OFFICE OF COMMUNICATIONS © 2009 BRANDEIS UNIVERSITY A013A

BRANDEIS UNIVERSITY
CLIMATE ACTION PLAN

Brandeis University Climate Action Plan
Version 1.0
September 15, 2009
Any updates or future versions available at:
www.brandeis.edu/campussustainability/climate/index.html

TABLE OF CONTENTS

1 BRANDEIS CLIMATE ACTION

PRESIDENT'S STATEMENT

September 15, 2009

Dear Brandeis Community,

Since its founding in 1948, Brandeis University has been a model for social consciousness and responsibility. As a leader among our nation's top academic institutions, Brandeis has played an important role in affecting the social and political landscape. Despite its youth, Brandeis has established itself as a leader in academic excellence and innovation, and there is no shortage of challenges to which Brandeis can help to contribute solutions. One of the most pressing of these is climate change.

In September 2007, Brandeis adopted the American College and Universities Presidents Climate Commitment, acknowledging that reversing global warming is one of the defining challenges of the 21st century. As part of this commitment, Brandeis will make environmental sustainability a priority and an integral part of practices designed to make the University carbon-neutral.

Brandeis will implement a comprehensive climate action plan, which sets forth cost-effective short- and long-term goals that take into account existing infrastructure and resources, together with proven strategies and innovative technologies for reducing dependence on nonrenewable energy resources. By employing a wide range of expertise, resources, and reputation, Brandeis can become a model of environmental stewardship, thereby furthering the University's commitment to social responsibility.

Climate change requires positive action, collaboration and creative problem solving. I call on all members of the Brandeis community to join with me in accepting this challenge in order that we may address it as a unified community.

Sincerely,

Jehuda Reinharz

President, Brandeis University

AMERICAN COLLEGE & UNIVERSITY PRESIDENTS CLIMATE COMMITMENT

"We, the undersigned presidents and chancellors of colleges and universities, are deeply concerned about the unprecedented scale and speed of global warming and its potential for large-scale, adverse health, social, economic and ecological effects. We recognize the scientific consensus that global warming is real and is largely being caused by humans…

We believe 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. Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society.

We further believe that colleges and universities that exert leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities. **Accordingly, we commit our institutions to taking the following steps in pursuit of climate neutrality:**

1. Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.

    a. Within two months of signing this document, create institutional structures to guide the development and implementation of the plan.

    b. Within one year of signing this document, 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.

    c. Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:

        i. A target date for achieving climate neutrality as soon as possible.

        ii. Interim targets for goals and actions that will lead to climate neutrality.

        iii. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.

        iv. Actions to expand research or other efforts necessary to achieve climate neutrality.

        v. Mechanisms for tracking progress on goals and actions…"

See **www.presidentsclimatecommitment.org** for complete commitment text

AUTHORS AND PROCESS

The Climate Action Plan is a collaborative effort of the Brandeis Environmental Sustainability Team (BEST), the advisory committee of the Campus Sustainability Initiative. BEST meetings occur monthly, at which various sustainability solutions are discussed by a diverse campus group. On – and off-campus experts in various topics were consulted. Many resources in creating this plan were provided by the Association for the Advancement of Sustainability in Higher Education (AASHE) and Clean Air-Cool Planet.

2008-2009 BEST Members

- Chair- Janna Cohen-Rosenthal ’03, Sustainability Coordinator, Facilities Services
- Aileen S. Bonilla, Advancement Services, Development Department
- Andrew Finn, Environmental Health and Safety Officer
- Bill Bushey, Energy Manager, Facilities Services
- Carrie Simmons, Assistant Director, Integrated Marketing, Communications
- Dan Feldman, Vice President for Capital Projects
- Dennis Finn, Grounds and Recycling Manager, Facilities Services
- Eric Olson, Ph. D, Senior Lecturer in Biology, Heller School
- Ivana Kovacikova ’11, Eco-Rep and Sustainability Summer Intern
- Lanni Nicole Isenberg, Departmental Coordinator, Heller School
- Laura J Goldin, Associate Director Environmental Studies
- Lisa Fleischman, Associate Director of Annual and Special Gifts, Development
- Marci McPhee, Assistant Director of the International Center for Ethics, Justice and Public Life
- Mark Collins, Vice President of Campus Operations
- Mathew Schmidt, ’11, President of Students for Environmental Action
- Michael Newmark Director of Dining Services, ARAMARK
- Michele Hutcheon, Departmental Coordinator, Heller School
- Preeta M. Banerjee, Ph. D Assistant Professor of Strategy International Business School
- Sabine von Mering, Ph. D. Associate Professor of German and Women's and Gender Studies, and Director, Center for German and European Studies
- Sharon Hewitt Ph.D., Florence Levy Kay Fellow in Ethics, Philosophy Department
- Stephanie Sofer '09, Undergraduate Representative Environmental Studies Department

Climate Action Planning Contact

Janna Cohen-Rosenthal
Sustainability Coordinator
jannacr@brandeis.edu
781-736-4194
www.brandeis.edu/campussustainability

Resources

- **Brandeis Climate Change Action Plan Site:** www.brandeis.edu/campussustainability/climate/index.html
- **Association for the Advancement of Sustainability in Higher Education (AASHE**): www.aashe.org
- **Climate Planning for Campuses: A How To Guide** www.aashe.org/wiki/climate-planning-guide
- **ACUPCC Reporting System**: acupcc.aashe.org
- **The American College & University Presidents Climate Commitment**: www.presidentsclimatecommitment.org
- **The Clean Air-Cool Planet on-line Campus Climate Action Toolkit:** www.cleanair-coolplanet.org/toolkit/

2 CARBON NEUTRALITY GOALS AND EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Brandeis signed the American College and University Presidents Climate Commitment (ACUPCC) in 2007. It is a bold public statement of Brandeis University's desire to not only educate a generation of sustainability minded leaders, but to take steps to reduce the climate change impact of university operations. As part of the obligation to this commitment, a Climate Action Plan is required to guide progress towards climate neutrality.

Included in the Brandeis Climate Action Plan are goals and a timeline for reducing greenhouse gas emissions. To determine the reduction goals, an inventory of greenhouse gas emissions was conducted for 2005-2008. Mitigation strategies were then chosen to address the major sources of emissions. Tactical recommendations are made for each mitigation strategy and accompanying educational efforts. Specific tactics, however, will be a work in process, with frequent community input and flexibility to respond to changing technologies and funding realities. Tactics were recommended for the Short Term (2010-2015) that are cost neutral or have short payback cycles. Tactics that may involve greater capital expenditures are discussed for inclusion in Mid Term (2016-2020) and Long Term (2020-2050) plans.

The Short Term reduction goal is to reduce greenhouse gas emissions by 2015 to 15% below the 2008 level of greenhouse gas emissions. Achieving this goal will be dependant upon the availability of funding sources. The Short Term goals are consistent with peer institutions and are significant milestones in reaching climate neutrality by 2050. See Table 1: Greenhouse Gas Reduction Goals for the full timeline of reduction goals.

Figure 1 Brandeis Climate Action Planning Process

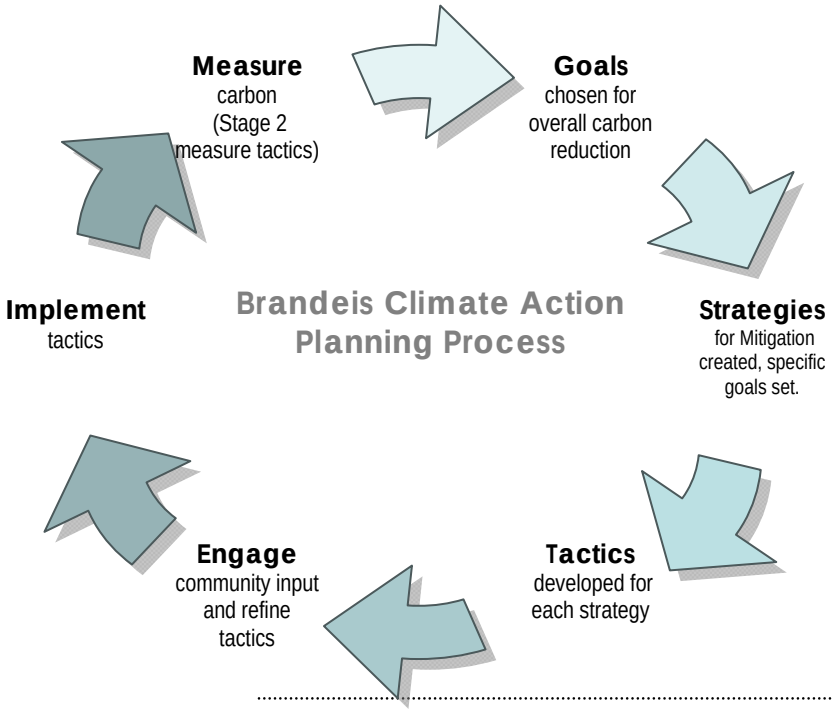


Table 1: Greenhouse Gas Reduction Goals

% Reduction	Goal Year	Base Year	Mitigation Strategies & Tactics (Adopted by end of Goal Year)	Notes	
	FY 2008	FY 2008	✓ Phase 1 & 2 Energy Savings Program ✓ Renewable Energy Credits (RECs)= 15% of use	Energy use declined for 2005-2008 and RECs were purchased for 2008. Commuting data for 2005-2007 estimated.	Past
-10% Estimate.	FY 2009	FY 2008	✓ Behavioral Change Program Begun ✓ LEED Silver Building Policy	2009 will see an increase because of gains in square footage and no REC purchase.	
15%	FY 2015	FY 2008	▪ Energy: 10% reduction from Efficiency and Renenewables. 5% from Conservation Policies & Energy Awareness and Behavioral Change Programs ▪ Transportation/Commuting: 15% change through Behavioral Change promotion and new policies ▪ Adopt LEED Gold Building Policy for new construction and renovation, maximize energy credits- this will deter growth of emissions during period	Because of current economic situation, all Mitigation Strategies are designed to be low cost or require minimal upfront capital. Goals are dependant on access to funding.	Short Term
30%	FY 2020	FY 2008	▪ Capital Investment in Energy Efficiency Projects ▪ Continued Behavioral Change projects for all emissions sources ▪ Protection of Campus Forest ▪ LEED Platinum Building Policy ▪ Space Maximization to avoid new buildings ▪ Renewable Energy= 30% of Electricity	Assumed ability to invest in longer payback projects and higher capital costs for "greener" buildings and renovations.	Mid Term
50%	FY 2030	FY 2008	▪ Fuel Switching/Cogeneration ▪ Renewable Energy= 75% of Electricity	Assumed technology will allow for affordable cogen. and increased renewables.	Long Term
100%	FY 2050	FY 2008	▪ Fuel Switching in Central Heating Plant ▪ Renewable Energy=100% of Electricity ▪ Offsets purchased for any remainder to reach goals	Assumed final 50% not possible without offset and REC purchases. Engage alumni community for projects with social benefit.	

Table 2: Highlights of Short-Term Mitigation Strategies & Tactics

Mitigation Strategies	Tactics: Major Recommendations (See plan for greater details)	Year
A Energy Conservation and Efficiency	**Brandeis Energy Savings Program Funded** Continue investing in efficiency to gain a minimum of 10% energy reduction from campus buildings. This goal may be coupled with renewable energy programs.	2010
	Energy Awareness and Behavioral Change Program Communications needed from high level. Can have 5% reduction over 5 years.	2010
	Energy Conservation Policies Campus Planning, Space Utilization, CFL Lightbulbs, Green Computing, Idling, EnergyStar purchasing, Temperature Set Points will produce savings, coupled with Energy Savings Program goals.	2010-2015
B Clean and Renewable Energy	**Install Solar Photovoltaics (PV)** Solar PV can be installed on existing buildings where technically feasible and through cost competitive financing structures.	2010
	Install Solar PV on new projects when Capital Projects budget allows	NA
C Green Building	**Master Planning** Consider space maximization before construction of new buildings. Will help maintain current levels of greenhouse gas emissions.	2010
	LEED Gold Building Standard for New Construction and Renovations Energy Efficiency prioritized in new construction plans.	2015
D Transportation	**Transportation Plan** Engage in more integrated planning among departments to achieve 15% reduction of emissions from commuting.	2011
	Provide Transportation Demand Management Services Incentivize community to use low carbon transportation options- changes in parking fees may fund new incentive programs	2011
E Waste Disposal and Procurement	**Create Campus Sustainability Plan** Waste is connected to broader environmental goals but is not carbon intensive for Brandeis.	2012
	Purchase Low Carbon Products – including recycled paper	2011
F Food	**Provide local sustainable food choices and audit purchases of food**	2011
G Carbon Offsets	**Avoid purchasing Offsets until Mid Term**	NA
Education	**Increase academic connections through courses, research, extracurricular projects, and outreach activities**	2010-2015

3 GREENHOUSE GAS INVENTORY

A. WHAT IS A GREENHOUSE GAS (GHG) INVENTORY?

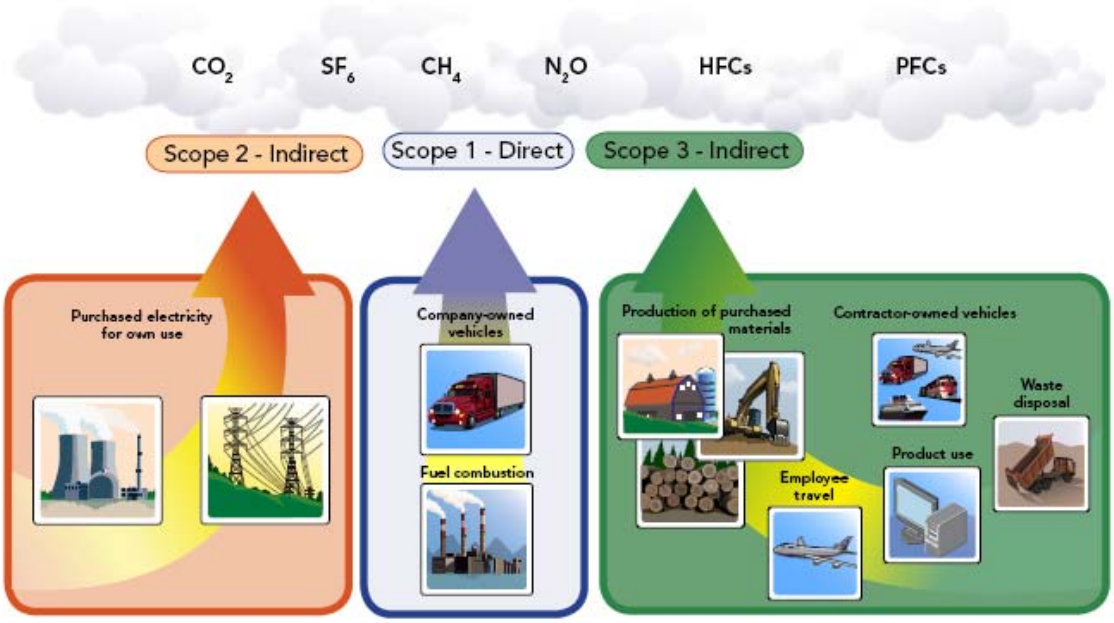
A GHG Inventory uses energy bills and other sources of information to assess and identify major sources of emissions on campus. The goal is to identify actions that can be taken to reduce emissions, and to allow the University to monitor its progress compared to a baseline year or years. Facilities Services staff, with assistance by student interns, performed GHG Inventories from fiscal year 2005-2009 (2009 will be published in September) using the Campus Carbon Calculator software produced by Clean Air-Cool Planet (CA-CP). This software package is the standard used by universities in the ACUPCC.

Claiming an institution is carbon neutral can be complicated. There must be a common understanding of what sources the institutions are required to "neutralize". To address this issue, the International GHG Protocol created the concept of "scopes" (see figure below). The protocol classifies emissions as follows:

- **Scope 1:** direct greenhouse gas emissions from sources owned or controlled by the University;
- **Scope 2**: indirect emissions caused by the generation of purchased electricity consumed by the University;
- **Scope 3:** Other indirect emissions that are a consequence of the institution's activities but are from sources neither owned nor controlled by the University

Figure 2: What Emissions Are Counted?

© 2008 by Clean Air-Cool Planet and Forum for the Future



The ACUPCC states that Scope 1 and 2 emissions must be included, while reporting on Scope 3 emissions is required only for commuting and air travel. All other sources are to be entered to the best of the University's ability. Each year data availability may change, and the greenhouse gas inventory results will be updated as appropriate. For instance, at Brandeis, commuting data was not available for fiscal years 2005-2007. Using the data from a 2008 commuting survey, the past years' commuting impact was estimated and updated. Brandeis will create a yearly GHG Inventory and publish the results every September.

Note: There are many gases that contribute to global warming. Carbon Dioxide is the leading contributor, so for ease of comparison all other gases are converted and referred to as the "Metric Tons of Carbon Dioxide Equivalent" and abbreviated as $MtCO_2e$ (reference: http://www.mtco2e.com).

B. WHAT IS INCLUDED IN THE BRANDEIS GHG INVENTORY?

Greenhouse Gas emissions were included for all Brandeis owned and controlled property. The inputs listed below were used; the input is followed by the source of the data.

Scope 1

- Natural Gas- Utility Bills, mostly heating in Central Heating Plant
- Gasoline and Diesel fuel- filled at the Brandeis station for university vehicles
- Refrigerants-leaked from HVAC equipment and replaced yearly. This source was determined to be less than 1% and may not need to be reported annually as per standard process.

Scope 2

- Electricity- Utility Bills

Scope 3

- Commuting Miles of Staff, Faculty, and Non Residential Students - calculated through a transportation survey
- Air Travel Miles- purchased by University Travel Agent and Procurement Cards
- Solid Waste- Billed by Waste Hauler (studies but was excluded as is not a net carbon impact)
- Wastewater- Utility Bills
- Copier Paper- Vendor Purchase History

Offsets/Negative Impact

- Renewable Energy Credits- Purchased credits in 2008, billed by Vendor in kilowatt hours

C. WHAT IS NOT INCLUDED IN THE GHG INVENTORY AT THIS POINT?

The following sources are sometimes included by other institutions, but are not considered in the realm of Brandeis's climate reduction responsibilities. They may also have been omitted from

the Brandeis 2008 baseline either due to the assumed small contribution to emissions and/or because of the difficulty in obtaining accurate data. The sources may be included in the future.

- Carbon Sequestration of Campus Woods (in discussion to be conducted by an Ecology Class)
- Composting
- Study Abroad Travel
- On campus residential students driving for recreation
- Subcontractor fuel usage
- The manufacturing impact of additional products purchased by the University
- The impact of products purchased by outside vendors, such as food from ARAMARK
- Events held at non-University controlled properties (for instance: an alumni event at a conference center or hotel)

D. RESULTS & TRENDS

Table 3: 2008 GHG Gross Emissions by Source & Reduction Goal Amounts

Sources	$MtCO_2e$ in 2008	Percentage of Gross Emissions	Short Term Reduction Goals $MtCO_2e$
Purchased Electricity	17,855.03	43.26%	2,678.25
On-Campus Stationary (Natural Gas & Heating Oil)	14,145.29	34.27%	2,121.79
Directly Financed Air Travel	3,849.46	9.33%	577.42
Faculty / Staff Commuting	1,889.92	4.58%	283.49
Scope 2 T&D Losses	1,765.88	4.28%	264.88
Student Commuting	1,015.93	2.46%	152.39
Direct Transportation	417.84	1.01%	62.68
Other	332.31	0.81%	49.85
Total	**41,271.66**		**6,190.75**

Figure 3: 2008 GHG Gross Emissions by Source

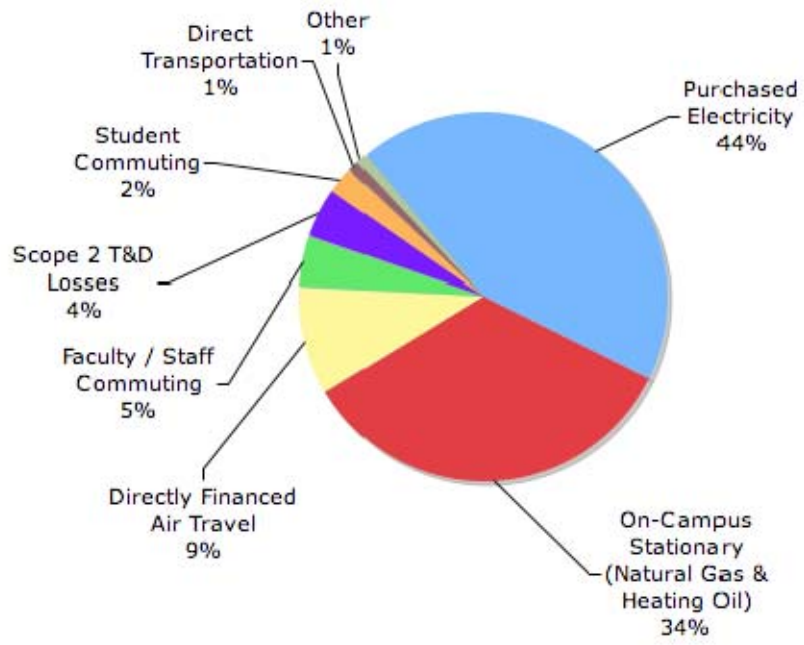


Table 4: GHG Emissions Summary

Year	Gross Emissions MtCO2e	Net Emissions MtCO2e	% Reduction Change in Gross Emissions	MtCO2e Gross Emissions Per Full-Time Student Enrollment	MtCO2e Gross Emissions, Per 1,000 Square Feet of Building Space
2005	48,508	48,508	NA	10.2	19.1
2006	46,864	46,864	4%	9.6	18
2007	42,222	42,222	11%	8.5	16.6
2008	41,272	38,370*	2%	8.2	16.2
2009+	*45,716*	*45,716*	-10%	*9.1*	*17.4*

** 2008 Includes a reduction of 2,902.1* $MtCO_2e$ *from Renewable Energy Credit Offset Purchases*

+ 2009 data is currently an estimate

Brandeis University's emissions were heading in a general downward trend from 2005-2008 because of energy efficiency investments, called the Energy Savings Program. These large-scale energy efficiency improvements (more details in mitigation section) affected purchased electricity, natural gas use (on campus stationary), and wastewater trends. In 2009, a 10% increase is estimated because of the addition of the Shapiro Science Center and Ridgewood Residential Quad. Brandeis also purchased off-campus generated Renewable Energy Credits (see section 4.B.2 for more detailed explanation) in 2008, which reduces the net emissions reported.

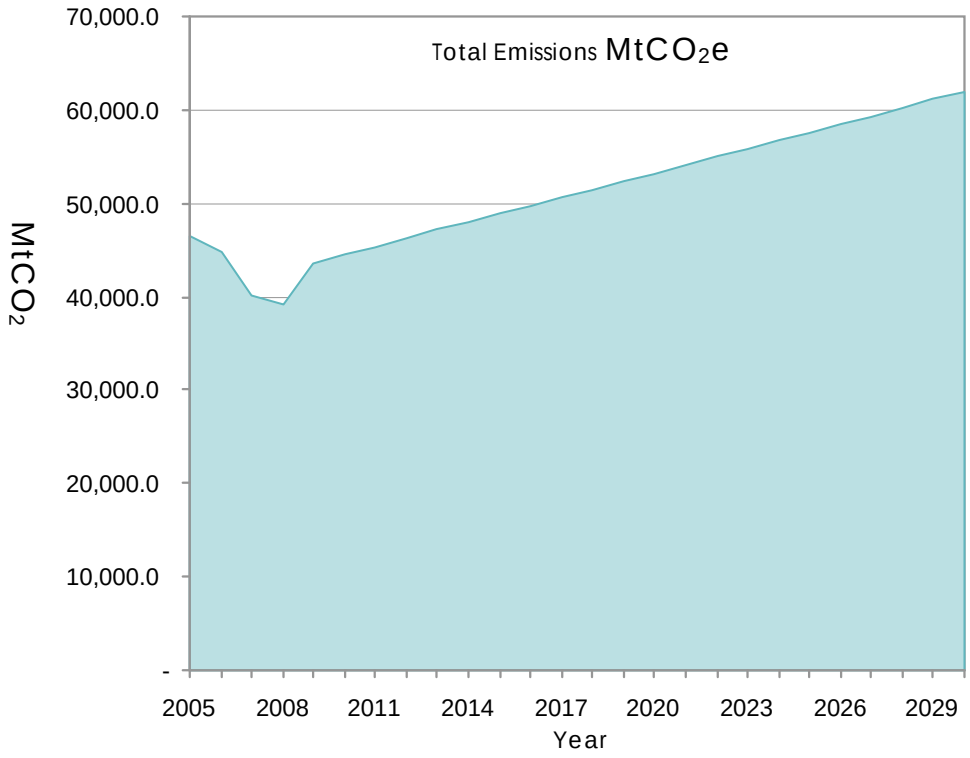
In 2008, Brandeis emitted an average of 8.2 $MtCO_2e$ per full time equivalent student. In comparison, the average emissions of the other 87 Doctorate-Granting Universities that have currently submitted their GHG inventories is 8.8 $MtCO_2e$. In 2008, Brandeis emitted 16.22 $MtCO_2e$ per 1,000 sq ft, while the other institutions that reported emitted 21.38 metric tons.

E. PROJECTIONS

The Campus Carbon Calculator software creates projections of CO2e emissions based on "Business as Usual" practices. Business as Usual means nothing changes politically or institutionally about our energy sources or practices. It also assumes growth at a moderate rate in both square footage and student population.

This exact projection trend is unlikely. Even without Brandeis's involvement, there is hope the electricity mix will become less carbon intensive through current cap and trade policies. Despite these possible steps forward, energy use has been shown to "creep" naturally, meaning more items using energy are being added to campus, even though the items are often more efficient. For instance, 10 years ago, no one had cell phone chargers and scanners, and fewer residential buildings were air conditioned. Energy prices will without a doubt rise faster than inflation. The exact amount is, of course, impossible to determine, but the increased load will cause energy budgets increase quickly. The projection model highlights the need to take decisive action to reduce emissions relating to possible future growth.

Figure 4: Business as Usual Emissions Projections



4 MITIGATION STRATEGIES

Mitigation Strategies Introduction

Brandeis is committed to reducing GHG emissions- with the ultimate goal of carbon neutrality by 2050. This goal must be divided into achievable milestones matched to realistic, yet visionary mitigation tactics. The mitigation strategies are linked to specific carbon reduction goals and divided into recommendations for:

- Short Term: 2010-2015
- Mid Term 2016-2020
- Long Term 2020-2050

The Climate Action Plan will address the following strategies to reduce climate change emissions:

A Energy Conservation and Efficiency
B Clean and Renewable Energy
C Green Building
D Transportation
E Waste Disposal and Procurement
F Food
G Carbon Offsets

Education is addressed in Section 5

Each of these mitigation strategies has crucial emission reduction potential for Brandeis. A diverse range of strategies is important. For instance, focusing only on energy conservation and not concurrently investing in renewable energy may put the University at greater risk for price fluctuations. Managing mitigation of carbon is similar to the "portfolio" approach for managing financial investments. Over the years there will be new and innovative tactics for each strategy, and the feasibility of some projects will change. This plan focuses on tactics to reach the Short Term goals and allows for ongoing community input into project specifics (see Section 8 Plan Implementation Section for more information about future plan revisions).

Mitigation Tactics Criteria

There are numerous projects that could be undertaken to reduce carbon emissions. The following criteria are to be considered when choosing projects:

- Potential for meaningful and cost effective GHG emissions reductions
- Availability of funding from various sources including campus budgets, borrowing, incentives from government and utilities, and grants from foundations

- Payback, return on investment (ROI)
- Academic impact- involvement of faculty and students for learning and research purposes
- Organizational capacity to undertake and manage the project
- Alignment with campus capital development plan, strategic, and other plans
- Stakeholder support and enthusiasm
- Other benefits, e.g. maintenance savings; capital improvement; improved safety, comfort, or productivity; public relations value, social justice implications in the community etc.

Mitigation Costs

Cost estimates for projects are often difficult to obtain for large scale infrastructural changes without a detailed engineering study. Therefore, all costs quoted are to be considered estimates. Energy prices do fluctuate- all energy assumptions are calculated considering a yearly 5% increase in energy prices. Efforts have been made to achieve meaningful carbon reduction through cost neutral options for the Short Term period. The solutions needed in the Mid Term and Longer Term options may require additional capital expenditures to meet reduction goals. As noted above, there are additional factors to consider when choosing projects beyond simple payback.

Key to Mitigation Strategies Section

Background information for each mitigation strategy and tactic are included. Each section will have also have:

➔ **Recommendations**: An arrow highlights a recommendation for current action or further study/discussion. Dates for implementation of the recommendation are given for each section.

Progress on recommendations will be available at www.brandeis.edu/campussustainability.

A. ENERGY CONSERVATION AND EFFICIENCY

The burning of fossil fuels to generate electricity and heat is the primary source of GHG emissions at Brandeis University. The most effective campus GHG emission mitigation strategy is to decrease energy usage where possible and increase energy efficiency in areas which require fossil fuel energy. Nothing is cleaner than the BTU or kilowatt hour of energy that is not used.

A. 1. Past Energy Conservation Efforts

For fiscal years 2005 and 2009, infrastructure bond funds were allocated for energy and water conservation projects. The campus Energy Manager, William Bushey, was hired in 2005 to

oversee these projects.

Phase 1 of the Energy Savings Program 2005-2006

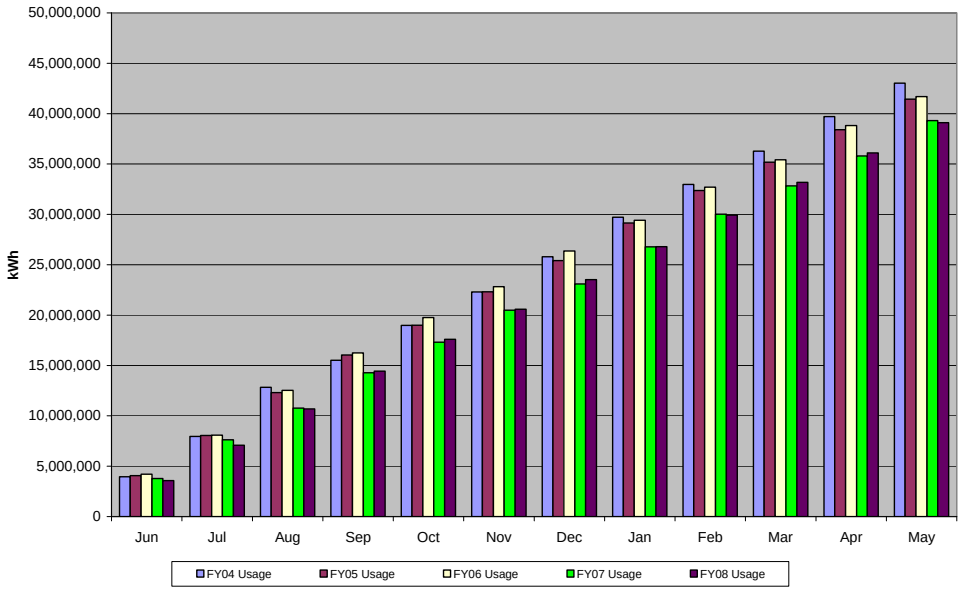
- Energy efficient lighting and occupancy-sensing lighting controls were installed;
- Energy efficient fans and pumps installed;
- Improved building heating, ventilation and air conditioning control systems adopted;
- Utilization of water conserving fixtures increased.

Phase 2 of the Energy Savings Program from 2007-2009

- Replace segments of underground steam and condensate piping
- Spingold Theater: Replace lighting in the Dreitzer Gallery, as well as the deteriorated heating and air conditioning units in classrooms and offices. Also, upgrading of heating and ventilation controls and the building's energy management system.
- Sherman/Hassenfeld and Kutz Hall: Installation of energy management systems.
- Ziv Quad residence halls and Brown Social Science Center: Installation of remote HVAC system monitoring and controls.

These projects totaled over $9 million dollars and have resulted in considerable cost and greenhouse gas emissions savings; most projects had a payback period of 1-5 years.

Figure 5: Cumulative Electricity Usage Main Campus and Gym



A. 2. Brandeis Energy Savings Program Recommendations

Energy efficiency in heating and electricity should account for a 10% reduction in greenhouse gas emissions by 2015. At current GHG emissions rates this would equal a 10% reduction in energy use. If the emissions profile of the local electrical grid changes, this would affect the amount of greenhouse gases emitted by Brandeis electricity use. The assumption, however, is that the local grid will become less polluting over time. In FY 2009 $1,000,000 was spent on the Energy Savings Program for projects with a 3-5 year ROI.

➔ **Energy Savings Program:** It is recommended that past levels of spending be continued to avoid losing savings and still reach the 10% GHG reduction goals. A minimum of $1,000,000 annually for the Energy Savings Program is needed in order to achieve reduction goals. See section A.3 for possible funding sources to reach energy reduction goals. Additional engineering audits are necessary to provide detailed costs and savings opportunities, information will be posted publicly each semester about completed projects.

A. 3. Energy Performance Contracting Recommendations

Brandeis is investigating contracting with an energy service company to provide an energy performance contract, which would require no upfront cost and pay for itself out of the savings achieved. Such a contract could allow Brandeis to take advantage of current utility incentives. Projects will be comprehensive and incorporate items with quick payback, which in turn may finance ones with longer paybacks. Savings will be guaranteed and verified through metering. Current estimates are that a comprehensive energy performance contract in several phases, covering all campus buildings can reduce baseline energy use by over 10%.

➔ **Energy Performance Contracting:** A proposal for the first phase of an Energy Performance Contract should be available for review by fall 2009. Reduction estimates may be adjusted after receiving a proposal and reviewing current financing scenarios.

A. 4. Energy Awareness and Behavioral Change Program Recommendations

The goal is to reduce GHG emissions by 5% over 5 years through a comprehensive Energy Awareness and Behavioral Change Program. This program requires changing the culture of the campus community to have members actively think about their energy usage and the impact of their actions on a global scale. There are many other groups and activities on campus vying for the attention and participation of community members, so creativity and persistence is needed to communicate the message. The Energy Awareness and Behavioral Change Program will be managed by Facilitates Services in coordination with the Campus Sustainability Initiative partners and B.E.S.T. members.

➔ **Energy Awareness:** The first step to achieving our goal is to make community members aware of their actual energy use- both the dollar cost and the environmental cost. Many people, especially students, are unaware of the huge costs their energy use involves. For instance each “mini-fridge” on campus costs the University about $50 a year. Publishing such data is an important educational tool and has the ability to play an integral role in behavioral change. Also, publicizing the Energy Savings Program efforts of a 10% reduction helps to motivate and inspire personal action, as community members see their behavior matched by institutional actions.

- ➔ **Monitoring Software**: Acquiring improved energy monitoring software is critical to allow for accurate student residential energy competitions, and enabling the community to directly see the results of their actions.

- ➔ **Eco-Reps Residential Program:** The Eco-Reps behavioral change program was launched in 2009 for residential undergraduate students, with a focus on recycling and waste reduction. This year the program will begin to focus on the larger carbon footprint and will offer a "residential green room certification program."

- ➔ **Orientation:** Sustainability Activities will be incorporated into Student Orientation programs.

- ➔ **Office Programs:** Each Academic and Administrative department will be approached to host an Energy Awareness presentation during 2009-2010 (see education section as well for further information). In these presentations we will aim to provide both energy and money saving tips for campus, as well as home, since these behaviors reinforce each other. By January 2010 we will launch a "green office certification program."

- ➔ **Presidential Communication:** One high level "ask" by the President will occur each semester to encourage community members to engage in energy saving behaviors.

- ➔ **Newsletters:** Updates on energy and environmental programs will be made available to the community monthly. The "Green Ideas for Brandeis" newsletter will be posted on the Campus Sustainability Website.

- ➔ **Yearly Report:** A "State of the Environment" report will be published every fall with GHG inventory data.

- ➔ **Connections to Sustainability Programs:** The energy awareness message will be connected to the vigorous recycling and other environmental programs. Because green programs reinforce each other, the campus community is much more likely to participate in energy conservation if they can also easily recycle, eat local foods, use recycled paper and observe other such green behaviors.

- **Cost:** Communications materials for the Energy Awareness and Behavioral Change Program will be funded at $5,000 for the academic year 2009-2010. Additional years will require similar communication budgets. Energy Monitoring Software can possibly be included in the Energy Performance Contract/Energy Savings Program.
- **Benefit:** An effective energy awareness and conservation program might reduce energy consumption on campus by a total of 5% by the 5-year goal. With improved monitoring software we can measure energy use before and after certain campaigns and redefine the strategy. This ROI is extremely high- but difficult to predict.

Table 5 Energy Awareness and Behavioral Change Programs Savings

Year	Business As Usual (with 3% Price increase)	Goal Reductions	New Cost (adjusted for decrease prior year)	Savings
2010	$9,522,038.95	0.50%	$9,474,428.75	$47,610.19
2011	$9,807,700.11	0.50%	$9,760,327.97	$47,372.14
2012	$10,101,931.12	1.00%	$10,004,327.84	$97,603.28
2013	$10,404,989.05	1.00%	$10,304,945.77	$100,043.28
2014	$10,717,138.72	1.00%	$10,614,089.26	$103,049.46
2015	$11,038,652.88	1.00%	$10,932,511.99	$106,140.89
Total	**$61,592,450.83**	**5.00%**	**$61,090,631.59**	**$501,819.25**

Note: The possible 10% Savings from the Energy Savings Program not included, since savings go to project loan costs

A. 5. Current Energy Conservation Policies

- **No Idling:** Facility Services' vehicles shall not sit idling for longer than 5 minutes except in the case of snow removal operations.
- **Comfort Cooling and Heating Policy:** Facilities implemented a temperature policy in 2008. Occupied temperatures are 70 degrees F in winter and 75 degrees F in summer with a s +/- 2 degree range and 5-10 degree unoccupied setbacks.

A. 6. Energy Conservation Policies Short Term Policy Recommendations

➔ **Energy Planning**: Immediately. Consider energy implications in budgets of any expansion of services and addition of programs. Engage facilities services to model possible energy and greenhouse gas costs of significant new proposals.

➔ **Space Utilization:** Immediately**.** Coordinate space utilization to maximize energy efficiency. For instance use fewer air conditioned facilities for summer programs and coordinating class schedules into the energy management system

➔ **Lightbulbs:** Immediately/FY2015**.** Restrict incandescent bulbs in dorm rooms by 2015 –and immediately provide incoming students with 1 CFL bulb.

- Cost: 800 light bubs for incoming first year class X $1.00 per bulb = $800

- Benefit: $8,694.30 annually based on $.15 per kWh and 4 hours use per day. Actual savings will vary. ROI Year = $7,894.30 and huge marketing satisfaction to encourage additional behaviors (Note: Implemented in August 2009).

➔ **Green Computing:** January 2010**.** Require all University owned computers to have energy management settings set for conservation by January 2010. Only users with clear need to use virtual desktop software can leave computers running during closed office hours. LTS has assisted to support this goal.

➔ **Idling:** FY 2011. Expand the idling policy to all vehicles on Brandeis campus including contractors by FY 2011- and engage the community to monitor idling and place necessary signage.

➔ **Space Heaters**: FY 2011.Restrictions on the use of portable space heaters where cooling policies are being fulfilled.

➔ **Energy Star:** FY 2011**.** Require purchase of Energy Star electronics by FY 2011, currently computers are bought that are EnergyStar certified.

➔ **Temperature Set Points:** *Yearly*. Review Comfort Cooling and Heating Policy and increase energy efficiency gain, given operations capacities and practices at peer institutions.

Table 6 : Short Term Energy Conservation and Efficiency Projects Summary

Projects	Initial Cost	% Reduction in $ and GHG
1. Energy Savings Program	$1,000,0000	10% over 5 years
2. Energy Performance Contract	$0- savings are guaranteed to pay for project costs	*Included in goal above*
3. Energy Awareness and Behavioral Change Programs	$5,000 each year	5% reduction over 5 years
4. Energy Conservation Policies	First year light bulb program =$800, Energy Star Products can cost slightly more to purchase- 1%-10%.	$7,694 in light bulb savings, EnergyStar products save 10%-30% in energy costs. Conservations Policies included in ESP goal.

A. 7. Mid Term/Long Term Conservation and Efficiency Recommendations

Looking far into the future of energy efficiency work is difficult. Brandeis assumes that innovation in technology will be such that deeper efficiency practices will be possible in the future. The most important concept for long term planning is to prioritize energy use and possible conservation options when changing use of buildings, adding programs and expanding service hours. Despite conservation gains energy use could creep up by adding more equipment and make conservation savings difficult to track.

- **Energy Savings Program**: The program will need to be renewed to meet current technologies and continue savings.

- **Retro Commissioning**: As buildings age their HVAC systems can begin to work improperly. Depending on the age of the building, retro-commissioning can often resolve problems that occur when operational and occupancy patterns change.

- **Energy Awareness and Behavioral Change Programs:** Continue to renew funding to meet current needs and best practices

- **Residential Appliance Policies**: With proper community input the university could create load limits per room and limit refrigerator use.

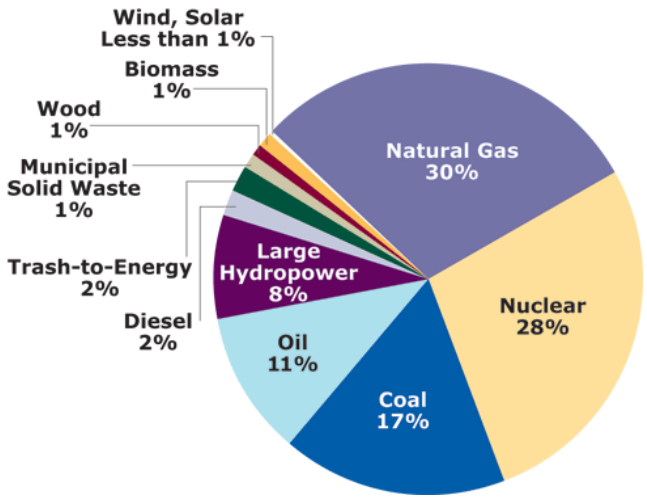
B. CLEAN AND RENEWABLE ENERGY

Reducing the demand for heating and electricity use on campus is crucial. In order to achieve climate neutrality, however, Brandeis will need to transition to carbon free renewable energy technologies and efficient on-campus generation. Reducing demand will make using renewable energy, which currently has higher upfront costs, a more affordable longer term mitigation strategy.

Clean and renewable energy is derived from sources that can be naturally replenished, such as solar and wind, and do not take destructive mining practices to produce. Renewable energy has added social benefits compared to fossil fuels, such as lowering dependence on foreign nations for resources, providing local jobs, and stable pricing. Current state and federal policies are being crafted that will significantly change the renewable energy sector, by essentially charging industries for emitting carbon. Massachusetts is currently in a cap and trade system for carbon emissions from electrical utilities. While a national policy has yet to be, enacted the expectation is that lower carbon energy sources will become more cost competitive and energy prices in general may rise.

Figure 6 New England Electrical Mix 2004

Source: NEPOOL GIS



B. 1. Current Energy Use

Currently the University has no on campus generation of electricity, besides emergency generators fueled by natural gas and diesel. The mix from the electrical grid determines the greenhouse gas potential of our electricity use. While we can work to manage our usage, we can't change the given mix. Currently, the electrical mix does not contain a significant amount of clean renewable energy (See Fig. 6 NEPOOL 2004 Electrical Mix). The central heating plant that supplies most heat and hot water on campus uses natural gas with fuel oil as a back up. Using Natural Gas for heating has a lower greenhouse gas potential than coal or the electrical mix, but is still a significant contributor to the emissions inventory.

B. 2. Renewable Energy Credits

The University can build renewable energy capacity on campus or buy Renewable Energy Credits (RECs) to reduce climate impact. RECs represent the "environmental attribute"

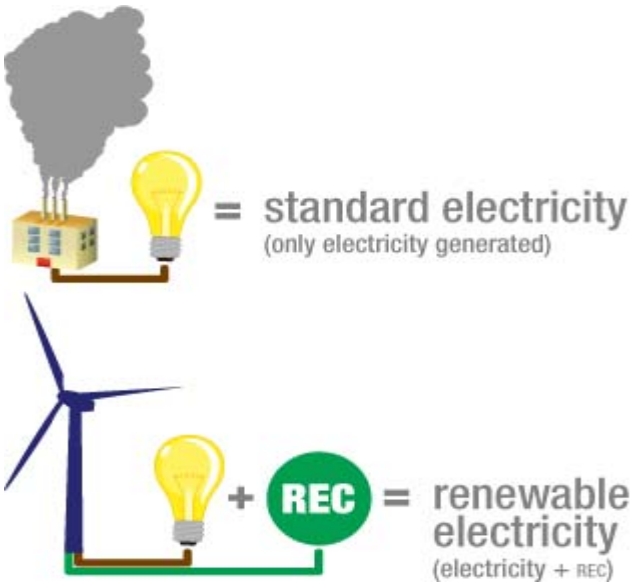
associated with renewable power. RECs are intended to provide a financing mechanism to expand renewable electricity generating capacity. It is a premium price over conventional power, just as organic food often has a premium because of the added benefits. The difference is that the environmental benefit from renewable energy (the REC) can be separated from the actual electricity and sold to different users while the "environmental attributes" of organic food go to the end user.

The quality and price of RECs can vary according to the type or resource, generation location, and third party certifications. Solar RECs are often more expensive than wind or biomass, as that resource is more expensive to build. RECs generated in New England are generally more expensive than "National" RECs because of regulations on New England utilities. Common third party certifications include "GreenE" certification by the Center for Resource Solutions.

RECs were purchased in FY 2008 for 15% of the campus energy use. Brandeis purchased 7,000 megawatt hours of National Wind RECs, certified by GreenE, at a cost of $35,004. RECs were not purchased in FY 2009 because of budgetary constraints. RECs are a type of Carbon Offset; see Section H for more detailed information about offsets.

Figure 7 Figure 7 What are RECs

Courtesy of http://www.green-e.org



B. 3. On-Campus Generation

The University could choose to switch fuels or purchase renewable energy systems for use on campus. Renewable energy has high upfront capital costs, but no ongoing fuel costs. Long term financial scenarios are difficult to predict because of fossil fuel fluctuation and changing rebate structures.

Cogeneration is a method of generating electricity from excess heat. The processes can reduce GHG emissions, if the system is efficiently designed and if the fuel source has lower emissions than fuel utilized by the power grid. Engineers would have to study the exact potential of cogeneration and renewables. Technology is innovating rapidly and many more options than listed in the table below could become available in the mid- to long- term.

Table 7: On-Campus Energy Generation Potential

Technology	Type of Power	Possible Potential	History/Benefits	Timeline
Solar Photovoltaic (PV)	Electrical	Installing solar PV on existing buildings could eventually produce 5-10% of campus electricity. Possible ground mounted systems in parking lots could increase the potential.	Students, Staff, and Faculty have been interested in PV because of the educational and social benefits. Is currently more expensive than efficiency. Many cost reductions are for tax paying entities.	Short and Midterm
Wind Power	Electrical	The potential for large or small scale wind turbines on the Brandeis campus is unknown. Estimate production of 5-15% of current electricity use.	The university attempted to study wind speeds on campus, but was denied a permit by the City of Waltham to erect a Metrological Tower. More effort would be needed to gain permitting and community support. Larger scale wind power is becoming competitive.	Short and Midterm
Solar Thermal	Water Heating	Solar hot water systems must closely match production with demand; residential buildings used year round would be best suited.	More cost effective than PV but can be difficult to maintain. Rebates offered by Gas Utility companies.	Short and Midterm
Cogeneration	Space Heating/ Electrical	Converting the CHP to generate electricity from waste heat- Natural Gas could still be used or switch to more renewable fuels (see below).	Would need engineering studies. Project would probably cost millions, but be a comprehensive reduction step.	Mid to Long Term
Geothermal	Space Heating/ Electrical Cogen.	Unknown without engineering reports.	May not be cost effective for individual buildings, given efficiency from existing central heating plant.	Mid to Long Term
Biomass	Hot Water/Space Heating/ Electrical Cogen.	Waste veg. oil could be used to provide small co-gen systems in kitchen facilities. Large scale fuel switching of CHP fuel to a Biomass product (woodchips) would be a potential. No potential for landfill gas nearby.	Costs are unknown. Would need to secure consistent supplies of biomass for the large quantities needed by the CHP. Some biomass use is controversial and would need additional studies of the societal impact.	Long Term

B. 4. Power Purchase Agreements for On-Campus Generation

A new business model for installing renewables, most commonly solar power, is called a "Power Purchase Agreement" (PPA). A company can be contracted to install and own a PV system located on Brandeis buildings. A PPA will require Brandeis to purchase power from the PV system for a number of years at set rates. The primary advantage of this arrangement is that Brandeis is not responsible for the installation, operation, maintenance, or cost of the PV system. Also, this arrangement makes solar more affordable, as the PPA provider can take advantage of tax credits which Brandeis, as a non-profit entity can not. If the RECs for PPA systems are not retained or purchased, Brandeis cannot claim the carbon reduction. Signing a PPA agreement, even without the RECs, has many benefits, including supporting the local economy and creating stable pricing.

B. 5. Off-Campus Renewable Energy

Brandeis could completely own or enter into a contract for electricity and/or RECs with renewable energy generation at off campus sites. Brandeis could, in essence, own an off campus "power plant." This type of project would make sense if building off site was more cost effective than using campus property and there were added social benefits to the proposed project.

B. 6. Educational Displays

Maximizing the educational and research value of on-site energy installations helps compensate for longer paybacks periods compared to conservation. A renewable energy system raises general energy awareness, one of the largest barriers to behavioral change. Renewable energy systems can be created to have the most educational benefit, by allowing the project to be highly visible and involving students in the planning. After installation, software and displays can be used to show the power generation of the systems (See Section 5 for more Educational Connections).

B. 7. Short Term Clean and Renewable Energy Recommendations

In the short term, the recommendation is not to purchase offsite RECs, and instead focus on energy conservation and investing in on-campus renewable generation. Goals below are for electricity production, not heat generation, as purchasing RECs only counts towards electricity emissions.

Table 8 Renewable Electricity Goals form RECs and On-Campus

Year Accomplished	Renewable Energy Goals
2016	15%
2020	30%
2030	75%
2050	100%

- ➔ **Solar PPA:** PPA models are being considered for Fall 2009 for about 250 KW (under 1 % of electrical load) that are cost competitive. It is probable that contracting to purchase the RECs of these systems push the projects further over current electrical prices, but there is still great benefit to installing on-campus solar PV systems.

- ➔ **On Campus Installations:** Install renewable energy on new capital projects when the budget allows, retain RECs from purchased systems.

- ➔ **Voluntary Programs:** Offer Brandeis community opportunities to voluntarily purchase RECs through local suppliers.

- ➔ **Wind Turbine:** Continue to investigate large scale wind power, build greater support for wind power in Waltham.

- ➔ **Connect to Efficiency Programs.** Investigate including renewable energy and cogeneration opportunities in contracts with Energy Performance Contract providers (see Section 4.A.1.2).

- ➔ **Education:** Expand educational opportunities on Renewable Energy and involve students in above projects (see Section 5 for more).

B. 8. Mid-Term to Long-Term Clean and Renewable Energy Recommendations

- ➔ **Renewable Energy Goals:** In the mid term the University can affordably reduce carbon emission from electricity generation by purchasing RECs. The goal will be to double the previous 15% purchase in 2008 to 30% of electricity use by 2020. Use cost savings for further projects.

- ➔ **On Campus Installations:** Buy the PV systems back from the PPA providers at contract end, if economically feasible and/or purchase systems for new buildings where budget allows.

- ➔ **Cogeneration:** Cogeneration could be an option for Brandeis's natural gas central heating plant. A cogeneration project would most likely cost millions of dollars. Reducing demand first, then scaling a system to University needs is a good long range strategy.

- ➔ **Off Campus:** Investigate off campus projects to meet goals.

C. GREEN BUILDING

Brandeis University maintains over 2,600,000 square feet of building space. Additions and renovations to campus buildings are necessary to support educational programs and respond to community needs. In order to meet climate change reduction goals, however, the university will consider the energy implications of new square footage and changes to campus buildings. Goals in green building include:

- Build new buildings only when necessary
- Optimize site selection in order to preserve green space and minimize transportation impacts
- Orient buildings to take maximum advantage of sunlight
- Use energy as efficiently as possible, to minimize energy use per square foot
- Maximize the use of renewable energy where cost effective
- Use water as efficiently as possible
- Minimize waste water and run-off
- Minimize materials impacts by using recycled and locally sourced products
- Recycle building material waste
- Design for access to low carbon transportation
- Design for a healthy and comfortable indoor environment

C. 1. Current Green Building Policies/LEED

LEED stands for "Leadership in Energy and Environmental Design" and is the standard rating system for green building, administered by the US Green Building Council. A number of LEED certification systems have been developed, such as LEED-NC for New Construction and Major Renovations and LEED-EB Existing Buildings: Operations & Maintenance.

To be LEED certified a building is built at standards higher than required by state building codes. For LEED New Construction, buildings must achieve a variety of prerequisites in the following categories:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design Process

LEED points are earned for achieving various credits in each of these categories. Depending on the number of credit points reached, a LEED building will be either: LEED Certified, LEED Silver, LEED Gold, or LEED Platinum.

Since 2006 Brandeis Office of Capital Projects has adhered to a policy of creating projects at a LEED Silver (or greater) equivalent standard. The buildings have not been third-party certified by the US Green Building Council, but the design team works to meet the standards set by

LEED. Current requirements of obtaining LEED certification through third-party verification are cost prohibitive because of the inability to account for the efficiencies in using a central heating plant. Future versions of LEED may change this regulation and the University could choose to participate in the certification process.

Table 9: Brandeis Green Buildings

Building Name	Project Date	LEED Rating	Square Feet
Heller-Brown	2006	Certified	37,760
Irving Schneider and Family Building	2006	Silver	34,340
New Ridgewood Residence Halls	2009	Silver	86,797
Carl J. Shapiro Science Center	2009	Silver	108,323
Carl and Ruth Shapiro Admissions Center	2009	Silver	20,700
Mandel Center for the Humanities	2010	Silver	37,000
		Total LEED	**287,160**

C. 2. Space Maximization Recommendations

- **Master Planning:** In order to keep GHG footprint at the baseline and minimize unnecessary cost, the campus master planning processes will include maximizing the utilization of existing buildings and avoiding new construction. The university will determine whether there is a way to meet the program needs for the building by reconfiguring and better utilizing existing space. For instance, scheduling more classes earlier in the day can defer the need for a new building. Master planning will also take into consideration transportation objectives in Section D.

- **Wise Summer Use and Community Planning:** Brandeis seeks to increase student enrollments over the next few years, by 100 undergraduate students a year over the next four years. The current plan requires more summer residencies. While increased use of buildings in the summer may raise the total energy use, the avoided cost of new buildings to accommodate these students in the regular year will be outweighed by the increased summer usage. Air conditioning buildings is very carbon intensive, so planning use of buildings appropriately in the summer could still allow for increased student population at current or slightly increased rates of energy use.

- **Use Energy Management Systems Efficiently**: University campuses, including Brandeis, have structural space inefficiencies because of the academic calendar. Over the summer and during student breaks, some staff is still present and departmental offices are still open, so most HVAC equipment is running even if the buildings aren't fully occupied. Planning for future new buildings and renovations should take into account how HVAC systems can be designed considering the space fluctuations over the year. Brandeis

maintains an Energy Management System, which allows energy use in spaces to be programmed, and equipment shut down where possible. Use of the Energy Management system can be expanded and improved. Building occupants will be made aware when shut downs in their space are scheduled.

C. 3. Green Building Goals/LEED Recommendations

➔ **Increase Green Building Standards:** Capital Projects has worked hard to make current building projects reach LEED Silver standards. Project Managers in the office are LEED accredited and contracted firms are chosen for their green building expertise. The assumption is that in the future, building green will become more affordable and more innovative, and Brandeis's institutional knowledge will expand to allow for raising the Green Building Policy standard and perhaps applying for third-party verification. Changes to the LEED system, including a LEED for Campuses may require updates to these goals.

Table 10: Green Building Policy Goals

Year Accomplished	LEED Rating
2015	Gold
2020	Platinum
2030	Platinum or Higher
2050	Zero Energy (may use offsets)

➔ **Maximize Energy Credits in Green Buildings:** The LEED-NC rating system is criticized because a building could potentially be declared "green" but not be highly energy efficient. In order to reduce climate change impact Brandeis will work to maximize the LEED energy credits available in new projects:

- EA Credit 1 – Optimize Energy Performance (9–10)
- EA Credit 2 – On-Site Renewable Energy (3)
- EA Credit 6 – Green Power (consider use)

➔ **Use LEED Standards in Renovations:** LEED-NC is applied to major renovations of existing building projects. When Capital Projects and Facilities Services engage in minor renovations, similar standards will hold as in new construction projects, and the energy credits mentioned above would be prioritized.

D. TRANSPORTATION: COMMUTING AND UNIVERSITY FLEET

Transportation is a significant contributor to Brandeis's overall carbon footprint. For 2008, greenhouse gas emissions from transportation accounted for over 17% of total campus GHG emissions.

Table 11: Climate Change Impact of Transportation in MT CO2E

Year	University Fleet	Faculty / Staff Commuting	Student Commuting	Directly Financed Air Travel*	% of Emissions
2005	363.5	1,872.7	960.7	3,849.5	14.53%
2006	325.7	1,941.1	981.5	3,849.5	15.15%
2007	418.3	1,977.7	1,007.3	3,849.5	17.18%
2008	417.8	1,889.9	1,015.9	3,849.5	17.38%

**Exact use past 2008 unknown, same factor used each year.*

There are three sources of GHGs within transportation:

- University sponsored travel (mostly air travel)
- On-site fuel consumption by University vehicle fleet (gasoline and diesel)
- Student, faculty, and staff commuting to campus

D. 1. Air Travel Recommendations

To calculate the number of miles traveled we used data reported by the campus travel agency and credit card reports. Air travel was curtailed for FY 2009 due to budget constraints. The gains in reduced GHG emissions from Air Travel may rise once budgets begin to grow. We can capitalize on this current trend and change the culture away from unnecessary air travel. The goal is to reduce Air Travel GHG emissions by 15% by 2015. Some air travel is unavoidable; in this case, the use of carbon offsets is appropriate.

➔ **Teleconference Equipment:** Encourage the use of teleconference equipment provided by Library and Technology Services through trainings.

➔ **Alternative Travel Policy:** Encourage staff and faculty to use public transit for short business trips. Partner with AMTRAK and bus providers to highlight discounts.

➔ **Offset Policy:** (Long Term) By 2020 require departments to purchase offsets for air travel. These offsets are affordable and can be as low as $10 a cross country flight.

➔ **Study Abroad:** Students can be engaged to study the amount of air travel from study abroad trips, and work to offset these emission sources.

D. 2. Vehicle Fleet

Currently the university's fleet has an average fuel economy of 13.46 mpg. Currently 18 vehicles are over 9 years old and will be in need of replacement in the near future. Within 10 years most of the fleet will have been replaced, allowing an opportunity to dramatically increase our fleet's fuel economy.

The majority of the university fleet consists of trucks and vans, and the models are far from the most efficient; there are currently not many gains (2-3 mpg better) to be realized by adopting all new models. Hopefully, as the auto industry is forced by new CAFE standards to increase fuel economy, Brandeis can profit from new models with better fuel efficiency. The University contracts for transportation services with Crystal Shuttle; data about fuel use from Crystal Shuttles is currently unknown.

D. 3. Short Term Vehicle Fleet Recommendations

- ➔ **Increased Fuel Economy:** All Facility Services vehicles purchased must have fuel economies 15% better than their predecessors, or be the most efficient available model.
- ➔ **Idling Policy**: Strictly enforce university idling policy, invest more time in educating all drivers, where possible outfit vehicles with timed engine shutoff mechanisms.
- ➔ **Small Vehicles**: Purchase and use more small vehicles for transportation around campus. Investigate electric vehicles where possible. Replace facilities vans with smaller vehicles with better fuel economy such as the Honda Element. While large vans are necessary for certain tasks, smaller vehicles could be useful for smaller repairs and quick trips around campus.
- ➔ **Contractor Vehicles**: Engage contractors, such as Crystal Shuttle, to improve vehicle fuel efficiency. Attempt to calculate this additional fuel use.
- ➔ **Police Fleet**: Replace University police fleet with effective, but more efficient models as needed.

D. 4. Mid and Long Term Vehicle Fleet Recommendations

- ➔ **Vehicle Policy:** Average fuel economy of fleet must meet certain target goals. 18 mpg by 2020 and 22 mpg by 2030.
- ➔ **Biodiesel:** Use reclaimed oil for some diesel engines, if technologically and financially feasible. Engage students to create this project.

D. 5. Staff, Student, and Faculty Commuting

Mileage and emissions data were calculated based upon the responses obtained in the transportation survey sent out in the fall to non-residential students, full time staff and faculty. In future years, surveys will focus on actual emission factors of community vehicles.

Results:

- 66.7% drive alone trips
- 5.1% carpool trips
- 11.3% public transit trips
- 1.9% bicycle trips

Goals:

- Decrease campus congestion and increase safety of campus roads.
- Increase satisfaction from commuters
- At a minimum, reduce GHG emissions from commuting by 5% per year based on previous year's emissions for 2008-2050. This goal ties to the "Behavioral Change" goal of 5% of total GHG.
- Decrease number of parking permits requested
- At a minimum, reduce the percentage of Drive Alone Trips to less than 20% of the total campus trips 2020.

Students:
Currently the University issues 1,416 student parking passes each year at a fee of $125 per year. This fee is below other suburban campuses. The rate could be increased to be more in line with other Universities.

Faculty/Staff Commuting:
The majority of faculty and staff commute in Drive Alone Trips (DAT). Driving alone is the leading cause of congestion and poor ambient air quality, in addition to contributing to GHG emissions. Transportation Demand Management (TDM) uses a combination of incentives and marketing policies to make alternative forms of transportation (carpooling, cycling, walking, or taking public transit) more attractive to commuters than driving alone. By reducing the number of cars traveling to campus, parking demand declines. This eliminates the need to create additional parking spaces. Currently, only 20 faculty/staff members take advantage of the pre-tax commuter rail passes, many commuters mentioned that the commuter rail passes were too expensive to utilize regularly. Parking fees can be used to subsidize public transit. To address this issue in greater detail, a comprehensive transportation plan is recommended to be created within the year.

D. 6. Short Term Staff, Student, and Faculty Commuting Recommendations

➔ **Create a Sustainable Transportation Plan:** This plan will integrate overall climate action goals with University planning to ensure future growth is consistent with reducing carbon emissions and promoting a pedestrian friendly campus environment. Engage key stakeholders to develop plan, including Human Resources, Public Safety, Facilities Services, and Student Life.

➔ **Improved Data Collection**: Increased coordination efforts among planning entities will allow for sharing of information and improve data collection.

- ➔ **Join Transportation Management Authority (TMA):** A TMA will provide emergency ride home program for non-driving commuters.

- ➔ **Increase Zip Cars.** The University has had great success with the newly added Zip cars on campus and may need to add more if utilization rises further. Prioritize a fuel efficient or hybrid ZipCar.

- ➔ **Biking Classes:** Hold biking safety and information workshops to educate the campus community and inspire more individuals to feel comfortable bicycling.

- ➔ '**Deis Bikes** The recently created 'Deis Bikes program is great start to promoting cycling on campus. This program could be expanded to run through the summer (to accommodate the numerous students remaining on campus for jobs/internships/summer classes and to allow the rest of the Brandeis community to take advantage of bike sharing.

- ➔ **Riverside Shuttle:** Investigate creation of a university shuttle to the Riverside MBTA stop. Recent surveys show interest in this service and cost sharing potential with local businesses would enable this option to be more affordable.

- ➔ **Transportation Communications:** Better publicize all transportation related initiatives such as MBTA passes, carpool networks, bike sharing programs, and public transportation schedules. MBA students have been engaged in developing a comprehensive branding strategy.

- ➔ **Carpool Software:** While the University is currently a member of the Massrides ride-sharing program, we only have 25 registered carpoolers. Adopting an easy to use and free carpool service (such as Goloco) with greater marketing efforts will increase the number of carpoolers.

- ➔ **Student Fee Increases:** Through community dialogue possibly increase fees and use revenue to improve transportation services. Begin this process in 2009-2010 school year.

- ➔ **Staff Fees:** Through community dialogue possibly increase fees and use revenue to improve transportation services. Begin this process by 2010-2011 school year.

- ➔ **Transportation Demand Management (TDM) Policies:** Using the revenue to further support other forms of transit or cash out program such as transit pass reduction and parking polices.

- ➔ **Human Resources**: Provide flexibility in schedules and telecommuting (occurred summer 2009).

D. 7. Mid and Long Term Staff, Student, and Faculty Commuting Recommendations

- ➔ **Improve shuttle service:** Increase services where needed. Use technology such as Shuttle tracker that shows the location of the shuttle on campus in real time

- ➔ **Improve Pedestrian and Bicycle Access:** Working with the campus community prioritize creating a walker and bike friendly campus, with more bike lanes, shower facilities, bike racks, sidewalks, and closing sections of the peripheral road to cars.

- ➔ **Residential Car Limits:** A possibility is to allow only third and fourth year students to bring cars to campus. Work in policy groups to recommend an appropriate year to implement this goal.

- ➔ **MBTA:** Work with local businesses to reduce area congestion by negotiating with the MBTA on discounted transit passes and expanded service in exchange for greater ridership

- ➔ **Offsets:** Engage community to offset their travel carbon emissions

E. WASTE DISPOSAL AND PROCUREMENT

E. 1. Trash, Recycling, and Compost

At Brandeis, we currently send our trash to a facility that burns the waste to create energy. This process is actually less carbon intensive than burning fossil fuels to create energy, therefore, the university trash does not create emissions on our greenhouse gas inventory. Using this facility is an important choice in reducing our climate change impact. However, it is not environmentally or financially preferable to encourage more waste generation, even if the activity doesn't create audited carbon emissions. Increasing waste on campus would result in additional maintenance costs and increased tipping fees for trash and recycling. The tipping fees for trash are much higher than composting or recycling.

The university community works hard to reduce waste and divert as much waste as possible from trash to recycling and composting. All of the waste from the dining halls is sent to a commercial composting facility, called WeCare Environmental. This facility sorts trash from compostable items to make compost and mulch products. Our recyclable products are sent to a single stream recycling facility. This facility sorts paper from plastics, allowing all recyclables to be put together by users at Brandeis. The recycleable materials are then sold to create new products. Manufacturing products from recycled materials is much more energy efficient than using virgin materials.

Table 12: Waste Disposal Methods

Waste Type	Disposal Method
Recyclable Materials: Papers and Plastics	Single Stream Recycling
Waste from Dining Halls	Commercial Composting
Campus Trash	Waste to Energy
Construction Waste	Dependent on Contractor, much diverted

Improvements to the waste collection system are possible. Students performed a waste audit in October 2008, by sorting trash from one day of use and found that by volume 40% of the trash was recyclable material. Recycling containers are also often contaminated with trash, and the materials must be discarded. Currently composting is only available in the dining halls and could be expanded to other facilities.

In addition to improving the recycling rate, by diverting more trash to recycling, the Brandeis community can work to lower the overall amount of waste produced on campus. Recycling rates improved during participation in the annual "Recyclemania" contest among college campuses, but the rates still fall below other area schools.

Table 13 : Brandeis Recyclemania 2009 Rates

Month	Average Weekly Recycling Rate	Pounds Recycling per person
January	9.67%	4
February	15.83%	6
March	16.12%	8

Table 14: Boston Area Schools Recycling Rates during Recyclemania 2009

School	Average Weekly Recycling Rate	Pounds Recycling per person
Boston College	41.79 %	12
Tufts	38.15 %	16
Harvard	29.63 %	12

Source: http://www.recyclemaniacs.org/results09.aspx

E. 2. Products

The waste materials Brandeis sends to be recycled and composted are made into products that can be less carbon intensive. Purchasing fewer products and choosing recycled products when possible is often called "closing the loop." If the market for recycled products is not supported by consumers, we may not be able to have affordable recycling operations.

All products purchased on campus have carbon emissions associated with their manufacture, transportation, use and disposal. For instance the use of bottled water requires using fossil fuels to create the bottle, ship the products, and eventually dispose of the bottle. This process is viewed as environmentally negative, but is not currently able to be fully audited in our Greenhouse Gas Inventory. The recent efforts to reduce bottles water use are commendable and encourage further environmental behaviors.

CA-CP's Campus Carbon Calculator will currently calculate the carbon impact from purchasing office paper. The office supply vendor for copier paper is able to provide us with the pounds of copier paper purchased each year (not for individual printer paper which is purchased by departments). In 2008, 119,841 pounds of copier paper with no recycled content was purchased, and 1,810 pounds of paper with 30% recycled content were purchased. This paper purchase creates 156.7 metric tons of eCO2, which is less than .05% of the total university carbon footprint. While reducing paper use is an important general sustainability and financial goal, it does not have significant impact on the audited carbon footprint.

Many companies are choosing to become climate neutral through similar internal auditing and reduction programs. It is important to support these efforts and recognize vendors with shared values. A few third party certifications exist for verifying "Climate Neutral" products, but the market is still in the early stages and few products are available.

E. 3. Short Term Waste, Recycling, and Product Use Recommendations

➔ Goals:

- Recycling Rate at 30% by 2015
- Reduce overall tons of waste leaving campus
- Increase purchase of environmentally responsible products

➔ **Low Carbon Waste Disposal**

Maintain contracts with waste to energy, recycling and composting vendors to make waste disposal remain a minimal greenhouse gas impact for university operations.

➔ **Sustainability Planning**

The efforts of climate change mitigation should focus on the sectors with the highest impact on our global warming footprint. However, becoming a climate neutral campus also entails leadership on general environmental issues, such as waste disposal and purchasing. In two years, by the end of FY 2011, create a Sustainability Plan that uses metrics beyond carbon reduction for recommendations for campus operations.

➔ **Robust Reuse and Recycling Program**

Connect waste reduction and recycling to energy awareness efforts in order to improve recycling rates. Continue to participate in Recyclemania, promote the end of year Move-Out Donation Program (where unneeded items are given to local charities), and promote reuse of products on campus.

➔ **Recycled Content Purchasing**

Prioritize procuring materials with recycling content. Engage university offices to reduce use of supplies to take advantage of possible cost savings.

E. 4. Mid- and Long-Term Waste, Recycling, and Product Use Recommendations

➔ **Carbon Neutral Purchasing Policy**

In the long term, we envision the ability to purchase many products and services from fellow carbon neutral institutions and corporations. Review current best practices and create appropriate policies.

F. FOOD SERVICES

Growing, transporting, cooking, consuming, and disposing of food causes a significant contribution to world wide carbon emissions. Energy use in dining facilities and waste disposal can be captured in the GHG Inventory. Since Brandeis University Dining Services is a contracted operation with ARAMARK, a national vendor, the Brandeis Greenhouse Gas Inventory does not take into consideration the full impact of ARAMARK vehicles and food purchases. The ability to track food purchases will most likely be included in future versions of the Campus Carbon Calculator.

F. 1. Current Food Related Programs

As the largest consumer of campus food services, undergraduate students have also been very motivated to increase the health and sustainability of their food. Working in partnership with Students, Campus Operations, and Dining Services, the following successful programs have been implemented:

- Trayless Dining: reduces food waste and energy costs from washing food
- Various fair trade and organic items are available
- ARAMARK works to increase purchase of local food and provide vegetarian options
- Discounts are offered to customers who use refillable mugs
- Students began a Farmers Market with local vendors
- Starting in Fall 2009, bottled water will not be sold in most campus locations and undergraduate students will be given reusable water containers.

F. 2. Food Services Recommendations

➔ **Energy Efficient Equipment**

A recent audit of the kitchen, revealed that there was not much equipment that currently could be cost effectively replaced to reduce kitchen energy use. When kitchen equipment does need to be replaced, prioritize purchase of energy efficient models.

➔ **Auditing**

Engage ARAMARK to track the Greenhouse Gases of food purchases. Use Campus Carbon Calculator or other tools by FY 2011.

➔ **Local Food Purchases**

Continue to prioritize purchase of locally produced food. Track and publicly display the vendors used by ARAMARK by FY 2011.

➔ **Waste Reduction**

Work to offer incentives to food service customers and employees to reduce waste. Include food services as part of the upcoming Sustainability Plan.

➔ **Community Planning**

Food Services are a crucial element of campus life, but the full carbon impact is unknown. Engage the community to create a long term food sustainability plan when carbon auditing includes Food Services.

G. CARBON OFFSETS

Several universities and corporations have chosen to become carbon neutral in the short term by purchasing off-campus carbon offsets. A carbon offset can be an energy conservation and efficiency, fuel switching, renewable energy, reforestation, or carbon capture and storage project. A Renewable Energy Certificate (REC) is a type of carbon offset. In order to be a credible carbon offset, the fee for the offset must be the "difference maker". Meaning the price paid must actually help the project occur if it couldn't before the help of additional financing. Foreseeing the need to regulate this new market, the ACUPCC created a "Voluntary Carbon Offset Protocol" that determined that Universities should purchase high quality offsets that are:

- Real
- Additional
- Transparent
- Measurable
- Permanent
- Verifiable
- Synchronous
- Registered
- Not double counted
- Retired

G. 1. Carbon Offset Recommendations

➔ **Offset Guidelines**

Reducing the carbon emissions from direct campus operations is the highest priority for Brandeis. There is great potential for reductions that are cost effective, improve quality of life, and provide educational opportunities. If short term reduction goals are not met through on-campus efforts, offsets can be purchased that are high quality and third party verified. This option will probably be necessary in the long term for carbon emissions that cannot be affordably reduced on campus. Guidelines for the purchase of offsets will be created through community involvement and peer institutions.

➔ **Renewable Energy Credit Purchases**

See Section B.7 for an explanation of RECs. Since renewable energy projects have no carbon reduction claim without the REC, purchasing RECs from verifiable projects and retaining on campus RECs are recommended ways to reduce carbon emissions when project budgets allow.

➔ **Campus Forests**

Brandeis's property has a small amount of forest, and no off-campus forested properties are owned. The carbon reduction work done by the existing campus forest is unknown. Studies are needed to measure the current status. Any changes to the campus forest would then count as emissions of greenhouse gases. In the mid to long term, campus planning efforts will work to retain the current campus forest. After the trees are studied, reduction in the forest will be countered through verifiable high quality offset products.

5 EDUCATION

Colleges and universities have the ability to change the impact of campus operations, but they can also educate to inspire further climate change initiatives. Brandeis students and faculty have long been known for leadership on a wide range of social justice issues. Students and faculty working on sustainability have carried on this legacy through many activities including, building local gardens for low income residents, performing greenhouse gas inventories for the city of Waltham, and creating renewable energy systems in developing nations. Brandeis was awarded the Sustainable Endowments Institute's "2009 Champions of Sustainability in Communities Award" for the class project with Waltham's Prospect Hill Tenants Association.

The Climate Action Plan builds on this unique Brandeis heritage of active learning and seeks to expand academic offerings. The ACUPCC states that the climate action plan should include:

> *"Actions to make climate neutrality and sustainability a part of the curriculum and other educational experiences for all students.*
>
> *iv. Actions to expand research or other efforts necessary to achieve climate neutrality."*

Climate change education and sustainability are important academic topics and could be integrated into the curriculum more broadly, as well as being defined programs in Environmental Studies and graduate fields.

Academic and research work done on campus can be connected to campus sustainability improvements and to sustainability solutions with global implications. A university is a model laboratory for society; the changes and strategies made on campus can be adapted to other institutions. An integral part of climate action planning is sharing news and information to help others succeed in climate neutrality. Community outreach can be conducted through student volunteerism, events and information sharing.

Creating a sustainable campus is an important point of student and alumni pride and evidence of continuing leadership in both social justice and emerging academic disciplines. Climate Action Planning will over time engage the alumni community, which has considerable expertise to help Brandeis achieve climate neutrality.

In *Education for Climate Neutrality and Sustainability: Academic Guidance for ACUPCC Institutions* (April 2009), education leaders recommend action in the following contexts:

- The Content of Learning -- to reflect interdisciplinary systems thinking, dynamics and analysis for all majors and disciplines with the same lateral rigor across the disciplines as there is vertical rigor within them
- The Context of Learning -- to make human/environment interdependence, values and ethics a seamless and central part of teaching of all the disciplines, rather than isolated as a special course or module in programs for specialists
- The Process of Education -- to emphasize active, experiential, inquiry-based learning and real-world problem solving on the campus and in the larger community

A. CURRENT CURRICULUM AND OTHER EDUCATIONAL EXPERIENCES

Undergraduate Academic Degrees and Programs:

- Environmental Studies B.A.
- International and Global Studies B.A. with Global Environment Specialization
- Sciences: B.S. in Biology, Biochemistry**,** Biological Physics**,** Chemistry, Physics

Graduate Academic Degrees:

Heller School for Social Policy and Management

- M.A. in Sustainable International Development
- M.B.A. with a Sustainable Development Concentration
- Dual M.B.A./ M.A. in Sustainable International Development
- Dual M.A. in Sustainable International Development and Coexistence and Conflict
- Dual M.A. in Sustainable International Development & JD with Northeastern University School of Law

International Business School

- M.B.A. in Socially Responsible Business with Global Green Track (New in Fall 2008)

Graduate School of Arts and Sciences

- Global Studies M.A. with Global Environment Concentration (New in Fall 2009)
- Coexistence and Conflict M.A.
- Sciences: M.S & Ph.D. Chemistry, Physics, Biochemistry, Biochemistry

Research:

Faculty in the programs mentioned above publish papers and conduct scientific research in topics relating to climate change, sustainability and energy. The Brandeis social science research program is uniquely positioned to address many topics including: international economics, history, coexistence studies, and international development. The biological and physical science research programs at Brandeis are not focused on applied science. However, the science research program is beginning to grow in materials sciences, which could have applications in energy resources and reducing pollution. In September 2008, Brandeis was one of several leading research institutions that was awarded an NSF funded grant to form a Materials Research Science and Engineering Center (MRSEC). It is anticipated that novel low-power devices such as “lab on a chip” instruments and other nanotechnology devices may result from basic research within this highly interdisciplinary facility.

We are building upon our established strengths in condensed matter physics, biophysics and synthetic catalytic chemistry to embark on research programs that could make significant advances in sensors, energy and environmental chemistry. We are currently exploring how our basic research can be applied to fuel cells, harnessing solar energy, and new catalysts for fuel production.

Some research examples include:

Adam B. Jaffe, Dean of Arts and Sciences and Fred C. Hecht Professor in Economics
Jaffe, Adam B., R. G. Newell and R. N. Stavins. "The effects of economic and policy incentives on carbon mitigation technologies." Energy Economics 28. 5-6 (2006): 563-578.

Andrea Bertello, Lecturer Heller School Sustainable International Development
Bertello, Andrea. The Portfolio Hunters: Focus on the Acquisition and Consolidation of Wind Power Assets. New Energy Finance. London: 2007.

Preeta Banerjee, Assistant Professor of Strategy, International Business School
Banerjee, Preeta and Shastri, Vanita, ed. Social Responsibility and Environmental Sustainability in Organizations: How Entrepreneurs Contribute to Economic Development and Social Good. Sage India, 2009.

Brian Donahue, Associate Professor of American Environmental Studies
Donahue, Brian. ""Remaking Boston, Remaking Massachusetts"." Remaking Boston: An Environmental History. Ed. Conrad Wright & Anthony Penna. Pittsburgh, PA: University of Pittsburgh Press, 2009 (forthcoming)

Programs and Extra Curricular Educational Offerings:

Student Sustainability Work

- Students Representatives on BEST committee
- Student Internships for Greenhouse Gas Inventory
- Student Internships for Climate Action Planning
- Student Sustainability Employee at ARAMARK
- Greening the Ivory Tower Course: students complete hands on campus sustainability projects
- Experiential Learning Program: engages students across disciplines in local community work
- Eco-Reps: students hired by Facilities Services in partnership with Residential Life as peer educators in campus housing.

Career Development

- Environmental Internship Program
- Annual Green Career Fair

Leadership and Clubs

- **Student Union:** Undergraduate Student governmental body, a representative sits on BEST committee, the Union passes resolutions, engages in community education, and partners with clubs on environmental issues. Offers the 'DeisBikes, bicycle sharing program.
- **Students for Environmental Action:** (SEA) Undergraduate Environmental Club that worked to adopt the ACUPCC. SEA runs campaign outreach on a wide range of environmental topics, hosts Earth Day events, and speakers.
- **NaturaLiving Club**: Undergraduate Club working on campus farmers market and educational activities.
- **F.R.E.S.H Water:** Undergraduate club works to bring clean water to developing nations
- **Positive Foundations:** Undergraduate club supports the UN Millennium Development Goals
- **The Waltham Group**: Undergraduate volunteer club with long history of community impact. Waltham group works to reduce waste and collect student donations during end of year move out.
- **Bike Club:** Provides resources to biking community.
- **HellerSave:** Group of Heller staff, students, and faculty working to create sustainability at the Heller School.
- **NetImpact:** Business Schools Club that works to engage MBA students in socially responsible careers.

B. SHORTERM EDUCATION RECOMMENDATIONS

➔ **Brandeis Forum on Environmental Crisis Events:** A group of Brandeis faculty and staff have convened this year to create increased academic collaboration on the topic of climate change. The Forum will invite speakers to campus for public lectures and small brown bag lunches. The Forum activities are being coordinated with existing events from the Campus Sustainability Initiative and Global Communications.

➔ **Brandeis Forum on Environmental Crisis Website :** An interactive website presence about climate change and sustainability is being created. The website will highlight campus research and sustainability activities both to increase collaboration on campus and share relevant information with a general audience.

➔ **Ethics Center Fellowship :** In February 2010, Hoseob Yoon, a Korean artist specializing in incorporating environmental themes into his work in education and design, will serve as the Ethic Center's fourth Distinguished Visiting Practitioner. The residency will include class visits, art demonstrations, exhibits, and one-on-one visits with students and members of the community.

➔ **Celebrate Research Offerings:**Research activities relevant to climate change will be highlighted on the Brandeis Forum on Environmental Crisis website, as well as in campus

publications. A research forum will be held by 2012 to honor student and faculty research on climate change.

➔ **Connect Research to Campus:** We will work to connect research initiatives to the challenges faced in the operations components of the climate action plan. The Campus Sustainability Initiative will engage social scientists in communications studies and efforts.

➔ **Integrate Sustainability Education into regular courses:** Faculty can integrate sustainability examples into their existing courses. Using real life examples can increase student engagement and learning. In 2009-2010, the Campus Sustainability Initiative will work with the faculty in various programs and departments to encourage reflection on this topic within their existing courses. As part of the Brandeis Forum on Environmental Change, faculty will be invited to brown bag lunches to learn more about climate change and sustainability issues.

➔ **First Year Reading:** We also suggest that, over the next few years, one of the books chosen for the First Year Summer Reading Project be selected with environmental and climate themes in mind.

➔ **Student Life:** The Department of Community Living and Student Life continue to support Eco-Rep and behavioral change activities. Expansion of this collaboration could include themed housing floors and increased staff training. Much effort has been made and will continue to include students in formal classroom settings and through extra-curricular activities in developing climate change outreach campaigns. The Student Union has appointed a point person from the Student Union E-Board on environmental issues, called the Director of Community Advocacy. Section 4. A. 4 has more discussion of behavioral change activities.

➔ **Community Outreach:** Many of the activities mentioned above would be open to the public and student internships are often with local groups. In addition, the Campus Sustainability Coordinator is serving on the City of Waltham's Energy Committee to share information on mitigation strategies.

C. MID TO LONG TERM EDUCATION RECOMMENDATIONS

➔ **Sustainability Graduation Requirement:** The ACUPCC calls for educating all students about climate change at Brandeis. The short-term goals call for increasing voluntary offerings, while building institutional capacity on climate change issues. Deliberation by faculty about making "climate neutrality and sustainability a part of the curriculum and other educational experiences for all students" should occur by 2015. In terms of undergraduate students, this would occur through the regular academic venues. There are many options for covering the basics of climate change and other environmental issues, including internships, Justice Brandeis Semesters, and International Summer Seminars, all of which could include some practical activity designed to further sustainability on campus, in the surrounding community, or in the world. Faculty may also choose to incorporate examples, texts and theory about climate change into various majors and

courses. For instance, one professor might teach sustainability primarily through literature, while another may focus on social justice issues related to climate change.

➔ **Expand Research Offerings:** Academic research topics relevant to climate change mitigation and adaptation will be expanded above 2009 levels. This goal will be accelerated with additional external grant support.

6 IMPLEMENTATION STRUCTURE

An effective Climate Action Plan will be a working document with continuous review. A review of the progress towards meeting the reduction timeline is required yearly by an Implementation Review Group of senior leadership. The Climate Action Plan touches on all aspects of campus life. While many mitigation strategies will be implemented by Campus Operations, long term sustainability requires feedback and coordination among all entities. The Implementation Review Group will decide on recommendations submitted from B.E.S.T. and Town Hall Forums to stay on track to the proposed targets. Flexibility in the exact tactics taken to achieve the carbon neutrality timeline is needed to respond to community needs and new technology.

A. MONTHLY

- An Environmental Update, called "Green Ideas for Brandeis" will be posted on the Campus Sustainability Initiative website. Community members can voluntarily sign up for a list to receive these electronic newsletters and updates, as well as receive contact information to send feedback and suggestions.
- BEST meetings will be held monthly to advise the Campus Sustainability Initiative programs. The BEST chair (currently is Sustainability Coordinator) works to recruit and maintain a broad representation among the Brandeis community. BEST meeting notes will be publicly posted.

B. SEMESTER

- A season specific message with behavioral change encouragement and any updates of progress will be sent to the entire campus community from the President's Office. This message will be made available through e-mail and print.
- Implementation Review Group receives an update on progress in mitigation strategies from the Sustainability Coordinator. This will help keep members up-to-date in advance of the yearly meeting.

C. YEARLY

- State of the Environment/Greenhouse Gas Inventory Released publicly every fall
- Climate Change Town Hall Forums will be organized to respond to State of the Environment and generate tactical ideas for mitigation. The recommendations in the plan will be posted online.
- Implementation Review Group meets during summer session for review of progress and fiscal year planning.

D. EVERY THREE YEARS

- Formal re-evaluation of reduction goals and plan by Implementation Review Group

E. IMPLEMENTATION REVIEW GROUP

- President: Jehuda Reinharz (or designee)
- Executive Vice President and Chief Operating Officer: Peter French
- Senior Vice President, Students and Enrollment: Jean Eddy
- Senior Vice President of Communications: Vacant
- Provost and Senior Vice President, Academic Affairs: Marty Krauss
- Senior Vice President, Institutional Advancement: Nancy Winship
- An Officer from the Board of Trustees
- Vice Presidents in the EVP/COO Office
- Student Representative from B.E.S.T