Increasing Energy Awareness on Nantucket

An Interactive Qualifying Project
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Abstract

As the summer demand for electricity on Nantucket approaches the supply capabilities of the two undersea cables that power the island, residents of Nantucket face the possibility of having to finance a third cable. The goal of this project was to assist the Town of Nantucket Energy Office in identifying ways to increase public awareness about cost saving and energy reduction initiatives. Through surveys and interviews we evaluated residents' knowledge and receptiveness toward energy and energy saving programs. We recommend that the Town Energy Office work with local stakeholders to distribute information and hold events that promote energy saving initiatives and drafted informational materials that the Town Energy Office may use in the future.

Acknowledgments

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Executive Summary

Nantucket faces the unwelcome and expensive prospect of having to install a third undersea cable in order to meet the demand for electricity in the summer. To delay, or perhaps, avoid this problem, the Nantucket Energy Office and the utility company National Grid have been researching and implementing programs to reduce peak electric demand, such as Demand Response and Municipal Aggregation. Additionally, they have been promoting the Mass Save Home Energy Assessment program to reduce energy demand and also give consumers the ability to better monitor their energy consumption. Although these programs may defer the need for a third cable, the public needs to be properly informed about what they are and how they work in order for them to be effective.

The goal our project was to identify ways to increase public awareness about cost saving and energy reduction initiatives. The project had four major objectives:

1. Identify lessons learned from past approaches to enhance cost and energy savings,
2. Assess public knowledge and attitudes towards local energy issues and programs,
3. Determine how local stakeholders can support the initiatives of the Town Energy Office, and
4. Develop outreach materials to promote energy awareness and energy saving on Nantucket.

By investigating other communities' attempts to enhance energy awareness we determined what techniques may or may not work on Nantucket. In addition, by assessing the public's knowledge of current outreach material through the use of a survey, we determined where knowledge is lacking and how the outreach material can be improved. We interviewed local stakeholders and organizations to determine how each might assist the Town Energy Office in this effort. Finally, we developed new outreach material and strategies based on the findings from our research.

Conclusions

From the results of our survey of 194 year-round residents and 88 seasonal residents, we concluded that the majority of the population on Nantucket is aware of how the island receives its electricity, but is generally not aware of the surcharges that pay for the cables or what the major factors are that increase electricity demand in the summer. We found that seasonal

residents are generally less aware of these topics than year-round residents. We also found that the majority of the population on Nantucket is interested in participating in different energy saving programs. We conclude that those who are opposed to participating in such programs may be more interested if they were better informed.

From our stakeholder interviews, we determined that there are multiple opportunities for collaboration between the Town Energy Office and local organizations. These local organizations appear willing to assist the Town Energy Office in planning events, procuring locations for the events, funding, and distributing informational material. By leveraging these partnerships, the Energy Office can create new opportunities to educate the public about energy saving programs and technologies.

Recommendations

Based on our findings, we recommend that the Town of Nantucket Energy Office pursue the following to increase energy awareness:

- *Collaborate with local stakeholders to develop energy policies or programs to increase participation in energy efficiency initiatives.* We recommend that the Town Energy Office work with local organizations to organize events to promote energy efficiency measures. By collaborating with organizations such as the Nantucket Island Chamber of Commerce or Housing Nantucket, the Town Energy Office has the opportunity to organize various events to showcase the energy efficiency incentives offered to residents on the island. Specific events could include an energy-focused 'Business After Hours' or a live demonstration of a Mass Save Home Energy Assessment. Furthermore, there are opportunities for educational programs to be developed in collaboration with the Maria Mitchell Association for use during its summer Discovery Camps.
- *Work to develop outreach material tailored to Nantucket residents, and distribute the materials via local media.* We recommend that the Town Energy Office create informational exposés to be included in organization newsletters. Rather than create its own newsletter, the Town Energy Office should develop informational pieces to be sent out in issues of local organization newsletters. The information included should be relevant to ongoing projects or projects that may be implemented in the future.

- *Work with future groups to explore new energy programs.* We recommend that a future group explore ways to improve the Town Energy Office Website. We recognized that the Town Energy Office website needs to be improved. The website should present the problems facing Nantucket more prominently and feature residents taking a stance toward energy efficiency. Sections should be developed to explore topics such as Demand Response or Municipal Aggregation to quell doubts residents may have about the purpose of these programs.

Authorship

	Primary Author	Secondary Author	Editor
Introduction	KM	FB	LS
Background Literature			
United States Energy Consumption	KM	--	LS
United States Policy on Modernization of the Electricity Grid	LS	--	LS
The Ideal Electricity Grid: A Smart Grid	LS	--	LS
United States Smart Grid Pilot Projects	LS	--	LS
National Grid's "No-Wires Alternative" in Rhode Island	KM	--	LS
Worcester's Pilot Project	FB	LS	LS
Public Response to Smart Grids and Energy Conservation in General	LS	--	LS
Feasibility of a Smart Grid on Nantucket	LS	--	LS
Electricity Use and Energy Saving on Nantucket	KM	--	LS
Non-Wires Alternative on Nantucket	KM	--	LS
Mass Save Home Energy Assessment Program	FB	--	LS
Demand Response on Nantucket	KM	--	LS
Municipal Aggregation	LS	--	LS
Summary	LS	--	LS
Methodology			
Objective 1	LS	--	KM
Objective 2	KM	--	LS
Objective 3	KM	--	LS
Objective 4	FB	KM	LS
Findings and Analysis			
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Objective 2 Findings	LS	FB	LS
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Recommendations	KM	--	LS

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1.0 Introduction

As demand for electricity continues to increase in the United States, there is concern that the outdated electrical distribution system will not be able to meet demand. This led utilities and policymakers to re-examine the United States' power supply infrastructure in order to upgrade it with more modern and 'smarter' technology. In an attempt to create this new grid, the United States government drafted the Energy Independence and Security Act of 2007. This act details the use and functions of a smart grid to control energy consumption and efficiency. In the United States alone, more than 100 smart grid pilots have been implemented, each with their own set of challenges.

In addition to the concern of aging infrastructure, the island of Nantucket experiences an increase in electric demand each summer, resulting in the need for additional supply capabilities. Currently, Nantucket is supplied electricity through two undersea transmission cables from the mainland. Recently, the peak demand in the summer surpassed the supply capacity of one of these cables. Although reaching the capacity of both cables is not expected to occur in the near future, it would be problematic if one cable were to malfunction. To alleviate this concern, the installation of a third undersea transmission cable, which would likely raise electric costs for residents, has been proposed. While Nantucket residents may be aware of the growing energy problem, they might be unaware of techniques or technologies that could be implemented to lower peak energy demand.

To aid the Town of Nantucket Energy Office, the goal of our project was to identify ways to increase awareness about cost saving and energy reduction initiatives. We investigated current and past approaches to increase energy savings and reduce electric costs through research and interviews. We then determined public awareness to pertinent energy issues and response to the implementation of smart grid infrastructure, such as Demand Response, and new project ideas, such as Municipal Aggregation, through resident surveys and interviews. Because programs like these rely heavily on customer participation, gathering public response data is crucial to successful execution of such a program in the future. The data collected helped us determine where knowledge about energy efficiency is deficient as well as what the major concerns are about current and future programs. The recommendations we formulated based on our findings should help the Town of Nantucket Energy Office increase awareness and promote cost and energy saving programs.

2.0 Background Literature

2.1 United States Energy Consumption

In response to outdated electrical infrastructure and the increase in electricity demand over the past forty years, the current United States power grid is approaching its transmission capabilities. As the use of high-powered devices and systems becomes more prevalent, electric energy is being consumed at a higher rate than it can be generated and distributed. It was noted that "Even as demand has skyrocketed, there has been chronic underinvestment in getting energy where it needs to go through transmission and distribution, further limiting grid efficiency and reliability…In short, the grid is struggling to keep up" (U.S. Department of Energy, 2008).

If the current electric grid were to remain as is, there may be future repercussions such as: higher energy prices, increased power outages, and decreased power quality. With increased energy demand and driving factors like distributed generation, regulatory incentives, and new technologies, new federal policies to upgrade the nation's electric grid have been supported (Wade, 2010). These policies have focused on improving the electric grid to be more reliable, efficient, secure, environmentally friendly, and upgradable.

2.2 United States Policy on Modernization of the Electricity Grid

In 2007 the United States Congress drafted an act, titled the Energy Independence and Security Act of 2007, to increase the country's energy independence and security, enhance energy efficiency and to promote research on various energy related topics. In its efforts to accomplish these tasks, the act requires electric utility companies to "…integrate energy efficiency resources into utility, State, and regional plans; and adopt policies establishing cost-effective energy efficiency as a priority resource" (*Energy Independence and Security Act of 2007,* 2007). Congress created a set of ten provisions that would transform the current electric grid. When implemented simultaneously, these provisions define what has come to be known as a smart grid. As an incentive the Act encourages the utility company to apply for federal grants, in which qualifying projects can cover up to 20% of the cost of installing smart grid technologies. The Energy Independence and Security Act of 2007, describes a smart grid as a system that:

- utilizes digital information and controls technology;
- uses dynamic optimization of grid operations and resources;

- deploys and integrates renewable resources;
- incorporates demand response, demand-side resources and energy-efficiency resources;
- deploys "smart" technologies for metering and grid operation and status communication;
- integrates "smart" appliances;
- deploys and integrates electricity storage and peak-shaving technologies;
- provides consumers with timely information and control options;
- develops standards for communication and interoperability of connected equipment and,
- identifies and lowers unnecessary barriers to adoption of smart grid technologies, practices and services (*Energy Independence and Security Act of 2007*, 2007).

Under the provisions of the Act, a city can apply for a grant to implement a smart grid pilot project. The project however, does not need to incorporate every "smart" technology and concept described in the Act; it can instead focus on integrating one or two aspects of a smart grid into the city. This allows each smart grid to be tailored to meet the needs and unique characteristics of a particular location.

Two years later, in February 2009, another Act was drafted titled the American Recovery and Reinvestment Act of 2009. With regards to a smart grid, the Act further enhanced the grant system established in the Energy Independence and Security Act of 2007. The American Recovery and Reinvestment Act of 2009 states, "...establish procedures to ensure...that the grant goes to the party making the actual expenditures for the qualifying Smart Grid investments, and that the grants made have a significant effect in encouraging and facilitating the development of a smart grid…" (*American Recovery and Reinvestment Act of 2009*, 2009).By amending the Energy Independence and Security Act of 2007, the American Recovery and Reinvestment Act of 2009 greatly increased interest and participation in The Smart Grid Investment Grant (SGIG) program.

2.3 The Ideal Electricity Grid: A Smart Grid

The many technologies and concepts laid out in the Energy Independence and Security Act of 2007 provide utility companies with many options in their efforts to comply with the

requirements of the Act. Although a completely modernized electric grid would solve the current and forecasted problems with the existing electric grid, the full scale implementation of a smart grid throughout the United States is unrealistic in the short term. However, by allowing utility companies to beta test different aspects of the smart grid with financial assistance, the country will become better educated and less resistant to future upgrades to the grid. In addition, utility companies will have the opportunity to adjust their business model to accommodate the new technologies and concepts. Since the publication of the Act in 2007, the most well-known smart grid projects in the United States focus on Advanced Metering Infrastructure (AMI), Demand Response (DR), and Distributed Energy Resources (DER).

Advanced Metering Infrastructure, or smart meters, are devices that provide the consumer with real time readings of energy consumption. Unlike standard electricity meters, which store data on electricity usage until the utility company takes a reading every billing period, smart meters store data on electricity usage and allow consumers to track their usage throughout the day. These data are also available to the utility company through a Local Area Network (LAN) that the meter connects to wirelessly using radio frequency (RF) technologies. This two way communication provides many benefits to both the consumer and the utility company that the standard meter cannot. The constant reading of energy consumption can almost instantaneously alert the utility company of a disruption of electricity flow, namely a power outage. Furthermore, it allows the utility company to determine the extent of the outage and send a maintenance crew to the exact source of the problem. In addition to providing assistance during a blackout, smart meters work to save both the consumer and utility company money. By informing the consumer of current electricity usage and cost, it allows them to actively work to reduce consumption. Whether it be through unplugging electronics that are not in use or turning off lights when exiting a room, the consumer will save energy and consequently money while the utility company saves money by eliminating the need to build a new generation or distribution facility to meet demand ("About smart meters," 2015).

Another major focus when it comes to smart grid pilot projects is the implementation of 'Demand Response.' *Demand Response* is an approach that allows utility companies to monitor and manage consumer demands through use of smart grid technologies and financial incentives. In an effort to avoid the costly expense of building additional generating and/or distribution capacity to meet demand, utility companies discount consumer rates if they lower their energy

consumption during peak demand times. The smart technologies used in DR programs include wireless thermostats and switches, where the thermostats are mainly used for buildings with central air and the switches are used for buildings with window air conditioning units, both can be directly accessed by the utility company. During peak demand hours the utility company can then either increase the temperature reading on the thermostat or AC unit or cycle the cooling system to decrease the amount of electricity that must be generated while saving the consumer money ("Demand Response," n.d.).

Unlike other smart grid concepts which give most of the control to the utility company, the use of Distributed Energy Resources (DER) gives the majority of control to the consumer. *Distributed Energy Resources* are: "...small-scale power generation sources located close to where electricity is used (e.g., a home or business), [which] provide an alternative to or an enhancement of the traditional electric power grid" (Capehart, 2014). In many ways DER is beneficial to both the consumer and utility company. The consumer, under ideal conditions, will experience greater reliability, higher quality, increased efficiency and lower costs, while the utility company is able to save money by eliminating the need to construct additional power plants and high-voltage transmission lines. Many different types of DER technologies can be implemented to achieve these benefits such as turbines, wind systems and photovoltaic systems; all of which work to produce power and/or store power. DER technologies can be used in different ways as well; they can be used as a primary source of power in order to avoid the potential for frequency variations, surges or other disruptions, they and they can be used only at times of high electric demand when independently generated energy can be used at a lesser expense than the electric utility is able to provide. Although there are many benefits to DER technologies, they are best used to supplement the existing technologies that provide base load as they work to further enhance the overall system (Capehart, 2014).

Although many of the smart grid pilot projects that have been implemented in the United States incorporate only one or two of the many smart grid concepts and technologies, a completely modernized electric grid would integrate all smart grid concepts and technologies and meet all standards described in the Energy Independence and Security Act of 2007, as illustrated in Figure 1.

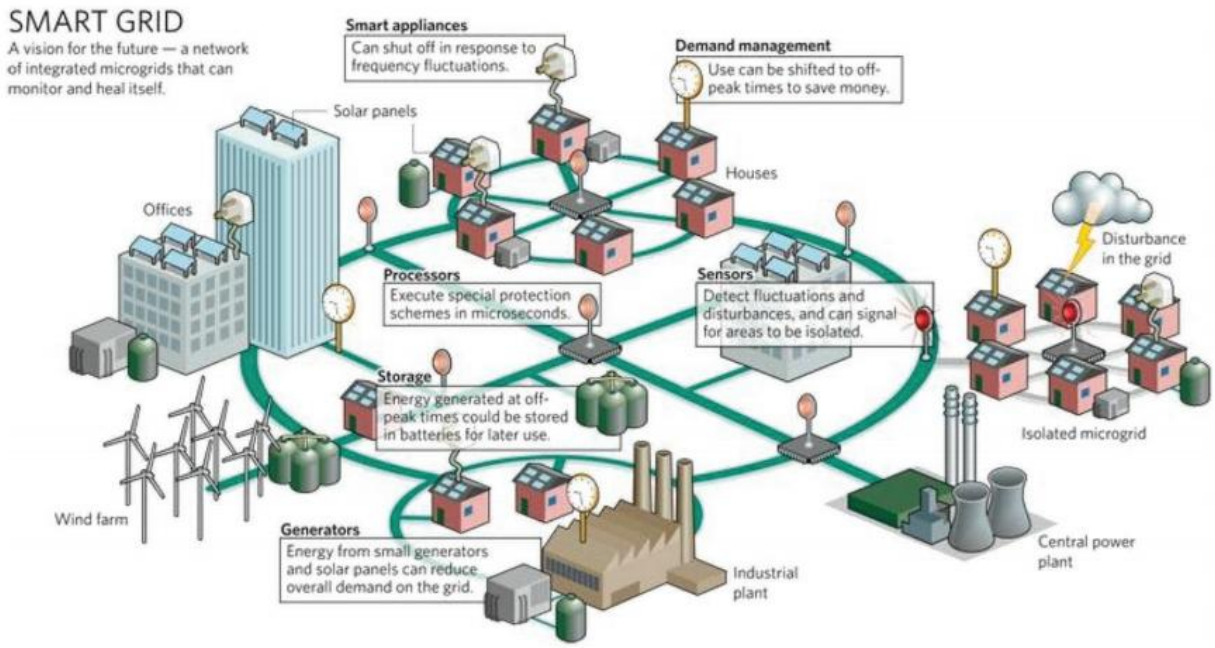

Figure 1: The Smart Grid Decomposed

(Marris, 2008)

The integration of all these concepts and technologies will take time and cost a large amount of money, thus the current smart grid pilot projects work to further develop and advance these concepts and technologies by obtaining feedback on how they work and how they are perceived by the public.

2.4 United States Smart Grid Pilot Projects

When the American Recovery and Reinvestment Act of 2009 was put into place, smart grid pilot projects began to emerge throughout the United States. In just over six months, 99 SGIG (Smart Grid Investment Grant) program projects had begun in many different parts of the country, with the implementation of many different types of programs at regional, city, and local levels, as depicted in Figure 2.

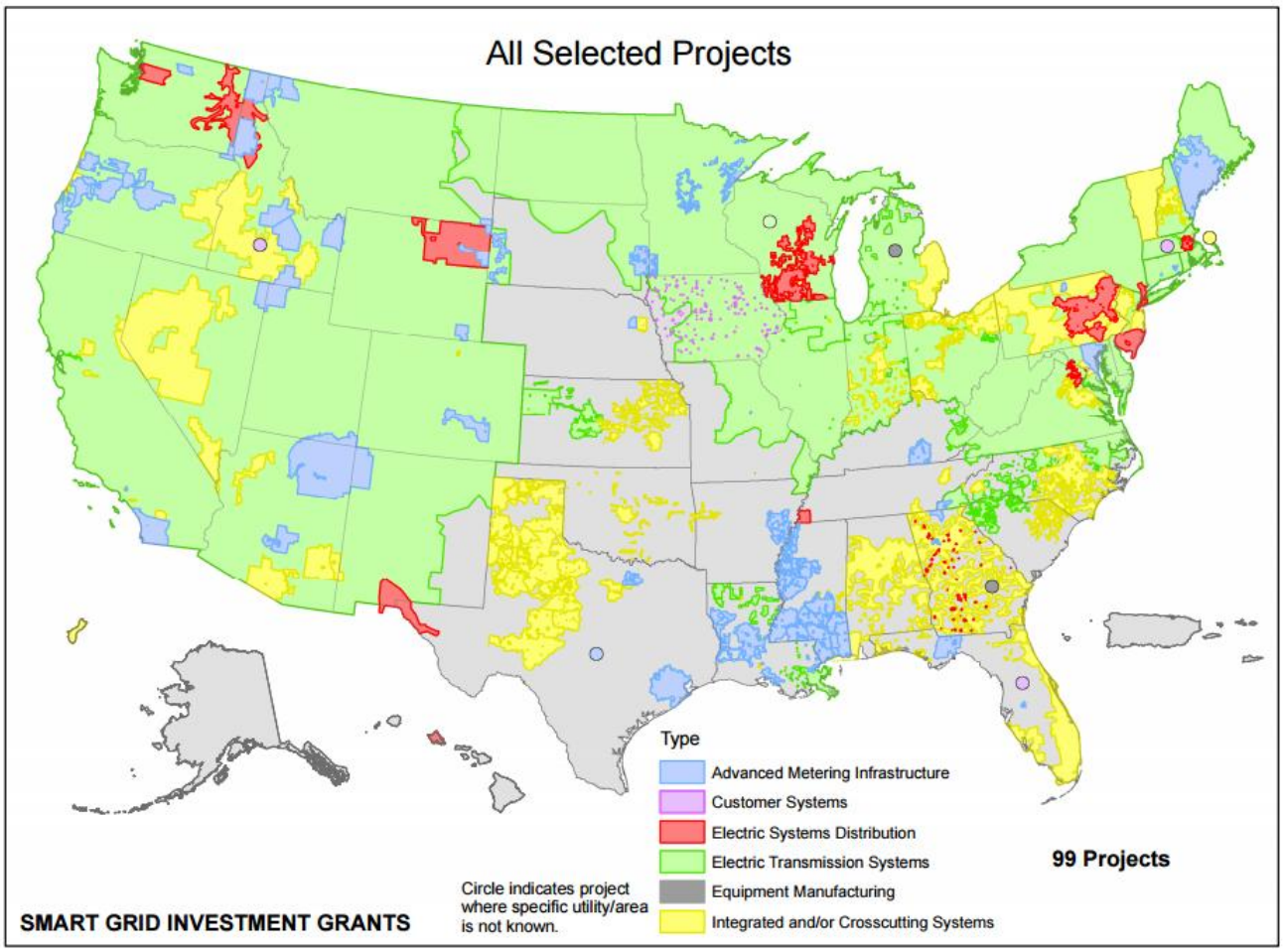

Figure 2: Map of Smart Grid Pilot Projects

("Recovery Act: Smart Grid Investment Grants," 2009)

As discussed above, the most commonly referenced project types are AMI, DR (labeled Customer Systems in Figure 2) and DER (not a direct project type as of 2009, but integrated into many of the different project types). Since the time during which the Recovery Act was put into place, many additional SGIG program projects have been implemented covering a vast array of the project types as shown in Figure 2. The pilot projects discussed below present common implementations of AMI and DR.

2.4.1 National Grid's "No-Wires Alternative" in Rhode Island

Seeing new opportunities for non-wired energy solutions[1] through their "Standards for System Reliability Procurement," National Grid began a six-year pilot project in Rhode Island called DemandLink, which focused on lowering the load on electric feeders[2] in order to defer the need for an additional feeder. This project concentrated heavily on the smart grid concept of Demand Response, as it involved the installation of smart thermostats and switches. The pilot has been relatively successful thus far, but complications have arisen pertaining to customer participation and best marketing methods.

In 2009, National Grid recognized "Non-Wires Alternatives" (NWAs) as a possible solution to alleviate the peak load on critical energy generation systems. Following consultations with various stakeholders, National Grid selected the towns of Tiverton and Little Compton for the implementation of a smart grid pilot in Rhode Island. The two towns received their power through two 'feeders' from a substation in Tiverton and were concerned that peak electricity loads might soon exceed existing capacity. The two feeders were expected to be over capacity by 2021, so construction of a third feeder was planned for 2014. National Grid determined that in order to defer the construction of the third feeder, a load reduction of 1 MW would be necessary (Anthony & Foley, 2014).

National Grid hoped to reduce the electric load by offering customers Wi-Fi thermostats for central air conditioning units. Because heating, ventilation, and air conditioning (HVAC) systems account for the largest share of electricity consumed in the residential sector, National Grid made this a top priority for reducing electricity loads (U.S. Energy Information Administration, 2014). After the first year of the pilot in 2012, National Grid realized they had overestimated the number of people that had central air conditioning systems. During their second year of the pilot, National Grid expanded the technology options to include window air conditioners (A/C) by offering customers plug load devices which could wirelessly connect to the internet, and had an internal thermostat that could be set to a specific temperature remotely

[1] "The Standards…[stipulate]…that NWAs may include, but are not limited to [the following approaches to address changing energy demand and supply]: energy efficiency, including peak demand and geographically-targeted energy efficiency; combined heat and power; distributed generation, including renewable energy resources; demand response; direct load control, energy storage, and alternative tariff options" (Anthony & Foley, 2014).

[2] Feeders are supply lines for residential consumers that emanate from utility-owned substations (General Electric, 2015).

via smart phone app or website. National Grid also began offering new incentives such as purchase rebates on new, more efficient A/C units, and recycling older, less efficient A/C units at no cost ("Non-Wires Alternatives in Rhode Island: Using Energy Efficiency and Demand Response for System Reliability," 2014). Moving into 2014, National Grid's priority was to continue the incentives that resonated with customers and improve the technological capabilities of the plug load devices to support more powerful A/C units (National Grid, 2014a).

While people seemed to enjoy the rebates as well as disposing of their old appliances, many were concerned about privacy and security of Wi-Fi thermostats and thus chose not to sign on with the project. Brian Kearney, Director of Residential Services at RISE Engineering explained some of these concerns:

> "It's kind of tough to convince the customer that you are going to control their thermostat. We had a few customers that were worried about both security and comfort in their homes. That's understandable, but most people ended up being pretty open to the idea once you explain the functionality of being able to control a thermostat on your Smartphone. I think that is a really huge win" ("Non-Wires Alternatives in Rhode Island: Using Energy Efficiency and Demand Response for System Reliability," 2014).

Despite customers concerns, National Grid was able to gain and retain program participants by relaying information about the program and the intent of the devices to alleviate any fears about malicious usage of the thermostats.

The pilot project reduced electricity loads, by an estimated 176 kW, which was sufficient to postpone the construction of a third feeder from 2014 to 2015 (Anthony & Foley, 2014). In 2014, however, customer participation declined and National Grid reworked their marketing campaign to concentrate on slogans that promoted helping to better the community rather than saving money or energy. National Grid also increased their presence on social media, and organized a community event to promote the pilot (National Grid, 2014a).

Moving into 2015, National Grid is adding a rebate incentive for electric heat pump water heaters (HPWHs), and they are continuing all the incentives from 2014. They will also be taking an increased focus on recruitment, and marketing for the pilot will be modified to concentrate on specific communication goals (see Appendix 1) with hopes to increase both their customer retention and recruitments.

2.4.2 Worcester's Pilot Project

In 2009, in an effort to adhere to the Energy Independence and Security Act of 2007, National Grid applied for a grant to enact a smart grid pilot project in Worcester, Massachusetts. The city of Worcester was chosen because "…[it is the] largest city in National Grid's MA electric service territory…[and has a]mix of overhead [and] underground distribution infrastructure [with] newer more automated substations as well as those not automated which will allow for extrapolation of findings across the service territory" (Worcester Telegram & Gazette, n.d.).

Once National Grid's project proposal and grant was approved in 2012 by the Department of Public Utilities (DPU), National Grid completed the installation of 15,000 smart meters in a carefully selected pilot area, see Figure 3 (Dayal, 2011, 2012).

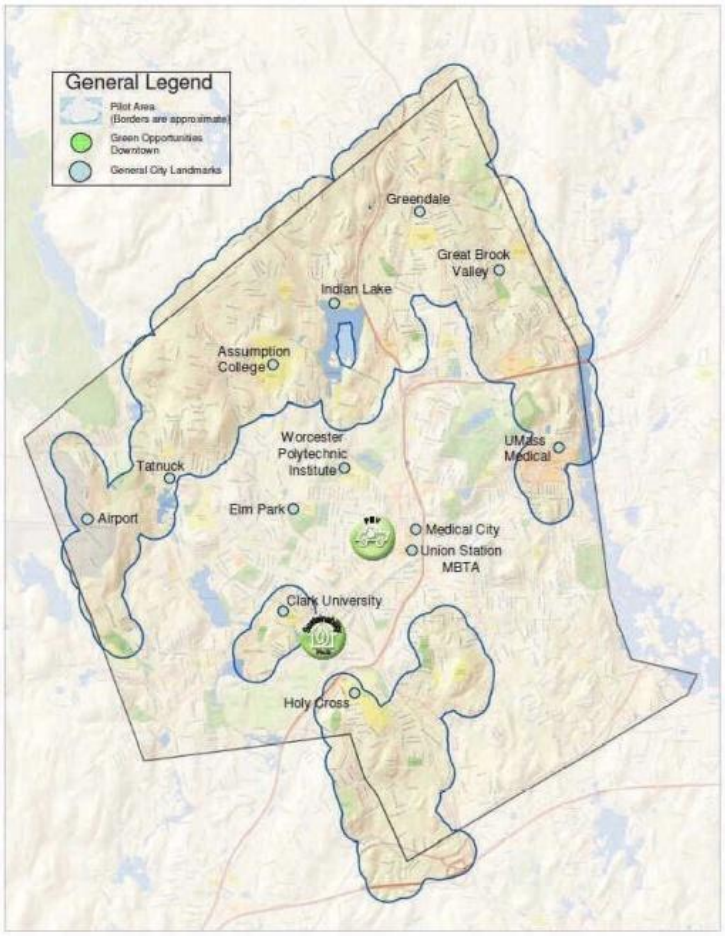

Figure 3: Smart Grid Pilot Area--Worcester, MA

(Worcester Telegram & Gazette, n.d.)

The pilot area includes a diverse customer base with a representation of high and low residential areas as well as commercial and industrial customers. The diverse customer base along with the different rate and technology packages will allow National Grid to better analyze and determine the benefits of a smart grid. Customers in this area were informed of the pilot and told that smart meters would be installed unless they actively opted out of the program.

As part of the program, National Grid offered customers two different rate options: critical peak pricing (CPP) and peak time rebate (PTR). The CPP rate option charges customers higher rates during peak hours and lower rates during off peak hours whereas the PTR rate option offers customers a rebate when they shift their electricity usage to off peak hours. In addition to choosing a rate, customers are offered one of four technology packages. The first package, Level 1, provides the customer with access to a personal web site that gives advanced energy information customized to their energy consumption. Level 2 includes the same technology as Level 1 with the addition of a home display unit, such as an interactive electronic picture frame that displays energy consumption in real time. Level 3 also includes the same technology as Level 1 as well as a thermostat or Automated HVAC Control system that can connect to the smart grid and make automatic load reductions during peak periods. At Level 4, customers receive all technologies offered in the three preceding levels in addition to advanced web and/or mobile control of all load control devices (Worcester Telegram & Gazette, n.d.).

The pricing plans are further supplemented with increased rates on particular days known as "Conservation Days." These days occur no more than 30 times a year usually during hot, summer days where energy consumption is at a peak. For the CPP pricing plan, conservation days introduce a third rate during the hours of the day that the event is taking place and for the PTR pricing plan, these days present opportunities to decrease consumption to earn a rebate (Jones, 2015).

To further engage and educate customers about the project, National Grid introduced another aspect: the integration of a Sustainability Hub. Unique to Worcester's pilot, the Hub was designed and built with the intension of providing the participants of the pilot with a place "…for the community to experience interactive exhibits and have hands-on access to Smart Grid technology & education" (Worcester Telegram & Gazette, n.d.). The Hub is set up like a home with the latest energy efficient technologies and smart grid technologies on display in order to demonstrate energy saving techniques. It aims to increase active participation by providing

customers with the knowledge they need to successfully reduce their overall energy consumption. Like many other pilot projects that have been implemented throughout the United States, many concerns are raised regarding the safety and security of the technologies used. In some ways, the Sustainability Hub also acts as an information hub, to educate and alleviate concerns involving pricing plans and the technologies used in the project (Worcester Telegram & Gazette, n.d.).

2.5 Public Response to Smart Grids and Energy Conservation in General

Since 2001an American research company, Gallup, has been asking citizens: "Which of the following approaches to solving the nation's energy problems do you think the U.S. should follow right now—[emphasize production of more oil, gas and coal supplies (or) emphasize more conservation by consumers of existing energy supplies]?" (Moore & Nichols, 2014) and has found that citizens consistently favor conservation over production as seen in Figure 4.

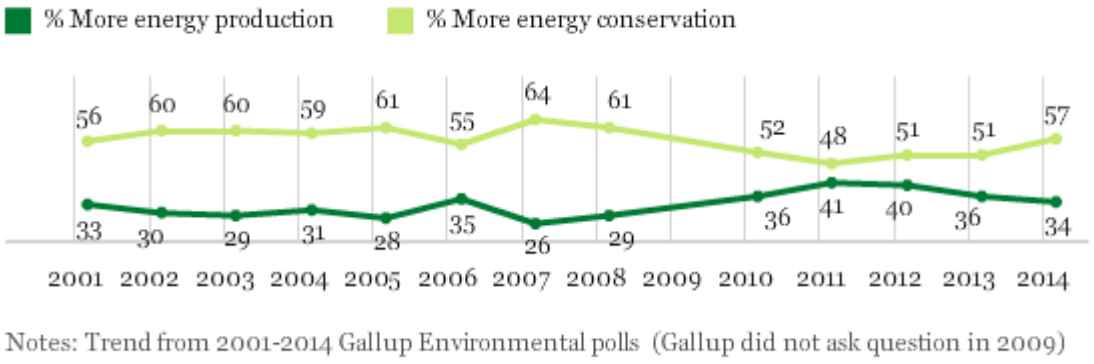

Figure 4: Americans' Preferences for U.S. Energy Policy

(Moore & Nichols, 2014)

There has not been a single year since 2001 where citizens have favored production over conservation, ultimately supporting the conservation initiatives proposed and implemented over the last 15 years. Specifically, the Energy Independence and Security Act of 2007 was an advancement towards energy conservation. The survey conducted two months after the enactment of the Act is highly reflective of this, as 2007 was the year that the largest number of citizens favored conservation over production.

Although citizens may favor conservation over production, they may be unaware of how to best conserve energy or are not taking the steps to do so within their homes. To investigate this, a study in 2010 conducted a survey "…that asked participants to indicate the most effective

thing they could do to conserve energy" (Attari, DeKay, Davidson, & Bruine de Bruin, 2010). The question was open-ended and resulted in 17 different categorized responses. The most common response, given by 19.6% of respondents, was to "Turn off lights" with other responses, which play a significant role in the current energy situation, including: "Chang[ing] the setting on the thermostat (6.3%)," "Shut[ing] off appliances/use appliances less (4.9%)" and "Buy[ing] green energy/solar energy/alternative energy (2.6%)" (Attari et al., 2010). The low percentage of responses in each category, especially the previous three mentioned, suggests that citizens are generally not aware of the best practices to conserve energy. To increase awareness many approaches can and have been taken; SGIG projects for example have great potential, but current practices can be improved.

In September 2014, the Department of Energy (DOE) conducted a study to analyze customer experience and customer communications and education in the SGIG projects that had been implemented. The DOE focused their study into four phases: planning, recruitment, operation and evaluation. The planning phase focused on the utility's approach to education and outreach as well as organization and management. Overall, they found that there should be greater emphasis on general customer education where more thought should be put into the value and content of the information being relayed as well as the distribution of the information. With regards to recruitment, the study determined that a wide variety of delivery channels should be used and an emphasis on delivering consistent, straightforward messages should be practiced. In terms of operation once the program has begun, the DOE determined that notification frequency and distribution techniques need to be refined along with the process for handling customer complaints especially with relation to peak event days. Finally, upon completion of the project the DOE found that better plans must be in place for dealing with customer devices and more comprehensive evaluations need to be conducted and presented. All of these findings are results of the constant feedback and concerns expressed by customers who participated in a pilot program and are aimed to educate utility companies that pursue smart grid pilot programs in the future (Scheer & Cappers, 2014).

2.6 Feasibility of a Smart Grid on Nantucket

In 2010, an Interactive Qualifying Project team (Alvarado, Phillips, & Taleb, 2011) explored the possibility of implementing a Smart Grid on Nantucket and determined that it would be worthwhile to further investigate the details of its implementation. The Town of

Nantucket Energy Office and National Grid, the major electricity supplier for Nantucket, are working together to explore different energy saving programs. They are researching the possibility of installing smart grid technologies associated with DR and DER as well as programs apart from smart grids such as the Mass Save Energy Assessment and Municipal Aggregation. Because Nantucket is an island there are many challenges that come with the installation and maintenance of smart grid technologies, such as smart meters, wind turbines or solar panels. For this reason, the Town Energy Office and National Grid have to conduct extensive research and think creatively about how to solve the growing concerns about the island's energy consumption.

2.7 Electricity Use and Energy Saving on Nantucket

The island town of Nantucket sits about 30 miles to the south of Cape Cod, Massachusetts. Prior to 1996, the island of Nantucket relied on a 20 Megawatts (MW) Electro-Motive Diesel (EMD) power plant to supply the islands electric needs. Demand for electricity surpassed this supply, especially during the tourism months; and in 1996, National Grid, laid a 36MW undersea transmission cable, costing $30 million, that connected Nantucket to Cape Cod's electric grid. Within the following decade, however, demand surpassed the supply capabilities of the cable, and a second 38MW cable, costing $41 million, was laid in 2006. Residents of Nantucket pay an extra 15% surcharge on their monthly electric bills to pay for the two cables. If electric demand were to surpass the 74MW capability of the two cables, Nantucket has generation capabilities that reach 6MW ("Nantucket Energy Office," n.d.).

Electricity consumption on Nantucket is dominated by the residential sector, while the industrial and commercial sectors make up only a small portion of energy consumers, see Figure 5. In the commercial sector, the airport, the waste digester at the town dump, and the schools are the largest single users of electricity; however, the large number of small shops and businesses collectively use more electricity.

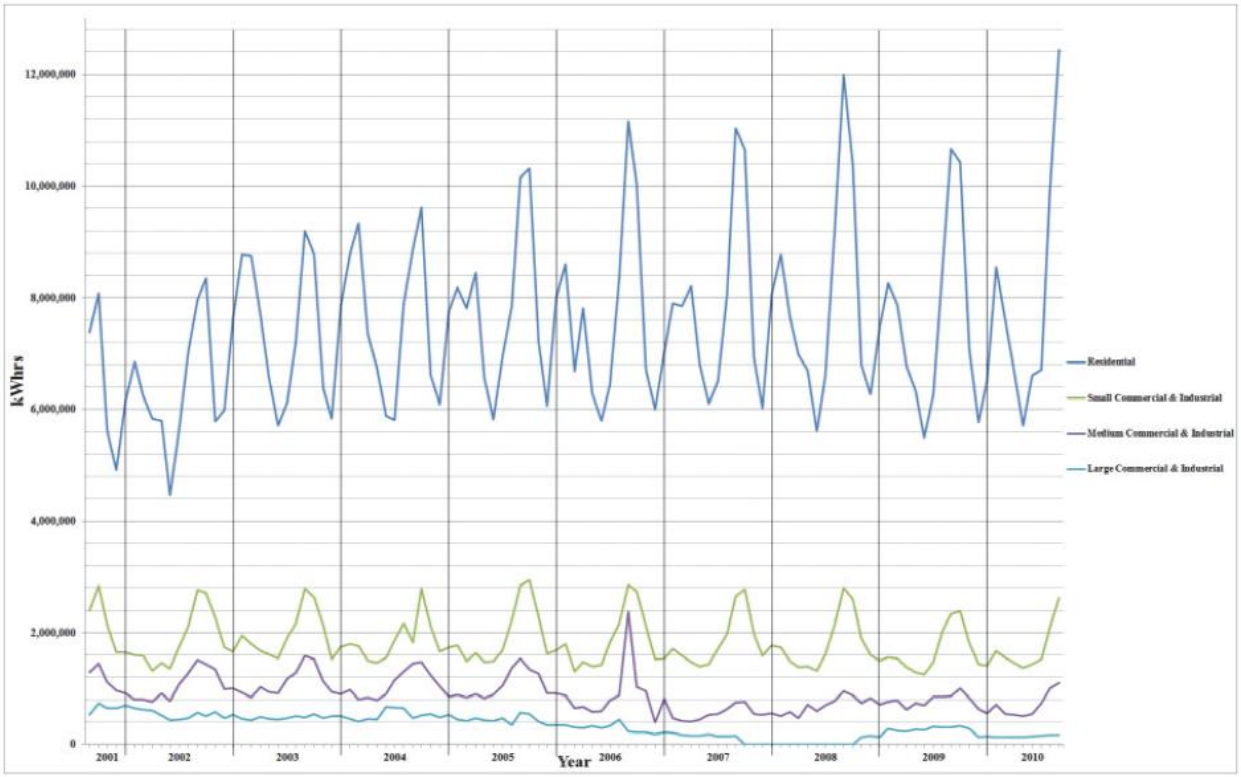

Figure 5: Nantucket Energy Consumption by Sector

(Alvarado, Phillips, & Taleb, 2011)

In the summer of 2013, Nantucket reached an all-time high in its energy demand—45 Megawatts—which is a 12.5% increase from the peak demand in 2012. Because this surpasses the supply capacity of one cable, it would be detrimental if one cable became inoperable and the island had to rely on a single cable for its power. As a precautionary measure and considering recent electric demand, it has been proposed that a third cable be installed. It was determined that in order to defer the construction of a third cable, a load reduction of 18MW would need to take place by 2028 ("Nantucket Energy Office," n.d.).

Nantucket residents already pay 15% more for electricity than residents on the mainland (National Grid, 2014b, 2014c) and a third cable is likely to add to the electric costs. For several years, town officials and residents have been exploring ways to defer the third cable. The installation of a wind turbine at the Nantucket High School has provided 12-15% of the school's electricity since its first year of operation. The town has also explored options for solar photovoltaic (PV) and has identified many prospective sites for implementation. As part of these ongoing efforts, the Town of Nantucket applied for a grant that ultimately led to the creation of

the Nantucket Energy Office in 2011. The Nantucket Energy Office was founded “to assist the Town in identifying and implementing energy efficiency, conservation and renewable energy programs that are economically viable, environmentally responsible and socially beneficial for Nantucket” ("Nantucket Energy Office," n.d.). More recently, in an effort to decrease electricity consumption and thus defer the need for a 3rd transmission cable, National Grid implemented a Non-Wires Alternative plan for Nantucket.

2.8 Non-Wires Alternative on Nantucket

National Grid’s 7-year “Non-Wires Alternative” on Nantucket is a plan to reduce energy consumption on the island as a whole in order to defer the costly installation of a 3rd cable. National Grid is especially looking to increase energy efficiency and harness customer side technologies within the first few years of the project to help alleviate the peak electricity demands (Graziadei, 2014). Before the project began, National Grid called upon the Cadmus Group to create a research study to identify whether energy efficiency technologies can be implemented by customers such that sustainable load reductions on Nantucket are achieved. During the study, energy trackers were placed in 70 homes to determine the major contributors to peak loading ("Nantucket Energy Office," n.d.). The results indicated that heating and air conditioning systems, as well as faulty insulation were major factors. These results helped National Grid determine what devices and incentives were needed to promote cost and energy saving programs.

The Non-Wires Alternative plan, which began at the beginning of 2015, is meant to provide time for the research and enactment of programs to help decrease peak energy loading during the summer. To achieve their common goal, the Town Energy Office and National Grid have already implemented the Mass Save Home Energy Assessment program and are currently researching and proposing the implementation of other programs including Demand Response and a community solar project. The two programs that are the major focus for the next two years are the Mass Save and Demand Response programs.

2.9 Mass Save Home Energy Assessment Program

A top priority of the Town of Nantucket Energy Office was to build a stronger relationship between the Town of Nantucket and National Grid. Through the dedication of both

parties, a program was developed through Mass Save providing residents on Nantucket access to energy efficient technologies ("Nantucket Energy Office," n.d.).

Mass Save is an organization that was created in Massachusetts that “offers economic incentives to its residential customers to make improvements to their homes to reduce their energy consumption” ("Nantucket Energy Office," n.d.). Additionally, the Mass save program offers free energy efficient LED light bulbs, programmable thermostats, dehumidifiers and smart strips as well as rebates towards the purchasing of insulation and large energy efficient appliances such as refrigerators and hot water heaters ("Nantucket Energy Office," n.d.).

The Mass Save Home Energy Assessment is a 2 hour process that assesses energy usage through an evaluation of three components within the home: the thermal layer, the mechanical systems, and consumer products. An assessment of the home’s thermal layer involves examining the insulation layer in the home and determining its efficiency. Similarly, the efficiency of the home’s mechanical systems, namely the hot water heater and air conditioner, and consumer products, such as the microwave or the refrigerator, are determined. After the assessment, the assessor provides the homeowner with a “home energy road map,” detailing energy saving techniques and associated incentives ("Home Energy Assessments," n.d.).

In a personal communication with Lauren Sinatra at the Town Energy Office, she stated that the Mass Save program has been very well received on Nantucket, but there is still a lack of public awareness of the program. The Town Energy Office has greatly increased awareness of this program since they began working together in 2012; as a team, they have provided over 1100 no-cost home energy assessments. The year before the program began, only 40 audits had been conducted on the island. By increasing awareness of the program and about the auditing process, it will increase participation and overall satisfaction ("Nantucket Energy Office," n.d.).

2.10 Demand Response on Nantucket

While technologies to monitor and control energy use are being placed in homes across Nantucket through the Mass Save Home Energy Assessments, there is little in place that compels residents to change their behaviors when using energy. This issue can be seen in the Rhode Island Demand Response pilot mentioned above. While the implemented technology was effective during the first few years of the pilot, there was no incentive for changing behaviors and participation dropped. This particular concern, however, is being addressed through smart grid pilots as deployed in a number of selected cities such as Worcester, MA. Its combination of

In-Home Displays (IHDs) and time-of-use rates allows consumers to monitor their energy use. Knowing their real-time consumption should give consumers ample reason to conserve energy during times of high energy demand. Although an AMI project is not being considered for Nantucket, a Demand Response program such as this would work to reduce resident's energy costs as well as work to defer the need for the third cable.

2.11 Municipal Aggregation

Unlike the programs discussed above, which aim to decrease the peak electric load in the hope of deferring the need for a third transmission cable, Municipal Aggregation aims to:

- decrease peak electric load,
- decrease consumer's cost per kilowatt hour, and
- make use of a greener power supply.

The installation of the first two undersea transmission cables to power the island is financed through a 15% surcharge on residential electricity bills. Although there is a growing need for a third cable, which will likely be financed through an increase in the surcharge, Lauren Sinatra of the Town Energy Office stated that it is still unclear how the prospective third cable will be paid for. Even without the need for a third cable, the current electricity prices on the island are significantly higher than those on the mainland. To address this concern the Town of Nantucket Energy Office is investigating Municipal Aggregation.

Municipal Aggregation "…is the method by which local and county governments can buy electric power on behalf of the consumers within their borders" (Department of Energy Resources, n.d.). In other words, the town removes its citizens from their "default" electric provider and purchases energy from a third party supplier on behalf of the community. In many cases, the town decides to buy from a supplier that produces energy in a clean way, for instance through the use of renewable resources. In keeping with the program's aim towards energy efficiency, many towns implementing Municipal Aggregation introduce a time-of-use pricing plan to encourage residents to defer their energy use to off peak hours. With this push towards energy savings, Municipal Aggregation establishes a foundation for resident's interest in saving energy, allowing for increased receptiveness towards implementation of future energy saving programs such as AMI and DR (Department of Energy Resources, n.d.).

2.12 Summary

In its efforts to defer the need for a third undersea transmission cable, the Town of Nantucket Energy Office and National Grid have researched, proposed and implemented a range of programs. National Grid has drawn from its experiences with previous smart grid pilot projects, namely the DR project in Rhode Island and the AMI project in Worcester, MA, to draft a Non-Wires Alternative for Nantucket. With a focus on increasing energy efficiency, achieved through the Mass Save program, and DR over the next few years, the NWA aims to decrease peak load. In addition to National Grid's proposal, the Town Energy Office is also investigating Municipal Aggregation as an option to both decrease peak load and resident energy costs. As all of these programs require resident awareness and support, the Town Energy Office has asked our team to determine Nantucket resident's awareness and attitudes towards how electricity is currently delivered to the island and the programs that National Grid and the Town Energy Office have and are seeking to implement.

3.0 Methodology

Our goal was to assist the Town of Nantucket Energy Office in identifying ways to increase public awareness about cost saving and energy reduction initiatives. In order to achieve our goal we formulated four objectives:

1. Identify lessons learned from past approaches to enhance cost and energy savings,
2. Assess public knowledge and attitudes towards local energy issues and programs,
3. Determine how local stakeholders can support the initiatives of the Town Energy Office, and
4. Develop outreach materials to promote energy awareness and energy saving on Nantucket.

Figure 6 shows our overall goal, objectives and associated tasks that we discuss in more detail below.

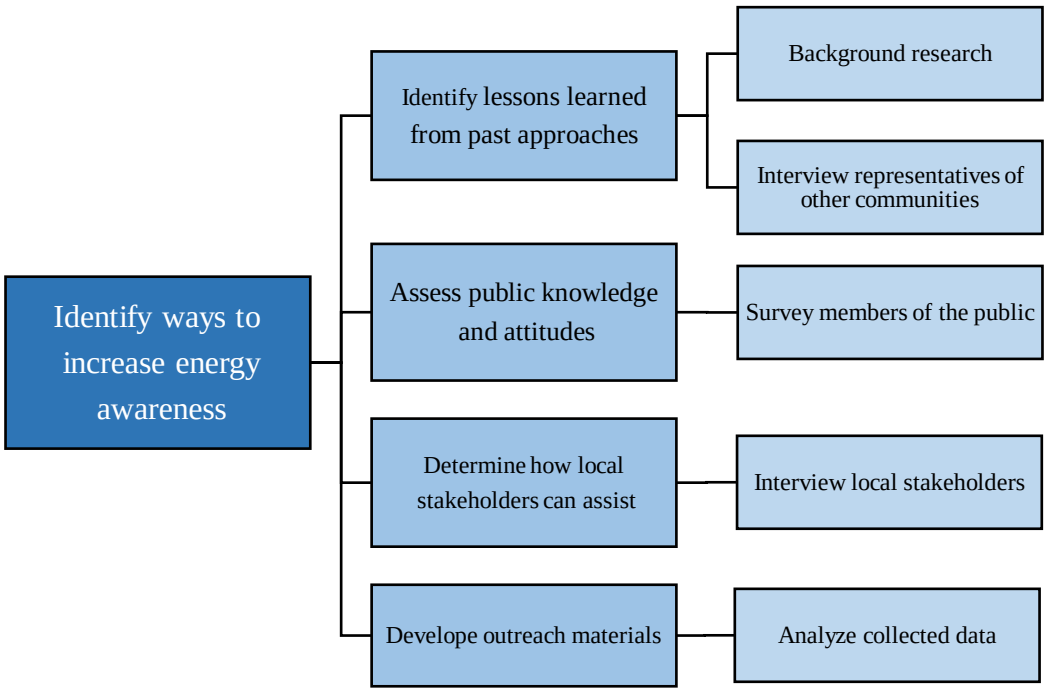

Figure 6: Project Overview

3.1 Objective 1: Identify lessons learned from past approaches to enhance cost and energy savings

Through conversations with our sponsor, Lauren Sinatra, and the National Grid Project Manager for the NWA, Lindsay Foley, we were able to determine the energy saving programs that they were most interested in us investigating. These programs included Mass Save, Demand Response (DR) and Municipal Aggregation. To gain a better understanding of these programs we familiarized ourselves with them through research, observation, and interviews.

We continued our background research with a particular emphasis on finding examples of surveys and other research on public attitudes and awareness pertaining to the three programs. While there may have been numerous studies conducted on the topic of public attitudes to energy and energy conservation measures, we could not find any published data on the three aforementioned programs in particular. As a result, we identified key personnel to be interviewed who would be able to provide us with further information regarding the implementation of these programs and the overall public response to them.

Our interviews were conducted with experts in the fields of the Mass Save program, Demand Response, and Municipal Aggregation. To learn more about the Mass Save program, we shadowed a Home Energy Assessment. We built upon our knowledge about Demand Response by speaking with Kevin Kelly, manager of the Groton Light Department, who conducted a Demand Response project three years ago in Groton, MA. Finally, to learn more about Municipal Aggregation we spoke with Mark Cappadona at the Colonial Power Group, who has acted as a Municipal Aggregation consultant for 21 towns throughout Massachusetts.

We prepared for each interview by conducting background research on the interviewee and tailored our set of questions to focus on the interviewee's area of expertise. We e-mailed each prospective interviewee to acquire permission to interview them and to schedule a meeting time.

The Mass Save interview took place with an auditor while they complete a Home Energy Assessment, the interview with Kevin Kelly took place in person over the Thanksgiving break, and the interview with Mark Cappadona was conducted over the phone. These interviews were conducted by one or two members of our team. In the case where only one member was present he/she conducted the interview and took notes and in the case where two members were present, one member conducted the interview and the other member took notes. At the end of each

interview we asked the interviewee for their permission to be referenced or quoted in our final report given that we would request their approval of the section where information they provided appeared.

Our efforts were aimed to better educate ourselves about the cost and energy saving programs that are currently being researched and implemented on the island. This information allowed us to draw proper correlations between the effectiveness of programs conducted on-island and elsewhere. Following our research into these programs, we used the gathered information to guide our assessment of the energy efficiency programs and measures currently in place on Nantucket.

3.2 Objective 2: Assess public knowledge and attitudes towards local energy issues and programs

To properly identify how the public receives information about energy and understand where knowledge is lacking we assessed public awareness of current energy education practices by surveying members of the public.

We created a survey with questions covering two major topic areas: knowledge and awareness, and opinions and attitudes. Topics in the survey included:

- Awareness of the need for a third undersea transmission cable
- Knowledge of, and opinions toward, smart grid concepts and Municipal Aggregation
- Awareness of, and attitudes toward, energy saving programs such as Mass Save

We developed our questions based on topics introduced in the literature and discussions with Lauren Sinatra and Lindsay Foley. The survey, presented in Appendix 2, is divided into several categories ranging from general information about the survey participant, to their knowledge and opinions of local energy resources. The survey we created was anonymous and directed towards adults. The only information about the participant that we collected was their age, residential status on Nantucket, and their email if the participant wanted to receive energy updates or be interviewed by us. We created the surveys using the Qualtrics software. The software allowed us to both use the online version as well as an app while offline on an iPad that was supplied to us by the Town Energy Office. We distributed the surveys online as well as by handing out paper copies and using the iPad at public events. Qualtrics automatically compiled the survey results and we entered the paper survey responses into the software.

We consulted closely with our sponsor and advisors during the development of the survey instrument. We attempted to pre-test our preliminary instrument through convenience sampling of the public in downtown Nantucket. Unfortunately, there were very few people willing to take the survey, so we instead turned to local businesses such as bakeries, clothing stores, and Young's bike shop, and obtained 11 responses from the local retailers. After respondents had completed the survey we reviewed each question with them in person to discuss any issues with word choices, logic, or response options. Following this process, we made the necessary changes and consulted with our sponsor to finalize the survey.

The next step was to distribute the survey. For this we considered a number of options, all of which had their advantages and drawbacks. We originally planned to distribute the surveys through the public school system or via convenience sampling outside busy locations in downtown Nantucket. Following consultations with our sponsor and members of the public about the easiest ways to distribute information, we decided to send out both versions of the survey through the Nantucket Civic League to 21 homeowner associations on the island, and to perform convenience sampling with paper surveys or on the iPad at events such as Builder's Association meetings or the Whaling Museum's Food for Thought lecture series. We received 346 total responses, 297 of which were completed.

3.3 Objective 3: Determine how local stakeholders can support the initiatives of the Town Energy Office

Stakeholder alliances will be key in aiding the Town Energy Office as it disseminates information to the public. To begin, our sponsor provided us with a list of groups and organizations to contact regarding possible interviews. We then expanded the list by asking each interviewee which group or organization they thought would be beneficial to speak with. The interviews were focused on learning how the group or organization believed they could help the Town Energy Office as well as their thoughts regarding our ideas on how they could be of assistance. Our ideas for support, as well as the findings from these interviews will be discussed in the next chapter. The script of basic questions that we used in every interview can be seen in Appendix 3. We followed the same procedures for setting up and concluding an interview as described in Objective 1. We used the results to make recommendations on how each group or organization can aid the Town Energy Office.

3.4 Objective 4: Develop outreach materials to promote energy awareness and energy saving on Nantucket

Through our surveys mentioned above, we compiled data to be used in developing outreach materials about how to increase energy awareness on Nantucket. To identify what information to include in our promotional materials, we determined specifically where public awareness on energy saving is lacking; we identified residents' attitudes towards possible cost and energy saving programs and energy efficient technologies. Using this data we were able to conclude which topics needed to be addressed more prominently, and organized the information into a format that we believe would be effective in educating the public.

4.0 Findings and Analysis

In this section we discuss our major findings collected from the survey and interviews we conducted. Our survey allowed us to gauge general energy awareness, attitudes towards cost energy saving programs and opinions on how to best promote cost and energy saving and disseminate program information. The interviews that we conducted regarding Demand Response and Municipal Aggregation provided insight about how similar cost and energy saving programs might be received on island. Finally, the interviews that we conducted with stakeholders gave us insight into how other groups and organizations on Nantucket can assist the Town of Nantucket Energy Office in its efforts to increase public knowledge about cost and energy savings. Based on all of our findings presented in the following sub-sections we created an informational display highlighting the knowledge that was seemingly lacking, the resulting product can be seen in Appendix 4 and further explanation of how the information was grouped together is presented in the next chapter.

4.1 Objective 1: Lessons Learned

We conducted interviews with the Groton Electric Light Department and Colonial Power Group to learn more about initiative such as Demand Response and Municipal Aggregation. We also shadowed a Mass Save Home Energy Assessment to educate ourselves about the process of an energy assessment and to determine what information could be more heavily advertised to increase participation. The findings, which resulted from completion of our first objective, helped us develop educational tools for use by the Town Energy Office.

Mass Save Assessment Shadowing

To gain a better understanding of how a typical Mass Save Home Energy Assessment is conducted, we shadowed two auditors as they assessed the property of a Nantucket resident. During the assessment we observed and asked questions regarding each step of the assessment process:

1. Measure both the interior and exterior of the house including ceiling height
2. Examine the vents and recessed lighting fixtures to assess air leakage into the attic
3. Inspect the insulation in the attic to identify possible air leakage points
4. Perform a carbon monoxide and pressure test of the home
5. Take measurements from the furnace to determine its efficiency

6. Install LED light bulbs, low flow faucet heads, smart power strips and smart thermostats throughout the house.

As the assessors talked the homeowners through each step of the process we were able to identify the major questions that arise during the assessment including: "Why are CFL light bulbs not replaced?"; "How can a smart power strip help reduce energy usage?"; and "How can a new thermostat help me manage my energy usage?" As we listened to the assessors answer these questions we found that CFL light bulbs will not be replaced due to the insignificant difference in efficiency and the smart thermostats will only be installed if the proper wiring is already in place. As these responses initiated some disappointment among the homeowners they helped us formulate recommendations on how to more accurately market the program and provide customers with information regarding what steps to take before and after the assessment.

Interview with the Manager of the Groton Electric Light Department

We gained further insight into the implementation of smart grid programs and technologies through our interview with Kevin Kelly, Manager at the Groton Electric Light Department. He has overseen implementation of a Demand Response program and the installation of smart meters within the town of Groton, Massachusetts. With regards to smart meters, he provided us with similar information that we present in Chapter 2 about Worcester's pilot project. However, unlike Worcester's pilot, the Groton system provides customers with daily usage readings, in hour increments, of which they can compare with their usage on the same day of previous years. As the smart meters have been installed for almost 10 years now, Mr. Kelly said that the project has been very successful and customers are impressed by their ability to view their usage and make adjustments to their behaviors to reduce their costs.

Based on the information Mr. Kelly provided us with about the Demand Response program, that was implemented about three years ago, we found that it was conducted in a similar fashion as to National Grid's plan on Nantucket. While the program in Groton only had 30 volunteers, in addition to the volunteer's monthly savings from decreasing their consumption, each participant earned a yearly rebate ranging from $0 to $38 dollars depending on the number of thermostat modules. Additionally, through software calculations, Groton Electric was able to conclude that on the hottest day of the summer in 2012, each thermostat included in the program saved 1.93 kW. Upon conclusion of the program Mr. Kelly said that, although the rebates were

small, the amount of information they learned from the implementation greatly improved their methods which they plan to enact during the implementation of another Demand Response program for next summer.

In addition to providing insight into the execution of smart grid programs, he informed us of effective strategies when distributing information to residents. Mr. Kelly said that Groton Electric informs its customers about current events and future programs through their quarterly newsletter. He explained that in his experience simple facts and explanations allow for better understating and greater interest in the subject matter. As it pertains to the current situation on Nantucket, this interview aided in the design of our informational display as well as identified a Demand Response program as both cost saving and an effective way to lower peak electric demand.

Interview with the President of the Colonial Power Group

Our interview with Mark Cappadona, President of the Colonial Power Group, enhanced our understanding of Municipal Aggregation while suggesting effective strategies to educate Nantucket residents about the program. To aggregate a town, his company purchases electricity at a lower rate than the basic service rate from companies that produce green power. Using Nantucket as an example, he informed us that while customer's electric supply rate will decrease, they will still be charged transmission fees through National Grid. Additionally, the electrical infrastructure within the town will continue to be maintained through National Grid. From his experience, he found that residents are generally surprised to learn that their previous electric provider will maintain their presence within the town. Along with this misconception, Mr. Cappadona provided us with a list of commonly asked questions and their respective responses (see Appendix 5) which provided us with additional content to incorporate into our outreach material. Furthermore, we discussed successful marketing strategies when educating an older demographic and found that personal communications, such as having a consultant present in the town to answer questions, resonates best.

4.2 Objective 2: Public Attitudes and Awareness on Nantucket

The survey that we distributed to Nantucket residents contained five groups of questions, where each group was designed to gauge awareness and attitudes towards different energy topics and energy saving programs. In order to determine specifically who on the island is not well

enough informed, we asked two general questions at the beginning of our survey about age and residential status. From the 292 responses to the question regarding age, we found that 59% were 60 and over, 22% were between the ages of 50 and 59, 11% were between 40 and 49, 8% were between 30 and 39, and 1% were under the age of 30. Regarding residential status, we found that of the 282 residents who responded to the question 60% were year-round homeowners, 31% were seasonal homeowners, 9% were year-round renters, and 1 respondent was a seasonal renter. Because the number of year-round renters and seasonal renters made up a small percentage of the respondents, and would thus yield insignificant results, we decided to base our analysis on year-round versus seasonal residents. Similarly, the minimal response rate from age groups ranging from 18 to 39 prompted us to disregard the data collected for those age groups as it would likely skew the results. As this demographic information is important for the Town of Nantucket Energy Office to consider when making outreach and informational decisions, the following sub-sections layout our findings.

General Energy Awareness on Nantucket

We assessed residents' general awareness of their personal energy usage, how the town receives its electricity and how it is paid for, as well as what is contributing to the peak load during the summer. By gauging residents' awareness on these topics we were aiming to determine whether or not residents know how a third cable will affect them and if they believed there was a way to defer it.

Out of the 274 respondents who said that they pay their electric bill, 75% did not know their average monthly electric consumption in kilowatt hours. As it stands, this suggests that residents are more concerned with their usage as it pertains to cost rather than reducing their consumption. However, when reviewing the values given by respondents who said they knew their monthly consumption we found that only 66% were able to provide a reasonable response (defined as a value between 300kWh and 1000 kWh which is based on the assumption that an average residential house uses 700 kWh per month[3]). Although we recognized that the other responses may have been accurate, possibly due to the use of alternate energy sources, with the limited number of responses we found them unreasonable to include in the average. We found that the age group most uninformed about their usage was of those aged 50-59, where 84% of

[3] Calculated based on graph provided to us by National Grid.

respondents said that they did not know their average monthly electricity consumption. Through a similar analysis on seasonal versus year-round residents we found that 71% of year-round residents did not know their usage compared to 86% of seasonal residents who did not.

Unlike their lack of knowledge about their electricity usage, respondents were generally knowledgeable about how electricity is transmitted to the island. We found that 74% of respondents knew that there are two cables powering the island and that 20% of respondents thought that there is only one cable. Although one may argue that the distinction between knowing if there are one or two cables is insignificant, both our team and our sponsor think that residents' responses indicate their level of knowledge regarding the energy issues on this island. Therefore, we associate a correct response with a resident who is more likely aware of the need for a third cable and is more willing to take the necessary steps to help defer the need for it. When analyzing based on demographic we found that age had no significant effect on the result, but 80% of year-round residents knew that there are two cables compared to 60% of seasonal residents.

Compared to the 94% of respondents who were aware that the island is powered by at least one cable, we found that only 47% of respondents knew that they are financed through resident electric bills. This suggests that over 50% of the population is unaware that they will likely be paying for the third cable and are thus are less likely to take the necessary steps to help defer its need. Through analysis by age we found that among each group there were almost an equal number of respondents who chose each option. When looking at residential status however, we found that 54% of year-round residents knew they finance the cables compared to only 32% of seasonal residents.

Through our background research we determined that peak demand on Nantucket occurs in the summertime between 5 and 10 o'clock at night. Our survey results indicated that 43% of respondents knew that demand for electricity is highest in this time frame. Furthermore, in an analysis based on age we found that among all age groups, about 42% of respondents were aware of the high demand period. Similarly, we found that 47% of year-round residents were aware of the time frame and 34% of seasonal residents were aware. We also gauged awareness of the fact that it is the mid sized and small homes, which make up 80% of the residential sector[4], combined that contribute most to peak electric demand. We found that the majority, 63% of respondents,

[4] Calculated based on a graph provided to us by National Grid.

thought that it is the large homes, those consuming in excess of 2000 kWh per month, that are responsible for peak consumption. Through further analysis of our results, we found that only two respondents, both year-round residents, knew that it is primarily the mid sized and small homes combined who are accountable for the peak load.

Our final question in the general energy awareness section of our survey asked residents to indicate if they thought it is possible to defer the need for the third cable if homes and businesses worked to become more energy efficient. Although we found that 88% of respondents thought that it is possible, it is likely that residents will not change their behaviors until they are better informed about how the cables are paid for, who contributes most to the peak load, and during what times of the day peak load occurs.

Reducing Island-Wide Energy Use

The next section of our survey focused on assessing attitudes towards energy saving programs. We asked questions regarding public awareness and opinions of the Mass Save Home Energy Assessment program to determine how the program can be improved as well as opinions about the implementation of a Demand Response program to determine how to increase participation. From speaking with Lindsay Foley, a National Grid Community Representative, we found that both the Mass Save and Demand Response programs play major roles in National Grid's Non-Wires Alternative plan in the coming years, thus stressing the importance for the Town Energy Office to increase awareness and gain support for these programs.

We found that 80% of respondents had previously heard about the Mass Save program, but that only 58% had received an assessment. Of those who had received an assessment, 72% indicated that they were either "satisfied" or "very satisfied" with the program. We found no difference by age, but more year-round residents (88%) had heard of the program than had seasonal residents (60%). Furthermore, we found that 22% more year-round respondents said that they have had an assessment compared to seasonal residents.

As part of the Mass Save program residents will receive free programmable thermostats if they have a central air-conditioning system. Since the implementation of the Demand Response program will require volunteers to have a programmable thermostat it was important for us to determine how many residents have one. From the survey we found that 45% of respondents have one, 76% of which are year-round residents. When looking specifically at whether or not residents support the implementation of Demand Response we found roughly

60% of respondents (based on age and residential status as well) would support the program for some type of monetary incentive. However, we found that of those who said that they would not be willing to participate, said so due to a misconception about the program, as shown in Figure 7.

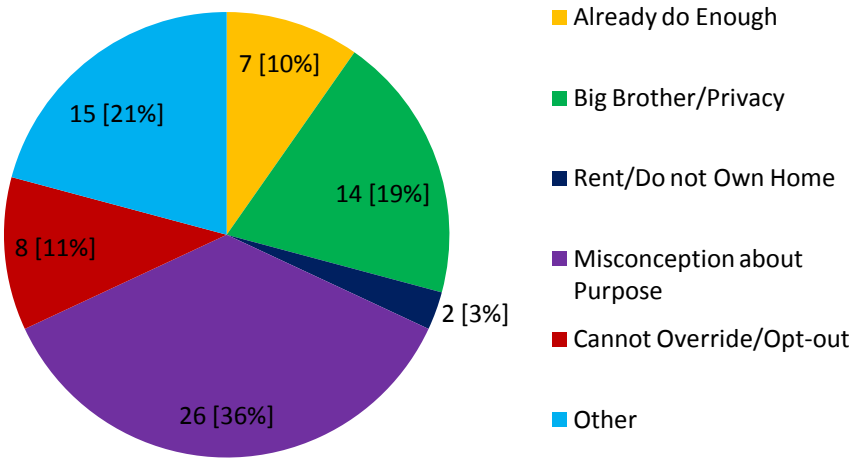

Figure 7: Reasons Respondents Provided for not Wanting to Participate in a Demand Response Program

The most common misconception was that the program would restrict resident usage of the thermostat and that the utility would control the thermostat constantly rather than only during peak demand times as it is actually intended.

National Grid and Other Electric Suppliers

Since the Town Energy Office is considering the possibility of implementing a Municipal Aggregation on Nantucket, we intended to find out residents' opinions of their current electric supplier and their thoughts on changing suppliers. Our findings then allowed us to make recommendations on the content and target audiences for educational programs.

National Grid was the supplier for 88% of respondents, 79% of whom are satisfied with National Grid as their supplier. Of the remaining 34 respondents who are not supplied electricity through National Grid, 94% said that they are satisfied with their supplier. Overall, 19% of respondents said that they were dissatisfied with their supplier, primarily due to cost (see Figure 8).

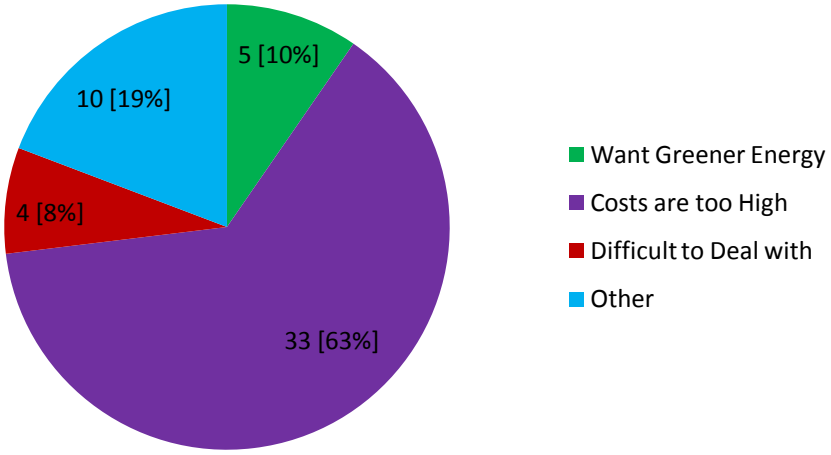

Figure 8: Reasons the 34 Respondents Gave for Dissatisfaction with Their Electric Supplier

The vast majority of responses that focus on cost being the reason for dissatisfaction speaks to the public's willingness to explore different supplier options. This was supported by the 95% of respondents who expressed interest in participating in a Municipal Aggregation program if it was able to provide greener power and/or electric cost savings. Although there was a greater response rate for participation when electric cost savings would be involved, roughly half of all respondents said that they were interested in both greener power and electric cost savings being pursued. We also found that of those who said they would not be interested in participating, 80% were over the age of 60 and 100% were over the age of 50.

Marketing and Outreach

As the Town of Nantucket Energy Office is exploring ways to educate the public about energy and energy saving programs, it is crucial to find out the most efficient and effective way to distribute information to residents. Through our survey we analyzed responses given based on two distribution methods: passive and active sources, allowing us to gauge what respondents are most receptive to.

Through a wide variety of passive media sources, we found that the majority of respondents would prefer to be informed through The Inquirer and Mirror, the Town website and Mahon About Town. Although both our team and Lauren Sinatra thought that the different social media sources and word of mouth would rank most popular, the results make sense due to the age demographic of the respondents. When looking at specific age groups however, we found

each group consistently chose The Inquirer and Mirror and the Town website as their preferred methods of distribution. This can be seen in Table 1 where the highlighted sections represent the top three choices for each age group.

Table 1: Preferred Informational Method by Age Demographic

	What is your age?					
How would you best recommend the Town and National Grid distribute information about energy news, programs and events?	18-29	30-39	40-49	50-59	60 and over	Total
Facebook	0	16	9	20	32	77
Twitter	0	5	5	3	4	17
Public Town meetings	1	11	6	15	52	85
Town website	1	14	20	30	102	167
Energy Office website	0	12	14	20	64	110
Mahon About Town	0	11	10	21	74	116
I&M	1	16	19	43	144	223
Tourism Guide	0	3	0	2	8	13
Message boards around town	0	4	3	8	10	25
Local Television	0	3	5	12	34	54
Local radio	0	14	12	22	45	93
Word of mouth	1	7	3	8	12	31
Volunteer energy committee	0	4	5	6	18	33
Resources available in Town buildings	0	6	4	13	26	49
Other	1	1	5	12	21	40
Total	2	22	32	60	171	287

In addition to looking at the age demographic, we also compared preferences between year-round and seasonal residents. Interestingly, we found that there is no difference in preference; both year-round and seasonal residents said that The Inquirer and Mirror followed by the Town website is where they would like to receive their information about energy news, programs and events.

In addition to asking about print media sources, we also gauged public opinion on the Town having a local sustainability hub, similar to the one in Worcester, and found that 85% of respondents thought that residents would benefit from such a location. The 15% who said they would not support it as a Town project gave reasons such as it being a waste of money, the

information is already online, and the 'worst offenders' (i.e., those using excess energy) would not use it. As an even better way to bring residents into the hub and promote the learning of the information that is being presented,89% of respondents believed it would be helpful if there was a knowledgeable staff person available to help explain the information presented and to answer any questions.

4.3 Objective 3: Stakeholder Involvement

Through the 9 interviews that we conducted with different groups and organizations on the island we found that many of them would be valuable partners to the Town Energy Office as it works to increase general energy awareness and promote energy saving programs. Each interview revealed ways in which the group or organization could help disseminate informational brochures or other outreach materials, help with either the planning of an event or the acquiring of land for an event, or provide funding for programs, events or other energy related initiatives. The following sub-sections present the specific findings from each of the interviews we conducted.

Visitors Services

From our interview with Kate Hamilton-Pardee, the Director at Visitors Services, and David Sharpe, the Administrator at Visitor Services, we found that an alliance between Visitors Services and the Town Energy Office would be beneficial when looking to distribute information to tourists. Ms. Hamilton-Padee and Mr. Sharpe informed us that with the multitude of brochures and pamphlets that tourists collect from Visitors Services, the chance that our brochure will be read is not guaranteed; however, when we presented them with our idea to incorporate energy saving tips into a map of the island, they were very optimistic that the Town Energy Office's messages would be heard. In addition to their willingness to display any informational display, they also assured us that Visitors Services would be able to add any program or event that the Town Energy Office was holding to its events calendar. Finally, Ms. Hamilton-Pardee and Mr. Sharpe said that Visitors Services would be open to adding an energy section to their yearly publication, titled Nanetiquette, provided the Town Energy Office submitted the content.

Nantucket Island Chamber of Commerce

After interviewing Janet Schulte, the Interim Executive Director of the Nantucket Island Chamber of Commerce (NICC), we found that the NICC would be a key partner in relaying information to local businesses. One event idea that Ms. Schulte had, and offered to help organize, is what is known as a "Business after Hours," which is a social gathering of local business heads that occurs twice a month during which they discuss current local events. As we introduced our idea of developing a recognition program to persuade local businesses to become more energy efficient, Ms. Schulte responded by suggesting that a "Business after Hours" event could be a platform to showcase businesses that are leaders in energy efficiency on the island. As these events would be an effective way to increase energy awareness among the 700 members of the NICC, it could also incentivize other businesses to become more energy efficient. Additionally, Ms. Schulte said that the NICC would be able to disseminate information through the NICC's constant contact network.

Nantucket Public School District

Our interview with Michael Cozort, Superintendents of Nantucket Public Schools, provided us with insight into how to stimulate students involvement in understanding the energy challenges that the island is currently facing. Although Mr. Cozort thought our idea of integrating an energy program into the curriculum would be a great opportunity to educate students, he informed us that the information must be found within existing standards and not added to them. He supported our ideas to form an energy club and develop an internship position for a student at a sustainability hub where both would encourage the community to learn about energy and energy savings. While these ideas aim to involve students already interested in energy, an idea that Mr. Cozort seemed open to was integrating informational displays throughout the interior of the new school that is being built.

Maria Mitchell Association

From speaking with Jascin Finger, Deputy Director of the Maria Mitchell Association (MMA), we found that the organization could potentially work with the Town Energy Office on effective ways to educate children. With many different science based classes for children ages 3-16 already in place, Ms. Finger said that energy facts might be viable and that a program focusing solely on energy use could potentially be offered if the Town Energy Office were to

sponsor it. We also found that MMA might be able to feature rack cards and brochures in their local buildings.

Housing Nantucket

After talking to Anne Kuszpa, the Director at Housing Nantucket, we found that Housing Nantucket could assist the Town Energy Office by circulating information to residents on their mailing list. We also presented the idea of hosting an event in which the auditing process of a Mass Save assessment would be demonstrated. Ms. Kuszpa expressed interest in the program and said that she would be able to ask for a volunteer from their list of tenants to locate a home to be used for the event. Additionally, Ms. Kuszpa conveyed her interest in the purchasing of solar panels to be installed on the roofs of the 30 properties that Housing Nantucket owns, but stated that the organization would require assistance in procuring funds for the project.

Nantucket Land Bank

Through our interview with Eric Savetsky, Director of the Nantucket Land Bank, we found that the Land Bank may be able to allocate land for small-scale outdoor events. Although Mr. Savetsky was not certain that the Land Bank would be able to provide land, he was optimistic that depending on the size and characteristics of the event, the Land Bank would be able to provide assistance. Aside from this, Mr. Savetsky did not feel that a solar project on Land Bank property was in keeping with the Land Bank Act.

Nantucket Land Council

From our interview with Cormac Collier, Executive Director of the Nantucket Land Council, we found that the Land Council could contribute funds as well as help with fundraising for community based energy projects. We also found that the Land Council would be able to distribute educational materials regarding energy and energy saving programs through their mailing list as well as include information on these topics in their newsletters and on their Facebook page.

ReMain Nantucket

Through our interview with Project Manager Rachel Hobart and Virna Gonzalez, the Office and Events Manager, we learned about opportunities for funding as well as innovative ideas on how to increase energy awareness on the island. As ReMain is interested in enhancing

education in the downtown on a variety of fronts, including energy, Ms. Hobart and Ms. Gonzalez spoke about potential opportunities for grant funding that might dovetail with educational opportunities, such as an internship position at the Greenhound building or the Town Energy Office. In addition, they suggested an innovative way for the Town Energy Office and National Grid to disseminate information to the public. Ms. Hobart and Ms. Gonzalez believed that a great way to circulate energy information would be to print it onto the coffee sleeves used at local coffee shops. This technique would allow the Town Energy Office to quickly spread the word about Mass Save or other energy saving programs. As a sponsoring organization, they were also able to provide us with a list of sustainability guidelines a business must follow to receive sponsorship. These guidelines are very similar to those commonly associated with energy recognition programs.

Nantucket Community Foundation

We interviewed Margaretta Andrews, the Executive Director of the Community Foundation for Nantucket, and found that this organization would work to distribute information and help with funding. Ms. Andrews said that the Community Foundation would be able to include information in their bimonthly newsletters regarding energy related topics if it is pertinent to the overall message of the newsletter. Additionally, she said that the Community Foundation could assist the Town Energy Office by managing and maintaining funds supplied through private donors.

5.0 Recommendations and Conclusions

5.1 Conclusions

The goal of our project was to identify ways to increase public awareness about cost saving and energy reduction initiatives on Nantucket. We used surveys and interviews to gauge current levels of awareness about energy issues on Nantucket. From the results of the survey we were able to conclude that the majority of the population on Nantucket is aware of how Nantucket receives its electricity, but is generally unaware of how it is paid for and what the major contributing factors are that determine electricity demand. We were also able to conclude that seasonal residents are generally less aware of these topics than year-round residents. We also concluded that the majority of the population on Nantucket would support and participate in energy saving programs pursued by the town, such as Demand Response and Municipal Aggregation, if these programs reduced costs and/or increased sustainability. We concluded that those who said they were opposed to participation in and the implementation of these programs may be more interested if they were better informed about the specifics of the programs.

From our stakeholder interviews, we concluded that there are multiple opportunities for collaboration between the Town Energy Office and local organizations. These local organizations are willing to assist the Energy Office in planning events, procuring locations for events, funding, and distributing informational material. By leveraging these partnerships, the Town Energy Office can create new opportunities to educate the public about energy saving programs and technologies.

5.2 Recommendations

We developed recommendations for the Town Energy Office with the intent to increase participation in and support of cost and energy saving programs about energy policies or events, tailoring outreach materials specifically to Nantucket and suggesting how future groups could continue our work.

Programs and Policies

We recommend that the Town Energy Office work with local organizations to organize events to promote energy efficiency measures. By collaborating with organizations such as the Nantucket Island Chamber of Commerce or Housing Nantucket, the Town Energy Office has the opportunity to organize various events to showcase the energy efficiency

incentives offered to residents on the island. Specific events could include an energy-focused 'Business After Hours' or a live demonstration of a Mass Save Home Energy Assessment. Furthermore, there are opportunities for educational programs to be developed in collaboration with the Maria Mitchell Association for use during its summer Discovery Camps.

We recommend that a policy or program be developed to reward businesses or residents making strides in energy efficiency. By working with organizations such as ReMain Nantucket or the Chamber of Commerce, a recognition program could be developed to reward individuals in the community that are implementing energy efficient techniques. ReMain has created guidelines for sponsorship that requires events to exhibit sustainability, and these guidelines could also be applied to businesses. Organizations such as the Nantucket Land Bank and Housing Nantucket may also be willing to create new energy policies for homebuyers. Sustainability pledges could be developed that detail the steps that a new homebuyers could undertake to ensure that their houses are as energy efficient as possible.

We recommend that the Town Energy Office continue pursuing Municipal Aggregation and a Community Solar project. From our survey we found that residents would be willing to support and participate in these programs. The Town Energy Office should work to disseminate information about these programs to increase knowledge of and support for these initiatives, while also working to develop a Municipal Aggregation plan. The Town Energy Office should also request that a Municipal Aggregation consultant visits the island and speaks with residents about the benefits of the program.

Outreach Material

We recommend that the Town Energy Office continue to disseminate information about Demand Response and the Mass Save program. Dissemination efforts should focus on these programs as they will be major parts of National Grid's Non-Wire Alternative plan. Specifically, misconceptions about Demand Response must be addressed, and Mass Save Home Energy Assessments should be advertised more aggressively toward seasonal residents.

We recommend that the Town Energy Office create informational exposés to be included in organization newsletters. Rather than create its own newsletter, the Town Energy Office should develop informational material to be disseminated in the newsletters and informational materials posted and distributed by other local organizations, such as the Chamber

of Commerce, Housing Nantucket, and Maria Mitchell. The information included should be relevant to ongoing projects or projects that may be implemented in the future.

We recommend that information be developed for placement in the 'Spotlight' section on the Town of Nantucket website. By having a spotlight on the Town website, information can more accessible to residents who may be unaware of the Town Energy Office's existence; it will also serve as a resource for links to the Energy Office website or to sign up for a Home Energy Assessment.

We recommend that the Town Energy Office asks National Grid to revise its Nantucket-specific website to better address the needs, interests, and concerns of Nantucket residents and businesses. As it stands, National Grid's website on Nantucket (ngrid.com/Nantucket) does little to compel residents to sign up for a Home Energy Assessment or change their consumption habits. Revisions should be made to emphasize the necessity of decreasing peak demand load. Residents need to be informed that they already pay for the transmission cables on their monthly electric bill, and may have to pay for the third cable. They should also be made aware that they pay for the Mass Save program through an energy efficiency surcharge to encourage participation in the program.

We recommend that the Town Energy Office collaborate with other local organizations to develop outreach materials for distribution via local establishments. The Town Energy Office can work with local organizations like Visitors Services, the Chamber of Commerce, and the Nantucket Civic League to distribute information to large numbers of both residents and businesses. By also developing printed materials such as rack cards, posters, or maps, non-residents can become better informed about energy savings. Outreach material can also be developed for placement in yearly publications such as the Chamber's yearly guide book, or the Visitor's Services *Nanettiquet*. We have created a sample rack card which can be seen in Appendix 4.

We recommend that the Town Energy Office explore ways to improve its website. We recognized that the Town Energy Office website needs to be improved. The website should address the problems facing Nantucket more prominently and feature residents taking a stance toward energy efficiency. Sections should be developed to explore topics such as Demand Response or Municipal Aggregation to quell doubts residents may have about the purpose of these programs.

We recommend that the Town Energy Office explore ways to develop an Energy Efficiency Fund through the Community Foundation. The Town Energy Office should explore the possibility of setting up a public fund for energy efficiency projects. The fund would be controlled by the Community Foundation for Nantucket and all projects would be vetted by the Town Energy Office. The Town Energy Office would need to devise a fundraising campaign or locate private donors to initiate the fund.

We recommend that the Town Energy Office further explores the opportunity to have a volunteer or intern at the Greenhound Sustainability Hub. A volunteer or internship opportunity through the Town Energy Office and ReMain Nantucket would involve working at the Greenhound Sustainability Hub. The student worker would act as a guide at the Hub to initiate demonstrations or discussions about proper energy savings techniques. The opportunity may also involve helping the Town Energy Office plan or run events, or redistributing our survey to the public during the summer to gain more insight into the attitudes of seasonal residents.

Future Work

We recommend that in the future the Town Energy Office, National Grid, WPI or other research groups:

- Monitor and evaluate public participation in and attitudes towards energy saving programs, such as Municipal Aggregation and Demand Response, as they are rolled out and implemented on island;
- Explore and evaluate ways to encourage short-term seasonal visitors to save energy while on island since they contribute substantially to the summer peak demand; and,
- Investigate further the implementation of alternative energy technologies on island, including solar, tidal, and off-shore wind.

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Appendix 1: Communication Goals for DemandLink pilot in 2015

1. Helping further customer understanding of how demand response events work, and fully comprehending the expectations outlined in the terms and conditions they sign as Pilot Participants
2. Appreciating the benefits to the entire community derived from demand response participation
3. Educating customers via interviews with Pilot Participants who have experienced energy cost savings utilizing DemandLink devices
4. Illustrating energy cost savings enjoyed by customers who have participated in Window Air Conditioner Rebate/Recycle offer

Appendix 2: Nantucket Resident Energy Survey

Nantucket Resident Energy Survey

We are a team of Worcester Polytechnic Institute students working in collaboration with the Nantucket Energy Office to assess energy awareness on Nantucket. The survey should take less than 5 minutes. Your responses will remain anonymous and you may skip any question you are not comfortable answering.

General

1. What is your age: ☐ 18-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60 and over
2. What is your residential status on Nantucket: ☐ Homeowner (year-round) ☐ Renter (year-round) ☐ Homeowner (seasonal) ☐ Renter (seasonal)

General Energy Awareness

3. Do you know roughly how much electricity you consume in an average month, in Kilowatt hours (kWhs)?
   ☐ Yes,_____kWh ☐ No
4. Do you know roughly during which time period demand for electricity is highest on Nantucket?
   ☐ 10pm-8am ☐ 8am-12pm ☐ 12pm-5pm ☐ 5pm-10pm ☐ Unsure
5. Do you know how Nantucket gets its electricity?
   ☐ 1 undersea transmission cable from Cape Cod ☐ Downtown power plant ☐ Unsure
   ☐ 2 undersea transmission cables from Cape Cod ☐ Stored delivered by boat
6. True/False: Nantucket residents pay an extra 15% surcharge on their monthly electric bills to pay for the two undersea cables that deliver power to the island. Please do not change your answer indicated above.
   ☐ True ☐ False ☐ Unsure
7. The demand for electricity on Nantucket is more than 5 times the Massachusetts state average. At this rate a costly 3rd undersea cable may be necessary. What do you think most contributes to this recent surge?
   ☐ **Industrial Facilities** (Wastewater Plant, Schools, Airport, Stop and Shop, Hospital, etc.)
   ☐ **Large Commercial** (Hotel, Town Buildings, Private Clubs, etc.)
   ☐ **Small Businesses** (Restaurants, Inns, Retail Shops, etc.)
   ☐ **Large Homes** (usage exceeds 2000+ kWh/month)
   ☐ **Mid Size Homes** (usage between1000-2000 kWh/month)
   ☐ **Small/ Average Homes** (usage between 0-1000 kWh/month)
8. Is it possible to defer the need for a 3rd cable if island homes and businesses became more energy efficient?
   ☐ Yes ☐ No ☐ Other Comments:_____

Reducing Island-Wide Energy Use

9. Do you wish your house was more energy efficient?
   ☐ Yes ☐ No
10. A Nantucket resident* pays approximately $100/year on their monthly electric bill to fund the Mass Save program, which offers no-cost energy saving equipment, incentives and services such as free Home Energy Assessments.
    Have you heard of the Mass save Program before? ☐ Yes ☐ No
    If yes, how did you hear about it?_____
11. Have you received a Mass Save Home Energy Assessment?
    ☐ Yes, in the last 3 years ☐ Yes, more than 3 years ago ☐ No, but I am interested ☐ No, I am *not* interested
12. If you have already received an assessment, please indicate your level of satisfaction with the program.
    ☐ Very satisfied ☐ Satisfied ☐ Neutral ☐ Not Satisfied ☐ Not satisfied at all
    Please explain your choice:

*Based on assumption that an average resident uses 700 kWh/month

13. Does your home have a programmable or smart thermostat?
    ☐ Yes ☐ No
    If yes, what are your opinions of it?_____

14. There have been many communities who have implemented a Demand Response program in which, with the customer's permission, National Grid has the ability to monitor and adjust their thermostat settings, by a few degrees, to reduce electric demand during peak hours. Would you be willing to participate in such a program if it:
    ☐ Offered a monetary incentive or incentivized electricity pricing ☐ Lowered energy costs
    ☐ No, I wound not be willing to participate in such a program because_____

National Grid and other Electric Suppliers

15. Who pays your electric bill?
    ☐ I do ☐ My landlord ☐ Other, please specify_____

16. Who is your electric supplier?
    ☐ Viridian ☐ Con Edison ☐ Constellation ☐ National Grid
    ☐ Unsure ☐ Other:_____

17. Overall are you satisfied with your electric supplier? ☐ Yes ☐ No
    If no, could you please explain why?_____

18. Are you aware that you can purchase your electricity from a supplier other than National Grid?
    ☐ Yes ☐ No

19. Municipal Aggregation is the process in which a town removes its citizens from their "default" energy provider and buys energy from a third party vendor on behalf of the community. More than 70 towns in Massachusetts have adopted a Municipal Aggregation policy and in turn have obtained greener power and lower energy costs.
    Would you be in favor of Municipal Aggregation on Nantucket if it meant receiving (check all that apply):
    ☐ Greener power ☐ Electric cost saving ☐ I would like more information
    ☐ No, I want to stay with National Grid as my default power provider because_____

Energy Marketing & Outreach

20. Do you think it would be helpful to Nantucket residents if there was a local Sustainability Hub, where energy information is available and energy efficiency technologies are demonstrated?
    ☐ Yes ☐ No; why not_____

21. Would it be helpful to have a knowledgeable staff person or volunteer available at the Sustainability Hub to answer the public's questions about saving energy?
    ☐ Yes ☐ No

22. How would you recommend the Town and National Grid distribute information about energy news and events?
    ☐ Facebook ☐ Twitter ☐ Materials in Town buildings
    ☐ Town website ☐ Energy Office website ☐ Mahon About Town
    ☐ I&M ☐ Tourism Guide ☐ Message boards around town
    ☐ Local Television ☐ Local radio ☐ Volunteer energy committee
    ☐ Word of mouth ☐ Public Town meetings ☐ Other:_____

Please leave us with your email if you would like to receive updates on island energy initiatives:

Email:_____

No personal information will be used in the analysis of our survey data or our reports. Thank you!

Appendix 3: Nantucket Stakeholder Basic Interview Script

We are a team of Worcester Polytechnic Institute students working in collaboration with the Town of Nantucket Energy Office to assess current practices to promote energy awareness on Nantucket. The purpose of this interview is to acquire a first-hand account about energy awareness and public opinion regarding the implementation of energy saving programs. The interview should take less than 15 minutes. Please know that you may skip any question you are not comfortable answering, and may also stop the interview for any reason. Since your views are important, we would like to quote you in our final report but we will give you the right to review any quotations we use prior to publication and if you prefer we can anonymize your contributions. May we proceed?

1. What is the mission of your group or organization?
2. Do you have a prior business relationship with the Town of Nantucket Energy Office? What have you previously worked on together?
3. Would you be able to help the Town Energy Office distribute energy related information?
4. Do you have any other ideas on how you could help the Town Energy Office?
5. Are there any other groups or organizations on Nantucket that you think could be of value in aiding the Town Energy Office in its goals?

Appendix 4: Sample Rack Card

Appendix 5: Frequently Asked Questions About Municipal Aggregation

COMMUNITY CHOICE POWER SUPPLY PROGRAM

FREQUENTLY ASKED QUESTIONS

1. WHAT IS BEING ANNOUNCED TODAY?

The Town of Adams is announcing that it has selected _____ as the supplier for its Community Choice Power Supply Program.

2. WHAT IS THE "COMMUNITY CHOICE POWER SUPPLY PROGRAM"?

The Community Choice Power Supply Program ("Program") allows local governments, like the Town of Adams, to combine the purchasing power of its residents to achieve savings on electricity costs. In doing so, it creates competition among electricity suppliers which helps ensure competitive rates. Consumers are no longer "stuck" with the cost and fluctuation of Basic Service Rates because the Program offers them another option. In addition to offering savings, the Program allows the Town to set its own energy related goals, such as long-term rates or even green options.

3. HOW WILL THIS AFFECT ME?

You will receive the benefit of a lower rate on your electricity and therefore a lower electric bill. Otherwise, YOU WILL NOT NOTICE ANY CHANGE. The only difference you will see is that _____ will be printed under the "Supply Services" section of your monthly bill. You will continue to receive one bill from National Grid. You will continue to send your payments to National Grid for processing. National Grid will continue to respond to emergencies, read meters and maintain the distribution and transmission lines. Reliability and quality of service will remain the same. Furthermore, you will continue to have all existing consumer rights and protections.

4. WHO IS _____?

<insert description of supplier>

5. HOW AND WHY WAS THIS SUPPLIER CHOSEN?

The selection was made on a competitive basis.The Town of Adams issued an RFP for suppliers to bid on the Town's electricity load. ___ _____ offered the lowest bid and guaranteed

that 100% of the energy purchased would be offset by renewable energy credits from sources both local and national.

6. WHEN DOES THIS PROGRAM TAKE EFFECT?

The new lower rates begin on the day of the month in _____ that your meter is read. This date varies by service area. Your meter reading date is shown on your bill. You can find more information about reading your meter at https://www1.nationalgridus.com/BillsAndPayments.

7. WHAT DO I NEED TO DO TO PARTICIPATE IN THE PROGRAM?

You do not need to take any action to participate in Adams' Program. All Basic Service consumers will automatically be enrolled in the Program.

8. WHAT DO I NEED TO DO IF I <u>DO NOT</u> WANT TO PARTICIPATE IN THE PROGRAM?

You may: 1) Opt-out and continue paying National Grid's Basic Service rate; or 2) Opt-out and choose your own Competitive Supplier (if one is available to you).

9. HOW DO I OPT-OUT?

Fill out, sign, and return the enclosed postage paid card or visit www.colonialpowergroup.com/adams/and click the opt-out button, then fill out and submit the Opt-Out Form. You may also call (866) 485-5858 to opt-out.

10. WHAT IF I AM ON A BUDGET PLAN OR ELIGIBLE LOW-INCOME DELIVERY RATE?

You will continue to receive those benefits from National Grid.

11. WHAT IF I HAVE ALREADY CHOSEN A COMPETITIVE SUPPLIER OR GREEN POWER SUPPLY OPTION ON MY OWN?

You will not be enrolled in this Program. You will continue to get your electricity from that Competitive Supplier or that Green Power Supply. However, if you would like to be enrolled in Adams' Program, you will need to cancel your contract with your existing supplier and contact Colonial Power Group, Inc. and request to be placed on the Town's Program. You will be automatically enrolled in the next available meter reading cycle.

12. WHO IS COLONIAL POWER GROUP, INC.?

Colonial Power Group, Inc. is an energy consulting company that is helping the Town of Adams to facilitate the Community Choice Power Supply Program.