Title: The Massachusetts Green Communities Program for Municipal Building Retrofits: Assessing Initial Impacts on Small Communities

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Abstract

In 2008 the Commonwealth of Massachusetts passed the Green Communities Act into legislation, committing to the intentions of advancing renewable/alternative energy and improving energy efficiency. Among other provisions, the Act mandates that the utility companies supply all cost-effective efficiency and conservation before turning to more expensive sources of traditional energy generation, quadrupling state funding for energy efficiency. The Act established the Massachusetts Green Communities Program and the associated Division of Green Communities within the Department of Energy Resources to aid municipalities and other local governmental bodies in reducing their energy consumption and energy costs, reduce pollution, develop new renewable and alternative energy resources, and create local jobs to support these industry changes. The Green Communities Program was specifically created to manage the grant program and provide technical assistance services for municipalities. After one year in operation, 53 municipalities have achieved the Green Communities designation, thereby meeting the following criteria: (1) providing as-of-right siting for renewable/alternative energy uses, (2) expediting permits for as-of-right facilities, (3) developing a five-year, 20% energy reduction plan, (4) committing to buying only fuel-efficient vehicles, and (5) adopting Board of Building Regulations and Standards Stretch Code for new construction.

This study was conducted with the intent to inform and enhance the second generation of the program, which is set to roll out in 2012. The study focuses particularly on small communities, under 35,000 in population, and investigates how they are enabled to and impeded from becoming a designated Green Community. The authors assert that the Green Communities Program has helped organize existing community capacity toward the goal of energy efficiency, but warns that there are still barriers that inhibit communities from achieving deeper success. Although the Program has so far generated little actual energy efficiency savings, this study demonstrates that the Green Communities Program has initiated substantial momentum towards enabling energy efficiency in communities and laid a foundation upon which utility companies could easily capitalize. In order to continue the forward momentum of the energy efficiency successes started by the Green Communities Program, the utility companies should develop the second tier of efficiency programs that are designed to achieve deeper and more long-term energy efficiency, and they should begin by targeting communities which have completed the Green Communities Program process and have received their designation.

1.0 Background & Context

On May 25, 2010, Governor Deval Patrick of Massachusetts, publicly announced that 35 cities and towns had achieved their Green Communities designation. A little after a year later, the number of designees has grown to 53, and more than half of the state population has affiliated with the program. This study looks at how towns with populations below 35,000 have so far interfaced with the Green Communities Program, highlighting early successes and key areas for program improvement. The study was undertaken through the MIT Energy Efficiency Strategy Project and is meant to inform and enhance the next generation of the program, which is set to launch in 2012.

1.1 Massachusetts Green Communities Act of 2008

In July 2008, the Commonwealth of Massachusetts passed the Green Communities Act (GCA) into state law, significantly changing state energy policy. The bill enacted several mandates intended to advance the renewable and alternative energy requirements and improve energy efficiency in the state. The GCA changed the state's renewable portfolio requirements from the standard 4% annually to a 4% base in 2009 that would increase 1% each subsequent year. Under this provision, 15% of the electricity generated in the State will come from renewable energy by 2020 (PEW Center on Global Climate Change n.d.). The Act also requires that energy utility companies employ all cost-effective energy efficiency measures before providing additional energy from traditional sources, whereas before 2008, additional demand was met exclusively through providing additional electricity. Energy efficiency is now viewed as an energy resource.

In terms of energy efficiency, the GCA relies on two major programs to advance Massachusetts' current condition: the energy efficiency programs run by the utilities and the Massachusetts Green Communities Program. Linked together, these efforts drive the state-wide energy efficiency mission. (Senate of the Commonwealth of Massachusetts 2008). Additionally, the GCA included a number of complementary provisions, including:

- State Department of Energy Resources (DOER) established:
  (1) Established from Division of Energy Resources.
  (2) Intended to house the new Division of Green Communities.
  (3) Tasked with orchestrating the Green Communities grant program and its collective program elements (Environment Northeast 2008).

- Energy Efficiency Advisory Council (EEAC) established:
  (1) Composed of participating utility companies and their stakeholders.
  (2) Mandated to establish and regulate demand-side utility programs.
  (3) Ensures that all cost-effective energy efficiency is met by developing 3-year efficiency plans.
  (4) Acts as a political body and effectively advocated for the increase in investment funding to support the utility efficiency programs.

- Regional Greenhouse Gas Initiative (RGGI) auctions established as Green Communities Program funding source:
    (1) Annual proceeds designated as primary funding source.
    (2) Remains a sustainable source of funds though insufficient to cover program costs.

- International Energy Conservation Code (IECC) established as the minimum building code standard:
    (1) Adoption by the State Board of Building Regulations and Standards required within one year of its update.
    (2) Makes the stretch energy codes available for municipalities participating in the Green Communities grant program.

1.2 Utility Companies' Energy Efficiency Programs

The GCA ensured that electric and natural gas energy utility providers would be integral to the advancement of the State's energy goals by mandating that they develop efficiency programs that deliver demand-side energy resources that are cost-effective or cheaper than supply before turning to more expensive sources of traditional energy generation. The utility companies have eight program administrators (PAs) who manage demand-side efficiency programs; seven are from investor-owned utility companies (National Grid, NStar, Unitil, Western Mass Electric, Columbia Gas of Massachusetts, Berkshire Gas, and New England Gas Company), and one is a municipal aggregator (Cape Light Compact).

The utility company programs are bolstered by the State, which has increased the amount of their program budget by four times the previous rate. If implemented in a cost-effective manner, energy efficiency is the cheapest resource available. State investments in electric efficiency programs and natural gas efficiency programs increased from $123 million (2008) to $547 million (2012) and from $27.5 million (2008) to $148 million (2012) respectively. The combined 2012 utility budget, about $695 million, is more than quadrupling the 2008 figures. These investments were granted to the utility program administrators by the Massachusetts Department of Public Works through the EEAC's 3-year plan (2010 – 2012). The increase in the utility companies' financial endowments is intended to percolate into rebates for their energy customers who elect to install efficient measures and appliances. The total program budgets approved in the 3-year plan were $1.2 billion for electric efficiency programs and $355 million for the natural gas efficiency programs over 3 years (2010 – 2012). These investments project a total net benefit of approximate $3.9 billion in savings; for every $1 invested in energy efficiency measures, about $3 of savings are generated. (Environment Northeast 2010).

1.3 Massachusetts Green Communities Program

The Massachusetts Green Communities Program is a new program that came out of the GCA. The Green Communities program is managed by the State's Green Communities Division but designed to co-align with the energy efficiency programs managed by the state electric and natural gas utility companies. The Green Communities grant program is the primary driver for incentivizing cities and towns to become

state-recognized Green Communities. The program specifically targets support to the municipal level in order to enable energy savings and develop renewable energy resources using the agents available to this sector, such as retrofitting public building, upgrading street lights, altering the local zoning, and upgrading building ordinances. In order to be eligible for the grant, municipalities must comply with 5 criteria (Massachusetts Department of Energy Resources 2011):

- **Criterion 1 – As of Right Siting:** Provide as-of-right siting in designated locations for renewable/alternative energy generation, research & development, or manufacturing facilities
- **Criterion 2 – Expedited Permitting:** Adopt an expedited application and permit process for as-of-right energy facilities
- **Criterion 3 – A 20% Energy Reduction Plan:** Establish benchmarks for energy use and developa plan to reduce baseline energy consumption by 20 percent within 5 years
- **Criterion 4 – Fuel-Efficient Vehicles:** Purchase only fuel-efficient vehicles for municipal use
- **Criterion 5 – Stretch Codes:** Set requirements to minimize life-cycle energy costs for new construction; the primary method of meeting these requirements has been to adopt the new Board of Building Regulations and Standards (BBRS) Stretch Code

1.3.1 Planning Assistance and Technical Assistance

To assist municipalities in attaining these five required criteria, DOER makes their suite of additional services and tools available to the aspiring green communities. DOER has created full-time staff positions, both in the office in the Division of Green Communities and on the ground as Regional Coordinators, available to communities for daily inquiries and project guidance. They offer planning and technical assistance on how to develop a strategy for completing the Green Communities requirements and for educating the community members on energy efficiency techniques and industry standards. These services are supported by other program components, including:

- **MassEnergyInsight**
  A web-based tool that collects and presents municipalities' itemized energy data to them in a user friendly format. This tool is accessed by over 200 municipalities in the Commonwealth.
- **Energy Management Services (EMS)**
  DOER provides municipalities with technical assistance and statutory oversight on the procurement process for energy savings and performance contracting with third-party consultants who provide energy efficiency services.
- **Mass Save®/Energy Audit Program (EAP)**
  EAP began as a DOER service designed to audit municipally owned buildings but is now provided and funded by the gas and electric utility companies through Mass Save® after EAP exhausted its initial funds (Grattan 2011).

All of these tools and services are made available to the participating municipalities of the Green Communities Program, but they also serve communities outside the program, and some, like the EMS, were even initiated before the passing of the 2008 GCA.

1.3.2 Financing

The Green Communities grant program is financed through a number of sources. Per the legislation, it can expend up to $10 million annually by drawing from two primary and two secondary funding sources. Primary sources include:

- Regional Greenhouse Gas Initiative (RGGI) auction allowances, and
- Nitrogen Oxide allowance trading programs.

Secondary sources include:

- the Renewable Energy Trust Fund, and
- Alternative Compliance Payments relating to Renewable Portfolio Standards.

In 2009, Massachusetts received additional funding from the American Reinvestment and Recovery Act (ARRA) to support its energy efficiency programs. This support came mostly in the form of the Energy Efficiency and Conservation Block Grants (EECBG). Some of this funding supported the development of MassEnergyInsight. Another $12.2 million was sub-granted to 97 municipalities with populations below 35,000. The EECBG sub-grants were separate from the Green Communities grants. However, the two grant programs were mutually supportive in their goals.

1.3.3 Program Implementation

After its legislative creation in July 2008, the newly founded Green Communities Division was officially launched in April 2009 and carried out its first effort of planning assistance outreach in August 2009. To provide assistance, the Green Communities Division contracted with private consultants to inform communities on the requirements for becoming a Green Community and the services offered to aid them in becoming one. To be eligible for planning assistance from DOER, communities were required to establish energy committees within their governments. Of the 351 communities in Massachusetts, 105 created committees and signed up to receive this service.

One year later, in May 2010, 35 communities became designated Green Communities in the first round of applications (Lusardi 2011). Of these 35 communities, 30 had received the initial planning assistance described above. Another 18 communities received their designation in the second round of applications in December 2010, of which 16 had received planning assistance. At the time of the writing of this paper, the Green Communities grant program is effectively one year old. Of the original 105 interested communities who received planning assistance, 46 went on to become Green Communities. Of the communities that did not go on to receive their designations, many continue to work towards the five criteria, while a smaller percentage has decided not to go further (Lusardi, 2011). The reasoning behind these communities' decision not to continue with the program varies; however several informants have postulated that the passing of the stretch codes may pose an impasse for many communities.

	Total Number	Receiving ARRA Funding	Total ARRA Funding (in millions)	Designated Green Communities
Large-City Equivalent (Pop>35,000)	42	42	$27.0	12
Small-Town Equivalent (Pop<35,000)	309	97	$14.7	41
Total	351	139	$41.7	53

1.3.4 Program Coordination

The Green Communities program effectively drew together the efforts of several political entities during its operation. The coordination across municipal, regional, state, and utility bodies resulted in distributed investments across Massachusetts. Specifically, the ARRA investments from the Federal government, Green Communities grants from the State government, and their resultant activities – especially the adoption of the stretch codes – have helped create a solid foundation of political infrastructure that engenders great potential for true and deep energy efficiency. While these political investments have so far generated relatively little energy savings, they have done the extraordinary job of setting the stage for further actions.

2.0 Research Overview

This research, carried out from February to May 2011, was generated as part of the MIT Energy Efficiency Strategy Project and sought to better understand the experience of small communities in Massachusetts in achieving increased energy efficiency by participating in the Green Communities Program. The research examined three communities that had successfully received Green Community designations in three different regions of Massachusetts. The research comprised a series of qualitative interviews from municipal staff people, utility company program administrators, non-profit advocacy groups, regional planning associations, and program managers at the State Department of Energy Resources.

2.1 Research Questions

My driving motivation at the beginning of this research was to answer the following questions:

- How does the Green Communities grant program enable small communities to achieve energy efficiency?
- What barriers inhibit small communities from achieving deeper energy efficiency?

These questions elicited clear responses from the interviewees. However, the feedback in response to these questions proved to be more complicated than expected. As a result, two additional questions emerged:

- How has the Green Communities program enabled participating communities to sustain and expand their energy efficiency achievements?
- What do small communities need from Green Communities or other energy efficiency programs in order to successfully meet the stated goal of reducing energy consumption by 20% over five years?

2.2 Methods & Limits

This research explores the experience of three small (population under 35,000) Massachusetts municipalities that attained Green Community designations. I chose to narrow my focus to small communities, under 35,000 in population for three reasons. First, small communities are the majority of Massachusetts communities, and developing programs that address their needs is important for achieving state-wide adoption of energy efficiency programs. Second, small communities face barriers to achieving energy efficiency that are not present in larger cities. Third, small communities can provide particular insight into the role of state-led energy efficiency initiatives because they were not eligible to receive direct federal funding under ARRA. A population of 35,000 was selected since this was the threshold used by the US Department of Energy to define small versus large municipalities in its grant programs. Communities above 35,000 in population were eligible for a direct EECBG grant from the Federal government and communities below 35,000 in population were limited to receive an EECBG sub-grant through Massachusetts' DOER. My initial hypothesis stated that small communities were an indicator of the strength of the Massachusetts Green Community Program since their specific government structure and limitations in administration and resources would restrict their capacity to achieve successful levels of energy efficiency. I, therefore, devised my research to explore whether or not the Green Communities grant program is successful at enabling energy efficiency in small communities of populations under 35,000.

Of the 351 municipalities in Massachusetts, 309 towns have populations smaller than 35,000 people — approximately 88% of the municipalities in Massachusetts. The State dedicated nearly 85% of their EECBG funding allocation for the sub-grant program, which far surpassed the 60% requirement of the Department of Energy (Jense, et al. 2009). Of these 309, only 97 small town-equivalent (less than 35,000 in population) governments actually received EECBG sub-grants administered through the DOER.

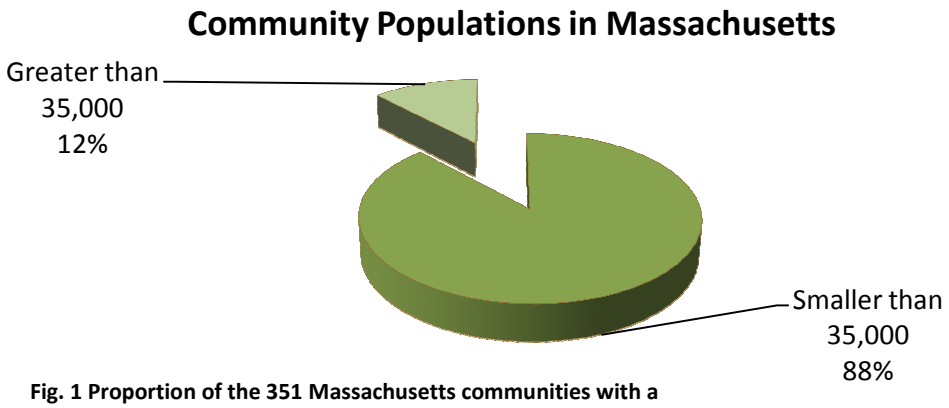

Fig. 1 Proportion of the 351 Massachusetts communities with a population less than 35,000 people, Courtesy of L. Reul

Between January and May, 2011, I conducted interviews with thirteen informants drawn from:

- Three designated Green Communities –Greenfield from the 1st round applicants in May 2010 and Wayland and Easton from the 2nd round in December 2010;
- Two utility companies – Nstar and National Grid; and
- Massachusetts State DOER
- Non Profit Advocacy Group
- Regional Planning Association

This study is limited by the size of the communities it examined, as well as by the kinds of community experiences it can describe. For reasons outlined above, this paper focuses on the experience of communities with populations under 35,000. By focusing only on communities that successfully achieved Green Communities designations, this research illuminates how effectively communities with the existing political capacity to meet the Green Communities Program criteria are achieving their energy efficiency goals. It cannot, however, explain why many small communities that met eligibility requirements for state planning assistance did not apply to become Green Communities. In addition, it cannot explain the reasons that some small communities abstained from participating in the program all together. Finally, this study is strictly focused on the Massachusetts Green Communities Program for municipal building retrofits and does not attempt to draw conclusions about other energy efficiency programs that are concurrently in operation.

2.3 Case Study Communities

This study considers three case study communities located in three different regions in Massachusetts, each with a separate Regional Coordinator. The communities range in population from around 13,000 residents in Wayland to almost 23,000 residents in Easton, and median household income ranges from just over $45,000 in Greenfield to over $130,000 in Wayland.

Wayland, Massachusetts, is a town of 13,219 people with a median household income of $130,643 in the Northeast Region of Massachusetts. The town received $131,775 from the Green Communities grant program to (1) install efficiency measures in the new town high school, (2) install energy conservation measures in a number of other municipal buildings and schools, and (3) develop a design for an energy retrofit for the town hall (Commonwealth of Massachusetts 2011).

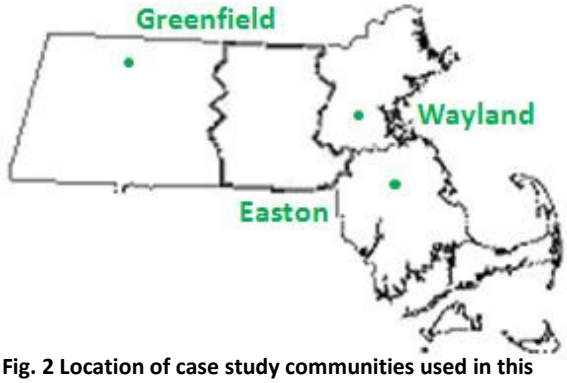

Fig. 2 Location of case study communities used in this research in context of the four GC Regions, Courtesy of L. Reul

Easton, Massachusetts, is a town of 22,913 people with a median household income of $84,375 in the Southeast Region of Massachusetts. The town received $168,300 from the Green Communities grant program to (1) replace the rooftop HVAC air handling unit at the police station, (2) a new energy efficient broiler at the Town Hall, and (3) an assortment of other conservation measures in other municipal buildings (Commonwealth of Massachusetts 2011). Easton leveraged audit programs in 2001 with Mass Electric and again in 2009 with the DOER's Energy Audit Program. The 2001 audits, however, will not contribute to the 20% reduction over 5 years as these took place 10 years ago. Easton is in the process of receiving additional audits through their utility companies (Edwards 2011).

Greenfield, Massachusetts is a town of 17,862 people with a median household income of $45,188 in the Western Region of the State. They received $202,066 from the Green Communities grant program to (1) pay down their ESCO projects, (2) expand the Greenfield Energy Efficiency Program for residential properties, (3) put 10% to administrative costs, and (4) hire a technical consultant to assist with the management of municipal efficiency measures affiliated with the Green Communities program. Greenfield had their audit completed through a performance contract with a third party consultant. They used the Green Communities grant in part to pay for this performance contract (Twarog 2011).

Although these towns represent a variety of contexts and each faced unique challenges, enough similarities emerged from their collective experiences with the Green Communities Program to suggest early indicators of success and common challenges that were faced during the program's first full year of operation. As the program remains in its early stages and the research was primarily qualitative, the study does not present conclusive quantitative outcomes. Instead it draws upon the rich experiences of three communities who successfully engaged with the program infrastructure and process and illuminates what aspects of the program have been perceived to be successful and what challenges still remain for the designated Green Communities, all of which are now well-positioned to advance the state's energy efficiency goals.

3.0 Implementing Parties of the Green Communities Program

The Green Communities Program ties together several different parties with drastically different organizational structures and missions. The coordination of these entities is one of the major challenges of making efficiency work in small communities. All of these players have different parameters, capacities, handicaps, and interests. Understanding the interests of each party and the incentives that drive their decision-making will elucidate the reasoning behind each observation. The success of the Green Communities Program depends on the degree to which the involved parties can align their actions.

3.1 Typical Small Town Governance

The majority of small communities that received Green Community designations use an open or representational town meeting model of government (US Census Report, American Community Survey 2005-2009). This form of government holds one annual town meeting in the spring, sometimes a second one in the fall if necessary, in which every voting member of the town or elected town meeting members (representational) vote on articles presented at the meeting. Decisions are made through the town meeting process and by a Board of Selectmen. The Selectmen and perhaps the Town Administrator are usually the only paid positions. Any committees or community boards, such as an energy committee, are usually staffed by volunteers.

3.2 Massachusetts State's Division of Green Communities

The stated mission of the Division of Green Communities is to serve as a hub of information to guide all 351 cities and towns in Massachusetts towards greater energy savings and consumption reductions via energy efficiency and renewable energy resources. The major roles of the Division of Green Communities are to administer the energy efficiency grants for the State and to manage the programmatic components of the Green Communities Program. They primarily serve as a publically accessible resource and conduct outreach activities to market their civic services.

3.3 Natural Gas and Electric Utility Companies – the Program Administrators

The investor-owned energy utility companies provide energy to all sectors in Massachusetts: residential, commercial, industrial, and municipal. They are required by the GCA to provide communities with technical and strategic assistance through energy efficiency programs in order to achieve annual energy savings. When the utility companies achieve energy savings via their customers who save energy as a direct result of a utility led action, they receive a credit. In the municipal field, they primarily garner energy savings through public buildings operations and maintenance and through regulatory changes affecting new construction or building renovations. Utilities offer benchmarking services of public buildings and public workshops to showcase the analysis of their results. They also fund building operator training and stretch code training. On one hand, utilities act as the public agency in that they are responsible for running the state's energy efficiency programs, but on the other hand, they are also privately held companies that need to earn annual profits (Jense, et al. 2009).

3.4 Other Players Involved with Enabling Energy Efficiency

Communities often implement the Green Communities grant program in conjunction with other support programs outside of the Green Communities Program. They may seek additional audit services or technical assistance from private consulting firms specializing in energy efficiency or energy services companies (ESCOs). The ESCOs provide a full range of services from initial auditing through financing and implementation of energy and water saving measures. They garner profits by taking the risk of the efficiency measures they implement, which is then repaid through the savings that the measures create (Jense, et al. 2009). While the roles of the Division of Green Communities and the program administrators (the utility companies) are designed to provide the necessary services to communities for them to successfully embark on the Green Communities grant program, oftentimes, the communities must leverage external sources to move forward with implementation (Bissetta 2011).

4.0 Barriers to Achieving Energy Efficiency in Communities

In 2009, the MIT Community Energy Efficiency Practicum identified the four major barriers to achieving energy efficiency in municipal buildings; these included: (1) the public bidding process, (2) inadequate data on energy usage of public buildings, (3) that there are not enough people to manage nor technical expertise execute projects with the communities, and (4) that energy audits may trigger costly building repairs which would make building owners reluctant to receive them (Jense, et al. 2009). The Green Communities Program addresses two of these barriers. To deal with the problem of inadequate data, DOER commissioned the creation of MassEnergyInsight. To deal with the shortage of technical expertise, the Division of Green Communities offers planning and technical assistance. The other two projected barriers, the public bidding process and the town's hesitancy to get audits, were not mentioned in interviews for this study. That said, this paper has identified and substantiated other structural barriers to enabling municipal energy efficiency and challenges that are specifically related to the Green Communities Program.

4.1 Voluntary Nature of Program Demands Active, Informed Citizenry to Drive Process

- **Energy Efficiency is Entirely Voluntary** – While the state has established its mission to enable energy efficiency in all 351 communities, they cannot force any unwilling or unable community to adopt it themselves. Since there is no mandate to adopt the State's energy efficiency initiatives, the entire Green Communities Program is dependent on the communities' volunteered investment. The Division can only make their tools and services available to any interested parties (Powelka 2011). Both the state and the utilities must wait for an invested community to come to them with a proposed project for this program to begin. This seems to require individuals with pre-existing expertise or values for energy efficiency to be willing to champion the idea. (Lusardi 2011).

4.2 Collaborative Planning and 3-Year Planning Cycles Lack Flexibility and Responsiveness

- **Collaborative Bureaucracy -** The GCA mandated collaborations under the EEAC between utilities, stakeholders, and their consulting teams to form the regulations and budgets for the Green Communities program administrators on a three-year cycle. This collaborative bureaucracy is so time intensive for utilities that they do not have enough personnel to both run the collaboration and to work on the basic plans, concepts, and strategies effectively (Henschel 2011).

- **Limited Program Planning and Administration (PPA)** – Utilities are limited to a certain amount in their projected overhead costs, or program planning and administration (PPA). The limits for PPA are set according to the size of the incentive and are established in the EEACs three-year program administrator energy efficiency plans. The deep efficiency projects that communities want to embark on require increasingly higher levels of PPA; the dedication of a full time equivalent staff person (Henschel 2011). The budgets in the 3-year plans are allocated to specific causes and leave little room for flexible case-by-case spending. As a result, the utilities must wait until the next budget is drafted, every 3 years, to alter allocations of PPA spending (Sullivan 2011).

4.3 Financial Incentives Discourage Adequate Resourcing for Achieving High-Efficiency Outcomes in Small Communities

- **Small Communities are Too Small for Business** – Utility companies function as businesses and cannot afford to assign a project manager to individual small clients. Small towns with a small number of municipal buildings are usually too small to merit the attention of their own project manager. As a result, these small communities are unlikely to have a connection or point of contact in the utility company to help guide them through the incentive programs and utility services (Henschel 2011). Similarly ESCOs also tend to be less interested in working with small communities, due to their limited building portfolio.

- **Grant Amount Insufficient to Reach Savings Goals –** The amount of funding awarded through the Green Communities grant program is insufficient to create any real savings in a community's energy bill. In the case of Wayland, the town was granted $131,775 through the program which enabled them to conduct a couple of lighting projects, re-commission some equipment in the school, and design a heating system. These changes will result in a modest reduction of energy usage, about 3-5% rather than the 20% reduction target. The grant does not provide enough capital to support any major project in which a community might invest. The funding from the Green Communities grant program acts more as an incentive (Tohn 2011). Communities have typically used the grant to leverage external funding sources in order to complete deep efficiency projects.

- **Utilities Only Finance the Low Hanging Fruit** – Utilities are tasked with delivering efficiency savings for towns. In general, towns do not have much available capital to invest in energy efficiency retrofits. Knowing this trend, utilities tend to perform audits that identify the small, attainable projects, which they believe communities will invest in and which will have relatively short pay back periods. They are hesitant to identify the big projects that would reach deep levels of energy efficiency since they doubt the community's ability to commit to and complete them. The problem, however, is that these small projects do not actually meet the town's needs to reduce energy usage by 20% in five years. (Tohn 2011).

5.0 Successes in Enabling Energy Efficiency in Small Communities

The 2009 MIT practicum study found that the greatest potential enablers of energy efficiency for municipal buildings were (1) for town governments to know where their municipal buildings stand in terms of energy usage, (2) for town governments to benchmark their usage against similar buildings to determine potential savings, (3) for town governments to monitor and verify their own savings, and (4) to train building managers in current best energy efficiency practices (Jense, et al. 2009). As mentioned above, the Green Communities Program enables all of these actions through the MassEnergyInsight tool and the infrastructure for planning and technical assistance. These and other separate, but complementary, achievements are described below.

5.1 Success Brought by the Green Communities Program

In the year that the Green Communities grant program has been in operation, several of its components have been highlighted as genuine and functional successes. From the perspective of representatives of the three communities studied, the following elements are genuine enablers:

- **MassEnergyInsight** – The web application tool commissioned by DOER to allow municipalities to be self-sufficient in collecting, tracking, and managing their energy usage with a user-friendly graphic format reportedly has been the most helpful of the Green Communities program's elements. This display of their energy data enables communities to make informed decisions and accurate efficiency projections.

- **Regional Coordinators –** The on the ground DOER staff have been extraordinary in terms of outreach and education. They join forces with the utility companies, the regional planning associations, and the Mass Municipal Association to conduct informational webinars. Also, they have made contact with nearly every, if not every, community within their region. One coordinator is placed in each of the State's four regions: Northeast, Southeast, Central, and West.

- **Technical Assistance** (TA) – TA is still one of the most highly sought after services from communities. The TA provided by the Green Communities Program is invaluable to the communities to get their staff and public educated.

- **Planning Assistance –** The Planning Assistance that DOER offered in May 2009 attracted the attention of 105 Massachusetts communities interested to become a Green Community and to learn about its process and the five criteria.

- **Stretch Codes and As-of-Right-Siting –** The participating communities successfully enact the five Green Communities Program criteria at their local municipal level. The most significant outcomes of passing all five criteria are the adoption of the stretch-codes and the incorporation of the as-of-right siting within the local zoning ordinances.

Viewed by many as one of the most challenging criteria of the grant program (Lusardi, 2011), the adoption of the stretch energy codes is seen as a great accomplishment by the communities who successfully passed them into their zoning laws, and by the State, which recognizes that changing the codes at the local level is far easier and faster than developing standards at the state level (Tohn, 2011). By definition, the stretch code is approximate 20% more stringent for commercial and residential buildings than the existing base codes. Every community in Massachusetts either uses the base code or the stretch code as their legal building code. However, communities that adopt the stretch code then qualify for extra incentives from the utility companies who are looking to gain energy saving credits. Citizens of a stretch-code-community are rewarded by utilities through financial rebates for "going the extra mile" and building to a higher efficiency level, though they are really only abiding by the laws of their town (Michaels, 2011).

Even with reward system disconnect between communities and utilities, the implementation of the stretch codes by the municipal government is a tremendous investment for energy efficiency. By improving the uniformity of the building energy codes across municipalities, the energy codes (everyone in the state either uses the base code or the stretch code) are creating economies of scale, which makes it easier for the builders and contractors to operate and improves building code compliance. The study conducted by the 2009 MIT practicum found that the building industry views code enforcement as the most significant motivator for building energy code compliance (Jense, Sklarsky, Ramirez, Shu, & Hayek, 2009). The utility Program Administrators believe that the combined implementation of both codes, like the stretch code, and standards, like efficiency ratings, create the greatest real success in establishing energy efficiency. They now question how many existing buildings actually comply with the legal building codes – 30% or 100%? The actual compliance of buildings to the stretch code is a topic of further study (Vohra, 2011).

5.2 Success Brought by Complementary Energy Efficiency Efforts

The Green Communities Program is largely reliant on several components external to what the program offers. These contributing factors are integral to the achievement of energy efficiency by local municipalities and are therefore equally important to highlight.

- **Small Community Enthusiasm** –Although burdened with specific challenges unique to small entities, employees of DOER have observed a greater interest and capacity in pursuing the

Green Communities grants program among small communities than large cities (Bissetta 2011)**.** They attribute this observation to the fact that larger communities are faced with more pressing social issues that diminish energy efficiency into a luxury status rather than a vital ethic. Another possible explanation is that larger cities have more human capacity and also access to direct federal funding for creating building improvement programs. They attribute to this because it is a vital ethic, but there was more of a demand to be a green community from small communities superseded the expectations. Though there is no clear explanation, the state was pleasantly surprised by the large response from small communities.

- **Characteristics of Success** –Successful communities that are able to achieve a high degree of energy efficiency policy and implementation seem to have several similar traits in their unique stories. This study found four salient enabling factors that directly impact communities' success. The most successful communities have:

  (1) Support from Political Leaders – Political support from the town selectmen or mayor to move ahead with energy efficiency
  (2) Long Term Financial Planning – A finance committee or team who plans for major energy efficiency projects in their long term budgets and capital planning processes
  (3) Full Time Dedicated Staff – A full time or paid staff person dedicated to the community's energy efficiency program
  (4) Champion – A citizen "champion" to advocate and campaign for energy efficiency within their community.

  The single most important factor to generate success is observed to be the presence of a champion in the community. The individual or group of individuals who champion the idea of energy efficiency in the community displays the long term endurance and dedication necessary to persevere through a completing a project. They have shown to possess a sense of ownership over the project and this sentiment fuels their stewardship from beginning to end. The champion can take the form of a community volunteer, a paid staff employee, a local advocacy group, or a volunteer committee. Every researched and interviewed municipality for this paper had a champion in their community.

  This research took observations from communities who became designated Green Communities either in the first or second round of the grant program. This fact should be accounted for when assessing the enablers and the barriers from the community perspective since these communities were more predisposed for success. Of the three communities studied, all have been pursuing energy efficiency for several years already and were familiar with it, and all had a community member involved who individually had preexisting knowledge of energy efficiency.

- **The Massachusetts Municipal Association (MMA)** is the major player taking an increasingly proactive role to aid communities in developing political and governmental structures to operate more effectively. DOER and the utility companies are specifically focused on technical

and financial support for energy efficiency measures. Municipal aid falls outside of their responsibility and capacity. The MMA and the regional planning associations are the primary sources of support and outreach for political structuring.

- **Regional Planning Associations** provide great resources to smaller local governments. Many are aware of the increasing investment in energy efficiency among municipalities. The Metropolitan Area Planning Council (MAPC), the Boston metropolitan regional planning association, is interested in community energy efficiency and, in particular, sustainable community structure that supports a long-term commitment to energy efficiency. They are on the cusp of rolling out two programs to aid communities on long term energy planning (Aki 2011).

  (1) Regional ESCO Procurement: A program that would aggregate demand and engage in performance contracting for the services of an ESCO on behalf of group of towns. This would benefit the smaller towns that would not normally appeal to ESCOs.
  (2) Regional Energy Manager/Circuit Rider Program: A program that would provide technical assistance to communities who are understaffed or lack expertise in the energy field.

6.0 Small Communities' Residual Resource Needs for Achieving Energy Efficiency

From the communities' perspective, the Green Communities Program is just one piece in the puzzle. Without leveraging other programs and funding sources, energy efficiency could not be met. The primary impetus for these communities to engage with the Green Communities grant program is (1) to reduce costs, either through the grant funding provided or through the savings generated through the project measures, and secondarily (2) to receive the technical assistance. The municipalities surveyed for this research held little to no value for receiving the official Green Communities label, except for Easton who saw the designation as a symbol its community engagement[1]. Though designated Green Communities like Wayland, Easton, and Greenfield are in an improved position for achieving energy efficiency at scale, these small communities have residual needs, such as[2]:

- **Greater Administrative Capacity –** Small communities need to find resources for staffing their initiatives and financing their investment. They need help with:

  (1) **Finding Resources for a Full Time Staff Equivalent** – The major inhibitor on the side of local government is the lack of full time staff to dedicate time & energy to manage the logistics and coordination of these energy efficiency projects. ($^{W, E, G}$)

[1] These two objectives and the sentiment on the GC label were reported by all three community case studies.
[2] This list of challenges were reported by interviewed representatives from Wayland (^{W}), Easton (^{E}), or Greenfield (^{G}) and are indicated by their respected notation. This material was gathered from interviews with Ellen Tohn of Wayland, MA (Tohn 2011), Adrienne Edwards of Easton, MA (Edwards 2011), and Eric Twarog of Greenfield, MA (Twarog 2011)

(2) **Learning to Leverage Other Grants** – They need to know how to leverage other grants and programs in conjunction with the Green Communities grant program to build enough financial support and assistance to actually implement a deep efficiency project. ([W])

(3) **Developing and Acquiring Financing Tools** – They are looking for better financing tools to enable deeper efficiency project planning from the start and to aid in long term sustainability of these efficiency projects. ([W])

- **Access to a Public Project Database** – They would like access to what other communities did with similar projects and the results they had with their projects. This information would aid in accurate benchmarking and devising plausible efficiency projects. ([W])

- **Help with Overcoming Limitations of Government Structures** – They need guidance on how to improve local political mobility to navigate through the limitations of the open town meeting model with few full time staff positions and resources available. ([E])

- **A Path to Reach Higher Efficiency Outcomes -** Small communities want to go beyond short pay-backs. They seek ways to:

  (1) **Get Deeper Energy Audits** – The Green Communities Program provided audit services that are deemed insufficient. Wayland, in particular, has discovered this to be true, as they've tried to reach a deeper level of energy efficiency through their Efficiency Forward project proposal with the utility provided audit. While Wayland used the audit information, they were unsatisfied with its quality – believing it to be slated towards quick paybacks and shallow efficiency results. Deeper energy efficiency requires a higher degree of engineering during these audits, and communities cannot plan for deep energy retrofits from the type of audits being provided by the utility companies (Tohn 2011). Neither Easton nor Greenfield used the Planning Assistance or and Greenfield did not use DOER's audit services. ([W])

  (2) **Execute the 20% Reduction Plan** – They are looking for how to actually follow through and deliver 20% energy reduction in 5 years. Communities have all made promises to deliver this on paper, but are unsure of how to actually implement. ([W])

The aforementioned barriers demonstrate that small communities have limited mobility in their capacity to adopt major changes to their daily routine. Their political infrastructure does not easily enable them to take on long-term (or even short term) deep energy efficiency commitments. So far, the Massachusetts Green Communities Program has not offered enough or the correct kind of assistance to truly address these municipal challenges. In order to better meet the needs of small communities, the DOER should continue to work on (1) better aligning utility interests with small community capacity, and (2) offer aid to communities in their structurally weakest areas—help build internal resources (both labor and capital) to be self-sufficient in achieving energy efficiency.

7.0 Positive Impacts of the Massachusetts Green Communities Program

More than 50% of the state population has successfully affiliated with the Green Communities Program after just one operational year (Pickering 2011). This observation is an early indicator that the Green Communities Program is inciting the cultural adoption of energy efficiency values across the state. Other key foundational achievements include:

- forcing the adoption of the stretch-codes among participating municipalities,
- creating more as-of-right siting for renewable and alternative energy uses
- forcing cities to adopt 5-year 20% reduction plans, and
- launching MassEnergyInsight.

These four program elements are tremendous achievements of the Green Communities Program that have specifically laid out program infrastructure for future long-term energy efficiency project implementation to build upon. Beyond these physical and policy achievements, the Green Communities has also built awareness, knowledge, relationships, and momentum.

7.1 Communities Better Understand Energy Efficiency

Communities now have in-house knowledge about the technical components of energy efficiency and the process of community-implemented energy efficiency. They now have an understanding of the energy efficiency language and they host specific individuals or constituencies who have working knowledge of baseline energy usage levels and potential efficiency project typologies.

7.2 Communities Have Been Organized and Given Focus

The Green Communities Program gave these communities an organizational process to follow en route to achieving energy efficiency and a focus to rally behind. Much of the beginning step to enabling energy efficiency in a community has to do with campaigning for the cause. The Green Communities Program offers a platform and an incentive for community stakeholders to articulate and discuss their personal goals. This kind of community organizing and campaigning is integral to successfully educating the public and making progress towards energy efficiency.

7.3 Communities Have Knowledge of their Energy Use

By completing the steps and adopting the criteria of the GC grants program, communities have become familiar with their energy data, can assess how well or poorly buildings perform, can understand what BTU means, and have made contacts within DOER and their utility providers (Michaels 2011). While the Green Communities Program is not designed to deliver deep efficiency savings in the long-term, it has successfully established a list of Massachusetts's communities that have comprehensive familiarity with their energy efficiency environment.

7.4 A Point of Contact Has Been Created for Communities

Each community now has a point person or group of people who have established a line of communication for their community with their utility company and the State agency. Since a person or a group of people were intensely engaged with their utility company and the state personnel through the GC Program process, they now possess enough proficiency with the project familiarity and energy knowledge to act as the specialist for their community.

8.0 Conclusions

While it created little materialized energy savings in its first year of operation, the Green Communities Program has developed a strong ground in municipal energy efficiency from which to spring into the next stage. The vital successes of the Green Communities grants program have established a ripe condition for subsequent actions. The legislated documentation of the stretch codes and the as-of-right siting, the online energy data tools, the municipal building baseline data, and the community understanding of energy efficiency processes have created an environment that can eventually support deeper and more sustainable energy efficiency projects.

How do we encourage the initiatives started by the Green Communities Program in these small communities to keep growing? And more importantly, how do we prevent what was started from disappearing?

To advance the initiatives of the Green Communities Program to the next level, where communities can build off of their newfound energy efficiency knowledge and baseline energy data to building long term project plans and achieve deeper efficiency savings, a new form of the program with new roles is needed. This paper proposes that utilities initiate the next-steps of achieving higher levels of energy efficiency.

Although this initiative started with the Massachusetts State Department of Energy Resources (DOER), utility companies are better equipped to deliver the next step actions. DOER established the catalyst incentive with the Green Communities grant program. It has done a highly laudable job at packaging novice municipalities into knowledgeable and organized communities, equipped with the tools they need to move forward in achieving their energy goals. While this success has set the table for enabling deep energy efficiency, the Green Communities Division is not ideally suited to actually deliver the true efficiency savings. Since they are barred with limited capacity to materialize actual energy savings, DOER and the Green Communities Division should stabilize their focus on their institutional strengths and engage communities with the program, educate about the program criteria, and usher applications in for Green Community designations.

Utility companies have the technical expertise, the raw energy usage data, the incentive funds, and the greatest capacity to measure and verify savings. Utilities and communities can most effectively support

each other's energy efficiency needs in Massachusetts, and linking the two parties in this type of business partnership is likely to evoke deeper and more stable state-wide energy savings.

As has been stated previously, small communities traditionally gain little attention from utility companies and ESCOs because of their small savings potential. However, with the involvement of the Green Communities Program, utility companies can leverage the communities' 20% reduction requirement into a feasible business strategy. Individual communities can aggregate significant savings by complying with the Green Communities criteria to reduce their municipal energy consumption by 20% over five years. For example, Easton, MA has projected as much as $360,000 in savings from the 20% municipal-wide reduction. A small community with Green Community designation now has a significantly large project to make a feasible business opportunity for the utility company. The utility companies can readily accept these small communities as energy clients while keeping in line with their institutional parameters. If all of these communities were moving towards a 20% percent goal, the actual savings amount would be quite immense.

The utilities should target Green Communities to work with because these communities can help identify where there is the greatest potential to conduct community programs, and they are advanced enough to create deep and scalable measures. After receiving their Green Community status, municipalities are ready to move beyond the initiation levels and into deeper energy efficiency measures. Green Communities have shown that they are educated, eager communities with the capacity to undertake energy efficiency projects. The natural next steps are for utility companies to manage and lead them into a second tier of deeper energy projects. With a vital role to play in the energy efficiency future, utilities should be designating their time and attention to Green Communities Program and its participants now.

In order to keep the Green Community Program mission moving forward, the next steps must address the emerging challenges that surface with advancing community engagement. Communities need help to materialize their paper commitments to substantial energy reductions, the commitment to long-term energy reduction needs to be absorbed into mandatory codes and standards, an accurate account of how many buildings comply with the current codes and standards needs to be understood, and education on operations, maintenance, and building-code compliance needs to be consistently delivered. These actionable items lend themselves as the foci of the programming for the next step. As the Green Communities Program continues to mature with the remaining Massachusetts municipalities, the Commonwealth continues to push the knowledge bar on creating large-scale sustainable energy efficiency.

Works Cited

Aki, Helen. *MA Green Communities Program Case Study Research.* May 4, 2011.

Bissetta, Joanne, interview by Lindsay Reul. (April 15, 2011).

Building Codes Assistance Project. *DOE Releases Guidelines for EECBG Grants Under ARRA.* March 27, 2009. http://www.bcap-energy.org/node/370 (accessed June 6, 2011).

Commonwealth of Massachusetts. *Patrick-Murray Administration Awards $3.6 Million to 18 New "Green Communities": State's second round of Green Communities grants will fund solar panels, energy efficiency projects and more in cities and towns across Massachusetts.* March 21, 2011. http://www.mass.gov/?pageID=eoeeapressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=110321-PR-18-Green-Communities&csid=Eoeea (accessed June 1, 2011).

Edwards, Adrienne, interview by Lindsay Reul. (May 4, 2011).

Environment Northeast. *Energy Efficiency Ramps up in Massachusetts: Recent Decisions Make the State a National Leader in Efficiency Investments.* Environment Northeast, 2010.

Environment Northeast. "Massachusetts 2008 Energy Bill: An Act Relative to the Green Communities, Senate Bill No. 2768." Summary, 2008.

Grattan, Steve, interview by Lindsay Reul. (April 21, 2011).

Henschel, Rachel, interview by Lindsay Reul. (April 13, 2011).

Jense, Bjorn N, Josh Sklarsky, Andre Ramirez, Gary Shu, and Carolyn Hayek. "Utilities Helping Towns Drive Efficiency in Public Buildings and New Buildings." In *Enabling Deep and Scalable Energy Efficiency in Communities*, by 11.946 Energy Efficiency Practicum, 28-37. Cambridge, MA: MIT, 2009.

Lusardi, Meg, interview by Lindsay Reul. (April 13, 2011).

Massachusetts Department of Energy Resources. "Designation Application." Application, Boston, 2011.

McDiarmid, Jeremy, interview by Lindsay Reul. (April 4, 2011).

Michaels, Harvey G., interview by Lindsay Reul. (May 18, 2011).

PEW Center on Global Climate Change. *Massachusetts Enacts Broad Energy Bill.* http://www.pewclimate.org/node/6040 (accessed June 2, 2011).

Pickering, Seth, interview by Lindsay Reul. (May 5, 2011).

Powelka, Aimee, interview by Lindsay Reul. (May 6, 2011).

Senate of the Commonwealth of Massachusetts. "An Act Relative to Green Communities." *No 2768.* Boston, 2008.

Sullivan, Cliff, interview by Lindsay Reul. (May 6, 2011).

Tohn, Ellen, interview by Lindsay Reul. (May 6, 2011).

Tohn, Ellen, interview by Lindsay Reul. (January 5, 2011).

Twarog, Eric, interview by Lindsay Reul. (May 4, 2011).

US Census Report, American Community Survey. "Total Population and Median Household Income." Data Set: 2005-2009 American Community Survey 5-Year Estimates, 2005-2009.

Vohra, Puja, interview by Lindsay Reul. (May 31, 2011).

CASE 1 | Wayland, Massachusetts

Town Population	**13,503**
Form of Government	**Open Town Meeting**
Median Household Income	**$130,643**
Invested in Energy Efficiency Since	**2009**

Presence of a Champion	**Presence of Mayoral or Selectmen Political Support**	**Long Term Budgeting from the Finance Committee**	**Paid Staff Position**
+	+	/	-
The Energy Committee was fortunate to be composed of a few specialists who consulted on energy efficiency in their professional careers.	Town Administrator, Selectmen, and the Financing Committee all endorsed it. In Wayland, these kinds of projects need the support of the Financing Committee as well.	The Finance Committee endorsed the stretch-codes and general energy efficiency incentives. They still need to include future projects into their capital investment plan.	The reporting, corresponding, and paperwork were completed by the volunteer efforts of the Wayland Energy Committee.

CASE 2 | Easton, Massachusetts

Town Population	**22,913**
Form of Government	**Open Town Meeting**
Median Household Income	**$84,375**
Invested in Energy Efficiency Since	**2000/2001**

Presence of a Champion	**Presence of Mayoral or Selectmen Political Support**	**Long Term Budgeting from the Finance Committee**	**Paid Staff Position**
+	+	/	+
The GIS Specialist who is able to dedicate a large portion of her work week to energy efficiency also serves as the head of the Green Communities Committee. Also, the schools are beginning to promote energy efficiency to their students.	The current Town Administrator came into office in 2006 and has since been in support of energy efficiency. Different community leaders (Board of Selectmen and Town Administrators) have consistently been supportive.	Easton is leveraging several sources of funding to support their energy efficiency programs as well as utility incentives and rebates.	The town GIS Specialist, a paid position, has been able to dedicate a large portion of her work week to Easton's energy efficiency programs and data management.

CASE 3 | Greenfield, Massachusetts

Town Population	**17,862**
Form of Government	**Mayor Council**
Median Household Income	**$45,188**
Invested in Energy Efficiency Since	**2003**

Presence of a Champion	**Presence of Mayoral or Selectmen Political Support**	**Long Term Budgeting from the Finance Committee**	**Paid Staff Position**
+	+	/	+
The Director of Planning and Development and the energy efficiency part time employee	The Mayor of Greenfield is strongly supportive of providing electricity to all Greenfield residents at a reduced rate.	Greenfield has been extremely successful in leveraging a number of external grants through EPA, HUD, etc.	Greenfield hired a part time employee entirely dedicated to the energy efficiency programs that the community runs. They use part of the GC grant to pay for this staff position.