Tracking the Progress of the Green Communities Act of 2008

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**Abstract**

Our IQP tracks the progress and implementation of the Green Communities Act of 2008 in Massachusetts. The Act attempts to make the state greener by requiring utility companies and towns to undergo changes, such as acquiring a set amount of energy from renewable sources. Our methods included giving a survey to members of the WPI community to assess their knowledge and opinion of the Act, and determine ways in which they implement green technologies into their own lives. We found that most of the public does not know what the Green Communities Act is doing for them, but that most people are going green in some way. We also gave a survey to all the town managers or equivalent town officials across the state to track and compare the progress of different towns with the Act. From this, we drew conclusions about different levels of progress with the Act’s goals at a town level.
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Introduction

An IQP during the 2008-2009 school year looked at the Green Communities Act of Massachusetts and attempted to track the progress of the Act in the first year that it was passed.\footnote{“A Green Initiative: The Green Communities Act.” http://www.wpi.edu/Pubs/E-project/Available/E-project-050509-135634/unrestricted/AGreenInitiativeTheGreenCommunitiesAct.pdf} The original project looked at the different sectors (utilities, towns, businesses and people) and determined how the Act would affect them when it went into effect in the beginning of 2009. In their report, they had further questions that they would have liked to tackle, and we set forth with the goal of furthering their project.

The goals of the IQP were to measure the progress made on the Green Communities Act since the last year’s group looked at it. With our survey and their survey available for comparison, we were able to look in depth at whether the WPI community knows more or less about the Green Communities Act this year, and whether or not they noticed any changes being made in the Worcester community. We also sent out a survey to each town to find out what changes were being made across Massachusetts. Finally, we researched news sources as well as utility companies to further expand our knowledge of the progress of the Green Communities Act.
Background

With the constantly increasing population and the technological boom of the past thirty years, there has been a constantly increasing demand for electricity and power. The downside to this increase in energy demand is that even the most modern and efficient power plants in the United States are responsible for some of the highest levels of emissions in the world of carbon dioxide, nitrous oxide, mercury and sulfur. Greenhouse gas emissions come from four main sources: the burning of fossil fuels to make electricity; industrial, commercial and residential burning of fossil fuels to make heat; the burning of fossil fuels to provide transportation like cars; and through emissions from other various activities such as agriculture.2 Unfortunately, it seems like the vast majority of the United States would rather pay less money for “dirty” power, than to invest in a cleaner energy alternative. Renewable energy sources can help mitigate climate change because new technologies like wind and solar rely on natural energy and do not require the burning of fuels such as coal and natural gas. Although the recent green initiative has been geared towards stopping global warming, hopefully as fast as possible, and developing new energy sources, it hasn’t always been that way.

The Kyoto protocol, developed in 1997, was one of the earliest attempts to lower global emissions, and was developed and signed by nearly every country in the world including the United States. Unfortunately, the Senate never approved the treaty, and therefore it was never put into practice. The sad truth is that the United

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2 ‘What are emissions’ http://www.masstech.org/cleanenergy/important/envemissions.htm
States, at that time, was responsible for 36.1% of the world’s emissions. President Bush (W.) claimed that the protocol would have “wrecked our economy,” and without the support of the President or the Senate, such a huge change could never come to pass. Hope is on the horizon, as the Obama administration has been a huge supporter of the “green movement,” and has called for some kind of legislation to combat the level of emissions. Almost preempts this call, Massachusetts—more specifically Deval Patrick—has been on the forefront of the green initiative, and on July 2, 2008 the Governor signed the Green Communities Act into law. Backed by numerous environmental groups in Massachusetts, including the Conservation Law Foundation, this act has many different aims, most notably energy reform in Massachusetts.

The first goal of the bill is to lower energy costs. With this new act, energy efficient programs will be able to compete in the energy market with the traditional energy suppliers. Utility companies will now be required to buy any energy efficiency improvements that cost less for them than generating power, which will ultimately lower customers’ energy bills. The utility companies will also offer rebates and other incentives for consumers to upgrade to more efficient models of lighting, air conditioning and other equipment. By promoting more efficient energy in homes, customers will soon require less energy for their daily tasks.

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The next goal is to promote renewable energy within the state of Massachusetts. The main sources of renewable energy in Massachusetts come from solar panels and wind energy. Other sources of renewable energy are fuel cells, bioenergy and hydropower. There are many plants across the state which already use these technologies, but they often cost more for consumers because the company owners are still trying to recoup their start up costs. Utility companies will be required to sign 10 to 15 year contracts with renewable energy developers to help the developers get money to fund new projects in Massachusetts, and get more business for the companies that already exist (making them more competitive with mainstream energy plants). This will help make renewable energy more mainstream and promote its use by utility companies. Going along with this, people who already have wind turbines or solar power at their homes can now sell any excess energy they produce back into the grid. This initiative is called net metering, and gives people an incentive to have their own renewable power. The act also allows utility companies to install solar panels, which they will own, on some customers’ rooftops.6

Finally, the act works to make state power greener overall. Benefits are offered to any communities that make a commitment to energy efficiency and using more renewable energy. Cities and towns can also apply to be recognized as a Green Community through a program, which will give them additional help and support with their goals to make their town greener. To apply to be a Green Community and to take part in the Green Communities Grant program, towns must met 5 criteria.

6 “Governor Patrick Signs Energy Bill Promoting Cost Savings, Renewable and Clean Energy Technology.”
The first criteria is to provide as-of-right siting in designated locations for renewable/alternative energy generation, research and development. The next is to adopt an expedited application/permit process for as-of-right energy facilities. They must also purchase only fuel efficient vehicles. A town must establish their benchmark for energy use and develop a plan to reduce the baseline by 20% within 5 years. Finally, towns must set requirements to minimize life-cycle energy costs for any new construction. One way to do this is to adopt a set of new stretch codes.7

A Department of Energy Resources (DOER) within the state government has been created, including a Green Communities Division to provide assistance to cities and towns with their efforts. The program will receive $10 million in funding, renewable yearly, to go towards renewable energy and efficiency projects in towns. The funds will be distributed by this new division.8 In addition to government funding, the laws also require Massachusetts to adopt the highest levels of efficiency for any new government buildings being created—thus guaranteeing a future that follows in our footsteps. One such certification for new buildings is the LEED certification. LEED certified buildings are designed specifically to reduce waste sent to landfills and greenhouse gas emissions, conserve energy and water, and be healthier and safer overall.9 As of now, there are 4641 LEED certified buildings total

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7 ‘Green Communities Grant Program’ [http://www.mass.gov/?pageID=eoeeternal&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=eoeeternal&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)


across the nation, with different levels of certification including platinum, gold and silver.\textsuperscript{10}

Renewable energy portfolio standards (REPS) are regulations that individual states put in place which require increased renewable energy production and utilization. One other addition from the act will double the rate of increase in the REPS of Massachusetts from 0.5\% to 1\% per year and remove the previous cap. As a result of this, by 2009, utility companies will have to obtain renewable power for 4\% of their sales. This will go up to 15\% in 2020 and 25\% in 2030, and so on.\textsuperscript{11} This program is a major step for Massachusetts, making it one of the national leaders in energy reform.

\textsuperscript{10} ‘LEED Projects and Case Studies Directory’
http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx

Research Methods

A previous IQP examined public knowledge and opinion of the Green
Communities Act by giving a survey to students, teachers and homeowners.\textsuperscript{12} We
have taken this a step further by administering a similar survey to a similar target
group in order to evaluate whether people have gained more knowledge throughout
the past year, or if they have taken any further steps to initiate green energy into
their lives. In order to do this, we had to get approval from the Institutional Review
Board, allowing us to interview people in person and ask them questions through an
online survey. Our survey was sent to all members of the WPI community, including
the undergraduate, and graduate classes, as well as all employees, giving us a total
audience of about 4,500 people. The goal of our questions was to provide us with
some insight in how the Green Communities Act is affecting the public, whether any
changes are taking place in the daily lives of our target base, and whether they have
noticed any changes being made by their town or government that might fall under
the Green Communities Act.

With respect to municipalities in Massachusetts, we have searched through
news sources online, using Google Alerts with the search terms “Renewable Energy
Massachusetts” and “Green Communities Act.” To date, this has given us well over
200 different articles—about 75% of them are relevant—with information about
towns in Massachusetts that have taken steps to implement the Green Communities

\textsuperscript{12} Toupin, Neil, Todd LeClerc, Christopher Boudreau, and Kent Rissmiller. “A Green Initiative – The
Green Communities Act.” http://library.wpi.edu:7008/vwebv/holdingsInfo?bibId=298650
Act. This information is invaluable because it shows what the public is interested in with regards to the progress being made. The 200+ news articles were used to figure out which towns are most actively utilizing the new state funding for renewable energy projects.

We then compiled a list of the town managers, administrators, or comparable positions for each of the 351 towns and cities in Massachusetts. Using their contact information, we sent out a survey, located in Appendix B, to each town official individually. If towns did not respond to the email, we further tried to contact them by email or phone in an attempt to get their input for our survey. From the survey results, we compared the effectiveness of the Act in different towns, such as large towns and small towns. We also got concrete examples of what actual towns are doing to further the progress of the Green Communities Act.

The utilities companies in Massachusetts are required by the GCA to buy a percentage of “green” energy every year. Many of the utility companies explain what they are doing to push forward with the green movement on their web pages, which have proven to be a good source of information. There are many programs in place by energy companies to utilize renewable energy and increase energy efficiency. Additionally, our survey to the public included questions about their energy bills and usage, and the results have shown us whether or not the price of electricity/energy has increased, whether they have been warned of a future increase, whether they would prefer to pay for “green” energy alternatives—even at higher cost—and if so, how much more they would be willing to pay. By comparing
the information we received from the public, and information from utility companies, we were able to get more accurate results this area of the act.

By looking at our information gathered from all of these sources (the public, towns, and utility companies) we were able to gain an accurate picture of the effects of the Green Communities Act on all parts of the community.
Utilities

After contacting several of the utility companies in Massachusetts, we were given links to the websites that showed what the companies were doing to be more green. The websites of utility companies are a great source of information that more of the public should take advantage of. They are simple and easy to navigate, and it is easy to find new initiatives that consumers might not know about. There are many different electric companies in Massachusetts; in this section we will focus on the initiatives made by a few different companies.

National Grid, a company that supplies both electricity and natural gas, has several different initiatives that they are pushing forward. Their main “consumer” initiative is called the 3% less initiative, which pushes consumers to use 3% less energy per year, over the course of the next 10 years. The primary incentives for consumers to participate are their reduced energy bills, and for the environmentally conscious, a reduced carbon footprint. Over the full course of 10 years, this would result in a 27.26% reduction in raw energy consumed if everyone achieves the 3% less. National Grid is also helping to push the solar industry forward. In the early 80s, they participated in a pilot program in which they constructed over 30 solar installations for homes and businesses in Gardner, MA. One could go so far as to say that they were on the forefront of solar power 20 years ago, and haven’t slowed their efforts since. Since then, they have connected over 5.64 megawatts of solar-generated electricity to residents in Massachusetts, Rhode Island, and New

13 https://www.powerofaction.com/about/
Hampshire. National Grid also recently constructed a new headquarters in Waltham, MA, which was Platinum-level LEED certified. Gaining a LEED certification is a challenging task on its own, but a platinum certification is the highest possible (essentially a 4 on a scale of 1-4), and indicates that the construction took the sustainability of its location, the water efficiency, energy and atmosphere, materials and resources used, as well as the indoor environmental quality into account. On April 23, 2009, National Grid applied to be eligible to create and own over 5 megawatts of solar generation in Massachusetts. The plan was approved in October of 2009, and the projects, located in Dorchester, Everett, Haverhill, Revere, and Sutton/Northbridge, are expected to be completed sometime in 2010.

In addition to all of these projects, National Grid recently started a program that could pay up to 70% of the cost for small businesses that are interested in energy efficiency upgrades. This program was created as a part of the Energy Efficiency Portfolio Standard (EEPS) for Massachusetts, which is part of the Green Communities Act. One of the main goals of the EEPS is to lower the energy consumption of the state by 15% by 2015, and although this might seem like a momentous goal, the “3% less initiative”—if it were representative of all of the energy usage in Massachusetts (for example if consumers who use other utility companies were to participate)—would result in 14.13% less energy consumption by 2015. The issue with this data is that not all utility companies have initiatives like this, and not all consumers are willing to participate. To help consumers reach this goal, National Grid has offered to pay up to 70% of the cost of energy efficiency upgrades.

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14 http://www.nrdc.org/buildinggreen/leed.asp
15 http://www.nationalgridus.com/masselectric/solar/index.asp
upgrades for small businesses that use less than 100 kilowatts of power. In addition to paying a large percentage of the total cost, National Grid will allow the small businesses to finance the remaining cost interest-free for 24 months. \(^{16}\)

One of National Grid’s competitors, NSTAR, is also offering several different green energy programs. Their main program is called “NSTAR Green,” which gives consumers the opportunity to receive either 50% or 100% of their energy from wind-powered generators. The downside is that there is a premium price that goes along with the program, depending on which percentage is chosen. For consumers who opt to receive 50% of their power, the cost is an additional 0.837 cents per kilowatt-hour, while the cost for 100% power is 1.396 cents per kilowatt-hour.\(^{17}\)

With the average Massachusetts consumer paying around 15.56 cents per kilowatt-hour\(^{18}\), an increase of 0.837 cents would result in a 5.38% total increase in energy cost, while an increase of 1.396 cents would result in an 8.97% total increase. These additional costs are manageable, and for those people who are environmentally conscious, are surely worth it. Unfortunately, NSTAR recently applied for an increase in the cost of these premiums—since they have to be agreed upon by the Massachusetts Department of Public Utilities before any changes can be put into place—which would result in an increase in the cost of the premiums for the 50% and 100% categories from 0.837 to 2.356 and 1.396 to 4.435 respectively.\(^{19}\) This changes the total percentage increases from 5.38% to 15.14% and 8.97% to 28.5%, which puts the prices on a completely different scale. While an 8.97% increase in

\(^{16}\) http://www.powerofaction.com/news/
\(^{17}\) http://www.nstar.com/residential/customer_information/nstar_green/nstar_green.asp
\(^{18}\) http://www.eia.doe.gov/electricity/epm/table5_6_a.html
\(^{19}\) http://www.nstar.com/residential/customer_information/nstar_green/rate_change.asp
cost isn’t going to dent the average budget, an increase of almost one third will surely have a greater impact. The application for the increase in premium cost is surely going to be dissected before any changes are made, but the huge increase in cost could be an issue for the green initiative. Not only will it dissuade consumers who were previously contemplating the program, but it could also result in consumers who were already participating leaving the program.

Unfortunately, if the majority of the consumers do choose to stop participating in the program, it could spell disaster for NSTAR. In order to properly launch this program, NSTAR had to first sign two 10-year contracts with wind energy suppliers, which ensures NSTAR 30 megawatts of power. This is power that has to be sold, since NSTAR is contractually obligated to buy the power, but if NSTAR doesn’t have any willing consumers who want to pay more for the energy, then they will have no choice but to force the energy on all of their consumers—this could result in increased rates for all consumers. This is all speculation, but the fact is that if nobody wants the power, and they have to get rid of it, then people should expect to pay more in the near future.

Another initiative that is being pushed forward by utility companies is a rebate program called “Mass Save.” This program sponsored by 8 of Massachusetts’ largest utility companies, including the ones mentioned above as well as Unitil, Western Massachusetts Electric Company, Berkshire Gas, Cape Light Compact, New England Gas Company and Bay State Gas. Mass Save offers rebates to the residential, business, and industrial communities, wherein interested parties can apply for rebates on qualified products. Each household in Massachusetts was eligible to
apply for rebates on up to four different appliances, with a total rebate value of up to $675. Unfortunately, after receiving over 26,000 rebate requests, the “great appliance exchange” program is no longer accepting applications. Mass Save is a collaboration of sorts, and every utility company helps to support it. In addition to the rebate programs, they also offer home evaluations in which a trained professional will evaluate the energy efficiency of your home, and offer suggestions as to how to improve the overall efficiency.

Bay State Gas, yet another utility company, recently had its Energy Efficiency Plan for 2010-2012 approved by the Massachusetts Department of Public Utilities. In the plan, the company meets all of the requirements set forth by the Green Communities Act, including the delivery of enhanced energy efficiency services, and the purchase of all available energy efficiency and demand reduction resources that are cost-effective.\(^\text{20}\) Bay State Gas will gradually increase its annual energy efficiency budget from $7.9 million to $22 million by 2012, which will help the company to increase the energy efficiency of its consumers. Ideally, this will save their consumers over 181 million therms of gas over the life of the modifications, which is roughly $135 million in savings. Bay State Gas also partnered with another company for the installation of a 425-kilowatt solar generation site, which is the largest in New England, generating over 535-megawatt-hours of power annually.\(^\text{21}\)

While the remaining utility companies all seem to offer some kind of energy efficiency programs, the aforementioned companies stand out. Not only are they compliant with the strict standards and expectations of the GCA, but they have gone above and beyond in the programs and incentives that they offer. In order for the green initiative to be successful in the long run, consumers, utility companies and legislators alike will have to work together. It might mean an increase in the cost of energy, at least temporarily, but it will lead to a world with less reliance on fossil fuels, and less money wasted on inefficient systems.
Cities and Towns

The first step in examining the progress of the Green Communities Act on cities and towns was to search for a list of all the towns, their government positions and contact information on the Internet. This information would be helpful for contacting all town officials at once. When such a database was not found, we created one using a complete list of towns in Massachusetts found on the www.mass.gov website. We then went to each town's individual webpage and compiled the contact information for town officials (town manager or the equivalent) for each of the 351 towns and cities in Massachusetts. This took countless hours of time to research each town individually.

With this database of town managers' (or other comparable positions) contact information complete, we were able to send out an email survey to each town individually. This survey can be found in Appendix B, and contained questions such as 'What has your town done to implement the policies of the Green Communities Act?' and "What have you found to be the biggest challenge in implementing the Green Communities Act?' With this survey, we were able to get an accurate picture of the success of the Act within each individual town in Massachusetts who responded. A good number of the town managers or comparable officials responded to our email survey. Those who did not respond originally got a follow up email and phone call, and those who still did not respond

http://www.mass.gov/?pageID=mg2terminal&L=3&L0=Home&L1=State+Government&L2=Local+Government&sid=massgov2&b=terminalcontent&f=cc_landing&csid=massgov2
simply did not get their data calculated in the results. By looking at each town individually, we could compare the success of differing towns in areas such as location and population size. These comparisons could eventually be used to make recommendations to towns based upon their criteria. For example, if most small towns were found to have done a specific thing to become greener, then it might be feasible for us to suggest to other similarly sized towns to do the same thing, while a larger city would have different potential options.

To compile the results of the survey, we used an Excel spreadsheet where all of the data in the responses was inputted from the emails we received from towns. Using all the responses, we went through them to look for general trends and similarities between different towns. Overall, we received a total of 67 respondents out of 351 towns total in Massachusetts. This is a large enough number that our data on the progress of the Green Communities Act is statistically relevant.

It was found that towns with larger populations (over 10,000 people) were more likely to implement the Green Communities Act into their communities. Of all the respondents with populations greater than 10,000 people, only 1 said they had not done anything of note to implement the Green Communities Act. This town was Shrewsbury, and while they said they were not doing anything, they are working on getting an Energy Efficiency Action Plan created. Towns with more people typically have more disposable resources with which they can start new projects and have more employees that can focus on creating new green initiatives in their town. In all of our responses, there were only very few towns with a population less than 5,000 people who was doing anything major with the Green Communities Act. Of note was
Tisbury, with a population of 3,851 who has established a Renewable Energy Committee, purchased a hybrid vehicle, and conducted a town-wide energy audit. The majority of the other small towns who responded either said they did not have the manpower and resources to pursue the Green Communities Act at this time, or simply were choosing not to implement it. Margaret Nartowicz, the town administrator of Sutherland, a town of 3,777 people, said the most challenging part of meeting the objectives of the Act is “being a small town in a program geared towards large towns and cities.” This sentiment was echoed throughout many other responses. In fact, many small towns responded to our survey and simply said they were not doing anything to meet the objectives of the Green Communities Act at this time. Out of all the towns with populations less than 10,000 people, only 38% are actively pursuing the implementation of the Green Communities Act at this time. Something that may improve the success of the Green Communities Act would be to have objectives that smaller towns can complete without having to do large scale projects. A sample small scale objective would be to conduct an energy audit throughout the town. This would give concrete spots in public areas that can be improved without trying to make changes throughout the town as a whole; this would also be more cost effective for towns without a lot of money to focus on fixing specific problem spots. Other things it was common for small towns to do included improving their lighting in town buildings to be more efficient (such as fluorescent lighting), and spreading the word to the population in their town that energy efficiency is a worthwhile investment.
Larger towns, such as towns with populations of 20,000 and above were more likely to have done large scale projects to implement the objectives of the Green Communities Act. Towns with higher populations were more likely to have done things like applying for grants from the Green Communities Program. Eighteen municipalities in Massachusetts have adopted the new Board of Building Regulations and Standards Stretch Codes (Greenfield, Pittsfield, Northampton, Holyoke, Montague, Leverett, Springfield, Athol, Acton, Tyngsborough, Sudbury, Lincoln, Lowell, Lexington, Kingston, Newton, Cambridge, and Mashpee). These new stretch codes require more stringent efficiency in new buildings being built. It means that buildings built today will use only 60% of the energy that a comparable building built under the old codes would use – or a 40% energy reduction. Large commercial buildings will also have a 20% energy reduction. The state is pushing to get more people to adopt this new stretch code, because making building construction more efficient is simpler than making the changes to the building once it is already built.

Overall, 54% of the towns who responded to the survey said that they did not feel very successful in their implementation of the Green Communities Act. It is still a relatively new act, so it is possible that some towns will pick up on their efforts and begin to make some progress in the near future. It is hard to expect that towns will have made major changes in only two years since the Act has been passed, especially since some towns do not undertake major building projects or look at their energy consumption every year. However, that is not to say that some towns

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23 ‘Summary of Stretch Appendix to Mass Energy Code’
http://www.mass.gov/Eoeea/docs/doer/green_communities/grant_program/stretch_code_table.pdf
did not feel as though they have been successful thus far, though. In fact, 46% of town officials that responded said they felt at least somewhat successful in the implementation of the Act. Micheal Jaillet, from Westwood, summed it up in his response: “We are making progress, but much remains to be done.” Many towns are beginning to take steps to meet the five criteria needed to become eligible for the Green Communities Program, but most are not there yet. One good start that many towns are making is the formation of some sort of Energy Committee, or similar group. In fact, almost 70% of communities that responded to the survey have at least one person (whether it be an employee, a volunteer, or some sort of committee like an Energy Committee) working on the issue of furthering green initiatives. This seems like a very high number, and it stands to reason that with so many people working towards the objectives of the Green Communities Act there should be an increase in successful towns in the near future.

One major concern that we noticed when looking over the results from the town survey, was that communities who had municipal light plants did not think they were eligible for the grants. There were 3 of them, and they all had the same response that they couldn't work towards being a Green Community due to their MLP. In fact, one town even sent over a project done by a Clark University student claiming that because they had a municipal light plant they were not eligible to even apply for the program. However, on the Massachusetts.gov website, we found that Municipal Light Plant (MLP) participation in the Renewable Energy Trust is in fact possible. Customers pay about 30 cents more per month which goes to support the development and promotion of renewable energy projects. This does not mean that
MLP’s are required to open their territory for commercial electric competition. Additionally, if they chose to participate, all of the Trust’s programs would be open for the MLPs, including grants and loans for installation of photovoltaic, wind, biomass or other systems at homes, businesses and public facilities in the territory. This clearly is a source of discrepancy between the town governments and what the government is trying to achieve with the Green Communities Act – obviously the government’s goal is to get as many people involved as possible.

Another area of the Green Communities Act that we were interested in learning about the progress made was the Green Communities Program that towns can join. Towns who met all 5 of the criteria stated above are eligible to apply to become a ‘Green Community.’ This program makes them a candidate for many grants to even further improve their energy efficiency. When we looked over our results of the town manager survey, only one town responded and said that they were recognized as a Green Community at this time. There is another deadline for applying in May 2010, so a few other towns were in the process of applying for the Green Communities program at that time. This brought the total of towns who plan to be recognized Green Communities by the end of the year to 17% of respondents. However, the rest of the towns that responded said that they did not meet all 5 criteria at this time. An additional faction of towns said that, while they are doing what they can to meet the objectives of the Green Communities Act, they do not have any plans to become a Green Community because it is too complicated to meet all the criteria and then apply. They are content just doing what they can without

the recognition for it, and the potential gain in grants is not a worthwhile motivator for them. This could pose a problem for Massachusetts in the future if more towns adopt that attitude, because then there will not be enough towns participating in the Green Communities Program.

In the survey results we got, there was a great variety of responses regarding the easiest way to implement portions of the Green Communities Act, but there were some overall trends. Easy and quick ways to make the town greener included more efficient fuel policies (such as buying hybrid cars for town officials when they were due to get a new car) and installing more efficient lighting. Other things towns can be doing are applying for grants from the state which they can then use to make their town more efficient, or implementing new zoning policies. The new zoning policies, such as the as-of-right siting and the expedited application/permit process, would help to make the town closer to fitting the criteria to become a Green Community.

There are still many challenges in towns that are preventing them from meeting the goals of the Green Communities Act. We had predicted that small towns simply do not have the resources or manpower to effectively pursue the implementation of the Act, and this was shown to be true when the towns with populations smaller than 5,000 people said they were not doing much, if anything to pursue the Act. Even in larger towns, town officials are still meeting resistance from their citizens when they try to pass policies which go along with the Green Communities Act, such as the new stretch codes. Jeff Chelgren, the town administrator from Wenham said that part of the reason for the resistance is due to
“public fear and mis-interpretation.” As is stated below in the next section, most of the public does not really know what the Green Communities Act is or what it does, and this may make people reluctant to support policies that they do not understand the purpose of.

Many towns and cities have implemented some sort of position or committee dedicated to furthering green initiatives in their community. Since almost 70% of our respondents had at least one individual working on these initiatives, this shows that the majority of towns are working towards creating greener communities and sincerely would like to follow the provisions of the Green Communities Act. Overall, most towns are trying in some way to comply with the Green Communities Act. There were many towns who were working to meet the May 2010 deadline for application into the Green Communities Program, so if they get accepted then that will be a great step into furthering the Act’s goals. With so many towns on board with the Green Communities Act, it will only get easier for officials to make changes in their towns and meet the 5 criteria.
News Sources

As a supplement to the surveys we sent to each town, we did our own research into what “green” initiatives were going on around the state. To help us figure this out, we used a useful tool called Google Alerts, which enabled us to easily get news updates on our search terms of “Green Communities Act” and “Renewable Energy Massachusetts." Of course, this yielded many results that had nothing to do with our project, so we had to sort through them to find out which articles would be useful to us. This section of our report is based entirely on the news articles that we found, and it should be known that this is in no way a complete representation of everything that has been going on in Massachusetts, simply the results that we accumulated.

From the news articles we accumulated, we were able to find a lot of information about what towns in Massachusetts were doing in order to supplement the results we got from the town surveys. Below is a listing of one main thing we were able to tell towns were doing for each town that came up in the news.

Acton – Thinking about passing the stretch code.25
Amesbury – $150,000 grant for solar panel installation on high school (35 kW)
Barnstable – 1 solar project from “cape pool”
Belchertown – Attempting to become a Green Community.26

26 http://www.gazettenet.com/2010/03/24/belchertown-looks-green
Boston – Logan Airport is installing solar panels EnerNOC given a three-year $10 million contract to track energy usage of state buildings.

Concord – Thinking about installing utility-scale solar generators, but meeting resistance from community.

Chelmsford – 8-kilowatt solar installation on top of public library.

Greenfield – Completed application for GC Status.

Fairhaven – Received $7.9 million for wastewater treatment plant that creates energy.

Falmouth – Received $148,500 grant for a 27-kilowatt solar installation for town hall.

Hamilton-Wenham – Beginning process of becoming a Green Community.

Hopkinton – NSTAR Pilot “Smart Grid” program.

Hyannis – 5 solar projects from pool of $364,000

Jamaica Plain – NSTAR Pilot “Smart Grid” program.

Kingston – Completed application for GC status

Lenox – Efforts to reduce total energy consumption

Lincoln – Possibly qualified as a green community, and is thinking of installing a solar generator.

Malden – Received about $18,000 in grant money for solar installation on high school.
Medford – Built a 100-kilowatt, 131 foot tall wind turbine on elementary school grounds. (Supplies 10% of schools energy needs).[^39]

Melrose – Contemplating green community status.[^40]

Newton – NSTAR Pilot “Smart Grid” program.[^41] Enacted stretch code[^42]

North Adams – Massachusetts Museum of Contemporary Arts roof will have solar panels installed (200kW) but will not own them.[^43] High school installation of 38-kilowatt solar project.[^44]

North Brookfield – 25 Acres sold to Ansar energy as part of their 30MW wind solar system.[^45]

Orleans – One solar project from “cape pool”

Palmer – Looking to become a Green Community.[^46]

Pittsfield – WMeco announced plan to build 1.8-megawatt solar facility (largest in New England)[^47]

Raynham – Olson’s Greenhouses get $20,000 grant for energy efficiency.[^48]

Rockland – Town got $150K renewables grant, building 24kilowatt solar system on elementary school.[^49]

Salem – Looking into adding a wind turbine somewhere in town, hired consulting firm[^50]

[^39]: http://www.nawindpower.com/naw/e107_plugins/content/content_ltp.php?content.5417
[^43]: http://www.benningtonbanner.com/entertainment/ci_14901721
[^45]: http://www.telegram.com/article/20100204/NEWS/2040668/1003/NEWS03
Somerville – Single-stream recycling program, solar panel installation\(^{51}\)

South Dennis – 2 solar projects from “cape pool”

Templeton – Wind turbine being installed behind high school\(^{52}\)

Uxbridge – Ansar Energy LLC wants to build 5-megawatt solar farm on 23 acres of farmland.\(^{53}\)

West Newbury – $17,000 grant to install solar panels, possibility of applying for Green community status.\(^{54}\)

West Yarmouth – 1 solar project from “cape pool”

Williamstown – Efforts to reduce total energy consumption\(^{55}\)

From the information on local initiatives found from the news sources through the Google Alert tool, it can be seen that towns all across the state are making initiatives in their community. While not all towns are making an attempt to follow the provisions of the Green Communities Act, the state as a whole is working to make Massachusetts a greener place. From the news articles we saw, it would appear that the largest green initiative in the state at this time is the acquisition of solar technology. Since all these articles appeared in local news sources, it shows that people are interested in reading about the changes that are taking place in their community with respect to new green technologies.

\(^{50}\) http://www.wickedlocal.com/salem/news/x1278483127/Be-our-gust-Officials-say-Salems-wind-tower-shows-promise

\(^{51}\) http://www.thesomervillenews.com/main.asp?SectionID=2&SubSectionID=2&ArticleID=3530

\(^{52}\) http://www.telegram.com/article/20100418/NEWS/4180435/1101

\(^{53}\) http://www.telegram.com/article/20100227/NEWS/2270347/1003/NEWS03

\(^{54}\) http://www.newburyportnews.com/local/x794090483/Board-looks-to-make-West-Newbury-more-energy-efficient

\(^{55}\) http://www.advocateweekly.com/ci_14928756
The Public

Our survey, found in Appendix A, was sent out to the entire WPI community, including undergraduates, graduate students, faculty, staff and employees. Overall, a total of 410 people took the time to respond to the survey out of a potential pool of approximately 4500 people in the WPI community. The results of this survey told us a great deal about the public’s knowledge and response to the Green Communities Act.

From the survey, we had a broad subject range. The respondents were evenly divided between males and females (51% male and 49% female). 62% were between 18 and 22 years, with 72% of respondents also being students. Additionally, 29.5% of the survey-takers were over 30 years old. This age range gave us a nice range of renters (43%), homeowners (26%), and people living in on-campus housing (38%), which is good because these three subgroups typically would have very different energy usage with respect to utilities and energy bills. In fact, only 62.7% of respondents to the survey reported that they pay for their own utilities.

One of the most important questions on our survey was the question about knowledge of the Green Communities Act. The question asked respondents to rank their knowledge of the GCA on a scale from 1-5. The vast majority of people said that their knowledge of the Act was a 1 or 2 (84% of respondents). This number actually went up from the survey given last year, where 64% of people said they had no knowledge whatsoever of the Act. This means that while cities and towns are
working hard to implement the Act in their communities, most of the public does not even know it exists or what it does. Based on this, the government could work harder to promote the Act to the public, such as by having additional information sessions, distributing flyers, or having commercials on television.

However, while most people had not heard of the Act, when given a short description of the Act (shown in Appendix A), 90.5% of people said they would support it. This shows that the public would be behind projects supported or funded by the Act. Given this information, in towns that said they were experiencing resistance from community members on projects or implementations of the Act, perhaps simply explaining the Act’s purpose would get more people on board.

While most respondents said that they did not notice the Green Communities Act being implemented in their town (80%), the 20% that did say they noticed changes had some trends in their open-ended responses. The most common response that came up was recycling efforts being made by cities and towns. This was especially noticeable in the WPI community, where a new program called Recyclemania is being implemented, and many people said they noticed increased recycling efforts across campus. Additionally, many respondents said they noticed an increase in the creation of green buildings, most notably East Hall at WPI, which is LEED certified. The majority of the WPI community probably has noticed these efforts; they just did not connect them with the Green Communities Act. Another common response was the creation of wind turbines throughout the state of Massachusetts to generate clean energy, including at regional high schools such as Holy Name High School in Worcester. In total, there were 71 people who said that
they noticed some sort of change in their community to make it greener. This is clearly a noticeable progress.

Another facet of the survey given was whether or not individual respondents are taking steps to make their own lives greener. On the survey, 95.5% of people had implemented at least one green technology into their life. The most common response was recycling, with 90% of people saying they recycle. The next most common green improvements were reusable water bottles, followed by energy efficient lighting. These responses were similar to the ones found by last year’s IQP team. This makes sense, because these green technologies are very simple and easy to make the change in their lives. We also asked people why they had or had not chosen to implement green technologies into their life. The most common reason for why people had no implemented any green initiatives into their life was that they had no opportunity to do so. Many of the survey’s respondents are college students living in either dorms or rented apartments, and do not really have any opportunity to change their residence’s carbon footprint or perhaps even install energy efficient lighting. However, these people could still choose to recycle when they are on campus. The next most common response for why people were not participating in any green initiatives was that it is too expensive. This makes sense given the current economic times. Green technologies often cost more than their comparable un-green counterparts, and people may be reluctant to spend more up front, either because they do not know if they will recoup their costs or because it is not worth it to them to pay more to help the environment in a seemingly small way. Again, the responses to this question were similar to those given by the respondents to last year’s survey.
The final ‘section’ of the survey looked at the use of green or renewable energy by utility companies. Of those who pay for their own utilities, only 29.1% of respondents were given an opportunity to have some portion of their energy consumption come from renewable sources. This seems like something all utility companies should be pushing, since they have to acquire some of their power from renewable sources anyway. Of those who were offered the option to purchase renewable energy, 45% of people chose to do so. This is almost half the people who are offered this opportunity, leading us to believe that if more consumers were given this opportunity it would be easier for utility companies to promote the use of renewable energy. Additionally, of the people who chose to purchase renewable energy when it was offered, about half said they did not notice a substantial increase in their energy bill, while the other half did. This leads us to believe that any increase in the bills are nominal and probably will not be an overwhelming increase. If the increase in energy bills is small, then it is likely that people who opt in will not choose to opt out in the future.

Of the people who purchase some sort of renewable energy, 41.7% are over 30, 10% are between 23-29 years, and 48.1% are between 18-22 years. This shows that while young people may be more willing to purchase renewable energy, older people are also willing. Almost 50% of the people who chose to purchase renewable energy had a yearly income of less than $25,000, while an additional 30% had an yearly income of over $50,000. However, of those who chose not to purchase renewable energy when given the option, almost 20% had an income over $50,000.
This shows that the available income of people does not have a very large correlation to whether or not they are willing to pay more for renewable energy.

To further support this analysis, of the people who said they had an income over $100,000 per year, 36% said they would be willing to spend 1-10% more on their energy bills to obtain some energy from renewable sources, while an additional 27% were willing to spend somewhere between 11-30% of their bills. Compared to people who had an income of less than $25,000 per year, 44% were willing to spend between 1-10% of their utility bill to obtain energy from green sources. 21% were also willing to spend between 11-40% more of their bill. Even though this group has less income, they were still willing to spend an equal, if not larger, amount of their bill to get some energy from green sources. This is good news for the Green Communities Act. According to these results from our survey, many people with low incomes will still be willing to support the progress of the Act in such ways as paying a little more to get energy from renewable sources.

No substantial conclusions about the people who said they would be willing to pay more to purchase renewable energy could be drawn. Of the people who pay for their utilities and were willing to spend any amount more on their bill, there was every age represented in almost equal proportions. While the most substantial income range was less than $25,000, this was only because that was the most prevalent range we got from our total pool of respondents. There also was an approximately equal percentage of people who rent apartments or homes (55%) and people who own their own homes (38%). From this we can conclude that age,
income or homeownership do not affect whether people are willing to purchase renewable energy with their utilities.
Conclusions

From both our survey of town managers across the state, as well as the online survey that we gave to members of the public in the WPI community, we were able to draw a number of unique conclusions about the progress of the Green Communities Act of Massachusetts.

The main overall conclusion we reached was that not enough of the public in Massachusetts knows about the Green Communities Act. From our survey of the public, well over half the respondents said their knowledge of the Act was a 1 on a scale of 1 to 5. This makes it hard for town officials to implement new policies because when the public does not know the reason for a new policy they are more likely to be suspicious and not want to approve it. For example, many town managers said they were having resistance in passing the new stretch code. If the town’s residents don’t understand what this is or the purpose of it, they might be wary of the policy. This issue of public resistance due to lack of knowledge could be solved simply by making the public more aware of the Green Communities Act and what its objectives are. There are many things towns and the state government could do to spread awareness, such as putting commercials on television, or distributing flyers.

We also realized that the public, in some ways, would be more willing to help support the Green Communities Act than they are given credit for. In the survey of the WPI community, many people said they would be willing to pay for renewable energy on their electric bill, but that they had not been given the opportunity. This is
an untapped market of people who could be using cleaner energy yet they have not been given the opportunity to do so. If utility companies gave all customers the opportunity to buy cleaner energy, or made it more prominent on people’s bills so more people would notice it, potentially they’d get more participants in their programs. The most common response to the question off our survey of why people have not implemented green technologies into their daily life was that they have no opportunity to do so. It stands to reason that if more people are given the opportunity to go greener, then they will. This could be achieved by putting more recycling bins in public places, or allowing students living in dorms to utilize more energy efficient lighting.

For the Green Communities Act to continue to succeed, Massachusetts needs as many towns as possible to be labeled as a Green Community. As of right now, this is not a high priority for many towns. The state should be doing more to help all towns reach this goal.

To further the goals of the Green Communities Act, there are a number of things that can be done. Since we found that the majority of the public doesn’t know what the Act is or what its aims are, the state government should redouble their efforts to hold information sessions and distribute materials explaining the Act to all the citizens of towns. When the public is more informed as to the purpose of projects, they will be more likely to support them. The state also should recommend to utility companies that they give all consumers the option to purchase green energy, if they are not already. If more customers have the opportunity to purchase renewable energy, then utility companies will find it easier to meet their part of the
requirements of the Act. Finally, Massachusetts should make the process of becoming a Green Community easier. Many towns are turned off by the strict criteria and do not feel like they’d be able to reach it, so they do not even try. By updating the criteria so all towns can achieve it (especially smaller towns), Massachusetts would probably get a much higher participation rate in the Green Communities Program, and therefore a higher success rate with the Green Communities Act.

Overall, the Green Communities Act is making progress. With 70% of towns putting someone at the forefront of this effort, small changes are beginning to take place across the state which will soon translate into large scale efforts. With continued effort from town officials, and renewed energy from the public, the Green Communities Act initiative has the potential to keep Massachusetts at the forefront of the green initiative across the country.
Possible Topics for Future Research

• How many towns are taking advantage of the grants from the government? Is there enough money in these grants for all towns that want them? Is the application process too difficult for it to be worthwhile for the towns?
• Have other parts of the country passed legislation similar to the Green Communities Act? How successful or unsuccessful have they been in the implementation of this legislation?
• How successful have utility companies green programs been?
• Have more towns been creating new projects due to the stimulus money that they can apply for?
• Have utility companies been successful in implementing the requirements of the Green Communities Act, such as the renewable energy mandates?
• What ways has the state reached out to educate people about the Green Communities Act and do they plan to continue or increase their outreach?
• What new renewable energy sources have been built in Massachusetts, and has the public responded favorably? ex: the wind turbines on the Cape
• Investigation into the opinions of the GCA from businesses in the state, and what their opinion of the act is
Acknowledgements

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Appendix A: Survey for WPI Community

* 1. What is your gender?
   - Male
   - Female

* 2. How old are you?
   - Under 18
   - 18-22
   - 23-29
   - 30+

* 3. Are you a student?
   - Yes
   - No

4. What is your yearly income?
   - $0 - $25,000
   - $26,000 - $50,000
   - $51,000 - $75,000
   - $76,000 - $100,000
   - $100,000+

5. What is your housing situation?
   - Homeowner
   - Renting/Tenant
   - Campus Housing

6. Do you pay for your utilities?
   - Yes
   - No

7. Which of these green technologies have you implemented into your daily life?
   - Solar panels
   - Energy Efficient lighting
   - Energy efficient windows/doors
   - Hybrid/electric car
   - Recycling
   - Reusable water bottles
   - Other
8. Have you been given an opportunity by your electric company to acquire some of your electricity through renewable sources?
   - Yes
   - No

9. Do you purchase some or all of your power from renewable sources?
   - Yes
   - No

10. If so, which of the following:
    - Hydroelectricity
    - Biofuels
    - Wind
    - Solar
    - Geothermal
    - Don't know the source

11. By purchasing energy from renewable sources, has there been a noticeable increase in your monthly electricity cost?
    - Yes
    - No
    - N/A

12. If you are not buying energy from renewable sources, how much more would you be willing to pay on your monthly bill for energy that comes from renewable sources?
    - 0%
    - 1-10%
    - 11-20%
    - 21-30%
    - 31-40%
    - Over 40%

13. If you have implemented green technologies, what is your primary motivation for doing so?

14. If not, why?
    - Less convenient
    - More expensive
    - No opportunity to do so
    - Not interested
    - Other
15. On a scale of 1 – 5 how familiar are you with the Green Communities Act of Massachusetts?

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5

Under the Green Communities Act of 2008, Massachusetts will remake the electricity industry by dramatically increasing energy efficiency technology and the development of renewable energy. It will require utility companies to use renewable sources for 20% of their total sales by 2020. Additionally, it will promote new green technology development in towns across the state through the Green Communities program, which provides grants and recognition for cities and towns.

16. Given this information, do you support such an act?

☐ Yes
☐ No

17. Have you noticed the Green Communities Act being implemented in your community (i.e. campus, town)?

☐ Yes
☐ No

18. If so, how?
Appendix B: Sample Survey given to Town Managers

To Town Manager Doe,

First off, I'd like to introduce myself. My name is Patrick Coffey, and I’m a junior at Worcester Polytechnic Institute. I am currently conducting a research project to determine how much progress has been made by the Green Communities Act of 2008. In order for my partner and I to accurately figure this out, we need the input of town managers, administrators, Select Boards, and mayors from across the state. We would appreciate it if you could spend a few minutes of your time filling out the short survey below, and send the response as a reply to this message.

What is your official title?

What is the population of your town?

What are some things your town has done to implement the Green Communities Act of 2008 (GCA)?

Would you say your town has been successful in implementing the policies of the GCA?

What are, or have been, the easiest ways for your town to meet the objectives of the Green Communities Act?

What do you see as the biggest challenge in meeting the objectives of the GCA?

Does your town have an employee or state-appointed group whose role is to further the green initiative?

Does your town have a public group, or perhaps an outstanding individual, that fills this role?

Has the populace of your town been resistant or accommodating to the GCA’s initiatives? Have there been other points of resistance?

Has your town been recognized as a Green Community? If not, do you plan to apply to become a Green Community in the future?

Would you be willing to be contacted in the future for a brief follow up interview on these topics?

Thank you for your time and consideration,
Patrick Coffey