Environmental Issues and Solutions in the Boston Metropolitan Area

Sponsor: Boston Project Center Director

Professor Susan Vernon-Gerstenfeld

Submitted to:

Project Liaison: Professor Susan Vernon-Gerstenfeld

Project Advisors: Susan Vernon-Gerstenfeld, WPI Professor

Alexander Wyglinski, WPI Professor

Submitted by:

Gabriel Louzao

Thales Oliveira

Oliver Rich

Date:

October 12, 2010

ABSTRACT

The goal of this project was to help the Boston Project Center refocus its future projects to address environmental problems in the City of Boston. To do this, our objectives were to identify the major environmental problems in Boston, which organizations are addressing these problems, and where they will focus their resources in the future. We concluded that funding is being directed towards addressing climate change and implementing clean energy solutions. Provided in this report is a list of individuals and organizations that could be approached as future project sponsors and a GIS map presenting the locations and general information of these organizations.

ACKNOWLEDGEMENTS

We would like to thank Mr. Douglas Fine from the Massachusetts Department of Environmental Protection, Mr. Derek Lennon from the Department of Conservation and Recreation, Mrs. Vivien Li from The Boston Harbor Association, Mrs. Kate Plourd from the Massachusetts Clean Energy Center, Mr. Paul Stordy from Massport, and Mr. Vincent DeVito for taking the time to answer our question so that we could better understand Boston's environmental situation. Also we would like to thank our project sponsor Professor Susan Vernon-Gerstenfeld and our advisor Professor Alexander Wyglinski for their continuous help.

EXECUTIVE SUMMARY

The greater Boston region must address the issues of pollution and climate change in the upcoming years if it is to continue sustainable growth. The City of Boston in conjunction with private organizations and government agencies has been working towards this goal for several decades now, but the consensus is that much more is needed. The local government aims to transform Boston into a green city by migrating to clean, renewable resources and educating its population about the benefits of clean energy and efficiency. The city has also implemented recycling programs and many other environmentally friendly practices. Though large amounts of money are being injected into programs to clean up Boston and the surrounding region, there is currently no organized database where this information is available.

Boston has many environmental problems that include air, water, and soil pollution. According to Vincent DeVito, former U.S. Assistant Secretary of Energy (Personal communication, April 15th 2010, see appendix C for full notes), these environmental problems exist due to the fact that Boston is at the end of both the gas and electricity pipelines. New England is also home to a large industrial sector which is a major contributor. However, organizations in the region have been able to place Boston in the forefront of promoting green practices. Pollution in the area has greatly decreased since the first remedial actions were taken. Due to the environmental problems that the region faces, the willingness in the region to fix these problems and WPI's commitment to promoting green practices, the Boston Project Center is refocusing its future research projects to tackle the environmental problems in Boston.

The goal for this project was to identify the environmental organizations in the City of Boston and their major focus in the coming years. As the world begins to direct its attention on preventing climate change, many of these organizations are starting to financially support

environmental initiatives. Worcester Polytechnic Institute has a strong commitment to promoting efficiency and clean energy programs, and as such Professor Susan Vernon-Gerstenfeld, the director of the Boston Project Center, would like to refocus future projects towards this end.

To reach this goal, our group identified the major environmental problems in the Boston area and the organizations that deal with these problems. We used interviews as well as archival research to find where the problems in the area lie and how they are being addressed. To do this, we looked into the funding that is being directed to address the environmental problems. A comprehensive list of organizations and people was assembled as this had to be included to help the Boston Project Center Director search for future projects. The information acquired includes the size of the organization, the issues they deal with, the available budget, and physical location of the organizations.

A substantial amount of information regarding the organizations and many of their programs that address environmental problems were acquired. The data provided us a snapshot of the many organizations and their budget information. Another important set of data we found was the funding sources for many of the organizations. This set of statistics showed us that government organizations are investing significant amounts of money towards clean energy and efficiency.

From this data we concluded that the primary focus of environmental organizations in the City of Boston will be to address climate change through adopting clean energy technologies and promoting efficiency. For example, the City of Boston's Environmental Department has received millions of federal dollars over the past several years to support a clean energy economy. With their budget information, we concluded that certain organizations may not be suitable to support an Interactive Qualifying Project (IQP) by not having sufficient resources. Due to the economic

downturn, many of these organizations have had their budgets cut over the past several years. This is another reason why many organizations are looking to make their operations more efficient as this will save them money.

Some of the potential partners include the Department of Conservation and Recreation, the Boston Metropolitan Planning Organization, The Boston Harbor Association, and the Massachusetts Department of Environmental Protection. As a form of final presentation, all of these organizations are presented in a GIS Google Map with brief contact information showing the location of their offices in the City of Boston. Also included, is a list of key individuals and organizational profiles for selected organizations that give in-depth detail into their programs.

AUTHORSHIP

CONTENTS

FIGURES

CHAPTER 1: INTRODUCTION

The City of Boston is facing many environmental problems, which are being addressed by various organizations to ensure a clean and healthy environment for its residents. Cleanliness of air, water and land resources are some of the areas where the organizations have historically focused their efforts, but new funding opportunities have recently surfaced in the areas of climate change and clean energy. Organizations and the city have begun to implement programs that plan to reduce their impact on the environment through the use of clean energy alternatives and efficiency programs. The purpose of this project was to identify the main environmental problems in the City of Boston and the organizations working to address these problems. The group also researched where these organizations will be directing their future focus.

Both government and private organizations have tried different approaches to ensure that the environmental problems that the city faces are addressed. The implementation of programs outlined in the Utility Restructuring Act (See Glossary) and the Green Communities Act (See Glossary) has made Boston an example for the country in terms of its environmental policies (DeVito, 2010). Organizations have diverse programs ranging from green practices in local restaurants to treatment plants that can improve the quality of water in Boston Harbor. Though much is being done, it is hard to properly identify which programs are getting grants and resources and what the focus will be in the coming years.

While there are many organizations working in the Boston region to solve the environmental problems, the director of the Boston Project Center (BOPC) does not have an organized database containing their projects and information. In order to know which organizations can be approached, several important facts need to be known. The director needs to know about the existence of the organization, what area of the environment it focuses on, and its

primary projects over the coming years. Information is also needed about the organization's funding, where it comes from, how much it receives, and how the funds are distributed throughout the organization. While it is desirable for the organization to be able to pay for the project, the director would focus more on the organizations with provocative and compelling projects. Finally, the director needs to know who the key individuals are and their position in the organization.

To provide this information, we identified the organizations and learned what they are doing in their respective fields, as well as how much funding they received and how they used that funding. Information on these organizations and people who could be contacted within them was then compiled into a database for the director to use in developing relations with future project sponsors. Also provided was a map showing the location of each office in the city and a short background description of the organizations.

CHAPTER 2: METHODOLOGY

This project is unique in that the methods that we used to accomplish each objective are similar if not the same. Therefore, for simplicity and organization, we will discuss our methodology by focusing on the explicit methods that were implemented instead of how we achieved each objective separately. Our objectives were to identify the major environmental problems in the greater Boston area and who the main players or organizations are that work to solve these problems. The methods that we used to address the objectives were archival research, the qualitative method, and interviews. They helped identified both the problems and the organizations that deal with these problems.

ARCHIVAL RESEARCH

Our group used archival research extensively as a resource during our project. Archival research refers to the process of gaining knowledge from existing documents, publications and other sources of information. These resources can include but are not limited to books, journals, websites, and videos. This type of research was used because our project's deliverable includes a compilation of the available data for the environment in the City of Boston and surrounding area.

Organizations

By researching websites and finding grant and program information, the group found and compiled results on organizations that are addressing environmental issues in the City of Boston. We researched into government as well as profit and non-profit organizations. To do this, we used the internet to find budget information, an organization's focus and its contact information. Also, some of these organizations collaborate and publish research papers, so we collected this information from some of their offices.

Newspapers and journals also provided a valuable resource as they publish current programs that address these issues. The advantage of using these resources is that we found information that is up to date and the articles presented in these resources dealt with successful programs.

Environmental Problems in the Boston Area

To research information about problems in the Boston region, many different resources were used. In our group's case, we focused on using scholarly resources that presented studies with reliable findings. This information was found using either internet resources with access to online periodicals, or physical publications and books available in libraries. Also, problems discussed in Boston were found in governmental websites like the EPA and regional organizations that address environmental issues. These organizations publish articles concerning the largest problems and have quantitative information on problematic areas. With these types of websites, we were careful as some were biased and all the information we took from them was triangulated to ensure that it was accurate.

QUALITATIVE METHOD

The qualitative method of collecting data refers to "the meanings, concepts, definitions, characteristics, metaphors, symbols and descriptions of things" (Berg, 1989). It is different from the quantitative method in that the data received is not number based, with exact results, but relies also on interpretations. To conduct the interviews that we needed, we followed the "two phases:" getting in and analysis.

The getting in phase deals with securing access to the setting, the participants and knowledge of the phenomena we are trying to identify. To secure the interviews, we identified exactly the data we needed to get, researched who the right person in the organization was, and

then we would finally set up an appointment to interview them. We encountered some obstacles it setting up these interviews, but these were circumvented with the help of a letter of introduction from our sponsor explaining the project. The majority of the times, the interviews were conducted using a semi-standardized method. In this type of interview, a protocol is drafted out but is not formally followed. The interviewer must then follow his questions but use the interviewee's answers to gain more information.

INTERVIEWS

Interviews were essential as we identified specific problems, acquired detailed budget information, and meet with key personnel. People interviewed were identified and contact information was acquired through our archival research, which was updated when we arrived in Boston. Some of the responses we acquired from the interviews answered our questions about the size of the problem, if the organization needs preliminary research done, if there is someone to supervise on a daily basis for the project, is there space for the students to work, and is the project accessible through public transportation.

Interviews with Department Heads of Various Organizations

To properly identify the environmental problems and future project sponsors in the City of Boston, we conducted seven interviews with department heads of various environmental organizations. Department heads were essential in deciding whether a company or organization was dependable for future projects. These company leaders also disclosed important information during interviews, which will helped us identify the problems the city faces, as well as the people who are be able to help.

We decided who to interview based on their involvement in specific environmental fields. These interviews had specific protocols based on the environmental area the person works

in. Future research areas for the Boston Project Center, such as environmental problems and the green energy industry were also discussed. The information gathered from interviewing the department heads of various organizations was essential in saving time, identifying environmental problems, and also future project sponsors.

CHAPTER 3: INVESTIGATION OF BOSTON'S ENVIRONMENTAL SITUATION

In order to achieve the goal of determining what the primary focus of environmental organizations in Boston will be over the coming years, it is first necessary to review what those same organizations are currently doing. In this section, we discuss several of the major problems that Boston currently faces and what some organizations are doing to address them. The work often overlaps among the federal, state, and local government organizations. Another central focus of this section is what programs are receiving funds. The best way for agencies and non-profits to receive their necessary funding is to adopt some of the issues and goals of the organizations that are distributing funds and grants.

OVERVIEW OF WATER RELATED CONCERNS

Potable water is a crucial resource for cities, yet it has become increasingly scarce. A study presented by the Center for Strategic and International Studies (2005) indicated that water has become the leading source of death and disease in the world and that by 2025 it will become the leading resource problem in the world's economy. Water is considered to be polluted when it is either not suitable for human consumption or if it is not able to support its naturally occurring biological population.

Toxins carried by polluted water are deposited in any soil that the water runs through and causes the pollution of the soil. As Krantz & Kiffersteing (2008) explain, irrigation canals carry large amounts of toxins, deposited from pesticide and fertilizer used in agriculture, and soils that absorb the pollutants become useless for growing crops. River banks also suffer from erosion as trees holding the soil are not able to live in contact with the contaminated soil and water. Several

institutions deal with water pollution in the city of Boston and have in place plans or programs to resolve these problems.

One of the organizations is the Massachusetts Department of Environmental Protection (MassDEP), which protects water resources by financing prevention, education and conservation. The largest part of their budget goes into the Air, Water, and Hazardous Waste Management Regulatory Programs (MassDEP, 2010a). Almost $16.5 million coming from federal grants was directed into this specific area alone. Of this $16.5 million, almost half goes to the regulatory programs for water management.

The yearly budget distributes almost $1.5 million to the Safe Drinking Water Act (SDWA) (Commonwealth of Massachusetts, 2010). The SDWA was passed in 1974 and is the principal Federal Law in the United States that ensures safe drinking water for the public (EPA, 1986). The act gave the EPA the task of establishing regulations for contaminants that might cause adverse effects and required enforcement through constant monitoring by local water providers. This specific appropriation deals with the testing and assurance that drinking water in Massachusetts is clean. To do so the state uses the guidelines set forth by the Federal Water Act (See Glossary), which dictates how and when samples are collected.

Another important organization dealing with water pollution in Massachusetts is the Department of Conservation and Recreation (DCR). They run one of the largest state park systems in the country, and therefore get a large portion of the yearly budget (Department of Conservation and Recreation, 2010a). Though these funds are important to the organization, it also relies heavily on grants to continuously implement new programs. The DCR has different programs in place to reduce water pollution coming from the parks under their jurisdiction.

One of these programs is the Storm Water Management program which focuses on ensuring that all the storm water from state parks is not contaminated (Lennon, 2010). The DCR continuously evaluates its current practices, and plans for improvement on problematic areas. This program relies heavily on the use of street sweeping and collection of garbage to avoid overflow to rivers. The budget is divided into almost $1 million from state funds, and more than $2.1 million coming from grants. These grants come from private institutions such as the Barr Foundation or government organizations such as the EPA. The aim of the program is to ensure that all of the state parks have a storm water management plans and that no polluted water is dumped into rivers or other bodies of water (Department of Conservation and Recreation, 2010b). Though the plan is addressing the issue, the large amount of land the organization oversees makes the combined $3 million in funds insufficient to ensure all parks manage their storm water plans efficiently.

The DCR's major problems are the funding cutbacks to their programs. The DCR relies mostly on grants and is victim of cutbacks, as parks are not a priority in times where funding is reduced. To cut back on spending, the DCR has focused on energy efficiency programs in most of their locations and are interested in making their facilities run efficiently.

The Boston Harbor Association (TBHA) is another of the major players in terms of water protection, conservation and cleanup (The Boston Harbor Association, 2010a). They are a non-profit organization that focuses their resources on ensuring that Boston Harbor and its surrounding areas are clean of pollution, promoting energy efficiency and green standards. Their annual budget is $320,000 and they cooperate with many organizations to implement their plans.

One of the programs that TBHA has in place is the Marine Debris Cleanup Program which consists of collection of floating debris and their proper disposal. A contractor for TBHA

removes debris from the water by hand and separates them for future recycling. The combined funding for this project is $40,000 and comes from sources including the City of Boston, Massport, Eastern Salt Company, and the Massachusetts Water Resources Authority as shown below in Figure 1 (The Boston Harbor Association, 2010a). As Executive Director Vivien Li said (2010), "TBHA aims to eventually put themselves out of business" with this specific program by not having the need to collect any debris from Boston's waterways.

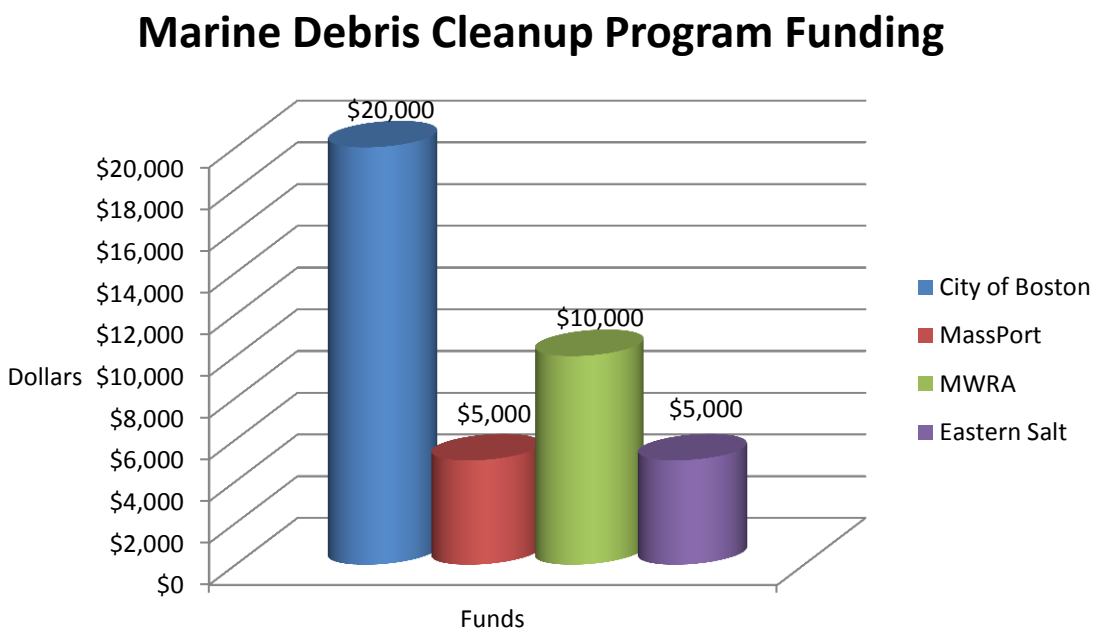


Figure 1: THBA Funding for Marine Debris Cleanup Program

(The Boston Harbor Association, 2010a)

TBHA also has in place a program called "Back to the Beaches" which focuses on protecting beaches in both the quality of their water and the cleanliness of the sand and its surroundings. To do so TBHA has teamed up with the Massachusetts Water Resources Authority, the Boston Water and Sewer Commission (BWSC) and the Department of Conservation and Recreation (The Boston Harbor Association, 2010b). The program consisted of a $30 million grant for new sand on the beaches, new and restored beach houses, more benches,

showers, walkways, and access to ensure the compliance with the Americans with Disabilities Act (See Glossary). The water quality is also monitored every week and beaches in the harbor now meet swimming water quality standards over ninety percent of the time. Through constant water quality monitoring and improvement of facilities, the program has allowed the public to enjoy clean and safe beaches for the first time in nearly two decades.

TBHA relies on funds given to them by the city and organizations such as the EPA, MassDEP and Massport, as well as donations, membership dues and events. They also host projects for universities, non-profit organizations and communities that wish to cooperate with them. A detailed summary can be seen below in Figure 2 and shows the division of their yearly budget of $320,000.

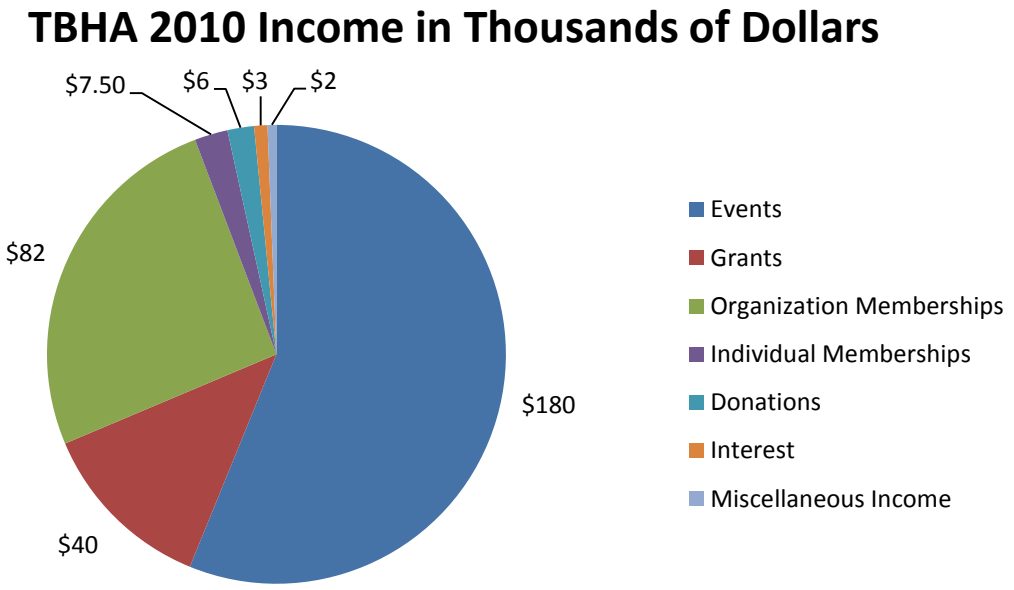


Figure 2: THBA Funding Sources

(The Boston Harbor Association, 2010a)

Though TBHA has been a leader in water protection in the state of Massachusetts, recent cuts to the environmental budget of institutions like the MassDEP and the DCR put at risk their

future contributions. To mitigate this effect, TBHA has begun to focus more on issues regarding rising ocean levels and global warming as the Barr Foundation is assigning $5 to $10 million in grants dealing with the effects of climate change (Li, 2010). One of the programs they are about to complete is the presentation of a series of maps where sea level rise is illustrated as it affects land in Boston. As Vivien Li discussed, by showing the land areas that will be flooded, residents will experience a personal attachment to the problem, and public awareness will increase. Other projects dealing with these issues are already being planned to therefore secure some of the Barr Foundation's grants and with these funds, the TBHA can continue with its mission of improving the cleanliness and safety of Boston's waterways.

OVERVIEW OF AIR RELATED CONCERNS

Air pollution has many negative effects in terms of health, and studies have highlighted the importance of improving air quality. The World Health Organization (WHO) (2002) has estimated that more than 2.4 million people die each year due to health problems directly related to air pollution. The risk for lung cancer also increases with air pollution and according to Pope (2002), the problem comes from inhalation of fine particles in the air. People in cities suffer from the effects of air quality due to high population density and the reliance on fossil fuels for heat, transportation and industrial applications.

Overall the air quality for the State of Massachusetts is acceptable and within legal standards according to The American Lung Association's State of the Air 2010 Report and the Commonwealth of Massachusetts 2009 Air Quality Report. However, Suffolk County did receive a failing grade from the State of the Air 2010 Report because of 11 Orange days (See Glossary) of high ozone from 2006 to 2008. Air related health problems in the Boston region are still a relevant issue. It is estimated that the Suffolk County has a population of 732,684

inhabitants and that 276,063 suffer health related problems related to air pollution as seen below in Figure 3.

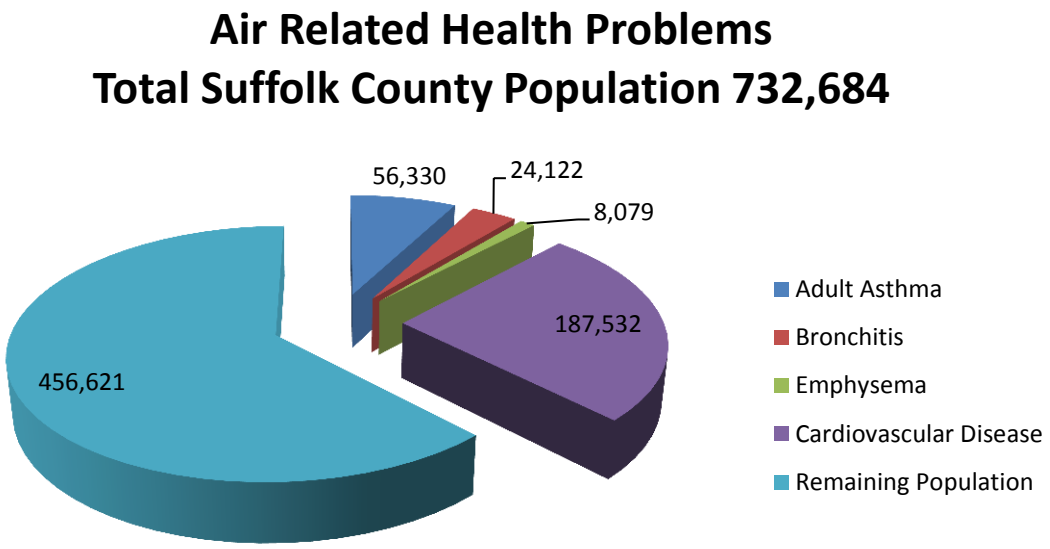


Figure 3: Suffolk County - Air Related Health Issues in 2008

(American Lung Association, 2010)

The Massachusetts Department of Environmental Protection (MassDEP) (2010e) develops regulatory programs to reduce emissions of pollutants that endanger human health and the environment. They are responsible for monitoring outdoor air quality for the state. The Boston Air Pollution Control Commission (APCC) (City of Boston, 2010a) is in charge of establishing regulations to protect Boston from air pollutants that cause health related problems or interfere with daily life. In an effort to increase awareness about air data the MassDEP launched a new MassAir Online (MassDEP, 2010f) website in April 2009. This site allows users to pick a location on a map of the state to find real-time air quality information in areas that the MassDEP has an air monitoring station.

The MassDEP has funds (Governor's Budget FY2011, 2010b) in place to improve air quality in the State of Massachusetts and the City of Boston. The projected fiscal year for 2011 for the MassDEP shows that they plan to spend $952,444 on the Clean Air Act (See Glossary). This money will go towards programs such as the Ambient Air Monitoring Network led by the Air Assessment Branch. It also shows that the Clean Air Act Operating Permit and Compliance Program will receive $1.657 million for the administration and compliance of current regulations under the Clean Air Act. Federal grant spending totals $16,335,826 for Air, Water, and Hazardous Waste Management Regulatory programs.

The federal grant spending (Governor's Budget FY2011, 2010b) for the Clean Air Act - Fine Particulate Matter Air Monitoring is $425, 357. The Ambient Air Toxics Pilot Project is registered under the MassDEP federal grant for the fiscal year of 2011 as $140,626. Both of these programs involve the maintenance and administration of several air monitoring stations around the state. These are all the areas the MassDEP funds to monitor and ensure a healthier air quality for Boston and the State of Massachusetts.

MassDEP's Air Assessment Branch (AAB) (2010b) operates a network of twenty nine air monitoring stations and 139 instruments at thirty locations across the state with a budget of $736,000 in 2010 (Ambient Air Monitoring, 2010a). Figure 4 below is a map showing the location of 5 monitoring stations in the Boston area. The AAB also oversees the operation of four privately funded industrialized monitoring stations in the Boston area which monitor the air twenty four hours a day and submit their info every hour to the MassDEP. All data compiled by MassDEP is then sent to the national Air Quality System (AQS) database which is administered by the EPA. The EPA's National Ambient Air Quality Standards will receive $309 million

nationally for fiscal year 2011 (EPA Budget in Brief, 2010a) for the prevention and control of air pollution as well as the implementation and development of programs to meet federal standards.

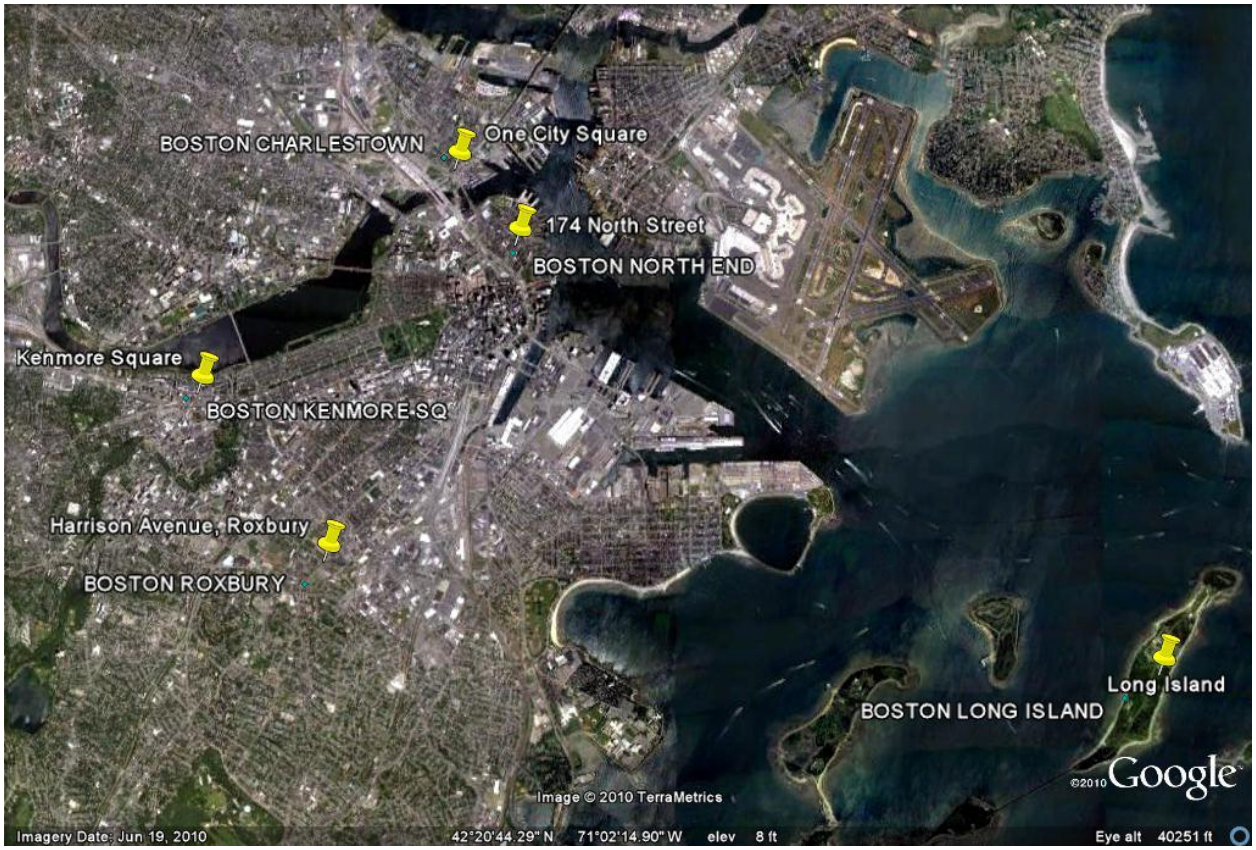


Figure 4: AAB Air Monitoring Station in Boston

(MassDEP, 2010f)

Extensive data on Boston and the State of Massachusetts in comparison to other locations is not yet fully known as the National Core Monitoring Network (NCore) for Massachusetts is not yet complete. NCore (Massachusetts 2010 Air Monitoring Network Plan, 2010c) is a new network of air monitoring stations that would collect a variety of data ranging from particle concentration, to pollutant gases and meteorological information in specific locations across the country. This data would be helpful to enforce regulations, supply information on local air quality, and provide emission levels.

MassDEP has chosen Boston-Harrison Avenue, in Roxbury, as the strategic NCore (2010c) site in Massachusetts due to its urban location and because of the work already taking placing at the location in regards to the gathering of air data. The overall goal of the NCore network is to increase scientific and public knowledge and improve technical competency of the nation's air monitoring networks. In addition to being an NCore site, Boston-Harrison Avenue has also been the National Air Toxics Trend Site (NATTS) (Massachusetts 2010 Air Monitoring Network Plan, 2010c) monitoring station for the EPA. The NATTS measures a wide range of toxic air pollutants, from black carbon to metals. The deadline for the completion of the project is January 1, 2011, but according to the Massachusetts 2010 Air Monitoring Network Plan, the project is expected to be finished by the end of 2010. This location will measure a wide range of air pollutants, from CO2 emissions, to ozone and particulate matter ($PM_{2.5}$), as well as toxic metals, and air toxics.

WASTE MANAGEMENT

Proper waste management is an important issue in cities considering the amount of waste produced per square mile. The collection and proper disposal of garbage and sewage is a difficult task in larger cities because the infrastructure to collect the waste is usually many decades old. To ensure proper disposal of these wastes, special facilities have been created to provide proper treatment. The City of Boston has a targeted budget of approximately $41 million for fiscal year 2011 to collect and dispose of solid waste and increase the recycling rate (Office of Budget Management, 2010).

Solid Waste

Solids are usually picked up in the city and taken to dump sites away from large populations. These dump sites usually are many acres across and follow a strict set of guidelines

to ensure that proper treatment is given to the waste (Bassis, 2010). Plastic layers are set every few feet to ensure that any liquids created from the decomposition process do not enter aquifers causing further pollution. Also, trash is covered every several months by soil and methane tubes are implanted in the ground to release the methane gas produced in the decomposition of wastes. These tubes are utilized in the collection of methane gas, which is used to generate electricity. The EPA (2010d) has calculated that every one million tons of waste can produce three hundred cubic feet per minute of landfill gas, enough to power seven hundred homes per year.

The City of Boston is situated in the Northeast region of the MassDEP's jurisdiction. While this region is the most populous it sends the least amount of solid waste to landfills (MassDEP, 2010d). The Northeast region only produces 412,360 tons of garbage that is sent to three separate landfills. This is only a fraction of solid waste produced because the northeast region has the highest use of combustion facilities (MassDEP, 2010c). A total of 1,468,652 tons of garbage is incinerated each year in three separate facilities. Most of the time emissions from these plants are kept within regulated levels; however, there are occasional instances where emissions go above the safe limit due to mechanical faults or power disruptions. The ash generated is also becoming an issue. A portion of the ash generated is reused in construction materials such as cement and asphalt, but the landfills designed to accept the remaining ash are beginning to reach capacity.

The Commonwealth of Massachusetts has implemented an ambitious plan to manage the solid waste generated between 2000 and 2010 (MassDEP, 2006b). The main goal is to achieve a waste reduction rate of seventy percent by 2010. A sub goal was added in a 2006 revision to reach a fifty-six percent recycling rate for the Commonwealth as the DEP recognized recycling as an important aspect to the plan. Several strategies have been implemented including

expanding and enforcing waste ban regulations, building partnerships to reduce waste, supporting cost-effect programs and driving recycling market opportunities. For example, scrap paper is now the largest American export by volume, and the export of US scrape of all kinds grew to $8.4 billion in 2005. It is estimated that through both direct and indirect economic activity, recycling generates more than $142 million in revenue for the state annually. According to the latest data update on the progress of the program, total waste reduction was at sixty-one percent in 2008 (MassDEP, 2010).

Liquid Waste

Liquid waste management refers to dealing with sewage and storm water, which if not treated, would be disposed of in rivers, lakes or the ocean. Proper management of these waters ensures not only the health of residents of a city but also the health of animal and plant life in the surroundings. Large cities produce large amounts of sewage, and if dumped directly into the ocean or rivers it can quickly destroy natural aquatic ecosystems. The MassDEP has allocated approximately $1.46 million for 2011 to enforcing the Safe Drinking Water Act and was given a grant of $215,047 for the Water Quality Management Program (Commonwealth of Massachusetts, 2010). Most of this money is generated from the $2.4 million the state makes each year in selling water (MassDEP, 2010i). This value is generated by the rate of $8.50 per million gallons of water used each year and the public water systems report that 287 billion gallons of water was used.

The latest addition to the Massachusetts Water Resources Authority (MWRA) liquid treatment centers is the Deer Island Sewage Treatment Plant (MWRA, 2010). The plant takes the waste of residential, business, and industrial sources from forty three greater Boston communities and safely discharges treated wastewater deep into the Massachusetts Bay. The

plant does this with fully approved permits from both the EPA and MassDEP following all set federal and state guide lines. The Deer Island plant greatly increases the capacity of the City of Boston to clean waste water; however, there is still the risk that during rainstorms the system can be overwhelmed and untreated waste could be discharged into Massachusetts water ways.

Recycling in the City of Boston

According to the Massachusetts Municipal Residential Recycling Rates provided by the MassDEP (2010g), the City of Boston has one of the worst recycling rates in the state as shown below in Figure 5. However, according to Svoboda (2008), who used raw data from the U.S. Census Bureau and the National Geographic Society's Green Guide (See Glossary) to compare cities, Boston was ranked third out of fifty, scoring a 4.9 out of five in the recycling and green perspective category. Other ranked categories included electricity, transportation, and green living. This survey, however, did not measure actual results of recycling programs. The grading system, in terms of recycling, was focused more on how comprehensive a city's recycling program was and how important the citizens considered environmental issues. This shows that while Boston residents are concerned about the environment, much could be done to improve their recycling rates.

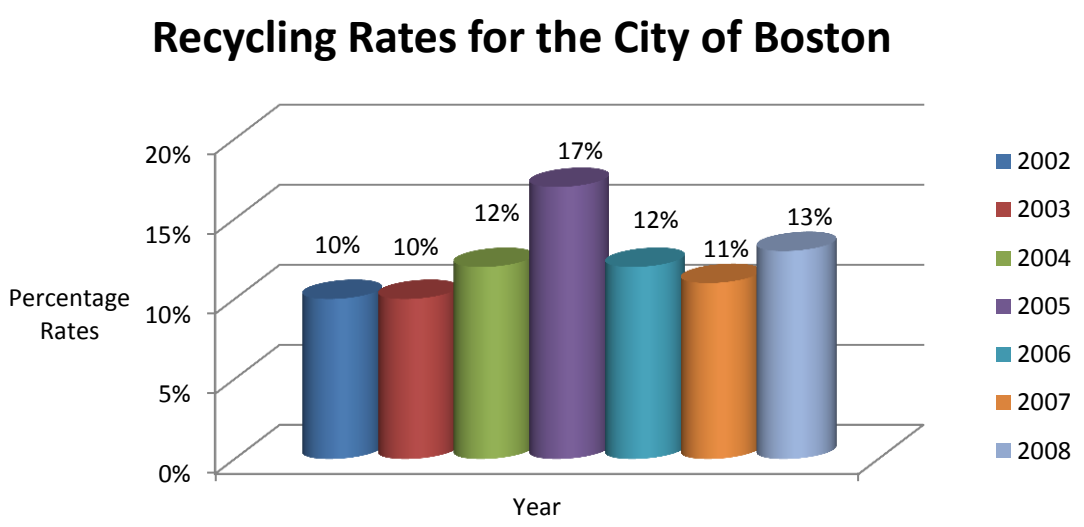


Figure 5: Annual Recycling Rates for Boston in percentages since 2002

(MassDEP, 2010g)

One of the largest programs Boston's Department of Public Works has implemented to improve its recycling rates is "Single Stream Recycling" (City of Boston Press Office, 2009b). In this method, all recyclable materials are discarded together and collected at once and sorted later at the recycling plant by an automated system. The city has provided residents with new, larger wheeled carts to provide increase capacity. The city is expected is save $1 million annually as the cost to recycle a ton of waste is generally $40 cheaper than sending it to a landfill or combustion facility. In preliminary findings, recycling rates dramatically increased in the districts where this program has been implemented. In West Roxbury, officials saw rates jump forty-four percent and in the South End by 143 percent (City Of Boston, 2010b).

New recycling facilities have been built to improve and manage the quality of the environment in the City of Boston (City of Boston, 2009a). The City of Boston recently constructed a plant which would turn fifty thousand tons of fall leaves into energy and fertilizers. Bacteria feeds on the grass and leaves to produce enough methane to power 1.5 megawatt generators and the compost generated is then used as fertilizer in Boston's community gardens.

Hazardous Waste

Hazardous waste is generally considered to be any toxic or chemical substance that poses a substantial threat to the environment or a severe health risk to the general population. These products cannot be disposed of through contemporary methods such as landfills or combustion. Depending on the product in question, it must either be treated through a special method or contained in a way that it cannot pose any risk. In previous decades, people did not know the serious repercussions of using such products. Today, much of the time and effort of environmental organizations now goes to clean up, mitigation, and prevention of hazardous waste contamination. The Hazardous Waste Cleanup Program receives the second largest allocation of the MassDEP's budget, roughly $14 million for fiscal year 2011, with administration finances getting the most.

As hazardous waste poses such a substantial risk, many organizations are involved in the efforts to protect against it. Under the direction of the EPA, both the MassDEP and the City of Boston have comprehensive programs in place to deal with this. Each municipality in the state, under the direction of the MassDEP, has created specific drop-off sites for household hazardous wastes (City of Boston, 2010c). Such waste includes auto fluids, light bulbs containing mercury, cleaners and pesticides, paint, and propane tanks. In some cases, used paints that are still in good condition can be handed in and redistributed. Not only does this lessen the amount of toxic pollution, but the state also generates some revenue from the programs (Commonwealth of Massachusetts, 2010). The MassDEP, for example, generates over $3 million a year from toxic use and hazardous waste transportation fees.

The cleanup of waste sites also provides a boost to the state economy (MassDEP, 2006a). Old industrial sites that have been abandoned and possibly contaminated, or brownfields, can be

cleaned up by private firms. A new business can then be built or the state can buy the land to place a public service such as a hospital or park. MassDevelopment is a state agency which acts as Massachusetts's finance and development authority (MassDevelopment, 2010b). They work with both the public and private sector to stimulate economic growth by preparing and funding key sites of development. Between fiscal years 2004 and 2008, they financed and managed more than nine hundred projects, representing an investment of more than $9.4 billion in Massachusetts. One such program they administer is the Brownfields Redevelopment Fund (BRF) Program. The program provides tax incentives to clean the land (MassDevelopment, 2010a). The BRF Program has been capitalized with $60 million by the state legislature since its inception in 1999. Through this program, brownfield site assessments can receive interest-free financing up to $100,000 and remediation projects can receive a below-market rate financing up to $500,000.

ENERGY AND CONSERVATION

Energy and conservation is another integral part of the efforts to mitigate climate change. The efficiency of structures can be vastly improved as non-polluting, green energy is a quickly growing sector of the economy.

Green Buildings

The EPA defines green construction as the practice of creating structures and using processes that are environmentally responsible and resource-efficient through a building's life cycle (EPA, 2010b). Fifty-five percent of the total energy used in Boston comes from commercial, industrial, and institutional buildings while residential buildings account for twenty-seven percent. Over the last few years, Boston has had an increase in this type of buildings not

only because of their reduced environmental footprint but because the improvement in efficiency leads to lower operating costs.

The Massachusetts section of the EPA has been promoting green building practices as well as implementing them on some of their buildings. They are now owners of a completely new state-of-the-art laboratory which has some of the most advanced technology implemented to make it energy efficient and green (EPA, 2010c). Not only have they achieved a gold rated LEED (See Glossary) building, but they cut down energy costs over thirty percent and water consumption over forty-nine percent from the time it was constructed.

The EPA implemented various technologies in this building to ensure that it served as an example for what future construction plans should look like. One of the technologies they implemented was the use of a green roof where plants act as a barrier from the heating of the sun and water is collected and used for landscaping purposes. They also approached the construction taking into account the position of the sun at different times of the day and placed offices and other facilities accordingly. Finally they also installed wind turbines to provide the electricity for the lab and placed photovoltaic window shades so that the lab could be powered by one hundred percent green power. The annual savings these buildings provide give a reason for other institutions to implement these technologies in their buildings.

Massport is currently investing in making some of their buildings greener as well. Through the use of more efficient practices and implementation of green technologies, they plan to reduce their building's environmental footprint (MassDEP, 2010d). With plans to invest almost $583 million in the next five years, and total assets reaching almost $1.5 Billion (Massport, 2009), Massport has the capital to implement many green initiatives and practices.

One of the specific projects that the Massport has dealt with is the continuous improvement of Logan International Airport's green practices. They have implemented plans like Boston Logan Recycles, where recycling bins have been located around the airport to reduce the amount of waste and increase the amount of recyclable material. Massport also spent $55.7 million in renovating the Terminal B Garage, and retrofitting it with solar panels, LED lighting and more efficient energy consumption practices. Finally among other plans, Massport also placed wind turbines on top of the Logan Office Center to generate clean energy, and through the use of Compressed Natural Gas buses they have shuttled passengers for more than thirteen million "clean air miles."

The City of Boston's government is also trying to implement green construction ideas into some of their buildings. Mayor Menino has not only shown an interest in this initiative but has now started to implement some of the solutions in city owned buildings. They received a $500,000 commitment from the state to develop the Boston Energy Alliance which would implement large scale, energy efficiency solutions citywide (City of Boston, 2009c). The plan is that this corporation will invest $300 to $500 million to improve the efficiency of buildings throughout the city. As a demonstration, the Boston City Hall installed a green roof to show the positive effects of using this solution. The benefits include reduced energy and heat consumption, reduction of storm water pollution and natural insulation (EPA, 2010b).

They have installed twenty five combined heat and power units in different schools (City of Boston, 2010e). The idea behind these units is that they generate the electricity used by each one of the schools, and use the steam created as a byproduct to provide heating during winter (The Cleaverton Research Group, 2010). These units have saved the city almost $8 million annually. They are also assigning a $2 million grant from the Massachusetts Renewable Energy

Trust to promote its renewable energy and healthy building design through their Green Affordable Housing Program (See Glossary).

The Massachusetts Renewable Energy Trust is another important organization that finances and distributes grants to different programs. They have now been absorbed into the larger Massachusetts Clean Energy Center, which in turn deals with larger programs and has some initiatives of its own (Renewable Energy Trust, 2010). The organization mainly finances programs that plan to improve energy efficiency by implementing green technologies like wind turbines and solar panels. The Renewable Energy Trust has almost one thousand programs that they have financed at investments ranging from millions to thousands of dollars.

One of the programs they financed is the Cape & Islands Self Reliance program (Massachusetts Renewable Energy Trust, 2002). This specific initiative granted over $550,000 to the Cape & Islands Self Reliance Corporation to install 116 kW of solar panels on various locations throughout the Cape. The idea behind the project is to create clean energy in the Cape to power schools and municipal buildings, and to also increase knowledge on these types of energy resources.

Energy

Mostly everything we use today in our daily lives requires some sort of power to operate. Currently most of this power is generated by burning fossil fuels such as petroleum, natural gas, or coal. This, however, is unsustainable as not only are the sources finite but the emissions generated by their burning damages the environment. For a sustainable future, fossil fuel sources need to be replaced by renewable sources such as wind, solar, and hydropower. Nuclear fission is also an option but the danger of radiation and the question of what to do with the waste limits the scope to which it can be used. (Friedman, 2008)

One of the main ways that Massachusetts is working to bolster the green energy market is by requiring energy providers to generate a portion of their energy from green sources. The Renewable Energy Portfolio Standard (RPS) and Alternative Energy Portfolio Standard (APS) set a number of guidelines that need to be met by energy providers and institutions (Executive Office of Energy and Environmental Affairs, 2010). Beginning in 2003 under the RPS, energy providers were given an obligation of generating one percent of their energy from green sources, with a one half percent annual increase. With the passage of the Green Communities Act in 2008, the sources were split into two separate classes and the annual obligation increase rose to one percent. The APS was established under Green Communities Act to provide incentives for businesses, institutions, and governments to install alternative energy systems that are not renewable, but cleaner and more efficient than fossil fuel systems.

The Commonwealth has also been taking advantage of the federal stimulus package the American Recovery and Reinvestment Act of 2009 (ARRA) (See Glossary). More than $70 million is being invested to projects across the state (Department of Energy Resources, 2010). One example supporting green energy is the Solar Stimulus. Approximately $20 million is being invested in installing 4.1 megawatts (MW) of photovoltaic systems at twelve public water and wastewater treatment facilities (Martinez, Haberlin, & Johnson, 2010). These twelve contracts represent the largest award for solar energy installations at public facilities in the state's history. An additional $4 million under the Commonwealth Solar Stimulus program is going to fifty six other projects that look to install solar facilities ranging from five kilowatts to two hundred kilowatts of power each (Capone & Plourd, 2010).

The City of Boston is also making a strong commitment to the adoption of green energy as the city is the largest municipal purchaser of wind power in the New England region and

receives 11.7 percent of its power from renewable energy (City of Boston, 2010e). On March 6, 2009, Mayor Menino announced the Renew Boston Plan with the goals of a 200 MW electricity demand reduction through alternative energy and efficiency and twenty five megawatts of solar power installations by 2015 (City of Boston, 2010d). Solar Boston is a $500,000 program aimed at promoting solar technology throughout Boston, working with local organizations to maximize participation in state and federal incentive programs and to create a non-profit group to implement the long-term goals of the partnership (Rickerson, 2008). The program brings funding, people, and ideas together from organizations such as the US Department of Energy, National Renewable Energy Laboratory (See Glossary), and Massachusetts Technology Collaborative (See Glossary). The projected solar capacity for Boston in 2008 was approximately 1,770 kilowatts of solar energy. However, an analysis done by the Solar Boston (See Glossary) group estimates that the city has the technical potential of 670 to nine hundred megawatts, or fourteen percent to nineteen percent of electrical consumption in 2006. With this program, Boston and Massachusetts hope to become a world leader in solar energy and a model for other cities.

As Boston is one of the windiest cities in the nation, the Office of Environmental and Energy Affairs is actively promoting the installation of wind turbines (City of Boston, 2010g). Massport installed twenty roof-mounted wind turbines as a demonstration at Logan Airport's Office Center in 2008, each capable of generating one kilowatt of clean power. The MWRA is also hoping to capitalize on wind energy in the Boston region. In November of 2009, two separate six hundred kilowatts turbines were installed at the Deer Island Sewage Treatment Plant which is expected to save $250,000 annually. Plans are under way for the addition of four more turbines.

Transportation

As society has become dependent on the rapid transport of both people and goods, transportation has become one of the leading sources of greenhouse gases, accounting for roughly twenty seven percent of total US emissions (Office of Transportation and Air Quality, 2006). Passenger cars accounted for thirty-five percent of greenhouse gas (GHG) emissions from the transportation sector in 2003, with all on-road vehicles accounting for eighty-one percent.

The Commonwealth of Massachusetts has three agencies that manage and supervise almost all transportation affiliated issues; the Massachusetts Bay Transportation Authority (MBTA), the Massachusetts Port Authority (Massport), and the newly formed Massachusetts Department of Transportation (MassDOT). The MBTA oversees all of the greater Boston areas mass transit systems including buses, ferries, subway, and commuter train network. Massport operates the seaports and airports in central and eastern Massachusetts but mostly focuses on the Port of Boston and Logan International Airport. The MassDOT was recently formed in 2009 from the integration of several different organizations that managed different parts of the state's transportation network. The agency also provides greater oversight and coordination of the MBTA, but legally they are still two separate entities. The City of Boston has its own transportation department whose primary focus is to improve safety and traffic flow and maintain the traffic signals and parking meters.

The Commonwealth of Massachusetts has also enacted several laws which hope to cut down on vehicle emissions. One such piece of legislation is the Massachusetts Vehicle Idling Regulation (MassDEP, 2010h). The regulation states that no motor vehicle may keep its engine operating for longer than five minutes unless it is necessary for repairs being completed, to receive or deliver goods, or to operate heavy machinery when no alternate power source is

available. Diesel train engines are covered under the same regulation but are allowed thirty minutes and planes are allowed to keep within the bounds set by the airport. A number of states have also begun to adopt emission standards for vehicles that are stronger than those passed by the federal government. California began the trend and several states, including New York, Massachusetts, and Maine, have followed suit.

To meet the standards that have been set, Massachusetts runs the Enhanced Inspection and Maintenance (I&M) Program that all road vehicles must pass. From January 1st to September 30th of 2008, the I&M Program conducted inspections on 3,475,390 cars and trucks, roughly seventy-five percent of the state's 4.63 million registered vehicles (MassDEP, 2009a). Of this, 114,371 or 9.2 percent of the 1.56 million gasoline fueled vehicles failed their initial tests. Those vehicles that were retrofitted and brought up to standard compliance levels recorded an average reduction of pollutant gases by seventy-one percent.

The EPA has $8.6 billion that are distributed by the Congestion Mitigation and Air Quality (CMAQ) Improvement Program throughout the country to various state DOTs and Metropolitan Planning Organizations (MPO) (Federal Highway Administration, 2009). In fiscal year 2008, Massachusetts and the Boston MPO had a total of $60 million to distribute to various programs (Regan, Murphy, & Hines, 2009). Such programs included the Statewide School Bus Retrofit Program which received $16.4 million over three years and was sponsored by the MassDEP to improve school bus emissions. The Intelligent Transportation System (ITS) program received $6.2 million with the intent of incorporating technology into the transportation sector to better manage traffic flow and cut down on fuel consumption. The City of Boston MPO was given $1.9 million to purchase hybrid locomotive switches to use in rail yards.

There are many other initiatives by various transportation agencies in and around the Boston metro area. Massport has been working since 2000 to fulfill a commitment to operate all facilities in an environmentally sound and responsible manner (Massachusetts Port Authority, 2009b). It has since been recognized internationally for its efforts including the nation's first LEED and ISO 14001 (See Glossary) certified terminal, ranked among the top three terminals for most efficient, head-of-line privileges for clean cabs, and a voluntary emissions reduction initiative to keep nitrogen oxide level at or below 1999 levels. With help from the ARRA, Massport received more than $13 million in federal funds to repave one runway with 'warm-mix' asphalt which is significantly more environmentally friendly than regular asphalt (Massachusetts Port Authority, 2009a). They also installed electric plug stations on twenty two berths at Massport's Fish Pier so fishermen could turn off their engines (which would normally provide power), reducing emissions by ninety-five percent.

The newly created MassDOT has adopted the GreenDOT Policy Directive in the hopes that the agency will become a national leader in greening the state transportation network (MassDOT, 2010b). The policy is driven by the three main goals: reduce greenhouse gas emissions, promote the healthy transportation options of walking, biking, and public transport, and to support smart growth development of the transportation system.

Biking has become a very popular mode of transport over the past decade and both MassDOT and the City of Boston have strong programs in place to support the activity. The Massachusetts Bicycle Transportation Plan prepared by the Executive Office of Transportation plans to construct a 740 mile Bay State Greenway of both on-road and off-road bike trails (Executive Office of Transportation, 2008). This plan would cost roughly $687.8 million dollars over the next twenty five years. The City of Boston was also awarded approximately $3 million

in federal funding from the US Department of Transportation for the Boston Bike Share Program making thousands of bikes available to residents with the swipe of a card (Moskowitz, 2010).

GRANTS AND CONTRIBUTIONS

Most organizations that deal with environmental problems in Boston rely on grants and contributions to carry out their programs. While government organizations such as the EPA provide grants to help with specific problems, non-profit and charity organizations also invest large portions of their budget in various projects. The understanding of each of these organizations and how they distribute their resources is important as they fund most projects in the City of Boston.

The Barr Foundation

Founded by Amos and Barbara Hostetter, the Barr Foundation is the state's largest private foundation (The Boston Globe, 2010). It is a charitable organization that has given grants in excess of $414 million dollars in the past decade. According to IRS data from 2003, the Barr Foundation reported assets of $670,969,000 and an income of $127,352,000 (Barr Foundation, 2005). More recent financial information about the organization shows that in 2008 their assets were reported to be $838,566,992 with an income of $298,857,082 (faqs.org, 2010a). In the beginning of 2010, the Barr Foundation gave $50 million dollars to Boston-area non-profit organizations to tackle climate change (The Boston Globe, 2010).

The Barr Foundation's mission is to improve the quality of life for all residents living in the Boston area (Barr Foundation, 2007). Their primary areas of focus are quality education, climate change mitigation, and cultural awareness enhancement. They do this by understanding the organizations they work with, strengthening connections, advancing racial justice, encouraging continuous learning, and supporting community leaders. This foundation works by

supporting non-profit organizations that received a personal invitation to be assisted through technical operating support, grants for programs, and capital assistance. Barr foundation staff members work closely with community leaders, other foundations, government, and non-profit organizations. The foundation uses several tools such as maps and databases with contacts and project information of the several organizations they work with and the relationship between them.

Since 1998, the Barr Foundation has invested over $117 million (Barr Foundation, 2010) to support local environmental organizations. Pat Brandes, the Executive Director wants to focus on the two largest producers of greenhouse gases in Boston: buildings and transportation. Two thirds of the city's emissions are produced by buildings and their plan is to make energy efficient retrofits that reduce greenhouse gas emissions.

The Massachusetts Clean Energy Center

The Massachusetts Clean Energy Center (MassCEC) was created as a result of the Green Jobs Act in 2008. The idea behind the project was to make clean energy a centerpiece for Massachusetts's economic future through funding opportunities for projects and initiatives (The Massachusetts Clean Energy Center, 2010). The Green Jobs Act states that the MassCEC is to be established to tackle the implementation of clean energy and technologies that significantly reduce the reliance on non-renewable energy resources. Such technologies include the use of solar, wind, water, biomass and other sources of alternative energy generation, as well as research to improve on some of the existing technologies. With its leading academic research, technology entrepreneurship and workforce skills, Massachusetts should quickly become a hub for green energy worldwide.

The MassCEC is part of the Executive Office of Energy and Environmental Affairs but is not subject to supervision or any control by them. The Massachusetts Renewable Energy Trust fund also became part of the center as it now acts as the funding body to all projects. The center is governed by a board of fourteen directors which have expertise and power positions in various areas of interest for the organization. The directors are assigned as shown below in Figure 6. Some specific positions can assign a designee to represent them.

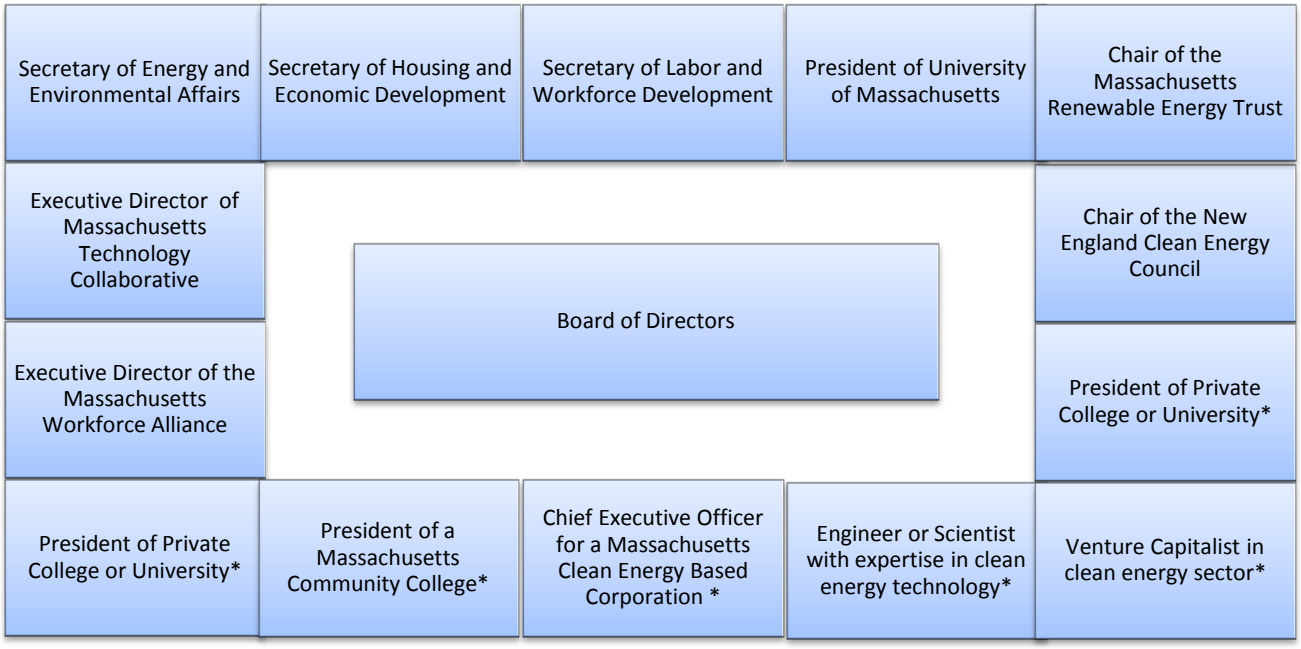


Figure 6: Massachusetts Clean Energy Center Board of Directors Distribution

(Positions marked with * are designated by the Governor)

The organization's grants are given through the Massachusetts Renewable Energy Trust, which uses funding from a surcharge on electricity bills (Plourd, 2010). This surcharge is their main line of income, and has been charged to Massachusetts residents for the last twenty years, divided as shown below in Figure 7. The MassCEC's total budget for 2010 consisted of almost $92 million, with $60 million awarded for clean energy projects, $45 million going directly to the installation of photovoltaic panels, $8.6 million for the development of sixty seven wind

power projects and $650,000 to improve power production from six small hydroelectric plants. Their budget for 2009 also included $20 million coming from the Massachusetts government, but only as a onetime grant. They invested over $34.6 million since 2005 to support green buildings and renewable energy installations. The MassCEC has funded 1084 projects, with investments ranging from $10,000 for solar panel installations, to a $5 million investment in the expansion of A123Systems, a corporation specializing in green technology.

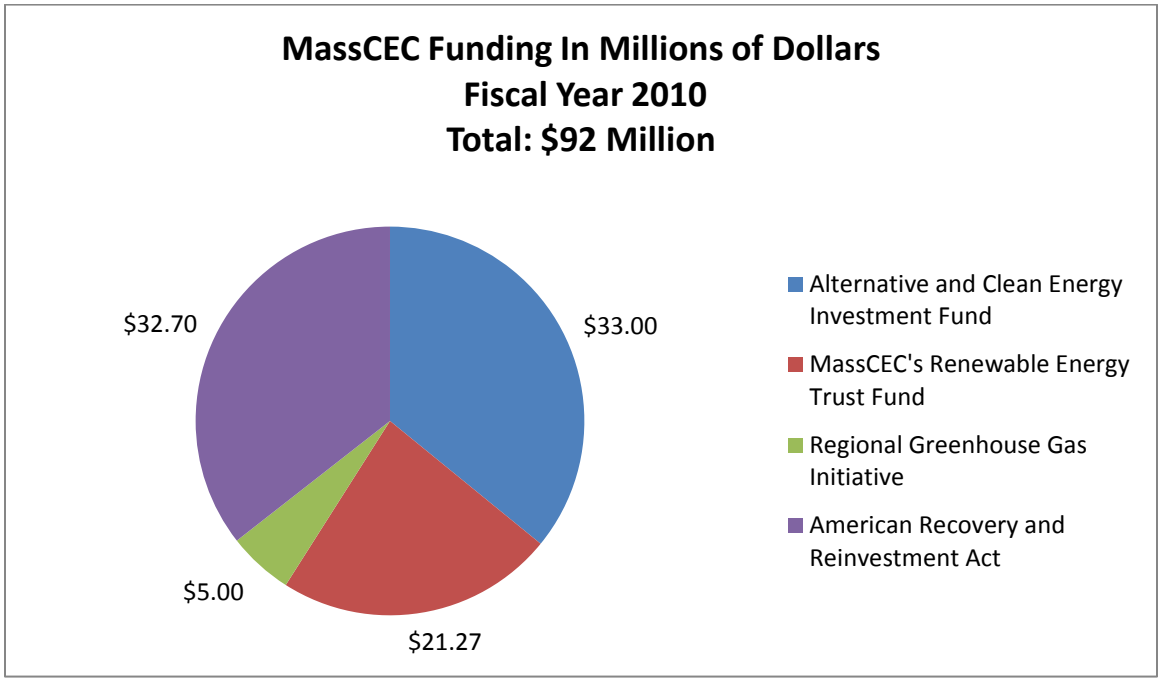


Figure 7: Division of MassCEC Funding for FY2010

(MassCEC, 2010b)

The Center has also worked with many universities in the past and has interacted directly with WPI in their contribution to the Institute for Energy Innovation and Sustainability (IEIS) project in Worcester (WPI, 2010). The IEIS was conceived by U.S. Congressman James P. McGovern to include Worcester in the green jobs, clean energy, and sustainability sectors. The Institute is concentrating on three distinct subjects: implementation of energy saving technologies, energy generation from sustainable sources and storage, transmission and use of

energy. They received a $150,000 grant to get the operations started with the help of WPI and Clark University, which would provide the center its expertise with green buildings, engineering and technology.

Federal Granting Process

Federal grant is a complex process that entails several obligations for the applicant. There are three types of grants: project grants, formula grants, and earmark grants (Federal Grants, 2010f). Project grants are funded by the government for research projects. A formula grant rewards states or localities based on formulas that show rate of infant mortality, poverty, and unemployment compared to the specific population. Earmark grants provide funds for projects or specific exemption from taxes. Legislators try to secure specific funds for particular projects or organizations in their respective state or district. In the past, members of Congress did not have to identify the project or themselves on the record. There is criticism of federal grants, as the general public argues that those who are familiar with the process can receive money rather than those who really need it.

Federal grants require expertise which a few individuals possess; as a result most federal grants are awarded to institutions, organizations, or state and local governments (about.com, 2010). Some organizations have full time employees that are responsible for applying and administering federal grants. Obligations must be met to be considered for the federal grant. A strict process must be completed, and detailed government requirements must be fulfilled if the money is granted.

Money becomes available for federal grants once the federal budget is approved (about.com, 2010). Grant projects that have been approved will then appear on the Catalog of Federal Domestic Assistance (CFDA). The CFDA contains a list of administered grants and

assistance programs. Newly available programs are announced in the Federal Register as a Notice of Funding Availability (NOFA). Submission of proposals and deadlines change for each organization and the type of grant they are applying to.

The process of acquiring a federal grant is complicated and requires several steps (Grants Process Overview, 2010). Preparation is the first step. Deadlines for the applications must be known months ahead of time. Research must be done to know if similar projects in the area or state have been approved. The proposed project goal must be unique and clearly established. Community support from academic, professional and government organizations are essential and often requested for federal grants. The basic components of a proposal include the proposal summary, introduction of the organization, the problem or needs statement, the project objective, the methods to accomplish it, the project evaluation, future funding, and specific and detailed budget. Once submitted, it is reviewed, a process that usually takes several months.

LAWS AND REGULATIONS

Laws play a large role in shaping the future of environmental projects in the City of Boston as resources are situated to different problematic areas. Organizations will shift their projects to where the resources are and lobby groups will try to push for legislation in their interest.

One of the most important laws in terms of environmental protection and energy was the Green Jobs Act of 2008. It was created to stimulate clean energy companies, while at the same time creating green jobs and provide training in the field. The bill was drafted with the help and guidance of the New England Clean Energy Council, an organization which aims to accelerate New England's clean energy economy for the benefit of its members, all of which are clean energy companies (New England Clean Energy Council, 2010). The bill assigns $25 million to

startup clean energy companies with grants from $2 to $5 million per year (Mass High Tech, 2008). It also gives $2.5 million to help with the training of experienced entrepreneurs and $12.5 million to train the workforce at local colleges and universities. The act also created the Massachusetts Clean Energy Center which would serve as the state's lead organization for the development of green projects. The center invested almost $60 million in 2010, making it one of the largest contributors to the clean energy sector.

Another of the important state legislations that has recently passed is the American Recovery and Reinvestment Act of 2009 (Mass.Gov, 2010d). This economic stimulus plan intends to create jobs and promote consumer spending during the recession. The government passed the act on February 17, 2009 and allocated almost $5.6 billion to Massachusetts alone. Almost $238 million were assigned to clean energy and environment, and as of 2010, $67 million has been spent at an average quarterly rate of almost $20 million. The main focus of the bill in terms of energy and environment was to incentivize new clean energy opportunities and create green jobs.

There is also the Massachusetts Global Warming Solutions Act (Sullivan, 2008) , which requires the reduction of greenhouse gas emissions by eighty percent from 1990 levels by 2050. By 2020, the plan is to have a reduction of twenty-five percent. Gradual reduction of emission levels allows for innovative change and entrepreneurship to deal with the current environmental problems. This new legislation supports research-and-development, entrepreneurship, and career training in the clean-energy technology industry.

On a national level, the American Clean Energy and Security Act, was introduced to the House of Representatives by Henry Waxman from California (Waxman, 2010). The main points of the bill include support for renewable energy, a smart power grid, standards and incentives for

improving energy efficiency, a cap-and-trade system to limit pollution, a plan for expanding clean transportation, and building a clean energy economy that will create millions of jobs. This legislation proposes the reduced emissions of greenhouse gases every year by a certain percentage, which the government believes will inspire the development of a clean energy economy in the United States. Representatives of the government argue that our dependence on oil undermines our national security and economic progress. The bill passed the House of Representatives on June 26th, 2009 with a vote of 219 to 212 and is currently under review in the Senate (Altman & Herzog, 2009).

While there are currently other bills waiting to be approved, most of them are small in terms of the budget allocated to them. There is the Off Highway Vehicles Bill, which aims to give officers the tools to enforce destructive riding on public and private lands. There is also the Sustainable Water Resources Act which aims to restore the state's protection for water resources. These bills each deal with very specific tasks and as such, do not have the same amount of funding as larger projects.

CHAPTER 4: TRENDS AND FUTURE FOCUS

Identifying the future focus of the green movement in Boston takes a strenuous analysis of the information compiled in our research. While countless organizations in the city work in the environmental field, their focus, involvement, and resources they work with vary greatly from one organization to the other. To better understand where the focus is shifting, we decided to first explain how the financing for organizations is being altered, what programs have had their budgets cut, and where new money is being directed.

BUDGET TRENDS

From Figure 8 below, we can see that over the past few years the appropriated budget from the state given to the MassDEP has slowly decreased. Since 2008, the total budget for all Massachusetts state environmental departments has dropped by nineteen percent (Goodman, Moser, & Bachrach, 2010). In times of economic difficulties, governments usually cut the budgets of departments such as the DEP and the DCR. According to the Environmental League of Massachusetts, the top three impacts of cutting environmental budgets are that environmental law enforcement is compromised, water quality is compromised due to reduced technical assistance at water treatment facilities, and parks and campgrounds are forced to close due to a lack of staff. According to Bacharch and Moser, if parks and beaches are not open, the $14 billion tourism industry and its jobs are at risk.

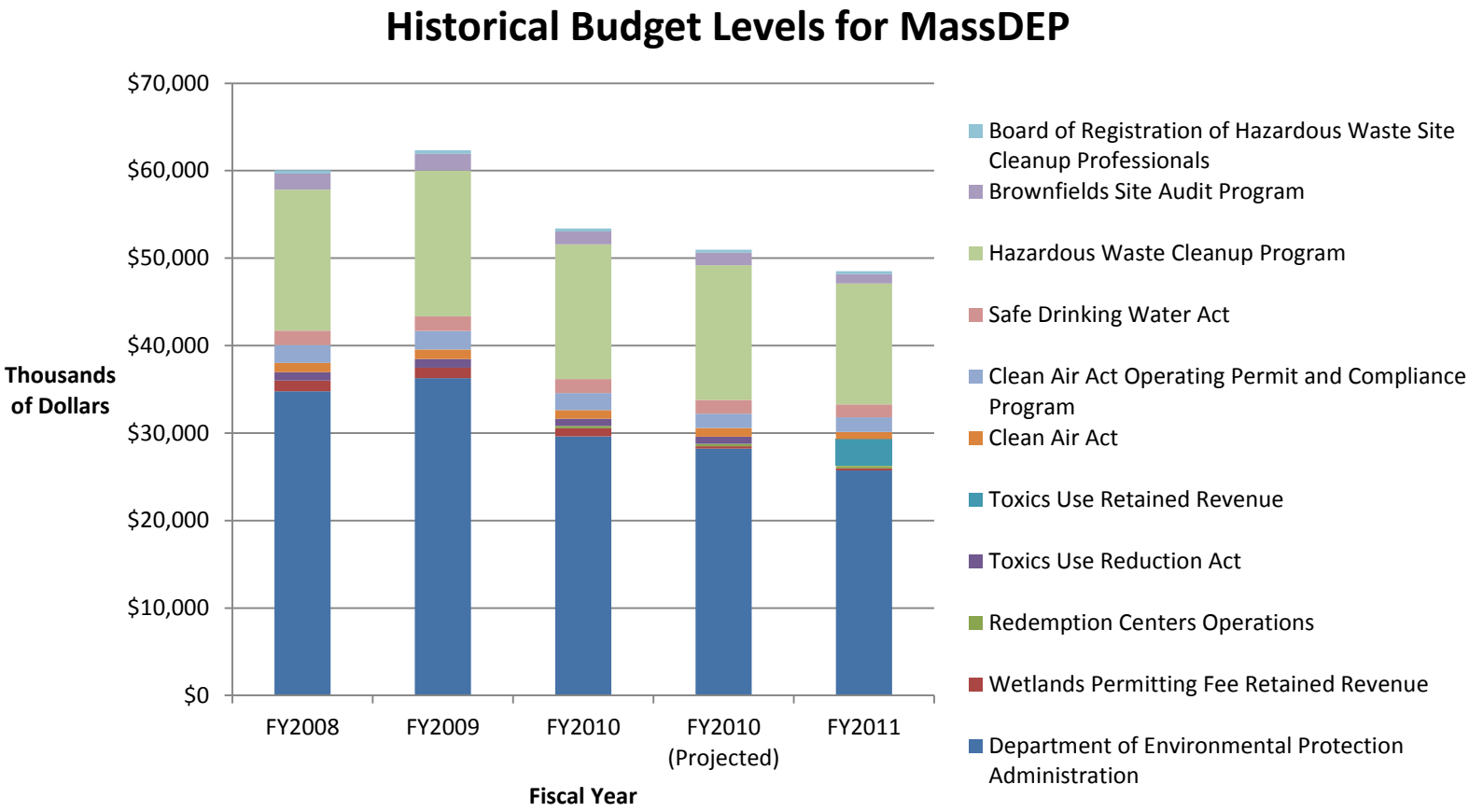
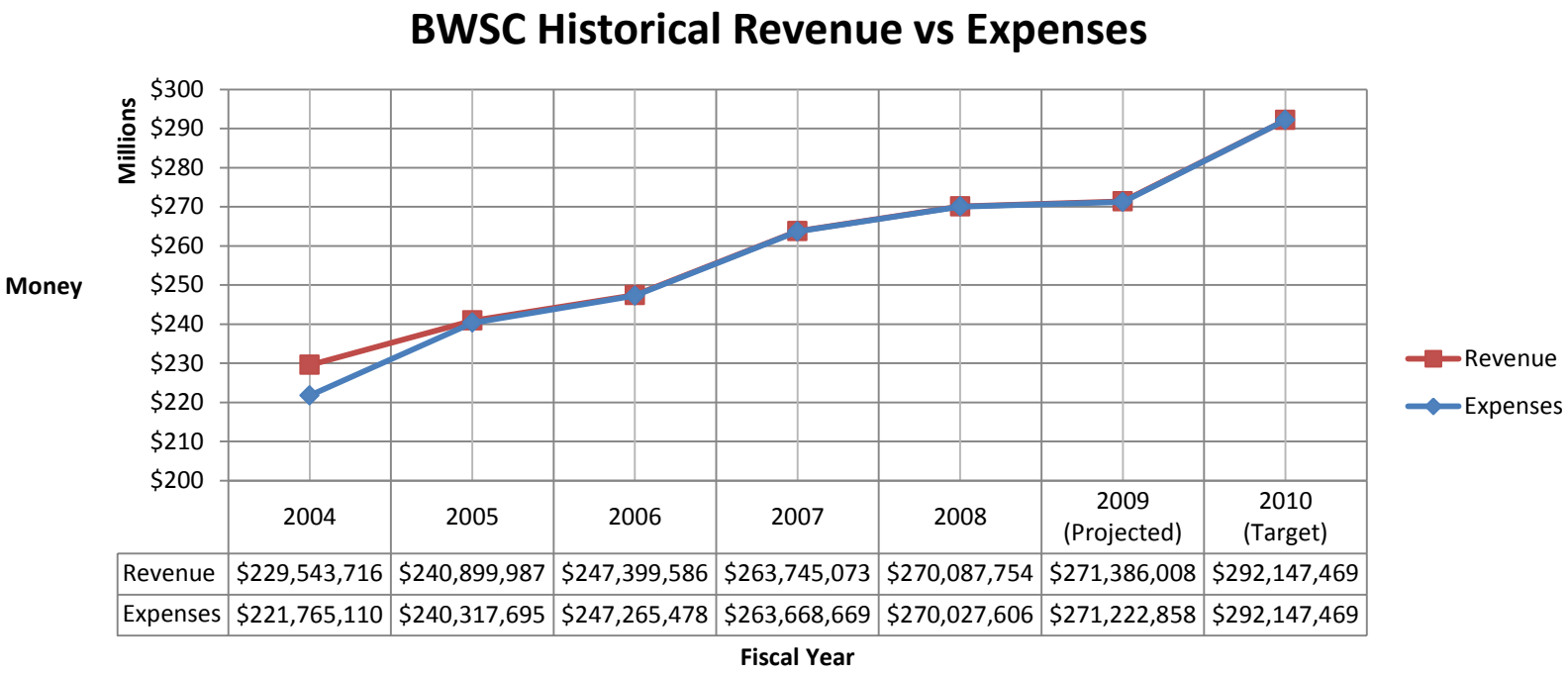


Figure 8: Detailed Graph of MassDEP Appropriated Budget

(Commonwealth of Massachusetts, 2010)

The state budget has also suffered cuts on programs, and Office of Technical Assistance (OTA) under the direction of the Executive Office of Energy and Environmental Affairs (EEA), has been greatly affected. The purpose of the program is to help businesses shift from using toxic chemicals in manufacturing processes to safer alternatives. For example, last year they worked to develop a new printing method for textile manufactures. One company adopted this new method and reduced their volatile organic compounds usage by eighteen thousand pounds, eliminated wastewater discharges, and decreased energy consumption by eighty-five percent. An OTA cost-benefit analysis estimated a roughly five to ten percent savings in productions costs. However, due to their budget being cut the installation of these new printers is at a standstill throughout the state. Between 2009 and 2010, their budget was cut by forty-five percent and they expect further cuts in the 2011 budget.



	2004	2005	2006	2007	2008	2009 (Projected)	2010 (Target)
Revenue	$229,543,716	$240,899,987	$247,399,586	$263,745,073	$270,087,754	$271,386,008	$292,147,469
Expenses	$221,765,110	$240,317,695	$247,265,478	$263,668,669	$270,027,606	$271,222,858	$292,147,469

Figure 9: Boston Water and Sewer Commission Historical Revenue vs Expenses

(Boston Water and Sewer Commissions, 2009-10)

While some organizations suffer budget cuts, there are others which are not susceptible to the downfalls of economic collapses. As seen above in Figure 9, the Boston Water and Sewer Commission has seen an increase in their revenue to match their expenses. The BWSC is funded primarily through assessments and rate charges on the use of water. In order to generate the necessary operational funds, the rate is increased periodically to meet demand. For fiscal year 2010, the commission charges a combined water and sewer rate revenue of $13.47 per one thousand gallons of water with a projected increase of 8.8 percent annually for the next two years. The MWRA follows a similar structure. While most of the money is dedicated to maintaining basic operations and wages, it does mean that there is a continuous pool of money available for green energy and efficieny projects.

The Environmental Department for the City of Boston has a very small operating budget, about $1.3 million annually on average. Approximatly eighty-four percent of this goes towards

personal salaries. The department does however receive external funds for a number of programs each year. As seen below in Figure 10, this value is usually a small amount spent out amoung a number of various programs that are drafted when needed. With the passage of the federal stimulus bill, the American Recovery and Reinvestment Act of 2009 (ARRA), there is suddenly a large influx of available funds for green energy and efficiencey programs. Figure 10 also shows Boston has received millions of dollars to put towards environmental initiatives, many of which have been delayed for years due to a lack of funding. As was discussed in Chapter 3, there are many different projects around the state funded by money from the ARRA and Boston is taking full advantage of this extra funding.

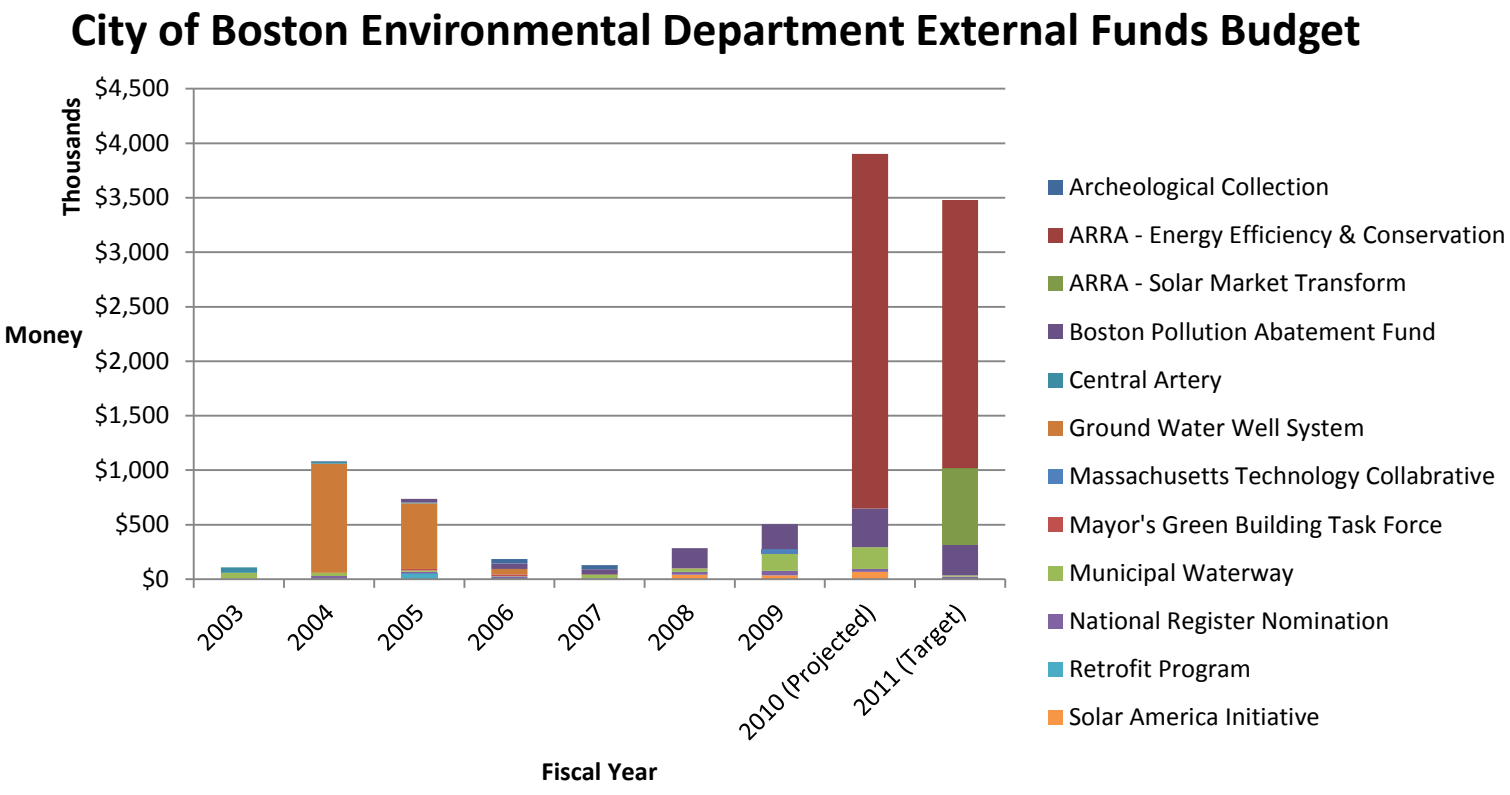


Figure 10: City of Boston Environmental Department Historical External Funding

(Office of Budget Management, 2005-10)

FUTURE FOCUS

As we have seen in Boston, the focus is currently moving towards two main issues: green initiatives and climate change. The reason for this is that organizations tend to follow the money and a substantial amount of funding is being designated to these issues.

The implementation of renewable energy and optimization of resources has been a recurring theme in our interviews and research. This is justified by that fact that a large amount of funding continues to be directed to these programs. Also, Boston's location makes some of these solutions more attractive to potential organizations. Since the Northeast does not have the resources to produce large amounts of energy, it is necessary to import them from other states, resulting in higher energy prices. Producing electricity locally is a better long-term economic solution so that Boston can be more self-sufficient in its energy needs. The higher startup cost of renewable energy production is mitigated by the fact that the energy is produced in-state. The government is therefore supporting these initiatives by passing laws and financing projects statewide, ranging from installing wind turbines on Cape Cod to partially subsidizing small solar home projects with tax breaks. The government is also assigning its resources to help emerging green energy companies therefore creating green jobs. This was a direct result of the Green Jobs Act, in which the Massachusetts Clean Energy Center was created. Legislation has also been passed to ensure that several energy efficiency guidelines were followed. One of the guidelines mandates that fifteen percent of the energy used by the state needs to come from renewable sources.

Another reason behind the emphasis given to efficiency and clean energy is that direct solutions for pollution involve large investments but usually generate no monetary returns. One example is the Marine Debris Cleanup Program by the TBHA, where they invest $40,000

annually in cleaning the harbor but do not receive any financial returns (The Boston Harbor Association, 2010a). Private companies and large organizations will usually only invest in environmental technologies if they can save money over time or if the implementation of these technologies will make their company more attractive to its customers. The implementation of solar panels on the roof of the Terminal B garage at Logan Airport by Massport is one example. The project cost almost $1.4 million but generates eighty three megawatts of electricity, which accounts for 2.5 percent of their total garage annual consumption (Massport, 2010). These savings, coupled with possible tax exemptions attract companies into investing in energy efficiency and clean energy resources. These larger companies also have budgets which allow them to invest in these costly technologies with more ease than smaller organizations, as they can better absorb the initial cost.

The clean energy sector has one of the largest allocations of funds in Boston. In terms of government funds, the ARRA assigned almost $27.2 billion to clean energy research and implementation, of which $238 million was directly given to the clean energy sector in Massachusetts (Mass.Gov, 2010d). Of this $238 million, almost $68 million has already been spent since the bill passed in 2009. The Massachusetts Clean Energy Center also invested almost $60 million in 2010 directly to the implementation of clean energy initiatives in Massachusetts through almost 1084 projects (MassCEC, 2010a). Massport is also planning on investing almost $583 million in the next five years, much of which is going into renovations to make buildings more efficient (Stordy, 2010).

This becomes one of the most effective ways of reducing the degradation of the environment. The use of clean energy resources reduces air, water and soil pollution by not creating the contamination in the first place, with the added advantage that it also creates profits

and jobs. Efficiency also creates savings and reductions across the board allowing organizations to cut down on operational expenses, retain key personnel, and increase revenue. Though many resources are going into these sectors, they are relatively new. As such, many organizations are just beginning adopt these methods and need assistance in implement them. The clean energy and efficiency sectors are where we feel Worcester Polytechnic Institute and the Boston Project Center will find the best project opportunities.

REFERENCES

about.com. (2010). *Federal Government Grants.* Retrieved September 14, 2010, from http://usgovinfo.about.com/od/moneymatters/a/granttruth.htm

Altman, P., & Herzog, A. (2009, May 22). *The American Clean Energy and Security Act (ACES) Can Help Build the Clean Energy Economy and Solve the Climate Crisis.* Retrieved March 31, 2010, from http://www.nrdc.org/globalWarming/legislation/waxman.asp

American Lung Association. (2010). *State of the Air Report.* Retrieved September 1, 2010, from http://www.stateoftheair.org/2010/assets/SOTA2010.pdf

Attorney General Office. (2009a). *Barr Foundation.* Retrieved September 30, 2010, from http://www.charities.ago.state.ma.us/charities/index.asp?charities_app_ctx=details&charities_sub_ctx=entry&origin=search&did=2726272725&bod=1286078257

Attorney General Office. (2009b). *Boston Foundation, Inc.* Retrieved September 28, 2010, from http://www.charities.ago.state.ma.us/charities/index.asp?charities_app_ctx=details&charities_sub_ctx=entry&origin=search&did=33342530&bod=1286097377

Barr Foundation. (2005, December 28). *Barr Foundation.* Retrieved September 15, 2010, from http://barr-foundation.idilogic.aidpage.com/barr-foundation/

Barr Foundation. (2007). *About Barr Foundation*. Retrieved September 16, 2010, from http://www.barrfoundation.org/about/index.html

Barr Foundation. (2010). *Mitigating Climate Change*. Retrieved September 16, 2010, from http://www.barrfoundation.org/Making/index.html

Bassis, L. (2010). *Waste Disposal*. Retrieved April 25, 2010, from http://www.umich.edu/~gs265/society/wastedisposal.htm

BBC News. (2009). *American Recovery and Reinvestment Act*. Retrieved September 2010, from http://news.bbc.co.uk/2/hi/business/7889897.stm

Berg, B. L. (1989). *Qualitative Research Methods for the Social Sciences.* Needham Heighs, Massachusetts: Allyn and Bacon.

Boston MPO. (2010a, August 19). *Unified Planning Work Program.* Retrieved October 1, 2010, from http://www.ctps.org/bostonmpo/3_programs/3_upwp/FFY_2011_UPWP.pdf

Boston MPO. (2010b, August 19). *Transportation Improvement Program and Air Quality Conformity Determination Federal Fiscal Years 2011-2014.* Retrieved October 1, 2010, from http://www.ctps.org/bostonmpo/3_programs/2_tip/FFYs_2011_2014_TIP.pdf

Boston Water and Sewer Commissions. (2009-10). *Current Expense Budget.* Boston: Finance Division.

Capone, L., & Plourd, K. (2010, April 12). *Patrick-Murray Administration Announces Stimulus Funds for 56 Solar Energy Projects*. Retrieved September 18, 2010, from http://www.mass.gov/?pageID=eoeeapressrelease&L=1&L0=Home&sid=Eoeea&b=pressrelease&f=100412_pr_comm_solar&csid=Eoeea

Center for Strategic and International Studies. (2005). *Adressing our Global Water Future*. Retrieved 4 1, 2010, from http://csis.org/files/media/csis/pubs/050928_gwf.pdf

City of Boston. (2008). *Mayor Menino Celebrates City's Green Affordable Housing Program*. Retrieved September 2010, from http://www.cityofboston.gov/news/default.aspx?id=3963

City of Boston. (2009a). *City of Boston Main Page*. Retrieved March 28, 2010, from http://www.cityofboston.gov/government/

City of Boston. (2009c). *Sustainability Accomplishments*. Retrieved September 2010, from http://www.cityofboston.gov/environmentalandenergy/

City of Boston. (2010a). *Air Pollution in Boston.* Retrieved September 3, 2010, from http://www.cityofboston.gov/environment/airpollution/

City Of Boston. (2010b). *History of Recycling in Boston*. Retrieved September 08, 2010, from http://www.cityofboston.gov/publicworks/RecyclingandSanitation/history.asp

City of Boston. (2010c). *Household Hazardous Waste*. Retrieved September 6, 2010, from http://www.cityofboston.gov/publicworks/RecyclingandSanitation/hazardous.asp

City of Boston. (2010d). *Renew Boston*. Retrieved September 18, 2010, from http://www.cityofboston.gov/environmentalandenergy/renewableenergy/Renew_Boston.asp

City of Boston. (2010e). *Renewable Energy*. Retrieved September 18, 2010, from http://www.cityofboston.gov/environmentalandenergy/renewableenergy/

City of Boston. (2010f). *Solar Boston*. Retrieved September 2010, from http://www.cityofboston.gov/environmentalandenergy/renewableenergy/solar.asp

City of Boston. (2010g). *Wind Energy*. Retrieved September 18, 2010, from http://www.cityofboston.gov/environmentalandenergy/renewableenergy/wind.asp

City of Boston Press Office. (2009b, June 23). *Mayor Menino Announces Citywide Single-Stream Recycling.* Retrieved September 15, 2010, from http://www.cityofboston.gov/news/default.aspx?id=4250

Commonwealth of Massachusetts. (2010, August 6). *FY2011 State Budget Summary - Department of Environmental Protection.* Retrieved September 6, 2010, from http://www.mass.gov/bb/gaa/fy2011/app_11/dpt_11/heqe.htm

Department of Conservation and Recreation. (2010a). *Budget Summary*. Retrieved Sept 2010, from http://www.mass.gov/bb/gaa/fy2011/app_11/dpt_11/hdcr.htm

Department of Conservation and Recreation. (2010b). *Storm Water Management Program*. Retrieved September 2010, from http://www.mass.gov/dcr/stewardship/stormwater/index.htm

Department of Energy Resources. (2010). *Stimulus Funding: Energizing the Commonwealth*. Retrieved September 18, 2010, from http://www.mass.gov/?pageID=eoeeaterminal&L=5&L0=Home&L1=Energy,+Utilities+%26+Clean+Technologies&L2=Resources+for+Current+Economic+Conditions&L3=Recovery+and+Reinvestment+-+Clean+Energy+and+Environment&L4=Energy+Recovery+Dollars+at+Work&sid=Eoeea&b=termi

DeVito, V. (2010, April 15). (T. Oliveira, G. Louzao, & O. Rich, Interviewers)

ELM. (2010). *About ELM*. Retrieved September 8, 2010, from http://www.environmentalleague.org/pages.php?name=About

Environment Massachusetts. (2007-09). *IRS 990.* Boston: Attorney General of Massachusetts.

Environment Massachusetts. (2010). *About Us*. Retrieved September 28, 2010, from http://www.environmentmassachusetts.org/about-us

Environmental League of Massachusetts. (2000-2009). *IRS 990.* Boston: Attorney General of Massachusetts.

EPA. (1986). *Safe Drinking Water Act and its Amendments of 1986*. Retrieved from http://nepis.epa.gov/Exe/ZyNET.exe/60000Z6Y.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1991+Thru+1994&Docs=&Query=570B91042+P.L.+99-339+site+epa.gov&Time=&EndTime=&SearchMethod=3&TocRestrict=n&Toc=&TocEntry=&QField=pubnumber^%22570B91042%22&QFieldYear=&QFi

EPA. (2010). *Clean Air Act (United States)*. Retrieved September 2010, from http://www.epa.gov/air/caa/

EPA. (2010a, February). *EPA Budget in Brief.* Retrieved September 8, 2010, from http://www.epa.gov/budget/2011/2011bib.pdf

EPA. (2010b). *Green Building*. Retrieved September 2010, from http://www.epa.gov/greenbuilding/pubs/about.htm

EPA. (2010c). Green Building, New England Regional Laboratory. Boston, New England: EPA.

EPA. (2010d). *Landfill Methane Outreach Program*. Retrieved March 31, 2010, from http://www.epa.gov/lmop/

Executive Office of Energy and Environmental Affairs. (2010). *RPS and APS Program Summaries*. Retrieved September 18, 2010, from http://www.mass.gov/?pageID=eoeeaterminal&L=4&L0=Home&L1=Energy,+Utilities+%26+Clean+Technologies&L2=Renewable+Energy&L3=Renewable+Energy+Portfolio+Standard+%26+Alternative+Energy+Portfolio+Standard+Programs&sid=Eoeea&b=terminalcontent&f=doer_rps_aps_prog

Executive Office of Transportation. (2008). *Massachusetts Bicycle Transportation Plan.* Boston: Commonwealth of Massachusetts.

faqs.org. (2010a). *Barr Foundation in Boston, Massachusetts (MA)*. Retrieved September 15, 2010, from http://www.faqs.org/tax-exempt/MA/Barr-Foundation.html

faqs.org. (2010b). *Boston Foundation in Boston, Massachusetts (MA).* Retrieved September 29, 2010, from http://www.faqs.org/tax-exempt/MA/Boston-Foundation-Inc.html

Federal Highway Administration. (2009, September 22). *Congestion Mitigation and Air Quality (CMAQ) Improvement Program*. Retrieved September 10, 2010, from http://www.fhwa.dot.gov/environment/cmaqpgs/

Find US Law. (1990). *Americans with Disabilities Act*. Retrieved September 2010, from http://finduslaw.com/americans_with_disabilities_act_of_1990_ada_42_u_s_code_chapter_126

Friedman, T. (2008). *Hot, Flat, and Crowded: Why We Need a Green Revolution - And How it Can Renew America.* Farrar, Straus & Giroux.

fws.gov. (2010). *Clean Water Act*. Retrieved September 2010, from http://www.fws.gov/laws/lawsdigest/fwatrpo.html

Goodman, N., Moser, S., & Bachrach, G. (2010). *On the Brink: Green Budget Fiscal Year 2011.* Boston: Environmental League of Massachusetts.

ISO. (2010). *ISO 14000*. Retrieved September 2010, from http://www.iso.org/iso/home.html

Krantz, D., & Kifferstein, B. (2008). *Water Pollution and Society*. Retrieved March 31, 2010, from http://www.umich.edu/~gs265/society/waterpollution.htm

Lennon, D. (2010, September 14). Personal Communication. (G. Louzao, O. Rich, & T. Oliveira, Interviewers)

Li, V. (2010, September 14). The Boston Harbour Association. (G. R. Louzao, & T. Oliveira, Interviewers)

Martinez, J., Haberlin, K., & Johnson, H. (2010, February 5). *City of Boston*. Retrieved September 18, 2010, from

http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=020510_solar&csid=Agov3

Mass High Tech. (2008). *Green Jobs Act*. Retrieved September 2010, from http://www.masshightech.com/stories/2008/03/17/daily10-Mass-House-Speaker-DiMasi-lays-out-50M-Green-Jobs-Act.html

Mass.gov. (1997). *Utility Structuring Act*. Retrieved September 2010, from http://www.malegislature.gov/Laws/SessionLaws/Acts/1997/Chapter164

Mass.gov. (2010a). *Ambient Air Monitoring.* Retrieved September 7, 2010, from http://www.mass.gov/bb/cap/fy2009/rec/proj/hea200eqeeqe20041173.htm

Mass.gov. (2010b). *Governor's Budget FY2011.* Retrieved September 7, 2010, from http://www.mass.gov/bb/h1/fy11h1/brec_11/dpt_11/heqe.htm

Mass.gov. (2010c, August). *Massachusetts 2010 Air Monitoring Network Plan.* Retrieved September 8, 2010, from http://www.mass.gov/dep/public/netplan.pdf

Mass.Gov. (2010d). *Recovery Act Spending In MA*. Retrieved September 2010, from http://arraprweb1.itd.state.ma.us/mapapp/money.html

Massachusetts Port Authority. (2009a). *Comprehensive Annual Financial Report.* Boston: Massachusetts Port Authority.

Massachusetts Port Authority. (2009b). *Environmental Initiatives Fact Sheet.* Boston: Massachusetts Port Authority.

Massachusetts Renewable Energy Trust. (2002). *Cape and Islands Self Reliance*. Retrieved Sept 2010, from http://www.masstech.org/project_detail.cfm?ProjSeq=498

Massachusetts Technology Collaborative. (2010). *What We Do*. Retrieved September 2010, from http://www.masstech.org/AgencyOverview/whatwedo.htm

MassCEC. (2010a). *Annual Budget.* Boston.

MassCEC. (2010b). *Massachusetts Clean Energy Center Statutory Report: Fiscal Year 2010.* Boston: Massachusetts Clean Energy Technology Center.

MassDEP. (2006a, November). Brownfields and Wate Site Cleanup Programs. *MassDEP Fact Sheet*. Boston, Massachusetts, USA: Department of Environmental Protection.

MassDEP. (2006b). *Solid Waste Master Plan: 2006 Revision.* Boston: Executive Office of Environmental Affairs.

MassDEP. (2009a). *Massachusetts Enhanced Emissions and Safety Test Inspection and Maintence Program 2008 Annual Report.* Boston: Executive Office of Envionmental Affairs.

MassDEP. (2009b). *Massachusetts Department of Environmental Protection*. Retrieved April 4, 2010, from http://www.mass.gov/dep/index.htm

MassDEP. (2010). *2008 Solid Waste Data Update on the Beyond 2000 Solid Waste Master Plan.* Boston: Executive Office of Energy and Evironmental Affairs.

MassDEP. (2010a). *About MassDEP: Northeast Region*. Retrieved May 2, 2010, from http://www.mass.gov/dep/about/region/northeas.htm#profile

MassDEP. (2010b). *About the Air Assessment Branch.* Retrieved September 6, 2010, from http://www.mass.gov/dep/air/aq/aq_about.htm

MassDEP. (2010c). *Active Combustion Facilites.* Boston: Bureau of Waste Prevention.

MassDEP. (2010d, May). *Active Landfills.* Boston: Bureau of Waste Prevention.

MassDEP. (2010e). *Air and Climate.* Retrieved September 5, 2010, from http://www.mass.gov/dep/air/index.htm

MassDEP. (2010f, September 8). *Air and Climate-MassAir Online.* Retrieved September 8, 2010, from http://public.dep.state.ma.us/MassAir/Pages/MapCurrent.aspx?ht=1&hi=101

MassDEP. (2010g, June 24). *Massachusetts Municipal Residential Recycling Rates*. Retrieved April 11, 2010, from http://www.mass.gov/dep/recycle/priorities/munirate.pdf

MassDEP. (2010h, April). *Massachusetts Vehicle Idling Regulation*. Retrieved September 17, 2020, from http://www.mass.gov/dep/air/laws/idlereg.htm

MassDEP. (2010i). *Safe Drinking Water Act Assessment Advisory Committee Annual Report to the Legislature 2009.* Boston: Safe Drinking Water Act Assessment Advisory Committee.

MassDevelopment. (2010a). *2009 Brownfields Redevelopment Fund Annual Report.* Boston: Brownfield Redevelopment Fund Advisory Group.

MassDevelopment. (2010b). *Company Overview*. Retrieved September 26, 2010, from http://www.massdevelopment.com/about/overview/

MassDOT. (2010a). *Boston Region MPO Overview*. Retrieved September 31, 2010, from http://www.ctps.org/bostonmpo/1_about_us/1_mpo/mpo.html

MassDOT. (2010b). *GreenDOT Policy Directive.* Boston: Massachusetts Department of Transportation.

Massport. (2009). *Annual Report*. Retrieved September 2010, from http://www.massport.com/massport/investor%20relations/financialpublications.aspx

Massport. (2010). *Terminal B Garage*. Retrieved September 2010, from http://www.massport.com/environment/Pages/SolarPanelsatLogan.aspx

MCAN. (2010). *What is MCAN?* Retrieved September 30, 2010, from http://massclimateaction.net/about-mcan.html

Moskowitz, E. (2010, July 9). Bike sharing in Boston gets $3m federal grant. *The Boston Globe*.

MWRA. (2010). *The Deer Island Sewage Treatment Plant*. Retrieved September 08, 2010, from http://www.mwra.state.ma.us/03sewer/html/sew.htm

National Geographic Society. (2010). *The Green Guide FAQ*. Retrieved September 2010, from http://www.thegreenguide.com/faq

National Renewable Energy Laboratory. (2010). *Home*. Retrieved September 2010, from http://www.nrel.gov/

New England Clean Energy Council. (2010). *Mission*. Retrieved September 2010, from http://www.cleanenergycouncil.org/about/mission

Office of Budget Management. (2005-10). *Operating Budget Fiscal Year 2006-11.* Boston: City of Boston.

Office of Budget Management. (2010). *Operating Budget Fiscal Year 2011.* Boston: City of Boston.

Office of Transportation and Air Quality. (2006). *Greenhouse Gas Emissons from the US Transportation Sector 1990-2003.* Washington, DC: US Environmental Protection Agency.

Ozone Watch-Warning System. (2010). Retrieved September 2010, from http://www.nctcog.dst.tx.us/trans/air/ozone/watchwarn.asp

Plourd, K. (2010, September 21). Massachusetts Clean Energy Center. (G. Louzao, & O. Rich, Interviewers)

Pope III, C. A. (2002). Air Pollution Linked to Deaths from Lung Cancer. *American Medical Association, 287*(9), 1132-1141.

Regan, T., Murphy, E., & Hines, M. (2009). *SAFETEA-LU 1808: CMAQ Evaluation and Assessment. Phase II Final Report.* Cambridge, MA: US Department of Transportation.

Renewable Energy Trust. (2010). *Index*. Retrieved September 2010, from http://www.masstech.org/renewableenergy/index.html

Rickerson, W. (2008, January 10). *Solar Boston.* Retrieved September 18, 2010, from http://www.cityofboston.gov/environmentalandenergy/renewableenergy/solar.asp

State Library of Massachusetts. (2010). *Green Communities Act*. Retrieved September 2010, from http://mastatelibrary.blogspot.com/2010/06/green-communities-act.html

Stordy, P. (2010, September 21). Utilities Control Manager Massport. (G. Louzao, & O. Rich, Interviewers)

Sullivan, K. (2008, July 2). *Governor Patrick Signs Energy Bill Promoting Cost Savings, Renewable and Clean Energy Technology*. Retrieved April 17, 2010, from http://www.mass.gov/?pageID=gov3pressrelease&L=1&L0=Home&sid=Agov3&b=pressrelease&f=080702_bill_energy_clean&csid=Agov3

Svoboda, E. (2008, February 8). *America's 50 Greenest Cities*. Retrieved April 10, 2010, from http://www.popsci.com/environment/article/2008-02/americas-50-greenest-cities?page=1

tbha.org. (2010). *About TBHA*. Retrieved April 4, 2010, from http://www.tbha.org/

The Boston Foundation. (2005, December 15). *Mission Statement.* Retrieved September 28, 2010, from http://www.tbf.org/AboutTBF/AboutTBFDetail.aspx?id=80

The Boston Foundation. (2007). *Grant Guidelines*. Retrieved September 30, 2010, from http://www.tbf.org/GrantSeekers/GrantSeekersDetail.aspx?id=238

The Boston Globe. (2010, February 14). *Big Gift for Local Climate Efforts*. Retrieved September 16, 2010, from http://www.boston.com/business/articles/2010/02/14/barr_foundation_giving_50_million_to_efforts_fighting_climate_change/

The Boston Harbor Association. (2010a). *Annual Budget Information.*

The Boston Harbor Association. (2010b). *Back to the Beaches*. Retrieved September 20, 2010, from http://www.tbha.org/programs_beaches.htm

The Chronicle of Philanthropy. (2010, Septermber 3). *Barr Foundation (Boston).* Retrieved September 30, 2010, from http://philanthropy.com/premium/stats/foundation/detail.php?ID=201248

The Cleaverton Research Group. (2010). *Combined Heat and Power Units*. Retrieved September 14, 2010, from http://www.claverton-energy.com/first-energy-offer-excellent-condition-complete-gas-engined-chp-system-for-sale-and-installation.html

The Massachusetts Clean Energy Center. (2010). *About Us*. Retrieved September 2010, from http://www.masscec.com/index.cfm/page/About-MassCEC/pid/11193

U.S. Department of Health and Human Services. (2010). *Grants Process Overview.* Retrieved September 14, 2010, from http://grants.nih.gov/grants/grants_process.htm

US Green Building Council. (2010). *Leadership in Energy and Enviornmental Design*. Retrieved September 2010, from http://www.usgbc.org/DisplayPage.aspx?CategoryID=19

Waxman, H. (2010). *H.R.2454 - American Clean Energy And Security Act of 2009*. Retrieved April 10, 2010, from http://www.opencongress.org/bill/111-h2454/show

Wikipedia. (2010f). *Federal Grants.* Retrieved September 14, 2010, from wikipedia.org: http://en.wikipedia.org/wiki/Federal_grants_in_the_United_States

World Health Organization. (2002). *Estimated Deaths Per Member State.* World Health Organization.

WPI. (2010). *News, IEIS*. Retrieved September 2010, from http://www.wpi.edu/news/20090/ieis.html

GLOSSARY

American Recovery and Reinvestment Act: An economic stimulus package enacted by the US Congress in February 2009. It aims to create jobs and promote investment and consumer spending during the recession. (BBC News, 2009)

Americans with Disabilities Act: A civil rights law that prohibits, under certain circumstances, discrimination based on disabilities. Signed by Congress July 26, 1990 (Find US Law, 1990)

Clean Air Act: A United States Federal Law to control air pollution which requires the EPA to develop and enforce regulations to protect the general public from exposure to airborne contaminants. Enacted by the US Congress December 17, 1963 (EPA, 2010)

Federal Water Act: Also known as the Clean Water Act, The primary Federal Law in the United States governing water pollution. Signed October 18, 1972 (fws.gov, 2010)

Green Affordable Housing Program: A program aiming to encourage sustainable development throughout Boston's neighborhoods. Developed by Mayor Thomas M. Menino in 2008 (City of Boston, 2008)

Green Communities Act: An act that aims to reduce energy consumption and spur clean energy technology in Massachusetts. Signed July 2, 2008 by Governor Deval Patrick (State Library of Massachusetts, 2010)

ISO 14001: A core set of standards used by organizations for the designing and implementing of effective environmental management systems. Under the International Organization for Standardization (ISO) (ISO, 2010)

LEED Rating: An internationally recognized green building certification system which ranks buildings based on a four level scale, Certified, Silver, Gold and Platinum. The Program adds up points in metrics like energy savings, water efficiency, CO2 emissions and Resources. Developed in 1993 by the US Green Building Council. (US Green Building Council, 2010)

Massachusetts Technology Collaborative: A Massachusetts based organization which aims to develop technologies, infrastructure development and support initiatives in the technology sector by perusing federal funding opportunities. (Massachusetts Technology Collaborative, 2010)

National Geographic Society's Green Guide: A newsletter published by the National Geographic Society which is intended to show people how to live a green lifestyle and shows studies conducted by its research team on various environmental issues. (National Geographic Society, 2010)

National Renewable Energy Laboratory: A Federal laboratory dedicated to the research, development, commercialization and development of renewable energy and energy efficiency technologies. (National Renewable Energy Laboratory, 2010)

Orange Days: Referring to the Ozone Watch-Warning System, which ranks air quality based on a color system by severity, with green being the best and purple being the worst. Orange means the air quality is "unhealthy" and "Active children and adults, and people with respiratory

disease, such as asthma, shout limit prolonged outdoor exertion" (Ozone Watch-Warning System, 2010)

Solar Boston: A half million dollar program to encourage the widespread adoption of solar energy in Boston. Launched in June 2007 by the City of Boston. (City of Boston, 2010f)

Utility Structuring Act: "An act relative to restructuring the electricity utility industry in the Commonwealth, regulating the provisions of electricity and other services, and promoting enhanced consumer protections. Approved by the Acting Governor, November 25, 1997" (Mass.gov, 1997)

APPENDIX A: CONTACT LIST

Name	Organization	Position	Phone Number	Fax Number	Email	Office Location	Website
Boston Region Metropolitan Planning Organization	Boston Region Metropolitan Planning Organization		617-973-7100	617-973-8855	publicinformation@bostonmpo.org	10 Park Plaza Suite 2150, Boston MA	http://www.ctps.org/bostonmpo/index.html
Derek Lennon	Department of Conservation and Recreation	Chief Financial Officer	617-626-1300	617-626-1449	derek.lennon@state.ma.us	251 Causeway St, Suite 600, Boston MA	www.mass.gov/dcr/
Priscilla Geigis	Department of Conservation and Recreation	Director of State Parks	617-626-4986			251 Causeway St, Suite 600, Boston MA	www.mass.gov/dcr/
Samantha Overton	Department of Conservation and Recreation	Director of Urban Parks	617-626-4934			251 Causeway St, Suite 600, Boston MA	www.mass.gov/dcr/
David Cash	Department of Enviornmental Affairs	Assistant Secretary of Policy	617-626-1000		david.cash@state.ma.us	100 Cambridge St # 900, Boston, MA	http://www.mass.gov/?pageID=eoeeahomepage&L=1&L0=Home&sid=Eoeea
Bill Dowd	Enviornmental Protection Agency	Budget Manager	617-918-1923		dowd.bill@epa.gov	5 Post Office Square - Suite 100 Boston, MA	www.epa.gov
Judith Doucette	Enviornmental Protection Agency	Regional Budget and Action Plans	617-918-1921			5 Post Office Square - Suite 100 Boston, MA	www.epa.gov
Environment Massachusetts	Environment Massachusetts		617-747-4400	617-292-8057	Info@EnvironmentMassachusetts.org	44 Winter Street, Suite 401, Boston MA	http://www.environmentmassachusetts.org/
Environmental League of Massachusetts	Environmental League of Massachusetts		617-742-2553		info@environmentalleague.org	14 Beacon Street, Suite 714, Boston MA	http://www.environmentalleague.org/
Kate Plourd	Massachusetts Clean Energy Center	Communications Manager	617-315-9339	617-315-9356	kplourd@masscec.com	55 Summer Street, 9th Floor Boston MA	www.masscec.com
Bawa Wavezwa	MassDEP	Federal Grants Manager	617-292-5525		Bawa.Wavezwa@State.MA.US	1 Winter Street, Boston MA	www.mass.gov/dep/
Douglas E. Fine	MassDEP	Assistant Commissioner for Planning & Policy	617-292-5792	617-574-6880	Douglas.Fine@state.ma.us	1 Winter Street, Boston MA	www.mass.gov/dep/
Ed Snyder	MassDEP		617-292-5674		Ed.Snyder@State.MA.US	1 Winter Street, Boston MA	www.mass.gov/dep/

Edmund Coletta	MassDEP	Press	617-292-5737		Edmund.Coletta@State.MA.US	1 Winter Street, Boston MA	www.mass.gov/dep/
Joseph Ferson	MassDEP	Public Information Office	617-654-6523		Joseph.Ferson@State.MA.US	1 Winter Street, Boston MA	www.mass.gov/dep/
William (Bill) Harkins	MassDEP	Budget Director	617-292-5906		William.Harkins@State.MA.US	1 Winter Street, Boston MA	www.mass.gov/dep/
Paul Stordy	MassPort	Utilities Control Manager	617-561-1673			1 Harborside Dr, East Boston, MA	www.massport.com
Brian Gosslain	State House		617-727-2040 ext 35429			24 Beacon St, Boston MA	www.mass.gov
Sara Glassman	State House		617-727-2040 ext 35480			24 Beacon St, Boston MA	www.mass.gov
The Barr Foundation	The Barr Foundation		617-854-3500	617-854-3501	info@barrfoundation.org	The Pilot House, Lewis Wharf, Boston MA	http://www.barrfoundation.org/index.html
The Boston Foundation	The Boston Foundation		617-338-1700		info@tbf.org	75 Arlington Street, 10th Floor, Boston MA	www.tbf.org
Vivien Li	The Boston Harbor Association	Executive Director	617 482-1722	617-482-9750	vli@tbha.org	374 Congress Street, Suite 307, Boston MA	www.tbha.org

APPENDIX B: ORGANIZATION PROFILES

1. Barr Foundation, The
2. Boston Foundation, The
3. Boston Harbor Association, The
4. Boston Metropolitan Planning Organization
5. Department of Conservation and Recreation
6. Environment Massachusetts
7. Environmental League of Massachusetts
8. Environmental Protection Agency
9. Massachusetts Climate Action Network
10. Massachusetts Clean Energy Center
11. Massachusetts Department of Environmental Protection

The Barr Foundation

General Information

The Pilot House
Lewis Wharf
Boston, MA 02110
Phone: 617.854.3500
Fax: 617.854.3501
Email: info@barrfoundation.org

Mission: The Barr Foundation's mission is to improve the quality of life for all residents living in the Boston area (Barr Foundation, 2007).

Overview:

Their primary areas of focus are to provide quality education, mitigate climate change, and enhance cultural awareness (Barr Foundation, 2010).

They do this by understanding the organizations they work with, strengthening connections, advancing racial justice, encouraging continuous learning, and supporting community leaders.

This foundation works by supporting non-profit organizations that received a personal invitation to be assisted through technical operating support, grants for programs, and capital assistance.

Barr foundation staff members work closely with community leaders, other foundations, government, and non-profit organizations. The foundation uses several tools such as maps and databases with contacts and project information of the several organizations they work with and the relationship between them.

Pat Brandes, the Executive Director wants to focus on the two largest producers of greenhouse gases in Boston: buildings and transportation. Two thirds of the city's emissions are produced by buildings. The plan is to make energy efficient retrofits that reduce greenhouse gas emissions. Transportation accounts for over a quarter of Boston's emission and will be overcome once quality transit systems are put in place.

Budget Information

This is the historical budget for the Barr Foundation found on The Chronicle of Philanthropy (2010) website.

Barr Foundation (Boston)
Organization's web site | Organizations in this state

Grant-making priorities: Arts and culture, Education, Environment and conservation, Local and regional causes

Accepts unsolicited proposals: **n/a**
Due to the recession, changed grant-making priorities or offered help to hard hit charities or communities in ways that go beyond traditional grant-making: **n/a**

Fiscal year	Assets	Change in assets from previous year	Number of grants approved	Change in number of grants approved from previous year	Value of grants approved	Change in value of grants approved from previous year	Value of grants paid	Change in value of grants paid from previous year	Projected next year giving
2009	n/a	--	n/a	--	n/a	--	n/a	--	n/a
2008	$878,950,397	-23.1%	n/a	--	n/a	--	$41,927,759	-6.9%	Unknown
2007	$1,142,271,401	+12.1%	267	-13.9%	$63,299,929	+60.7%	$45,055,701	+12.9%	Same
2006	$1,019,257,947	+18.9%	310	+17.0%	$39,378,474	-5.6%	$39,896,202	+6%	Same
2005	$857,054,761	+2.2%	265	+0.4%	$41,705,174	-15.5%	$37,643,279	+10.1%	Increase
2004	$838,237,131	+4%	264	0.0	$49,363,099	+1.8%	$34,199,069	-26.6%	Same
2003	$805,992,895	+5.9%	264	+41.2%	$48,483,034	+14.5%	$46,561,609	+13.1%	Same
2002	$760,765,310	-10.5%	187	-39.9%	$42,330,284	--	$41,167,200	-1.5%	Same
2001	$850,000,000	--	311	--	n/a	--	$41,783,051	--	Same

These are some of the donations the Barr Foundation contributed to several organizations, according to the IRS 990 forms (Attorney General Office, 2009a) for the fiscal year of 2008.

New England Aquarium Corporation Central Wharf Boston, MA 02110	None	Public Charity	Arts & Culture	$	2,500,000.00	509 (a) (1)
Museum of Science Science Park Boston, MA 02114	None	Public Charity	Arts & Culture	$	40,000.00	509 (a) (1)
The Boston Foundation, Inc. 75 Arlington Street, 10th Floor Boston, MA 02116	None	Public Charity	Arts & Culture	$	339,779.00	509 (a) (1)
The Boston Foundation, Inc. 75 Arlington Street, 10th Floor Boston, MA 02116	None	Public Charity	Civic & Community	$	100,000.00	509 (a) (1)
The Boston Foundation, Inc. 75 Arlington Street, 10th Floor Boston, MA 02116	None	Public Charity	Civic & Community	$	9,800.00	509 (a) (1)
The Boston Foundation, Inc. 75 Arlington Street, 10th Floor Boston, MA 02116	None	Public Charity	Education	$	150,000.00	509 (a) (1)
The Boston Foundation, Inc. 75 Arlington Street, 10th Floor Boston, MA 02116	None	Public Charity	Education	$	325,000.00	509 (a) (1)
Environmental League of Massachusetts 14 Beacon Street, Suite 714 Boston, MA 02108	None	Public Charity	Environment	$	100,000.00	509 (a) (1)
Massachusetts Audubon Society 208 South Great Road Lincoln, MA 01773	None	Public Charity	Environment	$	148,000.00	509 (a) (1)
Massachusetts Audubon Society 208 South Great Road Lincoln, MA 01773	None	Public Charity	Environment	$	28,000.00	509 (a) (1)

The Boston Foundation

General Information

75 Arlington Street, 10th Floor
Boston, MA 02116
Phone: 617-338-1700
info@tbf.org

Mission: "As Greater Boston's community foundation, the Boston Foundation devotes its resources to building and sustaining a vital, prosperous city and region, where justice and opportunity are extended to everyone (The Boston Foundation, 2005)."

Overview:

The Boston Foundation accomplishes their goals by giving grants to non-profit organizations, working with other foundations and organizations, and servicing as a center of information and action to improve the greater Boston area. The Boston Foundation distributes about $16 million a year to non-profit organizations in the Boston area from their Permanent Funds for Boston (The Boston Foundation, 2007).

They have three main types of competitive grants, which include:

- General Operating Support Grants are awarded for up to five years and receive up to $150,000 or 10-15% of the organization's operating budget, whichever is smaller. TBF works closely with the organization to achieve better outcomes to the Boston residents.
- Project Support Grants are to support specific projects or programs and vary in size of financial support, but generally range from $25,000 to $100,000. TBF normally funds non-profit organizations that fulfils the Foundation's strategic priorities, but at times does collaborate with larger institutions, such as hospitals and universities.
- Special Opportunity Grants are limited and highly competitive funds that support new ideas or new organizations that address critical problems certain communities face.

Exclusions: The Foundation does not support medical or academic research, political candidates, construction costs, scholarships, or religious programs.

Eligibility: The organization must be tax-exempt or work under a non-profit tax-exempt company.

Budget Information

This data was acquired from faqs.org (2010b) for the Boston Foundation for the year of 2008.

Boston Foundation Inc	
Employer Identification Number (EIN)	042104021
Name of Organization	Boston Foundation Inc
Address	75 Arlington Street, Boston, MA 02116-3936
Activities	Community Chest, United Way, etc., School, college, trade school, etc., Gifts, grants, or loans to other organizations
Subsection	Charitable Organization
Ruling Date	12/1997
Deductibility	Contributions are deductible
Foundation	Organization which receives a substantial part of its support from a governmental unit or the general public
Organization	Corporation
Exempt Organization Status	Unconditional Exemption
Tax Period	06/2008
Assets	$50,000,000 to greater
Income	$50,000,000 to greater
Filing Requirement	990 (all other) or 990EZ return
Asset Amount	$896,614,434
Amount of Income	$683,988,250
Form 990 Revenue Amount	$130,531,487
National Taxonomy of Exempt Entities (NTEE)	Philanthropy, Voluntarism and Grantmaking Foundations: Community Foundations

The following data comes from the Attorney General's Office for Non-Profits and Charities for the Boston Foundation, Inc (2009b).

BOSTON FOUNDATION, INC.

Consolidated Statements of Financial Position

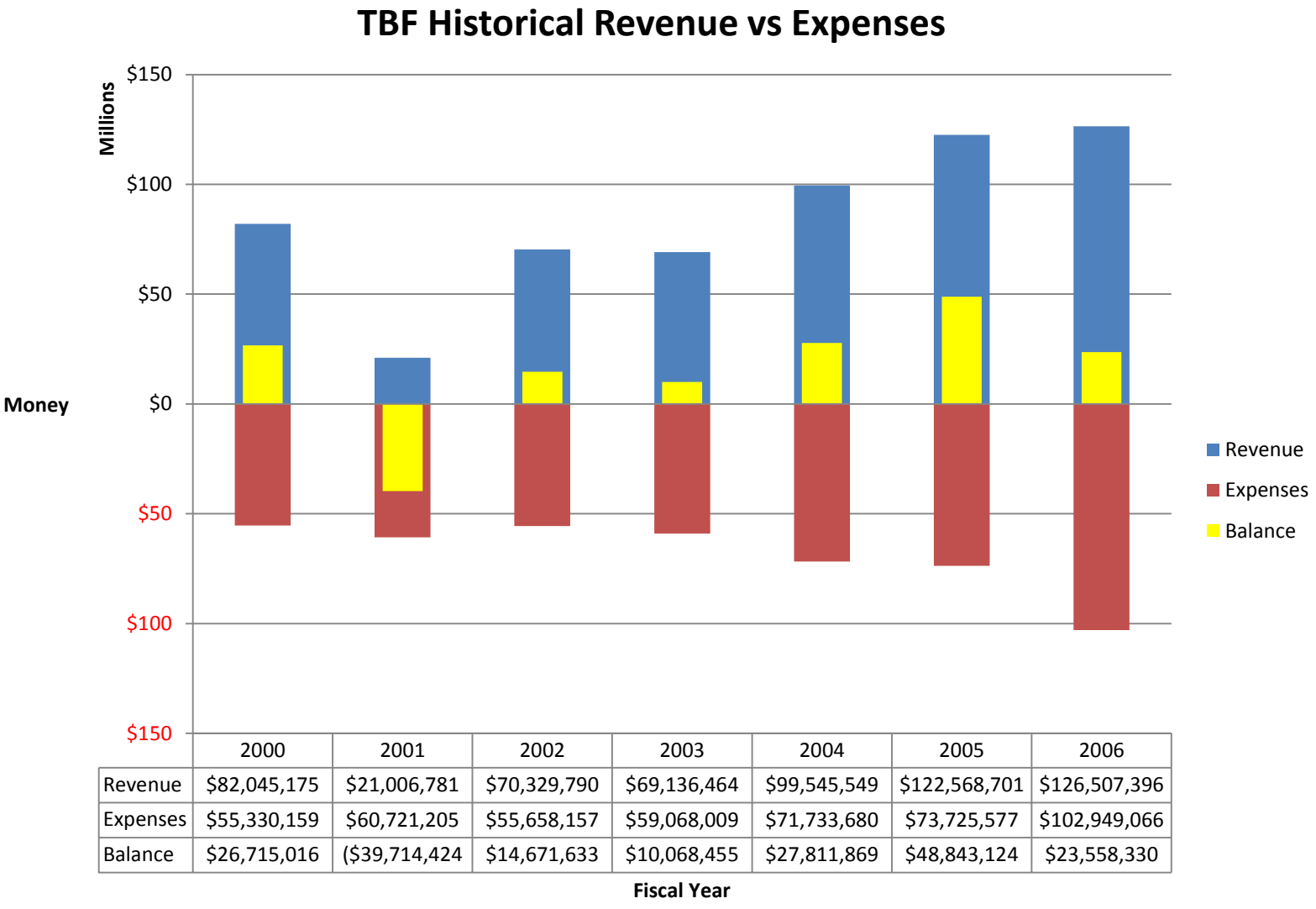
June 30, 2009 and 2008

(In thousands)

Assets		2009	2008
Cash and cash equivalents	$	5,166	2,272
Receivables for investments sold		297	270
Interest and dividends receivable		1,246	1,433
Program-related receivables and other assets		4,182	4,254
Contributions receivable, net		2,860	8,222
Investments, at fair value		667,013	896,221
Noncash donations held for sale		1,049	1,049
Fixed assets, net		793	1,115
Total assets	$	682,606	914,836
Liabilities and Net Assets			
Liabilities:			
Payables for investments purchased	$	474	403
Accounts payable and accrued liabilities		5,885	4,409
Line of credit		—	15,000
Long-term debt		801	1,015
Grants payable		5,504	6,222
Total liabilities		12,664	27,049
Net assets:			
Unrestricted		275,816	351,649
Temporarily restricted		183,757	323,250
Permanently restricted		210,369	212,888
Total net assets		669,942	887,787
Total liabilities and net assets	$	682,606	914,836

The following historical budget data also comes from faqs.org (2010b) from the year 2000 to 2006 for the Boston Foundation, Inc.

Total expenses	**$55,330,159**	**$60,721,205**	**$55,658,157**	**$59,068,009**	**$71,733,680**	**$73,725,577**	**$102,949,066**
Program services	$51,983,229	$57,307,497	$52,749,108	$56,096,870	$68,909,623	$70,668,578	$99,578,171
Management and general	$730,918	$877,088	$984,487	$905,081	$1,268,289	$1,116,446	$1,213,258
Fundraising	$2,616,012	$2,536,620	$1,924,562	$2,066,058	$1,555,768	$1,940,553	$2,157,637
Payments to affiliates	$0	$0	$0	$0	$0	$0	$0
Net assets or fund balances at end of year	**$637,809,403**	**$548,432,275**	**$555,694,439**	**$629,600,364**	**$671,080,380**	**$748,611,051**	**$870,685,581**
Excess or (deficit) for the year	$26,724,016	$-39,714,424	$14,671,633	$10,068,455	$27,811,869	$48,843,124	$23,558,330
Net assets or fund balances at beginning of year	$688,698,434	$637,809,403	$548,432,275	$555,694,439	$629,600,364	$671,080,380	$748,611,051
Other changes in net assets or fund balances	$-77,613,047	$-49,662,704	$-7,409,469	$63,837,470	$13,668,147	$28,687,547	$98,516,200



	2000	2001	2002	2003	2004	2005	2006
Revenue	$82,045,175	$21,006,781	$70,329,790	$69,136,464	$99,545,549	$122,568,701	$126,507,396
Expenses	$55,330,159	$60,721,205	$55,658,157	$59,068,009	$71,733,680	$73,725,577	$102,949,066
Balance	$26,715,016	($39,714,424	$14,671,633	$10,068,455	$27,811,869	$48,843,124	$23,558,330

The Boston Harbor Association (TBHA)

Key Contacts

Executive Director:
Vivien Li
374 Congress Street, Suite 307
Boston, Ma 02210-1807 vli@tbha.org
Tel: (617) 482-1722
Fax: (617) 482-9750

General Information

374 Congress Street, Suite 307
Boston, Ma 02210-1807
Tel: (617) 482-1722
Fax: (617) 482-9750

Mission: TBHA (2010) promotes a clean Boston Harbor with greater public access and open space, monitoring of water quality, and restoration of beaches through programs and strong advocacy.

Programs and Interests:

Marine Debris Clean Up Program – coordinated the use of $40,000 dollars to clean up Boston Harbor. Since the beginning of the project, 220 tons have been removed from Boston Harbor.

Back to the Beaches Program – Along with the Department of Conservation and Recreation (DCR), the TBHA has restored many beaches along Boston Harbor. Boston Harbor beaches have the most comprehensive and extensive water tests in the country.

First "Green" Water Taxi Launched in Boston Harbor – This completely electric water taxi provides a zero emissions, eco-friendly, and near silent ride to Logan Airport and 30 other locations.

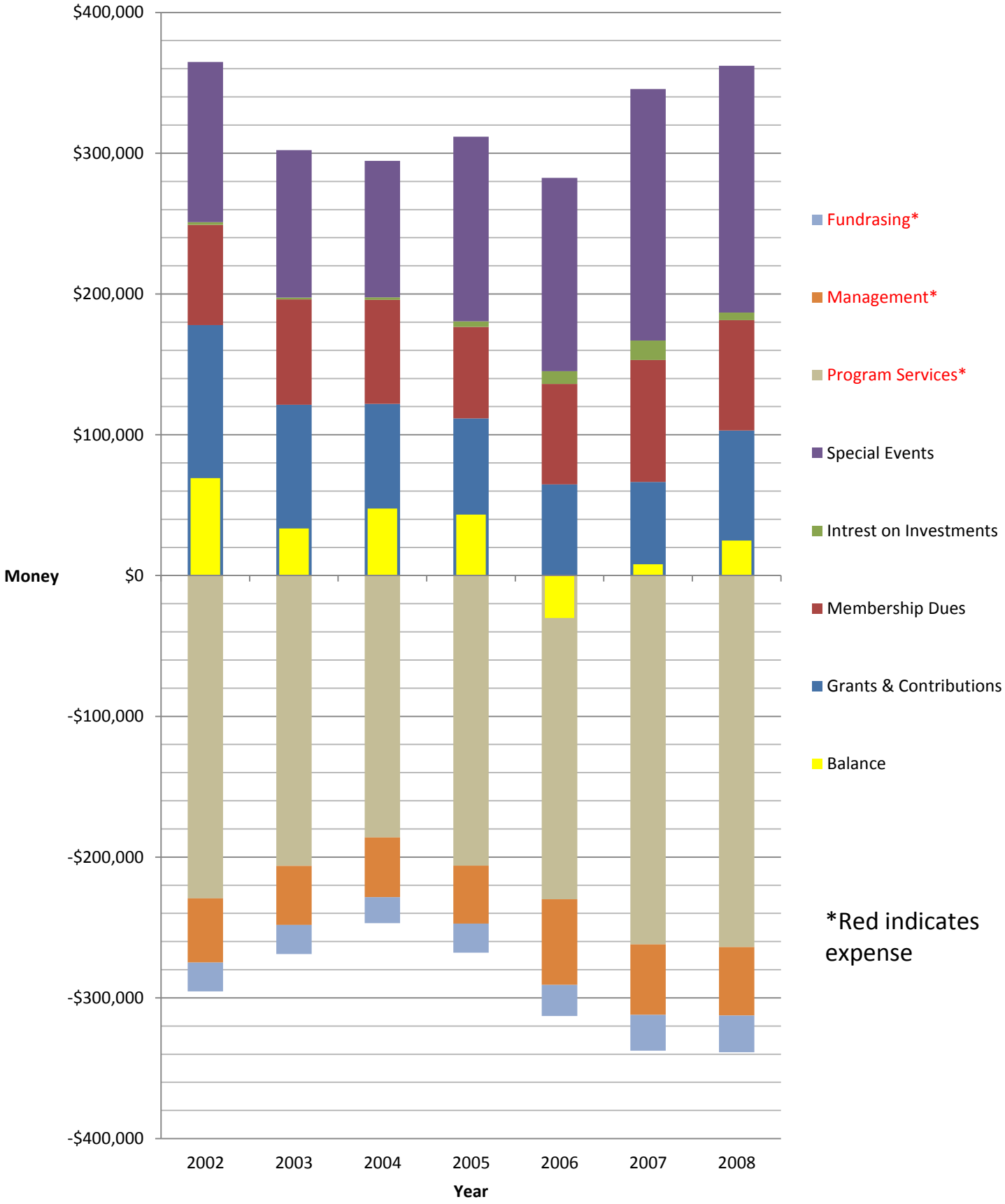
TBHA's 2010 Harbor Bound Program – Educate middle school students about the Deer Island Treatment Plant.

Harbor Walk – TBHA established the Harbor Walk audio tours, the first of its kind. There are several attractions in the 39 miles of the Harbor Walk system. The Boston Harbor Association is in charge of analyzing each section for maintenance and completing assessment reports.

Budget Information - TBHA FY 2010

Income				**Expenses**		
Organization	$	82,000.00		Accountant/ Audit	$	7,000.00
Individual	$	7,500.00		Consulting	$	4,500.00
Donations	$	6,000.00		Interns	$	10,000.00
Events	$	180,000.00		Equipment	$	500
Grants	$	40,000.00		Events-Auction	$	16,000.00
Interest	$	3,000.00		Events-Other	$	1,500.00
Miscellaneous	$	2,000.00		Programs	$	13,000.00
Total Income	$	320,500.00		Health Benefits	$	9,000.00
				Insurance	$	1,500.00
				Maintenance/ Repairs	$	250
				Meetings--Travel	$	1,500.00
				Miscellaneous	$	500
				Newsletter/Publications	$	1,500.00
				Office Expenses	$	2,000.00
				Payroll	$	200,000.00
				Payroll Tax	$	18,270.00
				Pension Benefits	$	8,000.00
				Postage	$	2,500.00
				Professional Dues	$	350
				Supplies	$	2,000.00
				Telephone	$	4,500.00
				Internet	$	3,000.00
				Utilities	$	1,800.00
				Rent	$	11,328.00
				Total Expenses	$	320,498.00

TBHA Historical Revenue and Expenses



*Red indicates expense

Boston Region Metropolitan Planning Organization

General Information:

State Transportation Building,
10 Park Plaza,
Suite 2150,
Boston, MA
02116
Phone:
617.973.7100
Fax:
617.973.8855

Mission: Oversee the federally required metropolitan transportation-planning process, which is often called the 3C-continuing, cooperative, and comprehensive process, for the Boston metropolitan area (MassDOT, 2010a).

Overview of MPO:

Based on eight areas of main focus (MassDOT, 2010a) for their visions and policies, they decide how federal and state money is allocated and for what programs and projects.

- System preservation, modernization, and efficiency
- Mobility
- Environment
- Safety and security
- Regional equity
- Land use and economic development
- Public participation
- Finance

MPO region includes 101 cities and towns in eastern Massachusetts

- Predominantly within a radius of 20 miles from the City of Boston
- Encompasses approximately 1,405 square miles
- 3 million live in the region and 2 million work there

Federal government refers to the work as the 3C process

- Continuing
  - Planning must be maintained as an ongoing activity to address short/long term needs and long term vision of the region
- Cooperative
  - Must involve a wide variety of interested parties through public participation
- Comprehensive
  - Must cover all transportation modes and be consistent with regional and local land-use and economic development plans

Work of the MPO is conducted by the Central Transportation Planning Staff (CTPS)

- Purpose to develop a permanent resource of expertise in comprehensive, multimodal transportation planning and analysis
  - Promote interagency cooperation
  - Ensure consistency among planning efforts
  - Reduce redundancy and fill gaps in the capabilities of MPO members
- Under the direction of the Transportation Planning and Programming Committee
  - Charged with providing policy direction for and oversight of the MPO's planning and programming activities
  - Supervises preparation of certification documents
  - Has established four subcommittees
    - Administration and Finance
    - Clean Air and Mobility
    - TIP Criteria
    - Unified Planning Work Program
  - Which Consists of the MPO's voting member, and the advisory group, The Regional Transportation Advisory Council
    - Independent group charged with providing public input on transportation planning to Boston Region MPO
    - Composed of citizen, professional, transportation-advocacy groups, neighboring MPO's, and agencies
    - Provides a forum for broad-based and robust discussion

Budget Information

Programs: The Unified Planning Work Program (UPWP) contains information on projects during the period of October 1 to September 30, (federal fiscal year) in the Boston metropolitan region (Boston MPO, 2010a). Transportation Improvement Program (TIP) is a four-year period program to improve transportation. The Long-Range Transportation Plan (LRTP) is a guide for at least the next twenty years towards investments that improve transportation systems in the Boston metropolitan region.

The UPWP is very important because it serves two main purposes:

- First, it serves to make government officials and the public aware of projects expected to be undertaken.
- Second, it provides complete budget information to government officials on projects to be carried out by the Boston Region MPO.

The UPWP has projects from the Massachusetts Department of Transportation, the Massachusetts Port Authority, and the Boston Region Metropolitan Planning Organization (MPO).

The projects will be funded (Boston MPO, 2010b)from federal, state, and local sources and can also come from any or all three organizations. The overall cost for the UPWP is a total of $7,367,100 for administration, planning studies, technical support, and certification requirements. Funding for the MPO projects in this UPWP comes from MassDOT, MassDOT Local Match, and MBTA for a total of $7,371,600.

The UPWP contains 71 projects for the FFY of 2011. Academic institutions, municipalities, and individual transportation agencies will carry out 14 projects. The other 57 will be carried out by the Central Transportation Planning Staff (CTPS) and the Metropolitan Area Planning Council (MAPC). Both the CTPS and the MAPC work for the MPO, Massachusetts Port Authority (Massport), and the Massachusetts Department of Transportation (MassDOT).

Many of the projects are from FFY 2010, but these are the new projects for the FFY 2011 to be undertaken on behalf of the MPO:

• Early Morning Transit Impacts
• Emergency Evacuation and Hazard Mitigation Mapping, Phase II
• Impact of Walking Radius on Transit Frequency and Reliability
• Livable Communities Workshop Program
• Maintenance Costs of Municipally Controlled Roadways
• MPO Freight Study, Phase II
• Roundabout Installation Screening Tool
• Bicycle Network Evaluation
• Low-Cost Improvements to Bottleneck Locations, Phase II
• Regional HOV Lane System Planning
• CharlieCard Trip Paths Pilot Study

The following data was acquired from the Transportation Improvement Program and Air Quality Conformity Determination for the Federal Fiscal Years 2011-2014 (Boston MPO, 2010b). This document was endorsed by the Boston Region Metropolitan Planning Organization on August 19, 2010.

This document includes projects from 2011 to 2014 and detailed budget information on each one. The Transportation Improvement Program (TIP) report includes where the money comes from and where it is going.

These are the projects for the Boston Region for the year of 2011 and their costs.

Chapter 3 **2011**

Blue Line **Blue Line Modernization** **MBTA**

Make improvements to the Blue Line, consistent with the MBTA's Capital Investment Program (CIP).

Funding Program:	Section 5309	Federal Funds:	$7,000,000
Air Quality Status:	Model	State Funds:	$1,750,000
TIP Category:	Transit Service Enhancement	Total Funds:	$8,750,000

Boston **Chelsea St Bridge Replacement Construction** **604517**

Replace the Chelsea Street Bridge (B-16-020) over the Chelsea River.

Funding Program:	Bridge	Federal Funds:	$8,000,000
Air Quality Status:	Exempt	State Funds:	$2,000,000
TIP Category:	Bridge	Total Funds:	$10,000,000

Boston **Huntington Ave/Symphony Area Streetscape** **604571**

Streetscape and art elements in the Huntington Avenue Corridor.

Funding Program:	HPP 447	Federal Funds:	$2,140,232
Air Quality Status:	Exempt	State Funds:	$535,058
TIP Category:	Earmark	Total Funds:	$2,675,290

Boston **Huntington Ave/Symphony Area Streetscape** **604571**

Streetscape and art elements in the Huntington Avenue Corridor.

Funding Program:	HPP 1811	Federal Funds:	$820,080
Air Quality Status:	Exempt	State Funds:	$205,020
TIP Category:	Earmark	Total Funds:	$1,025,100

Boston/Chelsea **East Boston Haul Road**

Fund design of East Boston Haul Road.

Funding Program:	HPP 2032 (SAFETEA-LU)	Federal Funds:	$2,000,000
Air Quality Status:	Exempt	State Funds:	$500,000
TIP Category:	Earmark	Total Funds:	$2,500,000

Boston & Cambridge **Longfellow Bridge** **604361**

Rehabilitate/restore the Longfellow Bridge from Boston to Cambridge.

Funding Program:	Bridge	Federal Funds:	
Air Quality Status:	Exempt	State Funds:	
TIP Category:	Bridge	Total Funds:	$290,000,000

Boston & Somerville **Interstate 93** **605050**

Fund structural overlay on Interstate 93.

Funding Program:	Major Infrastructure	Federal Funds:	$8,424,000
Air Quality Status:	Exempt	State Funds:	$936,000
TIP Category:	Major Highway	Total Funds:	$9,360,000

Boston **Route 99 (Alford Street) over Mystic River** **603370**

Rehabilitation of Route 99/Alford Street (B-16-029) over the Mystic River.

Funding Program:	Bridge	Federal Funds:	$12,000,000
Air Quality Status:	Exempt	State Funds:	$3,000,000
TIP Category:	Bridge	Total Funds:	$15,000,000

Boston Region **Clean Air and Mobility Program**

Funding for CMAQ-eligible projects in the Boston Region. The MPO's Transportation Demand Management (TDM), Suburban Mobility, and Bicycle Parking Infrastructure programs are among the eligible projects for funding.

Funding Program:	CMAQ	Federal Funds:	$1,600,000
Air Quality Status:	Exempt	State Funds:	$400,000
TIP Category:	Target Funds	Total Funds:	$2,000,000

Boston Region **Central Artery/Tunnel 2011**

Fund various contracts associated with the continuing reconstruction of the Central Artery.

Funding Program:	National Highway System	Federal Funds:	$70,000,000
Air Quality Status:	Model	State Funds:	
TIP Category:	Major Highway	Total Funds:	$70,000,000

Boston Region **Central Artery/Tunnel 2011**

Fund various contracts associated with the continuing reconstruction of the Central Artery.

Funding Program:	Bridge	Federal Funds:	$25,000,000
Air Quality Status:	Model	State Funds:	
TIP Category:	Major Highway	Total Funds:	$25,000,000

Boston Region **Central Artery/Tunnel 2011**

Fund various contracts associated with the continuing reconstruction of the Central Artery.

Funding Program:	State Transportation Program	Federal Funds:	$20,000,000
Air Quality Status:	Model	State Funds:	
TIP Category:	Major Highway	Total Funds:	$20,000,000

Boston Region **Central Artery/Tunnel 2011**

Fund various contracts associated with the continuing reconstruction of the Central Artery.

Funding Program:	State Transportation Program/Flex	Federal Funds:	$44,365,000
Air Quality Status:	Model	State Funds:	
TIP Category:	Major Highway	Total Funds:	$44,365,000

Department of Conservation and Recreation (DCR)

Key Contacts

Chief Financial Officer:
Derek Lennon
Phone: 617-626-1300
Fax: 617-626-1449
derek.lennon@state.ma.us

General Information

251 Causeway Street, Suite 600
Boston, MA 02114
Phone: 617-626-1250
Fax: 617-626-1351
mass.parks@state.ma.us

Mission: "To protect, promote, and enhance our common wealth of natural, cultural and recreational resources. (Lennon, 2010)"

Programs and Interests:

The Department of Conservation and Recreation (2010a) is responsible for 450,000 acres made up of parks, forests, historic sites, reservoirs, seashores, and lakes.

The divisional structure of the DCR is composed of four parts:

- Division of State Parks and Recreation: This division protects 300,000 acres of land and resources from mountains, beaches, ponds, trails, and state forests.
- Division of Urban Parks and Recreation: Preserves, maintains, and enhances the look of the environment within the Greater Boston Area.
- Division of Water Supply Protection: Monitors, manages, and protects the drinking water supply for Greater Boston.
- Planning and Engineering: Provides engineering expertise for the design, planning, and construction management of state and urban parks, as well as the water division.

DCR Budget Information - FY 2011

Row labels	28100100 ($)	28102041 ($)	Grand Total ($)
5400 - Central Region			
EE - Administrative Expenses	64,861.20	56,530.00	121,391.20
FF - Programmatic Facility Ops Supplies and Related Expenses	14,126.40	56,070.00	70,196.40
GG - Energy Costs, Utilities and Space Rental Expenses	107,163.00	491,735.00	598,898.00
JJ - Programmatic Operational Services	118,916.10	49,500.00	168,416.10
KK - Programmatic Equipment Purchase			
LL - Programmatic Equip Tax Exempt Lease-Purchase (TELP)	11,358.90	41,328.90	52,687.80
NN - Horizontal and Vertical Construction, Improvements, Maintenance	193,358.70	175,451.40	368,810.10
UU - Information Technology (IT) Expenses		774.00	774.00
5400 - Central Region Total	509,784.30	871,389.30	1,381,173.60
6600 - North Region			
EE - Administrative Expenses	42,056.04	62,652.60	104,708.64
FF - Programmatic Facility Ops Supplies and Related Expenses	61,484.42	55,921.50	117,405.92
GG - Energy Costs, Utilities and Space Rental Expenses	1,486,711.32		1,486,711.32
HH - Consultant Service Contracts			
JJ - Programmatic Operational Services	8,832.00		8,832.00
LL - Programmatic Equip Tax Exempt Lease-Purchase (TELP)	40,452.05	35,882.10	76,334.15

NN - Horizontal and Vertical Construction, Improvements, Maintenance	542,916.90	122,427.00	665,343.90
TT - Loans and Special Payments	5,000.00		5,000.00
UU - Information Technology (IT) Expenses		8,153.39	8,153.39
6600 - North Region Total	2,187,452.73	285,036.59	2,472,489.32
6700 - Harbor Region			
EE - Administrative Expenses	36,787.12	35,181.00	71,968.12
FF - Programmatic Facility Ops Supplies and Related Expenses	29,935.07	69,515.10	99,450.17
GG - Energy Costs, Utilities and Space Rental Expenses	1,433,283.36		1,433,283.36
JJ - Programmatic Operational Services	4,200.00		4,200.00
KK - Programmatic Equipment Purchase	4,031.34		4,031.34
LL - Programmatic Equip Tax Exempt Lease-Purchase (TELP)	40,767.42	35,899.20	76,666.62
NN - Horizontal and Vertical Construction, Improvements, Maintenance	344,400.42		344,400.42
PP - Grants and Subsidies	114,000.00		114,000.00
UU - Information Technology (IT) Expenses		5,996.15	5,996.15
6700 - Harbor Region Total	2,007,404.73	146,591.45	2,153,996.18
6800 - South Region			
EE - Administrative Expenses	45,823.25	39,393.00	85,216.25
FF - Programmatic Facility Ops Supplies and Related Expenses	46,426.22	33,827.40	80,253.62
GG - Energy Costs, Utilities and Space Rental Expenses	991,154.45		991,154.45
JJ - Programmatic Operational Services	2,707.43		2,707.43
KK - Programmatic Equipment Purchase			
LL - Programmatic Equip Tax Exempt Lease-Purchase (TELP)	21,597.96	21,599.10	43,197.06
NN - Horizontal and Vertical Construction, Improvements, Maintenance	263,644.20		263,644.20
UU - Information Technology (IT) Expenses		18,019.39	18,019.39
6800 - South Region Total	1,371,353.51	112,838.89	1,484,192.40
6902 - Mobile Maintenance			
EE - Administrative Expenses	69,040.04	53,983.80	123,023.84
FF - Programmatic Facility Ops Supplies and Related Expenses	10,648.12	10,826.10	21,474.22
GG - Energy Costs, Utilities and Space Rental Expenses	401,265.21		401,265.21
LL - Programmatic Equip Tax Exempt Lease-Purchase (TELP)	33,167.95	16,481.70	49,649.65
NN - Horizontal and Vertical Construction, Improvements, Maintenance	259,146.00		259,146.00
UU - Information Technology (IT) Expenses		6,122.45	6,122.45
6902 - Mobile Maintenance Total	773,267.32	87,414.05	860,681.37
Grand Total	6,849,262.59	1,503,270.28	8,352,532.87

Environment Massachusetts

General Information:

44 Winter Street, Suite 401
Boston, MA 02108
Phone:
(617) 747-4400
Fax:
(617) 292-8057

Mission: Environment Massachusetts is a citizen-based advocacy organization that overcomes environmental problems statewide. Environment Massachusetts has been tackling the state's environmental problems for the past 30 years through research, programs, and strong advocacy (Environment Massachusetts, 2010).

Programs and Interests:

New Energy Solutions: By repowering Massachusetts with clean energy and jobs from the construction of green buildings. They will work with government agencies to fully implement the Green Communities Act. Environment Massachusetts has been strong advocates for the approval and construction of Cape Wind. They have also been lobbying for a bill that would make it easier to build wind projects.

Global Warming Solutions: Support the Regional Greenhouse Gas Initiative (RGGI) that limits power plant emissions of carbon dioxide to ten percent below current levels by 2019.

Environment Massachusetts testified at public hearings to convince the DEP to implement the Global Warming Solutions Act. This law targets to reduce emissions of twenty-five percent below 1990 levels by 2020.

Preserving MA: By protecting rivers, streams, and the Quabbin reservoir, which provides clean water for more than 2 million MA residents.

Protecting Our Atlantic Legacy: Advocates for the protection of Stellwagen Bank, which runs from Cape Ann to Cape Cod and is home to Humpback Whales and endangered North Atlantic Right Whales.

Clean Air: Reduce diesel pollution in MA by retrofitting diesel engines with Diesel Particulate Filters (DPFs) that can reduce pollution of fine particles by ninety percent.

Our Health, Our Environment: Reduce everyday day expose to chemicals that endanger our health by advocating for the passage of the Safer Alternatives Bill, which promotes the replacement of chemicals with safer alternatives, whenever possible.

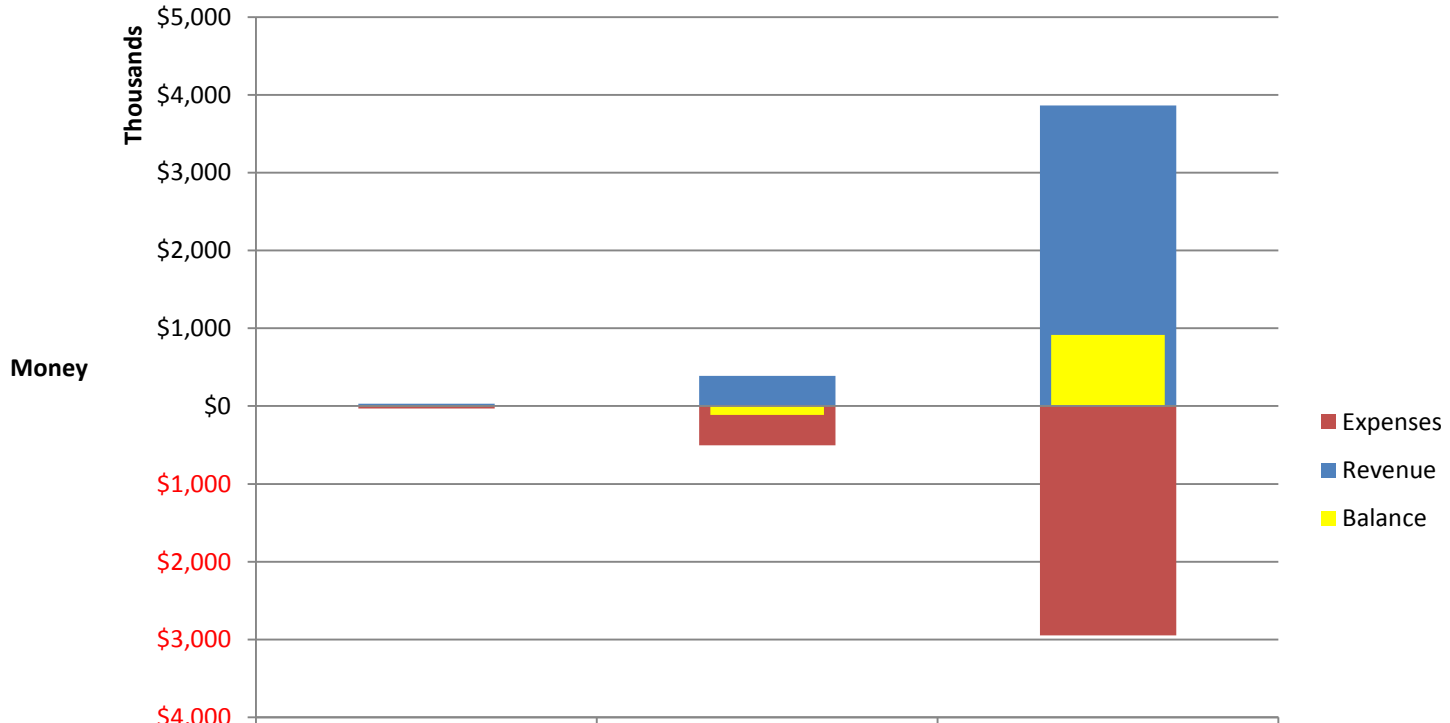
State Legislature: Environment Massachusetts supports and advocates for the full implementation of the Global Warming Solutions Act as well as the Green Communities Act.

Budget Information for Environment Massachusetts– FY2009

Activities & G	4	Number of independent voting members of the governing body (Part VI, line 1b)	4	4
	5	Total number of employees (Part V, line 2a)	5	8
	6	Total number of volunteers (estimate if necessary)	6	0
	7a	Total gross unrelated business revenue from Part VIII, line 12, column (C)	7a	0.
	b	Net unrelated business taxable income from Form 990-T, line 34	7b	0.
			Prior Year	Current Year
Revenue	8	Contributions and grants (Part VIII, line 1h)	389,788.	3,858,092.
	9	Program service revenue (Part VIII, line 2g)		
	10	Investment income (Part VIII, column (A), lines 3, 4, and 7d)	441.	6,433.
	11	Other revenue (Part VIII, column (A), lines 5, 6d, 8c, 9c, 10c, and 11e)		
	12	Total revenue - add lines 8 through 11 (must equal Part VIII, column (A), line 12)	390,229.	3,864,525.
Expenses	13	Grants and similar amounts paid (Part IX, column (A), lines 1-3)		1,810,700.
	14	Benefits paid to or for members (Part IX, column (A), line 4)		
	15	Salaries, other compensation, employee benefits (Part IX, column (A), lines 5-10)	54,055.	34,078.
	16a	Professional fundraising fees (Part IX, column (A), line 11e)		
	b	Total fundraising expenses (Part IX, column (D), line 25) ▶ 264,408.		
	17	Other expenses (Part IX, column (A), lines 11a-11d, 11f-24f)	451,078.	1,104,126.
	18	Total expenses. Add lines 13-17 (must equal Part IX, column (A), line 25)	505,133.	2,948,904.
	19	Revenue less expenses. Subtract line 18 from line 12	-114,904.	915,621.
			Beginning of Year	End of Year
Net Assets or Fund Balances	20	Total assets (Part X, line 16)	338,623.	1,255,255.
	21	Total liabilities (Part X, line 26)	454,918.	455,929.
	22	Net assets or fund balances. Subtract line 21 from line 20	-116,295.	799,326.

Part II Signature Block

Environment Mass Inc. Historical Revenue vs Expenses



	2007	2008	2009
Expenses	$31,988	$505,133	$2,948,904
Revenue	$30,597	$390,229	$3,864,525
Balance	($1,391)	($114,904)	$915,621

Fiscal Year

(Environment Massachusetts, 2007-09)

Environmental League of Massachusetts (ELM)

General Information

Contact Info:
14 Beacon Street, Suite 714
Boston, MA 02108
617-742-2553
http://www.environmentalleague.org

Mission: Protect the citizens and the environment of Massachusetts by advocating laws and programs that safeguard land, water, and air (ELM, 2010).

Programs and Interests:

Zoning Reform and Smart Growth

Managing Our Water Resources

Reducing Litter and Promoting Recycling

Climate Change

Reducing Harmful Chemicals

Greening Boston's Taxis: Gas Guzzlers or Hybrids

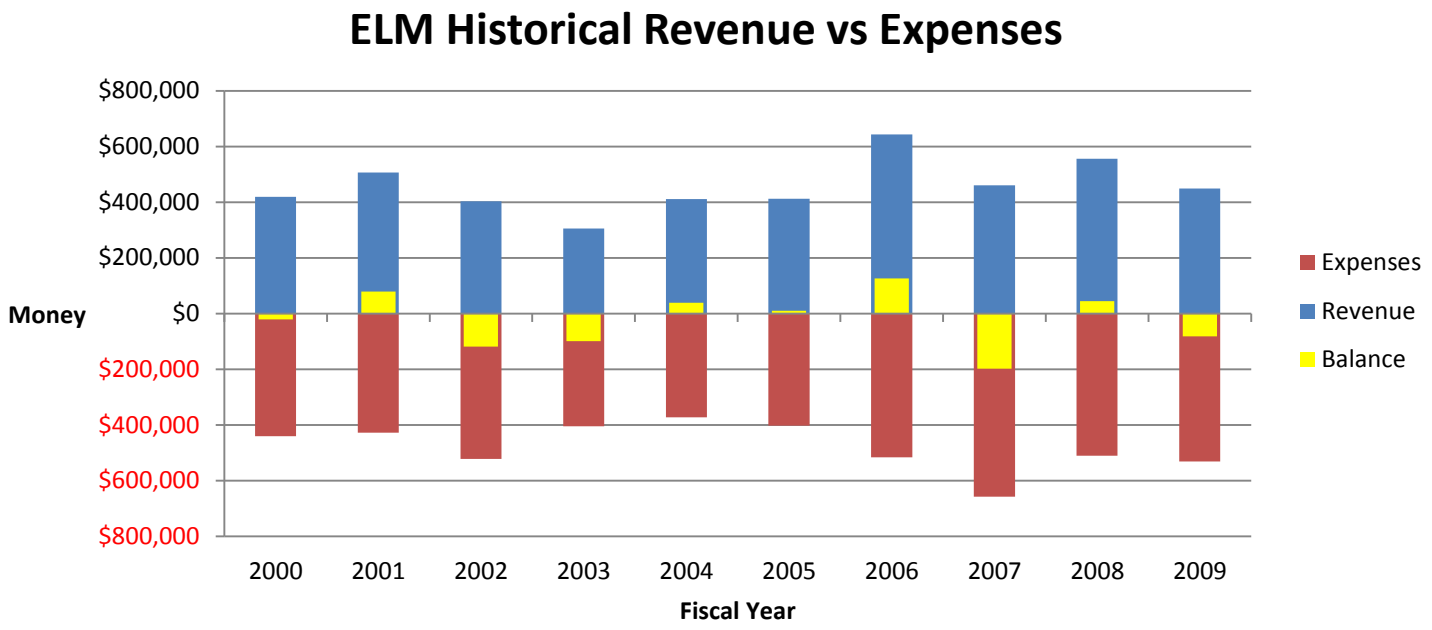
Global Warming Solutions Project (GWSP) - With support from the Barr Foundation, ELM has gathered a group of people with diverse backgrounds to come up with solutions to deal with global warming.

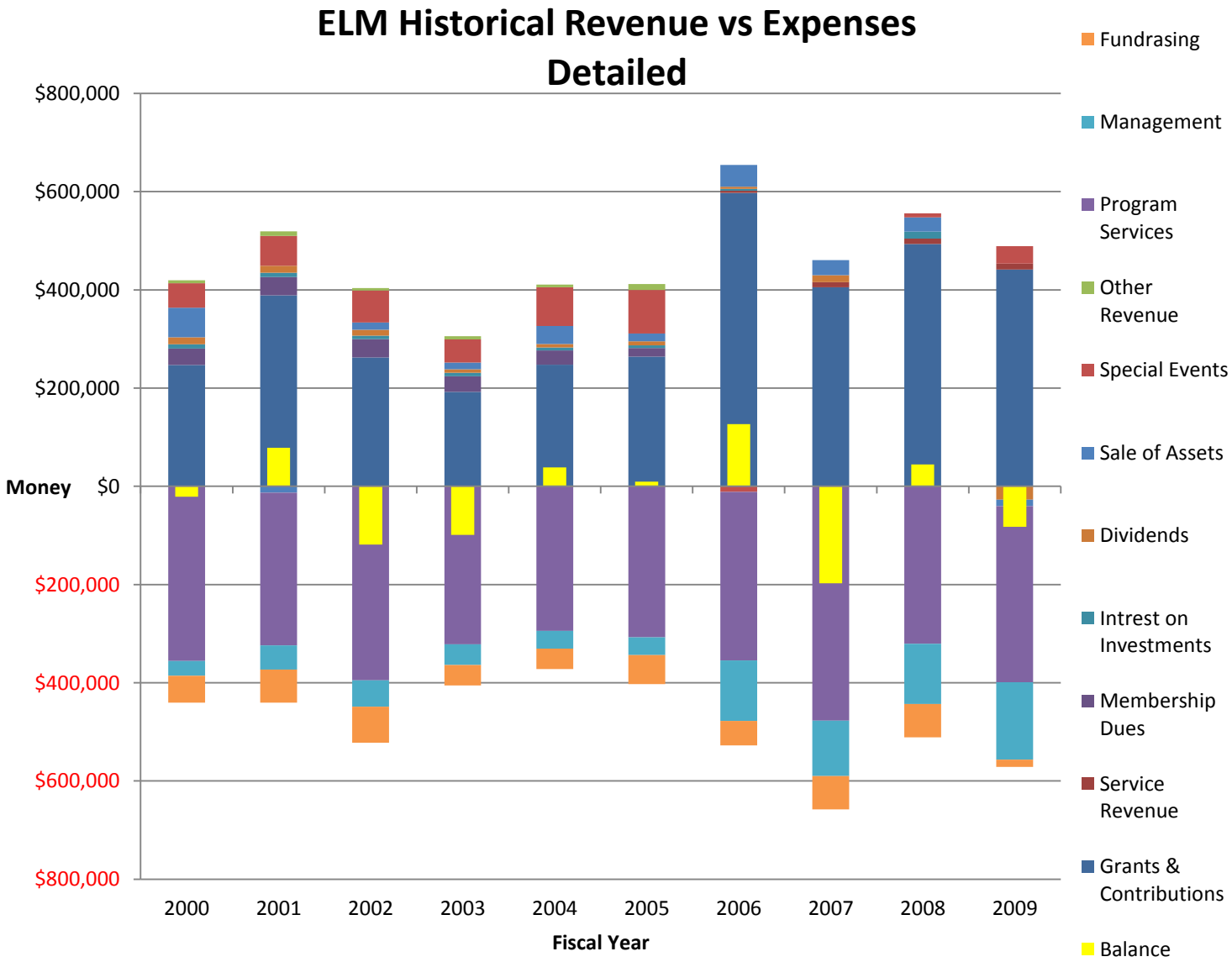
ELM will also host a summit in the fall of 2010 to connect members of different organizations to put their ideas together that deal with the current problems regarding global warming.

ELM will also publish by December 31, 2010 a strategy to achieve the Global Warming Solutions Act passed in August 2008 that targets to reduce emissions between 10 to 25% of 1990 levels from January 1, 2011 to 2020.

Budget Information

Revenue	FY 09	FY 08		Expenses	FY 09	FY 08
Contributions	139,974	146,523		Personnel	358,308	313,581
Events	99,195	272,755		Events & Fundraising	77,295	177,132
Foundations	216,851	276,624		Administrative	115,161	110,458
Dues	65,875	20,650		Direct Program Services	38,496	165,186
Interest and Misc	24,666	25,320		Total Expenses	589,260	766,357
Total Revenue	546,561	741,872				





(Environmental League of Massachusetts, 2000-2009)

United States Environmental Protection Agency (EPA)

General Information

EPA New England Headquarters
5 Post Office Square - Suite 100
Boston, MA 02109-3912
1-888-372-7341

Mission: The mission of the EPA (2010a) is to protect human health and the environment by studying environmental problems, developing and enforcing regulations, giving grants, sponsoring partnerships, and publishing information.

Programs:

General Programs for Boston Region

- Improve Environmental and Public Health Problems Facing Urban Residents.
- Decrease Lead Poisoning through Education and Prevention Programs.
- Tackle Overpopulation and Lack of Open Space.
- Tackle Global Warming and Rising Water Levels

Overall Problems

EPA's National Ambient Air Quality Standards (AQS) - $309 million (2011) nationally for the prevention and control of air pollution as well as the implementation and development of programs to meet federal standards.

Congestion Mitigation and Air Quality (CMAQ) Improvement Program - $8.6 billion (2010) to decrease greenhouse gases from traffic by improving traffic flow and regulating vehicle air pollution emissions.

Goal 1 - Clean Air and Global Climate Change- $1.2B makes up 11.9% of the FY 2011 Budget by goal. This money will go towards several programs to ensure air quality standards, such as the National Clean Diesel Program that focuses on reducing particulate matter from diesel engines by 95%.

Budget Information

$7.6 billion for 2000

$7.9 billion for 2001

$8.09 billion for 2002

$8.08 billion for 2003

$8.37 billion for 2004

$7.79 billion for 2005

$7.571 billion for 2006

$7.315 billion for 2007

$7.199 billion for 2008

$7.143 billion for 2009

$10.486 billion for 2010

$10.020 billion for 2011

Goal 2 – Clean and Safe Water - $4.6B makes up 45.7% of the FY 2011 Budget by goal. It funds several programs including the Clean Water State Revolving Fund and Drinking Water State Revolving Fund to ensure water quality.

Clean Water State Revolving Fund (SRF) - $66 million in 2011 for the State of Massachusetts to protect its water by proving federal financial assistance to municipalities and tribes to construct and maintain water and water treatment facilities.

Drinking Water State Revolving Fund (DWSRF) - $23 million in 2011 for Massachusetts to assist small communities in improving infrastructure projects to ensure safe water quality.

Goal 3 – Land Preservation and Restoration - $1.7 B which makes up 17.5% of the FY 2011 budget by goal to preserve and restore lands around the nation.

Goal 4 – Healthy Communities and Ecosystems - $1.7B which makes up 16.7% of the FY 2011 budget by goal. This money will go towards protecting ecosystems and communities by enhancing scientific research and partnerships.

Goal 5 – Compliance and Environment Stewardship - $824 million which accounts for 8.2% of the FY 2011 budget by goal. This money is invested in enforcing and improving compliance to environmental regulations.

Massachusetts Climate Action Network (MCAN)

General Information

P.O. Box 51563
Boston, MA 02205
Phone: 617-515-0600
www.massclimateaction.net

Mission: "The Massachusetts Climate Action Network (MCAN) is a coalition of locally organized groups fighting the climate crisis (MCAN, 2010)."

Overview and Programs:

MCAN accomplishes their mission by being an umbrella organization to more than 40 town based citizen groups in the fight against climate change (MCAN, 2010).

Boston Climate Action Network (BCAN) led by Loie Hayes, is the local group in the City of Boston.

MCAN is also allied with several organizations, such as: the Clean Water Action of Massachusetts, Environment Massachusetts, Global Warming Education Network (GWEN), HealthLink (North Shore), and the Mass Energy Consumers Alliance.

The Massachusetts Climate Action Network works closely with its chapters to tackle climate change, by drafting plans, passing municipal resolutions, setting up committees, and reaching out to the public.

State wide pressure from MCAN along with their citizen groups and allied organizations, the New England Regional Greenhouse Gas Initiative (RGGI) agreement was signed within days by newly elected Governor Deval Patrick.

MCAN states that it led advocacy efforts for years in support of the Climate Action Plan, which includes programs to reduce greenhouse gas emissions and fight climate change in the State of Massachusetts.

With the orientation of MCAN, many of their town based citizen groups have taken local climate action plans (CAPs) in their community.

The Low Carbon Living (LoCaL) Program was first started in 2007 to help typical households reduce their carbon emissions by 10%.

The Cool Mass Program plans to reduce the carbon footprint of 25% and 85% of households in a chosen community by 25% in a three-year strategic campaign. MCAN and other participating organizations hope to make the State of Massachusetts a leader in the household reduction of greenhouse gas emissions.

MCAN also feels that through their strong advocacy they have helped many of their chapter communities adopt energy efficient methods, such as replacing traffic signals and street lights to LEDs.

MCAN chapters can apply for additional funds from the Wolfe & Rita Climate Projects Funds with grants up to $1,000 per year for a project or activity that deals with climate action. The fund has distributed more than $7,000 to support local chapters.

Massachusetts Clean Energy Center (MassCEC)

Key Contacts

Communications Manager:

Kate Plourd
55 Summer Street 9th Floor
Boston, MA 02110
Phone: 617-315-9339
Cell: 617-449-8483
kplourd@MassCEC.com

General Information

55 Summer Street, 9th Floor
Boston, MA 02110
Phone: 617-315-9355
Fax: 617-315-9356
Info@MASSCEC.com

Mission: Develop and accelerate the growth of the clean energy sector in Massachusetts.

Programs and Interests:

The Massachusetts Clean Energy Center (2010)has the sole purpose of developing and rapidly advancing the growth of the clean energy industry. It is the first state authority of its kind in the nation.

Governor Deval Patrick and his team of advisors felt that Massachusetts was at a privileged position and could be the leader in the clean energy industry due to its world class universities, highly skilled workforce, and the technology entrepreneurship present in the state.

MassCEC also feels that MA is the perfect candidate for the first state agency in the country in charge of expanding the clean energy industry due to the large and growing number of clean energy companies in the state. They also believe that the constant creation of new technologies, first class academic research facilities, and the many environmental organizations the state has that deal with climate change and environmental problems makes Massachusetts an ideal state for the implementation of the first state agency in charge of developing and growing a clean energy economy.

Created by *An Act Relative to Green Jobs in the Commonwealth* (also known as the Green Jobs Act) on August 14, 2008, MassCEC (2010c)serves as a center to facilitate and accelerate the economic development of the green energy industry.

MassCEC plans that through its divisions of Workforce Development, Investment in Clean Technology, Renewable Energy Generation, and Clean Energy Sector Development, MassCEC can:

- Be the support center that invests in new and existing clean energy companies
- Provide training to build a highly skilled clean energy work force to fill out the jobs created by the new industry.
- Provide capital assistance for the growth of the clean energy sector in Massachusetts
- Support the installation of renewable energy projects.

MassCEC was merged with the Massachusetts Renewable Energy Trust (MRET) from the Massachusetts Technology Collaborative in November 2009, when Governor Deval Patrick signed An Act Relative to Clean Energy (also known as the Clean Energy Act). Both organizations had similar missions, their staffs and financial resources were united, making MassCEC the state's largest and lead agency charged with developing and growing the clean energy sector.

Budget Information- MassCEC FY 2010

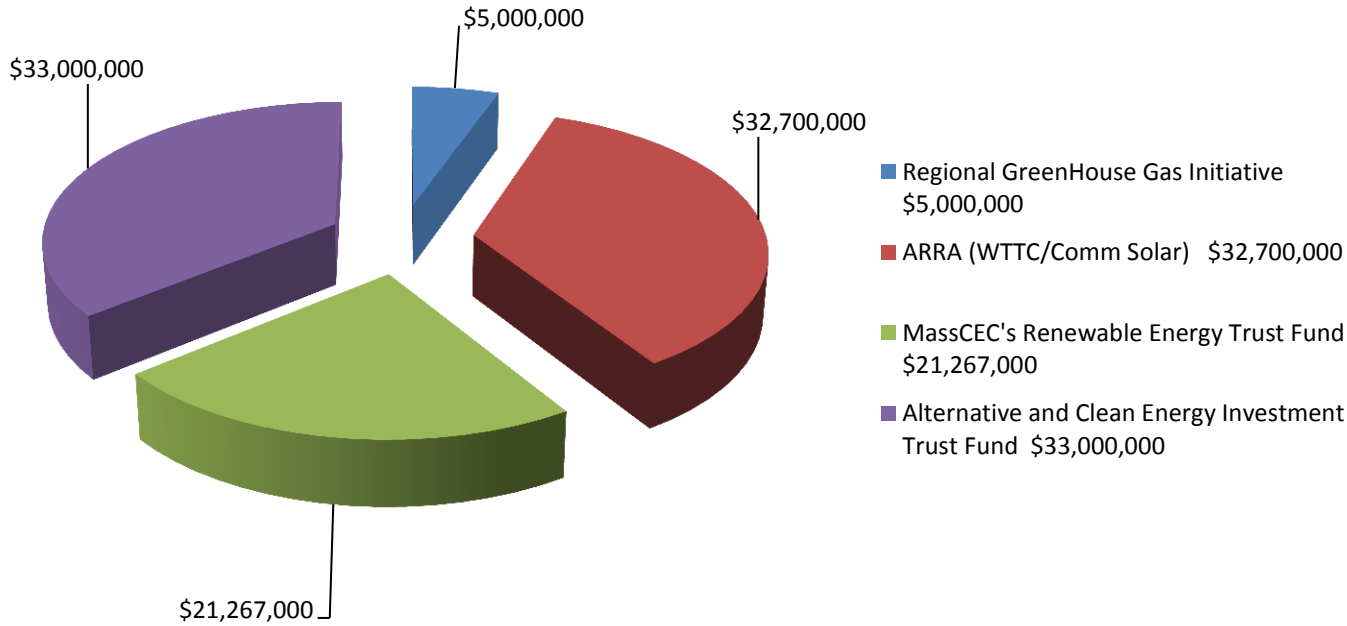
Based on the MassCEC Statutory Report: Fiscal Year (MassCEC, 2010b) spent approximately $70 million to fund:

- 1,084 renewable energy projects in 290 cities and towns
- Create 1,414 jobs in the clean energy sector
- Work force training
- $45 million to support the installation of 21 megawatts (MW) of solar photovoltaic power generation
- $8.6 million to support 67 wind power projects in 55 towns in the state, which includes 35 feasibility studies
- $650,00 to support six small hydroelectric facilities
- $8.3 million to support clean energy companies
- $4 million for work force training
- MassCEC has also committed $13.2 million in grants and loans to support the construction and development of the Wind Technology Testing Center (WTTC) in Charlestown.

When the MassCEC (2010a)was established in 2008, by the Green Jobs Act, $43 million from the Massachusetts Alternative and Clean Energy Investment Trust Fund was placed into the MassCEC. At the fall of 2008, the funds were reduced by $10 million due to an act that removed the funds from MassCEC to make it available for fiscal year 2009.

In May 2009, the American Recovery and Reinvestment Act (ARRA) awarded $24.7 million to the MassCEC for the development of Wind Testing Technology Center. They were also awarded $8 million in December 2009 from the Department of Energy Resources with ARRA funds for the Commonwealth Solar Stimulus rebate program.

Total MassCEC Funding



Massachusetts Department of Environmental Protection (MassDEP)

Key Contacts

Assistant Commissioner for Planning & Policy:
Douglas E. Fine
One Winter St.
2nd Floor
Boston, MA
02108
Tel:
617-292-5792
Fax:
617-574-6880
Email:
Douglas.Fine@
State.ma.us

General Information

One Winter
Street
Boston,
Massachusetts
02108
Main Phone:
617-292-5500
Main Fax:
617-556-1049
http://www.mass.gov/dep/

Mission: Ensure clean air, water, land, clean up, recycling, and safe management of hazardous and toxic materials for the State of Massachusetts (MassDEP, 2009b).

Programs and Interests:

Air Assessment Branch (AAB) - $736,000 (2010) for the operation of 29 air monitoring stations, 139 instruments at 30 locations in MA (MassDEP, 2010b).

Clean Air Act Operating Permit and Compliance Program - $1.657 million (2011) for compliance of current regulations under the Clean Air Act (MassDEP, 2010e).

Ambient Air Toxics Pilot Project - $140,626 (2011) for maintenance and administration of air monitoring instruments that measure air toxics

Clean Air Act- Fine Particulate Matter Air Monitoring - $425,357 (2011) for maintenance and administration of instruments that measure fine particulate matter.

Clean Air Act - $952,444 (2011) Money will go towards programs such as the administration of the Ambient Air Monitoring Network.

Air, Water, and Hazardous Waste Management Regulatory Programs - $16.5 million

Safe Drinking Water Act - $1.46 million (2011) to test and assure that drinking water is safe for consumption.

Solid Waste Management - $41 million (2011) to safely collect and dispose of solid waste and increase recycling rates in the City of Boston

Water Quality Management Program - $215,047 (2011) to test and assure that drinking water is safe for consumption.

Hazardous Waste Cleanup Program - $13.8 million (2011) for the identification, clean up, and prevention of hazardous waste sites

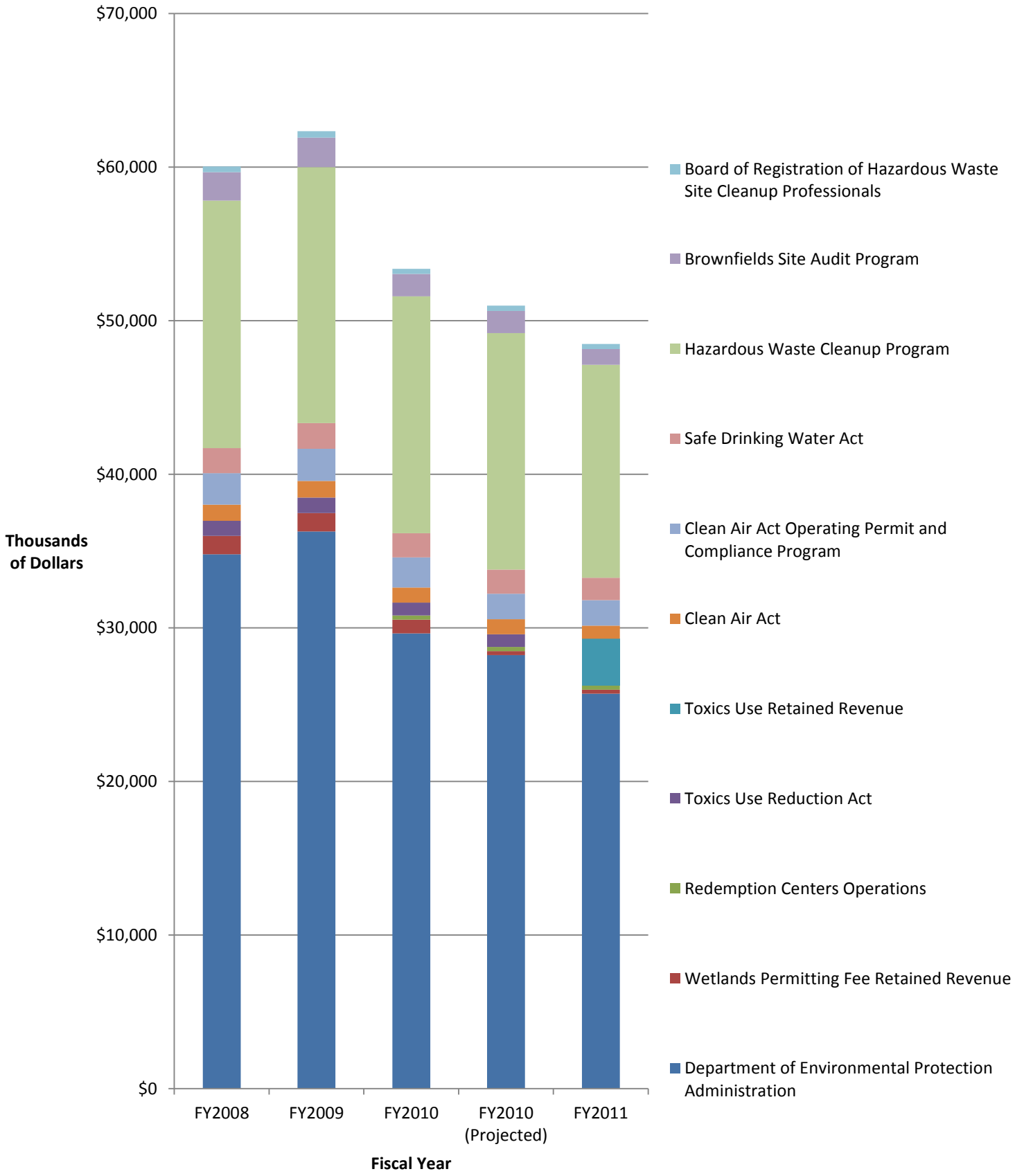
Boston Energy Alliance - $500,000 (2010) to identify and implement energy efficient solutions in Boston

Green Affordable Housing Program - $2 million to promote renewable and economic building designs.

Budget Information

ACCOUNT	ACCOUNT	FY2008 GAA	FY2009 GAA	FY2010 GAA	FY2010 Projected	FY2011 GAA
2200-0100	Department of Environmental	34,791	36,273	29,637	28,220	25,714
	Protection Administration					
2200-0102	Wetlands Permitting Fee Retained Revenue	1,200	1,200	904	261	261
2200-0107	Redemption Centers Operations	0	0	275	275	275
2210-0100	Toxics Use Reduction Act	983	1,008	831	831	0
2210-0105	Toxics Use Retained Revenue	0	0	0	0	3,051
2220-2220	Clean Air Act	1,049	1,080	983	983	952
2220-2221	Clean Air Act Operating Permit	2,050	2,104	1,957	1,657	1,657
	and Compliance Program					
2250-2000	Safe Drinking Water Act	1,629	1,674	1,576	1,574	1,465
2260-8870	Hazardous Waste Cleanup Program	16,117	16,663	15,420	15,383	13,856
2260-8872	Brownfields Site Audit Program	1,847	1,911	1,456	1,456	1,030
2260-8881	Board of Registration of Hazardous	378	415	342	342	337
	Waste Site Cleanup Professionals					
TOTAL	TOTAL	60,043	62,328	53,382	50,983	48,491
	* GAA is General Appropriation Act.					

Historical Budget Levels for MassDEP



APPENDIX C: INTERVIEW PROTOCOLS AND NOTES

INTERVIEW PROTOCOL FOR VINCENT DEVITO

Director of Institute for Energy and Sustainability
Partner at Bowditch & Dewey
Sits on the Advisory Board of Greenopolis.com

1. What is currently the primary focus of your work?
    a. What is the focus of the company's cases?
2. What kind of environmental cases did you work on for the commonwealth of Massachusetts?
3. Which was your most important achievement when you worked as a state lawyer for the Commonwealth of Massachusetts?
    a. Which laws do you think have helped Massachusetts the most in terms of sustainable energy?
    b. What laws do you feel have set the state back in terms of its environmental progress?
4. When you worked as the Assistant Secretary of Energy, which was the issue that interested you most?
    a. Which problems had the largest budget?
5. What is your opinion on the current administrations environmental and energy policies?
6. Do you think the government is doing enough to promote green practices?
    a. Why?
7. On which environmental issue do you think that this administration should focus its resources?
8. Which would you consider to be the main energy issues in Boston?
9. How does the east coast and specifically Boston compare to the rest of the country in terms of its willingness to implement environmental laws?
10. Which would you consider to be the main environmental problems in Boston?
11. Do you know of any potential funding sources that could be allocated to enhancing the environment in the Boston metropolitan area?
12. Do you know about WPI's project program?
    a. Which organizations in the city of Boston do you think would collaborate with WPI in solving some of the city's environmental problems?
13. In your opinion, how can the government change its reliance on fossil fuels for energy production?
14. What forms of energy production do you believe will become the dominant in the future?
15. Which of the possible technologies for clean energy production are the most feasible energy solutions for the state of Massachusetts?
16. Where do believe the common focus will shift in respect to the environmental problems in Boston over the next 5 to 10 years?

INTERVIEW NOTES WITH VINCENT DEVITO

Interview with Vincent DeVito
Recorded Notes: Thales Oliveira, Oliver Rich
Location: IGSD Conference Room
Date: 04/15/2010

Question 1) Current primary focus of work
- Corporate attorney right now
    - helping companies make money from helping with the issue
- Four types of clients
    - Corporate 500 companies
    - Investors
    - Development stage companies
    - Sustainability groups
        - working with IES
        - Northeast-Midwest institute
        - Worcester sustainability board
- Energy and climate change attributes
    - Mostly corporate
    - Qualifications
- helps with mergers and acquisitions
- worked for the federal government
    - National Energy Policy 2001, 03, 05
- started in Beacon Hill, moved to New York

2) Lawyer for the commonwealth
- Electrical Utility Restructuring Act of 96, 97
    - included renewable energy portfolio
    - Model for other states and the EU
- Department of public utilities
    - created regulations
- doing now
    - Helps companies comply with regulations

3) Laws that helped MA make progress
- Massachusetts Global Warming Solutions Act in California AB 32
- Green Jobs Bill
- American reinvest act funded many of these other bills
- Green communities act of 1998

4) Laws that Mr. DeVito feels set the state back
- Anything that has increased taxes

- takes money away from investment and commercial market
- States are still in deficit so causes more problems than it solves

5) Assistant secretary
- Only senior manager in bush not from Capitol Hill
- selected for opposing views
- worked for 4 and half years as senior manager
- Many representation work
- US rep for international energy agency
- developed policy
    - loan guarantee program, became law in 2005
- Policy coordination
    - coordinated with white house
- Many speeches and representation for foreign diplomats
- Staff of 100+ employees
- Used position to give independent market based advice

6) Has the current administration maintained the progress?
- National Energy Plan of 2001
    - was in charge of chapter 8, international
    - North America Energy initiative
    - US, Canada, Mexico to integrate power systems
    - Carbon sequestion program
    - All still running
- Not big yet, but started funding what was already in place
- FutureGen Project
- DeVito argues that there is no need for new plans but a need to fund the current plans

7) Issues in New England Region and Boston
- Biggest energy issue for northeast
    - End of pipeline in terms of gas, electricity
    - Tough citing laws
    - No natural resources, everything needs to be imported
    - Expense to bring energy here
- Solution
    - Clean energy technology economy
    - Domestic source of energy
- Jobs training in energy section to make MA more stable and independent
    - bring existing workforce, new students
    - gives them training build new, required infrastructure
    - Many new jobs in economy are installation jobs, and people need certification

8) Willingness to implement the laws
- Massachusetts is a leader
    - California is prominent because of scale
- What about Europe

- Little more advance in deployment of energy technologies
- Not of federation of multiple states
- US is the source of the ideas but takes too long to act
- Europe takes those ideas and acts

9) Sources of funding for WPI IQP projects
- IES
    - Maybe some partnership, get some grants
- Department of energy can provide funding for research
- Numerous foundations
    - may be office in WPI that gets money
    - System out there where you can look up foundations giving money for certain projects
    - identify office at WPI that chases funds

10) How can the government change from fossil fuel to other energy sources?
- Take away assumption that we need to move away from fossil fuel
- Instead research ways to use fossil fuels without emitting
- FutureGen on the DOE website
    - Carbon captor/sequestion program
- No part of our economy is able to sustain the impact of fossil fuels depletion
    - will not happen in near future
- DeVito feels it's not a resource solution, but a technology solution

11) Where will the focus towards a solution shift to?
- Clean energy technology feels like a bubble and is very profitable according to DeVito
- DeVito feels this bubble is not sustainable beyond another 10 years, but some sections of this bubble are such as water
- Water seems to be a very big issue
    - Impacts energy sector
    - Water supply was issue when building solar plant in Nevada
    - found water low underground, property became more valuable for water instead of solar energy

12) What organizations can we look into?
- Everyone is willing to work with students
    - They are cheap labor
    - What is not captured in experience can be acquired through enthusiasm and energy from college students
- Interns at DOE were good, became full-time employees
- Send email to DeVito for the list of companies/contacts in Boston

INTERVIEW NOTES WITH MASSDEP & STATE HOUSE

9/13/2010
MassDEP and State House
10 am
Meeting with Ed Snyder

- Ed Snyder, was the grant manager, not anymore
  - In air water and hw program, almost half goes to water
  - Bill Harkins budget director no answer
    - 617-292-5906 till Wednesday
    - Call early
    - Referred from Bawa (federal grants manager)
  - Public relations office
    - Joe Ferson

- State house
  - Contact Brian Gosslain and Sara Glassman for budget info
    - Brian ext 35429
    - Sara ext 35480
    - Phone is 617-727-2040

INTERVIEW NOTES WITH DCR & DEREK LENNON

Department of Conservation and Recreation
Meeting Minutes with Derek Lennon
09/14/2010 from 10 A.M. to 10:30 A.M.

- Derek Lennon - C.F.O. Division of Administration and Finance
- Derek mentions the storm water management program number is (2800-0401) in case we need to look it up
- General information
    - The DCR needs smart projects
    - Budget is very low and many corners have to be cut
    - What kind of projects can we do to help
- Some bond funded programs
- Almost all of the DCR's money goes towards water management
    - Almost $1 million from private grants
- Capital projects from $5 million to $20 million
- GIA budget is not representative
- Mainly street trash is swept into storm drains which causes large pollution to water
- Energy efficient programs is where most opportunities are
    - Programs that reduce energy consumption of older buildings
    - Programs that utilize small amounts of money but have a great return to the DCR

INTERVIEW NOTES WITH TBHA & VIVIEN LI

Minutes of Meeting with Vivien Li
Executive Director of The Boston Harbor Association
9/14/2010 from 11:30 A.M. to 12:30 P.M.

- Funding, where does it come from
    - Vivien Li states that due to the economic crisis the organizations has taken a serious decrease in its funds
    - She states that the total income for FY 2010 was $320 thousand dollars.
    - Most it comes from Events, to be exact $180 thousand dollars
    - Other organizations contribute around $80 thousand dollars and grants about $40 thousand
- Even though they have little money, Li argues that because of that they are very efficient with the little money they have
    - One example is the Marine Debris Clean Up Program
    - With grants of $20,000 from the City of Boston, $5,000 from Massport, $10,000 from MWRA, and $5,000 from Eastern Salt company
    - TBHA has managed to clean 220 tons of debris from Boston Harbor since the year 2000.
- The Back to the Beaches Program
    - Has also restored many beaches in the Boston Harbor along with the Department of Conservation and Recreation
- Vivien Li also mentions one of the greatest issues they are trying to address at this time
    - Sea water level rise
- She mentions that organizations go where the money is
    - According to her the Barr Foundation is shifting their 5-10 million dollars from general environmental problems to climate change and the rise of sea level water
- Li mentions several things that are happening for human behavior to be more aware of green life
    - Li states simple things from landscaping turning green by buying trees that last a long time instead of a tree that blossoms once a year
    - National and local governments that are focusing more on organic and healthy living by changing meals in school cafeterias
    - Michelle Obama taking care of her garden to incentivize people to grow their own food for a more healthier and organic living
    - Li also mentions the need to grow food locally and eat locally to decrease emissions from transportation
- Vivien mentions some of the plans the government is putting in place to address the current issues of the time
    - She mentions one of Mayor Menino's plan Sparking Boston's Climate Revolution

    - The Climate Action Plan
    - The city's plan to plant 100,000 trees
- Li mentions a conference November 9-10 about
    - Climate change
    - Sea level rise
    - She wants to get people's attention and show them pictures of what the city will look with 5 or 10 feet of water
    - Work with property owners to avoid blown debris into ocean
- TBHA has an Education Programs budget $8-10 thousand dollars
    - Chartering boats for education
    - Spray paints in drains to avoid trash being thrown
- Launched "Green Water Taxi" on June 3rd, 2010
    - Totally electric water taxi
    - Near silent
    - Ecofriendly
    - Goes to Logan Airport and 30 other locations
- Advocacy
    - Comment letters
    - Much of their time is spent on comment letters
    - For any further information, we could refer to their letters

INTERVIEW NOTES WITH MASSCEC & KATE PLOURD

9/21/2010
Mass Clean Energy Center
10 am
Meeting with Kate Plourd, Communications Manager

- Looked for investment portfolio online but was not available
- List of projects not very up to date
    - Working on updating with searchable database
    - Water + energy trust fund
- Renewable energy trust fund
    - Late 90's small surcharge on state energy users
    - Funds many programs
- Projects
    - Solar, wind, biomass
- Workforce development throughout state
- Investment arm
    - Gives grants to researchers
    - A123 recent deal
    - TPI composites for wind blades
    - All in state
- Should contact Edmund Coletta
    - Edmund.coletta@state.ma.us
- Send her email so she can return information package with projects and budget

INTERVIEW NOTES WITH MASSPORT AND PAUL STORDY

9/21/2010
Massport
Noon
Meeting with Paul Stordy, Utilities Control Manager

- State mandates 15% renewable energy by 2010
    - Wind turbines were to show what can be done
    - Focusing on Photovoltaic
    - Terminal A (planned)
        - Design Fixes are scheduled
    - Terminal B parking Garage(done)
        - PV's on roof
        - LED's
    - Consolidated Car Rental Lot (planned)
        - LED's
        - One location, saves on transportation
- Future projects can't add additional load to the system
- Fish pier
    - Electric outlets so fishermen don't run diesel generators
    - 22 berths
- Have used interns from Northeaster and Wentworth but for engineering purposes
- Capital funding 5 year plan
    - $583 Million

INTERVIEW NOTES WITH MASSDEP & DOUGLAS FINE

10/06/2010
MassDEP
9 am
Meeting with Douglas Fine, Assistant Commissioner for Planning & Policy

We started the interview by giving Mr. Fine an overview of the project

- Mr. Fine explains what the organization does:
  - Governor then cabinet Yean Boles.
  - Within the secretarial there are many agencies, MassDEP is one of them.
  - MassDEP 830 person agency and regulatory, equivalent to EPA.
  - Narrative mission: protect land, water, and air of commonwealth
- MassDEP has a number of statutes that enables them to implement federal and state laws
  - Clean Air Act, Clean Water Resources Act, American Recovery Act
- Federal delegation- congress passes a law, agency implements it, if it goes to EPA they often create structures for the state to delegate the laws
  - The bulk is delegated to state, delegation agreements through state and federal agreements
  - The federal government looks at the rules, if state rules are more strict, they allow it
  - Delegation categorical grants agreement
- MassDEP is able to implement federal and state rules
- Clean Air Act, Waste Water Act, CERCLA which includes superfunds, not much of fed wet land laws, costal protection
- After writing the regulations, the bulk of the agency's work is to planning and policy:
  - set standards, permits, compliance and assurance, verify documents, enforcement of laws, non-penalty notices (warning), to penalties, and criminal action
- Half of MassDEP is in Boston and the rest is spread around four locations in the state

His job description:

- Oversees 13 million dollars
- Has been with agency for 20 years
- Oversees Clean Air Act, Water, Waste, and Soil regulations
- Planning, kind of own office but responds to commissioner, but does work with others
- Put annual plans and reports
- Policy side, example when he works with other: many surface waters don't meet federal standards because of mercury that comes from the air. Cross bureau work and sometimes interstate work is necessary to address the issue

How does the MassDEP choose what the work of the year will be?

- In 2000, there were about 1250 employees, now there are about 830
- Mandates are linked with resources
- Budget and laws decide how much money is acquired
- Bottom line, there are several programs, but discretion for programs is getting smaller and smaller.
- When federal money is acquired, strict guide lines must be followed to remain and receive future federal funding
- Decisions are made based on money
- Cut state activities to keep federal money
- Around this time of year, future projects are discussed as the FFY starts
- AC- assistant commissioner for planning water, waste, air, site cleanup, planning
- Little pie left for discretion, this is the money used to fund extra projects
- Bu is getting smaller and smaller as budgets are cut
- Organizations don't really want to share the small pieces of their pie, even if it's for projects
- Doesn't end up being that political in MA in terms of environmental decisions
- Global issue of recession
- Health and Human Services receive huge piece of state pie
- Environmental is like ¼ of state pie
- From the environment pie, ¼ is DCR
- Capital funding and purchase of land
- Every body's budget has gone down except municipal aid
- DCR's budget has stayed the same because they were able to satisfy 18% budget cut
- 20% by fed grants, 30% by capital and bonds and 30% from general fund
- Recovery Act was very specific, as a result MassDEP did not see much of that money
- State Revolving Fund had a large piece of the pie
- Doug works with all the bureaus but has seen significant budgets cut
- Very limited to see the future and what the work of the MassDEP will be it all depends on money

Focus into future: what and how
What:

- Climate change includes mitigation and adaptation
- Storm water management urban and suburban
- Water quantity includes Ecological need and human needs
- Ozone Ground Level
- Particulate Matter due to diesel, car idle ling
- Emerging contaminants includes nano-particles, pharmaceuticals, personal care products
- Materials Management such as waste or trade etc., we are far off compared to EU

How: new tools

- Self-certification
- General Permits
- Incentives for behavior change
- Multiple benefits, ex. The way we started to push air quality save them money demonstrate through multiple benefits
- Electronic reporting, analysis, RBF with automated response
- GIS
- Public Access to data

Mr. Fine feels this is the future, maybe even for a WPI project. Worked with WPI in the past to make a project on climate change adaptation. An example of a project he mentioned was data collection and maps of the polluted rivers in MA that don't meet federal standards for mercury levels.