

Energy And Resources  
An Interactive Qualifying Project Report  
submitted to the Faculty of  
WORCESTER POLYTECHNIC INSTITUTE  
in partial fulfillment of the requirements for the  
Degree of Bachelor of Science  
by  
Jeffrey Huard  
Michael Kendall  
Aaron Na  
John Rodrigues  
Date: May 6, 2011

Approved:  
Professor Kent Rissmiller

## Abstract

In 2008 Governor Deval Patrick signed one of the nation's most comprehensive energy reform acts, the Massachusetts Green Communities Act. Through case studies this project analyzed the current status of that legislation. Our communication with officials from Worcester, Lancaster, Gardner and Sterling helped determine how some communities have achieved designation as a Green Community, and others have not. This report is intended to help municipalities seeking designation as a Green Community.

## Contents

Abstract .....	1
Introduction .....	3
Background .....	5
Energy Reform.....	5
Designation as a Green Community.....	7
Funding for Green Communities.....	11
Literature Review .....	13
Research Methods .....	16
Results.....	18
Worcester.....	18
Lancaster .....	20
Gardner .....	23
Sterling .....	26
Discussion.....	27
References .....	32
Appendix .....	35
A.2 Sample Town Contact Information .....	36
A.3 Sample Interview Questions .....	37

## Introduction

In July of 2008 Governor Deval Patrick signed the Green Communities Act (GCA). As a comprehensive energy reform bill its goals are to lower energy costs, and to promote renewable energy at the state and municipal level (Commonwealth of Massachusetts, 2008). The objective of this Interactive Qualifying Project (IQP) was to analyze the implementation of the GCA and develop recommendations for improving upon current progress.

The Green Communities Division of the Department of Energy Resources (DOER) was charged with helping the 351 municipalities of Massachusetts achieve the goals of the GCA and guide the state towards zero net energy (Department of Energy Resources, 2011a). To achieve these goals the DOER has provided local support from regional Green Communities coordinators, education and technical assistance. The DOER also encouraged collaboration between municipalities to share best practices and facilitate informed decisions and actions. It is intended that upon completion of these goals the Green Communities Division will provide a model to help communities across the United States achieve a clean energy future (Department of Energy Resources, 2011a).

Ten million dollars in funding was made available for the program. (Commonwealth of Massachusetts, 2008) “The Green Communities Designation and Grant Program, an initiative of the Green Communities Division, works with municipalities toward qualification as a Green Community and provides funding to qualified municipalities for energy efficiency and renewable energy initiatives” (Department of Energy Resources, 2011b). In May of 2010 the first 35 Green Communities were designated by Governor Patrick making them eligible to apply for a portion of the \$8.1 million in available grant money (Daley, 2010).

In December of 2010 another 18 municipalities became designated Green Communities

raising the total to 53 municipalities distributed across the state as show in Figure 1. These 18

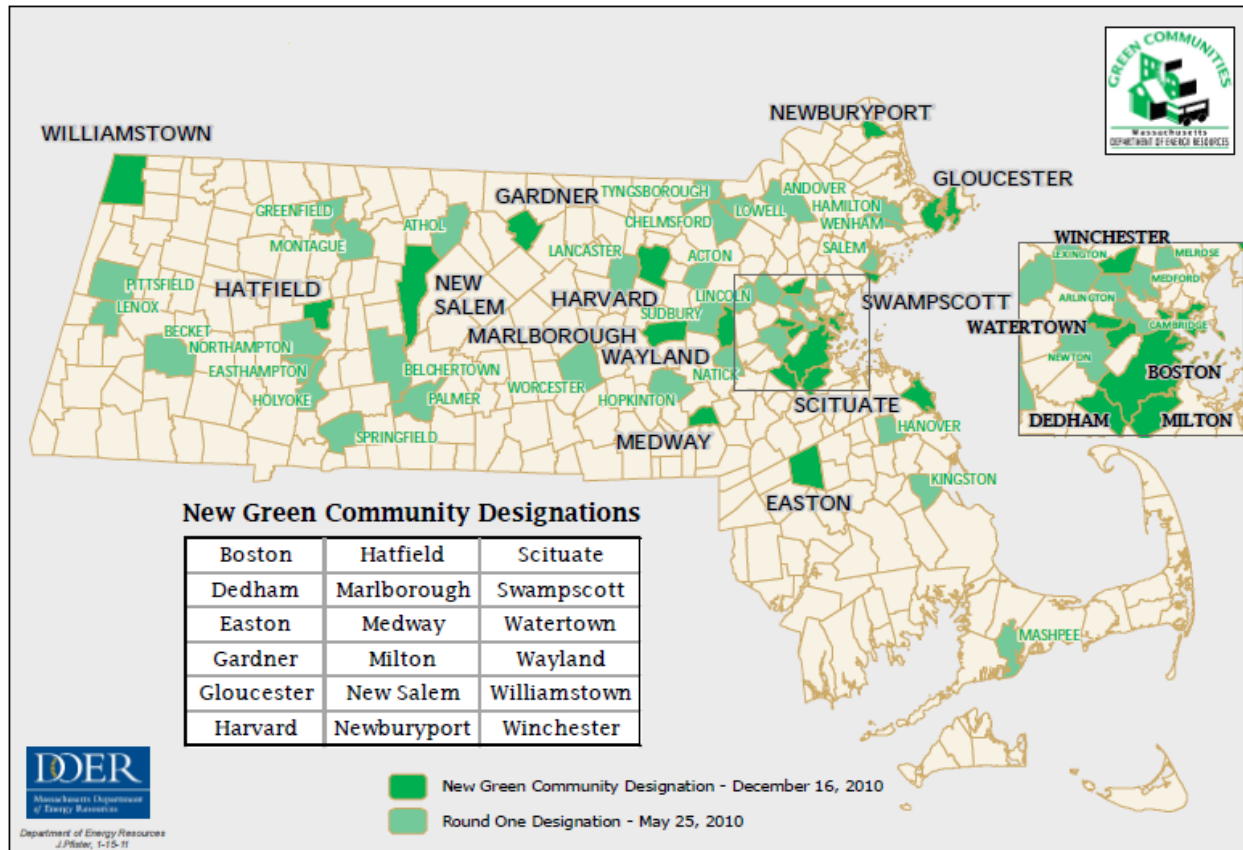


Figure 1. A Map of Green Communities in Massachusetts

new communities became eligible for \$3.6 million in grants through the Green Communities Grant Program (Commonwealth of Massachusetts, 2011a). This IQP has analyzed the actions taken by municipalities in the first years of the GCA and develops recommendations to help the remaining 298 municipalities become designated as a green community.

## Background

Energy costs have risen substantially in the first decade the 21<sup>st</sup> century which have resulted in an increased cost of living. There has also been a steady increase in the public's concern about climate change due to greenhouse gas emissions. These two concerns of the public had led governments to respond by developing energy efficiency programs and legislation. The GCA is one such bill that was signed into law in Massachusetts.

## Energy Reform

The first goal of the GCA was to lower energy consumption of the state, saving consumers money on their energy bills. Utility companies have been required to purchase all available energy efficiency improvements that cost less than it does to generate power. Rebates and other incentives have also be offered to consumers to upgrade lighting, air conditioning and other equipment when the cost less than that of generating the additional power required to power older models. The bill also required the State Board of Building Regulations and Standards to adopt the latest edition of the International Energy Conservation Code as a part of the State Building Code. With these minimum standards Massachusetts building standards were to achieved the highest international level of energy efficiency (Commonwealth of Massachusetts, 2008).

In addition to decreasing energy consumption the GCA has promoted the generation of renewable energy. Utility companies are required to enter into 10- to 15-year contracts with renewable energy developers to help provide financing for Massachusetts-based projects. The limit on “net-metering”, selling excess power back into the grid that was produced from private wind turbines or solar installations has been increased from 60 kilowatts to two megawatts. The

GCA also authorizes utility companies to own solar installations they install on customers' roofs up to 50 MW apiece. This practice was previously prohibited in Massachusetts. Additionally the GCA doubles the rate of increase in the Renewable Portfolio Standard, from 0.5 percent to one percent, and removes the cap. As a result utility companies were required to obtain renewable power equal to four percent of their sales in 2009, increasing by one percent each year (Commonwealth of Massachusetts, 2008).

Some communities in Massachusetts purchase their power from a municipal lighting plant (MLP) instead of an investor owned utility company. The GCA included the framework for MLPs to participate in the Massachusetts Renewable Energy Fund. Participating MLPs must charge the same 0.5 mill (1/20<sup>th</sup> of a cent) per kWh surcharge as participating utility companies, and pay the surcharge to the fund. After paying into the fund the MLP community becomes eligible to apply for grants from the fund for green energy projects (Massachusetts Clean Energy Center).

One significant but widely unknown aspect of the Green Communities Act was that it created provisions for towns and cities with Municipal Light Plants (MLP) to join the Massachusetts Technology Collaborative (MTC) and gain access to the Renewable Energy Trust Fund (Massachusetts Clean Energy Center). Many initially criticized the act believing that municipalities with MLPs would not be able to eligible to become designated Green Communities. The Massachusetts Clean Energy Center (MASSCEC) now posts resources and a Q&A on their website specifically for MLP communities looking to be officially recognized as green communities.

Accompanying the progressive legislation of the GCA, Massachusetts has set ambitious goals for renewable energy capacity. In April 2007 Governor Patrick established a goal of 250

MW of installed solar power capacity in Massachusetts by 2017. Then in January 2009 the Governor addressed wind power with a goal of 2,000 MW of installed capacity by 2020 (Commonwealth of Massachusetts, 2009). The energy reform of the GCA has been working toward the realization of these goals.

#### Designation as a Green Community

Municipalities that are eligible for grants from the Green Communities Designation and Grant program had to become qualified as a Green Community. Five qualification criteria were provided in the GCA that a municipality must achieve to become a Green Community. A community that achieves designation should demonstrate a commitment to reducing energy consumption, pursuing clean renewable and alternative energy projects, and providing economic development in the clean energy sector (Department of Energy Resources, 2011b).

#### Criteria 1

A municipality must adopt as-of-right siting for at least one of the following: renewable or alternative energy generating facilities, renewable or alternative energy research and development facilities, or renewable or alternative energy manufacturing facilities in designated locations (Pickering, 2010). As-of-right siting means that specific site or sites chosen may be developed for the intended purpose without the need for a special permit, variance, amendment, waiver, or other discretionary approval. The development is still subject to a site plan review to determine conformance with local, state and federal laws (Patrolia, 2010).

Locations designated for renewable or alternative energy generating facilities are required to have the following minimum power capacities to qualify:

1. On-Shore Wind – A minimum of a 600 kW turbine
2. Off-Shore Wind – A minimum of a 2.5 MW turbine



3. Solar Photovoltaic – A single ground-mounted system of a minimum of 250 kW
4. Biomass CHP - A minimum of 5 MW in a standalone building
5. Ocean, Wave or Tidal – No minimum threshold

(Pickering, 2010)

#### Criteria 2

An expedited permitting process must also be adopted for proposed facilities subject to the as-of-right siting provision. The period between the date of initial application and the date of final decision may not exceed 12 months (Pickering, 2010). In the event that no action is taken within the one year window, the project will be considered approved, a mechanism commonly referred to as a “constructive approval provision” (Patrolia, 2010). Areas where the expedited permitting process applies must coincide with areas zoned for as-of-right siting for criteria one (Pickering, 2010). Municipalities may apply the Massachusetts General Law chapter 43D (MGL c 43D) permitting process to these zoning districts to meet criteria two. MGL c 43D creates priority development sites in commercially or industrial zoned areas for buildings of 50,000 square feet or more with a review period of 180 days (Commonwealth of Massachusetts, 2011b).

#### Criteria 3

Municipalities must establish a benchmark for energy use and establish a plan to reduce the baseline by 20 percent within five years. The energy use baseline should consist of: municipal buildings including schools, vehicles, and street and traffic lighting if owned by the municipality. Energy tracking tools that are approved by the DOER may be used to develop the energy use baseline, and preapproved tools include Energy Star Portfolio Manager, ICLEI (International Council for Local Environmental Initiatives) software, and the DOER’s MassEnergyInsight (Pickering, 2010).

MassEnergyInsight.net is an energy tracking tool that has been developed and is maintained by the DOER and is made available for free to Massachusetts municipalities. Energy usage information is automatically downloaded from utility companies, and other information can be uploaded by municipal officials to keep all energy costs and accounts in one location. Custom reporting options are available that allow municipal officials to identify the least efficient energy users and track energy savings by fuel type (Pickering, 2010).

After the baseline energy use is found, a reduction plan should be created highlighting the projected yearly reduction in energy use. Documentation that regional school districts and the general government have formally adopted the plan must be included. Progress towards the established goals will be evaluated by the DOER.

#### Criteria 4

A municipality may purchase only fuel-efficient vehicles (Pickering, 2010). Using 2008 and 2009 Environmental Protection Agency (EPA) data, the DOER defines “fuel-efficient” as meeting the following combined city and highway MPG standards:

1. 2 wheel drive car - 29 MPG
2. 4 wheel drive car - 24 MPG
3. 2 wheel drive small pick-up truck - 20 MPG
4. 4 wheel drive small pick-up truck - 18 MPG
5. 2 wheel drive standard pick-up truck - 17 MPG
6. 4 wheel drive standard pick-up truck - 16 MPG

(Pickering, 2010)

Heavy-duty vehicles (over 8,500 pounds) are exempt from efficiency requirements, as well as police cruisers until they become commercially available (Pickering, 2010). The formal

policy adopted by the community for acquisition of fuel efficient vehicles must be submitted along with an inventory of non-exempt vehicles with a plan for replacement. Documentation showing that the municipality and local school district have adopted the fuel-efficient vehicle policy should also be included.

#### Criteria 5

All new residential construction over 3,000 square feet and all new commercial and industrial real estate construction must be required to minimize, to the extent feasible, the life-cycle cost of the facility. Life-cycle costs may be minimized by utilizing energy efficiency, water

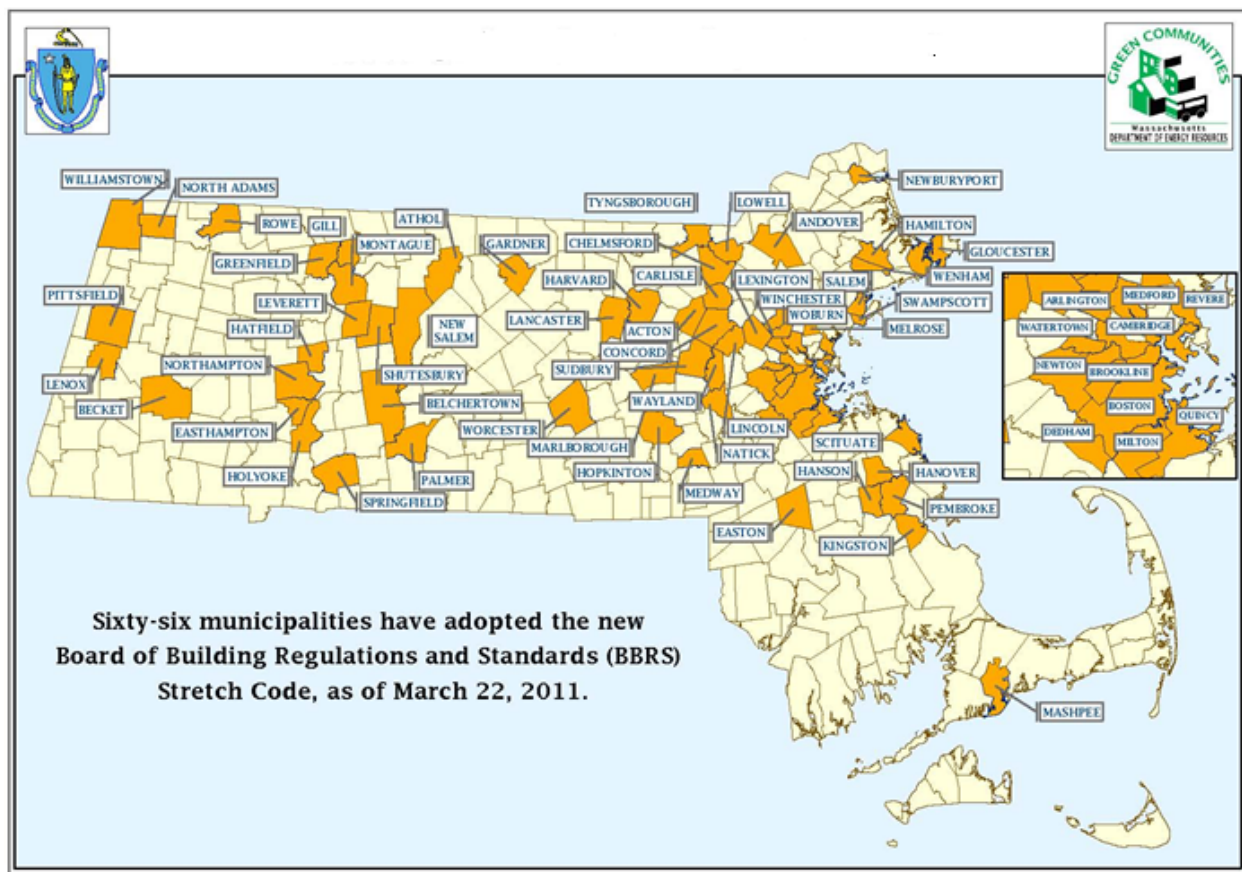


Figure 2. A Map of Stretch Code adoption by community

conservation and other renewable or alternative energy technologies. The DOER has recommended municipalities adopt BBS Stretch Code (780 CMR 120.AA) an appendix to the

MA State Building Code to meet these requirements (Pickering, 2010). Figure 2 illustrates the communities that have already adopted the Stretch Code as of March 22, 2011 and shows a similar distribution across the state as Figure 1 did for designated Green Communities.

#### Funding for Green Communities

After becoming a designated Green community a municipality can apply for grants through the Green Communities Division and Grant Program to receive a portion of the programs annually renewed \$10 in funding. Green Communities grants are determined using a formula with a \$125,000 base grant with additional amounts based on per capita income and populations, and awarded grants are capped at \$1 million (Patrolia, 2010). These funds can be used to subsidize the cost of activities like installing renewable energy resources (i.e. solar panels on the roofs of public buildings) or replacing city-owned vehicles with hybrids or other fuel-efficient vehicles.

In addition to funding provided through the Green Communities Division of the DOER municipalities can apply for federal funding. The American Recovery and Reinvestment Act of 2009 increased funding, along with extending tax incentives and grants to encourage renewable energy projects, energy savings and green jobs. Federal grants for the development of renewable energy facilities could provide funding for up to 30% of the cost of construction of facilities that were placed into service during 2009 and 2010. The production tax credit program for alternative and renewable energy production was extended through 2012. Financiers of alternative or renewable energy production facilities are also eligible for an investment tax credit through 2013, or 2012 for wind power projects (Vogt & Nesteroff, 2011).

Grant programs at the state and federal level are constantly changing as the different levels of government develop their green policies and budget concerns change. When beginning

an alternative or renewable energy, or an energy use reduction project a municipality should be aware of the numerous grants that are available for the project. According to the American Council for an Energy-Efficient Economy the GCA along with other available funding is expected to lead to an investment of \$2.2 billion in energy efficiency and demand resources between 2010 and 2012 (American Council for an Energy-Efficient Economy, 2011).

## Literature Review

Previously two IQPs focused on the early implementation of the GCA have been completed by Worcester Polytechnic Institute student groups. The first group studied the Green Communities Act in 2009, one year after the bill was signed. This group contacted some of the municipalities across Massachusetts and discovered that several had already shown considerable progress towards achieving the goals of the GCA (Toupin, LeClerc, & Boudreau, 2009).

One municipality that had shown significant progress was Newton. A website titled Clean Energy Newton had already been created and through the site residents of Newton could join programs such as New England Wind Futures. By participating in New England Wind Futures the residents of Newton could help to provide funding for wind energy projects, which suffer due to high upfront costs. Great support has been expressed by Newton for the generation of solar power. Newton South High was the site of the largest public school solar installation in New England. Additionally Newton had set a goal of 500 solar roofs installed by 2010.

Newton also received a significant amount of public support from organizations such as that provided by the Green Decade Coalition which has goals of promoting renewable practices, educating and communicating with the public. The strategies of the Green Decade Coalition included workshops, speakers, tours and school programs.

With the information gathered the group found that most municipalities making progress toward designation as a Green Community were located in Eastern Massachusetts. One reason for a lack of progress in some communities was a lack of information. A local Town Manager in Central Massachusetts was not aware of the GCA until a month after it had come into law.

In addition to the progress of the communities it was found that utility companies had also begun to participate in the GCA. Several companies, including National Grid and NSTAR,

allowed customers to purchase some or all of their energy from renewable sources. This power was provided at a surcharge of approximately one cent per kWh. Other programs were in place to help fund individual installations of renewable energy generation including NSTAR Solar, where NSTAR and Commonwealth Solar helped homeowners evaluate their energy usage and solar potential as well as offering rebate of two dollars per watt.

Finally, a survey of the local WPI community was used to gauge the public knowledge and participation in the GCA. While most people were unaware of the act, a portion had taken simple and low cost steps to reduce their energy consumption such as using high efficiency lighting. The most common cited obstacle to using green technology was financing some of the more expensive technologies.

In 2010 another group revisited the progress made towards the goals of the Green Communities Act during its second year (Coffey & Thomas, 2010). This group attempted to contact all 351 municipalities in Massachusetts to gather data about their participation in the Act. With 67 responses it was found that most of the larger communities (+10,000 people) were working towards becoming a green community, as defined by the GCA. Smaller communities (<5,000 people) were found to be less likely to pursue the goals of the GCA since they lacked the resources of larger communities. These smaller communities were taking steps independent of the GCA to make their communities green.

Utility companies continued to be involved with National Grid starting a “3% Less Initiative” encouraging customers to reduce their energy consumption by 3% over the next ten years, and constructing a new headquarters in Waltham, MA which achieved a Platinum LEED rating. The cost of renewable energy seemed to be on the rise judging by NSTAR’s increased rates on the wind power offered to customers.

Similar to the IQP in 2009 another survey of the local WPI community was conducted to judge public knowledge and support. When compared to the survey completed in 2009, the public became more aware of the GCA by 2010 although most people still knew little about it. When members of the WPI community were offered a brief explanation of the GCA there was great public support for the goals. Similar to the previous year's data, the most popular ways for people to make their living style green were low cost options such as improved recycling and reusable water bottles. It was also discovered that 50% of people surveyed claimed they would buy renewable energy if it were available.

The work of these two groups concludes that the majority of communities participating in the early years of the Green Communities Act tend to be of larger population. It was also indicated that successful communities appeared to have a large amount of public support. Lastly, an important finding was that utility companies were participating in achieving the goals of the GCA.



## Research Methods

Past IQPs have conducted large scale surveys of the municipalities in Massachusetts. Our group has performed case of municipalities to gather more information about a small number of communities. The office of the DOER in Worcester, MA has provided our group with information to help select communities of interest.

To facilitate the possibility of attending town meetings and performing in person interviews we limited our search to communities in Worcester County. A spreadsheet of all municipalities in Worcester County was developed that included their population, government structure, if they had a municipal light department, if they had adopted the stretch codes, and if they had been designated as a Green Community. Our contact at the DOER, Kelly Brown, informed us of the disposition of some of the municipalities she had been in touch with through her work, and this information was included on our spreadsheet.

Using the spreadsheet we selected five municipalities to contact. Populations ranged from roughly 4,000 to 21,000 and had a government structure of either open town meeting or mayor-council city. Communities that had been designated as a Green Community, were facing opposition or not intending on achieving designation were represented. Our goal was to gather data from a variety of communities to gain the best representation of the overall progress of the GCA.

After selecting the towns we wanted to study, we began building contact lists for each. Using the official town sites, contact information was collected for town administration, energy committees, building inspectors, and other officials or committees of interest. We then selected the individuals we would attempt to contact; in most cases it was a member of an energy committee, or an administrative secretary. Contact was initiated through email, and we attempted

to contact those who did not respond by phone to request an interview in person, or through a teleconference. A questionnaire was also made available via email in the event that an interview was not possible.

Of the five communities we attempted to contact our group was only able to gather data from Lancaster and Gardner. After meeting with Lancaster we found that many of the people involved with the GCA had contact information for officials of other municipalities who were involved with the GCA, which helped us contact Sterling.

There was also another group working on an IQP related to the GCA that had arranged a meeting with John O'Dell, the person who was responsible for Worcester, MA achieving designation as a green community. We took the opportunity to sit in on the meeting to gather any data relevant to our research.

While conducting the case studies our group encountered some obstacles. In some communities the people we needed to speak to did not have the time to respond to our questions, while others had left for vacation. It was also difficult to establish who would be able to answer our questions in a community that was not interested in being designated as a Green Community.

## Results

### Worcester

Before the Green Communities Act came into effect in 2008, the City of Worcester had already been working towards achieving a relatively high level of energy efficiency. By the time the GCA passed, Worcester had already replaced 70% of its vehicles with energy efficient hybrids and had conducted an energy audit on the city. The city also had already started working with an Energy Service Company (ESCO) to develop energy-saving projects for 160 municipal buildings. More over Worcester had already met zoning requirements for renewable resources and had an expedited permitting process in place for green projects (J. O'Dell, personal communication, January 20, 2011).

The duty of getting Worcester to meet the rest of the GCA's criteria was the responsibility of John O'Dell, manager of Energy Efficiency and Conservation in Worcester. Using the Mass Energy Insight software, an energy baseline for the city was created to easily make projections of future energy use, thus simplifying the decision making process. This eliminated the need to use the DOER provided consultants. Worcester felt that instead of using the consultants using in-house resources would be faster and easier because the DOER was understaffed.

When it came to the adoption of the stretch code, Worcester worked to educate the largest opposition, contractors and developers, of the new practices that would be needed. City council was able to pass the stretch code since state law must adopt the codes within the next three years. Contractors also agreed that the recession would be a good time to train employees in the new codes. The decreased demand for construction meant that training employees would be the best

use of time. These approaches helped the city win over the support of the stretch building code's opponents.

Worcester received \$852,000 in funding from the act after being designated a Green Community. Although this was much less than the expected amount (do we have a specific number?), the city set out to develop a spending plan. This plan included educational programs, for elementary and middle school students, on the importance of energy efficiency and marketing of Worcester's achievement in energy conservation. Worcester found the DOER to be a good resource for helping to begin the process of becoming green. Mass Energy Insight also received praise for being a free, all-in-one resource for cities and towns that provided a useful graphical interface for those using it. O'Dell recommended that any city or town looking to undertake the task of becoming a Green Community should find some type of leader with access to the many departments within the city or town's government involved in achieving the goal.

## Lancaster

Lancaster was example of a municipality fortunate enough to be one those that had begun efforts of being green before the enactment of the Green Communities Act. The two criteria Lancaster had already completed were the Right-of-Way siting and priority permitting for renewable energy. These initial conditions led the Lancaster Director of Planning to believe that achieving a green status would be “very doable” (N. Piazza, personal communication, February 15, 2011).

Because the ten million dollar fund would be spread out among all designated towns, town officials aimed to quickly meet remaining criteria in order to be among the towns in the first round of designation. One of their first steps was to attend workshops on the new act run by the Montachusett Regional Planning Commission (MRPC) and the Citizen Planner Training Collaborative (CPTC) as well as beginning a town energy study. Using funds from the DOER and Energy Efficiency and Conservation Block Grants (EECBG) from the American Recovery and Reinvestment Act (ARRA), Lancaster hired Vanasse Hangen Brustlin, Inc. (VHB) to perform energy audits. The results of the audits were used to develop the town’s energy baseline and to identify facilities in need of efficiency improvement.

In 2009, an energy commission was formed, consisting of five experts in the field of energy, was formed. At town meetings held twice a month, the commission was informed of the progress being made toward designation. The energy commission made a significant contribution to town efforts by ensuring public awareness of sustainable energy projects and by informing the public of the requirements of the new stretch code. The commission was also extremely helpful in presenting and implementing efficiency projects throughout the town.

Aware that many towns were receiving strong opposition to enacting the stretch codes, Lancaster officials used several methods to address public concerns. A presentation held at the town hall, along with distributed publications, proved to be important in swiftly passing the new building codes. Many towns also have received opposition to the new codes from their own building inspectors; however Lancaster's building inspector not only supported the new codes but also explained the new codes to all contractors and homeowners seeking permits. The inspector and town officials hoped to sway anyone opposed to enacting the Stretch Code by pointing out that, regardless of the actions of the town, the state would adopt and require the codes within three years and adopting the codes early on would allow for a longer training period and an overall smoother transition. To ensure an adequate period for training, it was decided that by the town board that the codes would not become mandatory until January 2011.

In addition to the presentation on the stretch code, the town also conducted an Energy Forum Series on their plans for renewable energy involving geothermal energy and photovoltaic cells. At the information sessions, officials described why it would be advantageous to install geothermal heating at the elementary school and at the community center as well as described their ambitious plans for photovoltaic energy. Lancaster initially planned to convert a former landfill into a five-megawatt solar energy plant that would be funded through a variety of sources including a federal earmark of \$500,000. Unfortunately, one requirement of this earmark was that the solar energy plant be design-build, which was deemed not possible due to the added costs. A combination of less funding and unforeseen costs resulted in the plant's capacity being decreased by 90%, down to 500 kilowatts.

On May 25<sup>th</sup> 2010 Lancaster was officially designated a Green Community. The DOER granted the community \$140,000 to be used on renewable energy and efficiency improvement

projects within a specified time period. The grant was sub designated to large projects, (e.g. the 500 kilowatt solar array), and smaller projects (e.g. high efficiency lighting in the town hall). One of the most important projects turned out to be the replacement of the municipal water supply pump control system. Immediately after installation, the new system resulted in a 30% savings in energy. The designation grant also allowed the town to install photovoltaic panels on the police station and purchase a hybrid vehicle. Although it is not a tangible benefit of the designation, the town felt a great sense of pride and satisfaction following the designation.

According to the director of planning, meeting all the criteria and being designated was the result of having already met two of the criteria: having someone in charge to manage the effort and keeping residents informed and educated on the typically controversial criteria of the Act.

## Gardner

The city of Gardner began their own efforts to go green and save money through limiting their consumption of heating oil (R. Hubbard, personal communication, March 4, 2011). One of the early projects included replacing the old windows in city-owned buildings with windows of higher energy efficiency that would help to better insulate against the cold weather. The city conducted a feasibility study to establish whether a wind turbine would be a viable investment or not. The results of this study showed that a large wind turbine in Gardner would be a good investment. By 2008, when the Green Communities Act passed, Gardner was also already on track to achieve green designation.

The responsibility of making Gardner a green community was that of the Director of Community Development & Planning for the city of Gardner, Robert Hubbard. It was the responsibility of him and a few others city officials to create the energy reduction plan, push for the passage of the stretch building code, streamline the permitting process for green energy facilities, and applying for all the grants needed to fund these projects. Gardner had the help of the DOER and Kelly Brown as other communities in central Massachusetts.

The stretch building code passed in Gardner without the anticipated controversy from private developers and coordinators, the code's typical opponents. As for the wind turbine Gardner hoped to build, the expedited permitting process for green energy generation is something that only helped the city achieve what it was already working towards. Since the original technical feasibility study showing a large wind turbine would be a worthy investment, a business plan has been developed for the city to finance the project.

The hardest part of making Gardner a Green Community was creating the energy reduction plan. The city had help from (VHB), a company that provides the planning for



complex infrastructure and development initiatives, to learn about how to go about creating a good energy reduction plan. Unfortunately, VHB's services were being paid for through the DOER's funding and did not include having VHB help the city develop the actual energy reduction plan. The Mass Energy Insight website helped to better understand Gardner's energy use and how best to reduce it. Although this website was in its infancy and wasn't perfect when Gardner was going through the process of becoming green, the support staff for the website were found to be accessible and helpful when needed for the city.

Gardner received a \$206,000 grant from the state of Massachusetts upon reaching the green status. The city plans to use the money to implement its energy reduction plan and help to cycle in new energy efficient vehicles for the city. The projects that Gardner plans to fund with this money include getting fuel efficient boilers for the city's senior center, high school, and city hall. However the grant wasn't everything the city hoped for and they learned that to fully execute their plans, the city would have to spend much of its own money. This led the city to search for any grants that could be used to fund their plans. One such grant was a \$50,000 that Gardner used for building the planned wind turbine.

As far as the future is concerned for Gardner being a Green Community, the city plans to use a portion of its grant money from becoming a Green Community to help implement its energy reduction plan. Gardner does not have plans to advertise its official status as a Green Community as of yet. With two wind turbines currently located at Mt. Wachusett Community College and two more at North Central Correctional Institution plus one more on the way, Gardner hopes that they will be advertisements for the city's environmental awareness.

The difficulty of becoming a Green Community tends to fall to the city planner in most communities and the case was not different in Gardner. Robert Hubbard, however, does not think

that this is the best approach. As city planners have much of their own agenda to fulfill for their cities, the added task of getting the city to become a Green Community only added to their likely heavy workload which keeps focusing on it hard. Most planners lack the qualification to efficiently perform all the tasks required by the Green Communities Act because of a lack of training in the technical aspects of what the Act requires.

## Sterling

The town of Sterling has had a difficult designation process up until this point. Because Sterling uses a municipal light department the additional criteria required to achieve designation has been controversial. The Sterling Municipal Light Department (SMLD), for example has been in discussion on the costs versus benefits of joining the Technology Collaborative (S. Hamilton, personal communication, April 25, 2011).

Unfortunately, SMLD officials have not listed any specific reasons why the board has not yet voted whether or not to join the MTC. It is apparent that the board is not interested in adding the additional 1/20th cent per kWh charge to customers until Sterling attempts to apply to become a designated community. It should be noted that this charge would amount to 30 cents per month for the typical residential customer using 600 kWh per month. Also, as defined in the GCA, once a MLP signs to gain access to the Renewable Energy Trust Fund, they are in a permanent agreement with the MTC and the membership cannot be revoked. This provision is required since, once the municipality has joined the MTC and met designation requirements; they have access to the aforementioned trust fund as well as grant monies from the DOER.

## Discussion

One of the most important things that many green communities had was a person to lead the movement to reach designation. In each of the designated green communities we studied, there was a paid employee of the town whose job (at least in part) it was to see that their town did what was necessary to meet the criteria of the act. In Worcester, the job naturally belonged to John O'Dell who is paid by the city to manage efficiency projects. In the smaller communities of Lancaster and Gardner the job belonged to the Director of Planning. Also, some of the towns had enough resources to start up an energy commission such as in Lancaster or hire a person to lead the initiative like Worcester.

However, many of the smaller communities do not have the resources to commit to the designation process which makes designation significantly more difficult. This leads to many towns believing that the act was designed with the larger towns in mind. While it is true that the larger communities have larger energy impacts, many of the smaller municipalities have more space for green energy development. These can be significant impacts towards the initial goals set forth by the Green Communities Act and so the smaller towns can very definitively impact energy goals of the state.

When the initial solar power goal was set in 2007 a few towns began to plan for solar power plants, unknowingly beginning the designation process. Gardner in particular began extensive energy efficiency plans for economic plans that had placed them in an excellent position to reach designation. Additionally Lancaster, as the result of a landfill re-use study, was already planning to install a five-megawatt photovoltaic power generation facility. In some instances there were cities that began the process due to simple chance. 70% of the city of Worcester's fleet was comprised of Chevy Sierras, which happened to be the DOER's SUV of

choice. While these circumstances can no longer be planned it does show that towns can take initiatives slowly instead of being discouraged by a lack of resources.

These long-term plans could also be aided by continuing the DOER energy consultants that many communities considered vital to early designation. While there are exceptions, such as Worcester, most communities that planned to achieve early designation found that the external energy consultants were useful. In fact the consultants were often considered vital to early designation. The private consulting firm Vanasse Hangen Brustlin, Inc. proved to be an indispensable resource to Lancaster and Gardner in conducting energy audits and looking for ways to improve efficiency. The continuation of the DOER sponsored consultants should prove to be especially useful to the smaller towns that are now beginning the designation process.

One possible consultant to look into would be Energy Service Companies (ESCOs). While they were banned during the 1970's due to fraud and corruption, with new regulation and oversight, ESCOs are now proving to be extremely worthwhile for organizations and municipalities looking to improve energy efficiency. Unlike the previous studies the 18% reductions meant that the DOER had very little to do in terms of aiding the designation. Worcester contacted Honeywell to formulate a plan to reduce energy consumption. The study resulted in a 40 million dollar plan to reduce the cities energy consumption by 18%, a significant portion of the required 20%.

Finally, it is apparent that communities looking to meet all GCA designation criteria must look for whatever private, state, and federal funding is available. This is particularly true for criteria one and three, for which a large number of grants are available. Lancaster for example used grants from the North Central Massachusetts Economic Development Council in the planning of the solar array generating facility they used to meet criterion one. Similarly,

Gardner received a \$50,000 grant from the Massachusetts Clean Energy Center toward building their proposed wind generator. To form the town energy baseline and five year energy reduction plan, Lancaster used funds from the American Recovery and Reinvestment Act (ARRA) and various grants from the Massachusetts Department of Energy Resources (DOER).

One possible consultant to look into would be Energy Service Companies (ESCOs). Worcester contacted Honeywell to formulate a plan to reduce energy consumption. The study resulted in an 18% reduction, a significant portion of the required 20%. While they were banned during the 1970's due to failures the recent studies proved to be extremely worthwhile. Unlike the previous studies the 18% reductions meant that the DOER had very little to do in terms of aiding the designation.

The Green Communities Act has evoked a very prompt response from a fairly significant portion of Massachusetts. With approximately 15% of the 351 cities and towns already being designated "green communities" during the first three years of the act's inception, the method the government has employed has certainly been effective until now. The Department of Energy Resources has provided valuable resources and hopefully will continue to encourage and promote the use of such resources in the future. Any single town cannot be expected to meet the necessary requirements without external support.

As such there are certain shortcomings within the Green Communities Act which could use some revisions. Because of the numerous requirements, smaller communities have a more difficult process of trying to achieve the designation. Some smaller communities have been able to meet the designation requirements but the lack of resources, when compared to larger ones, has left small communities under the impression that the act was made primarily for the larger ones. One possible way to address the deficiency would be to continue the DOER's consulting

program. Many cities and towns benefited greatly from the external support and so by aiding the smaller communities trying to achieve the designation there would likely be a response from a larger portion of communities.

A tiered system would also provide beneficial stepping-stones in the process to achieve a green status as some towns found it difficult to meet all the requirements for designation. By providing intermediate statuses, communities could allow for reassurance that they are proceeding in an efficient manner towards their goals.

One additional step that could be taken by the DOER or an independent organization is to calculate the success of the Green Communities Act in terms of kilowatt-hours. By attempting to calculate the total energy savings and sustainable energy production as result of the Act, the governor's office could provide lawmakers and Massachusetts's citizens with a better sense of the significance of the Act. It is also very likely that, presuming the reduction and generation totals were large enough, other states would be much more likely to imitate aspects of the GCA in creating their own "Green Communities" programs. While this would not impact Massachusetts state directly, the initiative shown by pioneering such a program would help to advance Massachusetts as a whole.

Of course, certain assumptions would have to be made for each of the criteria such as assuming that 20% energy reduction would only occur because of the act and that towns which purchased more efficient vehicles would not have done so without prompting by the act. Calculating the impact of a single criterion would be fairly straightforward for sustainable energy production projects. The impact of criteria two and five would be the most difficult since each instance of new construction would have to be analyzed for contribution toward energy reduction. Criteria two could be analyzed alongside the construction of the facility which can

then be compared to an average value for facilities of comparable size. Criteria five can then be analyzed in a similar way to criteria two, using a state or national average to determine the savings.



## References

- American Council for an Energy-Efficient Economy. (2011). State Energy Efficiency Policy Database, from <http://www.aceee.org/sector/state-policy/massachusetts>
- Coffey, P. J., & Thomas, K. (2010). Tracking the progress of the Green Communities Act of 2008 (S. a. T. P. Management, Trans.). Worcester, MA: Worcester Polytechnic Institute.
- Commonwealth of Massachusetts. (2008). Governor Patrick Signs Energy Bill Promoting Cost Savngs, Renewable and Clean Energy Technology, from [http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=080702\\_bill\\_energy\\_clean&csid=Agov3](http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=080702_bill_energy_clean&csid=Agov3)
- Commonwealth of Massachusetts. (2011a). Patrick-Murray Administration Awards \$3.6 Million to 18 New "Green Communities", from <http://www.mass.gov/?pageID=eoeepressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=110321-PR-18-Green-Communities&csid=Eoeea>
- Commonwealth of Massachusetts. (2011b). Summary of Statute MGL Chapter 43D, from [http://www.mass.gov/?pageID=ehedterminal&L=5&L0=Home&L1=Start%2C+Grow+%26+Relocate+Your+Business&L2=Licensing+%26+Permitting&L3=Chapter+43D+Expedited+Permitting&L4=Chapter+43D+Information&sid=Ehed&b=terminalcontent&f=permitting\\_chapter43d\\_43dsummary&csid=Ehed](http://www.mass.gov/?pageID=ehedterminal&L=5&L0=Home&L1=Start%2C+Grow+%26+Relocate+Your+Business&L2=Licensing+%26+Permitting&L3=Chapter+43D+Expedited+Permitting&L4=Chapter+43D+Information&sid=Ehed&b=terminalcontent&f=permitting_chapter43d_43dsummary&csid=Ehed)
- Commonwealth of Massachusett. (2009). Governor Patrick Sets New Goals for Wind Power [http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=090113\\_Goals\\_Wind\\_Power&csid=Agov3](http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=090113_Goals_Wind_Power&csid=Agov3)

Daley, B. (2010). State Designates 35 Green Communities, *Boston Globe*. Retrieved from

[http://articles.boston.com/2010-05-26/lifestyle/29301122\\_1\\_clean-energy-renewable-energy-projects-municipalities](http://articles.boston.com/2010-05-26/lifestyle/29301122_1_clean-energy-renewable-energy-projects-municipalities)

Department of Energy Resources. (2011a). About the Green Communities Division, from

[http://www.mass.gov/?pageID=eoeaterminal&L=3&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea&b=terminalcontent&f=doer\\_green\\_communities\\_gc-about&csid=Eoeea](http://www.mass.gov/?pageID=eoeaterminal&L=3&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea&b=terminalcontent&f=doer_green_communities_gc-about&csid=Eoeea)

Department of Energy Resources. (2011b). Green Communities Grant Program, from

[http://www.mass.gov/?pageID=eoeaterminal&L=3&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea&b=terminalcontent&f=doer\\_green\\_communities\\_gc-grant-program&csid=Eoeea](http://www.mass.gov/?pageID=eoeaterminal&L=3&L0=Home&L1=Energy%2c+Utilities+%26+Clean+Technologies&L2=Green+Communities&sid=Eoeea&b=terminalcontent&f=doer_green_communities_gc-grant-program&csid=Eoeea)

Massachusetts Clean Energy Center. Municipal Light Plant Communities, from

<http://www.masscec.com/index.cfm/page/Municipal-Lighting-Plant-Communities/cdid/11387/pid/11163>

Patrolia, S. (2010). As-of-Right Siting in Green Communities Program, from

<http://www.wickedlocal.com/hamilton/newsnow/x2034412333/As-of-right-siting-in-Green-Communities-program#axzz1KqOd9GnV>

Pickering, S. (2010). *Navigating the Green Communities Program*. Paper presented at the Helping

Massachusetts Municipalities Create a Greener Energy Future, Webinar.

Toupin, N. S., LeClerc, T. M., & Boudreau, C. J. (2009). A Green Initiative - the Green Communities Act (T.

a. Environment, Trans.). Worcester, MA: Worcester Polytechnic Institute.

Vogt, C. M., & Nesteroff, M. A. (2011). Federal Stimulus Provides Major Funding for Renewable Energy and Energy Conservation, from

[http://energypriorities.com/entries/2009/02/stimulus\\_legal\\_update.php](http://energypriorities.com/entries/2009/02/stimulus_legal_update.php)

## Appendix

## A.1 Town Selection Spreadsheet

Worcester County										
Town	Green	Population	Government	MLDP	Board	Leadership	Kelly	Stretch		
Ashburnham		5,546	Open	Yes		TA			population data from	
Athol	Yes	11,299	Open			TA		Yes	2000 census	
Auburn		16,259	Rep		Selectman	TA			green communities from	
Barre		5,113	Open			TA			Dec-10	
Berlin		2,380	Open							
Blackstone		8,804	Open		Selectman	TA (Vacant)			Government Key	
Bolton		4,148	Open		Selectman	TA	Wont		Open	
Boylston		4,008	Open	Yes		TA			Open town meeting	
Brookfield		3,051	Open			AA			Rep	
Charlton		11,263	Open						Representative town meet	
Clinton		13,435	Open		Selectman	TA			City	
Douglas		7,045	Open						Mayor-council city	
Dudley		10,036	Open			TA			Council	
East Brookfield		2,190	Open			TS			Council-manager	
Fitchburg		39,102	City		City Council	Mayor				
Gardner	Dec '10*	20,770	City		City Council	Mayor		Yes	Leadership Key	
Grafton		14,894	Open		Selectman	TA			TA	
						FC			Town Administrator	
						Tmod			TS	
Hardwick		2,622	Open						Town Secretary	
Harvard	Dec '10*	5,981	Open		Selectman	TA	Op	Yes	Tmod	
Holden		15,621	Open	Yes	Selectman	Tman			Town Moderator	
Hopedale		5,907	Open						Tman	
Hubbardston		3,909	Open			TA			Town Manager	
Lancaster	Yes	7,380	Open		Selectman	TA	Op	Yes	AA	
Leicester		10,471	Open		Selectman	TA			Administrative Assistant	
Leominster		41,303	City		City Council	Mayor			AC	
Lunenburg		9,401	Open						Administrative Clerk	
Mendon		5,286	Open			AA			ES	
Milford		25,152	Rep						Executive Secretary	
Milbury		12,874	Open			Tman			FC	
Millville		2,724	Open						Finance Committee	
New Braintree		972	Open							
North Brookfield		4,683	Open		Selectman	AA			Kelly Key	
Northborough		14,013	Open		Selectman	TA			Wont	
Northbridge		13,182	Open						Wont go green	
Oakham		1,673	Open						Op	
Oxford		13,352	Open			TMan			Going green w/ opposition	
Paxton		4,386	Open	Yes	Selectman	TA				
Petersham		1,180	Open							
Phillipston		1,621	Open			AA				
Princeton		3,353	Open	Yes	Selectman	TA				
Royalston		1,254	Open							
Rutland		6,353	Open							
Shrewsbury		33,345	Rep	Yes	Selectman	TMan				
Southborough		8,781	Open		Selectman	TA				
Southbridge		17,214	Council		Town Council	TMan				
Spencer		11,691	Open	Yes		TA				
Sterling		7,257	Open			ES				
Sturbridge		7,837	Open			TA				
Sutton		8,250	Open	Yes	Selectman	TA	Op			
Templeton		6,799	Open							
Upton		5,642	Open		Selectman	AC				
Uxbridge		11,156	Rep		Selectman	Tman				
Warren		4,776	Open							
Webster		16,415	Open	Yes		TA				
West Boylston		7,481	Open		Selectman	TA				
West Brookfield		3,804	Open							
Westborough		17,997	Open		Selectman					
Westminster		6,907	Open							
Winchendon		9,611	Open			Tman				
Worcester	Yes	182,882	Council		City Council	CM		Yes		
						Mayor				

## A.2 Sample Town Contact Information

### Gardner

#### Levi Heywood Memorial Library

- [http://www.gardner-ma.gov/Pages/GardnerMA\\_Library/index](http://www.gardner-ma.gov/Pages/GardnerMA_Library/index)
- 978-632-5298
- Administration
  - Mark P. Hawke
    - Mayor
    - [mayor@gardner-ma.gov](mailto:mayor@gardner-ma.gov)
  - Jennifer Griest
    - Mayor's Secretary
    - [mayor\\_secretary@gardner-ma.gov](mailto:mayor_secretary@gardner-ma.gov)
  - Office Phone: 978-630-1490
- Building Department
  - Dawn Reynolds
    - Principal Clerk Typist
    - [dreynolds@gardner-ma.gov](mailto:dreynolds@gardner-ma.gov)
  - Donna Kliskey
    - Senior Clerk Typist
    - [dkliskey@gardner-ma.gov](mailto:dkliskey@gardner-ma.gov)
  - Office Phone: 978-630-4007 Alternate Phone: 978-630-4020
- Community Development & Planning
  - Robert Hubbard
    - Director
    - [rhubbard@gardner-ma.gov](mailto:rhubbard@gardner-ma.gov)
    - 978-630-4011

### A.3 Sample Interview Questions

1. Our findings will be compiled into a report that will be published by WPI. Is it acceptable for us to reference you in our final report? (We can make a final draft available to you for approval, or mention you anonymously.)
2. Was becoming a green community your personal responsibility or did you work as part of a group?
3. In the early stages of the Green Communities Act, what were the motivating factors for going green?
4. When the Green Communities Act was passed, was your town/city in the process of working on any projects comparable to the criteria required to be a green community?
5. Which of the five criteria in the Green Communities Act did your town/city find most difficult and what helped you overcome them?
6. Are you aware of any public groups in your town/city that support green initiatives?
7. Are you aware of any public groups in your town/city that are opposed to green initiatives?
8. Are there any other green goals that your town/city is pursuing that are not related to the five criteria in the Green Communities Act?
9. How does your town/city intend to implement its plans to reduce energy consumption and purchase fuel efficient vehicles?
10. Do you have any marketing plans to promote your town/city as a green community?
11. Do you have any other plans for the grant money that your town/city is eligible for?
12. Do you have any advice for other communities that are just beginning the process of becoming green?