

# **Massasoit Community College**

## **Climate Action Plan**



**Brockton Campus**



**Canton Campus**

**January 14, 2010**

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## ACKNOWLEDGEMENTS

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## INTRODUCTION

On March 21, 2007, Massasoit Community College (MCC) President Charles Wall signed the American College & University Presidents Climate Commitment. The Climate Commitment states that “colleges and universities must exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality” (American College & University Presidents Climate Commitment, 2007). In order to achieve climate neutrality colleges and universities were instructed to take the following steps:

1. Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.
  - a. Create institutional structures to guide the development and implementation of the plan. (MCC completed this task within the two month deadline)
  - b. Complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting and air travel) and update the inventory every other year thereafter. (MCC completed the comprehensive inventory within the one year deadline and has completed the update as requested)
  - c. Develop an institutional action plan for becoming climate neutral. (MCC did not complete this task within the two year deadline, but was granted a four month extension)
2. Initiate two or more of the following tangible actions to reduce greenhouse gases while the more comprehensive plan is being developed.
  - a. Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council’s LEED Silver standard or equivalent. (MCC selected this as one of its two tangible actions)
  - b. Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist. (MCC selected this as one of its two tangible actions)
  - c. Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by our institution.
  - d. Encourage use of and provide access to public transportation for all faculty, staff, students and visitors at our institution.
  - e. Within one year of signing this document, begin purchasing or producing at least 15% of our institution’s electricity consumption from renewable resources.
  - f. Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution’s endowment is invested.
3. Make the action plan, inventory, and periodic progress reports publicly available by providing them to the Association for the Advancement of Sustainability in Higher Education (AASHE) for posting and dissemination.

On April 18, 2007, Governor Deval Patrick signed Executive Order 484 entitled “Leading by Example – Clean Energy and Efficient Buildings.” The Executive Order stated that all Commonwealth agencies shall meet the following targets:

1. Reduce greenhouse gas emissions that result from state government operations by 25% by Fiscal Year 2012, 40% by 2020 and 80% by 2050.
2. Reduce overall energy consumption at state owned and leased (at which the state pays directly for energy) buildings by 20% by Fiscal Year 2012 and 35% by 2020.
3. Procure 15% of agency annual electricity consumption from renewable sources by 2012 and 30% by 2020.
4. Utilize bio heat products with a minimum blend of 3% bio based materials for all heating applications that use #2 fuel starting with the winter of 2007-2008, and 10% bio heat blend by 2012.
5. All new construction and major renovations, effective immediately, must meet the Mass. LEED Plus green building standard established by the Commonwealth of Massachusetts Sustainable Design Roundtable.
6. Reduce potable water use, as compared to 2006, by 10% by 2012 and 15% by 2020.

The Presidents Climate Commitment and Executive Order 484(Massachusetts Executive Order 484, 2007) will provide the guidelines and time frame by which Massasoit Community College can reduce its greenhouse gas emissions. The Climate Action Plan creates a living document that will assist the College in successfully meeting its goals. On a broader level, the Plan will integrate sustainability into the College’s curriculum and provide students with the knowledge and skills needed to address the critical challenges faced by the world and enable them to benefit from the economic opportunities that will arise as a result of solutions they develop.

## SUSTAINABILITY TIMELINE

### September 2007 – October 2009

#### September 2007

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Partnered with the Division of Capital Asset Management (DCAM) and an engineering consulting firm to review the College's free energy audits in order to recommend energy conservation measures to be pursued.
  
- ✓ **Solar Thermal Panels**
  - Completed a feasibility study and worked with the Executive Office of Energy and Environmental Affairs (EOEEA) and the Division of Energy Resources (DOER) to secure funding to install solar thermal panels on the Field House on the Brockton Campus to heat the pool area.
  
- ✓ **MassRIDES**
  - Entered into a partnership with MassRIDES.

#### October 2007

- ✓ **Load Shedding Demand Response**
  - Agreed to shed a load of 494kw when electric needs for the New England area could be facing a power outage. Cost savings to the College yearly whether or not the College is asked to shed a load.

#### November 2007

- ✓ **Student Sustainability Club**
  - Formed a Sustainability Club entitled Emerald E.A.R.T.H. (Ecologically Active Ready To Help). The Club's primary focus for 2008 was an In-classroom Recycling Program and an Energy Fair in celebration of Earth Day.
  
- ✓ **National Grid – “How Sweet It Is”**
  - Donated 500 organic chocolate candy bars along with 500 Energy Star light bulbs to the College. Students sold the candy bars for \$1.00 each and gave each person a free energy star light bulb with environmental information.

- ✓ **Single Stream Recycling Pilot Program**
  - Implemented a Single Stream Recycling Program in November 2007 with the Administration Building. As of June 2008, all buildings on the Brockton Campus are on the Single Stream Recycling Program.
  
- ✓ **Leading By Example Pilot Projects**
  - Submitted five applications for pilot project funding. The College received \$18,000 towards a compactor to be used in conjunction with the College's Single Stream Recycling Program.

### December 2007

- ✓ **Sustainability Task Force Committees**
  - Established Task Force Committees on the Brockton and Canton Campuses. Committees include: Recycling, Green Purchasing, Curriculum, Community/Campus Awareness, Campus Watchdogs, Event Planning/Public Relations, Grants/Donations/Incentives, Cafeteria Products, Earth Day Program, Landscaping and Future Campus Initiatives.

### January 2008

- ✓ **VendingMisers**
  - Implemented VendingMisers on all vending machines. Cost savings to the College of \$150 – \$200 per year, per machine.

### April 2008

- ✓ **Environmental and Energy Fair: Student Sustainability Club**
  - Hosted the College's Energy Fair. Students planned and implemented all program activities, chose the theme and name for the event, designed an event logo and sold T-shirts with the logo. Twenty vendors participated in the Energy Fair. In addition to vendor participation, the Energy Fair presented information about renewable energy, recycling, sustainable farming, green purchasing and eco-friendly shopping, natural resources conservation and green building and design.

### May 2008

- ✓ **Emergent Technologies**
  - Renamed the Applied Technology Division the Emergent Technology Division (Architectural Technology, Diesel Technology, Engineering Technology, HVAC and Visual Arts) to encourage collaboration and sustainability innovation amongst the aforementioned departments.

## June 2008

- ✓ **Digital Meters**
  - Received funding for digital electric and gas meters for the Brockton Campus, Canton Campus and the Conference Center. The meters will allow for energy star reporting, real time reading and energy management.
  
- ✓ **Sustainability Faculty Mini-Grant Awards**
  - Established a grant competition to encourage faculty members to think of ways to educate students about sustainability through a variety of approaches and disciplines to reach a broad cross-section of students and to share the results with other faculty members. Sustainability Faculty Mini-Grant Awards were awarded for the following courses: Refrigeration Principles & Application, College Experience, Computer Aided Graphic Design, Advanced Java Programming, HVAC Systems Design, Introduction to Software Design & Development, College Physics II, Fuel Systems, Introductory Writing, Digital Video Editing, Beginning Windows, American National Government, History of Art II, Issues in Environmental Science and Methods & Materials.

## July 2008

- ✓ **Photovoltaics**
  - Completed a feasibility study on the roofing areas and structural conditions of two buildings on the Brockton Campus to support a PV system.
  
- ✓ **Geothermal**
  - Began a feasibility study for a geothermal heat source system at the Canton Campus.

## August 2008

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Responded to a Request for Proposals (RFP) from the Division of Capital Asset Management for an RFP for an Energy and Water Conservation Services Performance Contract for MCC.

## September 2008

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Hosted Pre-Proposal Conference for the Commonwealth of Massachusetts' Energy and Water Conservation Services Performance Contracting Program. Service areas to include: Lighting, Lighting Controls, Motors, Energy Management Systems, Domestic Water Conservation, Steam Trap Repairs, Variable Frequency Drives, Insulation, Building Assessment, Envelope, Vending Machine and Plug Load Controllers, Window Replacements, Roof Top Units, Air Handling Units, Make Up Air Unit, Demand Controlled Ventilation, Solar Thermal, Solar PV and Geothermal.

- ✓ **Lighting Retrofit**
  - Completed lighting assessments in conjunction with the energy conservation project which will address areas where daylight dimmers can be used.
  
- ✓ **Convocation**
  - Held a Fall Convocation whose theme was “Sustainability.” The guest speaker was Eric Friedman, Director of the Leading By Example Program overseen by the Executive Office of Energy and Environmental Affairs. Each attendee was given an environmentally friendly tote bag with the logo: “Going Green with...Massasoit Community College.”
  
- ✓ **Sustainability Conference**
  - Participated in the 2<sup>nd</sup> Annual CONNECT Summit at Bridgewater State College.
  
- ✓ **Inventories**
  - Completed Greenhouse Gas Inventories Report for the College.

### October 2008

- ✓ **Sustainable Garden: Landscaping Subcommittee of the Sustainability Task Force Committee**
  - Created a Sustainable Garden featuring native flowers and plants in the Quadrangle area at the Brockton Campus.

### December 2008

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Received and opened four bid proposals.
  
- ✓ **Emissions Reporting**
  - Hosted a roundtable meeting among the community colleges to discuss the ACUPCC Reporting on CO<sub>2</sub> Emissions for Travel.

### January 2009

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Hosted the Energy and Water Conservation Performance Contract Proposal Review Kick-off Meeting and Evaluation Meeting.
  
- ✓ **Biodiesel Project: Student Kyle Corkery**
  - Converted used cooking oil from the College’s Brockton Cafeteria into biodiesel fuel to power the Facilities Department’s lawn equipment. This was part of Kyle’s Environmental Honors Project.

## February 2009

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Hosted the Energy and Water Conservation Performance Contract Interviews.
  
- ✓ **Geothermal**
  - Completed Geothermal Test Well Drilling at the Canton Campus. The College is hopeful that the Canton Campus will be selected as a site for a future geothermal plant.
  
- ✓ **Leading By Example Pilot Projects**
  - Submitted two applications (solar trash compactors and an electric refuse hauler) for pilot project funding.
  
- ✓ **Sustainability Faculty Mini-Grant Awards**
  - Initiated the 2<sup>nd</sup> Annual Faculty Sustainability Mini Grant Competition. The competition invited all full-time and adjunct Massasoit faculty members to apply for a \$250 mini-grant to incorporate sustainability or “green” elements – themes, assignments, and discussions – into an existing course.

## April 2009

- ✓ **Energy and Water Conservation Services Performance Contract**
  - Signed a contract with Johnson Controls to perform the Investment Grade Audit (IGA) for the Energy and Water Conservation Performance Contract.
  
- ✓ **Sustainable Garden: Landscaping Subcommittee**
  - Created a second Sustainable Garden featuring native flowers and plants in the Quadrangle area at the Brockton Campus.
  
- ✓ **Environmental and Energy Fair: Student Sustainability Club**
  - Hosted the 2<sup>nd</sup> annual Environmental and Energy Fair. Twenty vendors participated in the Energy Fair. In addition to vendor participation, the Energy Fair presented information about renewable energy, recycling, sustainable farming, green purchasing and eco-friendly shopping, natural resources conservation and green building and design.

## July 2009

- ✓ **Sustainable Landscaping**
  - Submitted Case Study to the National Wildlife Federation showcasing the College’s Sustainable Landscaping efforts.

## October 2009

- ✓ **Sustainable Garden: Landscaping Subcommittee**
  - Created a third Sustainable Garden featuring native flowers and plants in the Quadrangle area at the Brockton Campus.
  
- ✓ **Photovoltaics**
  - Received state approval for the installation of solar photovoltaics at the Brockton Campus (Humanities Building – 75 kW array, Liberal Arts Building – 82 kW array, Science Building – 50 kW array, Student Center – 120 kW and Technology Building – 50 kW) and Canton Campus – 208.5 kW. The project will be financed under the Clean Renewable Energy Bonds (CREBs) program.
  
- ✓ **Student Sustainability Club**
  - Collected 350 empty cans and bottles in support of International 350 Day of Climate Action, a day to fight Climate Change and become aware of Global Warming.

## EDUCATION AND TRAINING

### **Faculty Sustainability Mini-Grants**

In Summer 2008 and again in Spring 2009, Massasoit's Grants Department sponsored a Faculty Sustainability Mini-Grant competition. All adjunct and full-time faculty members were eligible to apply for a \$250 grant to incorporate sustainability elements into an existing course. Proposal reviewers included staff members from the Grants Department and the Grants and Curriculum Sustainability Subcommittees. Applicants were required to indicate not only what curricular modifications they would make, but also how they would disseminate the results of their work to their colleagues.

The purpose of the competition was to encourage faculty members from a wide range of disciplines to infuse sustainability education into their curricula so that as many students as possible, regardless of their field of study, would receive the message about the importance of environmental stewardship. A total of 26 awards were made to 19 faculty members from across both campuses of the college. The college plans to hold a third competition in Spring 2010.

At least one section in each of the following courses was modified as a result of this initiative.

- Advanced JAVA Programming
- American National Government
- Architectural Detail Drawings
- Beginning Windows
- College Experience
- College Physics II
- Computer Aided Graphic Design
- Creating Web Pages
- Digital Publishing
- Digital Video Editing
- English Composition I
- Fuel Systems
- Graphic Design II
- Heating, Ventilating, and Air Conditioning System Design
- History of Art II
- Intaglio Printing: The Art of Etching
- Introduction to Business
- Introductory Writing
- Issues in Environmental Science
- Methods and Materials
- Principals of Economics I
- Printmaking Seminar
- Refrigeration Principles and Application
- Site Development
- Software Design & Development

Massasoit will continue to seek and provide grant funding and other incentives for faculty to 1) infuse existing curriculum with sustainability topics and issues and 2) develop new curriculum and courses focusing on climate change and sustainability.

## **Workforce Development and Community Education**

Since Fall 2007, Massasoit's Division of Workforce Development and Community Education has designed, developed, and offered several non-credit courses and trainings focused on alternative energy and energy efficiency. An introductory solar and wind energy series consisting of five 2-hour workshops was first offered in Fall 2008. The workshop series filled to maximum enrollment and has continued to run each semester since.

In Spring 2009, the college in partnership with local and regional agencies and employers was awarded a grant by the Massachusetts Clean Energy Center to offer a 250-hour Training Certificate in Introductory Energy Efficiency for Buildings. This program is running successfully and will be repeated under grant funding next semester. During Fall 2009, a 60-hour NABCEP (North American Board of Certified Energy Practitioners) Solar PV Technology – Basic Level course was developed and offered, and it filled to capacity.

The interest level in all of these non-credit courses has been high, and new offerings will continue to be developed according to the following plan.

- Work with other community colleges on the Clean Energy Center- funded grant that will develop similar weatherization and energy efficiency curriculum across the state
- Work with two local regional community colleges on the Clean Energy Center-funded grant that will develop and offer on-line professional development courses for design and construction of energy-efficiency buildings
- Continue to offer the introductory solar and wind workshops on both campuses
- Continue to offer the NABCEP-approved Solar PV Technology Basic Course
- Offer the NABCEP National Assessment for Solar PV Certificate of Basic Knowledge for participants who have completed the NABCEP-approved Solar PV Basic Course
- Explore grant opportunities to be able to continue to offer the 250-hour Energy Efficiency Program free of charge to participants
- Research and survey the interest level for offering a NABCEP-approved Solar Thermal course
- Design and offer a second level Energy Efficiency course aimed at preparing participants to become certified energy auditors

## COMMUNITY OUTREACH

Since President Wall signed the American College and University Presidents Climate Commitment in 2007, Massasoit Community College has undertaken the following initiatives to reach out to members of the community.

### **Sustainable Landscaping**

#### **Definition of Sustainable Landscaping.**

Sustainable landscaping is defined by the Sustainable Landscaping Committee at Massasoit Community College as “the use of environmentally responsible landscaping practices that respect and preserve the functioning of natural ecosystems.” The primary goals are to reduce the campus footprint and to minimize the overall, long-term monetary costs of landscaping at the college.

#### **Focus of Sustainable Landscaping.**

*Minimizing the use of synthetic chemicals:* This includes fertilizers, herbicides, and pesticides, some of which are products of fossil fuels and many of which have far-reaching environmental consequences. The use of fertilizers can result in high nitrogen and phosphorus levels in aquatic systems, which can lead to eutrophication and ultimately anoxic conditions that kill aquatic organisms. Many herbicides and pesticides kill non-target insects and plants, and can pollute ground water.

*Promoting water conservation efforts:* Chemical pollution of the surface and groundwater is reduced by not using synthetic chemicals on our landscape. The use of Magic Salt to treat walkways during the winter, according to the EPA’s Design for the Environment program, releases fewer chlorides into the surrounding soil and water than typical rock salt or calcium chloride, and results in less harm to surrounding plants. Not watering the landscape also reduces water usage on campus.

*Planting native plants and reducing the impacts of invasive plants:* Native plants are defined as those that were present in the area at the time of European settlement. Since they evolved in our climate and are a part of the native community, native plants provide habitat for native wildlife and require less maintenance, such as the use of energy, water, fertilizer, and herbicide. Non-native invasive plants are those that have been introduced into an area where they lack biological controls such as pests, predators, and competitors. Invasive plants lead to biological pollution of local ecosystems and displace native plants that native wildlife depend upon.

*Educating the campus community and greater public through awareness and outreach:* Several of the projects implemented thus far on campus have involved the use of Introductory Biology (BIOL 140/142) and Issues in Environmental Science (BIOL 143) courses. These classes have also used the “No Mow” area for laboratory work, including experiments on biodiversity and succession. Digital Photography and Creative Writing courses have used the plantings as well. In addition, signs have been posted in all areas to educate the greater community.

#### **Accomplishments.**

To date, four large plant beds in the campus Quadrangle have been planted with approximately three dozen native New England Plants. In at least two of the beds, invasive species, mostly burning bush (*Euonymus alatus*) and multiflora rose (*Rosa multiflora*), both of which are on the Massachusetts Prohibited Plant List, were removed. Almost all of the plantings were obtained through the New England Wildflower Society, the country’s oldest plant conservation society. Purchasing the plants locally ensures that the plants are local ecotypes, and thus have the genetic attributes that would most commonly be found in the Massachusetts area, as well as guarantees the plants were not collected from the wild but instead cultivated through sustainable practices. Although not a complete list, some of the plants now in place on campus include: tuliptree

(*Liriodendron tulipifera*), New England aster (*Aster novae-angliae*), purple coneflower (*Echinacea purpurea*), butterfly milkweed (*Asclepias tuberosa*), and oakleaf hydrangea (*Hydrangea quercifolia*).

In Spring of 2009, the first “No Mow” area on the Brockton Campus was created, located adjacent to the Administration Building. In addition to the reduction of fossil fuel use due to the cessation of mowing, this area has created critical meadow habitat that provides shelter and food for a wide variety of native animals, as early successional habitat is rare in Massachusetts. Signs to educate the public have been posted. In the future this area will be seeded with native New England vegetation and mowed on a strict schedule to best promote the growth of desired species.

### **Student Sustainability Club – Emerald E.A.R.T.H.**

In Fall 2007, Massasoit students formed the Emerald E.A.R.T.H. (Ecologically Active and Ready to Help) Club, a student group focused on sustainability. The club was started by a small group of students and was supported by a faculty advisor. The goal of the club, as outlined in its charter, is to “promote sustainability at Massasoit Community College and in the local community....” The club also supports activities that encourage students to enjoy and learn about their environment.

During the first year, the club’s major efforts included an in-classroom recycling program and an Energy Fair. As part of the recycling program, club members helped promote recycling in the student community. In addition, they brought recycled materials to collection centers. The Energy Fair was held in celebration of Earth Day. The goal of the Energy Fair was to communicate information about local and national efforts in the area of sustainability to the local and college communities. Twenty different environmental organizations participated in this fair, and over 200 individuals attended.

Emerald E.A.R.T.H. began the fall 2008 semester with several fundraisers, including a talent show with an environmental theme. The money raised was used to purchase and plant a native tree on campus. Educational outreach efforts were expanded and included a poster campaign promoting sustainable practices and monthly energy-saving tips in the student newspaper. Emerald E.A.R.T.H. also held its second Energy Fair, making it an annual event with the holding of a 2<sup>nd</sup> Energy Fair, Emerald E.A.R.T.H. made this event an annual enterprise. In addition, the club worked with the school cafeteria to promote the use of reusable travel mugs instead of disposable cups for hot beverages. As a result, the cafeteria implemented a policy whereby customers purchasing beverages in reusable mugs receive a discount. Emerald E.A.R.T.H. visited Brockton Brightfields, a local brownfields site. Club members learned about solar panels, energy generation, and the resulting reduction in the City of Brockton’s carbon footprint. The club culminated the year with the cleanup of a polluted river on the campus. Students and faculty removed large and small debris from the river and discovered a surprising diversity of plants and animals in the area.

Emerald E.A.R.T.H. has several projects planned for the 2009-2010 academic year. On October 23<sup>rd</sup>, club members took part in the International Day of Climate Action. This event is also known as “350 Day”; 350 parts per million represents the safe upper limit of carbon dioxide that must be attained in our atmosphere in order to slow the earth’s warming. On this day people around the world will be promoting the number 350 in various kinds of visible projects. The aim is to influence world leaders who met in December 2009 to develop international policies to address global warming. Emerald E.A.R.T.H. is collecting 350 returnable cans and bottles, which it will fashion into the number 350 on the campus quad. Educational posters will be set up in this area to make students, faculty, and staff aware of the significance of the number and the current global warming crisis. Emerald E.A.R.T.H. will join hundreds of other organizations by registering at the 350.org website and providing photos and information about Massasoit’s efforts on this day.

Other projects planned for this year include:

- The screening of a film on global warming
- Joining local groups to clean up a park in Brockton on “Brockton is Beautiful Day”
- Energy Save Day, in which students, faculty, and staff join forces to eliminate the use of as many electrical devices as possible at the college
- A continuation of the cleanup of the campus river. Expansion of this project to include the placement of bat houses and birdhouses in the area
- Celebration of Earth Day with the third annual Energy Fair in April 2010
- Kayaking trip in Boston Harbor in which members will learn about the local ecology and state and local efforts to clean up the harbor
- Working with Massasoit’s Landscaping Committee to plant and maintain on-campus native gardens
- Activity with the Brockton Boys and Girls Club to promote awareness and appreciation of the environment

### **Other Outreach Activities**

- In the past year, the Division of Workforce Development and Community Education held two green breakfasts, one conjunction with the Metro-South Chamber of Commerce, to educate area business owners about renewable energy technologies and related rebate and incentive programs. The division offered an additional training on green products.
- The Sustainability Task Force has developed a web page on the college’s web site to provide information about sustainability projects and practices on campus, regionally, and globally.

### **Future Outreach Initiatives**

Massasoit will undertake the following initiatives to expand its community outreach efforts:

- Sustainable Landscaping
  - Reopen a Community Garden on the Brockton Campus to promote responsible land usage and encourage interaction with the land. Students from Introduction to Nutrition (BIOL 138) classes will take the lead by installing infrastructure and implementing the initial planting and harvesting. Students will learn that growing their own food is an easy, inexpensive way to eat nutritiously and that by eating locally grown food that they will be reducing their ecological footprint.
  - Gain acknowledgement as a Certified Wildlife Habitat through the National Wildlife Federation, highlighting Massasoit’s sustainable landscaping practices and educate the campus community on the benefits of native landscaping

- Expand the “No Mow” areas of campus by replacing seldom-used lawn areas with native meadows, helping to create larger areas of quality habitat on campus for native wildlife and reducing Massasoit’s carbon footprint through a reduced usage of fossil fuels.
- Emerald E.A.R.T.H. Club
  - Continue to hold an annual Environmental Fair
  - Expand on partnerships established with K-12 schools and develop joint activities with area K-12 schools to educate youth about sustainability and climate change
- Division of Workforce Development and Community Education
  - Continue to offer current topics in sustainability training to area businesses and organizations. Twice a year through the Professional Development Center, these trainings and/or a sustainability conference will be offered to the community at large
  - Building on the partnership established under the Energy Efficiency Pathways grant program, collaborate actively with community organizations – including the Brockton Area Workforce Investment Board, the Brockton 21<sup>st</sup> Century Corporation/Building a Better Brockton, the Brockton Mayor’s Office, CareerWorks, the South-Metro Chamber of Commerce, YouthBuild, and SelfHelp – to encourage regional green business development, design and implement education and training programs to meet the needs of these employers, and provide green job opportunities for area residents
- Use both campuses as living laboratories for educating students, faculty, staff, and the community about sustainability, energy efficiency, and renewable energy:
  - Install signs to draw attention to and educate students, faculty, staff, and visitors about the college’s sustainable landscaping initiatives, renewable energy installations (solar PV panels, etc.), energy efficiency measures, recycling efforts, and green purchasing practices
  - Incorporate current and planned sustainable landscaping initiatives, renewable energy installations, and energy efficiency measures into both credit and non-credit curriculum
  - Invite members of the community and other stakeholders for campus tours to learn about these projects and practices
- Publicize, through both internal and external communications, the college’s sustainable practices and projects to serve as a model and an inspiration to students, faculty, staff, and the larger community
- Feature sustainability commitment and green initiatives on college’s home page

## FACILITIES AND OPERATIONS

The Energy and Water Conservation Services Performance Contract consists of the following Energy Conservation Measures (ECMs) that are intended to reduce energy consumption and improve building efficiencies:

**ECM #1: Lighting Retrofit** – This ECM recommends retrofit and replacement of the lighting systems campus wide. Most all of the existing fluorescent lighting systems will be retrofitted with 30 Watt T8 lamps and electronic ballasts. Fixtures may be decamped and reflectors added to obtain optimum light levels and efficiency. Some existing fluorescent fixtures may be damaged or inherently inefficient and will be replaced, again to obtain optimum light levels and efficiency. The existing incandescent exit signs will be replaced with LED fixtures and incandescent lamps replaced with compact fluorescent. Some HID fixtures will be retrofitted with high efficiency lamps. Energy savings will be realized by reducing the wattage of the existing fixtures. It is expected that when completed, this measure will save approximately 1,126,959 kWh per year which will result in an estimated dollar savings of \$180,356 per year.

**ECM #2: Lighting Occupancy Sensor Controls** – This ECM recommends installing new occupancy controllers on lighting systems campus wide with consideration given to best application for switch mounted and ceiling/wall mounted sensing systems. Energy savings will be realized by reducing the amount of lighting runtime to match the occupancy of the space. It is expected that when completed, this measure will save approximately 484,051 kWh per year which will result in an estimated dollar savings of \$77,221 per year.

**ECM #3: Motors** – This ECM recommends replacing the existing 15hp pool pump motor in the Field House with a high efficiency motor. The existing efficiency of the motor is 88.5%; the new motor will have an efficiency of 91.7%. Energy savings will be realized by the increased efficiency of the new motor over the old. It is expected that when completed, this measure will save approximately 4,020 kWh per year which will result in an estimated dollar savings of \$683 per year.

**ECM #4: Energy Management System** – This ECM recommends replacing the existing control system with a new Metasys DDC system and repairing the outside air dampers at the Student Center. The existing system is outdated and offers only basic control of equipment. The new Metasys system will allow more control options, better feedback through trending and real-time data and will be user friendly. It will also allow remote access to the system for more flexible use by user staff. Energy savings will be realized by optimizing scheduling and setpoints and operational economizers at the Student Center. Additional benefits will be gained through trending of equipment operation which will enable energy and environmental optimization. It is expected that when completed, this measure will save approximately 41,923 kWh per year which will result in an estimated dollar savings of \$27,732 per year.

**ECM #4a: Facility Performance Indexing** – This ECM recommends adding the Facility Performance Indexing (FPI) package to the Metasys system as outlined in ECM 4. FPI service has been designed and developed to add significant value to facility organizations, in particular the maintenance and diagnostics associated with major systems such as chillers, boilers, air handling units, rooftop units, terminal devices, and all controlled equipment. FPI provides a practical methodology that facility owners and maintenance personnel exploit to gain improved understanding on how their equipment performs and operates in an intuitive dashboard display. FPI currently supports real-time commissioning, autonomous major system setpoint optimization and data collection. Energy savings will be realized by optimizing scheduling and setpoints. It is expected that when completed, this measure will save approximately 116,517 kWh per year which will result in an estimated dollar savings of \$25,158 per year.

**ECM #5: Water Conservation** – This ECM is designed to reduce water consumption, wastewater production, and hot water energy usage through the installation of state of the art, highly efficient, plumbing products and controls. These products and controls were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene. Water and wastewater savings will be realized by the difference in water consumption between the old and new fixture components. Thermal energy will be conserved by a reduction in hot water usage. It is expected that when completed, this measure will save approximately 1,759 cf of water per year which will result in an estimated dollar savings of \$36,848 per year.

**ECM #7: Variable Frequency Drives** – This ECM recommends installing Variable Frequency Drives (VFD's) on selected HVAC fans to reduce fan speed to match required air flows, saving motor and thermal energy. These drives will be installed on existing fan systems and be varied by inputs such as exhaust, indoor and outdoor temperatures, CO2 levels and schedules. Energy savings will be realized by reduction of fan speed which is proportional to a reduction in energy consumption. It is expected that when completed, this measure will save approximately 66,739 kWh per year which will result in an estimated dollar savings of \$13,953 per year.

**ECM #9: Vending Machine Controls** – This ECM recommends installing new occupancy controllers on vending machines campus wide. The controllers operation is based on room occupancy using infrared technologies. Energy savings will be realized by reducing the amount of lighting and refrigeration compressor runtime to match the occupancy of the building. It is expected that when completed, this measure will save approximately 9,817 kWh per year which will result in an estimated dollar savings of \$1,473 per year. This conservation measure has been implemented.

**ECM #11: Roof Top Units, Brockton Campus** – This ECM recommends replacing the existing natural gas heating/electric cooling roof top units with high efficiency roof top units. Units will be sized for the current building conditions or replaced on a like for like basis depending on load calculations. Energy savings will be realized by the increased efficiency of the new roof top units vs. the existing. It is expected that when completed, this measure will save approximately 318,518 kWh per year which will result in an estimated dollar savings of \$66,857 per year.

**ECM #11b: Roof Top Units, Canton Campus** - This ECM recommends replacing the existing natural gas heating/electric cooling roof top units with high efficiency roof top units. Units will be sized for the current building conditions or replaced on a like for like basis depending on load calculations. Energy savings will be realized by the increased efficiency of the new roof top units vs. the existing. It is expected that when completed, this measure will save approximately 58,150 kWh per year which will result in an estimated dollar savings of \$8,723 per year.

**ECM #15: Demand Control Ventilation** – This ECM recommends installing CO2 sensors and associated controls on new and existing air handling equipment to optimize the amount of outdoor air entering the building based on actual ventilation requirements. Energy savings will be realized by optimizing the amount of outside air brought in for ventilation, reducing unnecessary conditioning of outside air. It is expected that when completed, this measure will save approximately 70,158 kWh per year which will result in an estimated dollar savings of \$37,872 per year.

**ECM #19: Building Weatherization** – This ECM recommends reducing infiltration by sealing gaps in the building envelope. Areas to be addressed: provide weather-stripping on exit doors; seal around roof top ventilators; seal gaps between roof and interior walls; provide weather-stripping on overhead doors; and provide weather-stripping to seal bulkheads. Energy savings will be realized by reducing the amount of outside air infiltrating into the building. It is expected that when completed, this measure will save approximately 3,910 kWh per year which will result in an estimated dollar savings of \$25,956 per year.

**ECM #20: Boiler Controls** – This ECM recommends installing boiler controllers on the hot water hydronic heating boilers at the Canton Campus. These controllers will reduce boiler cycling by up to 30%. Energy savings will be realized by reducing the cycling of the boilers. It is expected that when completed, this will result in an estimated dollar savings of \$2,921 per year.

**ECM #21: Computer Power Management** – This ECM recommends installing computer power control software on the campus LAN to monitor and adjust power settings on Windows OS computers. Energy savings will be realized by reducing the amount of operating hours by putting monitors and hard drives “to sleep” when not in use. It is expected that when completed, this measure will save approximately 32,670 kWh per year which will result in an estimated dollar savings of \$5,554 per year.

**ECM #22: Pool Cover** – This ECM recommends installing a retractable pool cover on the pool in the Field House. Energy Savings will be realized by reducing the amount of heat lost through evaporation and convection. It is expected that when completed, this will result in an estimated dollar savings of \$9,642 per year.

**ECM #23: Refrigeration Controls** – This ECM recommends refrigeration controllers on walk-in coolers and freezers and installing ECM motors on evaporator fans. The controllers will reduce compressor and evaporator runtime by up to 10%. The ECM fans are 30% more efficient than the standard two pole motors. Energy savings will be realized by reducing the runtime of the compressors and evaporator fans and the reduction in kW load of the new fans. It is expected that when completed, this measure will save approximately 43,220 kWh per year which will result in an estimated dollar savings of \$8,367 per year.

**ECM #24: Transformers** – This ECM recommends replacing existing transformers with similarly sized high efficiency transformers. Energy savings will be realized by the increased efficiency of the new transformer over the old. It is expected that when completed, this measure will save approximately 136,485 kWh per year which will result in an estimated dollar savings of \$23,202 per year.

## **Reduction of Hazardous Materials at Massasoit Community College**

“Hazardous materials” are substances defined by U.S. governmental regulations to have “inherent characteristics which pose an unreasonable risk to the public’s health and safety...” (From Triumverate Environmental training guide based on 49 CFP 100-185). Public awareness of hazardous materials has become more prominent in the last few decades after cases of contaminated sites from around the country have come to attention. Contamination has at times caused public health crises in cases such as the toxic waste sites of Valley of the Drums, Kentucky and Love Canal, New York in the 1970s. Effects on wildlife due to oil spills such as the Exxon Valdez spill in Alaska in the 1990s are also of paramount importance. The discovery and effects of these examples was the legislative basis for the federal Resource, Conservation, and Recovery act (RCRA) enacted on 1976 which is designed to prevent the mismanagement of hazardous wastes (From Triumverate Environmental training guide based on 310 CMR 30.00). Regulations put forth by the U.S. Department of Transportation (DOT) involving the safe transport of hazardous materials are also designed to minimize the potential for hazardous waste spills. These regulations cover proper training of personnel dealing with hazardous chemicals, proper labeling of hazardous materials, disposal procedures, and transport of these materials.

As a facility that generates hazardous waste, also known as a “generator,” Massasoit Community College must comply with federal and state regulations regarding training and proper handling of these materials. Massasoit has been making efforts to comply with these regulations and to even go above and beyond by acknowledging state recommendations regarding hazardous materials in schools. In 2006, Massasoit created a Safety Officer position in the Science Division. The safety officer deals with many aspects of hazardous waste generation on the Canton and Brockton campuses since science classes can often generate hazardous waste products. The safety officer at Massasoit must be, and has been, trained in the federal regulations outlined above. Knowledge of these regulations is the first step to implementing not only a program that is compliant, but one that is as safe and sustainable as possible.

After the creation of a safety-officer position, it became clear that reducing the amount of hazardous materials in science laboratories was needed to comply with these regulations in addition to making Massasoit a safer and more sustainable school. In an effort to reduce hazardous materials in Canton and in Brockton, science labs have switched to using chemicals that are either not hazardous, or a less hazardous substitute. For example, chemistry experiments that called for mercury or lead compounds have been eliminated from the curriculum. In addition to the reduction of hazardous chemical usage, the old chemical stocks at Massasoit needed to be cleaned out of storerooms and labs. To date, the science division has cleaned out almost all of the extremely hazardous materials from both campuses including mercury, lead, and sodium azide. Other unused and old chemicals have also been cleaned out at the same time. In addition most mercury-containing devices have been removed as well. This included mercury thermometers, sling psychrometers, and two mercury barometers. The Massachusetts Mercury Management Act of 2006 prohibits schools from buying mercury and also recommends that schools eliminate mercury and mercury-containing devices due to the highly toxic nature of this chemical.

In addition to the elimination and disposal of hazardous materials, the science division has also focused on identification and proper disposal of these materials. Hazardous waste regulations cover what constitutes as a hazardous material, and how to properly accumulate and dispose of the material. To comply with these regulations, the safety officer has begun to characterize waste streams as hazardous or not hazardous. For

example, two different wastes from a microbiology lab were submitted to a laboratory associated with Triumverate Environmental to determine whether the material met certain hazardous criteria. Once waste determinations are made, the waste must be disposed of properly. In the science division, if a waste is considered hazardous it is most often bottled and saved for a company specializing in waste disposal to pick it up. Some limited wastes can also be treated on site. Massasoit has purchased the proper labels for waste containers as well as set up the appropriate storage areas (called accumulation areas) with proper signage for hazardous waste disposal. Inspections of these containers and areas are made weekly to ensure safety.

Regulations of hazardous materials also cover the paperwork involved for a facility that generates hazardous wastes. As a generator of hazardous wastes, Massasoit has begun to re-evaluate the amount of waste different departments in the college produce, what is produced, and whether that fits with the current generator registration. Although the Brockton Campus registered with state regulatory agencies, the Canton campus had not. The Canton campus did then register this year.

Massasoit Community College greatly progressed in the last few years with regard to hazardous material usage and generation. The Science Division now has a safety officer that is properly trained with regard to hazardous material handling and disposal. The science division has also eliminated the highly hazardous materials from the curriculum, and has disposed of the highly hazardous materials. In addition, the science division has made waste determinations and implemented a proper accumulation area for the waste. In the future, the science division will continue to properly dispose of unused and old chemicals from both campuses. The safety officer will continue to encourage usage of less hazardous materials, make waste determinations, perform inspections, and stay current on governmental regulations. The removal of any mercury containing devices left on campus will be highly encouraged. Massasoit should consider a campus-wide safety officer who could make changes to other departments that the science division safety officer has made for the sciences. As a college that prides itself in sustainable practices, we should make sure that our college as a whole is reducing the usage of hazardous materials to reduce the risks to students as well as the environment.

## TRANSPORTATION

Massasoit Community College is a two-year commuter college with campuses in Brockton and Canton. Approximately 49% of the college's carbon emissions come from students, faculty and staff driving to and from campus. The Brockton campus has limited access to public transportation with only one Brockton Area Transit Authority (BAT) bus route serving the campus. Until recently this service ran between 6:40 am and 6:35 pm. The college worked with BAT to effectively extend the service to 9:00 pm. The Canton campus is not accessible by public transportation and due to its location is difficult to walk or ride a bicycle to.

In order to reduce the college's carbon emissions the college will need to establish the following action plan:

### **MassRIDES**

- Promote carpooling through MassRIDES. In September 2007, the college entered into a partnership with MassRIDES. MassRIDES is a service of the Executive Office of Transportation and assists with travel options. MassRIDES provides a free ridematching database whereby students, faculty and staff can find a carpool partner.

Currently, the college has six (6) parking lots with five (5) parking spaces (front row) in Lot #2 designated for carpooling. The college restricts these spaces to students, faculty and staff that are in vehicles with two or more passengers.

In Spring 2010, the college is planning to rollout an expanded carpooling program to include parking spaces in each of the six parking lots with a total of fifty-five (55) designated parking spaces for carpooling.

## CONCLUSION

Massasoit Community College is committed to the concepts of climate neutrality and environmentally sustainable practices. The College's faculty and staff have begun steps, through the compilation of its institutional action plan, towards encouraging integration of those concepts into the fabric of its strategic planning process.

While work has started in the development of both new credit and non-credit courses and programs which are specifically designed with "green themes", work has also begun in creating greater awareness in existing courses throughout the curriculum of sustainable practice. To involve the greater Massasoit Community in the reduction of energy at all levels and encourage those practices in work and at home, the College has continued its efforts in actively involving students in conservation practices outside the classroom environment or as ancillary to their classroom experience. The College has also made progress in sustainable landscaping, in the creation of facility plans and operations which encourage energy-efficiency, and in transportation efforts to reduce greenhouse emissions.

The College is steadfast in its honoring of the pledge signed by President Wall. It also hopes that its growth of sustainable practices will be an exemplar for residents in southeastern Massachusetts and the greater higher education community.

## REFERENCES

Executive Order 484 (2007, April). Retrieved December 21, 2009 from  
<http://www.mass.gov/Agov3/docs/Executive%20Orders/Leading%20by%20Example%20EO.pdf>

Presidents Climate Commitment (2007). Retrieved December 21, 2009 from  
<http://www.2.presidentsclimatecommitment.org/about/commitment.pdf>

## GLOSSARY OF TERMS

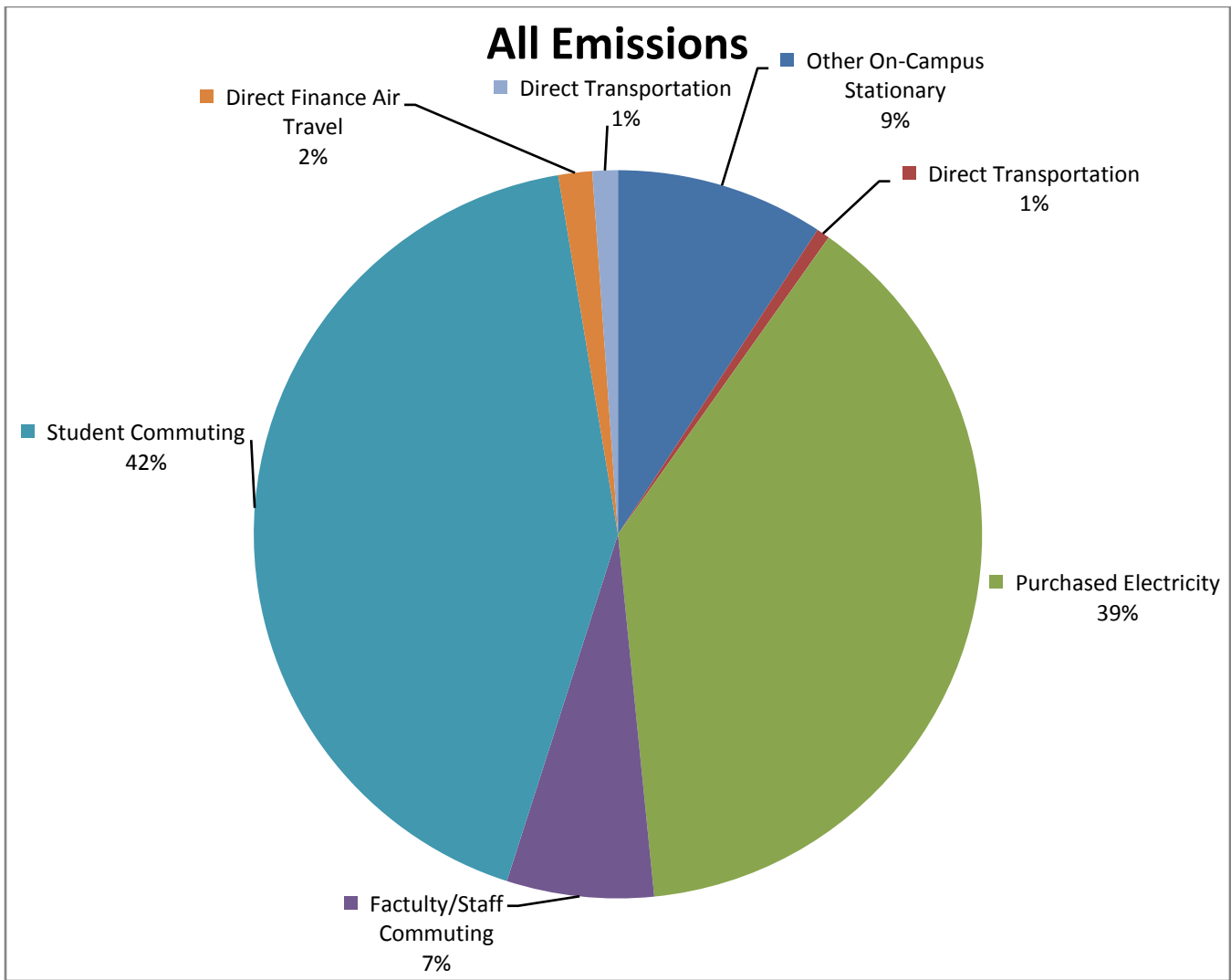
AASHE	-Association for the Advancement of Sustainability in Higher Education
ACUPCC	-American College & University Presidents' Climate Commitment
BAT	-Brockton Area Transit Authority
cf of water	-100 cubic feet of water is equivalent to 748 gallons
CREB	-Clean Renewable Energy Bonds
DCAM	-Division of Capital Asset Management
DOER	-Division of Energy Resources
DOT	-Department of Transportation
E.A.R.T.H.	-Ecologically Active Ready To Help
ECM	-Energy Conservation Measures
EOEEA	-Executive Office of Energy and Environmental Affairs
EPA	-Environmental Protection Agency
FPI	-Facility Performance Indexing
GHG	-Greenhouse Gases
HID	-High-density discharge – a type of electrical lamp
HVAC	-Heating, Ventilating and Air Conditioning
IGA	-Investment Grade Audit
kW	-Kilowatt – a unit of energy equal to 1000 watts
kWh	-Kilowatt hours – a unit of electrical energy or work equal to that done by one kilowatt acting for one hour
LAN	-Local area network
LED	-Light-emitting diode – a semiconductor light source
LEED	-Leadership in Energy and Environmental Design
MCC	-Massasoit Community College
NABCEP	-North American Board of Certified Energy Practitioners

PV	-Photovoltaics – a technology for converting sunlight directly into electricity
RCRA	-Resource, Conservation and Recovery Act
RFP	-Request for Proposals
VFD	-Variable Frequency Drives

## GREENHOUSE GAS EMISSIONS

During the summer and fall of 2008, data was collected to complete a comprehensive inventory of greenhouse gas emissions for the Fiscal Year 2007. The Clean Air – Cool Planet Carbon Calculator was then utilized and it was determined that Massasoit Community College’s net eCO<sub>2</sub> emissions totaled **13,687 Metric Tons**. The Chart below summarizes the annual emissions, for all measurement types, calculated by the Clean Air – Cool Plan Carbon Calculator Tool.

MODULE	Summary					
WORKSHEET	Overview of Annual Emissions					
UNIVERSITY	Massasoit Community College					
Select Year	2007	Energy Consumption MMBtu	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	eCO <sub>2</sub>
Scope 1	Co-gen Electricity	-	-	-	-	-
	Co-gen Steam	-	-	-	-	-
	Other On-Campus Stationary	23,883	1,260,817	126	3	1,264
	Direct Transportation	1,127	79,252	15	5	81
	Refrigerants & Chemicals	-	-	-	-	-
	Agriculture	-	-	-	-	-
Scope 2	Purchased Electricity	64,040	5,257,910	42	73	5,281
	Purchased Steam/Chilled Water	-	-	-	-	-
Scope 3	Faculty/Staff Commuting	12,415	871,598	174	60	893
	Student Commuting	80,721	5,666,929	1,132	390	5,808
	Directly Finance Air Travel	1,044	205,182	2	2	206
	Other Directly Financed Travel	-	-	-	-	-
	Study Abroad Air Travel	-	-	-	-	-
	Solid Waste	-	(4,400)	6,887	-	154
	Paper	-	-	-	-	-
	Scope 2 T&D Losses	-	-	-	-	-
Offsets	Additional					-
	Non-Additional					-
Totals	Scope 1	25,010	1,340,069	141	8	1,345
	Scope 2	64,040	5,257,910	42	73	5,281
	Scope 3	94,180	6,739,309	8,195	452	7,061
	All Scopes	183,230	13,337,288	8,378	533	13,687
	All Offsets					
		Net Emissions:				13,687

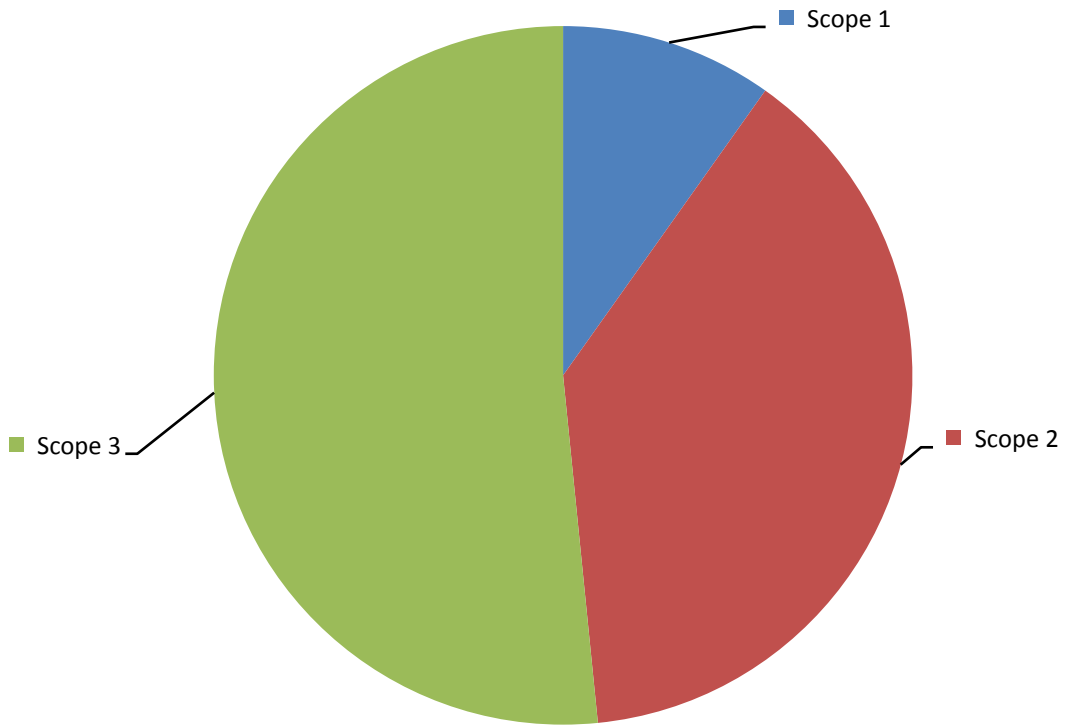


**Emissions by Scope**

As varying types of State Organizations were required to complete this process, GHG established three “scopes” for their accounting and reporting. By categorizing the emissions into these scopes, a more accurate comparison of these organizations could be made as there were varying types as well as climate policies. Furthermore, emission sources were categorized as either direct or indirect. The following defines each scope:

- Scope 1:** Includes emissions from sources controlled and owned by the college. This would include sources such as heaters, furnaces boilers, etc., as well as the fuel combustion generated by the vehicles owned by the college.
- Scope 2:** Indirect emissions generated by a utility in the production of electricity consumed by the college.
- Scope 3:** Includes all other indirect emissions that result from activities of the college (e.g. commuting, air travel, etc.). These sources, in scope 3, are not owned or controlled by the college.

## Scope Summary



The following is a Commuter Assumption Narrative.

### **I: STUDENT MILEAGE:**

- (a) % age Carpooling = 10%
- (b) Days commuting per term:
  - (1) Full Time Students: Spring term (71 days) + Fall (71 days) = **142 days**
  - (2) Summer Students: Summer I (20 days) + Summer II (20 days) = **40 days**
- (c) Number of trips per day = **1 round trip per day**
- (d) Average Miles per trip:
  - (1) Non Summer Students: Total # students = 7,619; Total miles all students = 132,582; **Avg. miles per trip = 17.40**
  - (2) Summer Students: Total # students = 3,554 (based on recent run); Total miles all students = 56,453; **Avg. miles per trip = 15.88**

### **II: STAFF, FULL TIME AND ADJUNCT FACULTY:**

- (a) % age Carpooling = **0%**
- (b) Days Commuting per year:
  - (1) Staff: 52 weeks per year \* 5 days = 260 possible days less 31 days consisting of: Holiday - (13); Est. Vacation (2 wks) - (10); Sick days (5); and Personal days (3) = **229 days**
  - (2) Full Time Faculty:
    - (1) Fall and Spring semesters – It was assumed that each professor comes in an additional 3 days for each term. = **148 days**
    - (2) Summer semester – It was assumed that 28% of full time faculty remain to instruct (40: summer term days/142: Spring/Fall term days) = 28%. It was still assumed that each professor comes in an additional 3 days for each term = 46 days \* 28% = **12.6 days**
    - (3) **Total Faculty days = 160 days**
- (c) Number of trips per day = 1 round trip per day
- (d) Total Faculty number: As both full and part time faculty have the same avg. trip mileage and trips per day applied, adjunct faculty had to be adjusted to a full time equivalent in efforts not to overstate mileage. The following assumption was made:
  - (1) # Adjunct professors =  $111 * 40\% (2/5) = 44$  \*\*Note: It was assumed that an adjunct professor teaches an average of 2 classes.
  - (2) # Full time Faculty = 123
  - (3) **Total Faculty # = 123 + 44 = 167 Faculty**

### **II. STAFF, FULL TIME AND ADJUNCT FACULTY: (Cont.)**

- (e) Total Staff Number: As both full and part time staff have the same avg. trip mileage and trips per day applied; part-time staff had to be adjusted to a full time staff equivalent in efforts not to overstate mileage. The following assumption was made:
  - (1) Full time staff = 348 **Reg. Full Timers**
  - (2) Part time staff: # part timers (334) \* 25% (Est.) = **84 full timers** \*\*Note: There was no way of knowing how many days these employees come to work as it includes varying types of employees, some that may even only come to work 1 to 2 days per week (i.e. Waitors, tutors, cafeteria staff, etc.)

(3) Total Staff = **432 Staff employees**

(f) Average Miles per trip:

(1) Staff = **17.02**

(2) Faculty = **19.68**

Student Mileage:

(a) %age Carpooling – It was assumed that 10% of our students were carpooling.

(b) Days commuting per term:

(1) Full time Student

### **III. AIR TRAVEL MILES:**

All air travel invoices were screened and analyzed to determine the number of passengers involved in the travel, where the flight originated, and the final destination. The mileage was then determined for each of these trips and totaled to get overall air travel miles.