.

Many utilities support low-income energy efficiency efforts. NSTAR's efforts, however, may be somewhat unique in their use of local weatherization agencies as the administrator for the single family programs, and the operation of separate multi-family and new construction efforts. This evaluation across two utilities (BECo and ComElectric) and the three programs in each presented a

unique look across these various types of efforts. The organizations involved and their relationships to support these six low-income efforts are displayed in Figure 1.

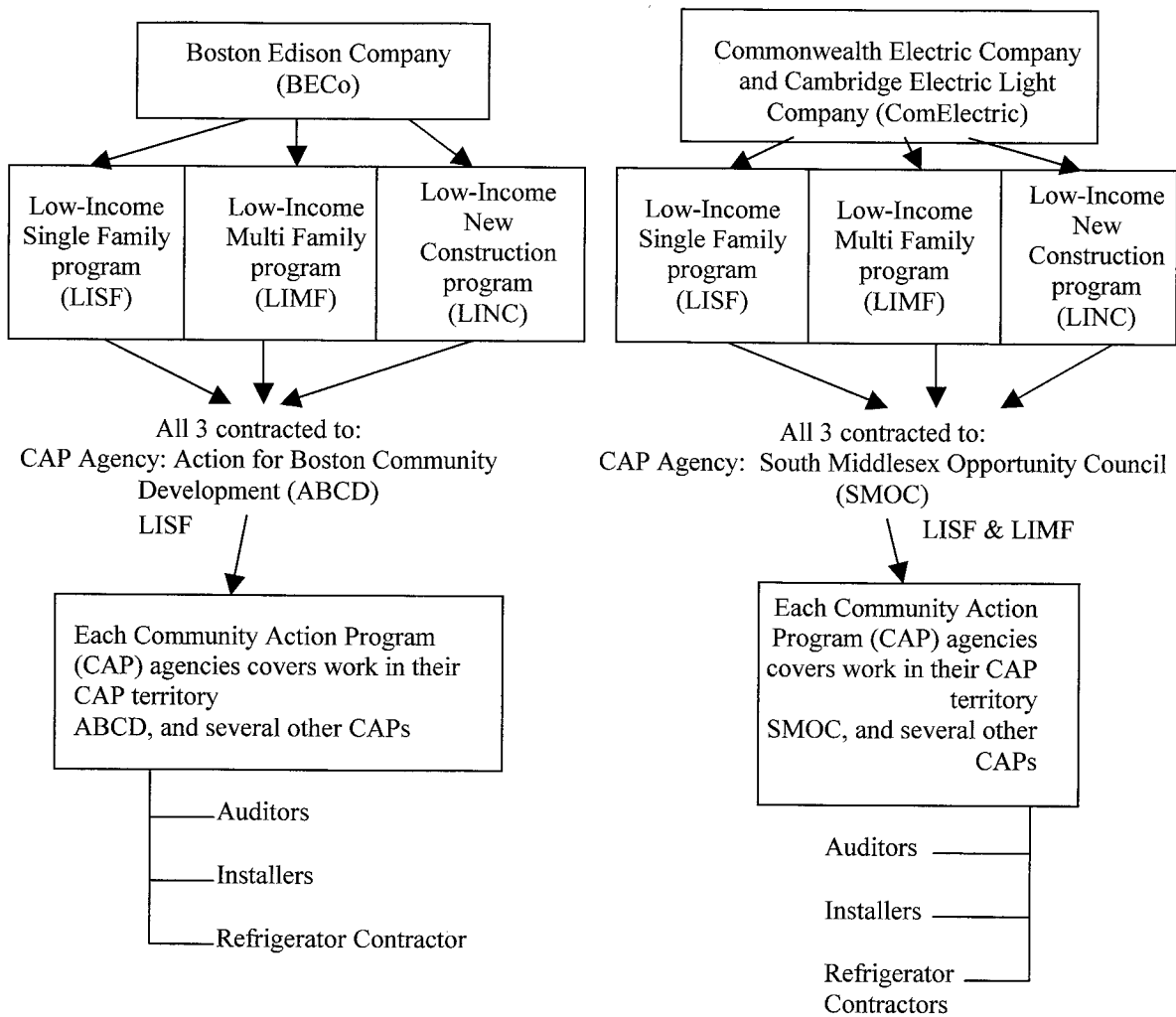


Figure 1. Organization of Programs and Implementing Actors

The programs are provided in coordination with the local Weatherization Assistance Program (WAP) in order to leverage the funds collected through a state-mandated energy efficiency charge. In Massachusetts, these WAP services are provided by local Community Action Program (CAP) agencies. The NSTAR Electric utilities contracted with a lead CAP agency in each of their respective territories to administer the low-income programs. BECo contracted with Action for Boston Community Development (ABCD) and ComElectric contracted with South Middlesex Opportunity Council (SMOC). SMOC and ABCD are responsible for participant identification, recruitment, home audits, customer education, provision of qualifying measures, and reporting of program results to their respective utilities. The utilities, along with their non-utility party collaborative, provide overall policy, program planning, design, program monitoring, and evaluation.

The Low-Income Single Family programs are provided in a manner quite similar to the WAP program services. As such, both lead CAP agencies operated these programs in their CAP area using contracted or agency auditors, with subcontracts for the installation of insulation and refrigerator

replacements. They subcontracted to other CAP agencies for services provided in each of the smaller CAP agency territories.

Both ABCD and SMOC, subcontracted the Low-Income New Construction Program to Conservation Services Group (CSG). CSG also holds the contract to administer the statewide ENERGY STAR® Home Program sponsored by a Joint Management Committee of electric and gas utilities in Massachusetts. The LINC program is operated as a subset of the ENERGY STAR® Home Program. The LINC works to coordinate with the CAP agencies and utilities to incorporate low-income housing into the ENERGY STAR® Home Program. The Companies' LINC programs target and subsidize owners and developers of low-income multi-family and single family buildings for both new and rehabilitation projects to allow them to obtain ENERGY STAR® rebates, and meet ENERGY STAR® Home criteria.

The lead CAP agencies took somewhat different approaches in administering the first year of the Low-Income Multi-Family (LIMF) Programs. ABCD subcontracted the administration of their LIMF program in the Boston area to CSG. SMOC administered their LIMF effort in a manner similar to their LISF effort.

In 1999, the LISF and LIMF programs offered compact fluorescent light bulbs (CFLs), lighting fixtures designed for CFLs, replacement refrigerators, conversion of electrically heated waterbeds to conventional bedding (ComElectric), waterbed covers or timers (BECo), and showerheads and aerators (electric hot water only), where these measures were found to be cost-effective. For electric-heated homes, cost-effective weatherization measures such as attic and wall insulation, caulking, and air sealing were also undertaken. As 90 percent of the Companies' customers are gas or oil-heat customers, most of the measures installed were lighting measures and refrigerators. For the year 2000 low-income programs, a fuel-blind pilot was initiated whereby weatherization services were also subsidized in non-electrically heated homes.

This paper summarizes key results from the process evaluations of these six programs. The process evaluation consisted of participant telephone surveys and interviews with lead individuals involved in program development or implementation. The telephone survey gathered information from 301 participants of the 1999 LISF programs. For the 1999 LIMF programs, 11 owners and 100 tenants were surveyed. A total of 28 individuals working on the programs in various capacities were interviewed. Of these, 21 worked with the single family program (LISF), and 12 each worked with LIMF and LINC. We interviewed with 14 individuals that worked with the BECo low-income programs and 15 that worked with the ComElectric programs. The number of interviews conducted is presented below, and grouped by role of the interviewee:

- Utility staff – 3;
- External planning – 3;
- Lead WAP agency – 3;
- CAP contractors – 6;
- Implementing contractors or auditors – 11; and
- Participants (LINC) – 2.

A Look Across the Low-Income Populations Served

Comparing the demographics of the 1999 LISF participants with the LIMF tenants, as seen in Table 1, shows that the multi-family residents are much more likely to be individuals over the age of 65 living alone with an annual income of \$10,000 or less. The single family low-income population

served by the programs show about half of the households with someone over 65 and one-third of the households having children.

Table 1. Comparison of LISF Participant & LIMF Tenant Demographics

	Single Family	Multi-Family (Units)
% with 1 or more residents over 65	49%	77%
% with children in home	35%	8%
Average # people per home	2.6	1.5
% Own	56%	--
% with a disabled resident	48%	41%
% HS graduate or more education	77%	88%
% with college or post-graduate	12%	22%
% with income \$20,000 or less	80%	91%
% with income \$10,000 or less	45%	74%
% with income \$5,000 or less	10%	9%

The 1999 participants for the LINC program consisted of one large multi-family rehabilitation project for BECo and two Habitat for Humanity homes for ComElectric. The “participants” for these LINC projects were the project manager from CSG and the developer for the large rehabilitation project, and the Habitat for Humanity organizations.

Differences Seen by Housing Type

The 1999 LISF and LIMF programs were electric-based programs whereby most of the measures installed were lighting and replacement refrigerators. Almost all the participants received at least one compact fluorescent and almost half received a new refrigerator, as shown in Table 2.

Table 2. Comparison of LISF & LIMF Installations from Telephone Survey

	Single Family	Multi-Family (Units)
Compact fluorescent lamps (CFL)	91%	87%
Lighting fixtures	5%	17%
Refrigerators (units)	49%	45%
Freezers (units)	8%	4%
Showerheads and sink aerators	21%	33%

It is extremely rare for a participant to receive more than one refrigerator from the program and no one received more than one freezer. This means that both the LISF and LIMF average one of these to any participant that received refrigerators or freezers. As shown in Table 2, only 5 to 17% of participants (depending on program and utility) received energy efficient lighting fixtures. But amongst the surveyed participants that received lighting fixtures, Table 3 shows that a significant proportion of these received more than one fixture, pushing the average to 1.4 to 1.9 per participant receiving fixtures.

Table 3. Average Number of Measures Received by Households Receiving At Least One

	Single Family	Multi-Family
Compact fluorescent lamps (CFL)	3.0	1.7
Lighting fixtures	1.9	1.4
Refrigerators (units)	1.0	1*
Freezers (units)	1.0	1*
Showerheads and sink aerators	1.5	1.8

* Assumed to be 1 and not asked in the survey of tenants.

The LISF results in Table 3 also show a higher number of fixtures per household for those receiving fixtures. There are more CFLs received per household in the LISF program (three per participant) than the LIMF program (less than two per household). This may be due to larger size of single family homes than the average apartment and/or that there are more people (and, therefore may be more lamps that meet the minimum usage consideration for replacement) in the LISF household than the LIMF household (as discussed above).

The short-term retention rates in both programs, LISF and LIMF, are quite high with the retention rates ranging from a low of 91% for showerheads and aerators in LIMF and for CFLs in the LISF program, to 100% for refrigerators, freezers, and other measures in both sectors. These retention rates, as found by the LISF and LIMF telephone surveys, are presented in Table 4.

Table 4. Comparison of LISF & LIMF Measure Retention Rates from Telephone Survey

	Single Family	Multi-Family (Units)
Refrigerators	100%	100%
Freezers	100%	100%
Lighting fixtures	100%	97%
Compact fluorescent lamps (CFL)	91%	98%
Showerheads and sink aerators	97%	91%
Other	100%	100%

The CFL usage information obtained from the participant surveys, shown in Table 5, is very similar across single family and multi-family units. In fact, the daily hours of use are more similar across these sectors (programs) than it is between the two utility programs. This points to a difference in policy in how decisions are made as to what criteria is used to select which lamps are cost-effective to be retrofitted with CFLs.

Table 5 also shows no take-back in either sector. In other words, there are as many participants that use their lights less after the program as those that use the lights more. At the same time, both sectors show relatively similar rates of spillover where the energy efficient lights are being used instead of other less efficient lights in the home. This would create a net gain in expected energy savings.

Table 5. Comparison of LISF & LIMF CFL Usage Information

	Single Family	Multi-Family (Units)
Winter daily hours of use	3.9	3.9
Summer daily hours of use	2.9	3.0
Using them more	7%	7%
Using them more but instead of other lights	8%	8%
Same usage as before	78%	78%
Using them less	7%	7%

Examining key satisfaction ratings across sectors in Table 6 finds that, in general, the satisfaction ratings by participants of the LISF program are somewhat higher than for the LIMF effort. This may be caused by the fact that the LISF (based upon the earlier CAP DOE efforts) is better established, while the relatively new LIMF effort is still on a program development learning curve. It may also reflect the fact that a greater proportion of LISF customers receive more services/measures and are more likely to receive weatherization through other efforts. This higher level of service and associated greater savings obtained could be the primary reason for the difference in ratings.

Satisfaction ratings were compared for owners versus renters and for households with no one over 65 versus those with residents over 65 in the LISF programs. No differences in satisfaction were found across these different demographic groups.

Table 6. Comparison of LISF & LIMF on Key Satisfaction Ratings
(Mean of Score from 1=Extremely Dissatisfied to 5=Extremely Satisfied)

	Single Family	Multi-Family
Overall satisfaction rating	4.5	T: 3.9 O: 4.4
Energy savings obtained	4.1	T: 3.9 O: 4.5
Usefulness of energy training	4.1	T: 3.9 O: 3.3
Quality of work performed	4.6	T: 4.1 O: 4.2
Amount of work performed	4.3	T: 4.0 O: 3.6

T=tenants and O=owners

Bill Payment and Service Payment Issues in Program Design

All of the single family participants were customers who paid their own bills. About half of the participants report having had difficulties in paying their electric bill in the past. For these participants, the program had a positive impact on bill payment. Half of those who had trouble with bill payment now report having had a change in their ability to pay their electric bill due to program participation. Each of these populations is a subset of the one prior. Or another way to look at this, is that one in four participants from BECo, or one in five participants from ComElectric, (that previously had trouble paying their bills) report that they are finding it easier to pay their electric bills due to either the measures installed or the energy education provided as part of the LISF program. The proportions and subsets of participants are shown graphically for NSTAR in Figure 2. (The subsets in the graph consist of the graph on the right being only the 48% with payment difficulties, and the lower graph are only those with prior payment difficulties that also saw a change.)

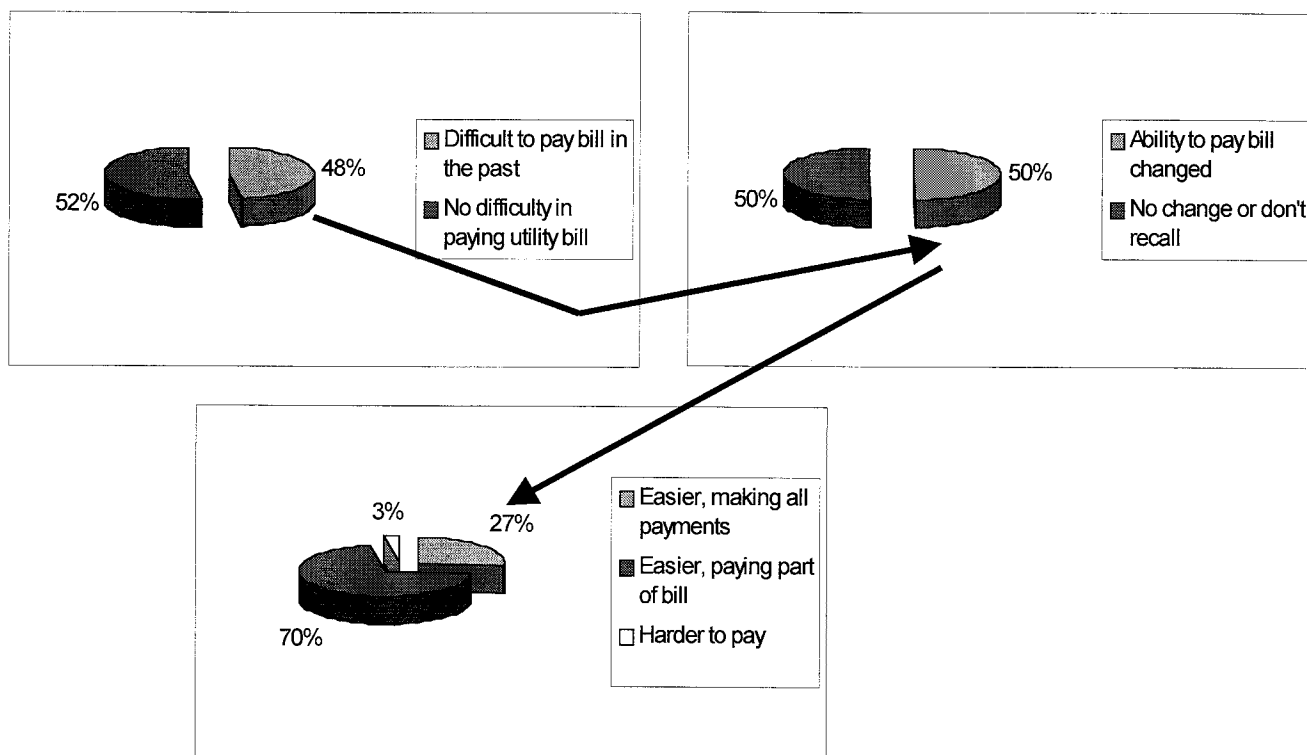


Figure 2. Program Effect on Utility Bill Payment for Single Family Participants

Utility-sponsored energy efficiency programs may take different perspectives on delineating whether the customers must pay their own utility bill to be part of the program, and how to handle multi-family units and subsidizing building owners. Many programs require that the low-income family must be utility customers (directly metered/submetered), paying their own utility bill, in order to participate. These programs took a broader stance with the assumption that lowering energy costs to buildings with low-income residents would benefit those residents as energy costs are often incorporated into the rents they pay (includes master metered accounts). This perspective expands the low-income target market and can change some of the program impacts.

The policy of treating multi-family buildings with low-income tenants, whether those tenants paid their own bills or not, meant that more low-income residents can be served by the programs. At the same time, one would expect there to be a much smaller program impact on the ability to pay electric bills, given that these customers do not pay electric bills. This, in fact, was found to be true. Approximately 70% of BECo's and 0% of ComElectric LIMF tenants reported paying their own electric bills. Of BECo's 70% paying their own bills, only 27.3% report having had difficulties in paying their electric bill in the past. Less than 20% of those with prior bill payment problems felt the program changed their ability to pay their bill and then less than half would say it helped them. Going back to the initial number of respondents results in only 2.6% of all LIMF participants (BECo) reporting any positive impact on their billing situation as the result of program participation.

The participant surveys also examined qualitatively perceived non-energy benefits. As part of this study, the multi-family building owners were asked to identify the non-energy benefits of participation with a rating of 1 for no benefit, somewhat improvement received a 2, and 3 for a great deal of improvement. The strongest benefits, as seen by the highest average rating, were found to be:

- How quickly the apartments rent (2.6 of 3);
- The overall condition of the building (2.3 of 3); and
- The comfort of the residences (2.1 of 3).

These building owner-identified non-energy benefits can be used and cited as part of marketing to future building owner participants.

One of the issues of working in multi-family units for low-income programs is what criterion to set for participation. Often, a set percentage of building occupants must be certified low-income for the building to be eligible for building measures, and often only low-income tenants can receive unit-specific measures (such as lighting and refrigerators). In other cases, the criterion for receiving measures is a percentage of low-income tenants occupying the facility and the entire facility is treated. This means that non-public housing can consist of complexes where some buildings can be treated while others can not, or some units treated while others can not. This presents a marketing hurdle in obtaining building owner cooperation and potentially causes "lost opportunities" in terms of maximizing energy savings. Our evaluation suggested that it might be helpful to both low-income citizens in general, and for recruitment of building owners, if a sliding scale was developed for building owner contribution. This scale could focus on treating whole buildings and complexes based upon the percentage of occupants that are low-income. Uniform treatment would be a "selling point" for owners and a sliding scale would allow much higher levels of cost-effective energy efficient investments to be made and, therefore, reduce the above referenced lost opportunities.

In a similar vein, large projects should be negotiated to maximize tenant benefits, energy savings, and owner contributions. This would allow a program to reach the most participants and provide benefits to low-income customers within its budget limitations. (This type of negotiated owner contributions are being used in the low-income program effort in Vermont.) Owner contributions could also be leveraged to provide funding for the non-electric measures while the electric funding supports the electric measures; this allows broader benefits for the participants (to include possible non-energy benefits) while maintaining the highest relationship between electric funding and electric measures.

Both of the suggestions involving sliding scales and owner negotiations need to be studied carefully to design an effort in a way to ensure that little to no penetration is lost in the process while enabling greater savings and participation. A careful planning effort would need to be undertaken before any action on these recommendations were to be attempted.

The very high usage and retention of common area measures suggest that these are some of the most cost-effective ways to achieve energy efficient usage in low-income housing. Continued examination of the benefits of common area measures to the actual low-income tenants is an appropriate topic for future evaluations. Expansion of common area measures, given high usage and retention, may then be considered an appropriate consideration for program improvements in the future.

The Need for Sector-Specific Programs

The Massachusetts Restructuring Act of 1997 required that low-income energy efficiency efforts include close coordination with local CAP agencies. Both the BECo and ComElectric programs were contracted to one lead CAP agency that then subcontracted to other CAP agencies in their respective areas to ensure coordination with other CAP-provided services. The various interviews indicate that these arrangements are working well. It appears that their ability to work well, at least partially stems from flexibility among key players in designing a relationship specific to the capabilities of each of the CAP agencies involved. In some cases, arrangements have been made to subcontract with CAPs to provide auditor-only services. In other cases, additional CAP agency administrative and management assistance is provided. There are a large number of actors involved in program implementation. The program success felt by all those interviewed and the customer satisfaction levels seen could not occur without significant and effective work at establishing well-defined roles that fit the capabilities of each of the organizations involved.

This process evaluation also looked at several issues to provide information for consideration of whether, and in what format, a potential uniform statewide low-income program should be considered by the Low-Income Energy Affordability Network (LEAN) (formed by the Massachusetts Community Action Program Directors Association, Inc.). We also examined and asked all the interviewees whether there should be a separate program for each housing sector (single family 1-4 unit dwellings, multi-family as five or more unit dwellings, and new construction).

Overall, those involved with the programs wanted the work with low-income customers and the low-income community to look like one program. At the same time, maintaining the distinction between the sectors (single family 1-4 dwellings, multi-family, new construction) was identified as being important, at least for program marketing purposes. The issues involved in targeting, marketing, and working with multi-family building owners and new low-income housing construction entities are quite different than those found in the single family sector. Because of the complexity of the relationships and training that must be developed in the LIMF and LINC sectors, distinct program processes and plans were felt to be required. The multi-family sector (five units or more) requires a marketing effort aimed at apartment owners and housing authorities, which is quite different than marketing directly to low-income customers and working with local social service entities. Even within some sectors there are differences that must be taken into account. For example, the low-income new construction effort must provide outreach, training, education, and program coordination to large low-income rehabilitation projects, Habitat for Humanity efforts, and local affordable housing efforts while also working with (and as a subset of) the ENERGY STAR® Home Program. Given the diversity found across and within sectors, the evaluation confirmed that these differences warrant three separate but coordinated and interactive programs for the three sectors: LISF, LIMF, and LINC. The three programs could operate more efficiently as separate entities and be made into a more coordinated effort with the following suggestions:

- 1) As the mission statements, goals and objectives for the three programs are refined and better imparted to program implementers, all three should have overlapping mission statements and clearly state that the utilities, state and federal programs (WAP), and CAP agencies have programs designed to assist low-income customers with their energy usage and bills whether they live in single family homes, apartments, or public housing.
- 2) Training and workshops were suggested. These could include a brief overview of the three programs and their similarities and differences. Many of the LISF-only implementers did not really know of or understand the other efforts. We expect that this would be true for other program staff that may wish to expand their low-income efforts into the large multi-family areas and to new construction. Increasing WAP agency understanding of the programs across the different sectors would not only provide them with better background, but may allow them to refer ideas or projects they see in the other sectors to those assigned to recruit for the multi-family and new construction programs.
- 3) Part of a better understanding of how to optimize the programs in each of these sectors involves creating detailed marketing plans for each sector. The differences in these marketing plans will help clarify where the differences between these programs are important.

Marketing Issues and Recommendations

All three program areas have achieved significant participation levels and energy savings. Particularly noteworthy are the gains made by the newer multi-family and new construction efforts. This in itself shows that the marketing methods used in each of the programs are generally successful. However, many low-income programs around the country, these included, are concerned about their outreach and ability to identify and obtain the more difficult to find low-income customers. This will become a more important issue as the program matures and penetration rates of current efforts increases through the existing lists of potential participants.

The utilities appear to be playing a major role in marketing the LISF programs as 35% of BECo's participants recall having heard about the program through BECo and 33% of participants recall learning about it through ComElectric. The weatherization agencies account another one-third of how participants learn about the LISF program. The LIMF program is marketed to the property owner by the utilities, SMOC, and CSG (for BECo) often via one-on-one meetings, and sometimes by SMOC through tenant recruitment and referrals.

It appears that all programs (LISF, LIMF, and LINC) could benefit from a clear and well-researched marketing plan. This marketing plan could find new ways to attempt to reach other interested parties and disenfranchised low-income customers. Its results would be beneficial to other low-income programs in the state and could help support LEAN's ongoing effort to develop a uniform statewide effort.

The interviews pointed out that reaching disenfranchised low-income customers is one of the largest gaps in outreach. Greater use of social workers, as is being tested in a couple of programs at other utilities, may be useful. As part of the market research, it might be worthwhile to review which local civic agencies are being used and where these efforts can be strengthened. The marketing plan for a low-income new construction effort should also provide for a systematic method of outreach toward those local organizations that look at developing affordable housing in their local communities. Additional work might be beneficial in seeking the disenfranchised through social service agencies, mental health clinics, and areas where they could be transitioning to low-income housing, such as: halfway houses for the mentally ill, the mentally handicapped, homeless shelters, and shelters for

battered women. Investigation of retirement housing may reveal where eligible multi-family low-income retirement homes are located.

Conclusion

All of the NSTAR Electric low-income programs (LISF, LIMF, and LINC) are considered quite successful by all program actors. A significant number of low-income customers are being reached and provided with energy efficiency measures, primarily energy efficient lighting and refrigerators. The participants are quite satisfied with the overall program, with the performance of their CFLs, and with the appearance of the lighting fixtures. Retention of the measures is quite high. Energy savings is, therefore, being achieved and this results in electric bill savings for low-income customers. In fact, about one in every four or five LISF participants has found that though they had difficulty paying their electric bills in the past, they are now more able to pay them.

Overall, all those involved viewed Boston Edison's and ComElectric's low-income programs as very successful. The overall ratings and the quality ratings were seven and above on a scale of one to ten for all three programs. Comments included that the programs were meeting their goals, serving many low-income customers, and that their performance has improved over time. They also recognized, however, that the programs had room for improvement in coordination, communication, outreach, finding the hard-to-find low-income population, and serving the customers with a greater levels of services.

There are many low-income energy efficiency programs operated across the U.S. with support via utility or public benefit funding from utility bill charges. Few, however, work through or this closely with, the local Weatherization Assistance Program (WAP). This arrangement appears quite workable and offers the advantage of utilizing agencies that generally know at least the single family low-income customers. They also provide the opportunity to expand and leverage the services offered to low-income customers in a less confusing manner and with less hassle to the customers.

The differences between the three sectors were found to be important. These differences are seen to continue the need for three separate but well-coordinated programs. Marketing may be significantly different for the three sectors and would involve differences in the type and nature of relationships aimed at on-going program recruitment, education and training, and in targeting and marketing methods. At the same time, the sector programs must work together with similar goals and objectives to appear as one effort to low-income customers and the low-income community so as to minimize confusion and maximize participation and assistance.

One of the issues involved in working in multi-family units for low-income programs is what criterion to set for participation. Often, a set percentage of building occupants must be low-income in order to qualify, or only low-income tenants can receive measures. This also means that non-public housing can consist of complexes where some buildings can be treated while others can not, or some units are treated while others can not be treated. This presents a marketing hurdle in obtaining building owner cooperation. It also potentially loses significant cost-effective energy savings. This evaluation suggested that it might be helpful to both low-income citizens in general, and in recruiting building owners, if a sliding scale was developed for building owner contribution. This scale could focus on treating whole buildings and complexes based upon the percentage of occupants that are low-income. Uniform treatment would be a "selling point" for owners, and a sliding scale can allow much higher levels of cost-effective energy efficient investments to be made thereby reducing lost opportunities. In a similar vein, large projects should be negotiated to maximize tenant benefits, energy savings, and owner contributions. This can allow the program to reach the most participants and provide the

greatest benefits to low-income customers within its budget limitations. Owner contributions could also be leveraged to provide funding for the non-electric measures while the electric funding supports the electric measures; this allows broader benefits for the participants (to include possible non-energy benefits) while maintaining the highest relationship between electric funding and electric measures. Nevertheless, conducting a program such as this requires experienced professionals implementing negotiations in a way that can ensure little to no penetration is lost in the process while enabling greater savings and participation because of this increased flexibility.

References

Megdal & Associates. *Process Evaluations of NSTAR's Low-Income Programs*, produced for the NSTAR Services Company, with B&B Resources, Inc., Delta Technologies (wholly owned subsidiary of GDS Associates, Inc.), MHM Consulting, and Quick Test Opinion Research Center, Inc. July 28, 2000 (with revisions of July 31, 2000).