Designing a Green Graduation at Colby College

Alaina J. Clark
Colby College

Follow this and additional works at: https://digitalcommons.colby.edu/honorstheses

Part of the Environmental Sciences Commons

Colby College theses are protected by copyright. They may be viewed or downloaded from this site for the purposes of research and scholarship. Reproduction or distribution for commercial purposes is prohibited without written permission of the author.

Recommended Citation
https://digitalcommons.colby.edu/honorstheses/300

This Honors Thesis (Open Access) is brought to you for free and open access by the Student Research at Digital Commons @ Colby. It has been accepted for inclusion in Honors Theses by an authorized administrator of Digital Commons @ Colby.
Designing a Green Graduation at Colby College

Alaina J. Clark
Environmental Studies Program
Colby College
Waterville, Maine

May 17, 2008

A thesis submitted to the faculty of the Environmental Studies Program in partial fulfillment of the graduation requirements for the Degree of Bachelor of Arts with honors in Environmental Studies

F. Russell Cole, Mentor        David H. Firmage, Reader        Thomas H. Tietenberg, Reader
ABSTRACT

Lately, there has been a growing trend of “green” events. The increase in understanding and discussions about the future climate has caused people throughout the world to become concerned about their contribution to climate change. This is true in the Northeast United States as well. Many New England colleges and universities, including Colby College in Waterville, Maine, are becoming leaders in climate change mitigation. As a teaching institution, Colby has recognized that public education is an important part of the solution to the climate crisis. Colby also understands that commencement weekend is an ideal opportunity for climate change education. As a result, the college will follow in the footsteps of other “green” events by hosting its first ever Green Graduation. Colby’s Green Graduation will have seven focus areas, including: 1. transportation; 2. dining services; 3. facilities and energy use; 4. recycling; 5. publicity and publications; 6. RESCUE; and 7. education and awareness. It will be both environmentally beneficial and economically feasible. The Green Graduation will help to raise awareness about climate change, and it will help Colby take a leading role in climate change mitigation. Colby’s 2008 Green Graduation will be a small step towards climate awareness and carbon neutrality.
ACKNOWLEDGEMENTS

I would like to acknowledge the following contributors without whom this project would never have been possible.

My thesis advisor, Russ Cole, Oak Professor of Biological Sciences, you were incredibly involved and invested in every environmental initiative at Colby, and you especially helped me to make the Green Graduation comprehensive and clearly defined. President William Adams and Vice President for Administration and Treasurer, Douglas Terp, for always being supportive and willing to listen to new ideas. Your encouragement of environmental initiatives has really made me proud to be a member of the Colby Community for the past four years. Patricia Murphy, Director of the Physical Plant Department, who helped to coordinate and define the roles of different sections of the campus. This project could never have been created for 2008 without your enthusiasm and resourcefulness. Joeseph Klaus, the Associate Director of Colby Dining Services, who had many imaginative ideas for dining at Green Graduation. You were a true role model and leader for this effort. Jackie Person, Administrative Assistant to the President, and Karen Ledger, Colby Scheduling Manager, who worked together to maintain both the quality and the environmental stewardship of graduation events. Thank you both for taking the time to make a creative and incredible effort for the Green Graduation. Beth Kopp, the Colby Environmental Studies Coordinator, for working with the Green Team of students and taking the time to always be supportive and energetic about all environmental initiatives taken at Colby. You have consistently inspired me and shown me that individuals with positive attitudes can make a difference in the lives of others. Thomas Tietenberg, Mitchell Family Professor of Economics, and David Firmage, Clara C. Piper Professor of Environmental Studies, for reading my thesis, for working on spreading knowledge and awareness of Green Graduation, and who have always been supportive throughout my college career. Manuel Gimond, the GIS and Quantitative Analysis Specialist, for tirelessly working with the maps of offsetting travel-related carbon emissions. The PPD Environmental Program Manager, Dale DeBlois, who took action and helped to coordinate the Green Graduation efforts made at the Physical Plant Department, and Kelly Wharton, Director of Campus Life, who has always supported student initiatives. Thank you also to the other staff members of these departments and the students who worked to make Green Graduation 2008 a successful event.

I learned so much from all of you and I truly appreciate your input, efforts, and advice. Thank you.
## TABLE OF CONTENTS

Abstract ........................................................................................................................................ i
Acknowledgements ....................................................................................................................... iii
Table of Contents ........................................................................................................................... v

**Background** ................................................................................................................................ 1
- Climate Change History ......................................................................................................... 1
  - Greenhouse Effect .................................................................................................................. 1
  - Runaway Greenhouse Effect .................................................................................................. 2
  - Intergovernmental Panel on Climate Change ........................................................................ 4
  - Climate Change Impacts in New England ............................................................................. 6

**Carbon Neutrality** ...................................................................................................................... 12

**Role of New England Colleges and Universities** .................................................................. 15
- American College and University Presidents Climate Commitment ................................... 15
- NEG/ECP Climate Change Action Plan .................................................................................... 17

**Case Studies** ............................................................................................................................. 18
- Middlebury College .................................................................................................................... 18
- Oberlin College ........................................................................................................................... 19
- Tufts University .......................................................................................................................... 19
- Other Initiatives ......................................................................................................................... 20

**Climate Change Initiatives at Colby** .................................................................................... 20
- The Next Step ............................................................................................................................ 22
- Why a Green Graduation? ......................................................................................................... 23
- What is a Green Graduation? ..................................................................................................... 24

**Green Graduation at Colby College** ...................................................................................... 26

**Current Graduation Climate Initiatives at Colby** ................................................................ 27

**Constraints on a Green Graduation** ....................................................................................... 28

**Collaboration** ............................................................................................................................ 28
- Green Graduation Collaborators ............................................................................................. 28

**Data Collection** ......................................................................................................................... 30

**Implementation** ......................................................................................................................... 32
- Education and Awareness .......................................................................................................... 32
  - Commitment ............................................................................................................................. 32
  - The Green Team ....................................................................................................................... 33

**Discussion of Components** ..................................................................................................... 34
- Green Graduation Components ............................................................................................... 34
  - Transportation .......................................................................................................................... 34
  - Dining Services ......................................................................................................................... 37
  - Facilities ..................................................................................................................................... 42
  - Recycling .................................................................................................................................. 44
  - RESCUE ..................................................................................................................................... 45
  - Publicity and Publications ........................................................................................................ 46

**Summary of Costs** .................................................................................................................... 47

**Future Suggestions** .................................................................................................................. 48

**Personal Communications** .................................................................................................... 51

**Literature Cited** ......................................................................................................................... 53
Appendices.................................................................................................................................. 59
  Appendix A. Petition to show support for a Green Graduation............................................ 59
  Appendix B. List of the 274 Seniors Who Signed the Petition........................................... 60
  Appendix C. Distances Guests Travel to Arrive at Colby for Graduation......................... 62
  Appendix D. Calculation of Guests’ Travel-Related Carbon Emissions............................. 63
  Appendix E. The Estimated Increased Costs of Products Used......................................... 65
  Appendix F. Description of LEED Certification................................................................. 66
  Appendix G. President Adams' Announcement of the Green Graduation......................... 67
  Appendix H. The Green Living and Purchasing Guide...................................................... 68
Climate Change History

Historically, the climate has been considered a natural system that humans cannot impact. The idea that human-made pollution could alter the earth’s climate seemed far-fetched in the eyes of the public (Weart 2007). Technology was considered to be benign and beneficial, and nature was always able to find a balance (Weart 2007). Despite G.S. Callendar’s claims in 1938 that the burning of fossil fuels could be contributing to the warming of the earth from the greenhouse effect caused by carbon dioxide, the public and most scientists were still confident in the “balance of nature” (Weart 2007). People scoffed at the idea that they could be changing a system as large and natural as the climate. They continued to believe that nature was “supra human” and that it would remain stable and overcome any anthropogenic influences (Weart 2007). Because people understand the greenhouse effect as a natural system, they were ready to argue that the changing climate is also natural and above human influences.

Greenhouse Effect

The greenhouse effect is an important process for life on earth. In 1827, a French scientist named Jean-Baptiste Joseph Fourier concluded that the atmosphere acted like an enormous garden greenhouse that trapped heat to warm the earth (EPA no date). He called this phenomenon “un effet de verre,” which means “an effect of glass” because the “greenhouse gases” in the atmosphere absorb about seventy percent of the heat from the sun that the surface of the earth reflects back into space (EPA no date). The atmosphere naturally acts like a glass greenhouse to help keep the earth warm and hospitable for life.

Short-wavelength, high-energy solar radiation shines from the sun onto the earth. The atmosphere reflects one-third of this radiation back into space and absorbs one-sixth of the radiation as it passes through (Chiras 2006; IPCC 2007; Le Treut et al. 2007; McKinney et al. 2007). About half of the radiation reaches the surface of the earth (McKinney et al. 2007). As the surface of the earth heats up, it reradiates longer wavelength, lower energy infrared radiation. Instead of going directly out to space, much of this infrared radiation is absorbed and reradiated back to heat the earth (Figure 1; EPA no date, EPA 2007a, McKinney et al.
This occurs because greenhouse gases, such as carbon dioxide, water vapor, methane, nitrous oxides, and chlorofluorocarbons allow the higher energy radiation to pass through the atmosphere but trap or reflect the lower energy, infrared radiation (McKinney et al. 2007). Without these gases, the average surface temperature of the earth would be about 33 degrees Celsius colder than the 14º C that it is today (Miller 1991, Ledley et al. 1999, Miller 2005, Le Treut et al. 2007, McKinney et al. 2007). Without the greenhouse gases preventing radiation from escaping into space, the surface temperature would be below the freezing point of water. This natural energy balance allows for life to exist on earth (Miller 1991, Miller 2005, McKinney et al. 2007). 

**Runaway Greenhouse Effect**

While the greenhouse effect is natural and necessary for life on earth, an increase in the amounts of greenhouse gases can lead to a positive feedback loop where more greenhouse gases, especially carbon dioxide, lead to a more intense greenhouse effect (Le Treut et al. 2007). These gases warm the atmosphere, which increases the concentration of water vapor, which then further intensifies the greenhouse effect (Le Treut et al. 2007). This self-reinforcing cycle may be enough to almost double the greenhouse effects caused by the added carbon dioxide alone (Le Treut et al. 2007). The increasing concentrations of greenhouse gases in our atmosphere are leading to a runaway greenhouse effect where different feedback loops work to continuously warm the earth (Le Treut et al. 2007, McKinney et al. 2007).

In 1850, the average global concentration of carbon dioxide in the atmosphere was 280 ppm (McKinney et al. 2007). This increased by nearly 13 percent to 316 ppm by 1959 and by 37 percent to 383 ppm by 2007 (McKinney et al. 2007, Tans 2008). Scientists believe that a carbon dioxide concentration of 400 to 500 ppm is the threshold of a stable climate.
and, beyond this concentration, the increased greenhouse effect will do irreparable damage to the climate (IPCC 2007, McKinney et al. 2007).

The rapid increase in atmospheric carbon dioxide concentrations has been shown to be due to human activities (IPCC 2007, Le Treut et al. 2007, McKinney et al. 2007, UNEP 2007, New York Times 2008, Scripps CO2 Program 2008). Many people have studied the impacts of the combustion of fossil fuels and deforestation. One of these people was Charles David Keeling, who worked with the Scripps Institution of Oceanography at the University of California in San Diego (Scripps CO2 Program 2008). Keeling was one of the first scientists to measure the rise in atmospheric carbon dioxide concentration. His meticulous work for almost 50 years at the Mauna Loa Observatory in Hawaii has provided us with the carbon dioxide data that yield the Keeling Curve (Scripps CO2 Program 2008). The Keeling Curve shows the rise in atmospheric carbon dioxide concentrations from 1960 to the present day (Figure 2). It also shows the seasonal variation in carbon dioxide due to the seasonal carbon uptake and decay (carbon release) of plants.

Even with these seasonal variations, the Keeling curve clearly shows a long-term rise in carbon dioxide due to the burning of fossil fuels (Le Treut et al. 2007, Scripps CO2 Program 2008). The scientists at the Scripps Institution of Oceanography were able to show that the Keeling Curve correlates with fossil fuel burning (Scripps CO2 Program 2008). They were able to provide the evidence that burning fossil fuels are causing the current trends of rising carbon dioxide (Scripps CO2 Program 2008).

Despite the irrefutable evidence of increasing atmospheric carbon dioxide and of global warming (e.g., the melting of the glaciers), it has been difficult to provide evidence to convince people that anthropogenic emissions will significantly change the climate (Scripps CO2 Program 2008). This challenge is coupled with the assumption that the climate is a natural system that is too well developed to be disrupted. By believing in the power of nature and the difficulty in modeling the climate system, people have been unable to provide irrefutable evidence of climate change (Weart 2007). For this reason, many studies have been conducted looking at the impacts and potential political responses to climate change (IPCC 2007, Miller 2005, McKinney 2007).
Intergovernmental Panel on Climate Change

In 1988 the World Meteorological Association (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change (IPCC) to sort through the multitudes of information published confirming and contradicting climate change (IPCC 2007). Because of the strong polarization around the issue, policy makers needed to have an objective and reliable source of information for their governmental decisions concerning climate change. The IPCC assesses on a “comprehensive, objective, open, and transparent basis” the scientific, technical, and socio-economic writings around the world about climate change and its implications for adaptation and mitigation (IPCC 2007). They used computer models to simulate various aspects of the climate and how they might change. These global climate models help to predict possible climactic changes (Chiras 2006, IPCC 2007).

The main purpose of the IPCC is to provide Assessment Reports in regular intervals. The most recent report is called “Climate Change 2007” and it is the Fourth IPCC
Assessment Report published (IPCC 2007). This report uses language stronger than any of the other reports, stating that climate change is “very likely” due to human activity (IPCC 2007, New York Times 2008). All the IPCC reports have been peer reviewed by people with differing scientific expertise, views, and nations to ensure that the reports remain objective and present “policy neutral” information to decision makers around the world (IPCC 2007). They created models based on the current trends of greenhouse gas emissions, temperature rise, and glacial melt to project scenarios for the stabilization of the climate (Table 1).

Table 1. Characteristics of the stabilization scenarios for greenhouse gas emissions in carbon dioxide equivalents (CDE) and the effects that each scenario will have on the mean global temperature (adapted from IPCC 2007).

<table>
<thead>
<tr>
<th>Stabilization Level (ppm CDE)</th>
<th>Global Mean Temperature Increase at Equilibrium (°C)</th>
<th>Year CO₂ needs to peak</th>
<th>Year CO₂ emissions back at 2000 level</th>
<th>Reduction in 2050 emissions compared to 2000 (ppm CDE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>490-535</td>
<td>2.4-2.8</td>
<td>2000-2020</td>
<td>2000-2040</td>
<td>-60 to –30</td>
</tr>
<tr>
<td>535-590</td>
<td>2.8-3.2</td>
<td>2010-2030</td>
<td>2020-2060</td>
<td>-30 to +05</td>
</tr>
<tr>
<td>590-710</td>
<td>3.2-4.0</td>
<td>2020-2060</td>
<td>2050-2100</td>
<td>+10 to +60</td>
</tr>
<tr>
<td>710-855</td>
<td>4.0-4.9</td>
<td>2050-2080</td>
<td>-</td>
<td>+25 to +85</td>
</tr>
<tr>
<td>855-1130</td>
<td>4.9-6.1</td>
<td>2060-2090</td>
<td>-</td>
<td>+90 to +140</td>
</tr>
</tbody>
</table>

Decision makers were able to use the results of these models to create plans for reaching the stabilization goals. Because of the intrinsic difficulties in modeling the climate, including uncertainty in the raw data, in the data interpretation, and in the models themselves, the IPCC found a broad range of potential changes to the climate (McKinney et al. 2007). Instead of just presenting this range of potential changes, the IPCC scientists presented different scenarios based on the assumptions they used in each model (IPCC 2007). In these different scenarios, the IPCC also calculated the global economic effects of stabilizing greenhouse gas emissions (Table 2). They determined that a level of 450 ppm would be ideal for a stable climate that would not drastically change our world today. To reach this level, the United States would need to make emissions cuts on the order of 80 percent below our 2000 emissions (IPCC 2007).
In the aftermath of the findings from the IPCC report, many different decision makers wanted more data and evidence for the mitigation goals and economic impacts of climate change in their local areas.

*Climate Change Impacts in New England*

Because climate change will not have the same effects everywhere on the globe, more localized studies are necessary. The Northeast Climate Impacts Assessment (NECIA) teams investigated the impacts of climate change in New England and published their findings to help people in the Northeast United States visualize the potential local ecological and economical effects (Frumhoff et al. 2007).

The NECIA Report was compiled by a team of 50 independent experts and the Union of Concerned Scientists, who all understood that climate change will not have the same effects everywhere on the globe (Frumhoff et al. 2007). They used climate science with information about the location, topography, and other influences in New England to determine the impact that climate change could have in these Northeast states. In their research, these scientists used models to predict the possible changes in the New England climate. These models construct various scenarios, similar to the methods used in the IPCC report (Figure 3, Frumhoff et al. 2007).

The analysis took place in two steps. First the impacts of emissions trajectories on the climate were estimated and second the impact of those climate changes on New England was estimated. The NECIA teams attempted to predict how the Northeast climate would change based on two different scenarios: low emissions and high emissions (Frumhoff et al. 2007). The lower emissions scenario correlates with the IPCC scenario called “B1” (Figure 3; Frumhoff et al. 2007). This scenario assumes that we will have a total atmospheric concentration of 580 ppm of carbon dioxide by the year 2100, compared to the present day concentration of 383 ppm (see Runaway Greenhouse Effect). To achieve the results of the

<table>
<thead>
<tr>
<th>Trajectories towards stabilization levels (ppm CDE)</th>
<th>Median GDP Reduction (%)</th>
<th>Range of GDP Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>590-710</td>
<td>0.2</td>
<td>-0.6 – 1.2</td>
</tr>
<tr>
<td>535-590</td>
<td>0.6</td>
<td>0.2 – 2.5</td>
</tr>
<tr>
<td>445-535</td>
<td>N/A</td>
<td>&lt; 3</td>
</tr>
</tbody>
</table>

Table 2. Estimated global macro-economic costs in 2030 for the trajectories towards different stabilization levels (adapted from IPCC 2007).
lower emissions scenario, people would need to quickly and actively work to reduce carbon emissions. The higher emissions scenario correlates with the “A1F1” scenario (Figure 3). This is based on a total concentration of 940 ppm CO₂, which assumes that we will not quickly reduce carbon emissions (Frumhoff et al. 2007).

Figure 3. The IPCC atmospheric carbon dioxide concentrations based on the projected emissions scenarios (IPCC 2007). The NECIA teams used two of these scenarios (A1F1 and B1) to study the climate change impacts in New England (Frumhoff et al. 2007).

The NECIA teams found that, regardless of our current emissions choices, in the next couple decades the Northeastern temperatures will rise 2.5 to 4° F in the winter and 1.5 to 3° F in the summer because of our past greenhouse gas emissions (Frumhoff et al. 2007). The NECIA teams were able to illustrate these temperature changes and their potential impact by showing how far south Northeastern states would have to move to experience those temperatures today (Figure 4). This method of representation gives a better understanding of how the climate change impacts will affect the Northeast way of life.
Figure 4. Illustrations of the distances south that New England states would have to move in order to experience projected temperature changes today (Frumhoff et al. 2007).
By the middle of this century our current emissions choices provide much different future climate scenarios. Under the higher emissions scenario, cities in the Northeast could experience an average of 20 days of temperatures above 100º F, lose an average of 15 snow-covered days per winter month, and short-term droughts could occur once each summer (Frumhoff et al. 2007). The authors also studied how these different scenarios would affect the economy and quality of life in the Northeast United States. They note that the composition of forests will dramatically change. Spruce and fir trees, which are vital to the sawlog and pulp wood industry, will almost disappear completely from the region, changing the composition of the Maine North Woods. Parts of the Northeast will become unsuitable for growing apples, cranberries, and blueberries, and Western Maine would be the only part of the region with snow for a reliable ski season (Figure 5, Frumhoff et al. 2007).

![Figure 5. Extent of New England snowfall under the higher emissions scenario. The red line outlines the historic area with at least a dusting of snow for at least 30 days, and the white areas show these regions are projected to be restricted to the higher latitudes and altitudes by the end of the century (Frumhoff et al. 2007).](image)

The NECIA report shows that climate change has the potential to drastically change the Maine economy. In 2005, Maine earned $393.2 million from the seafood industry, which climate change has the potential to disrupt by bringing warmer temperatures and warm
temperature species northward (Frumhoff et al. 2007). The bottom water temperatures of both the Eastern Gulf and the Western Gulf of Maine could increase 2º to 4º F and potentially affect our fishing industry (Table 3). Many species have specific water temperature thresholds that determine whether they can live and reproduce (Frumhoff et al. 2007). For example, the coast of Maine might be within this temperature threshold for lobsters, allowing the Maine lobster industry to expand as the animals attempt to flee from the inhabitable warmth of Southern New England. The increasing temperatures, however, will also increase the potential for diseases such as Lobster Shell Disease, which could potentially render many lobsters unmarketable (Frumhoff et al. 2007). The lobster industry contributes a majority of the profits of the Maine seafood industry. In 2005, the lobster industry contributed $319.1 million of the $393.2 million from all species combined (Frumhoff et al. 2005). If diseases and warming temperatures start to affect our lobsters, the Maine economy would be highly damaged.

<table>
<thead>
<tr>
<th>Table 3. Projected increases in bottom water temperatures (º F) relative to the historic average from 1970 to 2000 (Frumhoff et al. 2007).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northern Mid-Atlantic Bight</strong></td>
</tr>
<tr>
<td>Spring Low Emissions</td>
</tr>
<tr>
<td>High Emissions</td>
</tr>
<tr>
<td>Fall Low Emissions</td>
</tr>
<tr>
<td>High Emissions</td>
</tr>
</tbody>
</table>

The NECIA report specified many different economical impacts caused by climate change. Even if we all stopped emitting greenhouse gases today, our past emissions have created a momentum for climate change. Our future actions will determine just how severe this change will be. If we continue emitting greenhouse gases at the current rate, society in the Northeast will be drastically changed. By the end of the century, the Northeast could adapt to many of the changes, especially since the warmer temperatures would lead to a longer growing season. We would, however, lose many of the main crops, such as potatoes, blueberries, and apples that have a chilling requirement of a minimum of 1,000 hours of
temperatures below 45°. In 20 percent of the climate scenarios, this chilling requirement would not be met, showing a significant threat to sustained crop production (Frumhoff et al. 2007). Milk production could also decrease due to heat stress on the animals throughout the Northeast regions (Figure 6, Frumhoff et al. 2007). Besides these and other economic impacts, by the end of the century, the adverse health impacts, such as increased heat stress for elderly and young people and an increased incidence of asthma attacks, will also emerge. The NECIA report clearly shows that we need to take action now. They call for an “energy revolution” to reduce emissions levels 80 percent below our 2000 emissions by 2050 (Frumhoff et al. 2007). If we can make this effort, we may be able to achieve the low emissions scenario, where we will find it much easier to adapt to the effects of climate change (Frumhoff et al. 2007).

Because this report shows that climate change can attack our economy and our health from many different angles, adaptation to the changes is not an ideal option. To prevent the more severe economic and environmental effects that the high emission scenario is projected to cause, Maine and New England people and institutions must make an effort to meet the emissions reduction goals specified in the IPCC Assessment report (Frumhoff et al. 2007). New England has the chance to take the lead on climate change mitigation and show the world that we agree with the NECIA team: “the time to act is now” (Frumhoff et al. 2007).
Carbon Neutrality

By trying to meet the emission reduction goals from the IPCC assessments, a growing number of people and institutions are taking steps to become carbon neutral. Carbon neutrality involves a zero net emissions of greenhouse gases (Clean Air-Cool Planet 2008). This concept dates back at least to 1996 when Stonyfield Farm became one of the first companies in the nation to minimize its greenhouse gas emissions by buying carbon offsets (Clean Air-Cool Planet 2006). Stonyfield Farm and many other companies and institutions are making the public more aware about the need for reducing our carbon emissions (Clean Air-Cool Planet 2008).

To neutralize carbon emissions, it is necessary to have a method for comparing different greenhouse gases. The effects of these gases can be measured in comparison to the effects of equal emissions of carbon dioxide. These relationships, called Carbon Dioxide Equivalents (CDE), allow for easier comparisons of the climate change impacts of different types of greenhouse gas emissions because they place the emissions in a common currency. CDEs are calculated by multiplying the weight of the gas emitted by its global warming potential (GWP) relative to carbon dioxide (EIA 2003, IETA 2008). For example, methane has a global warming potential 21 times greater than that of carbon dioxide (Table 4, EIA 2003, EPA 2007b, McKinney et al. 2007). GWPs are based on the heat-absorbing ability and decay rate (amount removed from the atmosphere over a given number of years) of each gas relative to carbon dioxide (EIA 2003). Because of these attributes, CDEs are also based on the amount of time the different gases remain in the atmosphere contributing to the greenhouse effect (Rodhe 1990). The common currency of CDEs can then be used to help people understand and set effective goals for reductions of their greenhouse gas emissions and to directly compare the impacts of all emissions on the climate (EPA 2007b).

<table>
<thead>
<tr>
<th>Gas</th>
<th>GWP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>1</td>
</tr>
<tr>
<td>Methane</td>
<td>21</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>310</td>
</tr>
<tr>
<td>Halocarbons</td>
<td>140 to 11,700</td>
</tr>
<tr>
<td>Sulfur Hexafluoride</td>
<td>23,900</td>
</tr>
</tbody>
</table>
In 2006, “carbon neutral” became Oxford Dictionary’s “Word of the Year” (OUP Blog 2006). The “word of the year” is defined as a word or phrase that is thought to describe an important innovation during a year and that could potentially gain wider use in the future. The editor in chief of the New Oxford American Dictionary Second Edition explained that 2006 represented a year where the growing use of the word “carbon neutral” not only represented a greening of our culture but also of our language. She stated: “When you see first graders trying to make their classrooms carbon neutral, you know the word has become mainstream” (OUP Blog 2006). Children and adults alike are beginning to show, with their language and actions, that climate change in general and carbon neutrality in particular have become mainstream issues.

To achieve carbon neutrality, a company, organization, person, town, or institution must first conduct a carbon inventory to identify and quantify all sources of their greenhouse gas emissions (Clean Air-Cool Planet 2008). They can then reduce the energy they use by implementing many energy efficiency measures, such as purchasing EnergyStar appliances, installing more insulation, and using compact fluorescent light bulbs. As homes and businesses become more energy efficient, they can switch fuels, purchase renewable energy from their electricity provider, and change their behavior. For example, people could purchase a hybrid vehicle and also attempt to take more public transportation. Eventually, however, people, companies, or institutions may find that they cannot completely eliminate all their greenhouse gas emissions. To make this irreducible amount consistent with the concept of carbon neutrality for the present, they could purchase renewable energy credits from a reputable carbon offset trader in an amount equal to the number of carbon dioxide equivalents they are still emitting (Clean Air-Cool Planet 2008).

Carbon offsets can be biomass offsets that involve carbon absorption rather than carbon reduction, such as planting a forest, which takes up carbon from the atmosphere (Clean Air-Cool Planet). Often, carbon offsets fund projects for clean, renewable energy providers, such as wind and solar energies. For example, when you purchase carbon offsets from NativeEnergy, you are funding renewable generators and helping them to encourage utilities to buy their clean power (NativeEnergy 2008). In essence, the offsets fund the portion of the cost of providing this electricity that is not covered by its sale to the grid—a price currently determined by the cost of fossil fuels. This, in turn, causes the utilities to buy less energy
from fossil fuel burning generators and more from clean energy sources (NativeEnergy 2008). By purchasing these offsets, people are funding renewable energy projects that otherwise would never have existed. Instead of ignoring their greenhouse gas emissions, offset purchasers are paying for others to reduce an amount of greenhouse gases equal to that which they are emitting. Carbon offsets are a temporary method of achieving carbon neutrality because they need to be purchased annually. In the long run, the person or institution will either need to keep purchasing them or find a way to fully reduce their own actual emissions.

Renewable Energy Credits are different than carbon offsets. Renewable Energy Credits are used with companies selling energy from both fossil fuels and renewable sources (NativeEnergy 2008). When customers purchase renewable energy from a company, they gain a “credit” that states that their electricity consumption is from wind power, for example. Colby has a contract with Constellation Energy that is in the form of a Renewable Energy Credit because legally, we are able to say that our electricity consumption is fueled by renewable sources (NativeEnergy 2008; Murphy, pers. comm.).

Renewable Energy Credits can also be a form of carbon offset. For example, Colby purchased additional Renewable Energy Credits as a form of the carbon offset requirement for our Silver LEED Certified Building (see Appendix F). To be a carbon offset, the Renewable Energy Credit must be “additional” to other uses. This means that the renewable energy would not have been made available without the funding from Colby. Because Colby already had purchased 100% Green Electricity, the Green Energy-Certified Wind Renewable Energy Credits that Colby purchased for the (Silver LEED Certified) Schair Swenson Watson Alumni Center could be counted as an offset for other emissions (Murphy, pers, comm.). In this sense, a Renewable Energy Credit is a form of a carbon offset, but a carbon offset can take other forms that are not electric, such as carbon sequestration projects in forests or capturing methane emissions at a landfill (NativeEnergy 2008).

Because of the numerous companies offering carbon offsets and renewable energy credits, it is often difficult for people and institutions to be confident that their purchases are actually helping to lower carbon emissions. As a result, in 2006, Clean Air-Cool Planet worked with Trexler Climate and Energy Services, Inc. (TC+ES) to evaluate many of the carbon offset retailers. They investigated the challenges that the offset retailers face,
including transparency, and additionality (Clean Air-Cool Planet 2006). More transparent carbon offset retailers provide their customers with clear information describing exactly how their money is contributing to the offset projects. Additionality refers to whether or not the offset retailer could provide the offset project without money from the customer. Projects are considered additional if the money from the customer directly funds the offset project (Clean Air-Cool Planet 2006). It is important to look at the track record of each company, learn about the offset projects, determine if a third party is involved in the projects, learn how the retailer monitors the projects that are funded, and learn if the provider has sold the same offset to more than one customer (Clean Air-Cool Planet 2006). Customers can do this research on their own, but Clean Air-Cool Planet and TC+ES assessed and found the top offset providers for each type of qualification (Table 5).

They found that different companies were better at different qualifications. For example, Climate Care, Atmosfair, and NativeEnergy were the most transparent about their projects and operations, and the Climate Trust and AgCert/Driving Green paid the most attention to public education about global warming and global warming policies (Table 5, Clean Air-Cool Planet 2006). Overall in their report, Clean Air-Cool Planet and TC+ES explain that carbon offset customers must be smart consumers who ask questions and research the offset projects that they are funding so that they know exactly where their money is going. They provide a guide of the different company practices and the types of questions that customers can ask. This research has helped offset providers advertise their projects and see where they need to improve. It has also helped individuals and institutions learn about the different providers and increased awareness and demand for a carbon offset market (Clean Air-Cool Planet 2006). Colleges and universities have used this information to become more astute in how they use offsets to pursue carbon neutrality.

Role of New England Colleges and Universities

American College and University Presidents Climate Commitment

Climate change has become a large issue for many colleges and universities who have been dedicated to leading the moral code in society. Presidents of many of these institutions
<table>
<thead>
<tr>
<th>Offset Provider</th>
<th>Location</th>
<th>Profile</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgCert/ Driving Green™</td>
<td>Ireland</td>
<td>International Offset Provider—anaerobic digestion projects in South America</td>
<td>Offsets are developed, verified and validated with high regulations</td>
</tr>
<tr>
<td><a href="http://www.agcert.com">www.agcert.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atmosfair</td>
<td>Germany</td>
<td>Sells emissions offsets for air travel in the form of waste-generated electricity, and other renewable projects.</td>
<td>All offset projects meet the Gold Standard of the Kyoto Protocol and website gives project information</td>
</tr>
<tr>
<td><a href="http://www.atmosfair.de">www.atmosfair.de</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CarbonNeutral Company</td>
<td>UK</td>
<td>Small scale renewable energy projects, landfill gas collection, and energy efficiency</td>
<td>A third party evaluates all projects to ensure additionality</td>
</tr>
<tr>
<td><a href="http://www.carbonneutral.com">www.carbonneutral.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate Care</td>
<td>UK</td>
<td>Small scale renewable projects and energy efficiency projects in developing countries</td>
<td>Transparent projects with clear project-specific information for consumers</td>
</tr>
<tr>
<td><a href="http://www.climatecare.org">www.climatecare.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate Trust</td>
<td>USA</td>
<td>Has a portfolio of offsets available to sell in the market</td>
<td>Uses economies of scale, but ensures additionality and gives project information</td>
</tr>
<tr>
<td><a href="http://www.climatetrust.org">www.climatetrust.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Balance</td>
<td>UK</td>
<td>Supports energy efficiency projects in Africa and forestry projects in the UK</td>
<td>Imposes a strict screening processes to ensure additionality</td>
</tr>
<tr>
<td><a href="http://www.co2balance.com">www.co2balance.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NativeEnergy</td>
<td>USA</td>
<td>Renewable energy projects that benefit Native Americans, family farmers, and municipalities</td>
<td>Tests for additionality, and the website provides project-specific information and methods for calculations</td>
</tr>
<tr>
<td><a href="http://www.nativeenergy.com">www.nativeenergy.com</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable Travel/MyClimate™</td>
<td>USA</td>
<td>Creates renewable and energy efficiency projects in developing countries</td>
<td>Website gives project-specific information, benefits, and tests for additionality</td>
</tr>
<tr>
<td><a href="http://www.sustainabletravelinternational.org">www.sustainabletravelinternational.org</a></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
have agreed to commit to taking action to reduce the contribution that their schools make to climate change. By signing this commitment, called the American College and University Presidents Climate Commitment (ACUPCC), the institutions are agreeing to take steps in pursuit of carbon neutrality (ACUPCC 2008). These steps include: developing a comprehensive plan to achieve carbon neutrality, beginning to take tangible steps while the larger plan is being developed (such as purchasing Energy Star appliances or carbon offsets), and publicly presenting periodic reports on the progress of the plan for carbon neutrality (ACUPCC 2008).

So far, 515 college and university presidents have signed the American College and University Presidents Climate Commitment to achieve carbon neutrality at their institutions (ACUPCC 2008). Presidents, such as those from Trinity University, Middlebury College, Bowdoin College, Connecticut College, and the University of Maine, have recognized the need for higher education to lead society toward reducing their contribution to climate change (ACUPCC 2008). On Earth Day 2008, President Adams announced the addition of his signature to the ACUPCC, and that Colby will develop a comprehensive plan by 2009. This effort shows that the college is dedicated to emissions reductions and prepared to take a leading role in climate change mitigation.

This climate commitment does not mandate a specific time frame to reach carbon neutrality, but the institutions must set their own time frame and publicize their efforts so that their peers will be able to monitor their actions. The signers of the American College and University Presidents Climate Commitment recognize that they have a moral and social responsibility to rise to the challenge of carbon neutrality. Schools are training the future citizens, and to continue the fight against climate change, these people will need the skills and knowledge that only the colleges and universities can give them (ACUPCC 2008).

Because institutions of higher education rely highly on reputation to attract students, the schools will work to lead by example and achieve carbon neutrality as quickly as possible (ACUPCC 2008).

NEG/ECP Climate Change Action Plan

Even before the ACUPCC was formed, schools throughout New England, including Colby, have adopted a more specific program to reduce their contribution to climate change.
In 2002, the New England Governors and Eastern Canadian Premiers (NEG/ECP) agreed to a Climate Change Action Plan that called for leadership from colleges and universities (Clean Air-Cool Planet 2008). They set a goal, called Resolution 27-7, to reduce greenhouse gas levels to 1990 levels by 2010, to ten percent below 1990 levels by 2020, and to achieve an overall reduction of 75-80 percent below 1990 levels (NEG/ECP 2001).

Many New England institutions have accepted the NEG/ECP challenge for leadership and have created their own climate action plans to achieve these goals. Middlebury College, for example, has compiled a Carbon Reduction Initiative to help their “working group,” consisting of students, appointed faculty and staff members, and the Director of Environmental Affairs and the Campus Sustainability Coordinator, identify goals and develop a carbon reduction plan to outline each step necessary to meet the NEG/ECP challenge (Hanley et al. 2003). According to this Carbon Reduction Initiative, each year, the “working group” reports to the Environmental and Community Councils on progress made towards their goals (Hanley et al. 2003). Middlebury College, along with other schools, including Oberlin College, Tufts University, and the College of the Atlantic, has become a leader in climate change mitigation.

Case Studies

Middlebury College

Middlebury College has a Carbon Reduction Initiative with a list of potential objectives and strategies to minimize their campus climate impact and meet the NEG/ECP challenge (Hanley et al. 2003). In this initiative, the college broke down the campus into different categories of carbon emissions including heating and cooling, transportation, electricity, and solid waste. In each category, the major sources of emissions were highlighted and potential solutions were presented with their different benefits and costs (Hanley et al. 2003). For example, they suggest holding a competition between two dormitories or academic buildings to see who can use the least amount of energy by attempting to reduce the amount of steam required to heat the building and its water. As a prize, the people who win the competition are treated to Ben and Jerry’s ice cream, and the college succeeds in raising awareness in the community that they can “still live comfortably while reducing carbon dioxide emissions associated with heating the campus” (Hanley et al. 2003). Middlebury’s Carbon Reduction
Initiative is showing their community that climate change mitigation will be an important part of the future.

**Oberlin College**

Oberlin College in Ohio has also developed a plan to lead their campus and others down the moral pathway to carbon neutrality. In 2002, the college teamed up with the Rocky Mountain Institute and published a report called Climate Neutral by 2020 (Heede and Swisher 2002). In this report, Oberlin acknowledges that climate change will have a large impact on the future and that people should work to minimize their contributions. They are trying to take advantage of high quality technology and to look for cost effective means of reducing carbon emissions. Oberlin is trying to show that carbon reductions can be achieved at a reasonable price, “perhaps at a profit” (Heede and Swisher 2002). Oberlin conducted an Emissions Inventory to see where the school produces the largest greenhouse gas emissions. Then they created different plans for reducing these emissions. These plans are based on the amount of money the college is willing to spend. They include a “no brainers” scenario where the college makes the easy changes, or plucks the “low hanging fruit” (Heede and Swisher 2002). For example, it involves replacing their coal-fired boiler with a natural gas-fired system when the current system required major repair. The “no prisoners” scenario, however, has the college using hydrogen fuel technology to co-generate energy with the natural gas system (Heede and Swisher 2002). In each of these scenarios, and in those in between, Oberlin is showing that they have options from which to choose while attempting to become climate neutral by the year 2020.

**Tufts University**

Tufts University has also been a leader in campus climate sustainability. In 1999, Tufts committed to the goals of the Kyoto Protocol and after being one of the first universities to partner with Clean Air-Cool Planet, Tufts published the Tufts Climate Initiative to help meet these goals (TCI 2008). Tufts is also part of the Chicago Climate Exchange, and the university has signed on to the NEG/ECP reduction goals (TCI 2008). In 2005, the Tufts Climate Initiative won the EPA Climate Protection Award because of its strong leadership towards carbon reduction (TCI 2008). Tufts has partnered with many groups and interests to
attempt to make sure that every aspect of the university is invested in the initiative. The president continues to reaffirm Tufts’ commitment to the environment by signing pledges, commitments, and by making new partners, such as the Tufts Division of Operations and the University College of Citizenship and Public Service (TCI 2008). The Tufts Climate Initiative works closely with university operations, staff, faculty, and students in four key areas: carbon reductions, research and monitoring, education, and outreach and events (TCI 2008).

Other Initiatives

Other schools throughout New England have also taken initiative by partnering with Clean Air-Cool Planet. These schools include the University of New Hampshire, the University of Vermont, Harvard University, Bates College, and Bowdoin College who are working with Clean Air-Cool Planet to produce practical solutions to climate change (Clean Air-Cool Planet 2008). Clean Air-Cool Planet is helping campuses, communities, or corporations develop economically efficient and innovative climate policies (Clean Air-Cool Planet 2008). Currently, over 150 campuses, including Colby College, are using the Clean Air-Cool Planet Carbon Calculator to inventory their greenhouse gas emissions (Clean Air-Cool Planet 2008). This shows a growing trend in college and university awareness of the issues caused by climate change.

CLIMATE CHANGE INITIATIVES AT COLBY

Colby College, in Waterville, Maine, is a small liberal arts college with 1,867 total students and 228 faculty members. Its 714-acre campus on Mayflower Hill has been considered one of the most attractive campuses in the nation, and Colby works hard to maintain its natural beauty (Colby College 2008). The core values of Colby include academic integrity, campus sustainability and resource conservation, diversity, non-discrimination, and non-harassment (Colby College 2007b). Many academic programs, research projects, and student groups at Colby College have a global focus to help the students look beyond the small campus and see the bigger picture.

Colby works to carefully consider campus-wide environmental issues. In 2000, the Colby Environmental Advisory Group was formed to advise the President on campus
sustainability and environmental issues (Colby College 2007a). This group of faculty, staff, and students has helped the President create environmental initiatives for the campus. One of these, called the Recycle Everything Save Colby’s Usable Excess (RESCUE) program, was created in 2002 and has been helping to salvage the reusable materials that students leave behind each year. This program removes approximately 10 tons of waste from the waste stream annually, gives students a chance to reuse different items, and provides products to homeless shelters and charities (DeBlois, pers. comm.). With the RESCUE program, Colby is attempting to look to the future and lead its community toward long-term sustainability.

The Environmental Advisory Group also helped the college decide to became a partner with Clean Air-Cool Planet in May of 2003 to help define and implement greenhouse gas emissions reduction strategies (Clean Air-Cool Planet 2008). These strategies included: replacing incandescent light bulbs with low mercury compact fluorescent bulbs, fitting motion sensors to rooms to turn the lights off and on and to let them automatically adjust to changes in daylight, completing a greenhouse gas inventory, signing an energy contract in 2005 for 100 percent renewable energy from the Constellation Energy provider. These initiatives have already helped Colby to reduce our emissions to 27 percent below our 1990 levels (Terp, pers. comm.). Colby has also increased the number of initiatives in dining services for local and sustainable food, food composting and decreased food and water waste (Clean Air-Cool Planet 2008). Over the years, Colby and its environmental groups have worked diligently to make the campus a more environmentally friendly place (Table 6).

The NECIA report gives many reasons that the Northeastern states must work to reduce carbon emissions and minimize our contribution to climate change. Since the US Northeast is a national leader in technology, finance, and innovation, this region is well positioned to lead other areas toward the goal of lower emissions (Frumhoff et al. 2007). Colby College is a Northeast institution that contributes to environmental leadership in this region. In describing the college’s values, Colby states that it “seeks to lead by example and fosters morally responsible, environmental stewardship” (Summary of Colby’s Values 2007). Colby strives to create moral and well-informed citizens who are not afraid to take risks and defend their beliefs. The significance of these values prompted Colby to form the partnership with Clean Air-Cool Planet and continues to encourage the college to be a leader in climate change mitigation.
Table 6. Summary of major environmental efforts and initiatives at Colby College (Environmental Advisory Group 2007; Green Colby 2008).

<table>
<thead>
<tr>
<th>Group or Initiative</th>
<th>Leader</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Advisory Group</td>
<td>Douglas Terp, Administrative Vice President</td>
<td>Advise the President about environmental initiatives</td>
</tr>
<tr>
<td>Environmental Studies Club</td>
<td>Students and Environmental Faculty</td>
<td>Connect Environmental Studies Program with community and increase awareness of environmental issues</td>
</tr>
<tr>
<td>Environmental Coalition</td>
<td>Students</td>
<td>Promote student awareness of environmental issues</td>
</tr>
<tr>
<td>Green Dialogue Housing</td>
<td>Students and an Environmental faculty liaison</td>
<td>Optional housing to lead the campus to sustainable living</td>
</tr>
<tr>
<td>Energy Contract</td>
<td>Constellation Energy and PPD</td>
<td>Electricity mixture: biomass and hydroelectric</td>
</tr>
<tr>
<td>RESCUE</td>
<td>PPD, EAG, Faculty, Staff, and Students</td>
<td>Financially self-sustained recycling program</td>
</tr>
<tr>
<td>LEED Certification</td>
<td>Colby College</td>
<td>New buildings on campus (Schair Swenson Watson Alumni Center and Diamond Building) are certified environmentally friendly (see Appendix F)</td>
</tr>
</tbody>
</table>

The Next Step

The greening of ceremonies and gatherings is becoming a popular phenomenon that is creating public awareness about climate change and other environmental issues. Many bands have helped to spread this new trend by taking on the challenge of holding “green events” (REVERB 2008). The organizers of these events have educated themselves about environmental issues and worked to reduce the impact that these large gatherings and celebrations can cause. REVERB, an organization dedicated to both music and the environment, has helped to green over 50 tours, including those of the Barenaked Ladies and Dave Matthews Band in 2007 (REVERB 2008). These events use biodiesel to power their transportation, have clear recycling stations, use biodegradable products—such as starch-
based plastics—and sell carbon offsets to the fans that want to reduce their emissions from traveling long distances. The tours also provide climate change education and are sponsored by partnering companies who want the idea of carbon neutrality to be spread across the world (REVERB 2008). As the music industry has more green events, a whole generation of music fans will understand the importance of mitigating our personal climate change contribution.

At Colby College, we understand the importance of public education about climate change. Education is the main goal of many of our environmental initiatives, but despite many examples of environmental stewardship at Colby, some activities have the potential for improvement. One area for improvement of our environmental stewardship is the major events on campus, including commencement weekend. Colby holds various events for the seniors and their families that do not have the same focus on sustainability that has been used with other events such as the Green Campus Summit in 2005, which purchased carbon offsets for the travel emissions of the people attending (Green Campus Summit 2005). The purpose of this study is to investigate the environmental impacts of a traditional graduation and assess the environmental and economic effects of creating a Green Graduation. It will also take into account the added benefits of creating environmental awareness. My hypothesis is that an environmentally beneficial Green Graduation is economically feasible. I believe that Colby would gain respect and raise public awareness about the importance of reducing carbon emissions by holding such an event. I also believe that a Green Graduation will educate the Colby community about their personal and institutional environmental practices and areas for improvement.

**Why a Green Graduation?**

Commencement is a major event each year at Colby College. It is both a celebration of the accomplishments of students and a chance for parents and guardians to see the college that their children have attended for four years. Because this event takes year-long planning, a Green Graduation involves the efforts of all the people involved. It is a chance to ensure that everyone who plans the event is on the same wavelength and understands methods for being environmentally conscious. Commencement is also a great opportunity for education. Because it is widely attended and publicized, the environmental efforts made at graduation
will teach a wide variety of people about the possibility of having an event that is both polished and environmentally conscious.

By creating a Green Graduation, Colby will be adhering to its core values of sustainability and resource conservation. We will be showing the wider community that we are consistently thinking about the environment and that it should be in the forefront of their minds as well. A Green Graduation at Colby College will be a positive contribution to the worldwide effort to reduce carbon emissions and make the world more environmentally conscious. It will help everyone involved notice the changes that they can make in their personal lives to lead themselves toward sustainability.

What is a Green Graduation?

Recently, many groups and event planners worldwide, including those of the 2005 Green Campus Summit at Colby College, have attempted to reduce their carbon footprint and become more environmentally friendly (Green Colby 2008, REVERB 2008). There has also been an increase in the amount of information provided by the EPA and other organizations, such as Green Star, to help planners reduce the impact that their events, meetings, and ceremonies can have on the environment (Green Star 2008, EPA 2007c). Other colleges, including Bowdoin and the College of the Atlantic, have used the idea of carbon neutrality to focus on the environmental effects caused by their graduation ceremonies (College of the Atlantic 2007, Payson 2007, ten Broek, pers. comm.). Events similar to Green Graduations not only help the environment, but they help to empower individuals to take initiative and make a difference.

The College of the Atlantic, in Bar Harbor, Maine, was one of the first schools to think of a green or “waste free” graduation. Because this small college of 300 students only offers one major (Human Ecology), its waste-free graduation in 2005 was both popular and feasible (College of the Atlantic 2007). The college minimized the use of plastics, composted everything they could, increased recycling, had more local food, and attempted to eliminate all waste products (ten Broek, pers. comm.). This waste-free graduation helped students at the College of the Atlantic see that with a little hard work, it is possible to rally people behind a solution to climate change. It also helped the college see the difficulties in becoming waste free in the world today. If more schools follow the example set by the
College of the Atlantic, more people will begin to think about the issues. Green and sustainable graduations and other ceremonies are important because they can quickly involve the guests who attend these events and spread the awareness that individuals can make a difference, even if it initially does not feel significant.

Last year, at their 2007 graduation, Bowdoin College also attempted to create a green commencement ceremony. The Bowdoin dining services purchased biodegradable plates, silverware, napkins, and cups, and they sent them along with their food to be composted at their student-run composting sites (Payson 2007). The graduating seniors also had the option of signing a “Green Graduation Pledge” to be environmentally responsible in any future career that they chose (Payson 2007). During the green graduation, Bowdoin was attempting to be as environmentally friendly as possible. Similar to the College of the Atlantic, Bowdoin showed their community their commitment to reducing their contribution to climate change. This green graduation probably also helped Bowdoin to see the many different areas that can contribute greenhouse gas emissions. After planning this event, they have a better understanding of the areas in which they need to improve to reduce their carbon emissions (Payson 2007).

Oberlin College also had a Green Graduation in 2007 that was similar to the Green Commencement at Bowdoin. They purchased twenty-five percent of their food from local farmers, used bio-ware flatware that breaks down faster in a landfill, and created a Green Education Booth where guests had the chance to purchase the Renewable Energy Credits to offset their travel emissions (Oberlin College 2007). The booth also provided guests with information about what they could do to contribute to the initiatives of the weekend, such as signing a pledge to be “green” and consider the environmental impacts of their everyday actions (Oberlin College 2007). The students during the graduation ceremony even wore green ribbons to show that they had committed to take “environmental and social considerations into their careers and lifestyles” (Oberlin College 2007). Oberlin tried to use their greening of commencement weekend as method to start the initiatives that were previously described (see Case Studies: Oberlin College). They were able to gain momentum and bring their waste reduction and climate neutral initiatives to the rest of campus (Oberlin College 2007).
Duke University, a much larger institution, has also made attempts at a greener graduation ceremony. In 2006, they focused on the graduation of Masters students from the Nicholas School of the Environment and Earth Sciences. This ceremony, which contained about 100 graduates, used the Duke Environmental Leadership “Greening your event” guide to make this small ceremony more environmentally friendly (Duke University 2006). The graduation greening consisted of five key components: 1. the purchase of local and sustainable food; 2. the use of biodegradable, non-petroleum dishes; 3. food waste composting; 4. the purchase of green power; and 5. public awareness and education (Duke University 2006). By focusing on these key issues, Duke was able to discover that this smaller graduation was easily transformed into a green event with relatively low costs and “huge environmental benefits” (Duke University 2006).

These Green Graduation events are consistent with the increasing trend of environmental and global awareness among public institutions. They show that these colleges and universities are taking the threat of climate change seriously, and that they are willing to take the lead both in reducing their own climate impact and in educating the public. These green events spread awareness of solutions to climate change, and give the citizens a sense of hope and optimism for the future. As more institutions take the lead, students and citizens become more motivated to step into the flow of positive action.

**Green Graduation at Colby College**

The goals and expected outcomes of a Green Graduation at Colby involve the ideas of Dining Services, the Physical Plant Department, the President’s Office, the Scheduling Office, student environmental groups, the Dean of Students Office, and other contributors. These contributors for a Green Graduation at Colby were also influenced by the other graduation initiatives that were described above. The main goal is to make the event as carbon neutral as possible, and the individual goals are based within seven focus areas: 1. transportation; 2. dining services; 3. facilities and energy use; 4. recycling; 5. publicity and publications; 6. RESCUE; and 7. education and awareness. The 2008 Green Graduation will potentially become a new step for Colby in the evolving moral challenge of leading others toward sustainability (Summary of Colby’s Values 2007). A Green Graduation will help
Colby to demonstrate the core value of sustainability and resource conservation and it will help the school to show the community the importance of this value. We also hope that guests will leave suggestions for the next steps that Colby can take towards environmental sustainability and carbon neutrality.

**Current Graduation Climate Initiatives at Colby**

Many parts of graduation weekend at Colby College are already environmentally friendly. Colby currently has a contract for 100 percent green electricity from Constellation Energy (Green Colby 2006). Of the total energy used at Colby, 91 percent of it is hydroelectric energy, biomass (wood) energy, or wind-powered energy, while the other nine percent is co-generated at the steam plant on campus (Murphy, pers. comm.). Because this energy is already provided by climate friendly methods, electricity use at Colby does not contribute to climate change.

During graduation, Colby also has a tradition of a “Sustainable Trustee Dinner” (Klaus, pers. comm.). This dinner, catered by dining services, presents the faculty and trustees with local and sustainable food items. They are also presented with menus as educational souvenirs containing the information about the food that they consumed during this environmentally friendly dinner. The meal is served on china with cloth napkins and all of the pre- and post-consumer food waste is composted (Klaus, pers. comm.).

Dining Services at Colby also already composes all of the unwanted food produced in the dining halls on campus (Green Colby 2006). During graduation weekend, these dining halls are often used for meals, and this composting effort is considered a current green initiative that Colby has conducted. Colby also already provides recycling for redeemable bottles and cans on campus. We have designated recycling buckets for these products to be returned and recycled (Murphy, pers. comm.). Along similar lines, Colby has designated areas for students going home to leave their unwanted products for the RESCUE program (see Climate Change at Colby; Murphy, pers. comm.). The collection areas for RESCUE are located throughout the dorms to make Colby students aware that they do not need to throw unwanted items in the trash. In many ways, Colby is already teaching its students the importance of environmental conscientiousness.
Constraints on a Green Graduation

Despite the existing environmental initiatives during commencement weekend at Colby, some areas can be improved. These improvements, however, are constrained by the resources available at the present time. For example, Hawk Ridge composting in Unity, Maine, the composting facility to which Colby sends its food waste, cannot currently accept food materials that are too high in starch (Klaus, pers. comm.). This facility, which won the 2004 United States Composting Council Composter of the Year Award, produces high-grade compost under the brand name earthlife™ for local golf courses, landscapers, sports fields, and nurseries (New England Organics 2008). It does not currently have a grinder to reduce the time for corncobs and other items, such as starch-based silverware, to decompose (Klaus, pers. comm.). As a result, Colby cannot compost these types of items. Also, because Colby is located in Maine and because graduation takes place in the early spring, the supply of local food products available for the college to purchase is limited (Klaus, pers. comm.). Currently, Colby buys almost all of the available local produce available, and the types of food that we serve are limited by the supply that local vendors provide (Klaus, pers. comm.).

Finally, new greening initiatives at Colby could be limited by the costs of implementing them, the time it takes to change our traditional practices, developing employee understanding, and the possibility that we do not notice all wasteful practices. Environmental initiatives take time and experience to implement. As Colby continues to look to be a leader in sustainability, the constraints on a Green Graduation will become easier to overcome.

COLLABORATION

Green Graduation Collaborators

Many people are involved in planning graduation weekend at Colby and the logistics are staggering. Sub-committees are created to plan each event, and these committees must coordinate their work with Dining Services and the Physical Plant Department (PPD) to implement their plans. As graduation planning begins, different units of the college, including the Physical Plant Department, Dining Services, the Scheduling Office, the President’s Office, the Campus Life Office, and the Communications Office, have different
roles in the planning and implementation of the graduation weekend events. Dining Services caters all of the commencement events, PPD sets up for every event and helps with trash collection and recycling, and the Scheduling Office plans out each event by creating the commencement website, publicizing each event, collecting reservations for guests attending, and deciding how to decorate the events. The President’s Office is also involved in decorating and organizing the events to maintain the high standard of Colby College. The Campus Life Office organizes all the student events during senior week and the Communications Office handles all the contact that the college has with the community.

Because of the wide variety of people involved, it is necessary to include the input of everyone in the plans for a Green Graduation. This event began as a proposal for an honors thesis. The research for the thesis involved meeting with the key collaborators and planners for commencement at Colby. As more research and interest was gained, the collaborators began to believe that many Green Graduation initiatives could occur for the 2008 Commencement. The Green Graduation proposal was submitted to the Environmental Advisory to discuss the feasibility of the different components and initiatives. A student petition was also circulated among the seniors to generate interest in making the 2008 commencement more environmentally sustainable. After the EAG approved the initiative, the key individuals of the Green Graduation committee began to collaborate and communicate about the costs and benefits of the different components of the Green Graduation. These key individuals include: Patricia Murphy from PPD, Joseph Klaus from Dining Services, Karen Ledger from the Scheduling Office, Jackie Person from the President’s Office, Kelly Wharton from Campus Life, students and professors from the Environmental Studies Program, including Professors F. Russell Cole, David Firmage, and Thomas Tietenberg, and many others. Because many of these individuals are also members of Environmental Advisory Group, lead by college Vice President for Administration and Treasurer, Douglas Terp, they were able to understand the goals and restrictions of a Green Graduation. This event is a collaborative effort that could never succeed without the help and ideas from everyone involved. President William D. Adams has also been a key supporter and advocate for the 2008 Green Graduation. The Green Graduation at Colby shows that to solve environmental issues, we need communication and collaboration among
people of differing interests and skills. Similar to graduation, these issues often cross over many disciplines and require a true community effort.

**Data Collection**

The data on the current practices at a traditional graduation were gathered by interviews with the key planners (Table 7). Jackie Person, from the President’s Office, Kelly Wharton, from Campus Life, and Karen Ledger, from Scheduling, were able to provide a broad sense of the current practices at commencement. By collaborating and asking questions of all the people involved in graduation planning, it was possible to spread interest and curiosity about a Green Graduation. As each person began thinking about the current event planning, he or she identified ways that graduation could become more environmentally friendly. These ideas became the focal points for research until we gathered a broad sense of the different and feasible greening components for graduation.

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patricia Murphy</td>
<td>Physical Plant Department</td>
<td>Campus facility and energy use</td>
</tr>
<tr>
<td>Joeseph Klaus</td>
<td>Dining Services</td>
<td>Catering and composting at food events</td>
</tr>
<tr>
<td>Jackie Person</td>
<td>President’s Office</td>
<td>Trustee and faculty events</td>
</tr>
<tr>
<td>Karen Ledger</td>
<td>Scheduling Office</td>
<td>Student-attended events</td>
</tr>
<tr>
<td>Kelly Wharton</td>
<td>Campus Life Office</td>
<td>Senior Week student events</td>
</tr>
</tbody>
</table>

Research from other college initiatives also influenced the greening components for the Colby Green Graduation. For example, research about the recent graduations at the College of the Atlantic, Oberlin College, and Bowdoin College provided insight and helped to shape the components of greening at Colby College (see What is a Green Graduation). Information about different events and programs designed to be carbon neutral also helped to inspire Colby’s Green Graduation (REVERB 2008).
To compare the impacts of a Green Graduation with those of a traditional graduation, it was necessary to look at the different situations both qualitatively and quantitatively. Qualitatively, it is easy to see that using recycled paper, natural latex balloons, or biodegradable silverware is better for our environment. Quantitatively, however, it is more difficult assess how much better. The energy that went into producing these products must be converted into their carbon dioxide equivalents to truly compare the environmental savings of making each component of graduation more sustainable and environmentally friendly.

Finally, a travel emissions model was created to estimate the carbon emissions generated by parents and guardians traveling to Colby for graduation. The zip codes of these guests were entered into a Geographic Information System (GIS) of Northeast road networks and national airport locations to estimate the guests’ total miles driven and flown to arrive at Colby. Manny Gimond, the GIS and Quantitative Analysis Specialist at Colby, created a model in ArcGIS that calculated these mileages. We assumed that people within New England would drive to Colby, and that those outside of New England, including international guests, would fly to Boston and drive to Colby. Because driving can often create more carbon emissions than flying on a fully-booked flight, if guests flew to Portland, then this emissions number would be an overestimate (EIA 2003). In this way, the estimated carbon emissions from travel are conservative and probably an overestimate of the actual emissions generated.

The emissions estimates were based on mileage estimates used in the NativeEnergy emissions calculator (NativeEnergy 2008). The Clean Air-Cool Planet review considered NativeEnergy to be a valid offset provider in their Consumer’s Guide to Carbon Offset Providers (Clean Air—Cool Planet 2006). Because the NativeEnergy carbon calculator has valid justifications for its calculation methods, this calculator was used to determine estimates of the amount of money required to offset emissions generated by guests traveling to Colby. These financial costs of offsetting travel emissions were then compared with the environmental and educational benefits. It was also possible to compare the impacts of a traditional graduation to those of a Green Graduation.
Implementation

To raise awareness and interest in Colby’s Green Graduation, I created a student petition, with the support of the Colby Environmental Coalition, Environmental Studies Club, the Green House Dorm, and the Biology Club, and encouraged seniors to sign. The petition read:

“Can you believe it? It’s our final year at Colby and we’re ready for our graduation and entrance into the world. As you’ve probably read, climate change and environmental degradation are impacting that world. Projections from the Northeast Climate Impacts Assessment Team say that by the end of the century, increasing temperatures could reduce the amount of snow pack in New England while increasing the amount of winter rainfall. We are already beginning to see these effects: January of 2007 was the hottest yet recorded and the local winter businesses suffered. We need to focus on sustainability and emissions reductions now if we want to protect the environment and prevent more economic hardships. One step that Colby can take is to create a Green Graduation. Let’s make a statement and demonstrate how to minimize our contribution to climate change. A green graduation would involve carbon offsets for emissions generated by traveling to Colby, local and sustainable food, organized recycling and composting for the events, and increased awareness about waste generation. By signing this petition, members of the Class of 2008 join the student organizations listed below in respectfully requesting that the administration work with us and other groups to create a Green Graduation.” (see Appendix A)

This petition provided the Class of 2008 with information and awareness about the Colby Green Graduation project. It was distributed at many senior events to give seniors a chance for input and to ask questions and facilitate a discussion about Colby’s current environmental initiatives. A total of 274 seniors, which is more than half of the senior class, signed the petition, which was then presented to the President and to senior staff members to show the student support and interest in a Green Graduation (see Appendix B). This petition helped to generate awareness of Green Graduation among the graduating seniors.

Education and Awareness

Commitment

One goal, in addition to the goal of reducing our climate impact, of the Green Graduation is guest, staff, and student education about the efforts that we all can take to
minimize our contribution to climate change. Colby is attempting to raise awareness and understanding of the issues that face us all. We believe that a Green Graduation will help individuals see the areas where they, too, can become a contributor in environmental protection.

*The Green Team*

The Green Graduation at Colby will include two educational booths that are run by a group of underclassmen, called the Green Team. These booths will include information about the Green Graduation and about Green Colby in general. They will provide guests with the Green Living Brochure and explain how to purchase carbon offsets (see Appendix H). We will provide education about carbon offsets and the approximate cost, but we will not collect money at the booth. The educational booth will also give students and guests the option to “Show their Green” and make a talisman out of the green twine we provide. The twine can take many shapes; by wearing it, guests are simply showing that they support the initiative that Colby is taking to protect the environment. Also, these educational booths will be placed in two areas with high guest popularity: between the parking lot and Roberts Lawn and near the Pulver Pavilion Information Desk. The information booths will include eye-catching posters such as a comparison of the products traditionally used at graduation to the products at Green Graduation, a map of carbon emissions and offset costs to travel to Colby, and other visuals highlighting the Green Graduation. Members of the Green Team will be present to answer any questions and to help guests understand how to offset their travel emissions.

The Green Team will also be present throughout graduation to answer any questions the guests might have about the Green Graduation. They will wear eye-catching t-shirts and be present near the waste stations at dining events to help guests understand the recycling and composting strategies for each receptacle. By having students visibly endorsing the event, the guests will clearly see the support for the environmental initiatives taking place at the 2008 commencement.

The Green Team, two educational booths, and the many signs displayed at the different events at Colby’s Green Graduation will help the college to spread its message of sustainability and concern for the climate to a broader public. The different greening
initiatives will be obvious and clear at graduation, allowing guests to understand the
differences and perhaps decide to make some of the changes in their own lives. Colby has a
moral responsibility to lead by example and teach its students the importance of
sustainability and environmental awareness (A Summary of Colby’s Values 2007). These
educational and informational displays will help Colby to achieve this goal.

**DISCUSSION OF COMPONENTS**

**Green Graduation Components**

Colby’s Green Graduation consists of seven different components. These include:
transportation, dining services, facilities, recycling, RESCUE, publicity and publications, and
education and awareness. Each of these components includes a number of greening actions,
which will be discussed below.

*Transportation*

Although Colby College buys 100 percent renewable electricity, the college is still a
source of carbon emissions. Guests travel both internationally and from all over the United
States to attend graduation. They arrive in airplanes, cars, and buses that contribute carbon
emissions to the atmosphere. At a traditional graduation, these carbon emissions would be
environmental externalities that are not included in the costs of the ceremony. At Colby’s
Green Graduation, we are attempting to internalize these environmental costs.

At a traditional graduation, the guests, Trustees, faculty, and staff traveling to Colby
would produce emissions that go unnoticed by the Colby community. Using zip code data,
Manny Gimond, the college GIS and Quantitative Analysis Specialist, created a model using
ArcGIS to estimate the kilometers people travel by car and by plane (see Appendix C). I
then placed this information into the NativeEnergy carbon offset calculator to determine the
costs of offsetting these traditionally unnoticed emissions (see Appendix D).

To calculate the offsets of guest travel, many assumptions were made. This model
assumes that guests would arrive from the zip code listed under each student’s parents’
names, and it does not consider guests from other locations other than those provided: a
distant grandmother, for example. It also operates under the assumption that guests from
New England would drive all the way to Colby, and those from outside of New England would fly into Boston and then drive from there to Colby. Obviously, many people from outside of New England drive to Colby as well, but these people are assumed to have flown, allowing for an overestimate of carbon emissions. The estimated total costs of offsetting the travel emissions for people traveling to and from Colby for graduation would be $5,604. By investing this amount into renewable energy initiatives or other carbon offset programs of the college’s choosing, the model predicts that Colby would be neutralizing the addition of 464 total tons of carbon dioxide entering the atmosphere. As mentioned earlier, the assumptions of the emissions model make the emissions estimates by people traveling to Colby an overestimate, allowing Colby to be on the conservative side and offset more emissions than are actually produced.

The benefits to offsetting the emissions generated from guests and staff traveling to Colby include increased awareness about climate change and carbon offsets and the ecological benefit of preventing more carbon dioxide emissions from being released. A GIS map of the costs of offsetting the emissions generated from traveling from different parts of the country will be presented at the education booths (Figure 7; see Education and Awareness). These educational booths will also provide information about the reliable offset providers from which guests can purchase offsets.

Colby also understands the need to lead guests by example, and as a result, the college has purchased 1,300,000-kilowatt hours of additional Green Energy-Certified Wind Renewable Energy Credits directly in support of the Green Graduation (Murphy, pers. comm.). These offsets cost over $6,000 and directly offset more than the estimated travel-generated emissions of the guests (Murphy, pers. comm.). The offset component to Colby’s Green Graduation can help to lead the Colby community toward a greater understanding of climate change and the actions they can take to minimize future carbon emissions. By purchasing Renewable Energy Credits for the Green Graduation, Colby is helping to spread the word that carbon emission reductions and offsets are a large step towards a better future climate.
Figure 7. A GIS map of the estimated costs to offset carbon emissions from travel to Colby within the United States. (created by Manuel Gimond, data from Native Energy 2008).
Dining Services

Colby, along with the Sodexo food contract service, has been working to make dining services more environmentally friendly. Currently, 20 percent food purchases for Colby are from local Maine vendors and two percent (27 different items) are organic (Upton 2007). These amounts nearly exhaust the available supply of local and organic foods in the Waterville area because the local farms cannot support the volume that is needed to feed the Colby student population (Upton 2007). Colby is working with local farms to attempt to increase the supply of local food available year round (Klaus, pers. comm.). Colby Dining Services is ready to work with other members of the college to make the Green Graduation a reality.

Local and Organic Food Commitment

Dining Services is committed to looking at the menu options during graduation. Since graduation occurs in May, when the supplies of local and organic foods from the previous growing season are almost depleted, it is difficult to increase the numbers of local and organic food items for the Green Graduation (Klaus, pers. comm.). Colby is currently working with the Maine Organic Farmers and Gardeners Association (MOFGA) and the Farm Fresh Connection to see if more purchases can be made in the future. By creating demand for local and organic products, Colby is helping the Farm Fresh Connection and MOFGA create a market for more local suppliers (Klaus, pers. comm.).

Greening Impact

During the Green Graduation, Colby will have increased numbers of signs describing the local and organic food that is served, the local food vendors, and more advertisements about the completely Local and Sustainable Trustee Dinner, an initiative that began in 2005 (Klaus, pers. comm.). Also, we will provide Organic and Fair Trade coffee at a cost of $0.58 per pot for a total cost of $427 (see Appendix D, Klaus, pers. comm.). The Green Team will help to spread information and awareness of the importance of buying local, sustainable, and organic options. The goal of this heightened awareness and information provided at the Green Graduation is to potentially impact the guests enough to have them change their personal food preferences.
Local and organic food options not only support local vendors and are often healthier and fresher products, but they also have a smaller impact on climate change because they are grown within the state of Maine and do not need to be shipped from a great distance. Because Colby has held the Sustainable Trustee Dinner since 2005, we understand that we are limited in the availability of local food (Klaus, pers. comm.). The Green Graduation will not have a higher percentage of local and sustainable food provided. Instead, the benefits of the changes made during the Green Graduation are measured qualitatively as higher community awareness of the availability of local and organic food options. Also, Colby will be promoting the local vendors and potentially providing them with more customers (guests from Maine), and guests from out of state could begin searching for groups similar to the Farm Fresh Connection and MOFGA. Colby’s education of its guests could potentially lead to a higher demand for local and organic products that would help to reduce the expense of these products and potentially lead to increased numbers of customers who find the products attractive at the lower prices. By educating graduation attendees about local, sustainable, and organic foods, Colby will fulfill its role as a leader on the path toward sustainability and carbon neutrality.

**Mugs, Plates, and Flatware Commitment**

During the Green Graduation, Colby College is committed to minimizing our use of plastics. We have eliminated as much plastic as possible, including the packets of plastic flatware (wrapped in plastic) that are used at the picnics, lobster bake, and all the meals that are not catered. Colby Dining Services has committed to use biodegradable flatware, paper hot cups lined with biodegradable plastic, and a biodegradable cup for cold products (Klaus, pers. comm.). Colby is also committed to using the 100 percent recycled and compostable Chinet® molded-fiber plates that we have already been using for many of the catering events on campus (Klaus, pers comm.). These plates are durable and are made from pulp generated from milk cartons, scraps from food container manufacturers and other paper products (Reliable Paper, Inc. 2007). By using these products, Colby commits to educating commencement guests about the alternatives to plastic products.

**Greening Impact**

Traditionally, plastic forks, knives, and spoons are coupled with translucent, plastic cups for the water and plastic coated cups for the coffee and other hot drinks. All of these
petroleum products are then usually thrown into the waste system, further clogging up Maine’s landfills with materials that will not rapidly break down, especially in a landfill (Klaus, pers. comm.). During the weekend events at graduation, Colby provides guests with a total of 10,000 translucent plastic cups and over 13,000 plastic knives, forks, and spoons (Klaus, pers. comm.). By moving away from these products and switching to the biodegradable or stainless alternative, Colby will reduce the amount of plastic that we send into the waste stream.

The biodegradable flatware, called Spudware®, consists of 80 percent starch (potato or corn) and 20 percent soy or vegetable oil (EPS 2008). It can withstand high heat, and it is currently more expensive than the plastic flatware, at $0.02 extra per piece, for a total of $220 more than traditional flatware. The biodegradable, cold cup is made of a Natureworks® biopolymer, called Polylactic Acid, that looks just like plastic and breaks down easily with high moisture and heat (NatureWorks 2005). This plastic is also more expensive, at $0.05 extra per cup, for a total of $500 extra during graduation weekend. These products do have the advantage of being readily decomposable. The Hawk Ridge composing facility in Unity, Maine, however, cannot accept this flatware because it needs to be ground into fine particles before being composted. This facility does not currently own a grinder, and as a result, the flatware and cups would lower the quality of the compost that the facility produces. Until Hawk Ridge is able to accept these products, they will be sent to the landfill, but even in a landfill, the biodegradable products decompose faster and are less environmentally destructive than plastic products made from petrochemicals.

Despite the obvious financial drawbacks to purchasing biodegradable flatware and cups, at the Green Graduation, Colby will be able to inform the guests about alternatives to plastic products that are much less wasteful. These biodegradable products are made from starch products, such as potatoes, wheat, and corn that are often grown in the Midwestern United States, not petroleum that comes from oil in the Middle East (Cereplast 2006). Perhaps this educational effort will cause guests to purchase the biodegradable products instead of traditional plastics, helping us to “nibble at the edges” of the abundance of products made with petroleum-based plastics (Cereplast 2006). The use of biodegradable products at Colby could also lead the Hawk Ridge Facility to see the need to purchase an on-site grinder to accept these new compost items. This would also increase the types of food
waste that could be sent to the facility, including corncobs and orange rinds, which also need to be ground before they can be composted. By purchasing biodegradable products, Colby is using its power as a consumer to show that a move away from petroleum-based plastics will be necessary for future sustainability.

**Composting Commitment**

Composting of both pre-consumer and post-consumer food waste is collected at Colby in the dining halls each day. During the Green Graduation Colby commits to expand composting to the major picnic and meal activities. Members of the Green Team will also be available to assist visitors at the meals without wait service.

**Greening Impact**

Currently Colby only sends the pre- and post-consumer food waste generated in the dining halls to the Hawk Ridge Composting Facility. In doing so, Colby saves over $20,000 annually in water, sewer, and electrical costs by composting instead of running garbage disposals and removes about 80 tons of waste from the waste stream. In other words, the costs of sending the compost to Hawk Ridge are more than $20,000 less than the sewage fees, water use, and electrical costs of running garbage disposals (Upton 2007). The annual 80 tons of waste that Colby comports translate into an average of 1.5 tons of waste saved during the week of graduation events. At past graduation picnics and events that were not catered, Colby did not collect compost and all the waste was sent to a landfill (Klaus, pers. comm.). This has generally been true because of the difficulty associated with collecting food waste and ensuring that it does not become contaminated with non-biodegradable products, such as plastics, that would reduce the quality of the compost produced by Hawk Ridge.

At Colby’s Green Graduation, however, the senior picnic and graduate luncheon will have compost collection sites. These sites will have informational signs and will be overseen by the Green Team who will make sure that guests understand which products are compostable. This extra effort at composting will remove even more food waste from the waste stream and help guests see that Colby is truly dedicated to reducing its total waste. At the lobster bake, however, the Green Team will be more involved in helping guests compost because of the high abundance of food that cannot be composted, including corncobs, lobster
shells, and clamshells. These products would contaminate the compost, making it unsuitable for the Hawk Ridge Composting Facility.

Despite the costs of the unattractive compost stations and increased labor for Dining Services (about $120 for extra labor), these composting stations will educate guests about the feasibility of composting. If they see Colby making an effort to reduce the amount of waste generated, perhaps they, too, will try to become more conscious of the waste they produce. Colby could be leading the community towards taking the costs of waste generation into consideration. Also, if the composting stations at the commencement picnic and graduate luncheon are successful, Colby could potentially continue to incorporate this effort into other picnics and events held throughout the school year, advancing the campus down the path towards sustainability.

Other Initiatives

Dining Services has a large role in the success of commencement weekend. Guests expect high quality food and service, and as a result, Colby has always purchased and used the products that meet these expectations. For example, during the lobster bake, traditionally, Colby has used a “dinner napkin” that is bleached white because it is perceived to be of higher quality than the natural napkins used in the dining halls (Klaus, pers. comm.). At the lobster bake, Colby’s Dining Services also has attempted to decrease the length of the lines for food. This attempt at quick service has caused Colby to purchase the prepackaged packets of plastic silverware that include the knife, fork, spoon, napkin, lobster fork, plastic bib, and wet nap. These packets lead to increased waste, and often the napkin included is not made of recycled materials.

During the Green Graduation, Colby Dining Services will be working to produce the same quality food and service while incorporating environmental initiatives. At the lobster bake, the natural napkins will replace the “dinner napkin” and the prepackaged plastic flatware will be eliminated. Instead, the biodegradable alternatives to these products will be wrapped together in a natural napkin. The spoons, which are unnecessary at the lobster bake, will be eliminated, the plastic bibs will be replaced with a paper alternative, and the wet naps will be replaced with spray bottles of lemon juice and water. The total costs of these changes reach about $300, with the added risk of potential poor public perception. To reduce this risk, many signs, promotions, and the Green Team will need to be present at the event.
As people gain more information, they may be better able to respect the changes that Colby is making toward sustainability.

**Dining Services Summary**

The environmental initiatives in the dining services department have many individual costs. In total, these costs sum to approximately $2,150 more than traditional dining practices (see Appendix E). Because we were able to see the potential extra costs of these Dining Services initiatives long before graduation, the college had ample time to prepare for them. By planning the Green Graduation initiatives months in advance, it was possible to reallocate parts of the Dining Services budget and receive approval for any extra spending necessary. Some areas, such as eliminating plastic spoons from the lobster bake, help to save money and others are more expensive. Because Dining Services could visualize these potential monetary savings and expenditures, it was possible to understand the budget impacts of a Green Graduation. This shows that budget re-allocation and long-term planning can help to make environmental initiatives feasible on a large scale.

**Facilities**

**Energy Use Commitment**

Colby College purchases 91 percent of the energy that it uses (Murphy, pers. comm.). Since 2003, this purchased energy has been obtained from a 100 percent green electricity contract with Constellation Energy (Green Colby 2006). This green electricity is composed of 46.5 percent biomass (wood), 46.5 percent hydroelectric, and 7 percent wind energy (Murphy, pers. comm.). The rest of the energy that Colby uses (9 percent) is co-generated on campus at Colby’s steam plant (Green Colby 2006). By purchasing green electricity and co-generating energy on campus, Colby is committed to being more environmentally friendly and climate neutral.

**Greening Impact**

At the Green Graduation, Colby will place signs at the events and information at the three educational booths located in popular locations on campus that will spread a greater awareness of the green energy contract. In particular it is important to let visitors know that residences can purchase green electricity too; it is not just for large enterprises. This will help the guests and the Colby community to gain a greater respect for the efforts and
initiatives the college has made. These information booths will also help guests learn about the availability of green energy from energy providers similar to Constellation Energy. Colby will be demonstrating how people and institutions can use their power as a consumer to create a higher demand for clean energy. Also, by ensuring that the light bulbs used throughout graduation are the energy efficient alternative to incandescent bulbs and that energy reductions are made wherever possible, Colby will be demonstrating which products guests could buy to reduce their energy consumption. These signs and information booths have a minimal cost for Colby, but a huge potential benefit for both guests and the environment.

Decoration Commitment

For the Green Graduation, Colby is committed to use decorations that minimize the use of plastic and add minimal waste to the waste stream. The number of foil, or mylar, and latex foil balloons will be minimized, the incandescent decorative “twinkle” lights will be eliminated, and Colby is committed to using live plants in the decorations for most events instead of cut flowers. The colorful cut flowers are only used in an urn in front of the podium at commencement where pictures of the graduating students are taken. This urn is reused at other events, such as Baccalaureate, for photo opportunities (Person, pers. comm.).

Greening Impact

For the Green Graduation, Karen Ledger in the Scheduling Office has been working with the decorator to look for natural and energy efficient alternatives to the traditional decorations. The decorators have discovered a new balloon made of Qualatex, made in the United States and Canada from 100 percent biodegradable latex with no fillers added (Balloon Basics 2006; Holcomb 2008). This balloon begins to biodegrade as it is inflated and the material starts to stretch (Balloon Basics 2006; Holcomb 2008). In some instances, the college is concerned, however, that the biodegradable balloons would not reflect the quality of decorations that guests have come to expect, and as a result, we have decided on a compromise. The foil balloons will be purchased this year to improve the decorations. These balloons will then be deflated and re-used at future graduation events. Instead of using plastic weights to anchor the balloons, the college is purchasing cans of food that will then be donated to food shelters in Waterville (Ledger, pers. comm.). These compromises show that
Colby is interested in maintaining the quality of the commencement weekend and thinking about future sustainability.

PPD has also discovered an LED alternative to the “twinkle” lights that are normally used to decorate the commencement ball and the tents. These LED light strings are more expensive, but require less total energy (Murphy, pers. comm.). Colby has also decided to attempt to purchase only potted plants that are native or naturalized to Maine and can be sold or planted on campus. These simple adjustments can help to reduce the environmental impact of graduation. Also, by making signs and presenting information about the types of changes Colby has implemented for this event, the college will show guests the products available for them to make their own events and parties more environmentally friendly.

Facilities Summary

Most of these decoration changes have associated expenses, but, again, because the college was planning for the Green Graduation well in advance, we were able to visualize the costs and allocate the budgets to cover different areas. Also, by working with the decorators, Colby was able to save money by eliminating some decorations and then use the money saved to purchase more environmentally friendly alternatives. The facilities component on Green Graduation shows that by planning in advance, it is possible to find methods of absorbing expenses into different budget categories (Murphy, pers. comm.).

Recycling

Commitment to Recycle

Colby is committed to providing recycling containers for guests to place their returnable bottles and cans. Also, everyday at Colby we use print and copy paper that is made from 100 percent recycled materials and is 100 percent chlorine-free (Murphy, pers. comm.). Colby will also commit to printing all the written materials, excluding the diplomas, which were ordered too far in advance, for commencement on 100 percent recycled paper.

Greening Impact

Currently during graduation, Colby has recycling bins present next to the trash cans. These bins, however, can sometimes be the same size or shape as the trash cans, causing confusion with the guests who try to dispose of their items quickly and smoothly. Often, because of this confusion, recyclable bottles and cans are disposed of in the trash can or trash
is thrown into the recycling bins, rendering them too messy for the redemption center. This cross-contamination of waste and recyclable materials can even lose the college money, since it can return the bottles for $0.05 to $0.15 per bottle.

At Colby’s Green Graduation we will attempt to eliminate the confusion surrounding the waste and recycling bins. By consistently making the recycling bins a uniform color and shape with a specific top (with a hole in it), guests will be better able to discern between them and the trash cans. The Green Team will also be present to help eliminate the confusion. They will help guests to see which items are recyclable, which can be composted, and which should be thrown away. Signs at the event can help with this, too. Colby will create one for the recycling bins and composting buckets, outlining the items guests should place in each bin. These signs, the Green Team, and the different shapes of the bins will all help to eliminate confusion and potentially help guests think about their actions when they return home. The goal of Green Graduation is to help change social and personal habits. Composting and recycling will be forefront at this social event; perhaps when guests leave, they will remember the actions that they could take to recycle and reduce the amount of waste going to the waste stream.

**Recycling Summary**

The costs of increasing the number of signs and information about recycling will be minimal for the Green Graduation. These costs can easily fit within the budget used either for the RESCUE program or within PPD itself, since we are making the signs on the sign-maker in the Physical Plant Department. These signs will then be reusable each year, eliminating future costs of education at Green Graduation.

**RESCUE**

At the end of every academic year when the students move off campus, they leave their unwanted lamps, clothes, couches, and other items from their dorm rooms. Instead of being placed in the trash, these items are donated to charities or sold to students in the fall the next year. This is RESCUE, a program that began in 2002 and stands for “Recycle Everything Save Colby’s Usable Excess” (Murphy, pers. comm.). This program is popular with all the students, and removes approximately 10 tons of waste from the waste stream each year (DeBlois, pers. comm.). Directly after graduation, seniors must move out of their dorms and
apartments, leaving many items that they have collected over four years of college. In the fall, other students buy these inexpensive items and complete the cycle of reusing products rather than throwing them away and purchasing new ones.

Colby’s RESCUE program is already a self-sustaining program that will continue during the Green Graduation. We will include more signs about RESCUE to increase awareness of ways that Colby promotes reusing materials. As students and guests return home, many individuals may be able to take this message and become more aware of the products they throw out each day. They may be able to see the value of some of these products, and instead of throwing them away, they may give them to someone else or make it into a new usable product. By demonstrating appreciation for reusing and recycling these items, Colby is using its RESCUE program to lead by example and to help guests understand the value of a product’s many potential uses. Green Graduation is an event that will help spread the message that the RESCUE program is already presenting.

Publicity and Publications

During the spring, parents and guardians generally receive invitations to commencement and the dinners and a cappella concerts. They receive two mailings about commencement, and they can gain the rest of the information about the weekend online at www.colby.edu/commencement. For the Green Graduation, however, mailings from Colby will be printed on recycled paper. This paper does cost more than the paper on which it has been traditionally printed, but it shows the parents that Colby is thinking of the environment during all the aspects of graduation. Also, Colby will publicize its dedication to the environment by creating a webpage that explains all of the initiatives occurring at the Green Graduation. This webpage can be accessed with the following link: http://www.colby.edu/green/GreenGraduation/GreenGrad.html and it is located off the Green Colby website and the Commencement website to explain both the Green Graduation initiatives and the other initiatives done year round. President Adams has also announced to the Colby campus that we will be holding our first ever Green Graduation this year (see Appendix G). This announcement has helped to generate awareness and appreciation for the environmental initiatives at the college.
Programs

During the commencement ceremony, guests receive programs including the names of the graduates, the order of commencement events, the people receiving Honorary Degrees, and other information. Traditionally, these programs have been fairly long, and they have not been printed on recycled paper. For the Green Graduation, the programs will be two double-sided pages shorter, printed in soy ink on recycled paper, and at the bottom will be the Green Colby logo with an explanation of Colby’s effort to create sustainable initiatives (Figure 8).

In support of Colby’s Green Graduation, this is printed on 100% recycled paper. As a member of the global community, Colby seeks to lead by example and foster morally responsible, environmental stewardship.

Figure 8. Blurb to be printed at the bottom of programs and handouts necessary for commencement to help guests see the initiatives at the Green Graduation.

The costs of changing these programs include the time involved in determining if they could be made shorter as well as the expense of printing them on recycled paper. At the present time, the extra costs of the recycled paper are unknown. The reduction in the number of pages, however, does help to offset the increased costs of the recycled paper. For graduation, Colby generally prints 4,000 programs, which are either taken as souvenirs or discarded. By shortening these programs by two pages (front and back) 8,000 fewer pages were printed. Also, by printing these programs on 100 percent recycled paper, Colby is helping to create a market for recycled products, and making an effort to minimize our contribution to waste stream. The programs at the Green Graduation will demonstrate our true commitment to the environment.

Summary of Costs

The plans for a Green Graduation at Colby College involve many of our own ideas and incorporate those from the green graduations that occurred at the College of the Atlantic, Bowdoin College, Oberlin College, and Duke University. We attempted to incorporate all
the initiatives possible to plan in one year’s time. Colby will dedicate a website to the Green Graduation and provide information about all of the initiatives that were covered (see Publicity and Publications). This step is important because of its informational value. While researching this project, it was difficult to find clear information on the initiatives covered by the other green graduations. Because of the confusion in presenting information, there has been an effort to ensure that the Green Graduation initiatives at Colby will be clearly described and made available to the public.

The Colby Green Graduation will not be cost neutral (see Appendix E). Most aspects of it, however, are easy to fit into the budgets of the different groups involved in planning. For example, the Green Team t-shirts can fit into the budget at the Physical Plant Department and the Dining Services initiatives have been approved to fit within the budget allocated to food and dining. Colby hopes that guests will take the initiative to offset travel emissions. We are providing guests with information at the educational booths (about their personal travel emissions and possible offset providers) to potentially allow guests to use that information to buy offsets for their own personal emissions. They could even buy these offsets online from computers set up near the educational booths during the commencement weekend. This not only would offset some of the travel emissions to the Green Graduation, but it would also help guests to understand the concept of carbon offsets and carbon neutrality.

Colby has already purchased offsets directly for the Green Graduation 2008 (see Appendix E). These offsets are in the form of Green Energy Certified Wind Renewable Energy Credits and they are for a total 1,300,000 kilowatt-hours (Murphy, pers. comm.). The offsets cost the college approximately $6,000, which would counterbalance the emissions generated by guests traveling to Colby. Colby hopes that guests will begin to follow our example and take responsibility for their individual contributions to climate change. This could lead us further down the path to carbon neutrality.

**FUTURE SUGGESTIONS**

To travel further down the path to sustainability, Colby must continue to think of the environment. The Green Graduation initiatives are great steps for today, but they should be implemented at each graduation in the future and at Colby reunions and all major events.
There are other areas in which the commencement weekend could be made more environmentally friendly. They include:

- Obtaining a grinder for the campus or helping the Hawk Ridge facility obtain one for composting products higher in starch content, such as corncobs and the Spudware utensils that are used.

- Continue to work with local farms to expand the supply of local and organic food available in the spring at the time of graduation.

- Potentially renting hybrid vehicles to transport items, such as tables, around campus during the weekend.

- Though re-using foil balloons is a step towards developing an environmental consciousness, the college could go further and change the ways that it decorates events to be even more sustainable.

- Conducting follow-up analyses of the Green Graduation to determine which aspects were successful and to learn about public opinion of the event.

- Determining the actual extra costs of the recycled paper for programs, biodegradable balloons, LED light strings, potted plants, and biodegradable trash bags.

- Finally, developing a dialogue with all the community members to ensure that, everyday, people are considering the environment when they are planning events.

Colby is currently making great strides toward sustainability, but more dedication will be required if the college is to fully become climate neutral. Climate change will have a large impact on our economy and way of life. By committing to a Green Graduation, Colby is showing that we understand the potential impacts and that we are devoted to taking the climate into consideration for our future events and ceremonies. Graduation is a great opportunity to teach the greater Colby community about possible actions that can be taken to minimize the impacts of climate change. To make the school both an environmental and an economic leader in the Northeast, Colby needs to incorporate this environmental conscientiousness into all aspects of the college. This transformation will take time, energy, and commitment, but the benefit could be significant social change towards a sustainable future.
# PERSONAL COMMUNICATIONS

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broeck, Craig Ten</td>
<td>Sustainability Director</td>
<td>College of the Atlantic</td>
</tr>
<tr>
<td>Cole, F. Russell</td>
<td>Oak Professor of Biological Sciences</td>
<td>Colby College</td>
</tr>
<tr>
<td>DeBlois, Dale</td>
<td>PPD Environmental Program Manager</td>
<td>Colby College</td>
</tr>
<tr>
<td>Klaus, Joseph</td>
<td>Associate Director of Dining Services</td>
<td>Colby College</td>
</tr>
<tr>
<td>Kopp, Beth</td>
<td>Environmental Studies Coordinator</td>
<td>Colby College</td>
</tr>
<tr>
<td>Ledger, Karen</td>
<td>Scheduling Manager</td>
<td>Colby College</td>
</tr>
<tr>
<td>Murphy, Patricia</td>
<td>Director of the Physical Plant Department</td>
<td>Colby College</td>
</tr>
<tr>
<td>Person, Jackie</td>
<td>Administrative Assistant to the President</td>
<td>Colby College</td>
</tr>
<tr>
<td>Terp, Douglas C.</td>
<td>Vice President for Administration and Treasurer</td>
<td>Colby College</td>
</tr>
</tbody>
</table>
LITERATURE CITED


[accessed 4/4/08].


APPENDICES

Appendix A. Petition to show support for a Green Graduation.

GREEN GRADUATION 2008!

Can you believe it? It’s our final year at Colby and we’re ready for our graduation and entrance into the world. As you’ve probably read, climate change and environmental degradation are impacting that world. Projections from the Northeast Climate Impacts Assessment Team say that by the end of the century, increasing temperatures could reduce the amount of snow pack in New England while increasing the amount of winter rainfall. We are already beginning to see these effects: January of 2007 was the hottest yet recorded and the local winter businesses suffered. We need to focus on sustainability and emissions reductions now if we want to protect the environment and prevent more economic hardships. One step that Colby can take is to create a Green Graduation. Let’s make a statement and demonstrate how to minimize our contribution to climate change. A green graduation would involve carbon offsets for emissions generated by traveling to Colby, local and sustainable food, organized recycling and composting for the events, and increased awareness about waste generation. By signing this petition, members of the Class of 2008 join the student organizations listed below in respectfully requesting that the administration work with us and other groups to create a Green Graduation.

Environmental Coalition Biology Club Environmental Studies Club Green House

<table>
<thead>
<tr>
<th>Graduating Seniors Supporting This Proposal</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Email</td>
<td>Mailbox</td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B. List of the 274 Seniors Who Signed the Petition to Support the Green Graduation.

<table>
<thead>
<tr>
<th>Adam Curatolo</th>
<th>Ben Runyon</th>
<th>David Sternesky</th>
<th>Jamie Poster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adam Dunn</td>
<td>Beth Darling</td>
<td>Dori Smith</td>
<td>Jason Hayes</td>
</tr>
<tr>
<td>Adam Rich</td>
<td>Bill Whitledge</td>
<td>Dustin Hilt</td>
<td>Jeff Carroll</td>
</tr>
<tr>
<td>Adam Salamon</td>
<td>Brad Woodworth</td>
<td>Elizabeth Bower</td>
<td>Jen Zuar</td>
</tr>
<tr>
<td>Adrienne Angel</td>
<td>Brian Lam</td>
<td>Elizabeth Deeren</td>
<td>Jenn Bushee</td>
</tr>
<tr>
<td>Aime Schwartz</td>
<td>Brian Putnam</td>
<td>Elizabeth Mortati</td>
<td>Jenn Rully</td>
</tr>
<tr>
<td>Alaina Clark</td>
<td>Caitlin Coit</td>
<td>Elizabeth Petit</td>
<td>Jenna Walsh</td>
</tr>
<tr>
<td>Alex Connors</td>
<td>Caitlin Rumrill</td>
<td>Emily Butler</td>
<td>Jennifer Jewell</td>
</tr>
<tr>
<td>Alex Freyer</td>
<td>Caroline Allison</td>
<td>Emily Goodnow</td>
<td>Jess Coliflores</td>
</tr>
<tr>
<td>Alex Pietroforte</td>
<td>Caroline Brooks</td>
<td>Emily Kissner</td>
<td>Jess Egan</td>
</tr>
<tr>
<td>Alexandra Kenyon</td>
<td>Caroline Voyler</td>
<td>Emily Lyczkowski</td>
<td>Jess Emerson</td>
</tr>
<tr>
<td>Allie Holmes</td>
<td>Cassandra Jendzejec</td>
<td>Emily Sinnott</td>
<td>Jesse Kaler</td>
</tr>
<tr>
<td>Alyssa Lee</td>
<td>Cassandra Newell</td>
<td>Emily Wagner</td>
<td>Jessica Harold</td>
</tr>
<tr>
<td>Amanda King</td>
<td>Cate Denny</td>
<td>Emily Wilson</td>
<td>Jessica Ruthruff</td>
</tr>
<tr>
<td>Amanda Roehn</td>
<td>Catherine Delano</td>
<td>Emma Carlson</td>
<td>Joanna Corey</td>
</tr>
<tr>
<td>Amanda Theberge</td>
<td>Celia Boren</td>
<td>Eric Hansen</td>
<td>Jocelyn Burke</td>
</tr>
<tr>
<td>Amber Collins</td>
<td>Chantal Balesdent</td>
<td>Eric Holstein</td>
<td>Joel Alex</td>
</tr>
<tr>
<td>Amon Dang</td>
<td>Charles Frederick</td>
<td>Erin MacLennan</td>
<td>Joerose Tharakan</td>
</tr>
<tr>
<td>Amy Makowiecki</td>
<td>Charlotte Morse-Fortier</td>
<td>Erin McGowan</td>
<td>John Chung</td>
</tr>
<tr>
<td>Andrew Averbach</td>
<td>Charly Carrigan</td>
<td>Eva Gouguian</td>
<td>John Franklin</td>
</tr>
<tr>
<td>Andrew Cox</td>
<td>Chloe Warren</td>
<td>Evan Eshelman</td>
<td>John Kester</td>
</tr>
<tr>
<td>Andrew Jurschak</td>
<td>Chris Shelly</td>
<td>Evan Kaplan</td>
<td>John Swain</td>
</tr>
<tr>
<td>Angela Martinelli</td>
<td>Christian Crannell</td>
<td>Evan Mullin</td>
<td>Jon Steinberg</td>
</tr>
<tr>
<td>Anna Barnwell</td>
<td>Christian McTarnaghan</td>
<td>Grant Netzorg</td>
<td>Jonathan Godboat</td>
</tr>
<tr>
<td>Anna Birnberg</td>
<td>Christine Avena</td>
<td>Gregory Smith</td>
<td>Josh Lord</td>
</tr>
<tr>
<td>Anna Kelman</td>
<td>Chris Giangreco</td>
<td>Hande Yalnizoglu</td>
<td>Julia Gilstein</td>
</tr>
<tr>
<td>Anna King</td>
<td>Claire Thompson</td>
<td>Hannah Coleman</td>
<td>Julie Bero</td>
</tr>
<tr>
<td>Annie Feutz</td>
<td>Colin Riggs</td>
<td>Hillary Smith</td>
<td>Julie Bero</td>
</tr>
<tr>
<td>Anya Toteauu</td>
<td>Connor Tubridy</td>
<td>Holly Battelle</td>
<td>Julie Wilson</td>
</tr>
<tr>
<td>Arina Kelman</td>
<td>Cory Johnson</td>
<td>Isaac Needle</td>
<td>Justin Durn</td>
</tr>
<tr>
<td>Ashley Camps</td>
<td>Courtney Johnson</td>
<td>Isham Singh</td>
<td>Justine Ludwig</td>
</tr>
<tr>
<td>Austin Ross</td>
<td>Courtney Larson</td>
<td>Ivan Balbuzanov</td>
<td>Justine Scott</td>
</tr>
<tr>
<td>Bailey Woodhull</td>
<td>D. Wallace</td>
<td>Jack Davidson</td>
<td>Karina Carley</td>
</tr>
<tr>
<td>Behzad Larry</td>
<td>Daniel Adams</td>
<td>JaeHee Yun</td>
<td>Kate Yedinak</td>
</tr>
<tr>
<td>Ben Herbst</td>
<td>Danny Epstein</td>
<td>Jamie Enos</td>
<td>Kathleen Minor</td>
</tr>
<tr>
<td>Name</td>
<td>Name</td>
<td>Name</td>
<td>Name</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Ben Poulos</td>
<td>Darcy Taylor</td>
<td>Jamie Goldring</td>
<td>Kathleen Nicholson</td>
</tr>
<tr>
<td>Adam Curatolo</td>
<td>David Helfand</td>
<td>Jamie Plume</td>
<td>Kathryn Tom</td>
</tr>
<tr>
<td>Katie Harriss</td>
<td>Kristen Weigle</td>
<td>Leanne Power</td>
<td>Martin Connelly</td>
</tr>
<tr>
<td>Katie Ludwig</td>
<td>Kristi Boman</td>
<td>Leslie Wardell</td>
<td>Mason Dutton</td>
</tr>
<tr>
<td>Kelly Norsworthy</td>
<td>Kristina Shiroka</td>
<td>Leslie Wardwell</td>
<td>Matt Haefele</td>
</tr>
<tr>
<td>Kelsey Enright</td>
<td>Kristine Robin</td>
<td>Lindsay Phillips</td>
<td>Matt Warshaw</td>
</tr>
<tr>
<td>Kelsey Hilton</td>
<td>Kristyn Loving</td>
<td>Liz Petit</td>
<td>Megan Litwin</td>
</tr>
<tr>
<td>Kerry Whittaker</td>
<td>Kyle Smith</td>
<td>Logan Berg</td>
<td>Megan Smith</td>
</tr>
<tr>
<td>Kevin Hobson</td>
<td>Lacey Favreau</td>
<td>Lucia Giordano</td>
<td>Megan Watts</td>
</tr>
<tr>
<td>Kiira Heymann</td>
<td>Laura Perille</td>
<td>Luke LaViolet</td>
<td>Melanie Larson</td>
</tr>
<tr>
<td>Kim Graves</td>
<td>Laura Smith</td>
<td>Maddie Given</td>
<td>Melanie Ungar</td>
</tr>
<tr>
<td>Kit Clark</td>
<td>Laura Webb</td>
<td>Madison Gouzie</td>
<td>Meredith Carden</td>
</tr>
<tr>
<td>Kristen Barnico</td>
<td>Laurel Duggan</td>
<td>Marcy Shrader-Lauinger</td>
<td>Meredith Keyser</td>
</tr>
<tr>
<td>Kristen Kouttab</td>
<td>Lauren Baard</td>
<td>Margaret Chute</td>
<td>Michael Gwaze</td>
</tr>
<tr>
<td>Kristen Warden</td>
<td>Lauren Langford</td>
<td>Marti Laure</td>
<td>Michael Hudson</td>
</tr>
<tr>
<td>Michael King</td>
<td>Nolan Reis</td>
<td>Robert Glotfelty</td>
<td>Sanval Nasim</td>
</tr>
<tr>
<td>Michelle Easton</td>
<td>Owen Gilmore</td>
<td>Ronald Wise</td>
<td>Sarah E. Clark</td>
</tr>
<tr>
<td>Mike Butler</td>
<td>Palmer McAuliff</td>
<td>Rosalind Becker</td>
<td>Sarah Goldstein</td>
</tr>
<tr>
<td>Mike Finnerty</td>
<td>Pam Dudley</td>
<td>Ryan Chrenek</td>
<td>Sarah L. Clark</td>
</tr>
<tr>
<td>Mollie Puskar</td>
<td>Patrick Sanders</td>
<td>Sam Boss</td>
<td>Sarah Parrish</td>
</tr>
<tr>
<td>Morgan Manoff</td>
<td>Phil Mason</td>
<td>Sam Fabens</td>
<td>Sarah Switchenko</td>
</tr>
<tr>
<td>David Bethoney</td>
<td>Rachel Daly</td>
<td>Sam Hoyle</td>
<td>Sasha Bartels</td>
</tr>
<tr>
<td>Nahita Nishmin</td>
<td>Rand Hall</td>
<td>Sam Huntington</td>
<td>Shaelyn Germain</td>
</tr>
<tr>
<td>Nate Lifton</td>
<td>Rebekah Fasel</td>
<td>Sam Jones</td>
<td>Shannon Burnham</td>
</tr>
<tr>
<td>Neha Zaigham</td>
<td>Rich Waterman</td>
<td>Sam Reid</td>
<td>Sharon Fuller</td>
</tr>
<tr>
<td>Nicholas Cade</td>
<td>Robert Crossley</td>
<td>Samantha Rose</td>
<td>Sharon Noel</td>
</tr>
<tr>
<td>Nicole Terrillon</td>
<td>Robert Foster</td>
<td>Sandy Ma</td>
<td>Skylar Sutton</td>
</tr>
<tr>
<td>Steph Bowman</td>
<td>Tiffany Ng</td>
<td>Tom Myers</td>
<td>Virginia Brown</td>
</tr>
<tr>
<td>Stephanie Lubin-Levy</td>
<td>Tim Miller</td>
<td>Tom Treat</td>
<td>Vivek Freitas</td>
</tr>
<tr>
<td>Tanya Rosbash</td>
<td>Tim Patch</td>
<td>Tyler Ingram</td>
<td>Walter Cambell</td>
</tr>
<tr>
<td>Tara Allain</td>
<td>Tim Regele</td>
<td>Valerie Coit</td>
<td>Wes Miller</td>
</tr>
<tr>
<td>Taylor Kilian</td>
<td>Tim Williams</td>
<td>Vicotria Hayne</td>
<td>Whitney Somerville</td>
</tr>
<tr>
<td>Thomas Huff</td>
<td>Tim Worthington</td>
<td>Victoria Work</td>
<td>Will Cantley</td>
</tr>
</tbody>
</table>
Appendix C. Distances Guests Travel to Arrive at Colby for Graduation.

Table of the raw data of kilometers traveled by guests both driving to Colby from within New England and flying to Boston from outside New England. Note: The column titled “Total Driving Distance” includes the total of either the distance from the New England residents’ homes to Colby or the distance from the non-New England residents’ homes to their nearest airports. The distance from Logan International Airport in Boston to Colby is 287 km, which was multiplied by the number of cars assumed to make this drive. These numbers were converted to miles and the NativeEnergy Travel Calculator was then used to determine the amounts of carbon emitted from each type of travel (see Appendix D).

<table>
<thead>
<tr>
<th></th>
<th>Total Driving Distance (km)</th>
<th>Total Number Driving from Boston Airport</th>
<th>Total Flight Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents/Guardians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>within New England</td>
<td>90,744</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Parents/Guardians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from outside New England</td>
<td>9,385</td>
<td>274 vehicles</td>
<td>713,064</td>
</tr>
<tr>
<td>Trustees within New</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>4,060</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Trustees from outside New</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>England</td>
<td>420</td>
<td>6 vehicles</td>
<td>5,675</td>
</tr>
</tbody>
</table>
Appendix D. Calculation of Guests’ Travel-Related Carbon Emissions.  
Note: Cost Calculations from the NativeEnergy Travel Calculator

Guests from New England

Assumptions:
- One car used
- 100% Attendance at Graduation
- All guests drive a “medium fuel economy” vehicle

Vehicle Miles:
- One-way: 56,385.7 mi
- Round Trip: 112,771.4 mi

Carbon Emissions:
- One-way: 27.6 tons CO₂
- Round Trip: 55.1 tons CO₂

Estimated Cost to Offset Emissions
- One-way: $336.00
- Round Trip: $672.00

Guests from outside New England

Assumptions:
- Drive from zip code to air port
- Fly to Boston
- Drive from Boston to Colby
- 100% Attendance at Graduation with two people on each flight

Vehicle Miles
- One-way: 48,863.4 mi
- Round Trip: 97,726.8 mi

Airplane Miles
- One-way: 443,077.4 mi
- Round Trip: 886,154.9 mi

Carbon Emissions
- One-way Vehicle: 23.9 tons CO₂
- One-way Airplane: 177.2 tons CO₂
- Total One-way: 201.1 tons CO₂

- Round Trip Vehicle: 47.8 tons CO₂
- Round Trip Airplane: 354.5 tons CO₂
Total Round Trip:  402.25 tons CO₂

Estimated Cost to Offset Emissions
One-way:   $2,424.00
Round Trip:   $4,836.00

Trustee Travel Emissions

Assumptions
• Drive in one car from within New England
• Drive to from zip code to airport from outside New England
• Fly to Boston
• Drive from Boston to Colby
• 100% Attendance with 2 people on each flight

One-way miles
Vehicle miles:  3,853.8 mi
Airplane miles:  3,526.3 mi

One-way Carbon Emissions
Vehicle:  1.9 tons CO₂
Airplane:  1.4 tons CO₂
Total one-way:  3.3 tons CO₂

Round Trip miles
Vehicle miles:  7,707.5 mi
Airplane miles:  7,052.6 mi

Round Trip Carbon Emissions
Vehicle:  3.8 tons CO₂
Airplane:  2.8 tons CO₂
Total round trip:  6.6 tons CO₂

Estimated Costs to Offset Emissions
Round Trip:  $96.00
One-way:  $48.00

Totals for All Guest Travel

One-way
Emissions:  172 tons CO₂
Cost to offset:  $2,802.00

Round Trip
Emissions:  464 tons CO₂
Cost to offset:  $5,604.00
Appendix E. The Estimated Increased Costs of Most Products Used During the Green Graduation.

Dining Services:

- Biodegradable Spudware: $220.00
- Natural Napkin: -$70.00
- Fair Trade and Organic Coffee: $427.00
- PLA Biodegradable Cup: $500.00
- 16 oz. Biodegradable Beer Cup: $520.00
- Paper Bibs: $160.00
- Increased Labor: $142.00
- Increased Composting Costs: $234.00
- Up-Front Costs of Switching to Chinaware: $113.00

**Estimated Increased Cost to Dining Services:** $2,306.00

Unknown Increased Costs: *note: costs fit within budgets allocated to commencement*

- Programs Printed on Recycled Paper
- Biodegradable Balloons
- Biodegradable Trash Bags
- Potted Plants
- LED Light Strings
Appendix F. Description of LEED Certification.

In 1999, the LEED Green Building Rating System for New Construction was established to help professionals in the U.S. to improve the quality of buildings and reduce their impact on the environment. “Leadership in Energy and Environmental Design,” or LEED, Certification uses a rating system to determine just how “green” the building designs are. By certifying new buildings with the LEED rating system, professionals are reducing operating costs, enhancing building marketability, increasing occupant productivity, helping to create a sustainable community, and having a positive impact on public health and the environment (USGBC 2008). The LEED rating systems are voluntary, consensus-based, market-driven, and based on energy and environmental principles. The LEED certification rating systems are developed by the United States Green Building Council committees, which provide a third party verification for green buildings and allow them to be recognized for their commitment to environmental issues (USGBC 2008).

The certification process for LEED Buildings has different components. These components are based on a point system, which include heating systems, energy efficiency, renewable energy use, building with recycled materials, and other environmentally-based building initiatives. To be LEED Certified, a building must earn between 26 and 32 points. A building with 33 to 38 points is awarded LEED Silver, one with 39 to 51 points is considered LEED Gold, and one that earns 52 to 69 points is considered LEED Platinum (USGBC 2008). In order to earn LEED certification, an application that documents compliance with the rating system must be sent, along with the registration fees, to the U.S. Green Building Council (USGBC 2008).

At Colby, the Schair Swenson Watson Alumni Center has been awarded LEED Silver, and the Diamond Building has received certification. Colby has also applied for LEED certification for the new Pulver Pavilion. Colby’s goal is to certify all of the new development on campus in the future at LEED Silver.
Appendix G. The Announcement of a Green Graduation at Colby College, Sent by President Adams to the Colby Community on April 30, 2008.

To the Colby Community:

The many Earth Week activities held last week are wonderful examples of how the College community, both individually and institutionally, continues to find ways to reduce its impact on the local and global environments.

Earlier this week, Colby recognized by the Environmental Protection Agency as the 2007-2008 NESCAC Green Power Conference Champion for purchasing more green power (115 percent) than any other institution in the conference.

And now, I am pleased to announce the College's plan to finish the 2007-08 academic year with our first-ever Green Graduation, thanks to Alaina Clark '08, who developed the idea as part of a senior project. As part of Senior Week and Commencement activities, the College will be celebrating

(a) Our ongoing efforts to lead by example and foster environmental stewardship;
(b) An increase in sustainability efforts in many activities directly related to Senior Week and Commencement;
(c) Increased opportunities for education and awareness on environmental issues.

Events scheduled and supported by the Office of Special Programs, Physical Plant, and Dining Services will incorporate current and new green practices including minimizing the use of plastics, reducing electricity use, increasing composting, serving sustainable foods, using 100 percent recycled products, and reducing paper use, among other initiatives. Organizers also hope that receptions and events organized by departments will hew to these principles; assistance will be available from the departments listed at the beginning of this paragraph.

A key feature of Green Graduation is the Green Team, a group of Colby students and employees who will be staffing information tables and assisting visitors with composting and other greening efforts at events. Watch for future announcements from Green Team members for information about how you can volunteer.

Achieving environmental sustainability is among the College's core challenges, and Green Graduation is a great step in the right direction. I appreciate the extraordinary efforts that have been made to date on this endeavor and I encourage campus wide participation. Additional information and details will be available as we move closer to Colby Green Graduation 2008.

Sincerely,

William D. Adams
President

**The Environmental Advisory Group asks that you plan ahead for your dorm room and consider the potential environmental impacts of each purchase you make. Talk with your roommate(s) about purchasing communal appliances, and consider what appliances and supplies are already made available for students to use in their dorm and on campus.**

**Lighting**
Compact fluorescent light bulbs (CFLs) use 66% less energy than incandescent light bulbs, last 10 times longer, and provide high-quality light. To use the most efficient task lighting possible, replace incandescent bulbs with CFL bulbs or purchase lamps that use fluorescent tubes or high-intensity discharge (HID) bulbs.

**Phones**
Cordless phones use energy continuously. Cordless phones with an Energy Star rating use about one-third of the energy of standard models. If possible, purchase a phone with a cord.

**Furniture and Carpeting**
Purchase second-hand furniture and other supplies (chairs, lamp, storage container) at thrift stores and at Colby RECLUE sale before classes begin in fall. Some carpeting (leftover pieces of commercial carpeting) is economical and comes in many sizes.

**Bath and Laundry**
Biodegradable and non-aerosol hand soaps and laundry detergents can be broken down by microorganisms, reduce nutrient loading, and are non-toxic to aquatic species. Instead of using the dryer, consider drying your clothes on a drying rack.

**Class Supplies**
Most class supplies are available with some recycled content. Try to purchase supplies that are durable and reusable. Purchase non-chlorine and non-bleached paper with a high recycled content. Use scrap paper for notes (a binder can keep your notes organized). Purchase used books, share books with friends and classmates, or check books out from Colby libraries.

**RESOLVE:**
At the beginning of each year, Colby hosts a RESOLVE — Recycle Everything Save Colby’s Usable Excess — sale, where used dorm supplies, appliances, and furniture are sold. At the end of each year, students can avoid the waste stream by giving their unwanted clothes, furniture, and dorm supplies to Colby RECLUE.

---

**Top 10 Sustainability Tips**
Just as important as green purchasing is minimizing your resource use and waste stream. Below is a list of some of the things you can do to conserve resources and minimize waste.

1. **Buy goods with some recycled content;** this creates a market for recycled material.
2. **Consider the lifetime of a product:** Try to reduce your use of disposable items (razors, dishes, coffee cups) and items with excessive packaging.
3. **Set your computer to ‘sleep’ or ‘stand by’ after several minutes of non-use to save energy consumed by your monitor and/or hard drive.
4. **Edit documents on the computer screen as much as possible to avoid printing multiple drafts. Then, print on both sides of the paper.
5. **Minimize water use:** Do only full loads of laundry; don’t run water constantly when brushing your teeth or shaving; and limit your shower time.
6. **Close doors and windows and windows you see open during cool months.
7. **Turn off lights that are not in use.
8. **Find new uses for old things. For example, recycle grocery bags as trash bags.
9. **Give unwanted appliances, clothing, and furniture to Colby RECLUE at the end of the year so that they can be recycled and remain out of the waste stream.
10. **Be responsible stewards — know what resources you use; what waste you generate; and where your waste goes.**

**Useful Websites:**
- Environmental Advisory Group: www.colby.edu/eag/
- Sustainable Computer Tips: www.colby.edu/info.itech/green/
- Energy Star: www.energystar.gov