REDUCING HOUSEHOLD CARBON FOOTPRINTS

A Program to Engage the Mass Audubon Community

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All photos (including cover) taken by the Team unless otherwise noted.
ABSTRACT

Reducing the environmental impact of our actions to ensure a sustainable planet requires rethinking the way we use energy, the way we move around, and our consumption habits. A collective effort is needed to lower carbon emissions and combat climate change. The Massachusetts Audubon Society has connected their mission of protecting the habitats of Massachusetts’ wildlife with addressing climate change. They recognize the potential benefit of engaging the large Mass Audubon member community in this effort and have established a goal for each member household to reduce its carbon footprint by 25%. This is a challenging task because it requires a diverse group of members to voluntarily change their behaviors.

Our Team’s objective is to maximize Mass Audubon’s chances of achieving the goal they have set. In doing so, we have outlined a program, called Re-think, to engage the Mass Audubon member community to voluntarily reduce their carbon footprint. The program has a positive message, prompting people to rethink activities that have the largest impact on a household’s carbon footprint and is rolled out through projects targeting energy use, transportation, and waste. The Re-think program is designed to include the broadest number of households and to address common barriers to sustainable behavior changes. We emphasize that Mass Audubon needs to provide consistent outreach and supporting resource tools to the member community. They must also facilitate community interaction, solicit feedback from member households, and encourage incremental targets. Changing behaviors is a cyclical process, and the program must be dynamic in order to adapt to changing barriers. We have confidence that through the Re-think program, Mass Audubon and its member community will prove that addressing climate change can begin at home.
INDEX

Executive Summary ........................................................................................................... 1
Chapter One: Introduction
 Mass Audubon and Climate Change ................................................................. 5
Chapter Two: Research
 Literature Review ........................................................................................................... 11
 State Action .................................................................................................................. 23
 Peer Review ................................................................................................................... 24
Chapter Three: Data Collection & Analysis
 Demographic Profile of Mass Audubon Community ......................... 29
 Survey ............................................................................................................................ 31
 Focus Group .................................................................................................................. 36
Chapter Four: The Re-Think Program ................................................................. 41
Chapter Five: Conclusion ......................................................................................... 63
Bibliography .................................................................................................................. 65
Appendix 1 - Memorandum of Understanding ........................................ 73
Appendix 2 - Peer Review ......................................................................................... 79
Appendix 3 - Questions for Interviewees ............................................................... 87
Appendix 4 - Survey ...................................................................................................... 89
Appendix 5 - Focus Group Agenda ......................................................................... 91
Appendix 6 - Resource Tools .................................................................................... 92
Appendix 7 - Institutional Review Board ............................................................... 107
# FIGURES

2.1 Breakdown of an Average Individual’s Carbon Footprint in a Developed Country ................................................................. 13

3.1 Mass Audubon Membership by Zipcode .................................................. 30

3.2 Household Size of Survey Respondents ............................................. 32

3.3 Energy Efficiency Upgrades of Survey Respondents ..................... 33

3.4 Barriers to Energy Efficiency Upgrades of Survey Respondents .... 34

3.5 Primary Mode of Transportation of Survey Respondents ............... 35

3.6 Barriers to Recycling/Composting of Survey Respondents ............ 35

3.7 Survey Respondents Preferred Form of Communication with Mass Audubon .................................................................................. 36

4.1 Re-think Program Visualization .......................................................... 47
REDUCING HOUSEHOLD CARBON FOOTPRINTS: A PROGRAM TO ENGAGE THE MASS AUDUBON COMMUNITY

As a distinguished environmental conservation and advocacy organization, the Massachusetts Audubon Society (Mass Audubon) has recognized that addressing climate change is in line with its core mission. Mass Audubon envisions that their sizeable member community has an opportunity to contribute a substantial reduction in the overall greenhouse gas emissions (GHG) for the state of Massachusetts. Mass Audubon set the goal of a 25% reduction in the carbon footprint of each of its member households by 2020. This goal requires that Mass Audubon have an understanding of the current behaviors of member households throughout the state, and an idea of how to engage them in voluntary changes to foster sustainable behaviors. The intention of this report is to provide Mass Audubon with a program that will maximize the prospect of meeting the goal they have set for carbon footprint reductions.

A carbon footprint is defined as “the total amount of carbon dioxide directly and indirectly caused by an activity or accumulated over the lifetime of a product.” To begin, the Team compiled previous research to understand the main components of a household’s carbon footprint and also how to successfully encourage voluntary behavior changes.
This research revealed that households are a major contributor to GHG emissions in the United States, representing approximately 40% of overall emissions. However, it is also estimated that the household sector could reduce its carbon emissions by 20-30% in the next decade, using existing technologies. These statistics supported the objective of a program to significantly reduce household emissions. It was determined that the major drivers of a household’s carbon footprint are energy, transportation, and consumption of goods (including waste). Finally, our research suggested that households often have misconceptions about the impact of various actions and their effect on a carbon footprint.

Our review on various theories for changing behaviors confirmed that there are challenges to consider. Individuals are attached to habits and default behaviors and identifying the barriers and benefits to a behavior are critical to develop the appropriate strategy. A strategy targeted at the community level could be more effective as groups often influence the behaviors of individuals. The Team’s research on Community Based Social Marketing provided especially valuable insight, as it presented a clear methodology, with concrete steps, to generate behavior changes.

Field research was essential to achieve a deeper understanding of members’ current behaviors. The Team designed a survey to determine the frequency of behaviors related to energy efficiency, transportation, and recycling—each of which impact a household’s carbon footprint. This survey generated 250 responses, which were valuable in identifying behaviors to focus on and also barriers to these behaviors. A subsequent focus group was held to gather more insight from members of the Mass Audubon community and solicit feedback on our preliminary strategies. The Team also conducted interviews of staff at existing organizations that are dedicated to collective carbon reduction in Massachusetts. These sources identified similar challenges and highlighted the need for dedicated staff, consistent funding, and leadership in program implementation.
We recognized the potential for several of these organizations to serve as alliances for Mass Audubon.

The Team’s research and the data collection provided the foundation to develop the Re-think program, which will engage the broadest number of Mass Audubon households to reduce their carbon footprint through voluntary behavior change. The Re-think program has a positive image, encouraging member households to re-think the major drivers of their carbon footprint through projects that target energy, transportation, and waste behaviors. These projects include efforts to increase weatherization of homes, promote car-pooling, and institute composting within the Mass Audubon community. We envision the Re-think program to be implemented through Mass Audubon Nature Centers, where the organization makes physical connections to its member community. This will be supported by consistent outreach, interactive evaluation, and feedback from the Mass Audubon headquarters.

Finally, we have provided some recommendations for Mass Audubon that will sustain the Re-think program for the long term. This includes the need to have dedicated staff that is strongly coordinated with Nature Centers and the importance of consistent funding to support the program. In addition, it is critical for Mass Audubon to consider incremental goals and keep in mind that changing behaviors is a dynamic and ongoing process. The Team feels strongly that Mass Audubon is well positioned to fill the need for an information platform regarding climate change and to facilitate connections within their communities. We believe that the Re-think program supplies Mass Audubon with the strategies to successfully engage member households in significant carbon footprint reductions.
CHAPTER ONE:
INTRODUCTION

MASS AUDUBON AND CLIMATE CHANGE

Mass Audubon has a strong history of taking action to support its mission of protecting the nature of Massachusetts for people and for wildlife. Since its founding in 1896, Mass Audubon has grown into one of the largest conservation organizations in New England. It manages a network of twenty-one Nature Centers throughout the state, and has over 100,000 members that form 60,000 households. Furthermore, Mass Audubon serves as steward to 34,000 acres of conservation land; provides educational programs for 225,000 children and adults annually; and advocates for environmental policies at all levels of government.

Over the years, Mass Audubon has remained true to the core strengths of conservation, education, and advocacy in pursuit of its mission to protect all wildlife and their habitats. This involves a dedicated focus on the interconnected threats of habitat fragmentation and habitat loss. In 2010, Mass Audubon officially acknowledged that climate change represents a direct threat to wildlife. Specifically, an increasingly warmer climate driven by GHG emissions and deforestation threatens to accelerate habitat destruction (Mass Audubon, 2011). Mass Audubon is responding to the
Engaging and educating our membership in energy conservation and efficiency

risks posed by climate change with the organization’s unique strengths in science-based advocacy and environmental education, amplified by the support of a large and dedicated membership.

Mass Audubon’s climate change initiative is already in motion. Through energy efficiency, energy conservation, and an increased reliance on renewable energy sources, Mass Audubon has begun addressing its own organizational carbon footprint. In July of 2010, the Board of Directors adopted the Policy on Sustaining People and Nature in a Rapidly Changing Climate, which includes a plan to reduce greenhouse gas emissions by 50% of 2003 levels by the year 2014. As of year-end 2010, Mass Audubon estimates that they have achieved a 44% reduction (Energy & Water Conservation and Green Building Initiatives, Mass Audubon 2011).

The next phase of Mass Audubon’s climate efforts goes beyond leading by example. Therefore, as part of their Climate Change Statement (2010), Mass Audubon has illustrated the following goal:

Engaging and educating our membership in energy conservation and efficiency efforts directed toward a reduction of member household carbon footprints by an average of 25% by 2020. Mass Audubon, as the largest conservation organization in New England, has more than 100,000 members, and if our members have average carbon footprints, these actions will reduce CO$_2$ emissions by 1.8 million tons of CO$_2$, or 1.7% of the statewide total.

Mass Audubon’s climate change efforts are intended to support the goals outlined in the Massachusetts Global Warming Solutions Act (2008), which set state targets for GHG reductions. These benchmarks served as a motivation for Mass Audubon to set its own goals for reductions, as they recognized that because of its sheer size, Mass Audubon and its community of members is capable of collectively helping the state meet its target. In setting this goal for its members, Mass Audubon identified
several unique challenges that had to be faced. This would be the first time that the organization would directly ask its members to change their behaviors. In addition, with such a large and diverse community of members, it was difficult for Mass Audubon to grasp the current actions and behaviors of members with respect to carbon footprints. Finally, Mass Audubon was unsure of how to best engage member households to make voluntary behavior changes.

GOAL & RESEARCH QUESTION

The goal of the project is to design a program that will engage the households of the Mass Audubon community to voluntarily reduce their carbon footprint. Based on discussions with Mass Audubon, it was determined that the community should include members, visitors and program participants. The intent of this report is to provide Mass Audubon with a program that will maximize the prospect of meeting the goal they have set for carbon footprint reductions.

The team identified two research questions through which to approach our goal.

- “How do different actions and behaviors impact a household’s carbon footprint?”
- “What are the best ways to engage households in changing behaviors to reduce their carbon footprint?”
METHODOLOGY

To answer these questions, a methodology was established that involved both an examination of existing resources and the collection of new data. Existing information included a thorough review of the literature on carbon footprints and voluntary behavior change. It also involved an analysis of peer environmental organizations and a study of current regulations in Massachusetts pertaining to energy efficiency and greenhouse gases.

The collection of original data was multi-faceted and began with development of a survey, which was distributed to Mass Audubon members electronically. The survey questions were designed to capture the frequency of behaviors and actions that influence carbon footprint, barriers to changing those behaviors, and willingness to be engaged in climate change initiatives. Respondents to the survey were invited to participate in a focus group, which was held after the team had an opportunity to review the survey results and formulate some preliminary strategies. The purpose of the focus group was to elicit feedback on those strategies and gain a greater insight into the behaviors of Mass Audubon members. The third channel of data collection was through interviews of pertinent actors involved in climate initiatives. These individuals and organizations were identified through our research process and were questioned about best practices and barriers for engagement in climate change programs.

The accumulation of our Team’s research provided the foundation to develop a strategic program for Mass Audubon that will engage their member households to significantly reduce carbon footprints through voluntary changes. This program is structured to engage the broadest number of households within the Mass Audubon community of members, visitors and program participants.
The final product for our Team is the creation of four deliverables:

- Peer Organization Review

- A Community Based Social Marketing program designed to engage households to make voluntary changes that will significantly reduce their carbon footprint

- Resource tools that will help Mass Audubon educate households

- Suggestions for implementing the program over time, and ideas for evaluating its success
CHAPTER TWO:
RESEARCH

LITERATURE REVIEW

The Earth’s climate is rapidly changing. Globally, a wide range of actors are strategizing about how to mitigate the impacts of these changes. Actions vary from regulating GHG emissions through the Kyoto Protocol, to environmental groups lobbying national governments for greenhouse gas legislation, to the effort of individual households to reduce emissions by weatherizing their homes. The purpose of this review is not to prove the existence of climate change. Our research Team accepts and supports the scientific consensus that carbon dioxide (CO$_2$) and other GHG levels in the atmosphere, which have increased rapidly and substantially since the mid-19th century, are contributing to rapid shifts in the Earth’s climate. Rather, the review explores the origin of carbon footprints as a method of measuring GHG emissions and the specific contribution of households to the overall GHG levels in the United States. Secondly, it provides an examination of various theories and methods of promoting voluntary behavior change to reduce environmental impact.

1 United Nations Framework Convention on Climate Change, adopted 1997
Origin of Carbon Footprints

The idea of an ecological footprint was first introduced by Wackernagel and Rees (1996), and refers to an estimate of the area of land needed to produce all the natural resources a person uses; in other words, to sustain that person’s consumption. The concept of a carbon footprint emerged from the ecological footprint. A carbon footprint refers to “the total amount of carbon dioxide directly and indirectly caused by an activity or accumulated over the lifetime of a product” (Wiedmann & Minx, 2007). Measuring a person’s environmental impact with carbon footprints has become a popular measurement, particularly because people can quantify something invisible like greenhouse gases (Ross et al, 2010).

Carbon footprints can be developed at various scales - from nations, to corporations and organizations, and finally to households and individuals. They are typically expressed in the form of tons of carbon dioxide equivalent (CO₂-eq) per year. Measuring carbon footprints in CO₂-eq accounts for the fact that while CO₂ is the dominant greenhouse gas, there are several global warming gases - each with a different warming force². A measurement in CO₂-eq is intended to capture the total climate change impacts of an activity or product and express it in terms of the amount of carbon dioxide that would have the same impact (Walser, 2010).

Although the metric for measuring carbon footprints is generally agreed upon, there is debate about the precise amount of carbon that the typical U.S. resident generates. Some place the average carbon footprint per person at approximately 20 tons of CO₂-eq each year, as compared to the global average of about 4 tons of CO₂-eq per year (Walser, 2010; MIT, 2008). Other researchers suggest typical emissions in the U.S. of closer to 30 tons per person. This large discrepancy could be due to a stronger effort

² The principle greenhouse gases are carbon dioxide, methane, nitrous oxide, and fluorinated gases (EPA)
to capture indirect emissions, which is much more difficult (Berners-Lee, 2011).

An individual or household’s carbon footprint is composed of both direct and indirect emissions of greenhouse gases. Direct emissions originate from the burning of fossil fuels and include such things as household electricity usage and personal transportation (Walser, 2010). Indirect emissions are produced during the lifecycle of products used by the individual or household. These emissions are harder to quantify and include dietary choices, consumer goods purchases, and entertainment. Everything a person eats and buys has an impact on their carbon footprint because of the energy and resources required to produce and transport it. Figure 2.1 illustrates the typical carbon footprint of an individual in a developed country. The major contributors are household energy, transportation, and consumption of goods (which includes food and drink, clothes and personal effects, and recreation and leisure).

### Household Carbon Footprints

There is general consensus in the literature that households account for a considerable portion of the overall CO\(_2\) emissions in the United States. Gardner and Stern (2008, p.13) report that in 2005, 38% of national carbon emissions could be tied to household actions. Shui and Dowlatabadi (2005, p.205) state that consumers in aggregate were directly responsible for 28% of energy consumption and 42% of domestic GHG emissions in 1997. Because of their significant contribution to overall

2.1 Breakdown of an Average Individual’s Carbon Footprint in a Developed Country*

*Graph from carbonfootprint.com
emissions in the United States, households represent a logical target for strategies to reduce carbon emissions.

Much of the domestic action on carbon emissions mitigation has focused on national policy and various market solutions. This broad focus on CO₂ reduction overlooks available short-term reductions such as energy efficiency through the use of updated products or changes in the use of current technologies (Dietz et al., 2009). Near term successes in reductions “buy time to develop new technologies, policies and institutions to reach longer-term greenhouse gas emissions targets and to develop adaptation strategies” (Dietz et al., p.18,452). It has been proposed that through the utilization of existing household and transportation technologies, the household sector could reduce its greenhouse gas emissions by 20% (Dietz et al., 2009) to 30% (Gardner & Stern, 2008) in 10 years with little effort or cost.

Despite the capacity to reduce their carbon emissions, “households lack accurate, accessible, and actionable information on how to best achieve potential energy savings through their own steps” (Gardner & Stern 2008, p.14). The lack of information is hindering the ability of households to reduce their carbon emissions. Carbon reduction actions must be tied to benefits and prioritized in order of effectiveness. This places emphasis on the most effective actions and gives people a better idea of where to start. For example, it is useful to create awareness about the actual environmental consequences or energy use of specific actions. Without such awareness, people may unknowingly perform actions that increase or decrease their energy use (Baird & Brier, 1981).

Understanding environmental impacts is important for studies that try to measure pro-environmental behavior. Many studies of this nature focus on behaviors that are not significant contributors to environmental impact, such as not using plastic bags or buying recycled paper (Stern, Dietz, et al 1995). From an environmental perspective, these behaviors
have a negligible effect on energy or materials use, but may give people the false sense that their actions are sufficient. Therefore, studies based on these measures provide little insight into the variables that could be helpful in significantly reducing the environmental impact of households (Gatersleben et al, 2002). Instead, it would be beneficial for studies to measure motivators that drive behaviors with a strong environmental impact, such as household energy usage.

Since there is a strong correlation for consumers between carbon emissions and energy consumption, it is also wise to consult existing research on consumers’ views of the potential energy savings of various actions. Notably, this research suggests that while households perceive the greatest savings to be in the curtailment of activities, energy experts advise that the greatest savings are actually in energy efficiency measures (Gardner & Stern, 2008). This misconception could lead to the over or undervaluing of certain activities, and missed opportunities for carbon reduction and energy savings.

**Carbon Calculators**

One method of targeting household emissions is through carbon footprint calculators. As the general awareness of carbon emissions and their contribution to climate change has increased, carbon footprint calculators have become more common. These are online tools that transform information about a user’s lifestyle and activities into measurable carbon emissions. Carbon footprint calculators have been made available by government agencies, non-governmental organizations and private companies (Padgett et al, 2007). They are intended not only to show people what their carbon footprint is, but also to bring awareness to actions that would reduce it. Therefore, it is critical that these tools be accurate and meaningful, and provide enough information to people about where and how to make changes.
In a review of 10 different online carbon footprint calculators (Padgett et al, 2007), it was concluded that households receive inconsistent information about their carbon footprints, especially about the CO₂ emissions from electricity consumption. Their research also uncovered a lack of transparency, most often related to conversion factors and methodologies (Padgett et al, 2007). Many carbon calculators use default options for the ‘average’ carbon emissions of different activities. The data for these options comes from national averages, which do not always reflect the user’s actual emissions. In addition, the averages used often differ between carbon calculators. This can result in variations of several metric tons of carbon per activity. To account for these variations, some standardization in the field of individual and household CO₂ emissions is necessary. Furthermore, “transparent calculators would allow users to better understand the calculations and results and to choose a calculator that is more tailored to their needs” (Padgett et al, 2007 p.113).

An additional shortcoming of carbon calculators lies in their nature of “treating a person’s carbon footprint as an individual matter, rather than drawing attention to the interconnectivity and wider impacts of footprints across the broader community” (Ross et al, 2010, p.1). Most carbon footprint calculators compare household footprints to national or world averages instead of similar households in their local community. This method underestimates the motivational power of showing households how a reduction in their carbon footprint impacts their local community.

Carbon calculators and other resources can provide people with a great deal of information about their carbon footprint. However, simply possessing this knowledge does not guarantee that households will take actions to reduce their carbon footprint. Achieving this requires an understanding of the factors that influence decision-making and also how to encourage voluntary behavior changes. For instance, it is often assumed that households reporting a pro-environmental attitude
will consume less energy and materials than a household that does not report a pro-environmental attitude. However, it has been shown that pro-environmental attitudes led to certain pro-environmental behaviors, but they do not have a significant impact on energy usage (Gatersleben et al, 2002). This is especially important, as energy has been identified as contributing about 27% of a household’s carbon footprint (Figure 2.1). Other researchers have suggested that more specific attitudes toward energy-related problems and energy savings may be better predictors of household energy use (Ester, 1984; Stern, 1992). Ultimately, it is critical to acknowledge variables related to both economic characteristics and environmental attitudes when targeting household CO$_2$ reductions.

**Voluntary Behavioral Change**

To achieve a significant reduction in their carbon footprints, households have to make some behavioral changes. There is consensus among researchers that household behaviors have a tremendous impact on the environment (Goldsmith, 2011), due in large part to the significant levels of water and energy consumption that occur in the residential sector. Working for change requires willingness, effort, and the ability and desire to comply with expectations and goals (Isaev, 2010). Much of the study of voluntary behavioral changes has grown out of the field of behavioral economics. Behavioral economics studies the thoughts and motivations behind economic transactions by basing research in social, emotional, and cognitive study (Wilkinson, 2008). However, it is not the sole field of study that can affect behavioral change. According to Agyeman and Kollmuss, “the question of what shapes pro-environmental behavior is such a complex one that it cannot be visualized through one single framework or diagram (2002, p.240)”. Additional concentrations such as psychology, sociology, marketing, the environment, and public policy must also be considered (Zborel, 2009). Regardless of the frame, an understanding
of how and why people make decisions is imperative to the process of changing behaviors.

A variety of motivators must be considered when targeting behaviors that have a high environmental impact. Understanding the motivators of environmental behavior is an essential step to modifying them (Tanner, 2003). Tanner distinguishes four types of motivators. One type relates to specific attitudes, meaning that consumer beliefs serve as a better motivator than environmental concern in predicting environmentally friendly consumer behavior. Also, things that are perceived as barriers can also serve as motivators to adopting a behavior. Knowledge is the third motivator, and can be classified into two types. “Action-related knowledge” is more likely to affect behavior because it provides concrete connections of information to actions. Alternatively, “factual knowledge” is limited to definitions, causes, and consequences, and is less effective. The final type of motivator relates to personal norms or feelings of moral obligation (Tanner, 2003).

Stern (1992) confirms that behaviors related to household consumption are heavily influenced by norms established in the home and the neighborhood. He proposes that norms and attitudes are most effective for changing simple, repetitive, and low-cost energy consumption behaviors. For long-term and higher cost changes, strategies that emphasize financial incentives may be more effective for promoting change. This includes energy upgrades and transportation choices, which are significant contributors to a household’s carbon footprint (Black et al., 1985; Stern, 1992).

There are several behavior model theories that attempt to explain the process of an individual’s decision-making. These theories are meaningful in designing strategies for changing behaviors. The Psychometric Paradigm emphasizes an individuals “mental shortcuts” or habits that reduce the processing time needed to act. This line of study focuses on how humans
change their habits by reflecting on their own behavior and overcoming obstacles in order to adopt a new behavior (Isaev, 2010 p.172). Changing habits requires constant reminders and repetition. Therefore, visual reminders are often successful because they offer a graphic way of engaging people.

The Transactional World View model argues for a holistic perspective, highlighting the necessity of promoting changes first in attitudes and then in behaviors. It underscores the importance of social and physical contexts as well as the norms and social rules that inform an individual’s decisions (Altman and Rogoff, 1987). New behaviors “need support in the individual’s attitudes as well as in the physical and social environments” (Werner, p.34) and “behavior does not occur in isolation but is part of ongoing events in socio-physical settings”(Werner, p.41). It is important for the proposed behavior change to be supported by physical conditions and even institutional structure.

The Structural Theory model emphasizes that behaviors are rooted in social contexts and that addressing behaviors should focus on changing personal norms and beliefs. Individuals operate in multiple social contexts throughout the day, often simultaneously, and these social contexts can influence behaviors (Isaev, 2010). In addition, Pooley (2000) states that a person’s environment - where and how they live - can have a huge impact on their habits and decisions. Attitudes will be influenced through beliefs, affects, or feelings. Social influence takes place when people observe the behavior of others and imitate it. People also influence each other informally through everyday conversation, and increasingly, through online social networking. Studies indicate that information presented online strongly influences the attitudes and behaviors of others. Consequently, there is a need to adopt change models for these communities (Goldsmith, 2011).
Scientific evidence suggests that sustained pro-environmental behavior needs to focus on expanding choices for individuals, not limiting them (Zborel, 2009). For advocates of the Nudge Theory, this means highlighting the best or ‘right’ option, while still keeping ‘wrong’ options available to people. The use of choice architecture “organizes the context in which people make decisions” (Thayler and Sunstein, p.3), and guides behavior without excluding choices. People are encouraged through nudges.

**Community Based Social Marketing**

Community-Based Social Marketing (CBSM) is a method used to promote actions for changing behaviors. This methodology builds on the premise of social diffusion, which states that the adoption of new behaviors frequently occurs as a result of friends, family members or colleagues (McKenzie-Mohr and Smith, 1999). The effectiveness of CBSM is due to its pragmatic approach, which involves four steps. It is critical to begin by identifying internal and external barriers and benefits to a sustainable behavior. The next step is to design a strategy that utilizes behavior change tools. Usually, the strategies are carried out at the community level and frequently involve direct personal contact. The third step is to pilot the strategy with a small segment of the community. The process ends with an evaluation of its impact after implementation. Evaluation emphasis should be on the direct measurement of behavior change (McKenzie-Mohr and Smith, 1999, p.17). The results of the evaluation can then be used to refine the strategy.

CBSM highlights that encouraging more sustainable behaviors requires an understanding of the barriers and benefits of those behaviors. The leverage between the benefits and barriers to any behavior change will determine the willingness of individuals to adopt that change. Therefore, the challenge lies in making the alternative (sustainable) behavior attractive because it has more benefits despite its barriers (McKenzie-Mohr, Smith,
A clear definition of the barriers will help to define the appropriate tools to overcome them.

1999). A strategy that ignores barriers is unlikely to succeed. CBSM describes concrete behavior change tools to work with communities and individuals. Among these tools are commitments, prompts, norms, effective messages, and incentives.

Commitments are related to a person’s desire to be seen as consistent by others. Written commitments create obligations to the task and are therefore more effective than verbal commitments (McKenzie and Mohr, 1999). Prompts are another useful tool, specifically to remind people to engage in sustainable behaviors. It is important that prompts are framed as positive messages and “delivered close in space and time to the target behavior” (McKenzie and Mohr, p.64). Norms refer to the way people feel they ‘should’ behave, and are consistently viewed as a powerful motivator of environmental behavior. When individuals observe the behaviors of others they know, they are more likely to permanently adopt their norms. Consequently, successful norms should be developed through direct contact between people rather than through broad campaigns. Effective messages presenting clear, concise, and vivid information have a greater chance of affecting behavioral change. Vivid information is likely “to stand out against all the other information that is competing for our attention” (McKenzie and Mohr, p.85). Therefore, it is more likely to be remembered at a later time, having impact upon attitudes and behaviors. According to Goldsmith (2011), successfully promoting behavioral changes depends not just on the nature of the message, but also the source and the channel through which it is transmitted. Finally, incentives can serve as a motivator for individuals to perform an activity. Although financial incentives are the most common and powerful, competitions or public recognition of individuals can also be useful incentives. A clear definition of the barriers will help to define the appropriate tools to overcome them. For instance, if the barrier were motivation, then the use of commitments or incentives would be recommended. If the barrier were lack of awareness, effective communication would be appropriate.
CBSM outlines the process for engaging communities in behavior change through direct contact. Moreover, in designing strategies for voluntary behavioral change, the target audience or group must be defined. Even within the scale of ‘household unit,’ there may be multiple factors to consider, including socio-economic status, age of household members, geographic location, and level of ownership (Zborel, 2009). The scale of an environment might include a larger community and this is important for programs focusing on environmental education. In many cases, targeting the whole community leads to more effective results (Pooley, 2000).

Overall, people need to be aware of the potential outcomes of their actions and also their inactions (Meijers et al, 2001. p.15). When people feel that sustainable actions are unlikely to have any positive or tangible effects, they are less likely to engage in actions. The opposite is the case when people feel like they can really “make a difference” (Meijers et al, 200. p.14).

**Conclusion**

Each individual and household is responsible for a carbon footprint based on the actions of everyday life. An accepted mechanism for measuring carbon footprints is through a carbon footprint calculator. Research supports that households are responsible for a significant percentage of U.S. carbon emissions and consequently are a desirable level to target for reductions. Household carbon footprints can be reduced through the modification of behaviors related to energy usage, transportation, and consumption of goods.

The challenge of voluntary behavior change is that individuals are attached to habits and default behaviors. Changing behaviors is a process, and information alone will rarely bring about behavior change. The advantage of CBSM is that it defines a methodology of how to overcome barriers and motivate behavior change. The structure of CBSM is broad, so that it can be applied to various target audiences and a wide range of behaviors.
STATE ACTION

Massachusetts has made legislative efforts to promote and support energy efficiency, renewable energy installation, and energy procurement. A number of policies have been implemented over the last decade to encourage people to embrace energy efficiency. These efforts have set Massachusetts apart from the rest of the nation. In the most recent State Energy Efficiency Scorecard produced by the American Council for an Energy Efficient Economy (ACEEE), Massachusetts scored 2\textsuperscript{nd} behind California. The Scorecard rates a state’s programs on overall investment of resources to energy efficiency, both in state efforts and programs made available to residents (ACEEE, 2010).

In Massachusetts, climate change is expected to cause “warmer temperatures, increased frequency and intensity of storms, public water supply shortages, rising sea levels, and increased erosion which threaten our coastal areas” (EOEEA, 2007). In 2007, Massachusetts joined the Regional Greenhouse Gas Initiative (RGGI), the country’s first carbon trading program. Proceeds from the RGGI auction go back in to statewide energy efficiency programs and renewable energy development. In addition to RGGI, the Global Warming Solutions Act was signed into law in 2008 (Ch. 169 of the Acts of 2008). This law calls for Massachusetts to establish a baseline assessment of current carbon dioxide levels and then to set targeted goals to reduce those levels\textsuperscript{3}. The Green Communities Act was also signed into law in 2008 (Ch. 298 of the Acts of 2008) and provides additional resources to implement energy efficiency measures, increase renewable energy purchases, and create incentives for towns and municipalities to modify their energy usage. Since 1997, Massachusetts’ utilities have charged a systems benefit fee to fund efficiency efforts (section 134(a) of Ch. 164 of the Acts of 1997).

\textsuperscript{3} The goal is to achieve GHG reductions of 10-25\% below statewide 1990 GHG emission levels by 2020; and 80\% below statewide 1990 levels by 2050 (Ch. 298 of the Acts of 2008)
This fee makes residents eligible for a number of energy saving benefits including free energy audits. In addition, MassSave (www.masssave.com) is a program run by the utilities to help people identify rebates and incentives associated with: lighting and appliances, income-eligible programs, heating and cooling, building a house or addition, and multi-family structures with five or more dwelling units.

**PEER REVIEW**

By request of Mass Audubon, the Team assembled a peer review of other organizations, with the goal of identifying ‘best-practices’ in climate change initiatives and member engagement. A detailed description of the following organization is presented in Appendix 2: Manomet Center for Conservation Sciences, The National Audubon Society, The National Resources Defense Council, The Nature Conservancy, The Trust for Public Land, The Trustees of Reservations, and the Union of Concerned Scientists. The review of these organizations was done through an examination of their websites and other public information.

Our review suggested that Mass Audubon’s commitment to reduce its organizational footprint is on track with that of several of the organizations included. The National Audubon Society and the Trustees of Reservations have taken strategic steps to reduce their carbon footprints as well. The Trustees of Reservations are the most aggressive, aiming to be net zero by 2017. Organizational commitment to climate change mitigation seems to be a crucial precursor to member engagement in the same. However, Mass Audubon’s attempt to directly engage its members in carbon footprint reduction is unique. Several of the organizations that we analyzed are important policy advocates on climate change, but do not specifically ask for any climate change commitment from their members. This includes the Union of Concerned Scientists, the Nature Conservancy, and the
National Resources Defense Council. Members of these organizations are educated on carbon footprint reduction via newsletters and online resources. It is worth noting that these organizations tend to have national and even international member bases numbering at least one million. Other organizations, including Manomet and Trustees for Public Land, approach climate change primarily from a conservation perspective. These groups place emphasis on wildlife and open space conservation as a means of mitigating and adapting to climate change. Engagement with members and donors does not include any specific call to action regarding carbon emissions. Throughout the peer review, we did not uncover any conservation or advocacy group attempting to directly engage their member households in carbon footprint reductions.

Mass Audubon is uniquely positioned within this collection of environmental groups. They have a sizeable membership base, as well as expertise in both advocacy and conservation science, and they are endeavoring to go beyond education on climate change to actually engage their members in a collective effort to reduce GHG emissions.

In addition to the above peer organizations, we also expanded our research to include interviews with various groups currently working on climate change initiatives. We spoke to staff from CarbonRally, an online climate competition group; the Massachusetts Climate Action Network (MCAN); the City of Boston’s Environment Department; and the National League of Cities. The question guidelines for those interviews can be found in Appendix 3. These interviews provided insight into the best practices, challenges, and barriers that Mass Audubon may face as they begin a carbon footprint reduction initiative.

Carbonrally is an online community that engages people to reduce their carbon footprint through friendly competition. They have individual households as members, and also larger clients such as Boston University and Seventeen Magazine. The goal of Carbonrally is to mobilize people
to make small changes that on a collective scale will help combat climate change. The site is designed to change people’s routines through engagement in an online socialized competition with 40,000 members. The Carbonrally model is unique and they have been successful at getting people to sign up. However, the actual carbon reduction results have not been as successful as founder Jason Karas would have liked and he cited lack of time and money as the major barriers to carbon reductions for households.

Mass Audubon’s goal is most closely linked with the efforts of the Massachusetts Climate Action Network (MCAN), a strong climate policy advocate. MCAN does not have its own membership base. Instead, they work with 43 local climate groups throughout the state to implement household greenhouse gas reduction programs. Their Low Carbon Living Program and Cool Mass Campaign serve to connect households and communities in a support system for carbon footprint reduction.

MCAN has two programs aimed at reducing household consumption: the Low Carbon Living Program (LoCaL), which was launched in 2007 and the Cool Mass Campaign, which was launched in 2008. LoCaL is designed to help households lose 10% of their carbon footprint in 30 days. Households measure their initial footprint and are then teamed up in groups of 5-8 participating households to try to meet the target goal. Groups compare progress and provide support to one another. Throughout the program, MCAN monitors household’s progress and provides additional events, activities, and resources to support the goals set by households.

The Cool Mass Campaign is an extension of LoCaL, designed to engage one quarter of the households in the state to reduce their carbon footprint by 25% in three years. The program is administered through a community wide commitment. MCAN works directly with interested parties to engage members, but a volunteer from the community ultimately runs
the program. According to Susan Altman from MCAN, this model had difficulty in keeping people engaged. To date, communities involved in both programs have made progress but no communities have fully achieved either goal. One potential reason for this is the need to rely on volunteer efforts within communities. MCAN’s Susan Altman highlighted that this was an implementation barrier because it is difficult for volunteers to provide a consistent support system over an extended period of time.

Several common themes emerged throughout the course of the Team’s interviews. First was the importance of a dedicated staff member to run the program. Second was a consistent funding stream. Third was the importance of direct interaction with people to engage and promote change. We heard about an instance where MCAN organizers literally went door to door to talk with people to present them with options on how to engage in reducing their carbon footprint. Finally, the need for leadership from the organization was highlighted.

The lessons taken from our interviews and review of peer organizations began to shape a strategy for Mass Audubon’s climate initiative. The Team determined that it would be critical for Mass Audubon to combine its strengths with what has worked for other climate groups. Mass Audubon has already made strong progress on the organizational level to reduce its carbon footprint, which sets a solid example for members to follow. Additionally, Mass Audubon has a sizeable membership community like Carbonrally, but also the opportunity to make direct connections with members through their Nature Centers. Furthermore, the programs supported by MCAN could serve as a baseline in the development of household carbon footprint reduction initiatives for Mass Audubon.

The importance of direct interaction with people to engage and promote change was a common theme.
TAKE AWAYS

The major drivers of a household’s carbon footprint are energy, transportation, and consumption of goods.

There are often misconceptions about the impact of various actions and their effect on a carbon footprint.

Changing behaviors requires recognition that individuals are attached to habits and default behaviors.

It is necessary to identify barriers to the desired behavior change and leverage them with benefits.

A person’s friends, family members, and colleagues can be strong influences on behavior change.

Successfully promoting behavioral changes depends not only on the nature of the message, but also the source and the channel through which it is transmitted.

Massachusetts has numerous state resources and incentives to promote energy efficiency.

The need for a dedicated staff, consistent funding, direct contact, and leadership are critical to successful program implementation.

There are existing organizations dedicated to collective carbon reduction and they represent potential alliances for Mass Audubon.
According to statistics provided to the Team by Mass Audubon, there are approximately 100,000 Mass Audubon members. These form 62,000 households in Massachusetts, which constitute 92% of the Mass Audubon membership. The remaining 8% of members reside outside of Massachusetts or even outside of the country. Within Massachusetts, member households are spread throughout the state. They belong to urban, suburban, and rural communities. There are a strong concentration of member households in the zip codes assigned to Cambridge, Arlington, Lexington, Natick, Concord and Belmont. Boston is also home to a significant number of member households.

Figure 3.1 shows the concentration of Mass Audubon members by zip code. The diverse location of member households confirmed the need for strategies that would reach members in a variety of geographic regions. Additionally, Nature Centers provide an opportunity for Mass Audubon to make physical connections to its community of members.
In order to better understand Mass Audubon member households, it was necessary to undergo a data collection process. The Team was interested in determining the prevalence of a variety of behaviors and actions that contribute to a household’s carbon footprint. It was also important to understand barriers that stand in the way of desired actions, since these barriers would guide our strategies for responding to them. Finally, we wanted to gauge the willingness of Mass Audubon members to collaborate on a carbon footprint reduction program and their perception of whether households should be accountable for managing climate change. In order to reach the greatest number of individuals, the first phase of data collection was an electronic survey. Following this, the Team conducted a focus group of Mass Audubon members to gain a deeper comprehension of engagement level and solicit feedback on potential strategies.
SURVEY

The survey was designed to collect information from Mass Audubon members regarding behaviors that contribute to household carbon footprints. With over 62,000 households spanning a diverse geography, it was expected that there would be a wide range of behaviors and commitment levels among households. The survey questions were intended to capture this range, and identify trends among members and within various groups. Specifically, the Team was interested in how the behavior of individuals compares to that of families; how urban dwellers compare to suburban dwellers; and how the behavior of property owners might differ from that of property renters. It is important to note that the goal of the survey was not to create a carbon footprint for every respondent. Instead, the goal of the survey was to develop an understanding of the current level of commitment to carbon footprint management among Mass Audubon households.

In an effort to keep the survey length manageable, we focused on behaviors and actions related to major drivers of a household’s carbon footprint: efforts to increase household energy efficiency, transportation methods, and waste/recycling. Questions also addressed respondent’s barriers to the desired behaviors and actions, and their willingness to be engaged in future Mass Audubon initiatives to address climate change.

We distributed a pilot version of the survey at Mass Audubon’s Boston Nature Center. Respondents completed the survey on site, with Team members available to answer questions and monitor completion time. A total of 19 surveys were collected during this pilot. Based on this experience, it was decided to make several minor adjustments before mass distribution.

The final survey (see Appendix 3) consisted of 20 questions and was formatted using the ‘surveymonkey.com’ interface. It was decided
to distribute the survey as a link within Mass Audubon’s regular electronic communications. These included e-newsletters and any other communications sent during the survey window of March 15 to March 31, 2011. A link to the survey was also posted on Mass Audubon’s Facebook page. In total, the survey was sent to 5,324 households within the Mass Audubon community. Recipients included both Mass Audubon members and program participants. The total number of surveys collected was 254. Based on a sample size of 5,423, this represented a response rate of about 5%. It was recognized that in order to be statistically significant at a 95% confidence level, we needed 500 survey responses. Furthermore, since the survey was voluntary, we acknowledged the possibility that respondents were disproportionately more engaged in behaviors that lower carbon footprints. However, the survey results were still considered to be extremely valuable. They provided insight into Mass Audubon households on behaviors that drive carbon footprints. This knowledge would support the Team’s ultimate proposal to Mass Audubon.

The respondent population was characterized by a median age of 43 years. Females constituted 79% of respondents and males 17%. As expected, the response group was diverse across household characteristics.

The median household size was three, having two adults and one child under the age of 18. Only 16 respondents indicated a household size of one, and the maximum household size was 8. The most common response was a household of 4 people. In the state of Massachusetts, the average household size is 2.5\(^4\), just slightly smaller than our response group. Finally, the majority of respondents (75%) were homeowners, as compared to only 25% property renters. This rate is similar to the state of Massachusetts.

\(^4\) U.S. Census Bureau, State & County Quick Facts; Massachusetts, 2000
where it is estimated that 65% residents are homeowners and 35% are property renters.

In response to the survey question about whether individuals and households are accountable for managing climate change, 86% said that they are. This strong consensus supported the Team’s objective of targeting carbon footprint reductions at the household level. Moreover, 78% reported an interest in learning more from Mass Audubon regarding their carbon footprint. Results from the survey for each of its major segments are discussed below.

**Energy Efficiency**

A household’s carbon footprint is strongly driven by energy consumption and energy experts advise that energy efficiency measures can greatly reduce energy usage. Therefore, a survey question asked respondents to identify energy efficiency upgrades they had made in their homes. The results indicated that members of the Mass Audubon community have taken steps to address energy efficiency, with some measures exhibiting a greater frequency.

<table>
<thead>
<tr>
<th>Energy Efficiency Upgrade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgraded Insulation (within last 5 years)</td>
<td>28.17%</td>
</tr>
<tr>
<td>Upgraded Heating/Cooling System (within last 5 years)</td>
<td>31.75%</td>
</tr>
<tr>
<td>Low-flow Toilets</td>
<td>57.44%</td>
</tr>
<tr>
<td>Low-flow Faucets</td>
<td>26.19%</td>
</tr>
<tr>
<td>Low-flow Shower Heads</td>
<td>53.57%</td>
</tr>
<tr>
<td>DIY Window Wrap</td>
<td>13.87%</td>
</tr>
<tr>
<td>Double Pane Windows</td>
<td>61.51%</td>
</tr>
<tr>
<td>Energy STAR-rated Washer/Dryer</td>
<td>57.94%</td>
</tr>
<tr>
<td>Energy STAR-rated Refrigerator</td>
<td>61.90%</td>
</tr>
<tr>
<td>Energy STAR-rated Dishwasher</td>
<td>53.57%</td>
</tr>
<tr>
<td>Compact Fluorescent Light Bulbs (CFLs)</td>
<td>84.92%</td>
</tr>
</tbody>
</table>

3.3 Energy Efficiency Upgrades of Survey Respondents

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5 U.S. Census Bureau; American Community Survey, Massachusetts, 2009
The most prevalent upgrade reported was replacing incandescent light bulbs with compact fluorescent light bulbs. A full 85% of respondents have taken this step. Several other important energy upgrades were reported by at least half of the respondents. This included the purchase of an Energy Star rated appliance (refrigerator, dish washer, or clothes washer); installation of double-pane windows; and the use of low-flow shower heads and faucets. A smaller percentage, around one-third, have upgraded their heating, cooling, or insulation in the last five years. The above results were encouraging as they indicated that many in the Mass Audubon community are aware of the benefits of energy efficiency upgrades. However, the results are not enough to imply that the entire Mass Audubon community has been equally as active. The Team accepted that due to the small size of our response group, it would not be prudent to generalize the results to the broader population. Increasing energy efficiency was noted as a target for strategies to reduce carbon footprints in the Mass Audubon community. In addition, the survey indicated that only 55% of respondents had completed an energy audit and only 52% had utilized rebates for energy efficiency upgrades. As few as 25% of respondents had completed a home energy audit and utilized energy efficiency rebates. This highlighted a need to increase awareness of the available resources for free audits and rebates.

The overwhelming barrier to making energy efficiency upgrades was financial, referring to either a lack of funds or not being a budget priority. This indicated to the Team that a connection between energy efficiency and financial savings was as important as educating about energy incentives.
Transportation

The majority of people surveyed (84%) use a car as their primary mode of transportation. Second to cars, public transportation made up only 8% of the responses. These results emphasized the need to explore barriers to alternative modes of transportation within the Mass Audubon community. It was determined that a strategy to promote fewer single-occupancy vehicle trips would have a positive impact on household carbon footprints for this group.

Recycling/Composting

A total of 95% of respondents indicated that they recycle and 58% compost. The survey also asked for respondents to identify barriers to these activities. With such an overwhelming number of respondents already recycling, it is likely that the barriers reported were related to composting activities. The most common barrier cited was accessibility although this was followed closely by motivation. Additional barriers also included time and lack of knowledge.

Based on the survey results, composting could certainly represent a behavior to target within the Mass Audubon community. Composting is related to carbon footprint reduction because it keeps organic materials out of landfills. Food and other organic wastes decompose in a landfill and produce methane, a more powerful greenhouse gas than carbon dioxide\(^6\).

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\(^6\) U.S. Census Bureau; American Community Survey, Massachusetts, 2009
Engagement

The final section of the survey was intended to capture respondents’ willingness to collaborate with others to reduce their carbon footprint and preferred mediums of engagement. 38% of respondents reported being willing to collaborate with others. However, half of the survey respondents indicated that they were not sure about this proposition. It was recognized that addressing this hesitancy was critical since the Team’s research had indicated that community efforts are most effective at promoting sustainable behavior changes. E-mail was by far the most preferred method of communication, at 79% and 28% of respondents indicated a desire to engage through activities at Mass Audubon Sanctuaries and Nature Centers.

FOCUS GROUP

After analyzing the survey results, the Team organized a focus group with Mass Audubon survey respondents who volunteered to participate. The focus group was intended to test some of the Team’s initial program ideas, brainstorm with members, and increase our understanding of current behaviors. A total of four participants joined the Team at Mass Audubon’s Drumlin Farm on April 5, 2011. Although the group was small, the diversity of participants brought a variety of perspectives.

The focus group was set up in three stages (see Appendix 4). During introductions, we asked participants to discuss their motivations for caring about climate change and their personal impact, as well as the level of commitment they had made to reducing their carbon footprint.
Each participant categorized himself or herself as having made conscious efforts to reduce their carbon footprint with some lifestyle choices, and each was interested in going beyond this level. Children were identified as a motivator for all participants, as they all were parents and one gentleman also had several grandchildren. This gentleman expressed that age can be a tough barrier because older people are less receptive to change, but suggested that framing climate change in the context of their grandchildren’s future could be a motivating factor. Every participant was interested in protecting the environment.

Surprisingly, just as children were identified as motivators to reduce a household’s carbon footprint, they were also identified as barriers. One woman commented that chasing after three small children leaves less time to consider projects and behaviors that reduce environmental impact. In addition, kids require more space. Where she could once drive a small, more efficient car, she now needs a larger mini-van. Furthermore, families are attracted to suburban settings for space, but this also involves more driving.

When the Team proposed the idea of a carpooling network among members of the Mass Audubon community, a barrier related to safety concerns was voiced. It was noted that “this country is a country of strangers.” This barrier came up during the discussion of most neighborhood and community collaborations to reduce carbon footprints. It was agreed that the Mass Audubon community was large and could be effective, but that group members are mostly strangers to one another. In the absence of this familiarity, participants indicated that organizing in their own communities could be more effective. The idea of a tool kit enabling members to create a carpooling network in their own community was popular, especially for parents with school-age children.

Participants expressed the importance of a credible source for information about carbon footprints. It was acknowledged that Mass Audubon
possesses this credibility because it has expertise in environmental science and has severely reduced its own organizational carbon footprint. In addition, Mass Audubon is an un-biased, non-profit organization. One participant mentioned the need for the equivalent of a Consumer Report for “going green”. In addition to source credibility, it was agreed that effective communications are critical. Information may promote change, but only if it is visual and shows the impact of actions and behaviors.

The effectiveness of competitions to engage members to reduce their carbon footprint was also discussed. All participants agreed that children would be the driving force behind competitions and would encourage greater behavior changes. Pledging was also thought to be a useful tool, and the Team proposed the idea of instituting a pledge that households not buy bottled water. This would be in conjunction with visual messages showing the carbon footprint impact of bottled water and physical reminders such as stickers. Participants suggested that the impact of pledges could be increased if they were added up over time and displayed on a “carbon footprint thermometer.” This measurement tool could even serve to engage others if it was placed in a visible location.

Our focus group with Mass Audubon members illustrated several points that would be useful in the design of our proposal. First was the need for increased interaction among members of the Mass Audubon community. This would allow them to form connections and build familiarity, both critical to the success of a group program. Second was the importance of clear, concise, impact driven messages about carbon footprints. Finally, it would be necessary to address convenience barriers to reach busy families.
TAKE AWAYS

Mass Audubon has Nature Centers dispersed throughout the state; these physical locations provide the opportunity to reach a broad diversity of communities.

The overwhelming barrier to making energy efficiency upgrades is financial – either a lack of funds or not being a budget priority.

There are people within the Mass Audubon community who are deeply concerned with climate change and these individuals should be solicited as leaders for climate initiatives.

There is potential for large carbon reductions in transportation since 84% of respondents utilize a car as their primary mode.

Credibility is very critical in delivering climate change messages and Mass Audubon is ideal for this role as they are an unbiased, not-for-profit organization.

Messages about climate change that are clear, concise, and convey the impact of activities are best received.

Mass Audubon is well positioned to fill the need for an information platform regarding climate change and for facilitating connections both within and among communities.
CHAPTER FOUR:
THE RE-THINK PROGRAM

Based on the research and data collection described in Chapters Two and Three, the Team has designed the outline of a Community Based Social Marketing program for Mass Audubon. The proposed program is structured to educate and engage members of the Mass Audubon community to voluntarily reduce their household carbon footprint. In conjunction with Mass Audubon’s carbon footprint goal, the team’s strategies are designed to engage the broadest number of households, to prioritize actions and behaviors that heavily influence carbon footprints, and to link actions with available solutions.

Our research indicated that a successful behavioral change campaign should have a positive connotation. Therefore, it was important not to associate the program with giving things up, reducing quality of life, or loss. Instead, the program we have designed is called Re-think. It encourages households to re-think their energy usage, mobility and waste (which includes overconsumption of goods). The Re-think program contains a variety of projects to be implemented by Mass Audubon - each designed to target a behavioral change in one of these areas. These projects will deliver the greatest impact, since they focus on the major drivers of a household’s
carbon footprint. In designing the *Re-think* program, several features were identified as being important to the overall structure and for maximizing success of the program.

First, the Team feels it is important for the program to have an image. This image will provide something for people to identify with, and also lend credibility to Mass Audubon as the program’s sponsor. To build this image, the Team recommends that Mass Audubon create a marketing campaign for the program, including a logo, advertisements, and physical materials. The physical marketing pieces could include items such as stickers, reusable water bottles, and bike seat covers. They are important because they serve as visual reminders to participants and also assist in spreading awareness of the program to others.

**Outreach**

Of equal importance to the program image is the need for regular outreach from Mass Audubon to its member community. We propose that a section of Mass Audubon’s website be devoted to the *Re-think* program and other organizational climate change activities. This section should contain information about the goal of the *Re-think* program, a description of ongoing projects, upcoming events, and resource tools to assist households in lowering their carbon footprint. A sample of these resource tools has been organized and/or created by the Team and will be presented later in this Chapter. It is very important that messages on the website about carbon footprints and climate change be clear, concise and actionable so that readers understand not only the issue, but also how they can make a difference. Finally, this web page should have an easy to remember URL address.

In addition to the website, we suggest that Mass Audubon send out monthly emails to their member community, with ‘*Re-think* tips’ about small actions that they can take to reduce their carbon footprint and lead
a healthier, more sustainable life. The tips provided should be, visual and relevant to the time of year. For example, an email sent at the beginning of summer could provide tips on conserving energy in hot weather, how to outfit your bike for safe riding, and the advantage of shopping at local farmer’s markets. For all tips, it is critical to highlight the benefit of the suggested action. This benefit could be financial, in the case of using a fan instead of air conditioning, but it could also be time or health related. Graphic information that shows the benefits of the action and its connection to carbon footprint reduction will be most effective. These centralized communications and resources will create a consistent and reliable connection between Mass Audubon and its member community. They will also further strengthen Mass Audubon’s credibility as a source for climate change information and action.

Community Focus

The third important feature of the Re-think program is a community focus. Research supports that community-based marketing strategies are more effective at changing behaviors than informational campaigns alone. This strategy requires actual interaction and engagement with the community. In the case of Mass Audubon, Nature Centers serve as the place where physical connections are made between the organization and its community of members. They are also a place for people within the member community to interact and make connections with each other. For this reason, the Team proposes that the projects of the Re-think program be implemented through Mass Audubon Nature Centers.

We also recommend that to launch the program, a social event be held at several Nature Centers throughout the state. The goal of this launch event will be to introduce members to the concept of rethinking their carbon footprint and encourage them to start making connections with others in the Mass Audubon community. Based on member concentration and geographic spread, we recommend that the following Nature Centers
host a launch event: Pleasant Valley, Wachusett, Ipswich, Boston Nature Center, and Stony Brook, although certainly more could be added. It is especially important to have interaction at the launch and to build awareness of the influence that daily actions have on carbon footprints and what members can do about it. Suggestions for accomplishing this include organizing a recreational activity at the launch, providing local or in-season refreshments, and showcasing pieces of art that bring the consequences of climate change to life. Finally, the launch event is the proper place to present upcoming events and projects for the Re-think program.

**Interactive Evaluation**

Another feature that will maximize effectiveness of the program is to build in evaluation mechanisms that facilitate interaction of participants.

In the case of the Re-think program, the goal is to reduce household carbon footprints. Therefore, Mass Audubon could measure success through the pounds of carbon that are saved as members make behavior changes promoted by the program. However, this task would be cumbersome from an administrative perspective. It would require Mass Audubon to catalog the baseline carbon footprint for over 60,000 households and systematically update this information as behaviors were changed to reduce them. Although this method would provide the most precise measurement of carbon reductions, the Team proposes that such a method would have distinct challenges.

As an alternative, we recommend that Mass Audubon provide access to a comprehensive carbon calculator and encourage each member household to create a baseline carbon footprint for itself. According to our survey, only 19% of respondents had used a carbon footprint calculator. Therefore, it will be important for Mass Audubon to make this activity easy and even fun for households. Work stations should be set up in
Nature Centers so that visitors can calculate their carbon footprint on-site and ask questions if necessary. The calculator should also be embedded in Mass Audubon’s website and links to it included in emails of ‘Re-think tips’. The purpose of the calculator goes far beyond showing a household their starting carbon footprint. At various times throughout the year, especially after a Re-think project is implemented, households must be energized to re-calculate their carbon footprint. In this way, households will be able to see the positive impacts of their behavior changes reflected in a lower carbon footprint. Finally, members should be encouraged to share information about the carbon savings that their household have experienced. Mass Audubon can collect this information and display it so members understand how their efforts are contributing to the larger goal. Details about the carbon calculator that we recommend Mass Audubon utilize can be found in ‘Resource Tools’.

In addition to a carbon calculator, Mass Audubon can also evaluate the success of the program through member feedback. Social networking sites such as Facebook represent an interactive forum for members to share suggestions and success stories. Mass Audubon should initiate challenges for sustainable behavior changes on its Facebook page. As members complete challenges, they should be instructed to ‘Like’ the post. In this way, Mass Audubon can keep track of engagement numbers. Furthermore, since Facebook is a live platform, Mass Audubon can make suggested challenges based on the current day’s news. At the end of the month, one or two Mass Audubon households should be highlighted on the Facebook page for their efforts. These virtual interactions will compliment the physical connections made at Nature Centers and serve to strengthen the Mass Audubon sense of community.
Target Groups

The Mass Audubon community is diverse with regard to household characteristics. This diversity was highlighted in the Team’s survey and we expect it is even more pronounced throughout the entire population. Recognizing these differences among Mass Audubon households helped to guide our proposal for the Re-think program and its associated projects. We attempted to create projects that would include as many target populations as possible and that addressed the barriers for different groups. Following are the different characteristics that we think are most important to consider.

Type of Community: Urban, Suburban, or Rural

In many respects, the type of community that you live in determines your lifestyle. It may dictate the type of home you live in, your energy choices, transportation options, availability of services such as recycling, and access to goods. These variations result in different challenges and opportunities for household carbon footprint reductions.

Household Size: Individuals v. Families

The size of your household also influences your lifestyle. For example, households with children have different time constraints than those without. The size of a household may also impact its financial resources.

Financial Investment: Owners v. Renters

Any strategy focusing on the physical attributes of a dwelling has to consider the difference between property owners and those who rent. Owners have a motivation to make larger investments in energy efficiency upgrades. Renters lack the same incentives, and they also may not have permission from the property owner to make changes. However, there are many energy related tips and upgrades that do not require major investments.
Partnerships

Throughout the course of our research, it became clear that Mass Audubon is not alone in its concern for mitigating climate change in Massachusetts. Partnering with other organizations could provide unique networking opportunities for Mass Audubon to effect the large scale carbon reductions that they have targeted.

Mass Audubon should consider teaming with The Massachusetts Climate Action Network (MCAN) because of their experience working directly with communities to reduce household carbon footprints. Although not specifically interviewed for the report, Green Streets Initiative (http://www.gogreenstreets.org/) is a successful grass-roots organization aiming to reduce single occupancy vehicle trips. Their largest initiative, called Walk/Ride Day, encourages people to choose an alternative mode of transportation one day a month. Green Streets has already partnered with schools, businesses, and retailers and is looking for ways to expand, especially in suburban Massachusetts. Finally, Carbonrally has experience working with large organizations such as Boston University. If Mass Audubon sought an alliance with Carbonrally, members could take part in challenges as part of the Mass Audubon team and quantify their results through the Carbonrally website.

4.1 Re-think Program Visualization
RE-THINK ENERGY

PROJECT 1: Energy Fair

The energy fair is intended to be an event, hosted by Mass Audubon at Nature Centers throughout the state. The goal of the Energy Fair is to educate, engage, and connect members of the Mass Audubon community to ways of reducing their household’s energy carbon footprint. Mass Audubon should forge relationships to include credible sources at the event. This includes local vendors, energy efficiency advisors, energy service providers, and people knowledgeable in home improvements. It is also an opportunity for Mass Audubon to consider teaming with the organizations we have identified as potential partners. These individuals will answer questions, provide information, and demonstrate activities to reduce a household’s energy usage.

The Energy Fair is designed to address the most common barriers to household energy efficiency upgrades - information, money, and access. A variety of strategies are used to overcome these barriers.

Connection to Solutions
To address the barrier of access, members at the Energy Fair should be able to learn about a product that will improve their energy efficiency and then purchase it at the Fair if they choose. Vendors will be on site to sell energy upgrades at various price points, including CFLs, energy meters, and low-flow shower heads. Members may also be interested in projects that require a larger financial investment. To facilitate this, an insulation contractor and an advisor on renewable energy should be present. Finally, a representative from MCAN could be invited. MCAN has experience working with communities and their carbon reduction programs could be applied to Mass Audubon’s large community. Specifically, MCAN’s Low Carbon Living Program provides solutions for how to lose 10% of a household carbon footprint in 30 days.

Financial Incentives
Financial constraints are as a barrier to energy efficiency upgrades for many households. The Energy Fair is a great place to educate people about the various state incentives and rebates that are available for energy efficient appliances and home improvements. In addition, members should be encouraged to sign up for a complimentary energy audit of their home while at the Fair. Finally, if it is possible, Mass Audubon should attempt to negotiate with vendors to provide a slight discount on products that are purchased at the Fair and should seek sponsors who would be willing to donate items. These benefits would give Mass Audubon members an extra incentive to make energy changes.
Measurement of Success
The first sign of a successful Energy Fair will be the number of people who turn out for the event. Feedback from attendees will be the second measure. One method of promoting feedback would be to hold a raffle for an energy-efficiency item. To be eligible for the raffle, members would have to submit a photo of their finished project to Facebook or to report the energy savings reflected on their energy bill. They should also be encouraged to share any words of wisdom about the project they completed, so that other members will benefit. Members could even make their own ‘green-it-yourself’ videos to be posted on the website. The pledges, as well as their outcomes, should be on display on the website. Ultimately, the goal of the Energy Fair is to get members to go beyond just one or two upgrades and to comprehensively re-think their household energy.

Visual Messages
Information should be presented to members in a visual and interactive way. For example, a display of the amount of water that is consumed during a 5 minute shower versus a 10 minute shower would be highly impactful. There should also be demonstrations of simple do-it-yourself home energy efficiency projects such as insulating windows or installing a programmable thermostat. Members should be encouraged to participate in the demonstrations. The Energy Fair is also an ideal setting to introduce members to ‘Green-it-Yourself’ videos that could be playing on monitors at the Fair. These videos should be created by Mass Audubon and should show simple weatherization and energy home improvements that members can do on their own. Examples could include how to make door stoppers to prevent drafts; how to change shower heads, toilets or faucets to low-flow systems; and how to correctly vent a dryer and clean dryer ducts so that clothes dry faster. After the Energy Fair, these videos should be posted to the Rethink section of Mass Audubon’s website.

Commitments
The Energy Fair should utilize several types of commitments, beginning with a form of admission to the event. Entrance to the Fair could be one incandescent light bulb, which the member will trade for a CFL at the event. Alternatively, admission might be proof of biking or carpooling to the Fair, instead of driving alone. The second point of commitment should be as people are exiting the Fair. Because written commitments are more effective than verbal, we recommend that members be encouraged to write down a pledge to complete one action in their home that will reduce their energy use. These pledges should be grouped together on a large sheet of paper so that members understand the larger collective effort.

Communication
The energy related lists that are provided in the ‘Resource Tools’ section of this chapter should be made available at the Fair. These will allow both homeowners and renters to begin prioritizing their upgrade options. Communication should also continue after the Energy Fair to reinforce the messages received there. Mass Audubon should send an email to those who attended, reminding them of some Rethink energy tips and highlighting some of the pledges that were made by members. The email should also have a link to the carbon calculator and a suggestion for members to re-calculate their carbon footprint after completing their pledge upgrade.
PROJECT 2: Community Weatherization

The second project to address household energy is more community driven. It is intended to be an ongoing project starting after the Energy Fair, when members have begun making connections to each other. It addresses the barrier of time constraints and motivation to complete energy efficiency upgrades.

Community Norms
The concept of the project is basically a ‘weatherization barn-raising’ where members can come together and support each other. The goal is to help increase the energy efficiency of member households while also building a more connected Mass Audubon community. The project will bring Mass Audubon community members together to assist other members in weatherizing their homes. Special efforts could be made to assist senior and disabled members of the Mass Audubon community in making upgrades. Through this process, community norms will begin to formulate around this collective effort.

Connection to Solutions
Time is an issue for households when it comes to making energy efficiency upgrades in their home. This was confirmed in our survey by 15% of respondents who “didn’t have time” or “hadn’t gotten around to it” regarding energy projects. Community Weatherization organizes manpower to completely weatherize a home one day. Volunteers from the Mass Audubon community will join together to help with larger home improvement projects such as insulating an attic and re-sealing windows, or to complete a range of smaller upgrades throughout the house. Volunteers will be learning skills and could automatically be eligible for a weatherization of their own home.
To guide these projects, it may be advisable to have a contractor or comparable expert on hand. Mass Audubon should also consider that an alliance with MCAN could provide additional resources and tools to communities. MCAN compliments this project as they are designed to deal with community projects and could provide direction for Mass Audubon coordinating staff and members.

Measurement of Success

The most direct measurement of this project’s success will be the number of homes that are weatherized as a result. Pictures and testimonials from volunteers should be posted on the website and Facebook so other members can share in the process. Seeing neighbors and other members engaging in the project will likely inspire others to get involved. Additionally, any home that benefits from a Community Weatherization should be asked to share information about the reduction in its carbon footprint following the weatherization. This might also include some details about the financial savings in energy that the homeowner experienced.

Group Commitments

Group commitments, such as committing to assist in a Community Weatherization event, are shown to be effective. Members should be able to sign up for this project online or at Nature Centers where others can observe the commitment. Additionally, Mass Audubon should seek highly engaged members to act as leaders in this initiative. These would be people who have already weatherized their home, understand the benefits, and are willing to talk to others in their immediate community.
By encouraging people to not drive alone and to consider alternative modes of transportation, Mass Audubon can help shift members thinking about how they get around while also drastically reducing their carbon footprints.

**PROJECT 1: Be Car Free (For a Day)**

This project involves asking members to make a make a commitment not to use their car one day a month. In addition to reducing carbon emissions, the goal of the project is to show members the financial benefits of not driving everywhere and to highlight that there are alternatives ways to move around. Currently, the Green Streets Initiative is attempting a similar goal.

**Small Commitment**

This project seeks to shift people away from their cars for one day a month. The goal of small behavior changes is that they lead to more regular behavior changes. Once people recognize the relative ease and benefits of not driving everywhere, this will become a more normalized habit. We suggest that Mass Audubon work with Green Streets Initiative to institute Walk/Ride Days within their membership community. Green Streets is seeking to expand Walk/Ride days, especially in Boston and the surrounding suburbs. Mass Audubon could begin with a project in Concord or Natick, which are both communities with high densities of Mass Audubon members.
Incentives to Participate
There is a strong financial incentive for households to reduce their vehicle miles traveled. Mass Audubon should reinforce both the environmental value and the cost savings in gas of leaving the car at home – especially for short trips. A short, four-mile round trip by bicycle keeps about 15 pounds of pollutants out of the air we breathe7. Green Streets offers additional incentives for participants and these could benefit Mass Audubon members as well. They provide a free breakfast on the Walk/Ride Day and discounts to local businesses.

Visual Messaging
People will need to be reminded of the ‘Be Car Free’ day and of the benefits of not driving. Visual prompts should be designed for members to place on their car window or refrigerator, as a reminder not to use the car that day. Reminders should be sent via Facebook in the days leading up to the challenge and should include thought provoking messages, such as that “each gallon of gasoline burned in an average car’s engine blows 19.4 pounds of CO₂ into Earth’s atmosphere”8.

Measurement of Success
In order to measure the success of this program, people should sign up as having accepted the challenge to leave the car at home. Mass Audubon can track engagement levels and even ask members to estimate their number of vehicle miles saved by participating. To encourage interaction, members should be asked to post on Facebook about their experience and how they got to work, school, or ran errands instead.

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7 WorldWatch Institute, 2001 (http://worldwatch.org/)
PROJECT 2: Carpooling

This project is designed to fully engage the Mass Audubon member community through direct connections with each other. It will also extend beyond the boundaries of Mass Audubon to include the neighborhoods of Mass Audubon members. The goal of the carpooling project is to reduce transportation related carbon emissions by addressing three key barriers related to carpooling: identifying a network, convenience, and safety.

Community Norms

Targeting groups, as opposed to just individuals, helps to further define the Mass Audubon member community. Group efforts have been shown to reinforce behaviors and create a sense of commitment, especially when the commitment is made publicly. Through community carpooling, there is an opportunity for those members who start carpooling to influence others by example. Social influence takes place when people observe the behavior of others and imitate it. To reinforce this, we propose that Mass Audubon set an organizational example by starting a carpooling program from staff within their organization.

Communication

Mass Audubon’s staff carpooling program should be well publicized to the larger member community to ensure that members are aware of it. Employees statewide should be included, and they should be encouraged to carpool beyond just work. Expanding the project goal to include other activities such as school functions, sports’ practices, shopping trips, and other recreational activities, will help households identify other networks where carpooling is useful. It also reinforces that inconvenience does not have to be a barrier.
Incentives

The same actions for carpooling that people identify as barriers also present opportunities. Many people are concerned that making a commitment to a carpool removes their ability to come and go as they please. However, carpooling can also relieve people of tasks and free up time. Reframing these perceived convenience barriers as opportunities can help provide additional incentives to participants and reinforce the positive aspects of carpooling. People often overlook the many advantages of not driving and assume that they are too small to be worth the effort of setting up or joining a carpool. Shifting this line of thinking will require visual information related to the savings associated with not driving. This could include a clock that shows how much time people can save when they do not have to drive, or the financial savings of not driving one or two days a week. Once people have joined the carpool, these incentives should be reiterated through emails reminders and Facebook posts. Households should be encouraged to track their own savings and report on them, as well as other benefits of carpooling. These benefits might include meeting new people, learning about new areas of a community, or increased time that otherwise would have been spent driving.

Measurement of Success

Having employees post comments about the carpool could serve as a useful tool so other community members could see the many areas in people’s lives where carpooling really makes sense. Additionally, when Mass Audubon’s pilot program is complete, staff should be interviewed about their experiences, specifically how they overcame their initial reservations about carpooling. These testimonials should then be used to develop additional outreach programs for the larger member community.

After Mass Audubon launches their in house carpooling pilot program, they should focus on summer and school vacation-week camps because they make up a large part of the Mass Audubon community. This is an easily identified Mass Audubon group participating in the same activity and has great potential for a carpooling network. Lastly, Mass Audubon can assist their membership community in setting up their own carpool networks. Each of these additional projects should also involve a strong emphasis on the incentives of time and money saved and carbon reduced by joining.
The projects outlined below are intended to help reduce overall waste and increase awareness in the Mass Audubon community about the impacts of their consumption. It is our hope that through the implementation of these programs, Mass Audubon members will re-think what they purchase and how they dispose of it.

**PROJECT 1: Composting**

Food waste is now the single largest component of municipal solid waste reaching landfills and incinerators in the United States. This waste, as well as many other organic materials, could be composted instead. Composting has many benefits including reducing landfill methane and conserving valuable organic resources by returning organic matter and nutrients to the soil. Unfortunately, very few cities in Massachusetts provide curbside composting pickup. We propose that Mass Audubon set up composting centers at their Nature Centers, allowing members to drop off compostable materials. This will address the main barrier to composting, which is access. Additional strategies target the barriers of motivation and lack of information.

**Connection to Solutions**

Many people lack the space or the motivation to have a compost pile at home. This is especially true for those in urban settings. The opportunity to drop off composting at Nature Centers will give members of the Mass Audubon community a convenient way to begin composting. In the ‘Resource Tools’ of this report, a list of what can and cannot be composted has been created. This list should be distributed to members, as well as suggestions for how to store composting before drop-off. We recommend that a Mass Audubon staff person is available to answer questions at composting areas, at least until members become comfortable with the process.

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9 EPA, Basic Information about Food Waste, 2011
Interactive Education

The Mass Audubon composting centers are key to providing access to a broad range of members. However, it should be recognized that households might be interested in starting a backyard composting pile of their own, but are lacking the knowledge of how to do this. We suggest that Mass Audubon host a series of workshops that teach how to start backyard composting, and provide tips and information on the benefits of composting. In addition, Mass Audubon should seek out members who are already composting and engage them as leaders to promote the project.

The educational process could also be extended to demonstrate the benefits of compost as a material for garden soil. Mass Audubon could consider starting a small community garden to be run by volunteer members, or they could donate composted soil to members who are gardeners.

Visual Reminders

For visiting members and program participants, seeing a compost pile is the beginning of the education process for future participants. Research has also shown that visual reminders can help people more permanently change their behavior over time. It is important that this visual reminder also be present at home. After all, the main goal of this project is to reduce the amount of waste going to a landfill and to remind members to think about what they are throwing away. Mass Audubon should distribute bright stickers or magnets that can be placed on a member’s trash can, reminding them to think first about whether the item they are throwing away can be composted. This prompt at the point of action will reinforce the behavior.

Measurement of Success

The success of the composting project can be measured in several ways. Mass Audubon should definitely track the number of people who drop off composting. Another option would be to have a scale on site to weigh materials being dropped off. Mass Audubon could record this information and track how much waste is being redirected from landfills. A competition could even be developed between Nature Centers. Members should be encouraged to provide feedback, personal stories, and pictures about their composting experiences on Facebook. Finally, we encourage Mass Audubon to remind members that the first step in reducing food waste is to be thoughtful about food purchases, food storage, and preparation. Households can save money and reduce their carbon footprint by preventing waste from ever getting to the trash or compost bin.
PROJECT 2: E-Waste

New technology is constantly emerging and advertised as faster, smarter, and generally superior to the previous model. For many people buying the newest model represents being on the cutting edge, but discarding older electronics accounts for 50 billion tons of E-waste a year globally\(^\text{10}\). This amounts to significant carbon impacts as a result of both disposal and the resource extraction to create new products.


Connection to Solutions

Mass Audubon should educate member households about centers that have responsible recycling standards around the state where unwanted cell phones, televisions, computers, gaming devices and music players can be taken. Information should be presented that references the impacts of E-waste from discarded electronics.

The E-waste issue also represents a great opportunity for Mass Audubon to get its member community engaged in advocacy that goes beyond traditional environmental and land use legislation. There is currently legislation moving forward in Massachusetts, which addresses E-waste producer responsibility. Mass Audubon should provide information about the hazards of E-waste and emphasize the need to manage and reduce excessive waste produced from discarded electronics. Mass Audubon’s existing policy and government relation’s staff should distribute details of legislation and attempt to engage members. Households should be prompted to send letters and contact their state legislators to support E-waste legislation.

\(^\text{10}\) UNEP, 2006
Measurement of Success

The most direct measurement of this project’s success will be the number of letters that are sent to legislators and the number of pledges that are made to reduce and shift electronics consumption. Testimonials can be posted for the entire community to see and Mass Audubon can follow up with those who have participated. Learning about the experience of other households in limiting their consumption is likely to inspire others to get involved. Additionally, Mass Audubon should survey member households for their thoughts about the project, which is outside the scope of Mass Audubon’s traditional advocacy.

Visual Information

In an effort to make people aware of the realities of E-waste, Mass Audubon should begin raising consciousness on the issue at Mass Audubon Nature Centers. Showing graphic representations of the sheer volume of E-waste and its effect on the planet will be moving. Most E-waste is sent to poorer parts of the world for disposal, so it is important to reconnect people to the consequences of their discarded electronics. Images and statistics addressing not only the costs of purchasing new technologies but also the environmental and social costs of disposing of them should be presented.

Commitments

Emailing legislators and advocating for policies is not enough. Producers have a responsibility to take back products at the end of their life cycles, but consumers also have a role to play. Members should be asked to make a pledge to purchase products made by manufacturers who make greener products and have responsible recycling programs. Mass Audubon should make the Consumer Reports Greener Choices list available on the website. A follow up pledge should ask members to commit that they will re-think their overall electronics consumption. The pledge might be to skip the next generation of a device and not purchase new technologies until it is absolutely necessary. Throughout the pledge process, people should be asked to share why they are participating in the project and why they feel that limiting consumption is important. Mass Audubon should publish this feedback online and send it to legislators.

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RESOURCE TOOLS
The ‘Resource Tools’ presented here are designed to support the Re-think program. They have been created or organized by the Team to help the Mass Audubon member community reduce their carbon footprints. Full copies of the tools are provided in Appendix 6.

COOL CLIMATE NETWORK CARBON CALCULATOR:
As was discussed in Chapter Two, many carbon footprint calculators have drawbacks related to the averages they provide for inputs and the inability to compare footprint results with a larger community. However, online carbon calculators still present a valuable method for households to quantify their carbon footprint and visualize how their actions affect it. The team researched a variety of carbon calculators and we recommend that Mass Audubon promote the Berkeley Cool Climate Network\textsuperscript{12} carbon calculator for their member community. Several features set this carbon calculator apart from others that are available. First, the calculations and default averages that the calculator uses are highly transparent. Second, it provides visually appealing, easy to understand, and detailed breakdowns of the carbon emissions for each ‘wedge’ of a household’s footprint. Third, benchmarks in the calculator show users how they are doing compared to groups of similar size or character. Finally, households can save their carbon footprint and modify it easily after they make energy upgrades or change other behaviors. The calculator also generates customized pledges based on a users inputs that suggest behaviors to reduce the carbon footprint. In this way, it is easy for households to see how much of a difference the change had on their carbon footprint.

An important benefit of the Cool Climate Network is that online action groups can be formed. This would allow members of the Mass Audubon community to engage with each other. Mass Audubon can also add the 2008 Full Calculator widget to their site for free. However, this

\textsuperscript{12} http://coolclimate.berkeley.edu/uscalc
complimentary feature alone will not allow Mass Audubon to track member information and results. In order to fully utilize the community action plan component of this calculator, we recommend that Mass Audubon join as an Affiliate member. For a non-profit organization, this membership is estimated to cost $2,000 annually.

‘TOP ENERGY SAVERS’

This list provides the Mass Audubon member community with rated and prioritized actions to take or things to avoid based on each action’s carbon emissions. Many energy savings overlook the importance of behavior change. It is not enough to simply buy a new Energy-Star rated appliance. People must also think about the way that they use the appliance.

‘TOP 10 TIPS FOR RENTERS’

This list provides the most impactful actions that a property renter can take to reduce their carbon footprint. The focus is on actions that require little or no investment in the property, and center more around behavior changes.

‘CAN I COMPOST IT?’

This list outlines a wide range of items that can be composted and is intended to compliment the composting stations set up at Mass Audubon Nature Centers.

‘STATE AND FEDERAL RESOURCES TOOL’

The purpose of the state and federal incentive resource tool is to give the Mass Audubon member community one place to access up-to-date information about government tax credits, rebates, loans, and other offers for energy-related home improvements. Based on our survey data, access to information was a barrier for energy efficiency upgrades. The information provided in this tool must be reviewed annually for necessary updates.
CHAPTER FIVE:
CONCLUSION

This report was undertaken to support Mass Audubon’s goal of reducing the carbon footprint of each of its member households by 25% by 2020. Through the collective engagement of its community, Mass Audubon can contribute a substantial reduction in greenhouse gas emissions for the Commonwealth of Massachusetts. The process of encouraging sustainable behavior changes in households is challenging because it requires addressing default behaviors. The Team’s Re-think program confronts the barriers to behavior change through projects that set incremental goals for carbon reductions and encourage interaction among member households. Feedback and visibility of community members’ accomplishments will help to build and reinforce the Re-think program. This will also allow it to adapt over time as the Mass Audubon community becomes more engaged.

The success of the Re-think program depends not only on member participation, but also on the commitment of Mass Audubon to dedicate resources for project implementation, consistent outreach, and evaluation follow up. The Team concludes that Mass Audubon has taken on a considerable challenge, but we are confident that they are up to the task. Through the message of the Re-think program, Mass Audubon has an opportunity to facilitate significant reductions in greenhouse gas emissions and also enrich the Mass Audubon community by attracting new and diverse members.
BIBLIOGRAPHY


Gloria Villegas-Cardoza (Mass Audubon- Director of Education) in discussion with research team member. Interview Date: April 15, 2011.


Jacob Glickel (City of Boston-Environment Department). In discussion with research team member. Interview Date: March 16, 2011.

Jason Karas (Founder, CarbonRally.com). In discussion with research team member. Interview Date: March 15, 2011.


Susan Altman (Mass Climate Action Network-Outreach Director). In discussion with research team member. Interview Date: March 15, 2011.


I. Introduction

Project (i.e., team) number: 3
Project title: Climate Change Initiative
Client: Massachusetts Audubon Society

This Memorandum of Understanding summarizes the scope of work, work product(s) and deliverables, timeline, work processes and methods, and lines of authority, supervision and communication relating to the Field Project identified above, as agreed to between the UEP graduate students enrolled in the Field Projects and Planning course (UEP-255) offered by the Tufts University Department of Urban and Environmental Policy and Planning (“UEP”) who are identified in Paragraph II below; Massachusetts Audubon Society, further identified in Paragraph II below; and UEP, as represented by a Tufts faculty member directly involved in teaching the Course during the spring 2011 semester.

II. Specific Provisions

(1) The Field Projects Team working on the Project consists of the following individuals:
The Client’s contact information is as follows:

Client name: Massachusetts Audubon Society  
Key contact/supervisor: Susannah Lund, VP of Marketing and Communications  
Email address: [redacted]  
Telephone number: [redacted]  
FAX number: [redacted]  
Address: 208 South Great Road  
Lincoln, MA 01773  
Web site: www.massaudubon.org

The goal(s) of the Project is (are):

Our primary goal is to develop a series of educational and outreach strategies and actions that will create strong incentives for Mass Audubon members to reduce their carbon footprint by 25% over a 10 year period through voluntary behavior changes – thus contributing a substantial reduction in the overall Greenhouse Gas emissions for the state.

Secondary goals:
- Attempt to capture the current state of members’ sustainable behaviors and their willingness to be participate in climate change initiatives
- Evaluate how peer organizations have been working with the people in climate change initiatives
- Propose a set of actions members should take to reduce their carbon footprint
- Develop a strategy of how those messages should be delivered

The methods and processes through which the Field Projects Team intends to achieve this goal/these goals is/are:

- Analysis through case studies of peer organizations through their websites or interviews when necessary
- Review of the existing literature as it applies to climate change, voluntary action initiatives, and sustainable behaviors
- Surveys for the purpose of understanding current member practices and level of understanding/education on climate change
- Focus groups to gain insight into member “state of mind” and encourage collaboration of members in our process
- Geographic Information Systems (GIS) – use our knowledge of GIS software to further inform our research related to Mass Audubon members
- Observation of visitor involvement/interaction with climate and energy exhibits at various Sanctuaries
The work products and deliverables of the Project are (this includes any additional presentations for the client):

1. Peer Analysis of Climate Change action within relevant conservation groups, with a specific focus on Best Practices and potential alliance opportunities for Mass Audubon
2. “Road Map” for Mass Audubon suggesting an outreach and engagement plan to target various audiences (kids/teens/adults); through a variety of modes (traditional/online); at a variety of cost alternatives
3. Creation of a “Tool Kit” for members including resources, low-high cost actions, Best Practices, etc.
4. Suggestions for evaluating the campaign and measuring its impact (including potential measurement instruments and metrics)
5. Final Presentation to Mass Audubon staff

The anticipated Project timeline (with dates anticipated for key deliverables) is:

- MOU to signed by all parties by 2/08/11
- Project outline completed and delivered to client by 3/01/11
- Meeting between Project Team, client, and faculty advisor to take place between 3/03 and 3/18 at Tufts; specific date TBD
- Team presentation at Tufts on 4/20, 4/27, or 5/03; specific date/time TBD; presence of client at presentation requested
- Presentation to Mass Audubon staff; specific date TBD

The lines of authority, supervision and communication between the Client and the Field Projects Team are (or will be determined as follows):

Melissa Woods will serve as the primary contact for the Tufts team, while Susannah Lund will be the contact for Mass Audubon. Throughout the project, Melissa and Susannah will keep their teams informed including, as well as Professor Russell and teaching assistant Jay Monty.

The understanding with regard to payment/reimbursement by the client to the Field Projects Team of any Project-related expenses is:

Our anticipated expenses include mileage to/from client meetings/Sanctuary site visits and printing costs for on-site surveys and focus group materials. As required, we will keep timely, accurate and complete records of all expenses and submit them by June 1, 2011 on a single reimbursement form.
III. Additional Representations and Understandings

A. The Field Projects Team is undertaking the Course and the Project for academic credit and therefore compensation (other than reimbursement of Project-related expenses) may not be provided to team members.

B. Because the Course and the Project itself are part of an academic program, it is understood that the final work product and deliverables of the Project (the “Work Product”) – either in whole or in part – may and most likely will be shared with others inside and beyond the Tufts community. This may include, without limitation, the distribution of the Work Product to other students, faculty and staff, release to community groups or public agencies, general publication, and posting on the Web. Tufts University and the Field Projects Team may seek and secure grant funds or similar payment to defray the cost of any such distribution or publication. It is expected that any issues involving Client confidentiality or proprietary information that may arise in connection with a Project will be narrow ones that can be resolved as early in the semester as possible by discussion among the Client, the Field Projects Team and a Tufts instructor directly responsible for the Course (or his or her designee).

C. It is understood that this Project may require the approval (either through full review or by exemption) of the Tufts University Institutional Review Board (IRB). This process is not expected to interfere with timely completion of the project.
IV. Signatures

For Mass Audubon
By: Susannah Lund
Date: 1/27, 2011

Representative of the Field Projects Team
By: Kimberly Ke
Date: 2/03, 2011

Tufts UEP Faculty Representative
By: Rusty Russell
Date: 2/14, 2011
APPENDIX 2

PEER REVIEW

Peer reviewed organizations are presented in the following order:

• Manomet Center for Conservation Sciences
• The National Audubon Society
• The National Resources Defense Council
• The Nature Conservancy
• The Trust for Public Land
• The Trustee of Reservations
• Union of Concerned Scientists
Manomet’s mission is to conserve natural resources for the benefit of wildlife and human populations. Through research and collaboration, Manomet builds science-based, cooperative solutions to environmental problems.

Manomet Center for Conservation Sciences (Manomet) is a unique organization focusing on non-advocacy use of science for problem solving while building effective partnerships with organizations that can create change. Manomet acknowledges that “saving nature can no longer be viewed as somehow separate from saving ourselves,” their major initiatives include:

- Climate Change and Energy Initiative
- Natural Capital Initiative
- Shorebird Recovery Project

Manomet is approaching climate change with a “two-fold approach,” reducing greenhouse gas emissions and learning how to adapt to ecosystems already seeing the effects of climate change. Solutions for Manomet are always based in sound science so they are working with NGO’s, state and federal agencies, and foundations to implement approaches to combat climate change. Manomet members receive both quarterly and annual publications but active participation with the organization is not present. Manomet is based on the sciences therefore recommendations for lifestyle changes are barely present.
The National Audubon Society (Audubon) is an organization devoted to the bird population of the Americas. Their active chapters participate as “Citizen Scientists.”

Audubon has taken steps to reduce their own carbon footprint, including a new LEED certified headquarters. Additionally, many other Audubon facilities are also considered “Green Spaces” (http://www.audubon.org/sites/default/files/documents/AudubonVarick-FactSheet.pdf).

References to climate change on Audubon’s website are fairly limited. The climate change information is placed under a tab for “Policy Issues and Action”, and then a sub-section for “Climate Change Campaign” (http://policy.audubon.org/climate-change-campaign). The material provides a rudimentary education on climate change and ties its effects to birds.

The singular attempt to engage members in climate change mitigation is housed under a section called “Be Part of the Solution”. The suggestions presented are very basic including: changing light bulbs, buying organic, and monitoring heating/cooling practices (http://policy.audubon.org/be-part-solution). A Climate Change Fact Sheet provides links to resources such as the American Clean Energy and Securities Act, CFL facts, and “Top 10 Things to Combat Global Warming”.

Overall, addressing climate change is an ancillary goal of the National Audubon Society. Although the organization has confronted their carbon footprint, there is a limited attempt to engage members in climate change action.
THE NATURAL RESOURCES DEFENSE COUNCIL

Established: 1970 Location: National - HQ in NYC (Six regional offices) Membership: 1.3 Million

The Natural Resources Defense Council’s purpose is to safeguard the Earth: its people, its plants and animals and the natural systems on which all life depends.

NRDC is an environmental action group, supported by over 1 million members and the expertise of more than 350 lawyers, scientists and other professionals. Furthermore, the NRDC Action Center provides information and interactive ways for members and website visitors to become activists – through contacting legislators and joining activist networks.

“Curbing Global Warming and Creating the Clean Energy Future” is identified first on their list of priorities. NRDC acknowledges that climate change is linked to many of their priorities and proposes that climate change cannot be compartmentalized – that we need to inform locally, regionally, and nationally, but understand globally.

Through their website, the NRDC provides ample resources on green living, green business, and access to carbon calculators. With 1.3 million members, whose contributions account for 78% of donor support, NRDC appears to have a unique opportunity to drive climate change through the commitment of their members. However, it is unclear whether attempts to engage members are yielding results.
The Nature Conservancy is the leading conservation organization working around the world to protect ecologically important lands and waters for nature and people.

The Nature Conservancy (TNC) uses membership dollars to advocate for policy changes aimed at conservation throughout the world. With such a large and international membership base, TNC does not rely on volunteerism to achieve its goals. Conservation of land and marine features are their primary focus but they also address threats to conservation including climate change. They are a member of the US Climate Action Partnership and support legislation for:

- Meaningful reduction in greenhouse gas emissions
- Reducing emissions from deforestation and forest degradation
- Recognizing financing for natural areas and vulnerable communities to adapt to the consequences of climate change

In addition, The Nature Conservancy acknowledges the effects of climate change to the Massachusetts landscape: changes in the Berkshire forests, habitat changes for migratory birds, and the loss of local economies like lobster, cranberries, and maple syrup production. However, their strengths in combating global warming lie in:

- Advocate for innovative policies, with the goal of reducing emissions by 80% below 1990 levels by the year 2050
- Reduce the destruction of tropical forests
- Restore large-scale forests throughout the Americas
- Help natural and human systems adapt to unavoidable changes
The Trust for Public Land conserves land for people to enjoy as parks, gardens, and other natural places, ensuring livable communities for generations to come.

The Trust for Public Land (TPL) provides support for conservation advocacy, research, funding, and transactions. Through transactions, TPL serves as an independent agent, buying land from willing landowners and then transferring it to public agencies, land trusts, or other groups for protection. Since 1972, TPL has complete close to 4,000 land conservation projects in 47 states, protecting 2.8 million acres. Since 1994, TPL has helped states and communities craft and pass over 380 ballot measures, generating $36 billion in new conservation-related funding.

TPL has developed a Climate Conservation Program, which addresses climate change through 3 initiatives:

- Climate Mitigation - assists landowners and communities to set aside natural landscapes from development. Climate mitigation efforts have centered on forest preservation and afforestation. Carbon credits have funded some of their projects.
- Adaptation Landscapes - works to conserve lands that will help human and natural communities adapt to a changing climate
- Climate-Smart Communities - involves work to create parks and preserve open spaces that enrich and promote compact settlement patterns

In keeping with its conservation mission, TPL’s climate initiatives centers on land conservation. They have partnered with other conservation groups (such as the Nature Conservancy) on projects, but TPL has no interaction with individuals or households regarding carbon footprints.
In 2007, the Trustees of Reservations (Trustees) released and endorsed the “Trustees 2017 Strategic Plan” that maps out how they will achieve their three main climate change goals: reduce their carbon footprint to net zero over 10 years, nurture the health of their landscapes, and inspire and energize people to act. The strategic plan is broken down into four main conservation goals to be achieved by 2017 by both the organization and its members.

- Focus and accelerate land protection efforts
- Engage and mobilize people & a broad range of partners
- Through exemplary stewardship of properties and conservation restrictions, lead by example and demonstrate the importance of conservation to Massachusetts and beyond
- Be one of the best conservation organizations in the country

In order to achieve these four goals in ten years, a major theme throughout the plan is the identification and prioritization of resources. This includes reservations that should be highlighted for outreach and awareness as well as future properties to be prioritized for conservation. Additionally, the Trustees have identified the need for collaboration with other like minded groups to both promote conservation efforts but also to engage in outreach and education of both members and policymakers at the state and local level.
The Union of Concerned Scientists is a nonprofit partnership of scientists and citizens combining rigorous scientific analysis, innovative policy development, and effective citizen advocacy to achieve practical environmental solutions.

The Union of Concerned Scientists (UCS) started as a collaboration between students and faculty at the Massachusetts Institute of Technology (MIT) but has grown in membership to include parents, businesspeople, scientists, students, and teachers. UCS is not connected with any physical space; it combines independent scientific research and citizen action to develop innovative, practical solutions to secure responsible changes in government policy, corporate practices, and consumer choices.

Climate change is one of many focus areas including: scientific integrity, clean vehicles, clean energy, and food and agriculture. They work with leading experts to educate decision makers and the public about climate change, influencing change at the international, national, regional, and state level.

UCS is advocating for a comprehensive set of smart policies that can achieve the targeted carbon emissions reductions and jump-start the transition to a clean energy economy. In addition, they have been very influential in shaping the international climate negotiations and the domestic emissions reductions policy debate. UCS has committed to their own annual carbon inventory as well as a 5 year plan to reduce their emissions.

UCS has a robust amount of publications related to climate change. One of the most interesting and practical for households, is the monthly online newsletter of “greentips,” dedicated to help consumers in making positive environmental decisions. Running since 2000, it includes topics such as home improvement, vehicles, and energy use (http://www.ucsusa.org/publications/greentips/2004/saving-energy-while-staying-cool.html).
APPENDIX 3

QUESTIONS FOR INTERVIEWEES

1. Why did you get involved in climate change issues? Specifically, how have you engaged households vs individuals?
2. What have been your biggest implementation challenges and how have you tried to get people involved?
3. What have you found particularly useful to persuade people to change their behavior?
4. Are there useful resources your members use or specific places you send interested parties for more information?
5. What methods of contact do you find the most useful for disseminating information? What are your communication barriers?
6. How do you measure communities’ energy use, what drew you to that tool?
7. What are your long-term climate change goals?
Mass Audubon has partnered with Tufts University graduate students to survey its members and friends on their level of engagement and interest in combating climate change and reducing household carbon footprints. Our collective goal is to identify the best ways to limit people’s impact on the earth. Your participation in this survey will help us in that process and is greatly appreciated! Please note that participation is completely voluntary AND anonymous.

Zip code ___________ How many household members (including yourself)? Over 18______ Under 18______

1. Please read the following statement and check one response:
   Many of our everyday activities contribute to CO2 (carbon dioxide) emissions in the atmosphere and are linked to a rise in the average temperature of the Earth. Rising temperatures are shown to produce changes in weather, sea levels, and land use patterns, commonly referred to as “climate change.”
   [ ] I agree with the statement [ ] I disagree with the statement [ ] I don’t know

2. Which of the following do you have in your household? (Check all that apply)
   [ ] Compact fluorescent light bulbs (CFLs)
   Energy efficient appliances – (Energy STAR rated)
   [ ] Dishwasher
   [ ] Refrigerator
   [ ] Washer/dryer
   [ ] Double pane windows
   [ ] DIY Window Wrap
   [ ] Low-flow shower heads
   [ ] Low-flow faucets
   [ ] Low-flow toilets
   Upgraded Heating/Cooling System (Within last 5 years)
   [ ] Upgraded Insulation (Within last 5 years)

3. Which of the following (if any) do you consider to be the greatest barrier to questions 2?
   [ ] I’m not familiar with these options
   [ ] It’s not a budget priority right now
   [ ] I haven’t gotten around to it yet
   [ ] I can’t afford these options
   [ ] I don’t have time to install these options
   [ ] I am not willing to sacrifice performance

4. Have you completed a home energy audit?
   YES ______ NO ______

5. Have you utilized rebates for energy efficiency upgrades (i.e. major appliances, windows, insulation, and heating and cooling systems)?
   YES ______ NO ______

OVER ----->
6. What is your primary mode of transportation?
   - Car
   - Public Transportation
   - Biking
   - Carpooling
   - Walking
   - Other

7. Does your household (Check all that apply)
   - Recycle
   - Compost

8. If not, which of the following do you consider to be the greatest barrier to recycling/composting/reusable shopping bags?
   - I don't have access to these options
   - I can't afford these options
   - I'm not familiar with these options
   - I don't have time to install these options
   - It takes too much effort

9. Which of the following do you think is accountable for managing climate change? [Check all that apply]
   - Government
   - Environmental Groups
   - Individuals/Households
   - Corporations
   - I think that climate change will occur regardless of what anyone does

10. Which channels of communication between your household and Mass Audubon do you find most valuable?
    - Email
    - Mass Audubon newsletter
    - Facebook
    - Mass Audubon Sanctuary activities

11. A household’s carbon footprint is the sum of all emissions of CO2 (carbon dioxide) produced by household activities in a given time frame (typically a year). Have you ever used a carbon footprint calculator for your household?
    - YES
    - NO

12. Are you interested in learning more from Mass Audubon about how to lower your household’s carbon footprint?
    - YES
    - NO

13. Would you be interested in collaborating with others in the Mass Audubon community to lower your household’s carbon footprint?
    - YES
    - NO

Please tell us a little more about yourself and your household:

Gender  F   M    Age    Number of cars in your household

Do you  OWN or RENT your residence? If other, please specify

THANK YOU!!
FOCUS GROUP AGENDA

Introductions including selection of one of the statements below:
A. “I am aware of climate change, but I haven’t really taken any steps to reduce my carbon footprint.”
B. “I have made some conscious efforts to reduce my carbon footprint.”
C. “I have made numerous changes in my lifestyle to reduce my carbon footprint, and want to do more.”

Guided Discussion:
1. Motivations
2. Barriers
3. Level of Engagement

Program Proposals
1. Carpooling
2. Household Energy
3. Pledge Program

Conclusion
Top 10 Tips for Renters

You don’t have to be a homeowner to make big difference in your energy carbon footprint. These tips from the EPA and Energy Star® will show you how to be more energy efficient – saving you money, and reduce your carbon footprint. If there are things you can’t change on your own, share these tips and encourage your landlord to help you make a change for the better.

1. Lighting is one of the easiest places to start saving energy and money

Replace your 5 most frequently used light bulbs with compact fluorescent light bulbs (CFLs), which use 75% less energy, and last 6–10 times longer than standard incandescent light bulbs

2. Room air conditioner:

An ENERGY STAR model uses at least 10% less energy than std. models

Remove the window unit in the winter months to prevent energy losses

Be sure the window unit fits tightly in the window so outdoor air is not getting in

3. Programmable thermostat

To automatically adjust your home’s temperature settings when you’re away or sleeping

4. Consumer electronics, account for 15 % of household electricity use

Many consumer electronics use stand-by energy (from a few watts to 20 or 40 watts, even when switched off)

Unplug battery chargers or power adapters when not in use

Use a power strip as a central “turn off” point when you are done using equipment
5. **Low-flow shower head**

A low-flow showerhead uses 2.5 gpm or less which saves water and up to $145 a year on electricity — beating out both bathing and standard showerheads

6. **Clear Air registers of furniture so air can circulate freely.**

For radiators, place heat resistant reflectors between radiators and walls. In winter, this helps heat the room instead of the wall

7. **Natural temperature regulating**

In cold weather, keep curtains open to take advantage of the sun’s warmth; close curtains in warm weather to keep out the heat of the summer sun

8. **Run your Dishwasher with a full load and use the air-dry option if available**

Scrape dishes instead of rinsing before loading dishwasher – saves water and energy

9. **Wash laundry with cold water whenever possible, and do full loads**

Hot water heating accounts for about 90% of the energy your machine uses to wash clothes – using cold water laundry detergents.

Washing full loads can save more than 3,400 gallons of water each year

10. **Don’t over dry your clothes**

If your dryer has a moisture sensor that will automatically turn the machine off when clothes are done, use it.

Remember to clean the lint trap before every load; this speeds up drying & saves energy

Dry full loads, or reduce drying time for partial loads.

Try to dry loads made up of similar fabrics, so the entire load dries just as the cycle ends.
TOP ENERGY SAVERS

Use this list to match what you have done in your life to what else you can do to lead a healthier carbon lighter life!

1. Get an Energy Audit

As a resident of Massachusetts – you’re entitled to a free energy audit by your utility.

2. Heating and Cooling your home

Heating & Cooling your home can account for up to half of all energy used- make sure you are using it wisely! Here are some helpful tips on how to save energy & money:

Start with your attic – check air ducts & check ventilation every season

Change air filters every 3 months

Tune up HVAC equipment yearly with an in home checklist

Install a programmable thermostat

Seal your heating and cooling ducts

3. Heating Water

Heating water accounts for the 2nd largest cost in energy use in the home. Making a few simple adjustments can help you cut your water bill in half!

Set your water heater at 120 degrees Fahrenheit

With older water heaters, wrap them in an insulating jacket

Insulate the hot water piping

Wash your clothes on cold – heating water accounts for 90 percent of costs with running a washing machine .

Turn off electric water heaters and turn down gas water heaters when going away on vacation
4. Don’t Just Turn it OFF – Unplug It!

5-10% of residential electricity used in most developed countries is consumed by appliances that are turned off but left plugged in. Altogether, standby power, sometimes called “Vampire Power” is responsible for 1% of global CO2 emissions. Using a power cord and unplugging the whole strip when not in use is great for computers, printers, & scanners; or for home audio equipment. Appliances that use the most power in stand-by mode are:

Rear projection TV’s - DVR’s - Satellites - Desktop computers

Laptops - Audio minisystems

Buy Energy Star products which generally have lower stand-by settings

5. Replace Your Old Appliances

Appliance efficiency has drastically increased over the last 2 decades. The following list ranks which appliance you should change first based on how much electricity they use. Look for ENERGY STAR ratings and available rebates for purchase.

Refrigerators - Washing machine - Clothes dryer - Freezer - Dishwasher - Computer

6. Helpful Moves Around the House

These quick fixes will help you save money and reduce your carbon footprint. Ranked in order of energy saved, try these at home:

Install a low-flow showerhead – look for 1.6GPM or better

Install a clothes line in the summer

Install a low-flow toilet – look for dual flush

Plant trees outside – this can help reduce your heating and cooling costs
**Can I compost it?**

The following list of 65 items can ALL be composted! It’s meant to get you thinking about your compost possibilities. Imagine how much trash we could prevent from going into the landfills if each of us just decided to compost a few more things.

**From the Kitchen**

1. Coffee grounds and filters
2. Tea bags
3. Used paper napkins
4. Pizza boxes, ripped into smaller pieces
5. Paper bags, either ripped or balled up
6. Crumbs from the counters and floors
7. Used paper plates (as long as they don’t have a waxy coating)
8. Cellophane bags (not clear plastic—there’s a difference)
9. Nut shells (except for walnut shells, which can be toxic to plants)
10. Old herbs and spices
11. Stale pretzels
12. Pizza crusts
13. Cereal boxes (tear into smaller pieces first)
14. Plain cooked pasta
15. Plain cooked rice
16. Stale bread
17. Paper towel rolls
18. Stale saltine crackers
19. Stale cereal
20. Wine corks
21. Moldy cheese
22. Melted ice cream
23. Old jelly, jam, or preserves
24. Stale beer and wine
25. Paper egg cartons
26. Toothpicks
27. Bamboo skewers
28. Paper cupcake or muffin cups

**From the Laundry Room**

29. Dryer lint
30. Old/stained cotton clothing - small pieces
31. Old wool clothing — cut to smaller pieces

**From the Office**

32. Bills and other shredded documents
33. Envelopes (minus plastic window)
34. Pencil shavings
35. Sticky notes
36. Business cards (not glossy)
37. Receipts

**Around the House**

38. Contents of vacuum cleaner bag/ canister
39. Newspapers (shredded or torn to small pieces)
40. Subscription cards from magazines
41. Leaves trimmed from houseplants
42. Dead houseplants and their soil
43. Flowers from floral arrangements
44. Natural potpourri
45. Used matches
46. Ashes from fireplace, grill, outdoor fire pit

**Pet-Related**
47. Fur from the dog or cat brush
48. Feathers
49. Alfalfa hay or pellets
50. Rawhide dog chews
51. Fish food
52. Dry dog or cat food
53. Droppings and bedding from rabbit/hamster

**Party and Holiday Supplies**
54. Wrapping paper rolls
55. Paper table cloths
56. Crepe paper streamers
57. Latex balloons
58. Raffia
59. Excelsior
60. Jack o’Lanterns
61. Those hay bales from outdoor fall decor
62. Natural holiday wreaths
63. Christmas tree. Chop it up with pruners first
64. Evergreen garlands
65. Newspaper/droppings from the bottom of the bird cage

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**Things that should NOT be composted and Why!**

- Black walnut tree leaves or twigs - Releases substances that might be harmful to plants
- Coal or charcoal ash - Might contain substances harmful to plants
- Dairy products and eggs - Create odor problems and attract pests such as rodents and flies
- Diseased or insect-ridden plants - Diseases or insects might survive and be transferred back to other plants
- Fats, grease, lard, or oils - Create odor problems and attract pests such as rodents and flies
- Meat or fish bones and scraps - Create odor problems and attract pests such as rodents and flies
- Pet wastes: dog/cat feces, soiled cat litter - Might contain parasites, bacteria, germs, pathogens, and viruses harmful to humans
- Yard trimmings w/ chemical pesticides - Might kill beneficial composting organisms
SOLAR ENERGY

HEAT Loans: Solar Hot Water Systems
MA – Offers 0% interest loans of up to $25,000 over 7 years to assist with the installation of qualified energy efficient improvements in homes.
Requirements: Receive a Mass Save Home Energy Assessment.
Call (866) 527-7283 to schedule a free home energy assessment in order to access this incentive or visit www.masssave.com

Renewable Energy Equipment Sales Tax Exemption
MA – Exempts sales of equipment directly relating to any solar, wind powered, or heat pump system, which is being utilized as a primary or auxiliary power system for the purpose of heating or otherwise supplying the energy needs of an individual’s principal residence in the commonwealth.
Requirements: Must be a primary residence and must meet eligibility requirements. “Qualified renewable energy source property is property which transmits or uses solar energy for heating or cooling, for providing hot water or electricity… (MA 830 CMR 62.6.1).” Must fill out a Schedule EC with MA state income taxes.
Schedule EC:

Residential Renewable Energy Income Tax Credit
MA - Allows a 15% credit up to $1,000, including installation costs, of a renewable-energy system installed on an individual’s primary residence. Any remainder can be carried over for up to 3 years. Eligible technologies include: solar water and space heating, photovoltaic (PV), and wind-energy systems. They have to be in operation for at least 5 years.
Requirements: Available to both renters and owners of residential properties. Must fill out a Schedule EC with MA state income taxes (See above).

Commonwealth Solar II
MA - Offered by MassCEC, this program provides rebates for the installation of grid-tied photovoltaic (PV) systems at residences in eligible areas. Residential rebates do not have a cap, but the rebate will be based on the first 5 kW produced. Rebate amounts are based on the total PV system size per building starting at $0.75/watt.
Requirements: All rebate applications must be approved before the project installation begins.

STATE INCENTIVES

The information in this appendix has been broken down into 6 categories applicable to residences: solar, wind, miscellaneous renewable energy, energy efficiency, new residential construction, and additional resources. These categories will allow people to quickly reference a project type. To our knowledge, every available incentive has been listed for each category.
### SOLAR ENERGY CONTINUED

| **Renewable Portfolio Standard (RPS) Solar Carve Out** | **MA** - Allows for residential solar installations to receive incentives based on mWh (megawatt hours) produced. For 2011 the incentive is capped at $550 per mWh or $0.55 per kWh (kilowatt hours).

| **Commonwealth Solar Hot Water** | **MA** - The Massachusetts Clean Energy Center (MassCEC) provides rebates for the installation of residential solar hot water systems. Residents can receive an additional $200 if the system includes parts that are manufactured in Massachusetts. Rebates are capped at $3,500 per building or 25% of the total installed costs.

Requirements: Only residents that live in territories that contribute to the MassCEC Renewable Energy Trust Fund are eligible. The system must be installed at a year-round occupied residential building (1 to 4 units).

| **Residential Renewable Tax Credit** | **US** - Federal tax credit for residential installation of renewable energy including solar-electric systems, solar water heating systems, fuel cells, small wind-energy systems, and geothermal heat pumps. Thirty percent credit available for qualified expenditures (includes labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home) for a system that serves any taxpayer residence. The maximum allowable credit, equipment requirements, and other details vary by technology as outlined below.

Solar-Electric Property - There is no maximum credit for systems placed in service after 2008. The maximum credit is $2,000 for systems placed in service before January 1, 2009.

Solar Water-Heating Property - There is no maximum credit for systems placed in service after 2008. The maximum credit is $2,000 for systems placed in service before January 1, 2009. At least half the energy used to heat the dwelling’s water must be from solar in order for the solar water-heating property expenditures to be eligible. The tax credit does not apply to solar water-heating for swimming pools or hot tubs.

## WIND ENERGY

| **Renewable Energy Equipment Sales Tax Exemption** | **MA** - Exempts sales of equipment directly relating to any solar, wind powered, or heat pump system, which is being utilized as a primary or auxiliary power system for the purpose of heating or otherwise supplying the energy needs of an individual’s principal residence in the commonwealth.  
Requirements: Must be a primary residence and must meet eligibility requirements. “Qualified renewable energy source property is property which transmits or uses solar energy for heating or cooling, for providing hot water or electricity... (MA 830 CMR 62.6.1).” Must fill out a Schedule EC with MA state income taxes.  
| **Residential Renewable Energy Income Tax Credit** | **MA** - Allows a 15% credit up to $1,000, including installation costs, of a renewable-energy system installed on an individual’s primary residence. Any remainder can be carried over for up to 3 years. Eligible technologies include: solar water and space heating, photovoltaic (PV), and wind-energy systems. They have to be in operation for at least 5 years.  
Requirements: Available to both renters and owners of residential properties. Must fill out a Schedule EC with MA state income taxes. (See above). |
| **Commonwealth Wind Incentive Program** | **MA** - Microwind Initiative by MassCEC offers rebates of up to $4 a watt with a maximum of $100,000 for design and construction of customer-sited small wind projects with a 1 to 99 kW (kilowatt) capacity.  
Requirements: Projects must be in areas served by participating utilities. Applications must demonstrate that 50% or more of the electricity produced will be used on-site or net metered.  
To Apply: [http://www.masscec.com/microwind](http://www.masscec.com/microwind) |
| **Residential Renewable Tax Credit** | **US** - Federal tax credit for residential installation of renewable energy including solar-electric systems, solar water heating systems, fuel cells, small wind-energy systems, and geothermal heat pumps. Thirty percent credit available for qualified expenditures (includes labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home) for a system that serves any taxpayer residence. The maximum allowable credit, equipment requirements, and other details vary by technology as outlined below.  
Small Wind Energy Property - There is no maximum credit for systems in service between January 1, 2008 and December 31, 2016.  
## MISCELLANEOUS RENEWABLE ENERGY

<p>| Renewable Energy Equipment Sales Tax Exemption | MA - Exempts sales of equipment directly relating to any solar, wind powered, or heat pump system, which is being utilized as a primary or auxiliary power system for the purpose of heating or otherwise supplying the energy needs of an individual’s principal residence in the commonwealth. Requirements: Must be a primary residence and must meet eligibility requirements. “Qualified renewable energy source property is property which transmits or uses solar energy for heating or cooling, for providing hot water or electricity... (MA 830 CMR 62.6.1).” Must fill out a Schedule EC with MA state income taxes. Schedule EC: <a href="http://www.mass.gov/Ador/docs/dor/Forms/IncTax10/addl/sch_ec.pdf">http://www.mass.gov/Ador/docs/dor/Forms/IncTax10/addl/sch_ec.pdf</a> |
| Residential Renewable Energy Income Tax Credit | MA - Allows a 15% credit up to $1,000, including installation costs, of a renewable energy system installed on an individual’s primary residence. Any remainder can be carried over for up to 3 years. Eligible technologies include: solar water and space heating, photovoltaic (PV), and wind-energy systems. They have to be in operation for at least 5 years. Requirements: Available to both renters and owners of residential properties. Must fill out a Schedule EC with MA state income taxes (See above). |
| Residential Renewable Tax Credit | US - Federal tax credit for residential installation of renewable energy including solar-electric systems, solar water heating systems, fuel cells, small wind-energy systems, and geothermal heat pumps. Thirty percent credit available for qualified expenditures (includes labor costs for on-site preparation, assembly or original system installation, and for piping or wiring to interconnect a system to the home) for a system that serves any taxpayer residence. The maximum allowable credit, equipment requirements, and other details vary by technology as outlined below. Fuel Cell Property - The maximum credit is $500 per .5 kilowatt (kW). In case of joint occupancy, the maximum qualifying costs that can be taken into account by all occupants for figuring the credit is $1,667 per 0.5 kW. This does not apply to married individuals filing a joint return. The credit that may be claimed by each individual is proportional to the costs incurred. The residence served by the system must be the taxpayer’s principle residence. Geothermal Heat Pumps - There is no maximum credit for systems placed in service after 2008. The residence served by the system does not have to be the taxpayer’s principal residence. To Apply: <a href="http://www.irs.gov/pub/irs-pdf/i5695.pdf">http://www.irs.gov/pub/irs-pdf/i5695.pdf</a> (2010) |</p>
<table>
<thead>
<tr>
<th><strong>ENERGY EFFICIENCY</strong></th>
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<tr>
<td><strong>HEAT Loans:</strong> Insulation (Attic, Wall, &amp; Basement), Heating Systems, Hot Water Systems, Energy Star Windows and Thermostats</td>
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<tr>
<td>MA - Offers 0% interest loans of up to $25,000 over 7 years to assist with the installation of qualified energy efficient improvements in homes. Requirements: Receive a Mass Save Home Energy Assessment. Call (866) 527-7283 to schedule a free home energy assessment or visit <a href="http://www.masssave.com">www.masssave.com</a></td>
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<tr>
<td><strong>Major Renovations Program</strong></td>
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<tr>
<td>MA - Eligible homeowners working with a Home Energy Rating System (HERS) rater can receive up to $2,000 and free compact fluorescent light bulbs (CFLs) for certain fixtures. Homeowners must be making improvements according to a set of criteria aimed at improving the efficiency of the home and renovation. Requirements: Homeowners must be renovating or remodeling existing homes (additions must be over 500 square feet). To Apply: <a href="http://www.masssave.com/residential/building-a-house-or-addition/find-incentives/incentive-detail-major-renovation">http://www.masssave.com/residential/building-a-house-or-addition/find-incentives/incentive-detail-major-renovation</a></td>
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<td><strong>Energy Efficient Mortgages (EEM)</strong></td>
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<tr>
<td>US - Allows homeowners to finance energy efficiency improvements for existing homes (including renewable energy technologies) or finance the purchase of a new energy efficient home. Loans are insured through the Federal Housing Authority (FHA) or Veterans Affairs (VA) programs. The FHA allows lenders to add up to 100% of energy efficiency improvements to an existing mortgage loan with certain restrictions. The maximum amount of the portion of an energy efficient mortgage allowed for energy improvements is now the lesser of 5% of the value of the property, 115% of the median area price of a single-family dwelling, or 150% of the Freddie Mac conforming loan limit Requirements &amp; To Apply: <a href="http://www.fha.com/energy_efficient.cfm">www.fha.com/energy_efficient.cfm</a> &amp; <a href="http://www.hud.gov/offices/hsg/sfh/eem/energy-r.cfm">www.hud.gov/offices/hsg/sfh/eem/energy-r.cfm</a></td>
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<tr>
<td><strong>Department of Veterans Affairs (VA) EEM</strong></td>
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<tr>
<td>US - Homebuyers may borrow up to $3,000 - $6,000 (depending on documentation) if the projected energy savings are greater than the increase in mortgage payments. Loans may exceed this amount at the discretion of the VA. The VA insures 50% of the loan if taken by itself, but it may insure less if the total value of the mortgage exceeds a certain amount. Requirements: Available to qualified military personnel, reservists and veterans. To Apply: <a href="http://www.homeloans.va.gov/elig2.htm">www.homeloans.va.gov/elig2.htm</a></td>
</tr>
<tr>
<td><strong>Fannie Mae &amp; Freddie Mac EEM</strong></td>
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<tr>
<td>US - Fannie Mae lends up to 10% of completed appraised value for energy efficient improvements. Freddie Mac offers EEMs for 1-4 unit dwellings and includes the cost of energy efficient improvements to the purchase price of the home. Any energy efficiency improvements can qualify, and these mortgages can be combined with both fixed-rate and adjustable-rate mortgages. Borrowers should apply directly to the lender. To Apply: <a href="http://www.resnet.us/ratings/mortgages">www.resnet.us/ratings/mortgages</a></td>
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</table>
### ENERGY EFFICIENCY CONTINUED

| Residential Energy Efficiency Tax Credit | US - This credit applies to energy efficiency improvements in existing homes and for the purchase of high-efficiency heating, cooling and water-heating equipment in a primary residence. The maximum tax credit for all improvements made in 2011 is $500. The cap includes tax credits for any improvements made in 2006 - 2010. If a person claimed $500 or more of these tax credits in any previous year, any purchases made in 2011 will be ineligible for a tax credit. This credit can also be used towards 10% of the cost of upgrading the efficiency of the building’s envelope. The credit is equal to the full cost of the equipment up to the following caps:  
Insulation materials and systems designed to reduce a home’s heat loss or gain  
Exterior doors and windows (including skylights) - No more than $200 in total credits can be claimed for windows in years 2006 - 2011  
Pigmented metal roofs designed to reduce heat gain and asphalt roofs with appropriate cooling granules  
Advanced main air circulating fan: $50  
Natural gas, propane, or oil furnace or hot water boiler with an annual fuel utilization rate of 95 or greater: $150  
Electric heat pump water heater with an energy factor of at least 2.0: $300  
Electric heat pump which achieves the highest efficiency tier established by the Consortium for Energy Efficiency: $300  
Central air conditioner which achieves the highest efficiency tier established by the Consortium for Energy Efficiency: $300  
Natural gas, propane, or oil water heater which has either an energy factor of at least 0.82 or a thermal efficiency of at least 90 percent: $300  
Biomass stoves that use “plant-derived fuel available on a renewable or recurring basis, including agricultural crops and trees, wood and wood waste and residues (including wood pellets), plants (including aquatic plants), grasses, residues, and fibers”: $300  
|---|---|
### NEW CONSTRUCTION

<table>
<thead>
<tr>
<th>Program</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>MA Energy Star Certified New Homes Program</td>
<td>MA/US - Provides up to $8,000 to people constructing new homes more efficient than the typical Massachusetts home. Awards are based on different tier levels: Tier I $750, Tier II $1,250, and Tier III $8,000. To achieve the Tier III rebate, a home must demonstrate at least a 45% improvement over the baseline Massachusetts home. Requirements: Must have a HERS rating. To Apply: <a href="http://www.masssave.com/residential/building-a-house-or-addition/get-the-facts/massachusetts%20new%20homes%20with%20energy%20star%20eligibility%20s/">http://www.masssave.com/residential/building-a-house-or-addition/get-the-facts/massachusetts%20new%20homes%20with%20energy%20star%20eligibility%20s/</a></td>
</tr>
<tr>
<td>PACE Loans – Property Assessed Clean Energy Financing</td>
<td>MA - Allows homeowners to pay for energy improvements through an assessment on their house. This program is operated through local governments but not all offer this program. The federal government through Fannie and Freddie Mac mortgage holders has declared any properties they manage ineligible for this program.</td>
</tr>
</tbody>
</table>
Re: IRB Study # 1102028  
Title: Massachusetts Audubon Society Climate Change Initiative  
PI: Melissa Woods  
Co-Investigator(s): Paula Catalina Justiniano, Kimberly Ake, Micaelah Morrill  
Study Coordinator: Jay Monty  
Faculty Advisor: Rusty Russell  
IRB Review Date: 2/22/2011  

February 23, 2011  

Dear Melissa,  

Your Application for Exempt Status for the above referenced study has been reviewed. This study qualifies as exempt from review under the following federal guidelines:  

Exempt Category 2 as defined in 45 CFR 46.101 (b). For complete details please visit the United States Department of Health and Human Services Office (DHHS) for Human Research Protections (OHRP) website at:  
http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm#46.101  

Please know that this exemption does not relieve the investigator of any responsibilities relating to the research subjects; equal care must still be taken to ensure that subjects experience no harm to themselves or to their legitimate interests.  

Furthermore research should be conducted in accordance with the ethical principles, (i) Respect for Persons, (ii) Beneficence, and (iii) Justice as outlined in the Belmont Report.  

Any changes to the protocol or study materials that might affect the exempt status must be referred to the Office of the IRB for guidance. Depending on the changes, you may be required to apply for either expedited or full review.  

If you have any questions, please contact the Office of the IRB at (617) 627-3417.  

Sincerely,  

Yvonne Wakeford, Ph.D.  
IRB Administrator