Understanding the Complex Components of Community-Based Energy Efficiency Programs: A Study of Two Massachusetts Programs

A thesis

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Abstract

In recent years, a variety of stakeholders have recognized the role that energy efficiency can play in tackling energy, economic and climate change crises. This recognition has evolved into a growing interest in understanding the necessary elements for increasing energy savings and participation in energy efficiency programs. This thesis explores recent interest in residential programs that have "community" elements. It analyzes two Massachusetts community efficiency programs to understand how community energy efficiency programs are designed, developed, and implemented. Comparing the programs highlights the complex components of community efficiency programs. Further, such a comparison exposes the need for energy efficiency stakeholders to produce more in-depth, detailed descriptions and program evaluations of community efficiency programs. Lastly, this thesis argues that program partners need to be better prepared to address a variety of challenges that often impede a community program from increasing program participation and energy savings.

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Chapter 1 – Introduction

In recent years, a variety of stakeholders including municipalities, states, the federal government, utilities, businesses and nongovernmental organizations have recognized the role that energy efficiency can play in tackling energy, economic and climate change crises. This recognition has evolved into a growing interest in scaling-up energy efficiency efforts in U.S. buildings, particularly in the residential sector, which accounts for one-fifth of total primary energy consumption in the U.S. (U.S. Energy Information Administration, 2005).

During the 1970s and 1980s, American utility companies typically ran simple incentive-based residential energy efficiency programs. Although many of today's residential energy efficiency programs continue to operate similar programs, a new wave of energy efficiency programs has emerged. These programs seek to integrate a new, people-focused perspective into the development and implementation of residential energy efficiency programs. This new generation of programs accounts for the economic and technical aspects of energy consumption and also considers the behavioral and social aspects of energy use. These programs test a range of strategies informed by behavioral science and social science research, such as information feedback, community mobilization and segmented marketing, to increase energy efficiency efforts in the residential sector.

Many stakeholders in the energy efficiency field argue that developing a program that uses multifaceted approaches to achieve energy savings is necessary

to scale up energy efficiency to levels that can adequately address energy and climate challenges (Fuller et al., 2010). While there has been little evaluation of this new generation of energy efficiency programs, recent studies highlight how the integration of behavioral and educational strategies into program designs can help increase energy savings (Farnsworth, 2010).

The growing demand for comprehensive approaches to residential energy efficiency programs highlights a significant shift emerging in the energy efficiency field. With current energy efficiency programs penetrating only 2% of the target population, program administrators are experiencing increased pressure to consider how local contexts can influence the performance of an energy efficiency program (Michaels, 2009, p.9). As Lawrence Berkeley Laboratory suggests, in the future, "effective programs will tend to be tailored to the location, thoughtfully researched and piloted, personalized to the target audience, and more labor-intensive than simple incentive programs" (Fuller et al., 2010, p.67). Therefore, to maximize residential energy efficiency efforts, it is important for program administrators, whether they are utilities, government bodies, or private institutions, to build upon lessons learned from existing programs.

The goal of this thesis is to offer new insight into the complexities of residential energy efficiency programs. It explores the development and implementation of programs that have community elements by asking: *How are community energy efficiency programs designed, developed and implemented?* Developing a more nuanced understanding of how different types of community programs develop goals and tackle challenges, while dealing with situational

politics and stakeholder power dynamics, will be particularly useful for future program administrators who are interested in developing similar programs. Working under the theory that community efficiency programs have varying goals, designs, and outcomes, this thesis seeks to answer the following questions:

- *What are community efficiency programs? How is community defined? What are the community components of these programs?*
- *In what contexts do community efficiency programs arise? What are the priorities and goals of these programs?*
- *What roles do community groups and residents play in community efficiency programs?*
- *What are the politics and stakeholder dynamics that arise in a given program?*
- *What are the challenges and barriers faced by community efficiency programs?*
- *What are the impacts and/or results of community programs?*

To answer these questions, this thesis reviews relevant literature and presents case studies of two community efficiency programs. The literature review presents an overview of the energy efficiency field and provides context for the emergence of community programs. The case studies presented explore two examples of community-based energy efficiency programs: the Marshfield Energy Challenge in Marshfield, Massachusetts and the Community Mobilization Initiative in New Bedford, Massachusetts.

The complex components of community efficiency programs exposed in the analysis of the two case studies highlights how "community" can be incorporated into residential efficiency programs in a variety of ways. It also reveals the potential benefits and value of such an approach. The Marshfield Energy Challenge shows that a marketing campaign with a community theme can be effective in increasing participation in efficiency programs. In contrast, the New Bedford Community Mobilization Initiative illustrates how using local community members to conduct door-to-door outreach can also effectively increase program participation. Further, both programs show how building partnerships between community representatives and traditional efficiency program partners can create benefits that go beyond energy savings, such as generating local jobs and increasing interest in future community energy efforts.

As the popularity of community efficiency programs grows, the energy efficiency field must distinguish among different visions of community efficiency programs. The Marshfield Energy Challenge and the New Bedford Community Mobilization Initiative offer two compelling stories of community efficiency programs to help inform how stakeholders should approach similar programs in the future.

Chapter 2 – Methodology

As an exploratory research project on program development and process, this thesis does not attempt to reach definitive conclusions about the importance or cost-effectiveness of community efficiency programs. Instead, this thesis attempts to go beyond how best practices literature and process and impact program evaluations describe community efficiency programs by detailing two such programs. Prevalent literature on the subject matter typically does not include detailed descriptions of a program's history, stakeholder dynamics, and partner perspectives.

Methodology Selection

Robert Yin (1994) argues that conducting case studies as a research method should be used to answer "how" and "why" questions, since "how" and "why" questions typically seek to understand situations over time, as opposed to merely the frequencies or incidences of situations. The over-arching research question for this thesis: *How are community efficiency programs designed, developed and implemented?*, requires an in-depth investigation into the development and operation of community efficiency programs. Therefore, conducting case studies, instead of other types of research strategies, such as experiments and surveys, was the most appropriate research strategy for this thesis.

Selection of Case Studies

Sharan Merriam (2009) argues that the nature of qualitative case study analysis demands the use of non-probability sampling, as opposed to probability sampling.[1] Merriam suggests that because qualitative case study analysis is concerned with answering questions regarding how a process works or unfolds, using probability sampling is not useful or appropriate (p.77). Instead, Merriam suggests that researchers use the most popular type of non-probability sampling, purposive or purposeful sampling. Purposive or purposeful sampling encourages analysts to pick case studies that are "information-rich" (Merriam, p.77). This method is based "on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (Merriam, p.77).

The first step in purposive sampling is to determine the selection criteria used for case selection. Given this thesis' goal of understating how community efficiency programs are designed, developed and implemented, the following criteria were deemed important for selecting programs for the case studies. First, the programs examined had to have at least one "community" element. Second, the programs needed to be in locations that were easily accessible for interview purposes.

The second step in purposive sampling is to determine which type of purposive sampling to employ. Common purposive sampling types include: typical, unique, maximum variation, convenience, and snowball or chain

[1] Probability sampling allows the analyst to generalize study results from the study's sample to the population from which the sample was drawn.

sampling (Merriam, p.78). Aspects of snowball/chain sampling, unique sampling, and maximum variation sampling were used for this thesis. Snowball or chain sampling is the most common form of purposeful sampling. It involves locating relevant organizations and experts who are knowledgeable about a given research topic and using these contacts to get referrals for potential cases to study. The snowball sampling method was used to locate relevant organizations, experts, and literatures to determine which residential energy efficiency programs would be the most useful to study.

Unique sampling is used when one is interested in studying a unique or atypical attribute or occurrence (Merriam, p.78). For this thesis, having a community approach was the unique attribute that was used to identify programs to study, since most energy efficiency programs across the country do not incorporate community approaches. Unique sampling was used to narrow down which energy efficiency programs collected through the snowball sampling would be appropriate to study. Lastly, maximum variation sampling is used when one is identifying and seeking out cases that represent the widest possible range of the characteristic of interest for a study (p.79). Since this thesis aims to show the different ways in which efficiency programs have community components, maximum variation sampling was used to identify and select two programs that had a wide range of variation in terms of program operation and community approaches. Given the goal to create detailed case studies, as well as research time restraints, two case studies were deemed to be an adequate sample size.

Collection of Data

Primary and secondary sources informed the literature review and preliminary case study research. Primary sources include program websites and reports. Secondary sources include white papers, reports, and articles. The majority of the case study data was collected through semi-structured interviews. Background research using available literature on each case study was used to help formulate interview questions, as well as P. Cristian Gugiu and Liliana Rodriguez-Campos's 2007 "Semi-Structured Interview Protocol for Constructing Logic Models." A list of the case study interviews is provided in Appendix A.

Analysis of Data

When conducting multiple case studies, there are two stages of analysis: the within-case analysis and the cross-case analysis (Merriam, 2009). The first stage of the within-case analysis was done using coding. In this stage, important facts, ideas and themes/patterns in the case study literature and interview transcripts were noted and categorized.

The second stage of the within-case analysis was constructing a logic model for each case study. A logic model is a popular tool in program evaluation. According to the W.K. Kellogg Foundation, "a logic model is a systematic and visual way to present and share your understanding of the relationships among the resources you have to operate your program, the activities you plan, and the changes or results you hope to achieve" (2004, p.1). For the purpose of this research project, logic models were useful for organizing the case study data in a

way that helped identify program processes, stakeholder dynamics and discrepancies in the data collected, as well as to facilitate a comparison of the two programs. The logic models were developed using the information gathered from interviews and written material sources. Each logic model has seven components: (1) program situation; (2) program priorities; (3) program assumptions; (4) program external factors; (5) program inputs; (6) program outputs; and (7) program outcomes.

Once each case study was analyzed, a cross-case analysis was completed to answer the research questions presented in Chapter 1. The findings from the within and cross-case analyses ultimately informed the conclusions and recommendations of the thesis.

Chapter 3 – The Evolution of Energy Efficiency Programs

An Introduction to Energy Efficiency

Discussions about energy often fail to differentiate between *energy efficiency* and *energy conservation*. While both energy efficiency and energy conservation fundamentally aim to reduce overall energy use, energy efficiency is generally defined as a process that uses technology to reduce energy use for a given service or activity (e.g., the installation of more efficient heating systems, lighting, etc.). In contrast, energy conservation is a process that reduces energy consumption by means of behavioral changes (e.g., using energy services or activities less) (Schellenberg, 2010).

Prior to the 1973 OPEC oil embargo, energy policy and popular notions about energy consumption in the U.S. centered around two assumptions: (1) available energy supply was out-pacing energy demand; and (2) energy prices would continue to fall (Wulfinghoff, n.d.). Furthermore, energy efficiency was viewed as simply a "technical aspect of designing equipment, systems, and buildings" (Wulfinghoff, n.d., p.4). However, as a result of the 1973 energy crisis, Americans began to recognize that the supply of available energy sources would no longer sustain the country's increasing energy demands. Therefore, it was necessary to consider ways to reduce energy demand. Alan Meier, the Associate Director of the U.C. Davis Energy Efficiency Center, describes this emergence of the so-called "golden age of energy efficiency," where in "less than a decade, the foundations of energy efficiency were laid. The basic concepts, the new

technologies, and the policies were put in place to encourage demand-side reductions" (U.C. Davis Energy Efficiency Center, 2008).

Following the passage of the National Energy Conservation Act of 1978, utility demand-side management (DSM) programs began to emerge across the country. The act required utilities to offer residential customers on-site energy audits at no cost. Over the past thirty years, DSM programs have varied by state and utility due to differing regulatory conditions. In general, most utility DSM programs aim to reduce customer energy consumption by offering incentives, providing customers direct assistance through weatherization programs, and/or using demand response techniques to control energy use (Masters & Randolph, 2008).

In the late 1980s and early 1990s, many utility programs expanded DSM programs as a result of state regulators offering incentives and mandates for integrated resource planning. Utilities were asked to consider supply-side, as well as demand-side options, for future resource planning. This expansion was also influenced by the fact that people began to realize the limitations and vulnerabilities of traditional energy sources. Further, new notions concerning energy consumption became popular, such as Amory Lovins' "negawatts" idea, which viewed energy efficiency as a type of energy resource.

Despite this favorable context for DSM programs, regulated utilities, particularly investor-owned utilities, have traditionally had little incentive to invest in DSM programs, since they earn profits from the sale of energy. In some cases, regulatory agencies have tried to overcome this conflict by decoupling

profits from sales.[2] Some states that have restructured or partially deregulated utilities, such as Massachusetts, have public benefit charges, where a small per-kilowatt-hour surcharge is added to utility rates. The resulting revenue is used to pay for renewable energy, low-income, and energy efficiency programs (Masters & Randolph, 2008).

Traditional Approaches to Energy Efficiency

Research on the evolution of U.S. energy policy and planning reveals that the energy field has traditionally focused on the technical aspects of energy efficiency rather than the social and behavioral dimensions of energy consumption. In his 1993 article "Social and Behavioral Aspects of Energy Use," Loren Lutzenhiser argues that studies of how "social and technical processes produce growth and decline in energy demand [have] focused almost entirely on the physical characteristics of buildings and appliances, and on the aggregate effects of rising energy prices" (1993, p.248). Lutzenhiser suggests that this focus arose from the physical-technical-economic model (PTEM) of energy consumption that "dominates energy analysis, particularly in energy demand forecasting and policy planning" (1993, p.248).

According to Lutzenhiser (1993), the PTEM approach or paradigm makes the following assumptions:

1. There are typical consumer patterns of energy consumption and technology use;
2. Building technology efficiencies are the most important aspect of energy

[2] As of 2008, 28 states have adopted or have pending electric and/or gas utility decoupling (Natural Resources Defense Council, 2009).

use, and human behavior is considered to be secondary;

3. Changes in energy demand, either growth or decline, result primarily from technology changes (i.e., building and equipment changes) and these technology changes "depend rather systematically upon 'the cost of energy relative to consumer income, as weighted by the priorities of the consumer for services, convenience, comfort and time' " (p.248).

Michael Sullivan, an energy researcher and consultant, also adds that the PTEM approach operates under the assumption that consumers use an economic rational decision-making process when they choose energy technologies (2009, p.3). Sullivan explains that efficiency programs developed under the PTEM paradigm have primarily sought (1) to improve consumers' awareness of the availability and performance of energy efficiency technologies and (2) to reduce the costs of selecting energy efficiency technologies by providing economic incentives, such as loans and rebates (2009, p.3). While Lutzenhiser et al. (2009) emphasize that "it is very important to recognize that the PTEM approach is not simply 'old thinking,' but represents a foundational formulation that has been, and continues to be, deeply rooted in…regulatory policy and practice," Sullivan notes that "for some years, analysts, policy makers and program planners have been aware of the lack of consumer response to energy efficiency programs based on information and incentives" (Lutzenhiser et al, 2009, p.12-13; Sullivan, 2009, p.3).

In his 1992 article on DSM programs, Steven Nadel of the American Council for an Energy-Efficiency Economy (ACEEE), a nonprofit organization

that conducts research on a range of energy efficiency issues, highlights several problems with past DSM efforts, including the "over-reliance on traditional program approaches" (p. 524). Nadel highlights the limits of these programs' outreach approaches and describes how the most common types of DSM programs (i.e., information, rebate, and load management programs) "usually have low participation rates and savings per customer, for reasons including inadequate marketing, limited technical assistance, limited measures included in programs, and low incentives" (p.524). Further, Nadel notes how popular marketing strategies, such as direct mail and bill inserts, have had "only limited impact" (p.524). Whereas, "more effective strategies, such as personal one-on-one and intensive community-based marketing strategies (going door-to-door in a targeted community), are employed less often" by DSM programs (p.524).

Nadel describes energy audit programs as "the most common type of [DSM] information program." He references an evaluation of the federally mandated Residential Conservation Service (RCS) program to highlight the achievements of residential audit programs. Looking at the success of audit programs six years after the RCS program was instituted, the evaluation found that approximately 7% of eligible customers participated in audit programs and that audited households saw an average net savings of 3% to 5%. Nadel notes that programs with higher participation rates and savings typically had "a high degree of state and utility commitment to the program, the provision of financial assistance, and assistance arranging measure installation" (p.524).

For residential rebate programs, Nadel finds that achievements varied

depending on program requirements. For example, Nadel describes how:

> If eligibility levels are too low, then a high proportion of available models qualify for rebates, which results in high gross participation rates, high free riders, and low savings per rebate (due to the influence of free riders and to the fact that eligible appliances are only slightly more efficient than the average appliance). These problems have plagued a number of appliance rebate programs (p.516).

In response to these findings that highlight the limits of traditional efficiency programs, stakeholders have sought to expose the importance of the non-economic influences on energy use and to promote creative approaches to the design and implementation of efficiency programs.

The Social and Behavioral Aspects of Energy Use

Since the 1970s, a group of social scientists, including anthropologists, behavioral economists, psychologists, and sociologists, have criticized the energy field's lack of attention to the social and behavioral aspects of energy use. These researchers have developed a body of literature that analyzes the energy field's conventional assumptions about consumer behavior and suggests alternative ways of thinking about, defining, and developing energy efficiency programs.

These researchers argue that complex decision-making processes guide energy choices and cannot be described using a simple rational-economic model. For example, in their ethnographic analysis of the informal measurement techniques employed by those making decisions concerning residential energy use, referred to as "folk quantification," Willett Kempton and Laura Montgomery (1982) found that peoples' reasoning in everyday decision-making about energy conservation often leads to inefficient energy practices. When Kempton and

Montgomery asked interviewees to calculate their consumption of natural gas over the past three years, even though many interviewees were aware "of the relationship between consumption, unit price, and billed cost," interviewees for the most part used dollars to compare annual energy use, instead of hundreds of cubic feet (Ccfs), the meter measurement for natural gas consumption (p.820). Kempton and Montgomery found that this dollar comparison failed to accurately reflect the changes in energy consumption over the three-year period (p.820). While using dollar measurements does not accurately measure consumption, they also note how "dollar measurements…offer advantages in household management" because such measurements enable consumers to directly compare energy consumption to other living expenses (p.820).

When Kempton and Montgomery compared a "folk quantification" model for calculating payback of energy efficiency investments to an energy expert's method for computing payback, they found that the folk model is biased against cost-effective energy investments for several types of cost-effective measures. This is because the "folk quantification model overestimates payback periods" (p. 826). Kempton and Montgomery conclude that individuals are "systematically biased in ways that impede energy conservation more so than would be expected by an economically rational response to price" (p.826).

Researchers also point to heuristic decision-making models to explain how and why consumer behavior is not always economically rational. Heuristics are strategies that influence a person's decision-making process (i.e., rules of thumb). Sullivan argues that consumers use different decision-making heuristics

depending on the situation, the framing of a particular problem, and cultural and societal norms. According to Sullivan, decision-making heuristics include:

1. Bounded rationality (rational but limited by information-gathering costs)
2. Elimination by aspects[3] (rational but not based on compensatory evaluation[4])
3. Association (e.g. automobile features and self image)
4. Conformity (e.g. fashion items)
5. Dissonance reduction (consumers may adopt decisions that cognitively fit with the rest of their self-image and reject those that do not)
6. Altruism (consumers sometimes make decisions that are not necessarily in their individual interests, but benefit others or the society as a whole) (Sullivan, 2009, p.12).

Sullivan suggests that focusing only on the economic costs and benefits of energy efficiency decisions may reduce the effectiveness of an efficiency program's marketing efforts. He notes, "there have been few systematic efforts to employ techniques designed to get consumers to invoke different decision making heuristics by energy efficiency program developers" (p.12). Sullivan asserts that while it is unclear how effective such efforts would be, the success of such efforts in other forms of marketing suggests that efficiency programs would benefit from considering the different types of decision-making heuristics. "Green" advertising

[3] According to Reynald-Alexandre Laurent, elimination by aspects is "a heuristic followed by decision makers during a process of sequential choice and which constitutes a good balance between the cost of a decision and its quality. At each stage of decision, the individuals eliminate all the options not having an expected given attribute, until only one option remains" (2006, p. 1).

[4] According to Lorraine Lee and Rita Anderson, "compensatory decision making involves identifying a set of attributes applicable to the decision, assigning a relative importance or weight to each attribute, computing an overall score for each option based on the attribute weight, and selecting the option with the best score" (2009, p.114).

campaigns for consumer products, such as automobiles, are examples in which the marketing strategy is informed by heuristics other than economic rationality (Sullivan, 2009, p.13).

In their 1985 anthropological study analyzing energy decision-making and weatherization in Santa Cruz County, California, Richard Wilk and Harold Wilhite found that social status and visibility of energy efficiency technology influenced behaviors regarding energy use more than financial returns on investments. While homeowners were clearly interested in monetary savings related to weatherization, they were as interested in other issues related to their homes, such as creating a safe and secure home, self-reliance, anger towards utility companies, and preserving natural resources (Wilk & Wilhite, p.628). Based on these findings, Wilk and Wilhite suggest one reason why weatherization is so unpopular is because people believe weatherization is not the best measure to address non-monetary household goals (p.628).

Energy consumption choices are often influenced by many factors outside the individual, including household demographics, cultural backgrounds and local social influences. For example, while examining residential energy use in Santa Cruz County, Wilk found several "cultural explanations" for why residents act against their economic interest (Wilk & Cliggett, 2007, p.178). These cultural explanations include: (1) people fail to accurately measure energy use and the cost of energy use; (2) people associate certain air temperatures in the house to certain

levels of comfort; and (3) people believe weatherization is a messy or "dirty'' job (Wilk & Cliggett, 2007, p.178).[5]

Additionally, Wilk indicates the importance of cultural categories, which describe how people categorize their world. When Wilk talked to interviewees about categorizing household activities and asked them how they categorize weatherization, Wilk found that "one reason people were so uncomfortable about weatherization was that it did not fit into any cultural category"; respondents were unable to determine whether weatherization was a type of home maintenance, a repair, or an improvement (Wilk & Cliggett, 2007, p.179). Wilhite's 2005 article further illustrates how culture shapes energy use. Wilhite describes how Norwegians consider interior lighting to be an important cultural aesthetic. The desire to creating a particular ambience through lighting is one condition that contributes to why the country has the highest per capita energy use for lighting in the world.

Studies of the organizational spheres beyond the individual and household reveal that institutions such as neighborhoods, social networks, and community groups also influence consumer choices and behaviors related to energy use (Lutzenhiser et al. 2009, p.29). Hunt Allcott's analysis of a large-scale energy conservation pilot program reveals how "non-price 'nudges' substantially affect consumer behavior" (Allcott, 2010, p.1). The program, which was operated by the company OPOWER on behalf of a Minnesota utility, was designed to determine

[5] Wilk does not explain why he categorizes these explanations as cultural, although he does make clear that as an anthropologist, his first goal is to understand the way culture could explain the residents' behavior. It is possible that, while Wilk may acknowledge that there are other reasons for such explanations, such as incomplete information, he may argue that these reasons emerge from cultural conditions.

how home energy reports sent to residential utility customers would affect behavioral changes regarding energy use.[6] In his econometric analysis of the Minnesota program, which compared households that received the OPOWER report and households that did not, Alcott found that social influences at the local level (i.e., sending households individualized reports that compare neighborhood energy use) can influence behavioral changes in energy use (2010).

Lastly, researchers indicate there are several factors that influence the extent to which information and education changes behavior and energy use. For example, Paul Stern's review of trends in policy analysis of energy use explains that while consumers often have incorrect ideas and information about energy, as was revealed in Wilk and Wilhite's Santa Cruz research, providing accurate information to overcome such misinformation does not always change peoples' understandings and behaviors (1986, p.204). As Stern (1986) describes:

> Information is multidimensional. It is a product of a social process rather than a property of goods, labels, pamphlets, and the like. Because of this, people's responses to energy information depend not only on its availability and completeness, but on how it is presented, how information users interact with information sources, their trust in those sources, and the confirming or conflicting information that comes from friends and associates (p.206).

Social psychologists have developed certain ideas about when information is more likely to affect behavior. Referencing studies of behavior, Stern argues that people are more likely to change behavior if the information is "specific, vivid and personalized " (1986, p.205). Further, Stern suggests that paying

[6] The report has two key features. The first feature provides detailed information on a home's energy use and provides energy conservation tips specific to a particular household. The second feature of the report compares the energy consumption of the household to the energy consumption of households of similar size in neighboring locations.

attention to the format of information, how the information is displayed or conveyed, and the sources of information all affect the efficacy of changing behaviors regarding energy use.

A 1980 study on energy conservation in Massachusetts examined the relationship between peoples' pro-conservation attitudes and pro-conservation behaviors revealed that as the number and intensity of barriers to reduce energy consumption increase, people's attitudes and beliefs about energy conservation are less likely to predict behavior changes. Stern argues these findings help explain why "education efforts to change environmental attitudes and beliefs generally have little effect on behavior" (Gardner & Stern, 1996, p.76). Yet, because attitudes are more likely to change behaviors when large barriers to action are eradicated, such as costs, Stern suggests that education efforts to change energy use behaviors can be effective if large barriers are eliminated (Gardner & Stern, 1996, p.76).

Evolving Visions For Energy Efficiency Programs

While traditional efficiency programs provided basic information and incentives to enhance customer participation, there have also been instances of more innovative efficiency programs. In their 1992 report, Nadel et al. examine the participation rate in a variety of efficiency programs in the residential, commercial, and industrial sectors.[7] In their review of comprehensive weatherization programs, Nadel et al. found that programs with "the highest participation rates have generally been achieved by community-based programs"

[7] Participation rate is defined in this paper as participating customers divided by number of eligible customers.

(p.11). Nadel et al. discuss two such programs that were extremely successful: the Hood River Conservation Project in Hood River, Oregon and the Espanola Power Savers Project in Espanola, Ontario. These programs achieved participation rates of 85% to 87% over a 1.5 to 3 year period. Important characteristic of both programs include: the targeting of a single community, the installation of efficiency measures that were at no cost to the customer, the use of community-based marketing through, among other things, local media and town events (p.11).

The Eugene Water & Electricity Board (EWEB) Comprehensive Weatherization program is another example of a successful comprehensive weatherization program. This program was part of the broader Bonneville Power Administration (BPA) Residential Weatherization program. BPA initially paid 80% of the weatherization costs. However, over time, BPA paid on average 58% of weatherization costs. Over a ten-year period, the BPA program achieved a 58% participation rate over ten years. In contrast, the EWEB's participation rate was 70%. According to Nadel et al., "BPA staff attribute the high participation rate for the region-wide program, despite very low electricity rates, to high incentives and an environmental ethic throughout the region" (p.12).

Despite these success rates, it is important to note that current energy efficiency programs penetrate only 2% of the target population (Michaels, 2009, p.9). Nevertheless, these programs illustrate how comprehensive services, the footing of the majority of weatherization costs, and interest in environmental issues all influence a program's participation rate.

The insights gained concerning the social and behavioral aspects of energy use have motivated many energy efficiency stakeholders to take an interest in reforming and expanding energy efficiency programs through innovative design and implementation approaches. For example, as Michael Sullivan (2009) notes in his analysis of the behavioral assumptions underlying California's utility energy efficiency business programs:

> The next generation of [the utility PG&E's] energy efficiency programs…is a far cry from the generation of energy efficiency programs that were focused primarily on trying to motivate customers to install selected energy efficiency measures by providing information and incentives. These programs have been carefully crafted to respond to known market barriers and to some extent the behavioral factors that influence organizational decision making (p. 28-29).

Sullivan concludes that it is still unclear how PG&E's new generation of efficiency programs will ultimately play out. However, PG&E's interest in designing programs that go beyond the traditional, piecemeal, incentive-focused approach to efficiency represents a significant transformation currently taking place in the efficiency field.

The Behavior Energy and Climate Change (BECC) Conference further exemplifies the recent interest in new types of efficiency programs. With the goal of "understanding the nature of individual and organizational behavior and decision making, and using that knowledge to accelerate our transition to an energy-efficient and low carbon economy," the BECC conferences "bring together a diverse group of policymakers, social scientists, program implementers, media, and energy experts to explore the practical application of social and behavioral insights to address our energy and climate challenges" (BECC). More

than 650 participants convened in 2010 at the fourth annual conference, which focused on examining how residential energy efficiency programs could use lessons from social and behavioral science to become more successful.[8]

In addition to the BECC conferences, energy efficiency nonprofit organizations, research think tanks, academic researchers, government bodies, and even utilities have generated a body of literature that addresses the evolution of residential energy efficiency programs. Several reports have been released in the last several years describing energy efficiency program case studies and best practices. These publications highlight the increasing attention given to innovative design and implementation approaches.

In 2008, ACEEE released its "Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from Across the U.S." This publication reviewed "exemplary" energy efficiency programs in the residential, commercial and industrial sectors. The common features of "exemplary" programs include: (1) program cost-effectiveness; (2) personal contacts established by program representatives with customers; (3) comprehensive services; (4) collaboration among stakeholders, program participants and program administrators; and (5) innovation regarding new approaches, promoting new technologies, targeting customer segments that have traditionally not been well-served by past programs, and finding ways to achieve deeper energy savings (Kushler, Witte, & York, 2008).

[8] The 2010 BECC conference topics included: Behavior of People in Buildings; Social Norms; Community-Based Social Marketing; Guilt & Identity; Responses to Feedback; Social Media and Networks; and Smart Incentives. Although these topics are diverse in terms of how they address various aspects of energy efficiency programs, all approaches stem from ideas about the social and behavioral aspects of energy use.

In its 2010 "Driving Demand for Home Energy Improvements" report, Lawrence Berkeley National Laboratory examines fourteen residential energy efficiency programs. The report informs policymakers and program designers of the lessons and best practices learned from successful residential energy efficiency programs. Some of the key lessons highlighted in the report include: (1) programs should sell something people want (e.g., comfort, safety, community cohesion); (2) messaging must be tailored to the target population; (3) programs need to have "a local face, with buy-in from community leaders"; (4) program messaging/language should "tap into customers' existing mental frames" (i.e., use vivid and personalized examples to help customers understand what the work is and why it is important that it is done); (5) contractors must make good impressions to homeowners; (6) potential customers should be exposed to program message at least three times; (7) programs should "offer seamless, streamlined services"; (8) incentives must motivate customers to invest in efficiency improvements; and (9) pilot strategies should be tested before full-scale programs are launched (Fuller et al., p. 2-3).

In 2010, the Consortium for Energy Efficiency (CEE), a non-profit organization with energy efficiency program administrator members from across the United States and Canada, released its "Existing Homes Program Guide." This guide instructs members how to design effective residential programs. Arguing that program administrators must have "an understanding of what program approaches and strategies have been tried before, in what circumstances, and with what level of success," the CEE guide identifies what it found to be important

energy efficiency program elements (Foster, 2010, p.5). These elements included: identifying potential customers, particularly high users; ensuring capacity and capability of workforce; working with trade allies; reducing financial barriers through financing and incentives; motivating consumer action through specific marketing techniques; and verifying savings.

Community Energy Efficiency Programs

While the best practices and case study literature on residential energy efficiency programs suggest that there are several elements necessary to improve a program's participation and energy savings success, the importance of understanding a potential customer's interests and needs and developing collaborative stakeholder relationships are consistently emphasized. These program elements often are part of a broader recommendation for energy efficiency programs that advises some type of "community" component(s).

Harvey Michaels, the Director of Energy Efficiency Strategy Research at Massachusetts Institute of Technology, describes how "recent dramatic changes in legislation and funding sources for [energy efficiency] require that utilities, municipalities and states…re-examine their respective strategies and roles in the implementation of [energy efficiency] programs" (2009, p.18). It is in this context that people are beginning to believe that "achieving deep efficiency deployment might be achievable with a collective action commitment by communities, aided by targeted services, information tools and financial resources" (Michaels, 2009, p.9).

Penni Conner, the Vice President of Communications at NSTAR, describes this new trend in efficiency programs in *Electric Light and Power* magazine:

> Communities increasingly are interested in proactively addressing their energy needs. Utilities see this community interest as a key to unlock additional energy savings by tapping into the community spirit. Hence, energy efficiency programs across the country are designing new outreach and delivery models that leverage communities by tapping into the enthusiasm, innovation and resources available there (Conner, 2011a).

A key reason for this growing interest in community efficiency programs is that many stakeholders believe a community approach to efficiency will help overcome barriers to efficiency, such as consumers' lack of trust in utilities, consumers' lack of interest in, and knowledge of, energy efficiency, and consumers' failure to complete all of the steps of an efficiency program (Michaels, 2009; Green For All, 2010). Some also believe that a community approach is necessary to achieve local and national energy and environmental goals. Jim Parks, Lois Wright and Victoria Zavattero suggest:

> Many utilities and their communities are adopting ambitious goals for reducing energy use and helping to address global environmental challenges. Meeting these goals requires a new paradigm: collaboration between the utility, local government agencies, community groups and customers (Parks, Wright, & Zavattero, 2008, p.1).

Another reason stakeholders are interested in community programs is because they believe a collaborative approach will optimize program efficiency and effectiveness. Highlighting the potential benefit of collaboration among stakeholders in a community-based program, Michaels describes how "utilities can provide information, tools, and incentives, while community leaders have the

ability to leverage local networks to reach a broader and more attentive audience" (2009, p.9). In their examination of community-utility coordination, Hannah Carmalt Justus and Dan Schulte argue:

> In order to minimize potential threats and make efforts more strategic, utilities can work in conjunction with local governments and communities. Both utility program planners and community energy leaders will benefit from information that identifies why communities are interested in energy efficiency, highlights the types of initiatives communities are undertaking, and defines key attributes to community-utility coordination (Justus & Schulte, 2010, p.1).

Despite the growing interest in community efficiency programs, it is important to recognize the array of ways in which the energy efficiency field has approached "community" energy efficiency programs. A program that declares itself community-based, or merely uses the word community in its description, gives the impression that the program is concerned with participation, collaboration and/or supporting local interests. Yet, a closer look at so-called "community" programs reveals that these community programs often vary in how they understand, rely upon, and value "community." Because "community" can be defined in a variety of ways, this thesis accepts all broadly understood notions of "community," which include political districts, neighborhoods, groups of people with shared interests, etc.

Community program components can play an important role in efficiency programs because they help define a program's scope. For example, a program that targets a particular location or neighborhood has what can be called a *place-based community* component. Most, if not all, efficiency programs have some type of place-based community component. However, these programs vary with

respect to the degree to which location is essential to achieving program goals. Programs such as the Pratt Center for Community Development's Retrofit NYC Block by Block campaign, NYSERDA's Reduce the Use in District 39 campaign, and the Chicago Region Retrofit Ramp-Up program all use some form of block-by-block or neighborhood-by-neighborhood approach to encourage energy efficiency retrofits (Pratt Center; Gordon, 2010; Chicago Metropolitan Agency for Planning, n.d.).

In addition to using place-based communities to define a program's scope, programs also target *membership-based* and *issue-based* communities. For example, the Retrofit NYC Block by Block campaign works to increase energy efficiency retrofits in low- and moderate-income neighborhoods in New York City through community-based organization outreach and mobilization efforts. Some organizations target place-based communities, meaning they serve those who live in a particular part of New York City. Other organizations target membership-based communities, meaning they seek to help a particular ethnic or cultural group. Further, other groups target issue-based communities, which are groups of individuals that are interested in specific environmental, economic and/or social issues (Pratt Center). Targeting a particular type of community, defined by issue, place, or membership, can be seen as one way efficiency programs can utilize market segmentation in outreach efforts.[9]

[9] Market segmentation is typically used to identify groups of people that are most likely to respond to program outreach. However, market segmentation can also be used to identify characteristics of a particular community that then can be used to develop a customized marketing strategy to target that particular community. See the Lawrence Berkeley National Laboratory's "Driving Demand for Home Energy Improvements" report for examples of how energy efficiency programs use market segmentation.

While the type of community targeted helps define a program's scope and goals, community members often have an important role in program marketing and recruitment efforts. In some programs, the community's role is to be the face and spokesperson for marketing and outreach. Penni Conner of NSTAR refers to this community-centered efficiency program model as "community-based outreach." The community-based outreach model aims "to leverage relationships with community organizations that have influential relationships with the citizens and businesses of a community" (Conner, 2011a). These community relationships are then used to increase public awareness and interest in a program. The Greater Cincinnati Energy Alliance's work in Ohio and Kentucky uses this community approach by inviting volunteers from various community groups to assist with community outreach events and to conduct door-to-door canvassing (BetterBuildings, n.d.). Together We Save, a Milwaukee neighborhood efficiency project, uses neighbor-to-neighbor outreach strategies to increase energy efficiency efforts in two Milwaukee neighborhoods. The program also hired a community-based Energy Advocate to support the residents throughout the efficiency retrofit process (Schauer & Van de Grift, 2010).

Alternatively, some efficiency programs are only interested in leveraging the contacts of established community groups. Energy efficiency programs in Boulder, Colorado and the Chicago Region Retrofit Ramp-Up program are tapping into existing community networks, such as religious institutions and social advocacy groups (U.S. Weatherizing, n.d.; Chicago Metropolitan Agency for Planning, n.d.). The Center for Neighborhood Technology's Energy Savers

program in Chicago is working to leverage connections with the city's builder groups and associations. This community is made up of real estate professionals, financial institutions and property owners. Each of these members has an interest in revitalizing or developing particular local neighborhoods, and therefore are important allies to the Energy Savers program (Stitely, 2011).

In other program variations, the community is also seen as the provider of services. In this program model, a key component of the program is developing and/or supporting a local green jobs workforce. Penni Conner of NSTAR differentiates between "community-based outreach" programs, which use community relationships to deliver program messaging and outreach, and "community mobilization initiative" programs, which she describes as having both community outreach methods and work to develop local green jobs (Conner, 2011b). Believing that "an energy efficient community provides job opportunities for skilled workers," the Greater Cincinnati Energy Alliance is partnering with a range of institutions to ensure that local citizens have the necessary training to acquire the green jobs required to meet demand for retrofit work that is generated by the energy efficiency program (Greater Cincinnati Energy Alliance, n.d.).

With this growing interest in community efficiency programs, a body of literature has emerged that provides recommendations and advice for creating successful community efficiency programs (Berkowitz et al., 2005; Blackwell, Canseco, Dyson, 2008; Action Research, Inc., 2010; Clean Energy Solutions, 2010). Although these guides contain some of the same suggestions, the fact that there are numerous, different conceptualizations and models of the community

approach to efficiency has created a diverse list of proposals for how to design effective community efficiency program.

Further, while the literature on community approaches to efficiency provides insight into the nuances of community programs, this literature often lacks detailed descriptions of the program design process and the politics and power dynamics that play out between program partners. How is "community" defined? How do communities get involved in energy efficiency programs? Do communities want to participate in such programs, and why or why not? What influence and/or power do communities have in the design and implementation of such programs? These essential questions remain largely unanswered in most descriptions and discussions of community efficiency programs.

The Context of Community Efficiency Programs in Massachusetts

To understand a community efficiency program, one must identify the wider context from which the program emerged. Energy efficiency programs in Massachusetts have benefited from a recent surge in support for energy efficiency efforts at both the federal and state level. At the federal level, the American Recovery and Reinvestment Act of 2009 (ARRA) provided $20 billion through the State Energy Program (SEP), the Weatherization Assistance Program (WAP) and the Energy Efficiency and Conservation Block Grant (EECBG) program to support energy efficiency efforts across the country (Black, 2009). Massachusetts has earmarked its $54.9 million of SEP funding to support renewable energy and energy efficiency projects throughout the state (Executive Office of Energy and Environmental Affairs, 2009). Massachusetts is using $125.1 million in ARRA

funding to weatherize approximately 17,000 low-income homes and state public housing developments by 2012 through the WAP program (Commonwealth of Massachusetts, 2011; Mass Resources, n.d.). For the EECBG program, the federal government distributed $14.8 million in direct, population-based grants to 42 Massachusetts cities to support renewable energy and energy efficiency projects (Commonwealth of Massachusetts, 2011; Executive Office of Energy and Environmental Affairs, n.d.).

While these federally funded programs are designed to support a variety of energy pursuits, much of this funding is being used to support community efforts. The BetterBuildings program, the competitive part of the EECBG program, aims to scale-up energy efficiency building retrofits in communities across the country by challenging state and local governments, communities, private businesses and nonprofit organizations to build partnership programs. In addition to the $14.8 million awarded to Massachusetts through the EECBG formula block grants, Massachusetts was also awarded approximately $7.5 million through the BetterBuildings program to pursue these partnerships (U.S. Department of Energy, n.d.). See Appendix B for more information on how ARRA funding was distributed for energy purposes in Massachusetts.

At the state level, Massachusetts is known for having a "successful record of implementing energy efficiency programs for all customer sectors" (ACEEE, 2010). Since the 1980s, natural gas utilities have offered residential energy efficiency programs. In the late 1980s to mid-1990s, through a collaborative process, the state and energy stakeholders developed utility-focused DSM

programs. In 1997, during the restructuring of the state electricity industry, the state established a funding mechanism that required all state-regulated electric utilities to offer energy efficiency programs to their customers (ACEEE, 2010). Between 1980 and 2000, the Massachusetts Residential Conservation Services Program offered educational programs to encourage customers to pursue efficiency upgrades. In 2001, this program was renamed MassSave and was redesigned to offer new services and incentives to encourage efficiency investments (NSTAR et al., 2009).

MassSave currently offers qualifying customers free energy efficiency audits and various energy efficiency incentives and rebates.[10] An impact study report on MassSave explains that "the overarching goal of the program is to deliver non-low-income residential customers with services that are intended to simplify customer participation and provide a 'one-stop shopping' home energy efficiency and renewable energy service" (RLW Analytics, 2008, p.1)

The 2008 Green Communities Act, Massachusetts' comprehensive energy reform bill, also supports efficiency efforts throughout the state. Recognizing the significant impact that energy efficiency can have on reducing greenhouse gas emissions and ensuring that energy demand is met, the act declares energy efficiency to be the state's "first fuel" for meeting its energy needs (Massachusetts Department of Energy Resources). Specifically, this law requires the Massachusetts Department of Public Utilities (DPU) to "ensure that energy

[10] Investor-owned utility gas customers and investor-owned utility electric customers who heat with heating fuel oil can participate in MassSave. These customers pay a system benefit charge on their monthly utility bills that ultimately pays for the MassSave program. Massachusetts residents who pay a municipal utility for natural gas or electricity to heat their homes cannot participate in MassSave. However most, if not all, municipal utilities in Massachusetts, offer their customers some type of home audit/rebate program.

efficiency programs 'are delivered in a cost-effective manner capturing all available efficiency opportunities, minimizing administrative costs to the fullest extent practicable, and utilizing competitive procurement processes to the fullest extent practicable' " (ACEEE, 2010). The Green Communities Act also mandated the DPU to establish the Energy Efficiency Advisory Council, which is charged with working with the state investor-owned utilities to design their three-year energy efficiency plans. The 2010-2012 electric and gas three-year plans filed by Massachusetts investor-owned utilities calls for an annual electrical savings of 2.4% and an annual reduction in retail natural gas sales of 1.15% by 2012 (ACEEE, 2010). See Appendix C for the estimated electricity and gas participants and energy savings for MassSave set out in the 2010-2012 three-year plans.

Massachusetts' long-standing history of energy efficiency programs, its receipt of a significant increase in federal funding for efficiency efforts, and its establishment of the three-year utility efficiency plans formed the platform from which Massachusetts community efficiency programs have sprung, including the two case studies discussed in the following chapters.

Chapter 4 –The Marshfield Energy Challenge

The Marshfield Energy Challenge (MEC) was a residential and commercial energy efficiency and renewable energy pilot program in Marshfield, Massachusetts. The program ran from spring 2008 to fall 2009 and was sponsored by NSTAR Electric & Gas Corporation (NSTAR), the electric utility servicing Marshfield, and by the Massachusetts Technology Collaborative (MTC), a public economic development agency.[11] The MEC built upon the energy efficiency services and incentives that NSTAR already offered its customers through the MassSave program.

The MEC was developed to address increasing electricity demand in Marshfield and to relieve peak loads in the town by using demand-side resources, including energy efficiency, renewable energy, and direct load control (Rocky Mountain Institute et al. [RMI], 2007). Several strategies were implemented to encourage Marshfield residents and business owners to reduce their overall energy consumption by participating in NSTAR energy efficiency and renewable energy programs. A major component of the MEC was the development and implementation of a "new program model" for NSTAR efficiency programs that utilized a "community-based approach" (Opinion Dynamics Corporation et al. [ODC], 2010, p.1). This program model's marketing campaign promoted a theme of "community" and used both traditional (e.g., direct mail) and non-traditional

[11] MTC sponsored the program through the Massachusetts Renewable Energy Trust. This trust was established by the Massachusetts legislature in 1998 for the purposes of promoting clean energy technologies and sustainable electricity markets. The trust is funded by a system benefit charge on Massachusetts ratepayers' investor-owned utility electricity bills.

outreach strategies (e.g., tabling at community events, offering a community incentive) to increase program participation.

Ultimately, "the objective of the pilot was to test the effectiveness of this new program model and whether it could deliver 2 megawatts of demand savings to relieve local capacity constraints" (ODC, 2010, p.1). Further, NSTAR applied lessons learned from the MEC to develop a community-based outreach "franchise model,"[12] which is currently being tested in six pilot programs in communities throughout the state (P. Conner, personal communication, February 1, 2011).

Case Study Material

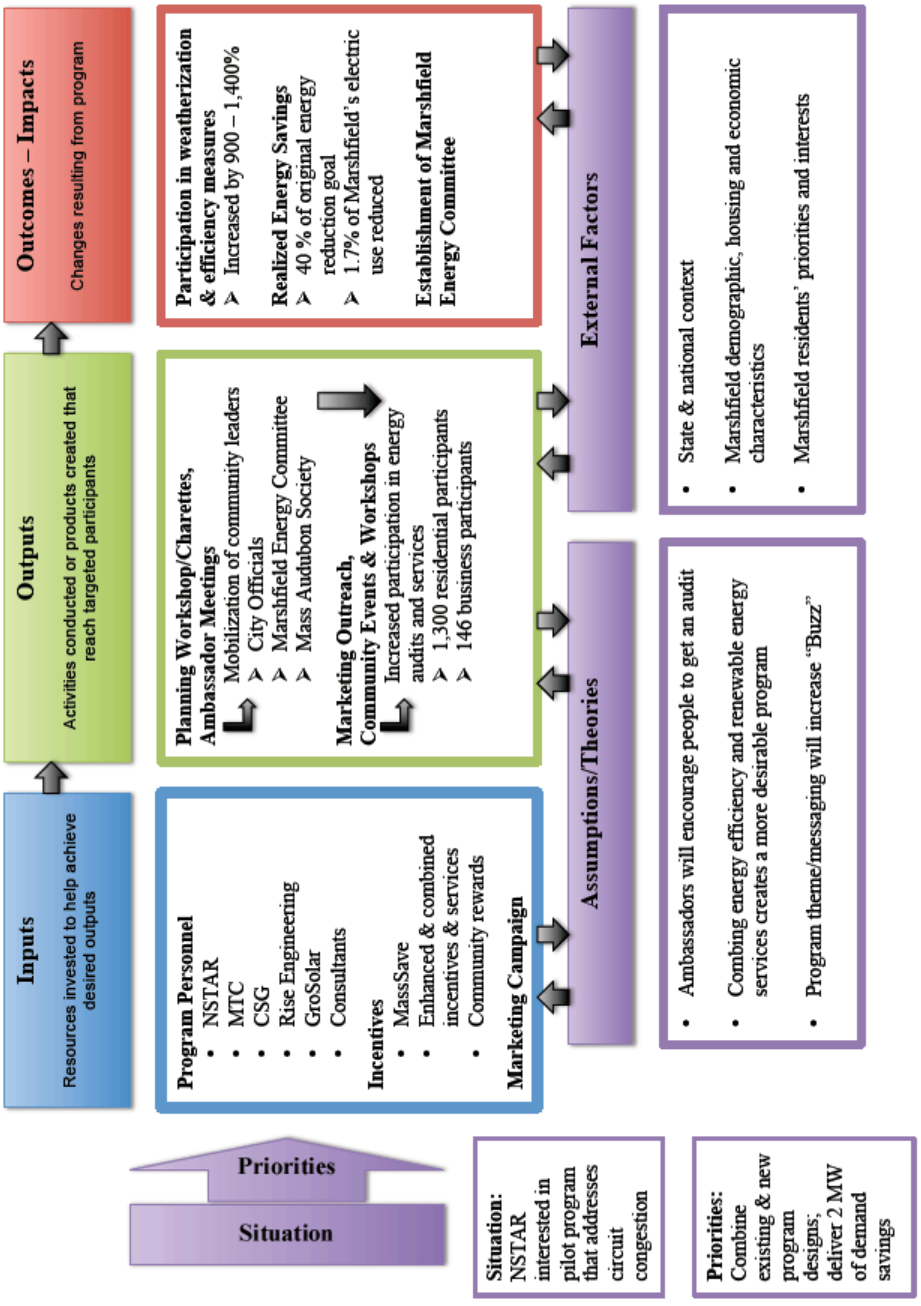
Interviews with MEC program personnel and written materials on the program were used to develop the case study presented in this chapter. A list of interviewees can be found in Appendix A. The written material reviewed includes: newspaper articles, websites, program materials, case study reports, Rocky Mountain Institute et al.'s "Marshfield Pilot Design Report," and Opinion Dynamics Corporation and M. Blasnik & Associates' "Evaluation of the Marshfield Distribution Relief Pilot."

Program Logic Model

The logic model created for the MEC, Figure 1, was developed using the information gathered from interviews and written material sources. The following sections discuss the MEC's logic model components.

[12] NSTAR's franchise model for community-based outreach relies heavily on motivating a community/town to participate in energy efforts by offering an incentive and by allowing the community to figure out how it can reach its energy savings potential. In the franchise model, NSTAR determines a town's energy savings potential, sets performance goals (i.e., achieving a certain number of audits or retrofits) based on this potential, and then the town is offered monetary rewards for reaching these various energy goals (P. Conner, personal communication, February 1, 2011).

Figure 1. The Marshfield Energy Challenge Logic Model



Program Situation

The MEC grew out of NSTAR's interest in developing a distributed generation pilot program (S. Haselhorst, personal communication, February 15, 2011). NSTAR engineers decided to run the pilot in Marshfield because Marshfield had a congested circuit restricted to Marshfield that needed attention. NSTAR thought this program could potentially allow it to defer future capital investment (P. Conner, personal communication, February 1, 2011). NSTAR considered several ways to stabilize the congested circuit, including constructing a biofuel generator to meet demand and using demand-side actions to reduce energy consumption (S. Haselhorst, personal communication, February 15, 2011). Ultimately, NSTAR decided to create an energy efficiency and renewable energy program to test whether energy efficiency could help NSTAR avoid future capital investments (P. Conner, personal communication, February 1, 2011).

Program Priorities

In addition to reducing capacity constraints and relieving peak loads, the MEC was also meant to test the effectiveness of using an energy efficiency program model that combined existing utility energy efficiency programs with new community-based outreach approaches to achieve energy savings in the residential and commercial sectors (ODC, 2010, p.1).[13] In pursuit of this goal, NSTAR sought out energy efficiency program best practices to determine how it could enhance the community components of its programs (P. Conner, personal

[13] Given the focus of this thesis on the community aspects of energy efficiency programs, this case study does not discuss how the program addressed the technical issues regarding congestion on the two distribution lines in Marshfield. More information on that can be found in Rocky Mountain Institute et al.'s "Marshfield Pilot Design Report" and Opinion Dynamics Corporation and M. Blasnik & Associates' "Evaluation of the Marshfield Distribution Relief Pilot."

communication, February 1, 2011). Pacific Gas & Electric (PG&E), a utility with prior pilot program experience, advised NSTAR to focus on "repackaging existing programs" instead of creating an entirely new program. PG&E argued that this model would successfully meet the needs and interests of a targeted community without developing an entirely new program. NSTAR took this advice and decided to repackage the traditional energy efficiency program it already offered to Marshfield residents through the MassSave program (P. Conner, personal communication, February 1, 2011). Part of the repackaging effort included developing a new marketing approach to convince residents to participate in the program. Ultimately, NSTAR wanted to determine whether a "repackaging of marketing dollars" would be the most cost-effective way to implement its efficiency programs (P. Conner, personal communication, February 1, 2011).

Program Assumptions

Program assumptions are the underlying beliefs or theories about how a program will function (University of Wisconsin-Extension, 2003, p.43). The main assumptions or theories underlying the MEC are related to what program partners thought would increase participation in energy efficiency programs. One such assumption was that the community leaders' participation and endorsement of the challenge would encourage Marshfield residents to participate in the program. NSTAR believes that leveraging various advocates and leaders in local communities is a powerful tool when seeking to increase program participation rates and increase participation at a deeper level (P. Conner, personal

communication, February 1, 2011). Rocco Longo, the Marshfield Town Administrator, supports this idea. He noted that many issues, such as energy, only become a community priority if community leaders promote them (personal communication, February 17, 2011).

Another program assumption was that NSTAR believed that combining related services (i.e., bundling energy efficiency and renewable energy incentives and services) would create a more desirable package for consumers (S. Haselhorst, personal communication, February 15, 2011). Lastly, NSTAR also believed that having a program theme centered on "community" would make the MEC more successful. A group of program consultants described how "there was general agreement among [them] and during the [multi-stakeholder planning] workshop that highlighting the benefits to the town as a whole [would] likely create greater buy-in and engender deeper reductions, and also reductions that are more likely to be sustained over a longer term" (RMI, 2007, p.3).

Program External Factors

The external factors that likely influenced the MEC include the general context in which the program arose, the town's demographic, housing and economic characteristics, and the priorities and interests of Marshfield residents.

Penni Conner of NSTAR offered three explanations for why NSTAR wanted to pursue its first community-centered pilot program. First, because NSTAR operates in communities, the company believed it had an obligation to incorporate the communities it serves. Further, the MEC gave NSTAR the opportunity to improve its visibility in the community by reaching out to more

consumers through a so-called "mass-customized" approach that repackaged existing NSTAR programs (personal communication, February 1, 2011). Additionally, Conner argued that Massachusetts' policy framework supporting energy efficiency ultimately allowed NSTAR to test a new type of efficiency program (personal communication, February 1, 2011).

Marshfield's demographics, economic conditions, housing stock and interests also likely influenced the MEC. Marshfield is located on Massachusetts' south shore, approximately 32 miles south of Boston. According to the 2000 U.S. Census, Marshfield has a population of 24,324 (U. S. Census Bureau, 2000a).[14] With respect to race and ethnicity, Marshfield is very homogenous. 97.7% of the population is white and only 0.7% of the population is Hispanic or Latino. With respect to language, only 3.9% of Marshfield residents over the age of 5 speak a language other than English at home. Further, only 1.5% of the population claims to not speak English proficiently.

Marshfield's median household income is $66,508, and 94.1% of persons aged 25 years or older are high school graduates. Over the last ten years, Marshfield's annual unemployment rate increased from 2.3% in 2000 to 4.9% in 2008 to 8% in 2010 (Commonwealth of Massachusetts).

The majority of Marshfield housing units are owner-occupied, with only 18% of the 8,905 housing units in Marshfield renter-occupied. The majority of Marshfield's housing units (85.3%) are one-unit detached structures. 74.1% of Marshfield's housing stock was built between 1920 and 1989. The majority of

[14] All statistics presented in this section, unless otherwise noted, are from U. S. Census Bureau, 2000a.

Marshfield residents heat their homes with utility natural gas (62.8%), followed by fuel oil or kerosene (27%), and electricity (6.9%).

While it is difficult to generalize about a population's interests or priorities, Sue Haselhorst of NSTAR noticed during the planning workshops that Marshfield residents had a sense of community pride and that people were real "townies" (personal communication, February 15, 2011). Further, Rocco Longo, the Marshfield Town Administrator, believed that the recent economic difficulties made residents more interested in money saving opportunities, such as energy efficiency upgrades. Yet, Longo also described how he has found Marshfield residents to be generally resistant to change due to distrust of government-led initiatives (personal communication, February 17, 2011).

Although it is hard to know which external factors influenced the MEC's development and outcomes the most, it is likely that the program was shaped by a combination of NSTAR's interest in developing a successful community efficiency program, Marshfield's overall homogenous and economic, demographic and housing characteristics, and the fact that Marshfield residents were accepting of the program.

Program Inputs

A program's inputs are the resources, contributions and/or investments put into a program to create program outputs. The MEC's program personnel, the marketing campaign, and the package of incentives offered to residents were critical to mobilizing community leaders and creating a community-focused outreach strategy. According Sue Haselhorst, formerly of NSTAR, NSTAR acted

as "executers at the programmatic level" by bringing partners together to help them design an overall budget and project plan (personal communication, February 15, 2011). Haselhorst also noted how NSTAR's role in the program was similar to that of the role of a general contractor for a project in that NSTAR was responsible for overseeing how the various partners executed their responsibilities (personal communication, February 15, 2011).

Conservation Services Group (CSG), the residential program delivery contractor, was responsible for formalizing and implementing the marketing strategies conceptualized by program partners. CSG also scheduled and completed the residential energy audits and weatherization work. Additionally, the CSG assessor was also responsible for submitting information about a home's potential for, and interest in, solar photovoltaic installation to GroSolar, the company responsible for solar installations in the pilot program. GroSolar then determined which households qualified for solar installations and completed the qualified installations.[15]

Many of the ideas for the community components of the MEC resulted from NSTAR and MTC's collaboration with a consulting team made up of the Rocky Mountain Institute of Boulder, Colorado, Energy and Environmental Economics, Inc. of San Francisco, California, and Freeman, Sullivan & Company of San Francisco, California (these three organizations will henceforth be collectively referred to as "the Rocky Mountain Institute Team"). In addition to working with NSTAR and MTC during the program design process "to analyze

[15] For businesses participating in the program, Rise Engineering completed the energy assessment and GroSolar was responsible for the solar audit and installations.

opportunities for targeted load reductions…and to model the possible scenarios and outcomes associated with varying layers of applied energy-efficiency, demand-response, and photovoltaic (PV) technologies," the Rocky Mountain Institute Team recommended and helped develop a planning workshop or "charrette" to facilitate the program design process (RMI, 2007, p.1).

The two-day planning workshop, held in November 2007, included a stakeholder meeting and a technical working session. According to the Rocky Mountain Institute Team, "the public meeting was designed to inform Marshfield stakeholders about the pilot's purpose and goals, and to solicit feedback on a number of specific marketing options" (RMI, 2007, p.1). MEC program partners attended the event along with ten to fifteen community members, including Marshfield selectmen, the school committee chair, a public librarian, the town planner, environmental group local representatives, a church minister/pastor, radio station owner and town residents (RMI, 2007, p.36). NSTAR's community relations liaison collaborated with a local state representative, with whom NSTAR had already developed a relationship, to make the initial contact with Marshfield leaders and to invite these leaders to the workshop (S. Haselhorst, personal communication, February 15, 2011).

Participants were asked to work in small groups to think about topics such as program outreach and budget (personal communication, February 15, 2011). NSTAR also took this opportunity to describe the context of the pilot program. NSTAR explained that it needed to do substantial updates/upgrades to a substation due to reoccurring blackouts, and before these updates were made,

NSTAR wanted to try to encourage energy conservation in Marshfield in order to reduce demand and delay making capital investments in the substation (P. Halkiotis, personal communication, February 17, 2011).

The workshop experience influenced the Rocky Mountain Institute Team's recommendations for the development of the community components of the program. Noting how "one of the most important things that became apparent in the community meeting and the workshop was the amount of support from community leaders for this program," the team suggested in their December 2007 "Marshfield Pilot Design Report' that the pilot program "capitaliz(e) on this strong sense of civic pride and community by designing the marketing campaign as a 'community project' rather than a 'utility program' " (RMI, 2007, p.2).

To promote the "community project," the Rocky Mountain Institute Team recommended creating a community-based marketing campaign that included segment-specific marketing efforts (RMI, 2007, p.3). For the overall marketing campaign, the consultants advised NSTAR to create a theme for the pilot, such as "We are Marshfield" or the "Marshfield Energy Challenge" to build upon the town's evident community pride. The team also recommended having a " 'Green Team' comprised of an NSTAR Electric employee (preferably a Marshfield resident) to act as a local liaison and community marketing manager" (RMI, 2007, p.3).

Additionally, the Rocky Mountain Institute Team recommended that NSTAR develop a marketing strategy that would take "a multi-directional, multi-pronged approach combining traditional approaches, such as direct mail, along

with broader community-based approaches" (RMI, 2007, p. 3-4). Further, the team suggested NSTAR work closely with Marshfield community leaders to help generate a high level of "buzz" about the program in the community. The team reasoned that by working with these leaders, NSTAR could "[get] the message into the community from a number of different directions, and possibly [communicate] several different messages (e.g., cost savings or environmental benefits) to appeal to different audiences" (Rocky Mountain Institute Team, 2007, p.3-4).

Ultimately, several of the Rocky Mountain Institute Team's recommendations were pursued. The pilot program took on the theme/name of "The Marshfield Energy Challenge;" it had several NSTAR employees serve as local liaisons to the community leaders and residents; it used a combination of traditional and community-based social marketing; and it worked with schools and community events to publicize the program.

Another fundamental element of the pilot program was the package of incentives and rewards offered to Marshfield residents in return for participating in the program. The program built upon the energy incentives and services already offered to Marshfield residents by MassSave, such as providing energy audits and the installations of instant savings measures, such as CFL lighting. However, the MEC differed from past NSTAR MassSave efforts because the MEC energy efficiency audit was coupled with a screening to see if a home was eligible to install solar panels. The MEC also incorporated the installation of solar photovoltaic systems and direct load control measures into its standard offerings

(P. Conner, personal communication, February 1, 2011; ODC, 2010). Additionally, households that agreed to install direct load control thermostats were offered additional incentives, such as not having to pay the customer co-payment required for insulation and air-sealing in the MassSave program (ODC, 2010, p.5). Finally, NSTAR helped the community install three photovoltaic panels on town facilities (P. Halkiotis, personal communication, February 17, 2011). NSTAR hoped the community would rally around these community incentives (P. Conner, personal communication, February 1, 2011).

Program Outputs

Program outputs are activities conducted or products created that are intended to reach targeted participants and create specific outcomes. For the MEC, the two main program outputs were the mobilization of community leaders to become program spokespeople and the implementation of marketing and outreach.

Mobilization of community leaders.

Community leaders were first brought into the pilot program during the two-day technical workshop. Paul Halkiotis, Marshfield's town planner, noted that many officials "were thrilled" when they learned about the pilot program (personal communication, February 17, 2011). Halkiotis was one these leaders. He believed the timing of NSTAR's proposal created an opportunity to focus the town's attention towards renewable energy and energy efficiency pursuits (personal communication, February 17, 2011).

The community leaders that attended the initial planning workshop and that expressed interest in the MEC were asked by NSTAR to be program "Ambassadors" or spokespeople (P. Halkiotis, personal communication, February 17, 2011). NSTAR asked the ambassadors to actively endorse the program by having an energy audit and sharing their audit experiences with people in the community. However, Ambassadors were not expected to recruit energy audit participants, nor were they asked to do any direct program solicitation, such as door-to-door canvassing (P. Halkiotis, personal communication, February 17, 2011). NSTAR organized periodic breakfast meetings for the Ambassadors throughout the duration of the pilot program, which created a venue for officials to update the Ambassadors on the program's progress and solicit the Ambassadors' input/feedback on the program.

Additional community members also worked in a volunteer capacity for the MEC. For example, Sue MacCallum, the Director of Mass Audubon South Shore Sanctuaries, read about the challenge in the newspaper and offered to host the MEC workshops at the Mass Audubon sanctuary. MacCallum's Mass Audubon office also publicized the workshops in their newsletters and flyers (S. MacCallum, personal communication, February 25, 2011).

Another interesting way that the pilot program mobilized community members was through the emergence of the Marshfield Energy Committee. Lane, a founding member of the committee, described how the timing of MEC was useful because it gave the committee some momentum, since people in the town were already thinking a lot about energy efficiency (personal communication,

February 11, 2011). After the town leaders' first meeting with NSTAR, Paul Halkiotis and Lane began formal discussions about the formation of the committee. Eventually, the Marshfield Selectmen appointed a committee made up of Halkiotis, Lane and other Marshfield residents (P. Halkiotis, personal communication, February 17, 2011). The committee was charged with helping develop clean energy projects to reduce Marshfield greenhouse gas emissions. Once the committee was formed, it became an active supporter of the MEC, working directly with NSTAR staff and speaking at MEC events.

While involving Marshfield community leaders was strongly emphasized, each of the program partners interviewed acknowledged that the MEC was really an NSTAR project. Haselhorst described how NSTAR was eager to work with community leaders and groups, like the Marshfield Energy Committee, but NSTAR also recognized that it was an outside entity coming into Marshfield to implement a program, and therefore the MEC was not a true grassroots effort (personal communication, February 15, 2011). Ambassadors also recognized NSTAR's leadership and control over the program. According to Paul Halkiotis, "NSTAR was in the driver's seat" and the town officials were along for the ride (personal communication, February 17, 2011). Despite the unequal power dynamic, the community leaders interviewed for this paper did not seem to have a problem with NSTAR's control. For example, Gia Lane thought that the program was generally well received. She described how NSTAR tried to get buy-in from town leaders, instead of simply barging in to Marshfield and starting the program without local approval (personal communication, February 11, 2011).

Implementation of marketing and outreach.

The second MEC program output was its approach to marketing and outreach.[16] A range of marketing and outreach strategies was used to encourage people to complete energy audits.[17] For outreach to the residential sector, traditional marketing approaches included direct mail, radio and newspaper advertisements, and website and brochure program descriptions. See Appendix D for examples of marketing materials. The community-based marketing approach focused on engaging community leaders and local residents at community events, seminars and school presentations. CSG used the message, "It's about where we live, work and play," and related visuals and branding to help "residents and business owners realize the connections among energy consumption, the stewardship of the planet and future generations" (Conservation Services Group, n.d.).

The community-based marketing efforts also involved participation in community events, such as an art festival, a summer concert series, school events, and the town fair. Further, program representatives had an informal presence in the community by attending town events, such as town meetings and voting days (ODC, 2010, p. 136-137). According to Penni Conner of NSTAR, the education programs, such as the workshops at the Mass Audubon sanctuary, were central to

[16] In general, the same marketing techniques were used for both the residential and business components of the program.

[17] The budget for the program's marketing campaign was approximately $170,000 and included $55,000 for the overall design and management of the marketing effort. $20,000 was allocated for direct mailing, $20,000 for newspaper advertisements, $5,000 for radio advertisements, $3,000 for community events, $2,000 for community leader outreach, $25,000 for community events and seminars, $15,000 for school programs, and $25,000 for collateral. An additional $25,000 was spent on the design workshop/charrette. According to Opinion Dynamics Corporation and M. Blasnik & Associates, these costs added approximately $0.08 per kilowatt-hour saved for all measures (ODC, 2010, p.5).

the program's marketing strategy (personal communication, February 1, 2011). The informational seminars/workshops held at the Mass Audubon Society's sanctuary targeted homeowners and addressed a range of interrelated energy topics. All of the workshops described the MEC and its intentions and encouraged attendees to sign-up for an audit. Each workshop also covered a specific energy topic, such as the low-hanging fruit options people can do to increase their energy conservation, renewable technologies and additional efficiency topics, such as insulation and thermal imaging (S. MacCallum, personal communication, February 25, 2011).

Sue MacCallum, the Director of Mass Audubon South Shore Sanctuaries and organizer of the workshops, noted how while most attendees were already interested in energy efficiency, they came to the workshops "looking for new ways to increase efficiency beyond what they had already done" (personal communication, April 6, 2011).

Program Outcomes & Impacts

In July 2010, Opinion Dynamics Corporation and M. Blasnik & Associates released their third-party process and impact evaluation of the MEC. This evaluation and the information gathered from interviews highlights the MEC's outcomes and impacts regarding energy savings, participation, cost-effectiveness and building capacity, and interest for future energy work in Marshfield.

Energy savings goals.

The pilot program sought to deliver two megawatts of demand savings (728 kilowatts in peak demand reduction in the residential sector and 1,274 kilowatts in peak demand reduction in the commercial sector). However, the realized savings from efficiency, direct load control and solar photovoltaic installations were only 385 kilowatts in the residential sector and 450 kilowatts in the commercial sector. [18] Therefore, realized savings from the pilot program was little more than 40% of the program's original energy reduction goal. Reasons for such shortfalls in realized savings, despite the high participation rates, include a lack of large commercial customer participation in the direct load control program and the fact that lighting measures were predicted to achieve greater energy efficiency in the residential sector than realized.[19]

Evaluators found that in terms of overall electric energy savings, program impacts are estimated to be approximately 1.5 million to 2.1 million kilowatt hours per year from commercial customers and 0.6 million kilowatt hours per year from residential customers. These savings represent about 1.7% of Marshfield's electric use.

[18] This section highlights the findings of the impact evaluation of the residential and commercial components of the program. To estimate program impact, the evaluation included what the evaluators termed a "bottom up" assessment and a "top down" analysis. The "bottom up" assessment used a combination of billing data analysis, engineering estimates and metering data to determine the impact of each program intervention or measure. The "top-down" analysis looked at substation and power line load data to assess demand impacts (ODC, 2010, p. 44).

[19] According the third party evaluation, "lighting measures were expected to produce more than 80% of the projected 911 kWh/participant energy savings and one third of the projected 233 watt peak demand savings. The billing analysis found average energy savings of just 300 kWh. It is not clear to what extent this shortfall was due to the higher number of bulbs installed per home than usual, other true measure performance issues, or lurking self-selection bias" (ODC, 2010, p.9).

Participation goals.

While the program's actual energy savings were lower than expected, the pilot was successful in achieving a high level of program participation.[20] With 8,908 households in Marshfield and 1,300 residential participants, the residential part of the program had a 14.6% household participant rate. 90% of the residential participants installed at least one energy efficient light bulb. A total of 19% of participants had an air conditioning tune-up, 20% of participants installed insulation, 16% of participants had air sealing, and 14% of participants installed heating measures (ODC, 2010, p.20). See Appendix E for a table that describes the various participation rates of residential customers in the pilot program.

To determine the significance of these participation rates, the evaluators compared the rates of participation before and after the pilot program was implemented in Marshfield to the participation rates of NSTAR energy efficiency programs in Duxbury, Massachusetts, a so-called "comparison" town. The comparison indicated that "the Marshfield Energy Challenge had a significant effect on the number of energy efficient installations and activities undertaken by Marshfield customers" (ODC, 2010, p.4). During the pilot program's two year tenure, participation in four key residential activities (energy audits, installations of CFLs, installations of solar panels, and installation of other energy efficient measures) increased by 900% to 1,400%. In contrast, in Duxbury, participation in residential energy efficiency activities increased by only 100% to 325% in 2008

[20] This section highlights the findings of the process evaluation of the residential components of the program. For this process evaluation, the evaluators examined program materials and databases, conducted in-depth interviews with program and implementation staff, conducted two surveys with residential participants (one in November 2008 and one in December 2009) and did a general population survey of Marshfield and Duxbury. Information on the process evaluation of the commercial components of the program can be found in the evaluation (ODC, 2010, p. 1-2).

and 2009 (ODC, 2010, p.4).

Since the pilot program focused on using both traditional and community-based approaches to marketing and outreach, the evaluators also looked at the success of the approaches. The evaluators found that overall, 35% of Marshfield residents were aware of the program and that these residents (both participants and non-participants) first heard about the program through the newspaper, direct mail or from friends/family. Participants were significantly more likely than the non-participants to have heard about the pilot program through direct mail, friends and family, the program website, and/or a community event. Participants were also more likely to have heard about the program through multiple sources. In contrast, non-participants were more likely to have heard about the program via the local newspaper (ODC, 2010, p.23).

The evaluators noted that "the high degree of information exchange through friends and family, particularly among participants (54%), suggests that the program's word of mouth efforts were successful in creating a 'buzz' in town and generating interest in participating in the program" (ODC, 2010, p. 24). Sue MacCallum of Mass Audubon posited that it seemed like word of mouth from friends and neighbors significantly helped people learn about the program (personal communication, February 25, 2011).

The evaluators found that the three most important factors influencing participation in the program were ease of participation (85% of participants found this influential), incentives for non-solar (60% of participants), and an interest in helping one's town (47% of participants). Only 21% of the participants said that

having family and friends participate in the program was influential (ODC, 2010, p.27).

The evaluators found that the main barrier to participation was lack of awareness. 78% of the non-participants interviewed had not heard of the challenge (ODC, 2010, p.31). Other barriers included residents having the intention to, but never getting around to signing up for the program (8%); residents being interested in the measures offered by the program (5%), residents not having enough information (5%) and other (5%) (ODC, 2010, p.32). Further, the evaluators found key demographic differences between participants and non-participants. For the residential component of the program, non-participants were more likely to be renters, to live in multi-family units, to live alone, be older than 50, and to have less education and lower income (ODC, 2010, p.34).

Although the pilot program had a large household participation rate compared to traditional participation rates in energy efficiency programs, the fact that lack of awareness was the primary reason for not participating in the program suggests that more outreach and marketing could have been done to improve general awareness of the program. Further, while the evaluators recognize that the program was successful in creating a "buzz" throughout Marshfield, evaluators also found that "most of the community based outreach efforts were recalled by very few residents" (ODC, 2010, p. 36).

While the evaluators do not offer explicit explanations for why there was a low level of awareness and recollection of the program, they do offer some insights. Of the 35% of residents who were aware of the program, "awareness

[was] significantly higher among Marshfield residents with central air conditioning (55%) compared to residents without central air conditioning (30%)" (ODC, 2010, p.23). Further, the evaluators found that "awareness of the program [was] also higher among on-circuit customers (42%) compared to off-circuit customers (31%) although this difference is not significant (at a 90% confidence level and 10% precision)" (ODC, 2010, p.23). The evaluators suggest that this difference in awareness is due to the fact that residents who lived on the circuit and who were believed to have central air conditioning were targeted by the program more than other residents. To overcome these awareness and recognition problems, the evaluators recommend that future programs consider implementing additional outreach mechanism and investing in community-events that create the highest cost-effective visibility.

Cost-effectiveness.

Although cost-effectiveness was not a requirement for the pilot program, it was nevertheless of interest to NSTAR, since non-pilot utility-run programs are typically required to follow cost-effectiveness standards. Although there is no public information on the cost-effectiveness of the MEC, according to a Massachusetts Institute of Technology report, the MEC's "ratio of investment per quantity of energy efficiency achieved [is] too high to be replicable broadly" (Michaels, 2009, p.20). This means that the amount of energy savings yielded per dollar spent in the MEC program is low enough that the strategies employed in the MEC are likely to be deemed not cost-effective for future programs.

While the third-party evaluation did not include a cost analysis, the evaluators did list the costs of the pilot program that went beyond the normal energy efficiency costs of doing business.[21] These costs included the $170,000 marketing budget,[22] the additional incentives offered on top of MassSave incentives to customers who installed direct load control thermostats, the offering of photovoltaic measures, and the time put in by NSTAR staff to support the program (ODC, 2010, p.5). Noting the importance of knowing the cost-effectiveness of a program when considering its repeatability, the evaluators suggest, "any future community-based program implementation should examine whether the increased participation rates were 'worth it' and which elements were most necessary and valuable" (ODC, 2010, p.5). However, it is important to note that because the MEC was a pilot program, the DPU was not required to examine the cost-effectiveness of the program.

Development of capacity for, and interest in, future energy work.

There were mixed results with respect to the program's impact on the community in the long run. For example, in terms of changing attitudes and awareness concerning energy issues, the evaluators found that there was "no significant differences between Marshfield residents and residents in Duxbury (the comparison town) with respect to several measures of energy efficiency awareness and attitudes" (ODC, 2010, p.7). Based on this comparison, the evaluators suggest that "while the Marshfield Energy Challenge was successful in

[21] The MEC evaluation does not list the average energy efficiency costs of doing business.

[22] While the MEC evaluation does not say what typical marketing costs are for energy efficiency programs, it is likely that NSTAR has some type of marketing budget for its non-pilot efficiency programs.

increasing the number of installations of energy efficient measures, it did not influence awareness and attitudes for the overall community" (ODC, 2010, p.7). While the evaluation does not offer insight into why there was no difference in awareness and attitudes between the two towns, the evaluation posits that "the large number of messages about energy efficiency and conservation to which customers around the country have been exposed in recent years makes it increasingly unlikely that changes in awareness, attitudes, and behaviors can be attributed to a single effort, such as the Marshfield Energy Challenge" (ODC, 2010, p.35).

One lasting impact of the MEC was the establishment of the Marshfield Energy Committee. While some Marshfield leaders wanted to establish a town energy committee prior to the MEC, many of the interviewees indicated that it was the momentum and interest in energy issues created by the pilot program, as well as the support from NSTAR, that ultimately helped get the committee up and running (R. Longo, personal communication, February 17, 2011; P. Halkiotis, personal communication, February 17, 2011; S. MacCallum, personal communication, February 25, 2011). NSTAR's support included making a renewable energy consultant available to the energy committee, having an NSTAR summer intern help the committee do a greenhouse gas emissions inventory, donating $1,000 in feed money to help the committee join the International Council for Local Environmental Initiatives (ICLEI) and to hire a wind consultant (P. Halkiotis, personal communication, February 17, 2011). Although there have not been any programs similar to the MEC implemented in

Marshfield since the end of the challenge, the committee has continued to work on a variety of energy issues by pursuing a municipal building ESCO project, developing a wind turbine project, and applying to become a Massachusetts Green Community.

Chapter 5 –The New Bedford Community Mobilization Initiative

The New Bedford Community Mobilization Initiative (New Bedford CMI) is a pilot program that aims to increase energy efficiency efforts and the development of green jobs in New Bedford, Massachusetts. NSTAR and the city of New Bedford are in partnership with two local nonprofit organizations, the Marion Institute and YouthBuild, to run the initiative. Although the program outreach began in July 2010 and ended on March 31, 2011, the energy audit process will continue through April 2011 and the weatherization work will likely continue for several more months. (K. Lydgate, personal communication, February 4, 2011).

The New Bedford CMI is the first of several NSTAR-sponsored CMI pilot programs in Massachusetts.[23] These programs have three primary goals: (1) to increase outreach to the customers that NSTAR has not served in the past, (2) to test how to integrate new outreach methods with NSTAR's traditional efficiency program outreach model, and (3) to create local jobs for contractors (T. Haggerty, personal communication, February 2, 2011). The CMIs build upon the energy efficiency services and incentives that NSTAR already offers its customers through the MassSave program.

The New Bedford CMI's goal is to simultaneously increase participation in NSTAR's efficiency audit program and increase demand for weatherization work for local contractors (City of New Bedford, 2010). Specifically, the program

[23] Other CMI projects that are currently on the ground include ones in the Chinatown neighborhood of Boston and in the city of Chelsea.

aims to weatherize 50 residential homes, 25 small business and 4 multi-unit buildings (K. Lydgate, personal communication, February 4, 2011). The New Bedford CMI aims to also test the effectiveness of using a local workforce to conduct program outreach and marketing (City of New Bedford, 2010). NSTAR will use the information from this pilot program to determine the feasibility of developing similar community-based programs in the future (City of New Bedford, 2010).

Case Study Material

Interviews with CMI program personnel and written materials on the program were used to develop this case study. A list of the interviewees is presented in Appendix A. Written materials reviewed include press releases, newspaper articles and organization websites.

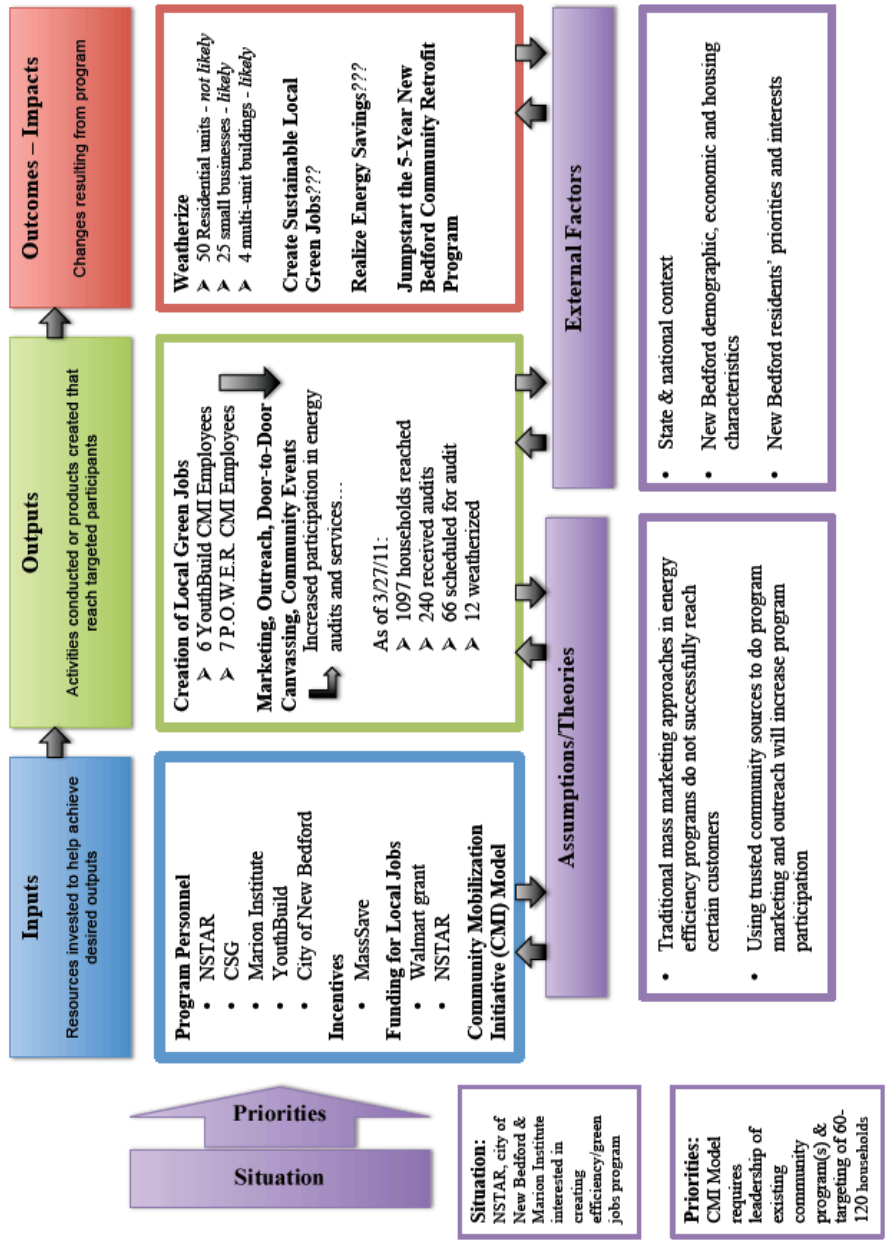
Program Logic Model

The New Bedford CMI logic model, Figure 2, was developed from information gathered from interview and written material sources. The following sections discuss each logic model component.

Program Situation

The New Bedford CMI grew out of several parties that simultaneously took an interest in developing an energy efficiency/green jobs program in New Bedford. NSTAR originally became interested in working on a pilot program in New Bedford when it was collaborating with the Green Justice Coalition, a coalition of community and environmental groups and labor unions, to develop

Figure 2. The New Bedford CMI Logic Model



CMI pilot programs. In July 2009, when the Massachusetts investor-owned utilities were discussing how to develop their 2010-2012 three year plans, GJC began discussions with NSTAR about ways in which utilities could more effectively serve customers that traditionally have low participation rates in energy efficiency programs. During these discussions, GJC proposed that utilities adopt a community mobilization energy efficiency program model. NSTAR ultimately decided to incorporate the CMI model into their pilot program plans in order to test the effectiveness of CMI model.

While NSTAR was developing its CMI pilot programs, the city of New Bedford was designing its Community Retrofit Program. The New Bedford Community Retrofit Program is a city-led, ARRA EECBG-funded program that aims to (1) increase awareness of, and accessibility to, energy efficiency opportunities, (2) "aggregate demand for energy efficiency services [to create] economies of scale to lower costs and maximize job creation," and (3) "align workforce development efforts with job opportunities" (Lang, 2010, p. 36). Through this program, the city hopes to weatherize 5,000 residential and small business buildings and achieve a 15% to 50% reduction in energy usage over the next five years (New Bedford Economic Development Council, 2010; Lang, 2010, p. 36).

Kalia Lydgate, the Green Jobs Green Economy Initiative Director at the Marion Institute, and who is also a New Bedford Mayoral Fellow, helped design the New Bedford Community Retrofit Program. When Lydgate learned about NSTAR's interest in developing a program that was consistent with the New

Bedford Community Retrofit Program, Lydgate contacted NSTAR to discuss how they could combine forces. When NSTAR learned about the city's weatherization goals, NSTAR realized that the city's program was substantively what NSTAR wanted to do in a CMI project (T. Haggerty, personal communication, February 2, 2011). Ultimately, NSTAR hired the Marion Institute, a non-profit organization dedicated to supporting sustainability and social justice projects, to administer the community outreach and the marketing aspect of the CMI. Effectively, the CMI became the first phase of the city's Community Retrofit Program.[24]

As the CMI was being negotiated, Lydgate co-founded the P.O.W.E.R. project with Khepe-ra Maat-Het-Heru, the founder of the education campaign, ESHU2 Collective (Education Should Help US x Ecology, Spirituality, Health, and Unity). P.O.W.E.R (People Organizing for Wealth and Ecological Restoration) aims to create local solutions to environmental, social, and economic concerns (The Marion Institute, 2010). As part of the Marion Institute, P.O.W.E.R. was designated to administer the CMI's outreach components. The CMI is P.O.W.E.R.'s first community-based project.

Another local organization, New Bedford YouthBuild, was given the responsibility of hiring a team of workers to complete the weatherization work resulting from the CMI energy audits. New Bedford YouthBuild has traditionally focused on providing young adults with construction and computer training, but has recently begun to focus on weatherization training (G. Williams, personal communication, February 7, 2011). Lydgate and the director of YouthBuild,

[24] It is important to note that the Green Justice Coalition was originally interested in working on the CMI, but for various reasons, which are discussed more in Chapter 6, the Green Justice Coalition ultimately did not become a CMI partner.

Gloria Williams, worked together prior to the CMI, and when Lydgate learned about NSTAR's pilot program, she invited YouthBuild into the discussions between NSTAR and the Marion Institute.

Program Priorities

The CMI's participation, weatherization, and local job creation goals are partially shaped by the requirements of NSTAR's CMI model. These provisions require that (1) existing community groups conduct outreach and that (2) the program targets households with incomes that are between 60% and 120% of state median income (K. Lydgate, personal communication, February 4, 2011). While the New Bedford Community Retrofit Program serves all New Bedford residents, the CMI outreach targeted the two neighborhoods with the highest percentage of households with incomes that are between 60% and 120% of state median income in New Bedford.[25]

Cost-effectiveness was another program priority. While this pilot program is not required to meet cost-effective standards, NSTAR will evaluate the program to see whether it passes a cost-effectiveness test. The purpose of the test is to determine if the program, or parts of the program, should be used to inform future efficiency programs sponsored by NSTAR (T. Haggerty, personal communication, February 2, 2011; K. Lydgate, personal communication, March 16, 2011).[26]

[25] Using assessor and census data, the Marion Institute determined that New Bedford's West End and South End neighborhoods had the highest percent of households with an income between 60% and 120% of state median income.

[26] The 2008 Green Communities Act requires all Massachusetts investor-owned utilities "to acquire all available cost-effective energy efficiency and demand reduction resources in the Commonwealth" (Commonwealth of Massachusetts, 2010, p.xii).

Program Assumptions

The primary assumptions underlying the New Bedford CMI are directly related to the CMI model. The CMI model assumes that traditional mass-marketing approaches in energy efficiency programs do not successfully reach certain customers. In testimony before the DPU, Mary Jo Connelly, the Research Director of Community Labor United, the organization that started the Green Justice Coalition and helped develop the CMI model, argues that "the way information is communicated and by whom is extremely important" and that a community-driven outreach approach is necessary to effectively engage constituencies, such as moderate-income residents and communities of color (Commonwealth of Massachusetts Department of Public Utilities, 2010, p.5).

Those responsible for the pilot program's outreach also believe that a more successful efficiency program connects to residents through trusted community sources. Lucky Daniels, a P.O.W.E.R. team member, described New Bedford as a "tight-knit, old-school community" and noted how it is often hard for outsiders to reach out and connect to local residents (L. Daniels, personal communication, February 4, 2011). According to Daniels, having most of the P.O.W.E.R. team from New Bedford helps the team understand the community members better. This understanding facilitates trust and cooperation between the outreach team and the community (personal communication, February 4, 2011).

Program External Factors

Massachusetts has a history of supporting energy efficiency projects. This support is an important external factor shaping the New Bedford CMI because it

has put pressure on utilities like NSTAR to explore creative ways to increase energy efficiency. Danah Tench, a staff attorney at Environment Northeast, noted that "through the Commonwealth's new procurement approach to energy efficiency, we are able to explore innovative solutions for delivering real energy savings to our citizens" (City of New Bedford, 2010).

Federal interest in energy efficiency is also an important external influence on the CMI. ARRA funding enabled the city of New Bedford to create an Energy Director position. Scott Durkee, who was hired to fill this position, plays an influential role in the New Bedford CMI.

Other external factors that have influenced the development and outcome of the New Bedford CMI include the city's demographics, economic conditions, housing stock, and community interests. New Bedford is a coastal city 51 miles south of Boston and spans 20 square miles. According to the 2000 U.S. Census, New Bedford's population was 93,768. 58.4% of the population is between the ages of 18 and 65 (U. S. Census Bureau, 2000b).[27] The majority of the New Bedford population is white (78.9%). African American residents make up 4.4% of the population, and 5.9% of the population reports as having two or more races. 10.2% of the population is of Hispanic or Latino origin. 37.8% of New Bedford residents over the age of 5 years old speak a language other than English at home and 17.3% of this population claim to not speak English proficiently.

Although New Bedford is famous for being a historical whaling port, only 1% of its employed civilian population has an occupation in farming, fishing or forestry. The most common occupations in New Bedford are sales and office

[27] All statistics presented in this section, unless otherwise noted, are from U. S. Census Bureau, (2000b).

occupations (23.6%), management and professional occupations (20.8%), service occupations (19.8%), production, transportation and moving occupation (25.1%) and construction and maintenance occupations (9.8%). The median household income is $27,569. Only 57.6% of persons 25 or older are high school graduates. The unstable economic conditions over the last several years have impacted New Bedford as the city's 5% unemployment rate in 2000 rose to 11.6% in December 2010 (U.S. Department of Labor, 2010).

New Bedford also has a high rental population, with 56.2% of the housing units renter occupied. The majority of New Bedford's housing units are also multi-unit structures. 30.2% of the housing units are one-unit and detached, 2.9% are one-unit and attached, 47.6% are 2 to 4 units, and 19.1% are 4 units or more. Approximately half of New Bedford's housing stock was built before 1939, and 91.7% of the housing stock was built before 1980. The majority of New Bedford residents heat with utility natural gas (75.1%), followed by fuel oil or kerosene (17.3%), and electricity (4.7%).

New Bedford's demographic, economic and housing stock characteristics have created both benefits and challenges for the CMI. The city's old housing stock and high unemployment rate make the city ripe for a program that aims to increase the energy efficiency of homes, particularly those that have not recently been weatherized, and to create new local jobs. Yet, these same conditions are also potential barriers for the program. For example, the extensive amount of old housing stock increases the likelihood of unmanageable preweatherization issues. Further, if there are upfront costs for participants, such as paying for insulation

and contracting work, the high unemployment rate might increase residents' reluctance to get their homes weatherized. Additionally, the city's high rental statistics and non-English speaking populations may also influence the program's level of success because of a lack of interest on the part of landlords[28] and communication challenges posed by language barriers.

The community's interests or priorities also likely influenced the program. P.O.W.E.R.'s Kalia Lydgate has found that the New Bedford community's response to the program has been better than expected (K. Lydgate, personal communication, February 4, 2011). Further, P.O.W.E.R.'s experiences interacting with residents and working with different community groups and leaders through neighborhood association meetings and a community block party indicate that New Bedford residents are at least somewhat invested and concerned about their community.

Program Inputs

As the main sponsor of the New Bedford CMI, NSTAR's primary role in the pilot program is to facilitate program design and implementation. During the program design process, NSTAR was responsible for bringing all of the program partners together, including the local contractors (YouthBuild), the primary program vendor (CSG) and the various community leaders (city of New Bedford and the Marion Institute) (T. Haggerty, personal communication, February 2, 2011). During the program's conceptualization, NSTAR created a process design

[28] Landlords traditionally have little incentive to invest in energy efficiency retrofits because they do not usually pay utility bills and therefore would not benefit financially from the utility cost savings that result from efficiency upgrades. This lack of interest is referred to as the split-incentive issue, where in rental situations, landlords and tenants have different economic interests or incentives regarding energy use.

document to ensure that all of the partners contributed to the program model's design (T. Haggerty, personal communication, February 2, 2011). Further, NSTAR designated community representatives responsible for designing the program outreach strategies.

NSTAR was also responsible for coordinating a training session for the community outreach leaders. The training session described the program's implementation process, instructed the leaders about energy efficiency measures and products, and included a description of the potential benefits for customers participating in the program. (T. Haggerty, personal communication, February 2, 2011). NSTAR also organizes the weekly, or sometimes bi-weekly, partner meetings. The purpose of these meetings is to discuss the status of the program and discuss any issues or problems that have occurred.

One important program input is the use of local leaders to develop and implement program marketing and outreach. Through the Marion Institute's P.O.W.E.R. project, New Bedford residents were hired to be CMI Community Mobilization Leaders. These leaders were charged with conducting in-person outreach efforts to encourage New Bedford residents, particularly those who have not been reached through traditional marketing efforts, to participate in NSTAR's energy efficiency program (New Bedford Economic Development Council, 2010). NSTAR funded P.O.W.E.R.'s work from July 2010 through March 31, 2011, and the P.O.W.E.R. Community Mobilization Leaders were paid $17 an hour. P.O.W.E.R. also sought out volunteers to assist in various aspects of the

program, such as babysitting[29] and tabling community events.[30] The P.O.W.E.R. outreach team met for at least two hours per week to discuss their outreach progress. These meetings included discussions about the most successful elements of the process and the challenges the team encountered (K. Lydgate, personal communication, March 16, 2011).

Another important aspect of the CMI is that the weatherization work goes directly to one local contracting company, New Bedford YouthBuild.[31] YouthBuild's primary goal with the CMI is to complete the weatherization work generated by P.O.W.E.R.'s outreach. YouthBuild's funding comes from several sources. During the YouthBuild program training period, many participants were paid through the AmeriCorps program (G. Williams, personal communication, February 7, 2011). In June 2010, the U.S. Conference of Mayors selected the city of New Bedford's partnership with the Marion Institute and YouthBuild to receive a $300,000 grant from the Wal-Mart Foundation to support and expand YouthBuild's efforts to create green jobs in New Bedford. YouthBuild used this funding to buy weatherization equipment and to create contracting positions that will serve both the city's Community Retrofit Program and the New Bedford CMI (Lydgate, 2010). Additionally, in July 2010, People Acting in Community

[29] It is interesting to note that many of the Community Mobilization Leaders are single fathers, so transportation and babysitting support has been helpful for the leaders (K. Lydgate, personal communication, February 4, 2011).

[30] NSTAR requires that anyone doing door-to-door outreach have a background check. Therefore, Community Mobilization Leaders are the only people allowed to conduct door-to-door outreach. Volunteers are able to assist in all other aspects of the program (K. Lydgate, personal communication, February 4, 2011).

[31] YouthBuild is a national program, with approximately 200 programs/offices across the country. YouthBuild targets young adults ages 16 to 24 who have dropped out of school, but who are interested in obtaining their GED or high school diploma and acquiring occupational skills. YouthBuild has traditionally provided construction and computer training. Recently, however, the New Bedford YouthBuild program has focused more attention on training these youths for weatherization jobs (G. Williams, personal communication, February 7, 2011).

Endeavors, Inc. (PACE), the for-profit contracting branch of New Bedford YouthBuild, received a $48,350 grant from the Massachusetts Clean Energy Center to support YouthBuild's weatherization training programs (South Coast Today, 2010).

The city of New Bedford's role in the CMI is another important program input. The primary role of the city's Energy Director, Scott Durkee, has been to facilitate discussions between partners. Durkee addresses community groups' questions or concerns during partner discussions on program problems or barriers (G. Williams, personal communication, February 7, 2011). The city has also supported the community groups by helping acquire the necessary resources for their work, such as workers gloves and government-issued IDs (K. Lydgate, personal communication, February 4, 2011). As a former employee of the Massachusetts Department of Energy and Resources, Durkee believes his previous professional experiences working with many of the partner groups, such as NSTAR, has helped him gain legitimacy and the trust of program stakeholders (S. Durkee, personal communication, February 23, 2011).

The more traditional inputs of the New Bedford CMI include MassSave's incentives and auditing process. The auditing process is managed and conducted by CSG, an NSTAR audit contractor, and incentives offered are the standard MassSave offerings.

Program Outputs

The New Bedford CMI's two main outputs are the creation of local jobs and the implementation of a marketing/outreach campaign.

Creation of local jobs.

The Marion Institute's P.O.W.E.R. project has hired seven people to work on the CMI. This group includes one of P.O.W.E.R.'s co-founders and six P.O.W.E.R. Community Mobilization Leaders. Kalia Lydgate and Khepe-ra Maat-Het-Heru are co-founders and are responsible for managing the inter-organizational relationships between the various program partners and managing/organizing the P.O.W.E.R. team, respectively (M. Driggs, personal communication, February 4, 2011). While all of the P.O.W.E.R. Community Mobilization Leaders are responsible for executing door-to-door outreach, each leader also has individual responsibilities. These responsibilities include media design, data management, and outreach to schools (K. Lydgate, personal communication, March 16, 2011).

One of the Marion Institutes' priorities for the New Bedford CMI was hiring local residents. Five of the six Community Mobilization Leaders have spent all, or a significant amount, of their lives in New Bedford. According to Marty Driggs, the Community Mobilization Leader not from New Bedford, P.O.W.E.R. was created to empower the New Bedford community. Consequently, P.O.W.E.R. was reluctant to hire outsiders to work on the community program (M. Driggs, personal communication, February 4, 2011).

The cultural and ethnic makeup of the Community Mobilization Leaders team was also important to P.O.W.E.R., because it was thought that an outreach team that resembled and understood the communities being served would create a

better rapport between leaders and community residents (K. Lydgate, personal communication, February 4, 2011).

P.O.W.E.R.'s co-founders advertised the available CMI positions in flyers and through word of mouth. Of the 40 applications received, only 6 of the applicants were women, and only a few of the applicants were fluent in languages other than English (K. Lydgate, personal communication, February 4, 2011). The hiring process did not require applicants to provide a resume or an education history. Instead, Lydgate and Maat-Het-Heru evaluated applicants using the theory that educational attainment is not always the best assessment of a person's abilities. As part of the hiring process, Lydgate and Maat-Het-Heru considered applicants' skills and passion for the working in the community (K. Lydgate, personal communication, February 4, 2011).[32]

In addition to the initial training provided by NSTAR, P.O.W.E.R. held review sessions to go over the information presented by NSTAR. To ensure that the outreach team knew how to adequately communicate with customers about the energy efficiency audit process, the Community Mobilization Leaders were required to pass a quiz prior to beginning door-to-door outreach. A copy of the quiz can be found in Appendix F. The team was also required to have racial sensitivity and conflict training. Additionally, P.O.W.E.R. sought to educate the leaders on general sustainability issues, such as farming, climate change, and

[32] Although the P.O.W.E.R. CMI workers are paid by NSTAR, it is important to note that NSTAR was not involved in the hiring process. Nonetheless, according to Lydgate, NSTAR was aware that Lydgate and Maat-Het-Heru were interested in hiring people who may have "hiring challenges," meaning little education or formal job experience (personal communication, February 4, 2011).

consumerism, and supporting leadership development and skill transfers through the acquirement of data, public speaking and basic computer skills.

YouthBuild has six people working on the pilot program. Two of the employees, the construction supervisor and the green coordinator, worked for YouthBuild before the CMI started. The four new hires made up the "Weatherization Team." To find job candidates, Stepping Stones, the local community college weatherization program, forwarded the resumes of its graduates' that were interested in joining the Weatherization Team to YouthBuild (G. Williams, personal communication, February 7, 2011). The YouthBuild CMI employees act as subcontractors to CSG (G. Williams, personal communication, February 7, 2011). While the weatherization team members did not have any prior knowledge of energy efficiency and weatherization techniques before joining the team, each team member completed a basic weatherization course and became MassSave certified, which is a requirement for all MassSave contractors.

The implementation of the marketing and outreach campaign.

The marketing/outreach campaign was another program output. P.O.W.E.R.'s outreach strategies included door-to-door canvassing; making phone calls to residents; participating in community events and meetings, such as church meetings, neighborhood association meetings, and schools events; and advertising on local radio stations, the local public access television channel, and social network websites. Door-to-door canvassing was their primary outreach strategy and was the most efficient outreach technique in terms of the number of

intakes, or audit sign-ups, collected over a given amount of outreach time. (K. Lydgate, personal communication, February 4, 2011).

P.O.W.E.R. also reached out to New Bedford residents through various community activities. For example, P.O.W.E.R. sponsored a neighborhood block party in New Bedford's West End neighborhood that had approximately 100 attendees.[33] To get feedback and advice from community members, P.O.W.E.R. created a community leadership advisory group. P.O.W.E.R. encouraged a range of people to participate in the group, including those who were not active in the community, such as retirees. By tapping into existing community relations and interests, P.O.W.E.R. used the monthly group meetings as a venue for participants to share ideas and concerns about community issues, including the weatherization pilot (K. Lydgate, personal communication, March 16, 2011).

The Community Mobilization Leaders focused their outreach efforts in two New Bedford neighborhoods that have a high percentage of median income households. To facilitate in P.O.W.E.R.'s outreach efforts, NSTAR gave P.O.W.E.R. a list of all NSTAR customers in these neighborhoods that qualified for MassSave (K. Lydgate, personal communication, February 4, 2011).[34] Although the program targets median-income households, the program did not have an income verification process.

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[33] The block party was important not only because of its high attendance, but also because it was the first time that the neighborhood had had such an event in 15 years or more. The West End neighborhood was once known as a vibrant community, but the neighborhood has seen an increase in violence over the last 10 to 20 years. Consequently, outdoor events were rare as residents feared for their safety (K. Lydgate, personal communication, March 16, 2011). According to Lydgate, the success and interest in the block party was an indicator of how the neighborhood has a community of residents interested in coming together for such an event (K. Lydgate, personal communication, March 16, 2011).

[34] Low-income households that have a reduced utility billing rate do not qualify to participate in MassSave.

In terms of language issues, some of the outreach team spoke basic Portuguese and Spanish. The main outreach materials were also available in Portuguese and Spanish in case the outreach leaders had trouble communicating with households. A copy of these materials in multiple languages can be found in Appendix G. P.O.W.E.R. also had a team of volunteers available to help with translation issues. Typically, however, P.O.W.E.R. found that households had someone who spoke English and helped with necessary translations (K. Lydgate, personal communication, March 16, 2011).

Regarding messaging, the Community Mobilization Leaders typically tailored their conversation to the interests and attitudes of the resident. Often the leaders explained to potential customers how energy efficiency relates to broader community issues, such as environmental and economic problems. The leaders also emphasized how the pilot program could create community solutions to community problems. Through their outreach, the leaders also tried to alleviate residents' skepticism of the program's "free" services and products. This was accomplished by explaining that the pilot program was an opportunity to save money and energy and ensuring residents would not be taken advantage of by participating in the program (N. Rebeiro, personal communication, February 4, 2011; L. Daniels, personal communication, February 4, 2011).

Because the pilot program's goals are oriented around the number of weatherization jobs completed, P.O.W.E.R.'s outreach strategy was not just to encourage people to sign up for energy audits. P.O.W.E.R. also focused on sustaining contact with residents after they receive an audit to increase the

likelihood that weatherization work would be completed. During these various "check-in" stages, P.O.W.E.R. tried to determine which challenges and barriers prevented people from moving forward with an audit or weatherization work. These barriers ranged from preweatherization conditions, to language barriers, to lack of financing and to scheduling conflicts. Two of the most problematic roadblocks the pilot encountered were dealing with a backlog of audits and preweatherization issues.

When the pilot program first started, the P.O.W.E.R. outreach team's primary responsibility was generating audit leads for CSG. Specifically, the P.O.W.E.R. outreach team was asked to send CSG, via a google spreadsheet, the contact information of households interested in receiving an audit. Then, CSG was responsible for accessing the spreadsheet and contacting the households to schedule audit appointments. However, this system for scheduling audits did not work out well because many households were ultimately never contacted by CSG. By mid-February of 2011, there was a backlog list containing approximately 200 households needing to be scheduled for audits. To put this number in perspective, the pilot program estimated that CSG would do approximately 60 audits a month (K. Lydgate, personal communication, February 4, 2011).

While there is no clear explanation for why CSG did not contact all households, several reasons have been posited. One explanation is that CSG did not leave messages for homeowners when it called to make an appointment (K. Lydgate, personal communication, February 4, 2011). Another explanation is related to the timing of the program. Originally, it was expected that the bulk of

CSG's work would be done during the spring and summer months, which is typically CSG's slow season. However, because the program's implementation was delayed, the program ramped up its obligations to the program during CSG's busy season (T. Haggerty, personal communication, February 2, 2011). This helps explain why CSG was not as successful in completing the scheduling as it had anticipated. Other plausible explanations for the backlog of audits are that CSG simply did not have enough personnel to meet demand and the fact that some households are simply difficult to contact. Very likely, the backlog problem was a combination of all of these circumstances.[35]

In December 2010, the program partners addressed the backlog issue. They decided to make the P.O.W.E.R. team responsible for scheduling the audit appointments for CSG. Further, to focus on resolving the backlog problem, the P.O.W.E.R. outreach team was asked to pause its outreach campaign to prospective households to focus entirely on scheduling audits for households that had already expressed interest. Ultimately, P.O.W.E.R. was successful at reducing the backlog and was able to resume its outreach campaign to get new households to sign up for audits (K. Lydgate, personal communication, February 4, 2011).

Another barrier to the implementation of the CMI was the number of homes that had preweatherization issues prohibiting households from moving forward with the audit and weatherization process. Preweatherization issues include knob and tube wiring and the presence of asbestos. Preweatherization

[35] It is important to note that CSG was not asked to comment on this matter. Although the original research plan for this thesis included interviewing CSG personnel for both case studies, these interviews did not materialize. When the CSG representative in the MEC was contacted, she said that she was unable to participate in an interview without NSTAR's permission and that NSTAR would be able to provide the information that was being sought. In response to this answer, it was assumed that CSG would not participate in any interviews for this thesis and that NSTAR's responses would be adequate for this thesis' research.

issues are generally conditions related to a home's structural integrity, and these safety issues typically must be resolved before a comprehensive audit and weatherization/retrofit work can be done. As of March 17, 2011, 42 of the 218 (19%) households that received an audit encountered some type of preweatherization barrier (M. Driggs, personal communication, March 27, 2011).

Although all of the program partners seem to have been aware that preweatherization issues would pose challenges, Lydgate noted that P.O.W.E.R. did not realize how extensive the preweatherization problems would be. To address the preweatherization problems, P.O.W.E.R. began working with an electrician who is volunteering to check households with knob and tube wiring. P.O.W.E.R. is also looking for funding sources to help households pay for the preweatherization problems (K. Lydgate, personal communication, March 16, 2011). Tina Haggerty of NSTAR and Lydgate have also met with the city of New Bedford's Office of Housing and Community Development to discuss ways in which the office could help address the preweatherization concerns in the future.

Program Outcomes & Impacts

With the New Bedford CMI audit phase still in operation, the program outcomes and impacts cannot be known completely.[36] However, the program's successes and failures thus far provide insight into what the program's outcome may be. Figure 3 highlights the achievements of the CMI in the residential sector as of the end of March 2011.

[36] As of mid-March 2011 a third-party evaluation of the pilot program had begun (K. Lydgate, personal communication, March 16, 2011).

Figure 3. The New Bedford CMI's Success in the Residential Sector [37]

Households Reached	1,097 households of 2,873 households visited through door-to-door outreach (38%) have been reached, meaning that P.O.W.E.R. was able to speak with 1,097 households to tell them about the energy efficiency opportunities
Audits *(as of April 8, 2011)*	240 households have received an audit
	66 households are scheduled for an audit in April
	35 households are still waiting to be scheduled for an audit[38]
	52 households scheduled audits were canceled
Weatherization Work	28 households have been issued weatherization contracts (18 air sealing contracts, 18 insulation contracts) • 12 of the 28 household have completed work • 8 households are being scheduled to have work done • The remaining households are waiting for some type of action on the owner's behalf[39]
	42 household of the 218 household that received an audit before March 17, 2011 had some type of preweatherization issue • 6 issues were resolved and the households received, or are scheduled to have, an audit • 10 households declined further weatherization steps • The remaining households have not been able to move forward because preweatherization issues have yet to been resolved[40]

Success in reaching weatherization goals.

The goal of the New Bedford CMI is to weatherize 50 residential homes, 25 small business and 4 multi-unit buildings. Although only 12 of the 240 households that received an audit thus far (5%) have completed weatherization work, it is possible that this number will slightly increase when the 66 households with audits scheduled in April complete the auditing process and the 8 households

[37] It is important to note that these numbers were collected by P.O.W.E.R. either during the last week of program outreach or immediately after outreach efforts ended. A finalized tabulation of program results will likely be in the forthcoming program evaluation of the New Bedford CMI. All of the program results in this section come from M. Driggs, personal communication, March 27, 2011, April 7, 2011 and April 8, 2011.

[38] P.O.W.E.R. has attempted to contact these households at least once, so the bottleneck issue here is related to difficulties getting in touch with households, not difficulties with the scheduling process, which was a cause of the scheduling bottleneck earlier in the program.

[39] Four households are in the process of returning contractor documents to schedule work; two are getting other construction work done before completing weatherization; one household needs to complete ventilation work before getting air sealing; and one household has declined to have further work done.

[40] P.O.W.E.R. is currently trying to help these households overcome these barriers, for example by helping them make appointments with heating system specialists (M. Driggs, personal communication, April 8, 2011).

that are currently scheduling weatherization work, complete this work. Had preweatherization and cost barriers not existed, it is probable that the CMI could have moved closer to reaching the residential weatherization goal. Although the commercial auditing process is taking longer than P.O.W.E.R. expected, P.O.W.E.R. is optimistic that more than half of the 60 businesses scheduled for an audit will complete weatherization work, which will exceed the 25 unit weatherization goal for businesses. Further, P.O.W.E.R. expects to exceed its goal of weatherizing 4 multi-unit buildings (M. Driggs, personal communication, March 27, 2011).

Outreach success and participation barriers.

Despite the likelihood that the CMI will not meet its residential weatherization goals, the program has nevertheless developed a successful outreach strategy for making initial contact with residents and helping them overcome barriers to completing an audit or weatherization work. In 9 months, the P.O.W.E.R. Community Mobilization Leaders spoke with 1,097 of city's 38,178 households through door-to-door outreach, which averages 122 households a month. The fact that P.O.W.E.R. has not encountered any serious conflicts or problems during their outreach indicates the success of their outreach.

P.O.W.E.R.'s outreach success can be attributed to several factors. Lucky Daniels, a Community Mobilization Leader, believes that the combination of (1) the P.O.W.E.R. team being part of a legitimate organization, (2) the fact that many of the P.O.W.E.R. team members had an established relationship with the community, and (3) the P.O.W.E.R. team was knowledgeable about energy

issues, contributed to its successful outreach (L. Daniels, personal communication, February 4, 2011).

One important aspect of the program's outreach success is P.O.W.E.R.'s ability to address the backlog-scheduling problem and its efforts to help households overcome preweatherization issues. Had the scheduling issue not been a problem in the first place, it is likely that P.O.W.E.R. would have been able to reach even more households, since their efforts could have been spent reaching out to additional households. Further, several households on the backlog list eventually lost interest in the program once P.O.W.E.R. got in touch with them to schedule an audit several months after they had originally expressed interest in the program (K. Lydgate, personal communication, March 16, 2011).

In regards to participation barriers, it appears that there are several reasons why more households did not sign up for an audit and/or complete weatherization work. The P.O.W.E.R. leaders found that the most common response from households that declined signing up for an audit said that they were simply "not interested" (37% of refusals as of December 31, 2010).[41] Other reasons why households did not sign up for an audit include the fact some households recently had an audit (25%) or insulation work completed (10%). Additionally, 8% of the households expressed skepticism about the program, indicating they did not believe the measures would save them money or energy (M. Driggs, personal communication, March 27, 2011).

[41] P.O.W.E.R. has found that residents are often not more forthcoming about why they are not interested (M. Driggs, personal communication, March 27, 2011).

In terms of why households are not issued a weatherization contract after an audit, CSG has determined that more than half of the audited households were not cost-effective weatherization opportunities. The second biggest barrier to the issuance of weatherization contracts is the existence of preweatherization issues. The inability to pay for preweatherization work or the weatherization work co-pay is also likely to inhibit participation. P.O.W.E.R. found that preweatherization costs vary widely from a couple hundred dollars to tens of thousands of dollars for complete rewiring of entire floors (M. Driggs, personal communication, March 27, 2011).[42]

Cost-effectiveness.

Another important aspect related to the outcome of the CMI is whether the outreach was cost-effective in terms of the amount of money spent on outreach and the actual energy savings achieved. In the end, the success of the program's energy savings goals will depend on how many households complete weatherization work. This highlights the importance of determining how to address preweatherization and financial barriers to increase the number of households that complete weatherization work.

Creation of local jobs.

The New Bedford CMI generated 11 new jobs through P.O.W.E.R. and YouthBuild. Yet, several uncertainties remain regarding the permanency of these positions. While the newly established P.O.W.E.R. positions were created with the hope that they would last beyond the CMI, the funding provided by NSTAR for these positions ended on March 31, 2011. P.O.W.E.R. is currently looking for

[42] In order to understand the impact of these cost barriers, more analysis of the program is required.

other funding. Potential sources include grants and out-of-pocket audit and weatherization payments made by households that decide not to participate in the MassSave program (K. Lydgate, personal communication, February 4, 2011).

For YouthBuild, the lack of guarantee of what the weatherization workflow would be for the contractors has been an ongoing concern and problem. YouthBuild expected to have two Weatherization Teams made up of approximately 10 people working on the CMI. However, the program thus far has not resulted in the demand for weatherization that YouthBuild originally expected, which has limited the number of people that YouthBuild has hired. YouthBuild hopes to sustain the weatherization contracting positions by continuing to work on weatherization projects through the city Community Retrofit Program (G. Williams, personal communication, February 7, 2011). Further, YouthBuild is looking for other weatherization opportunities, such as working on homes that are not interested in receiving the MassSave rebate (G. Williams, personal communication, February 7, 2011).

The lack of funding to sustain the jobs created by the CMI and the uncertainty of future work makes it difficult to assess what the long-term success of the program will be for job creation. While the experiences and skills acquired by the P.O.W.E.R. and YouthBuild employees in the CMI will likely improve their future job prospects, such benefits do not satisfy the larger goal of creating long-lasting, stable and local jobs.

Development of capacity for, and interest in, future energy work.

While the New Bedford CMI will not meet all of its initial goals, the program's successful outreach and community engagement is likely to help build capacity and interest in supporting future energy efficiency efforts in New Bedford. The city of New Bedford's five-year Community Retrofit Program should greatly benefit from the lessons learned from the CMI regarding the preweatherization challenges in New Bedford's housing stock, as well as the different resources or inputs that are necessary to make a successful retrofit program. As Scott Durkee commented, while the city is still deciding how it will institutionalize the residential energy efficiency efforts once the CMI ends, his main priority going forward is to use the lessons learned regarding the partners' strengths and weaknesses to avoid needless duplication of efforts and to maintain the efficient residential structure in future endeavors (S. Durkee, personal communication, February 23, 2011). Building upon the program partnerships established through the CMI, as well as tapping into the community interest in efficiency issues that were created by the CMI, should help the city of New Bedford as it develops and implements the next stages of its efficiency plans.

Chapter 6 – A Cross-Case Analysis

The case studies of the MEC and the New Bedford CMI have similar components and goals, yet they differ from each other in significant ways. To better understand these similarities and differences, this chapter presents a cross-case analysis of each of the case studies using the original thesis research questions presented in Chapter 1.

What are community efficiency programs? How is community defined? What are the community components of these programs?

While the respective community approaches of the New Bedford CMI and the MEC often differ, an examination of the two programs suggests that, at the most basic level, a community-based efficiency program is a program that aims to increase energy efficiency efforts in some manner. A community-based energy program also uses some community elements to catalyze this increase.

In both the MEC and the New Bedford CMI, there were multiple understandings or definitions of "community." Stakeholders often described the community as the residents living in the respective town or city's political boundaries. Yet, at the same time, the programs' goals and priorities often honed in on specific groups or enclaves within the greater communities, which caused stakeholders to simultaneously form a more narrow definition of community. For example, in the MEC, all qualified Marshfield residents could participate in the program (i.e., non-low-income NSTAR electric customers). The MEC sent direct mailings to all of the qualified residents. Yet, the program also targeted additional direct mailings to residents on the congested circuit and to homes that were

believed to have a central air conditioning system.[43] Further, the MEC used energy usage data to direct mailings to targeted communities (S. Haselhorst, personal communication, February 15, 2011). Therefore, for the MEC, while the community was often depicted as including all of the town's residents, in actuality, NSTAR also targeted a specific subset of the Marshfield community based solely on geographical location.

In New Bedford, while the city has a plan to implement an energy efficiency program that serves all New Bedford residents over the next five years, the New Bedford CMI was designed to reach a particular subset of the New Bedford community. Specifically, it targeted two neighborhoods that have a high percentage of households that had incomes that were between 60% and 120% of state median income. Therefore, similar to the Marshfield program, the New Bedford CMI often uses the word community to describe the greater New Bedford residents. Yet, the program also focused on serving a particular subset of the community defined by both geographical location and economic conditions.

In regards to actual community components, both the MEC and the New Bedford CMI developed a marketing and outreach theme that centered on "community." In Marshfield, the marketing campaign used slogans, such as "We are Marshfield," to promote the sense that participating in the challenge made one an active member of the Marshfield community.[44] In New Bedford, the

[43] According to the MEC evaluation, customers on the targeted circuit were sent one direct mail postcard and two letters, while all other residents received a post card and one letter (ODC, 2010, p.18). The postcard was sent to 11,092 Marshfield homes on May 2, 2008. The evaluation does not state how many people on the circuit were targeted with the additional letter. However, it does note that in July 2008, 1,054 homes that were believed to have a central air conditioning system were sent an additional letter (ODC, 2010, p.135).

[44] See pages 46-47 in Chapter 4 for more information on the development of the MEC's community theme.

Community Mobilization Leaders often described the program to residents as an opportunity to save money and support the community by reducing the city's greenhouse gas emissions and by supporting local businesses. Further, the CMI's marketing and outreach strategies included participation in community events, such as block parties, meetings, or fairs. The purpose of these events was to increase the program's visibility in the community and the number of participants in the program.

While both programs sought to build relationships with key community leaders in order to have these community members serve as program messengers, the responsibilities of these messengers differed in each program. In the MEC, local leaders informally promoted the program by acting as so-called "Program Ambassadors." While NSTAR officials asked the Ambassadors to act as program spokespeople by participating in the program and telling residents about their experiences, the Ambassadors were never asked to do any formal outreach.[45]

In New Bedford, the community members who made up the P.O.W.E.R. team had a more formal, structured role in the outreach and marketing components of the program, not least of all because P.O.W.E.R. was the primary means of disseminating the program's message. As the primary program messengers, the P.O.W.E.R. team was responsible for designing and implementing the program's outreach and marketing strategies. The P.O.W.E.R. team not only focused on reaching community members through door-to-door outreach, but also focused on building relationships with important groups and

[45] See pages 48-50 in Chapter 4 for more information on the roles of the MEC Ambassadors.

leaders in the community, such as faith-based institutions, to support their outreach efforts.[46]

Interestingly, although the MEC did not use door-to-door or neighborhood canvassing outreach strategies, when NSTAR was first designing the program it considered implementing similar outreach strategies during the second year of the program. However, by the program's second year, NSTAR decided it did not need to "retool" program outreach strategies because the marketing advertisement campaign proved successful enough in its first year (S. Haselhorst, personal communication, February 15, 2011).

The New Bedford program also differed from the MEC in that it made the community an integral part of program's weatherization work. In Marshfield, established energy efficiency and renewable energy service providers (e.g., CSG and GroSolar) completed the energy audits and weatherization work. In contrast, the New Bedford CMI selected the local organization, New Bedford YouthBuild, to complete the weatherization work.

Lastly, a community component that both programs shared was that both programs improved community capacity for future energy efforts. For instance, in Marshfield, a direct community benefit of the MEC was the establishment of the Marshfield Energy Committee. While the MEC was not solely responsible for establishing the committee, the MEC provided a favorable atmosphere and resources that helped the committee gain support and credibility.

The importance of the CMI's creation of jobs for community members cannot be underestimated. The P.O.W.E.R Community Mobilization Leaders' and

[46] See Chapter 5 for more information on P.O.W.E.R.'s formal and informal roles in the CMI.

the YouthBuild teams' role in the CMI not only helped build leadership in the local community, but it also created a unique work environment that brought together people from various educational and life backgrounds and offered them new career paths.[47]

In what contexts do community efficiency programs arise? What are the priorities and goals of these programs?

The MEC and the New Bedford CMI have similar fundamental elements. They are both NSTAR-sponsored pilot programs that have community components. They both build upon MassSave services and incentives and seek to increase participation in MassSave. Both programs also test the efficacy of using nontraditional outreach and marketing mechanisms to increase participation in MassSave.

Despite these similarities, the respective contexts in which the programs arose and the specific priorities and goals of the two programs differ significantly. With respect to context, one essential difference between the two programs is the implementation dates. The MEC was NSTAR's first efficiency pilot program that had a focused community component. In addition to the MEC being NSTAR's first community-focused efficiency program, another influential component of this program was that NSTAR sparked the initial interest in developing this pilot. Although the MEC had community components, all of the stakeholders recognized that the pilot was an NSTAR-run program. This meant NSTAR was

[47] See pages 58-60 and page 87 for more information on the long-term impacts of the two programs on their respective communities.

the main entity controlling the design and implementation of the MEC.[48] Further, while the program provided direct benefits for Marshfield residents, the original motive of the program was to address NSTAR's concern over capacity restraints, not to help Marshfield's residents save money and energy by becoming more energy efficient.

The New Bedford CMI started a few years after the MEC was launched and emerged from a different political, social, and economic context than the MEC. One of the most significant changes that occurred between the implementation of these respective pilot programs was the signing of the Green Communities Act in July 2008. This act established the Energy Efficiency Advisory Council and required Massachusetts investor-owned utilities to pursue all means of cost-effective energy efficiency. At this time, the Green Justice Coalition and other non-profit and community groups, like the Marion Institute, began discussions with various state, municipal and utility officials about the need to both increase the participation rate of residents traditionally underserved by MassSave and support local job development.[49]

The differing contexts are also directly related to the programs' contrasting goals and priorities. Since NSTAR was the sole designer and oversight body of the MEC, the MEC program targeted NSTAR customers living on the congested circuits that needed relief. On the other hand, the New Bedford CMI was a collaborative effort created by multiple parties, including several

[48] See page 50 in Chapter 4 for a more complete explanation of NSTAR's power in the MEC.

[49] See pages 32-35 in Chapter 1 and 61-66 in Chapter 5 for more details on the context in which the New Bedford CMI emerged.

different entities affiliated with the New Bedford community. These parties all took a collective interest in developing an efficiency program in New Bedford. Consequently, the New Bedford CMI was oriented around the particular goals and priorities held by an array of stakeholders. Although there were several interests at the table during the planning stages of the New Bedford CMI, the program also prioritized the development of a cost-effective model for targeting hard-to-reach communities in New Bedford and generating jobs.

What roles do community groups and residents play in community efficiency programs?

Comparing the MEC and the New Bedford CMI reveals that community efficiency programs differ in how and when community components are integrated into the program and in what capacity stakeholders can influence the development of these components. There are two important parts of the program design and implementation process: (1) how stakeholders are brought into the program and (2) how stakeholders/partners obtain power or responsibilities.

The MEC's design and implementation elements are aptly described as top-down. NSTAR determined how the program was implemented and how it proceeded. Community members did not become involved with the program until NSTAR decided to achieve its energy goals by improving its efficiency program. Further, many of the community marketing ideas materialized during and after the initial planning workshop/charrette. NSTAR and its program partners and consultants recognized the initial enthusiasm and interest of residents at the workshop. Yet, while NSTAR was the lead decision-maker in the program, NSTAR seemed to value town leaders' approval. Further, on several occasions,

NSTAR solicited feedback and input on the implementation of various aspects of the program from the Ambassadors (P. Halkiotis, personal communication, April 6, 2011). Further, community member approval was emphasized by the Rocky Mountain Institute Team's recommendation for how to do the community-based marketing aspect of the program:

> It will be important to vet very early on the program's concepts, themes, marketing approaches, and community goals with the town's leaders and informal opinionshapers. This will set the foundation upon which to build the initiative and grow the support that many of the leading townspeople will already be offering. The consensus around how to roll out the pilot will be influenced by discussions with the dozen or so leading citizens and opinion-shapers that have been identified within Marshfield (RMI, 2007, p. 38).

While the community leaders lacked formal power or control over the MEC, they still played important roles in the program. For example, the leaders often increased the program's exposure and legitimacy and helped address residents' concerns or questions about the program. With respect to exposure and legitimacy, Rocco Longo, the Marshfield Town Administrator, described how the town's partnership with NSTAR gave the program more legitimacy because people were skeptical about why the utility wanted households to reduce energy use. Further, the town was influential in increasing the program's exposure by talking about the MEC at televised selectmen meetings (R. Longo, personal communication, February 17, 2011).

Longo also described an instance in which he and an NSTAR representative met with a disgruntled resident. The resident was upset because he had heard NSTAR was planning to control all program participants' air

conditioning systems through NSTAR's direct load control program. The resident was invited to meet with Longo and an NSTAR representative. Longo and the representative described NSTAR's intentions and its purpose with respect to the air conditioning units (offering a voluntary direct load control program). This dialogue overcame the misinformation challenging the program and placated the resident (R. Longo, personal communication, February 17, 2011).

While some elements of the New Bedford CMI program are similar to the MEC in terms of partner roles and responsibilities, the CMI pilot also has grassroots or bottom-up elements related to the design and implementation aspects of the program. Unlike the MEC, the focus on integrating community components into the program came at the very beginning of the CMI program design process. Four of the major program parties (NSTAR, town of Marshfield, P.O.W.E.R., and YouthBuild) came to the planning table with a preconceived idea of creating an energy efficiency program that would have community components, such as creating local jobs to implement various aspects of the program.[50]

Although NSTAR and CSG were largely responsible for coordinating much of the technical and financial aspects of the program, the community partners also had formal roles and responsibilities in implementing the outreach and weatherization work. The P.O.W.E.R. team was the sole marketing and outreach provider, while New Bedford YouthBuild is the program's designated contractor for completing the weatherization work.

[50] See pages 61-66 in Chapter 5 for more information on the initial development of the CMI.

The community partners and the CMI pilot appeared to mutually benefit each other. The program offered the community partners job opportunities, while the community partners offered the program ties to the community that helped increase interest in the program. The services provided by the community partners to the program is highlighted on P.O.W.E.R's website:

> [The CMI] model has many benefits. Not only does it save residents money, reduce carbon emissions and create local jobs, it also builds community and showcases the value of social networks. By developing a team of community leaders to educate, do outreach and engage participants, we are able to take advantage of existing social networks and use the power of peer reinforcement to promote a shift in consciousness and behavior of the community (The Marion Institute, 2010).

Community partners also acquired informal roles in the CMI that were influential in shaping how the program unfolded. For example, while P.O.W.E.R. and YouthBuild were not formally instructed to address certain program barriers, such as preweatherization, both groups tried to find ways to resolve such issues. Further, P.O.W.E.R.'s efforts also helped build community capacity and camaraderie through non-door-to-door outreach efforts, such as organizing neighborhood meetings and holding community events like the block parties.

What are the politics and stakeholder dynamics that arise in a given program?

In both the MEC and the New Bedford CMI pilot programs, stakeholder dynamics were generally positive. However, both programs also had situations that strained stakeholder relations at times.

MEC program partner dynamics.

Overall, those interviewed who were involved in the MEC indicated there was minimal tension among partners or between the partners and the general public. As described in Chapter 4, there seemed to be little, if any, controversy that arose when NSTAR first proposed the program. Sue Haselhorst, NSTAR's MEC Manager, thought that one reason why there was an overall positive relationship between partners was because of the high level of commitment she and NSTAR had to the program (personal communication, February 15, 2011). Haselhorst also described how the NSTAR community liaison's role helped the utility address many issues that could have caused tension had they not been addressed, such as customers not understanding the details of the program, as in the above example about the direct load control program. Another reason that the partners had a good relationship may be that, lacking municipal resources to implement a similar program themselves, town officials were excited about NSTAR's plans.

Lack of communication at the end of the MEC.

One aspect of the MEC that elicited frustration among some Marshfield community leaders related to how the program ended. At the end of the MEC, NSTAR sponsored a public event to celebrate the program's success. NSTAR also held a wrap-up breakfast meeting for the Ambassadors. At this meeting, NSTAR emphasized that many of the services offered by the MEC, such as the MassSave incentives, would remain available to residents after the MEC ended. However, NSTAR indicated that, moving forward, the advertising for such

services would be less intense than during the MEC (S. Haselhorst, personal communication, February 15, 2011).

Despite the public community event and the wrap-up meeting, some interviewees expressed frustration or disappointment that they were not given more details about the program's outcome. According to Halkiotis, the town did not receive a final report from NSTAR about the program. Consequently, Halkiotis was forced to ask NSTAR for program statistics, such as number of installed measures (personal communication, February 17, 2011).[51] Yet, despite the lack of closure observed by some, Town Administrator Rocco Longo noted that, because of the MEC, the town of Marshfield and NSTAR have developed a friendly and accessible relationship (personal communication, February 17, 2011).

CMI community group conflicts.

The New Bedford CMI program had several issues related to program politics and stakeholder dynamics.[52] A political issue that occurred when the CMI was first proposed had to do with tensions between two community organizations. As described in Chapter 5, the Green Justice Coalition, a coalition of Massachusetts organizations working to improve energy efficiency opportunities

[51] It is interesting to note that, from the perspective of NSTAR, Opinion Dynamics Corporation and M. Blasnik & Associates' third party evaluation of the MEC is not considered a public document because it was not filed with the DPU. However, when asked during the thesis research process if the Marshfield Energy Committee could receive a copy of the evaluation, NSTAR said that it was comfortable sharing the evaluation with the committee because they were active in the MEC (J. Gudell, personal communication, February 14, 2011).

[52] It is possible that more observations were made about CMI program's politics and stakeholder dynamics as compared to the MEC, because the CMI program had more complex community components. Another reason for more observations may be because the research for this thesis was done during the implementation of the CMI and several years after the MEC's implementation. This difference in time may have affected how interviewees recalled information about program politics and stakeholder dynamics.

for marginalized communities, played an essential role in helping NSTAR develop the CMI model. Currently, the Green Justice Coalition has a primary role in two of NSTAR's CMI pilot programs. The coalition originally planned to have a leading role in the New Bedford CMI, too. However, while the Marion Institute and the Green Justice Coalition were at the talking table when the CMI program was initially discussed in New Bedford, the two groups had disparate ideas about which local community group(s) should implement the program's outreach and the extent to which unions should be involved in the program. Ultimately, their disagreements were not resolved and the Green Justice Coalition separated from the New Bedford CMI (K. Lydgate, personal communication, February 4, 2011).

Program partner dynamics.

Although there were several parties involved in the CMI program, many interviewees noted that program partners generally had a productive and cordial relationship. Representatives from each partner group (NSTAR, CSG, the city of New Bedford, P.O.W.E.R. and YouthBuild) engaged in productive, weekly phone meetings to discuss program progress and issues. Scott Durkee of the city of New Bedford indicated that despite the expected disagreements that arose from conflicting ideas and visions for the program, the program illustrated how different groups can cooperate to do energy efficiency work (personal communication, February 23, 2011).

Yet, interviewees also mentioned tense relationships between the partners. For example, while YouthBuild and NSTAR had a good relationship at the beginning of the project, once the backlog issue arose, the relationship became

strained (G. Williams, personal communication, February 7, 2011). Not only did Gloria Williams of YouthBuild think that NSTAR and CSG were not doing enough to address the backlog issues, she was also led to believe that either the CMI was not a priority to NSTAR or CSG, or that NSTAR merely did not expect the P.O.W.E.R. team to generate as much interest in the program as quickly as it did. Despite having raised these issues with the other partner programs, when Williams was interviewed in February 2011, she was skeptical that the backlog issue would be addressed adequately and resolved (personal communication, February 7, 2011).

Another interesting aspect of the CMI program's stakeholder dynamic has to do with misunderstandings and challenges related to communication between program partners. In several instances, interviewees described situations in which there was a lack of information or misunderstandings among program partners that negatively affected how the program unfolded. According to Kalia Lydgate of the Marion Institute, one example of this misunderstanding between program partners occurred early on in the program, when P.O.W.E.R. discovered that NSTAR required background checks on anyone doing door-to-door outreach. According to Lydgate, P.O.W.E.R. did not expect this restriction and this restriction prevented P.O.W.E.R. from using volunteers to do the door-to-door outreach, since background checks are very costly, and not an expense the Marion Institute was willing to pay for out of its budget (K. Lydgate, personal communication, February 4, 2011). According to NSTAR, the background check issue is vetted during the planning stage process of any program, and again prior

to contract signing. NSTAR contends that all contractors/program partners participating in the New Bedford CMI knew prior to signing a contract with NSTAR that there were background check requirements for anyone who was contacting, and possibly entering the homes of, NSTAR customers (W. Stack, personal communication, April 28, 2011).

According to Williams, other examples of miscommunication or misinformation among program partners existed. For example, YouthBuild was originally told that everyone who was contacted by P.O.W.E.R. would receive air sealing. Later, however, NSTAR explained to YouthBuild that doing air sealing in all homes was not financially feasible (personal communication, February 7, 2011). When asked about this air sealing issue, NSTAR acknowledged the potential for miscommunication or misunderstanding concerning this issue. NSTAR's audit program advertises that it offers "free air sealing" to its customers, and NSTAR recognizes that this wording may lead people to think that all homes qualify for air sealing. However, NSTAR explained that only some homes qualify for this free air sealing. William Stack of NSTAR clarified this point:

> All weatherization work must be cost effective, and the greatest savings generated in air sealing is in the attic. If the attic is finished or for other reasons cannot be air sealed, air sealing cannot be offered to the customer under the program because the savings generated by just air sealing basement levels and living space of the home are insufficient to justify the expense and thus would not be cost effective (personal communication, April 28, 2011).

Stack noted that these issues were discussed during the initial program training. However, he also offered that perhaps the distinction between free air sealing for

all customers and free air sealing for those that qualify was overlooked or not communicated clearly enough. Describing a lesson learned from this CMI experience, Stack noted that " in [NSTAR's] excitement to roll out the CMI, [it] may have compacted too much training [information] in too short a period of time" (personal communication, April 28, 2011).

Another example of communication misunderstandings is how P.O.W.E.R. originally assumed it would have easy access to the household data collected by CSG, such as audit results and weatherization recommendations. However, P.O.W.E.R. quickly discovered that CSG was not making this information readily available. Instead, P.O.W.E.R. realized that, in order to obtain information needed to facilitate follow-up work with each resident, the group would have to be more aggressive in getting this information from CSG (K. Lydgate, personal communication, February 4, 2011). It ended up taking months after P.O.W.E.R. requested audit result information before CSG gave P.O.W.E.R. the requested information (K. Lydgate, personal communication, February 4, 2011)

What are the challenges and barriers faced by community efficiency programs?

The MEC and the New Bedford CMI faced very different challenges and barriers. For example, in New Bedford, housing characteristics significantly complicated the weatherization work. In contrast, it appears housing characteristics were not problematic for the MEC. With 72.9% of New Bedford's housing stock built before 1960, 42 of the 218 homes that had an audit as of March 17, 2011, had preweatherization issues. Preweatherization issues are

typically found in older homes and include knob and tube wiring and lead-based paint and asbestos. In Marshfield, the housing stock is newer compared to New Bedford. Only 39.9% of its housing stock was built before 1960. In fact, preweatherization issues were not addressed in the third-party program evaluation for the MEC, nor did interviewees consider such issues to be a barrier to the MEC's participation rate.[53]

Because preweatherization issues are currently not considered part of the scope of Massachusetts utility energy efficiency programs, the New Bedford CMI program did not allocate any institutional or financial resources to overcome this challenge. Yet, even without having the formal responsibility of addressing preweatherization issues, both P.O.W.E.R. and YouthBuild took informal steps to help individual households overcome preweatherization problems so that the rest of the auditing process and weatherization work could be completed. NSTAR's Tina Haggerty noted that while the program's outreach was successful, the program needed other sources of funding to overcome the preweatherization barriers (personal communication, February 2, 2011).

The New Bedford CMI program was also challenged by the difficulty associated with screening out low-income customers. Low-income utility customers in Massachusetts do not qualify for MassSave, and therefore were not able to participate in the CMI, since the CMI is a MassSave program. However, low-income residents are eligible to receive free weatherization services from

[53] The third-party evaluation of the MEC did note that some participants completed a home energy assessment but did not qualify for the installation of any program components (e.g., installing light bulbs, installing insulation, etc.). However, the evaluation does not cite how many households fell into this category, nor does it cite preweatherization issues as reasons for inability to qualify. While preweatherization issues may be a reason, another reason may be that CSG determined that there was a lack of opportunity for savings from weatherization for such homes.

their local community action program (CAP) agency and reduced rates for many utilities. While NSTAR gave the P.O.W.E.R. outreach team a list of low-income households in the neighborhoods in which P.O.W.E.R. was working, the high turnover rate of households in these neighborhoods required the outreach team to ask homeowners if they were low-income. This created another step to be completed to filter out households not qualified for the program (T. Haggerty, personal communication, February 2, 2011).[54]

Since the MEC and the CMI were both pilot programs, they had a "learn-as-you-go" element to them. While the "learn-as-you-go" element in the MEC was mostly due to NSTAR's deciding which methods would work best for its program, the New Bedford CMI had a more difficult time with the "learn-as-you-go" system. For example, Kalia Lydgate of the Marion Institute described how the P.O.W.E.R. team had difficulty figuring out the details of CSG's auditing process. The process required the team to understand the various obstacles that prevent households from moving forward with weatherization work (K. Lydgate, personal communication, February 4, 2011). While NSTAR hosted initial training sessions for the outreach team to review the auditing process, Lydgate indicated that certain details, such as the pervasiveness of preweatherization issues, or the fact that homes with finished attics have no air sealing opportunity, were not addressed adequately before the program launched. Consequently, much time was spent throughout the program figuring out the nuances of the process. This lack of

[54] While this issue did not surface in the research on the MEC, it is possible that NSTAR faced this issue to some extent when it sent direct mailings to customers. However, because Marshfield is a wealthier community than New Bedford, it is likely that filtering out the low-income households was less problematic in the MEC.

preparedness slowed program implementation and perhaps contributed to the pervasive backlog problem (K. Lydgate, personal communication, February 4, 2011).

P.O.W.E.R. also faced auditing process difficulties when working with a local plumber to address combustion safety issues that CSG found during audits. In several instances, when the plumber looked at the households that were flagged for combustion safety issues, the plumber did not find any problems. When P.O.W.E.R. raised this issue with CSG, CSG explained that the heating combustion safety test follows BPI standards.[55] Since general plumbers or contactors are typically not trained in BPI, in these instances the plumber did not recognize the combustion safety barriers noted by CSG. Had P.O.W.E.R. been warned that a BPI test would be required, P.O.W.E.R. could have addressed these barriers in more efficiently (K. Lydgate, personal communication, April 10, 2011). While NSTAR argued that the "bootcamp" training and the additional program-specific training educated P.O.W.E.R. and YouthBuild about weatherization barriers and air sealing issues, NSTAR also recognized that it could have offered more training to the outreach and weatherization employees and that this could have stressed the significance of preweatherization barriers (Stack, W., personal communication, April 28, 2011).

Another issued tied to the "learn-as-you-go" and partner expectations aspects of the program is the lack of preparedness for dealing with unanticipated

[55] BPI (Building Performance Institute) is a company that develops technical standards for home performance and weatherization retrofit work.

problems. The backlog scheduling issue is the best example of this.[56] Neither NSTAR nor CSG was fully prepared to deal with the growing backlog. While the backlog problem seems to have resulted from a combination of several factors, such as timing, scheduling difficulties, and capacity, Lydgate was surprised that the bottleneck issue was not anticipated and that they were not remedied immediately by NSTAR and CSG (personal communication, February 4, 2011). When asked in February, after the partners determined how to address the bottleneck issue, Tina Haggerty of NSTAR indicated that senior management at both NSTAR and CSG were interested in installing safeguards to prevent this problem from occurring in the future, although she did not provide details on these potential safeguards (personal communication, February 2, 2011).[57]

Since the CMI pilot was P.O.W.E.R.'s first project, and given that most team members had minimal prior knowledge of energy efficiency programs, the team was challenged to learn a substantial amount of information about energy efficiency, the auditing process and techniques for successful outreach in a short amount of time. Ultimately, the "learn-as-you-go" aspect of the program in the New Bedford CMI, in conjunction with different program partner expectations, amplified the challenge of creating a smooth-running program. Lydgate thought that given CSG's and NSTAR's expertise in the auditing process, they might have foreseen some of the P.O.W.E.R. team's questions and confusion and would have informed the team about these issues during the initial training (personal

[56] For a detailed description of the backlog issue, see pages 79-80 in Chapter 5.

[57] Tina Haggerty also noted how NSTAR and other utilities are trying to tackle this backlog issue as they developed a new MassSave model (personal communication, February 2, 2011).

communication, February 4, 2011). While NSTAR argued that all of these issues were discussed to some degree during the trainings, it also acknowledged that issues such as weatherization barriers and air sealing opportunities should have been discussed in more detail (W. Stack, personal communication, April 28, 2011). To address this failure of communication and information sharing, Lydgate suggests that future programs have front-loaded training to minimize confusion and dedicate more time to troubleshoot issues at the beginning of the program (personal communication, February 4, 2011).

What are the impacts and/or results of community programs?

While this thesis highlights how energy efficiency programs differ in their community components, it is important to consider these differences in the context of the programs' impacts and results. Specifically, understanding the ways community-based programs are successful and comparing their degrees of success can help energy efficiency stakeholders and community-program advocates understand which types of community components should be emulated and pursued in the future. Unfortunately, because there is no cost data for either the MEC or the New Bedford pilot, and since there is incomplete data for the New Bedford pilot, it is difficult to complete a comprehensive comparison of impacts.

Nevertheless, the available data can still help to shed light on the cost issue. Figure 4 compares available statistics for the marketing mechanisms, work completed, energy savings and jobs created for the residential parts of the MEC and New Bedford CMI pilot programs. When comparing the potential reach of each program's marketing, it is important to note that the information listed in

Figure 4 is incomplete. For the MEC, there are several additional marketing tools that were used that do not have potential reach estimates. Examples of these tools include word-of-mouth information sharing, media coverage, community events, radio publicity, and distribution of program brochure. Further, it is unclear how many people/households overlap for each marketing mechanism's potential reach. Similarly, for the New Bedford CMI, there are additional marketing mechanisms in addition to the door-to-door outreach, such as word-of-mouth information sharing and local community events, that do not have potential reach estimates. Nevertheless, these types of marketing strategies likely increase the number of people/households reached.

Figure 4. Comparison of Programs' Participation in the Residential Sector

	Marshfield[58]	**New Bedford**[59]
Length of Program (Marketing)	≈ 24 months	≈ 12 months
Number of Housing Units in Town/City	8,905	41,511
Number of Eligible Households	?	?
Potential Reach of Postcard Mailing	11,092 households	n/a
Potential Reach of Letter Mailing	1,054 households	n/a
Potential Reach of Advertisement in Local Newspaper	4,123 households	n/a
Potential Reach of NSTAR/Program Website	10,340 people	n/a
Potential Reach of School Seminars	500 people	n/a
Potential Reach of Door-to-Door Outreach	n/a	2,873 households
Increase in Program Participation	900% – 1,400%	?
Number of Household Audits	1,296	306
Percentage of Households that Completed Air Sealing Work	16%	7.5%
Percentage of Households that Completed Insulation Work	20%	7.5%
Energy Savings	385 kW	?
Local Jobs Created	n/a	11

[58] ODC, 2010.

[59] M. Driggs, personal communication, March 27, 2011.

Despite these caveats, Figure 4 highlights distinctions between the two programs. While the town of Marshfield has less than one-fourth the number of housing units than New Bedford, the potential reach of MEC's marketing was significantly larger than the potential reach of New Bedford's door-to-door outreach. At the same time, the table indicates that the New Bedford CMI likely had a higher chance of having direct, personal contact with potential customers.

In regards to the number of audits/energy assessments completed by each program, it should be noted that because the New Bedford program is currently completing audits through April 2011, the number presented in Figure 4 is an estimate and includes the 260 households that have received an audit and the 66 households that are scheduled for an audit sometime in April. While it is difficult to compare the audit statistics because of the differences between the two programs, simply looking at both the number of audits completed and the programs' operation lengths suggests that, had the New Bedford CMI continued to run for almost two years (the length of the MEC), it is possible that the CMI would achieve approximately 816 audits, which is 62% of the audits completed in the MEC over 24 months. However, even if the two programs achieved the same number of audits in a given amount of time, without detailed data on the cost of each program's marketing and outreach efforts (i.e., paying for direct mail, paying P.O.W.E.R.'s wages, etc.) it is impossible to know the cost effectiveness of each pilot program and which program employed the most cost-effective marketing and outreach strategies.

There are also problems comparing the weatherization work completed by the programs. While the third party evaluation of the MEC provides information about the percentage of households that installed energy measures after the audit, including air sealing and insulation, for the New Bedford CMI, the number of contracts issued for insulation or air sealing work must be used to estimate the percentage of households that have, or will, complete air sealing and insulation work in the CMI pilot. The estimated percentage of households for both insulation and air sealing work for the CMI pilot is slightly less than half of the percentage of households that received this work in the MEC. One question that cannot be answered now, but should be addressed in the formal evaluation of the New Bedford CMI, is to what extent preweatherization issues and program costs prevented households that received an audit from completing air sealing and insulation work.

With respect to energy savings and local job creation, since the New Bedford pilot is still conducting audits and weatherization work, it is difficult to predict the program's overall energy savings. Even if both programs had the same number of audits or percentages of households with air sealing or insulation work, it would be difficult to predict which program would achieve more savings. On the one hand, it is possible that the MEC achieves more savings because it offered basic weatherization work and direct load control and installation of photovoltaics. On the other hand, the New Bedford housing stock is significantly older than Marshfield's. Consequently, the homes in New Bedford might yield

higher energy savings, as well as be more expensive to retrofit, if they were initially more inefficient.

As for job creation, the New Bedford CMI pilot focused on hiring local residents, while the MEC did not. Yet, as was noted in Chapter 5, it is unclear at this point whether the CMI jobs will be sustainable when the CMI pilot ends.

Summary of Findings and Conclusion

Recent interest in community-based efficiency programs is fueled by the idea that community involvement in an energy efficiency program helps increase a program's success. To better understand the nuances of programs that are so-called "community based" or have "community components," this thesis examined in detail two energy efficiency programs. The case studies in Chapters 4 and 5 and the cross-case analysis presented in this chapter informed the following conclusions about community efficiency programs:

- Community energy efficiency programs arise in various contexts, and such contexts can influence who is at the table to design and implement the programs. For both the MEC and the New Bedford CMI pilot, state and national policies that support efficiency efforts were influential in the programs' emergence.
- The priorities and goals of community efficiency programs vary depending on the stakeholders' power and interests. In the MEC, NSTAR coordinated program design and implementation. NSTAR shaped the program's goals and priorities to meet NSTAR's need to reduce particular capacity restraints. In contrast, in the New Bedford CMI, many

stakeholders, including two local community groups, played essential roles throughout the program's design and implementation process. The CMI's collaborative atmosphere created space for multiple priorities to be obtained, such as increasing participation in MassSave, creating local jobs and targeting median income residents.

- The word "community" in community efficiency programs is defined in multiple ways. Both the MEC and the New Bedford CMI used "community" to define the entire town or city. However, in both programs, the word "community" was also used to describe particular enclaves of the greater city communities that were being targeted (i.e., those on a congested circuit or those with median income).
- Community components of a community efficiency program vary, but often include a marketing scheme that depicts the program as beneficial to the targeted community. Other community components include having community leaders serve as spokespeople for the program, holding and/or attending community events, and having community members control parts of the program, such as the outreach and weatherization work.
- The design and implementation process of community efficiency programs can build upon the same existing efficiency programs, and yet the programs can vary depending on the stakeholders and program partners involved. Both the MEC and the New Bedford CMI built upon the MassSave program, and yet varied in terms of program goals and program partner responsibilities.

- The roles of individuals and community groups in community efficiency programs can vary in terms of responsibilities and the degrees to which the roles are informal or formal. Community involvement in a program at any level appears to increase participation rates in MassSave audits.
- Regardless of a program's community components, program partners can have, at least, an adequate working relationship. A comparison of the MEC and the New Bedford CMI indicates that the more program partners involved, the more opportunities for contentious program politics and stakeholder dynamics. Both programs, however, showed how collaborative efforts can be mutually beneficial to the various program partners, since the needs and interests of each program partner can be met at the same time that specific program goals are being achieved.
- Community efficiency programs face different barriers depending on housing and economic characteristics. Further, the more program partners or stakeholders involved in a program, the more difficulties are likely to arise in a program concerning coordination and communication.
- Community efficiency programs can vary in their community components and yet still increase participation in the auditing process. Other program outcomes, such as creating jobs and supporting community energy efforts, appear to occur only if such outcomes are made part of a program's original goals or priorities.

Chapter 7 – Final Thoughts and Recommendations

Over the past several years, various stakeholders, including utilities, state and municipal governments and nonprofit organizations, have taken an interest in improving the participation rate of energy efficiency programs. While the main goals of efficiency programs have traditionally been to generate energy savings and delay capital investments, stakeholders are now interested in additional program goals, such as creating local jobs and serving populations that have previously not participated in efficiency programs. One way stakeholders have expressed interest in improving efficiency programs is by creating new programs or building upon existing programs that take a community approach to energy efficiency. Recognizing that energy efficiency programs that take a community approach vary in their goals, designs and outcomes, and that the energy efficiency field lacks in-depth accounts of community-based programs, this thesis attempts to offer new insight into community-based efficiency programs.

Comparing the MEC and the New Bedford CMI pilot highlights how "community" can be incorporated into residential efficiency programs in a variety of ways. It also reveals the potential benefits and value of such an approach. The MEC shows that a marketing campaign with a community theme can be effective in increasing participation in efficiency programs. In contrast, the New Bedford CMI illustrates how using local community members to conduct door-to-door outreach can also effectively increase program participation. Further, both programs indicate that leveraging partnerships between community

representatives and traditional program partners in various ways can be an overall positive experience resulting in benefits that go beyond energy savings, such as creating local jobs, as well as interest in future community energy efforts.

Given the potential for community efficiency programs to improve current economic and energy situations, as well as the uncertainties that remain in terms of how much financial and institutional support will be available for such programs in the future, the following recommendations are offered.

Recommendations for How Community Efficiency Programs are Discussed

1. ***Energy efficiency stakeholders need to treat "community" as a specific unit of analysis in efficiency program discussions.*** As this thesis illustrates, not all community energy efficiency programs are alike. Further, community programs often vary in how they understand and define "community." Stakeholders should therefore make "community" a specific unit of analysis when discussing efficiency programs in order to distinguish programs' community components. This distinction will help leaders and participants understand the ways in which a program can use community elements. It will also help distinguish which of the elements are most effective at reaching identified goals. Making these distinctions in popular discourse, as well as in academic and policy contexts, will help improve general understanding of community efficiency programs. Community components include, but are not limited to:

    - Collaborating with various stakeholders, including community representatives, in the design process;

- Using a marketing campaign that has a "community" theme;
- Having community leaders serve as representatives or "Ambassadors" of the program;
- Creating local jobs by hiring local community members/groups to implement outreach and weatherization work;
- Conducting various forms of outreach to community members via direct mail, radio and newspaper advertisements, social networking websites, community events, door-to-door canvassing, etc.; and
- Creating incentives or long-term benefits for communities that result from the program, such as installing renewable energy technology in public buildings, supporting the development of a local energy group, or establishing the foundation for expanding efficiency efforts.

2. ***Energy efficiency stakeholders need to produce more in-depth descriptions and program evaluations of community efficiency programs.*** The in-depth descriptions of the MEC and the New Bedford CMI presented in this thesis go well beyond what is presented in typical efficiency program case studies. While brief case studies and best practices literature are not without merit, those developing new, or improving existing, efficiency programs would benefit from detailed descriptions outlining how community programs have been developed and implemented. More detailed program descriptions and analyses will help stakeholders develop a more nuanced understanding of community components and help stakeholders develop sound models for developing future community programs. While process and impact

evaluations, such as the one for the MEC, are invaluable for understanding particular aspects of a program, many programs either do not perform such an evaluation or do not make such evaluations available to the public, meaning the utility tries to control who can access the document, as was the case of the MEC evaluation. Furthermore, such evaluations often fail to elaborate on stakeholder dynamics, cultural and local dynamics, and cost information, all of which are important to consider when developing an energy efficiency program. Lastly, program descriptions and evaluations should not only describe successes, but elaborate on the challenges and barriers to the program, too. Highlighting logistical and building-related hurdles, such as preweatherization issues, will help stakeholders recognize which aspects of efficiency programs need further attention.

Recommendations for Designing Community Efficiency Programs

1. ***Energy efficiency stakeholders need to clearly define program goals and identify whether each goal coincides with current policy frameworks and regulations.*** The comparison of the MEC and the New Bedford CMI revealed that community programs vary in their goals. Stakeholders should recognize that different community program components may be more effective at reaching desired goals. In some instances, creating a traditional mailing marketing campaign that has a community theme may be adequate for increasing program participation. In other instances, however, hiring local outreach teams may be more appropriate to achieve multiple desired goals, such as increasing program participation and creating jobs. If the primary goal

is to maximize energy savings, it is also important for stakeholders to recognize that the communities with the highest potential for energy savings opportunities may also be the most difficult communities with which to work, because of barriers such as age of housing stock.

Additionally, it is also important that stakeholders consider how a program's cost-effectiveness will be evaluated. Currently in Massachusetts, investor-owned utilities are mandated by the DPU to deliver energy efficiency as cost-effectively as possible. Currently, utilities operate under the assumption that this mandate does not allow them to address preweatherization issues as part of their efficiency programs. However, stakeholders such as the Green Justice Coalition are looking into whether preweatherization costs could become part of efficiency program costs, as defined by the state DPU. Furthermore, when the DPU calculates the cost-effectiveness of a program, it does not monetize the non-energy benefits to a community, such as jobs creation, which makes it difficult for utility programs to justify job creation as a program goal.

In order for future efficiency programs to achieve multiple program goals, such as energy savings, creating jobs, and increasing service to those traditional underserved, stakeholders must reconcile the challenge that utility-led programs face when trying to address multiple goals. In the future, if utilities are mandated to achieve multiple goals and if new or existing program partners can offer the additional financial and programmatic resources necessary to overcome barriers, utility-led community efficiency programs

may be successful in achieving multiple goals. However, given the challenges presented in a utility-led program, stakeholders should also consider whether it makes more sense to develop community efficiency programs outside the existing utility program structure.

2. ***Energy efficiency stakeholders need to improve the planning of programs by ensuring that all program partners are amply aware of potential program barriers and that adequate resources are available to address such barriers.*** As the analysis of the New Bedford CMI program reveals, even when community-based outreach mechanisms are successful in getting people to sign up for an energy audit, a program can still face many hurdles before weatherization work is complete. In order to make future programs as effective as possible, experienced program partners, such as utilities and vendors, should be adequately prepared to educate other partners about potential program barriers. For example, not only should a utility or vendor be able to warn of potential barriers, but they should also make clear from the outset how to address such barriers and whose responsibility it is to see that these barriers are overcome. Lack of clarity on this front was problematic in the New Bedford CMI when P.O.W.E.R.'s initial attempts to help households address combustion safety issues were unsuccessful.[60] Providing clearer and more detailed information will help program partners use available resources and time more efficiently when troubleshooting program impediments. Further, program partners should also focus on securing resources to help households overcome preweatherization barriers by making available

[60] See page 106 in Chapter 6 for more information on this situation.

financial and institutional support and financing mechanisms that help median income households pay the out-of-pocket participation expenses.

Program partners should also ensure that available resources are readily available. For example, the New Bedford CMI's outreach team demonstrated early on in its efforts that it would be able to engage a large number of participants and that approximately one in ten audits would progress into weatherization work. This level of engagement and audit conversion rate, coupled with the program's goal to weatherize 50 housing units, signaled to P.O.W.E.R. that CSG's plan to audit only 60 homes a month would be insufficient to meet the program's goals in the allotted time (K. Lydgate, personal communications, April 10, 2011). While P.O.W.E.R. was eventually able to work with CSG to address this issue, had CSG anticipated the need to have more staff available to do audits, the scheduling problems could have been avoided.

3. ***Energy efficiency stakeholders need to consider how community efficiency pilot programs and efforts can be sustained/institutionalized in the future.*** As was described throughout this thesis, national and state political and policy contexts have been crucial to advancing community efficiency programs over the past several years. However, much uncertainty remains as to whether this support will exist in the future. The Massachusetts investor-owned utilities are currently designing their next three-year gas and electric plans. While the three plans for 2010-2012 explicitly support community efficiency programs, it is not clear whether the future three-year plans will offer the same support.

Also, on the national level, while many community efficiency programs have been supported in full or in part by various types of ARRA stimulus funding, it is unlikely that this level of financial support will be made available again in the near future. If stakeholders believe that community components are crucial to the success of efficiency programs, they must think about alternate ways to garner intuitional and financial support for such programs.

4. ***Energy efficiency stakeholders need to rethink the value of creating so-called franchise models for community efficiency programs.*** Given the interest in developing community efficiency programs, as well as the recognizable challenges of creating such programs, some in the efficiency field have proposed using a so-called "franchise" model to help future program designers create a community efficiency program. However, as this thesis reveals, while all community efficiency programs have some type of community component(s), many other program elements can differ greatly. These differences, as highlighted in the case studies, emphasize the need for customized programs, not formulaic "franchise" programs. Instead of developing such models, those interested in supporting the expansion of community programs should develop resources that help future program designers and implementers understand the different types of community approaches and the various benefits and challenges that come with each approach.

Recommendations for Future Research on Community Efficiency Programs

1. ***Energy efficiency stakeholders need to conduct energy savings and program cost analyses.*** While different community efficiency program goals vary, they all aim to increase energy savings. As this thesis indicates, it is often difficult for non-utility program partners to assess the energy savings achieved by a program, either because such an evaluation is not made public or because the information needed to calculate savings is deemed confidential. Additionally, evaluations are typically costly and complex, requiring significant expertise and financial resources. Further, programs often vary in how participation is defined and energy savings and program costs are calculated. These conditions make it difficult for those studying efficiency programs to benchmark or compare the energy program statistics. While this thesis attempts to shed light on the nuances and differences between community programs, it offers little insight into which types of community programs can achieve the most energy savings in the most cost-effective way. In order for community program advocates to make a stronger case for the value of incorporating community components into an efficiency program, more research should be done to discern the extent to which community programs can achieve energy savings.
2. ***Energy efficiency stakeholders need to compare outcomes of community programs to non-community-focused programs***. In addition to increasing research on the energy savings of community efficiency programs, researchers should also compare how a community efficiency program and a more

traditional efficiency program attempt to address the same type of barrier or problem. Such a comparison would be useful in determining the importance and necessity of having community components in future energy programs.

As the popularity of community efficiency programs grows, the energy efficiency field must distinguish among different visions of community efficiency programs. The MEC and the New Bedford CMI offer two compelling stories of community efficiency programs to help inform how stakeholders should approach similar programs in the future.

Appendix A – Case Study Interview List

Penni Conner
Vice President of Customer Care, NSTAR
Phone Interview - February 1, 2011

Marshfield Energy Challenge

Michael Blasnik
Principal Consultant, M Blasnik & Associates
Phone Interview - January 27, 2011

Paul Halkiotis
Town Planner, Town of Marshfield
In-Person Interview - February 17, 2011

Sue Haselhorst
Former Senior Engineer, NSTAR
Phone Interview - February 15, 2011

Gia Lane
Chair, Marshfield Energy Committee
Phone Interview - February 11, 2011

Rocco Longo
Town Administrator, Town of Marshfield
In-Person Interview - February 17, 2011

Sue MacCallum
Director, Mass Audubon South Shore Sanctuaries
Phone Interview - February 25, 2011

Antje Siems
Senior Project Manager, Opinion Dynamics Corporation
Phone Interview - February 3, 2011

New Bedford CMI

Gregory "Lucky" Daniels
Popular Education Specialist, The Marion Institute
In-Person Interview - February 4, 2011

Marty Driggs
Community Mobilization Leader, The Marion Institute
In-Person Interview - February 4, 2011

Scott Durkee
Energy Director, City of New Bedford Energy Office
Phone Interview - February 23, 2011

Tina Haggerty
Project Manager, NSTAR
Phone Interview - February 2, 2011

Kalia Lydgate
Green Jobs Green Economy Initiative Director, The Marion Institute
In-Person Interview - February 4, 2011
Phone Interview – March 16, 2011

Norman Rebeiro
Community Mobilization Leader, The Marion Institute
In-Person Interview - February 4, 2011

Gloria Williams
Director, YouthBuild New Bedford
Phone Interview - February 7, 2011

Appendix B – Massachusetts ARRA Funding for Energy-Related Projects

Massachusetts ARRA Funding for Energy-Related Projects and Programs as of March 25, 2011.

	Estimated Funds to State Agencies	Awarded	Under Contract/ Committed	Expended
Energy Efficiency and Conservation Block Grants (EECBG) - Formula	$14,752,000.00	$14,752,100.00	$4,883,678.00	$9,235,945.00
Energy Efficiency and Conservation Block Grants (EECBG) – Competitive Grants	$7,500,000	-	-	-
Weatherization Assistance Program (WAP)	$122,077,457.00	$125,077,457.00	$43,697,684.00	$74,751,767.00
State Energy Program (SEP)	$58,251,642.00	$54,911,000.00	$19,608,668.00	$28,641,323.00
Energy Efficient Appliance Rebate Program and Energy Star Program	$6,235,000.00	$6,235,000.00		$6,228,765.00
Electricity Delivery and Energy Reliability	$796,207.00	$796,207.00	$97,164.00	$641,965.00

Column Explanations:

- Estimated Funds to State Agencies = Estimate of spending that will be distributed through Massachusetts State Agencies.

- Awarded = Amount of Federal Stimulus funds awarded by federal agencies to state government agencies, and recorded on the state's accounting system.

- Under Contract/ Committed = Amount of Massachusetts State Agency Awarded funds for which there are signed contracts in place or a written commitment has been provided. Funding has been reserved in the accounting system, but not spent.

- Expended = Amount of Awarded funds which have been distributed by Massachusetts State Agencies.

Sources: Commonwealth of Massachusetts, 2011; U.S. Department of Energy.

Appendix C –MassSave Participation and Energy Savings Estimates

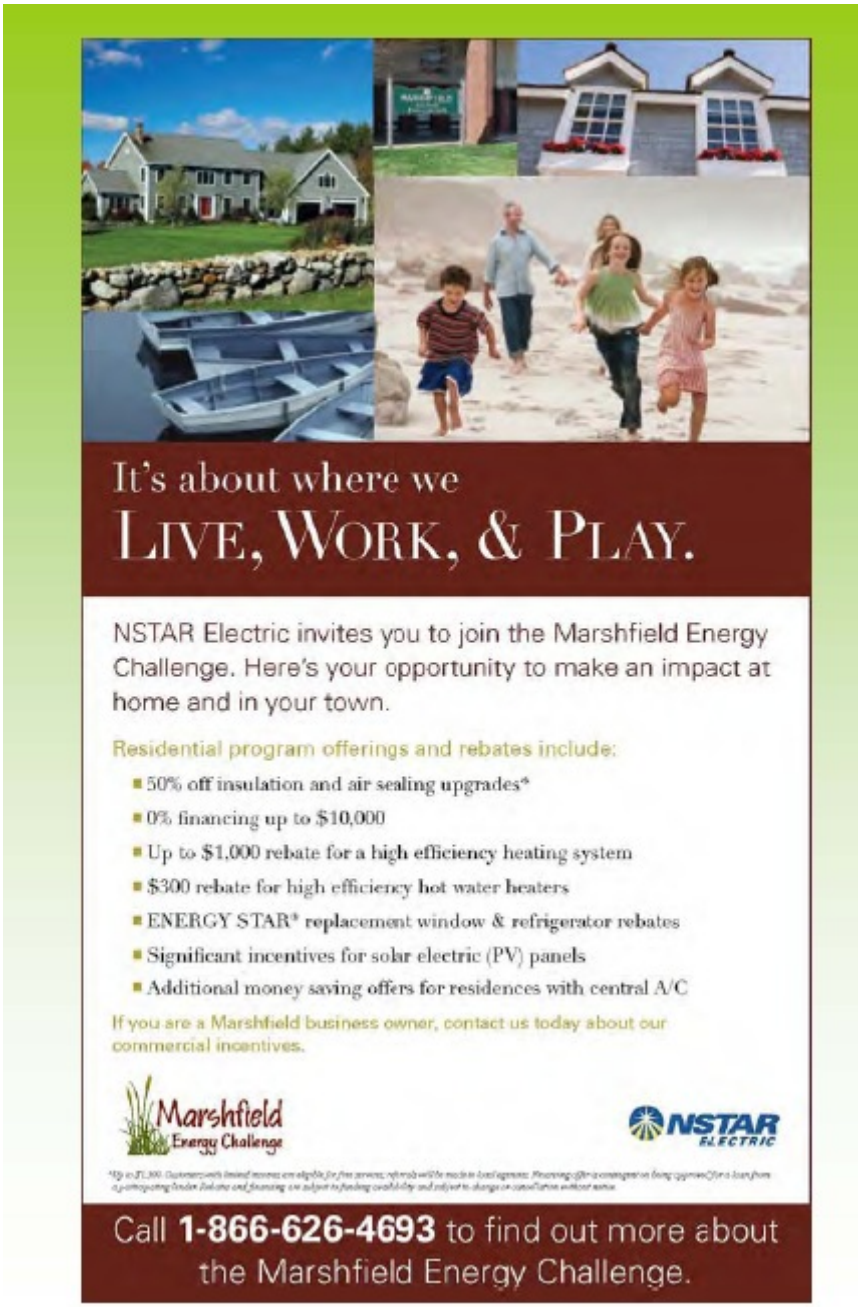
Estimated Participation and Energy Savings for MassSave in 2010-2012 Three-Year Plans

	Electric Participants	Annual Electric Savings (Capacity – kW)	Annual Electric Savings (Energy – MWh)	Gas Participants	Annual Gas Savings (MMBTU)
2010	27,493	13,404	28,587	8,950	785
2011	33,876	19,613	38,216	11,020	1,256
2012	45,653	23,985	45,801	13,466	2,041

Sources: National Grid et al., 2009; NSTAR, 2009.

Appendix D – Marshfield Energy Challenge Marketing Materials

MEC Advertisement

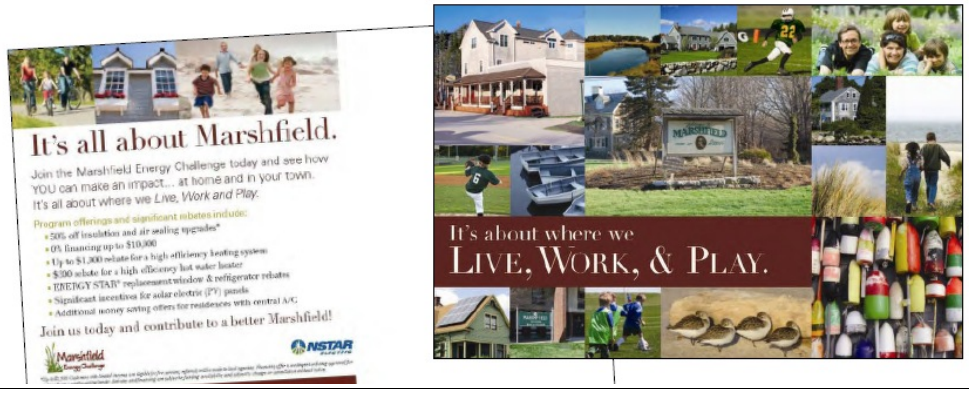


Source: DeVito, 2009.

MEC NSTAR Website

Source: DeVito, 2009.

MEC Direct Mail



Source: DeVito, 2009.

MEC Bill Messages

Marshfield - Residential
How much LOWER can THIS BILL go? Find out: Join the Marshfield Energy Challenge. Call 866-626-4693 today or visit www.nstar.com/marshfield IT'S ABOUT WHERE WE LIVE, WORK AND PLAY.

Marshfield - Business
How much LOWER can THIS BILL go? Create a whole new way to think about energy: Join the Marshfield Energy Challenge. SAVE MONEY, HELP THE ENVIRONMENT Call 866-626-4693 today or visit www.nstar.com/marshfield

Source: DeVito, 2009.

MEC School Outreach Stickers

Source: DeVito, 2009.

Appendix E – Marshfield Energy Challenge Residential Participation Rates

Residential Customer Program Participation

Program Component	Number of Participants	% of Participants
Audit Participants	1,296	100%
Lighting	1,171	90%
Insulation	259	20%
AC Tune-up	241	19%
Air Sealing	210	16%
Heating	180	14%
Thermostats	109	8%
Refrigerator Rebates	33	3%
Window Rebates	17	1%
Duct Sealing	4	<1%
Solar Panels	32	2%

Source: ODC, 2010, p. 20.

Appendix F – P.O.W.E.R. Community Mobilization Quiz

The following information is reproduced with permission by P.O.W.E.R.

POWER Community Mobilization Quiz

Name_____
Date_____

1. Name and explain at least 3 of the 7 steps involved in getting a customer through the end of the CMI process. (bonus points to name and explain all 7, your own words are acceptable)

1.
2.
3.
4.
5.
6.
7.

2. What do the letters CMI and CML stand for?
CMI: CML:

3. How many units of 1-4 residential housing do we need to get weatherized?
- How many multi-family units?
- How many businesses?
- Which of these three types of buildings are we starting with?

4. What percentage and/or how much money will NSTAR provide free to customers per unit?

5. Explain what happens in an energy audit?

6. Name the company that does the audits:

7. What is the purpose of this pilot project? Why is NSTAR partnering with the city of New Bedford and others to make this happen? What are they trying to find out?

8. Is New Bedford the only city that is doing a project? Can you name others?

9. Explain the difference between a screening audit and a diagnostic audit?

10. What is a rebate? How do rebates work?

11. What is the target income population? Choose one:

20 to 30% median income
40 to 80% median income
60 to 120% median income
80 to 150% median income

12. If someone does not qualify because they are lower income than our target population, what local agency will help them figure out how to get weatherization services? How do we (CMLs) find out if someone qualifies?

13. Outside of the pilot, can all NSTAR customers receive free services from or is it only those with a certain income?

14. Are loans available if someone wants to get insulation but cannot afford it? If so, can you name a bank that may provide a loan for qualifying individuals? Will the customer have to pay interest?

15. In this pilot can we work with a home where the landlord does not live?

16. Is the age of the home a factor in weatherization? Why?

17. What are the benefits to the customer of doing weatherization work on their home? Why should people make this investment?

18. What does POWER stand for?

- Why did we choose this name?

19. What organization is POWER a project of? And what non-profit organization is home to the program that POWER is a project of and what do each of them do?

20. Who does what and how for the POWER project? (draw arrows to match the two sides)

ESHU^2 Collective	Payroll and sponsors GJGEI
Marion Institute	Community engagement (supervision)
partner to GJGEI	
YouthBuild	The org that POWER is project of(supervision)and partner to ESHU
Green Jobs Green Economy (I)	Community leadership and official
leadership	
City of New Bedford	Does weatherization construction
CSG	Does audits

21. What is the name of the organization that gives us office space? Name one thing they do.

22. What does ESHU^2 Collective stand for?

23. What does OIC stand for and what does it mean to you?

24. Name in order the six principles and also please state the one for which you are the assigned principle keeper and one idea that you have about how to do that?

25. Name the 4 partners on the Community Mobilization Initiative pilot:

26. What have you learned about yourself and your community by meeting its residents and going door to door?

Short Essays on Eco-Warriorship (25% of grade) Choose one:

1. Read the following definition on warriorship provided by ESHU and generate your own response to the material, including your own thoughts on the subject. Warriorship definition: L^2= V.C.R. Leader x Leadership Developer = Visionary x Collective x Re(productive)

This means that in order for one to call oneself a warrior they must be a **L**eader and also a **L**eadership Developer (one who helps make other leaders). This takes care of L^2

To balance the equation, a leader must also be **V**isionary (have passion and see things that aren't there yet) x **C**ollective (know how to take care of others and have compassion) and (**R**e)productive (both be able to reproduce their efforts but also be productive (get things done).
Please respond to this definition and also identify which area you identify with most (L, V, C or R) and share any other thoughts you have on warriorship as it relates to this equation.

OR

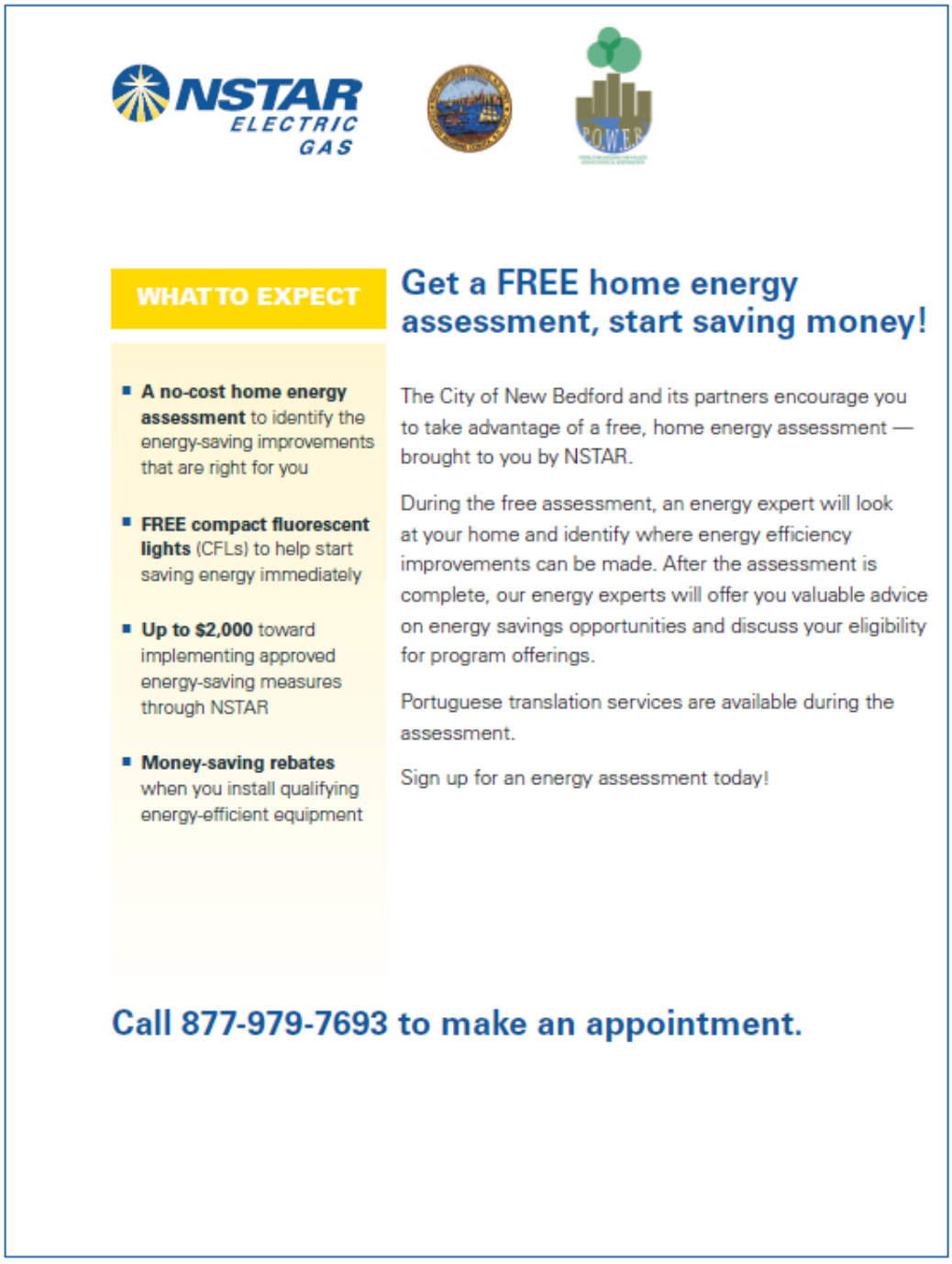
2. Write about your thoughts on sustainability. Please write about why you think POWER chooses ecological restoration over sustainability. Please explore and explain your thoughts and demonstrate your understanding of sustainability issues and ecological restoration. Please note some things that you want to change about your personal actions to add to the sustainability movement.

Respond to these prompts on a separate sheet of paper.

Finally – please find Khepe-Ra ESHU rep and Kalia GJGEI rep to do your final verbal role play which counts for 25% of this exam.

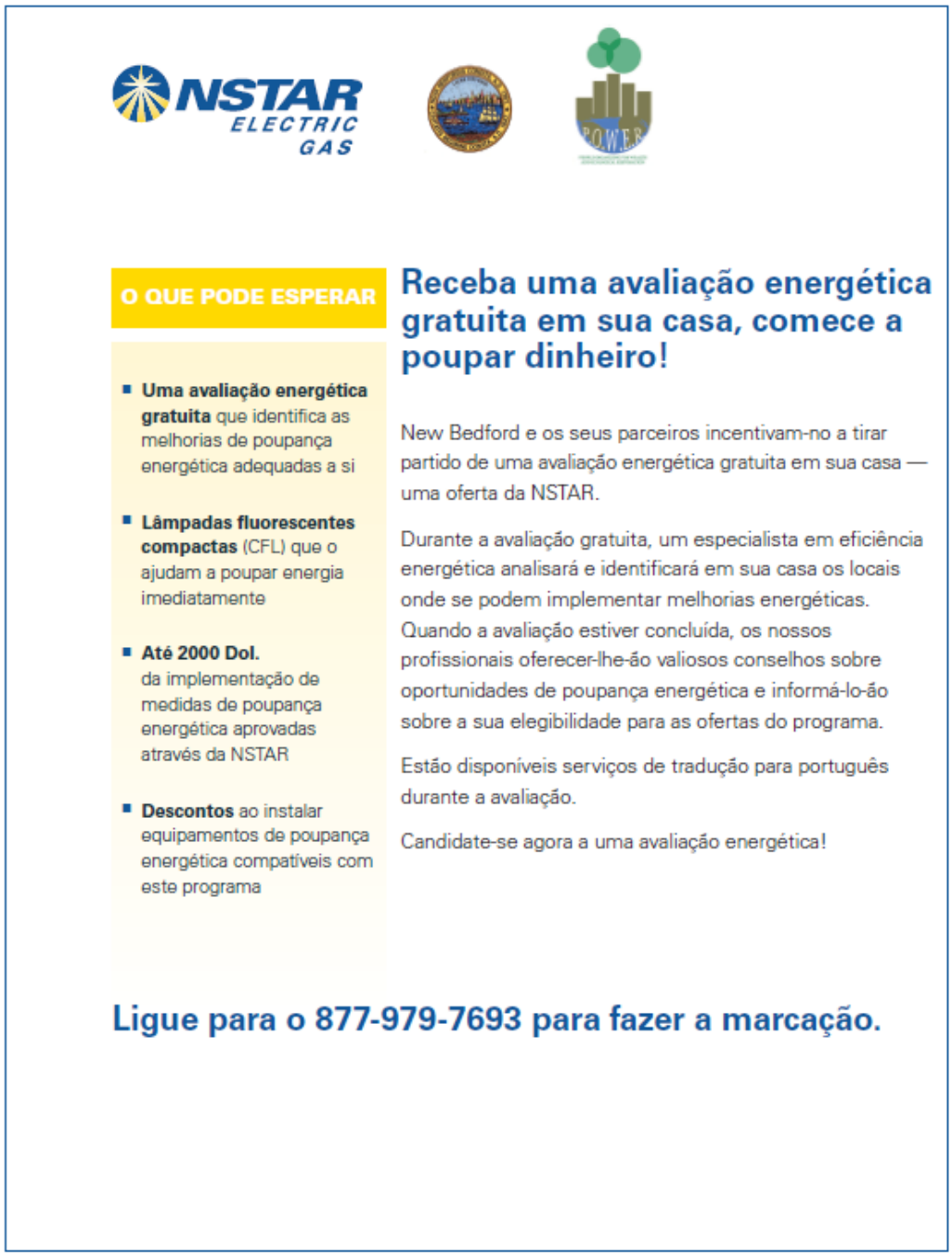
Appendix G – New Bedford CMI Marketing Materials

Outreach Flyer in English



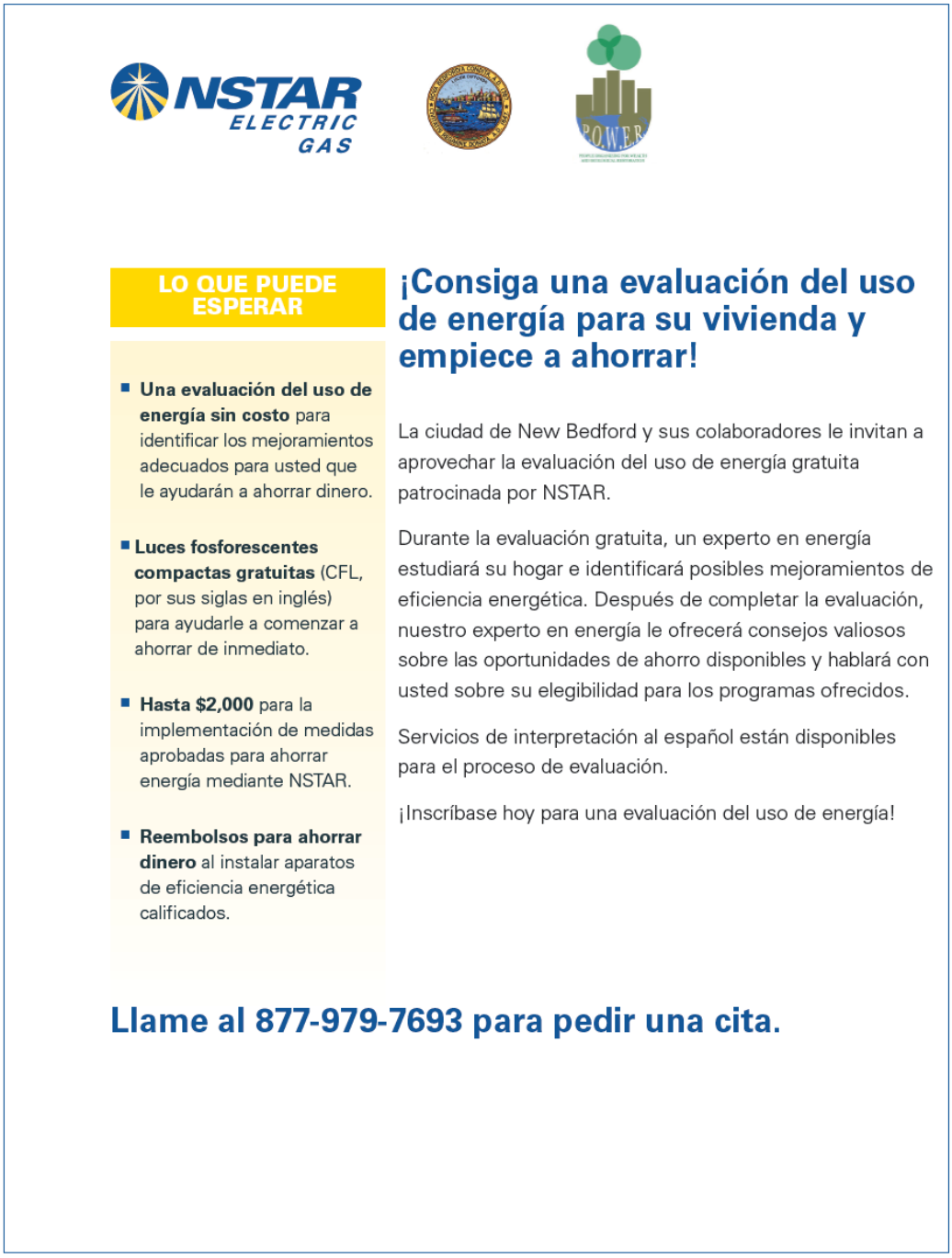
Source: K. Lydgate, personal communication, March, 18, 2011.

Outreach Flyer in Portuguese



Source: K. Lydgate, personal communication, March, 18, 2011.

Outreach Flyer in Spanish



Source: K. Lydgate, personal communication, March, 18, 2011.

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