

CLIMATE MATTERS CONTEST SUBMITTALS

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1. Mandatory Vegetarianism

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Name(s) and affiliation(s) of competitor:: Danny Lowinger, Class of 2012, Interested in Econ, ES, and Gov

Email for primary contact:: dlowinge@bowdoin.edu

Description the proposed program: The proposal for this program is pretty simple: force people to become vegetarians. That might seem quite hard to do, but considering Bowdoin is ultimately responsible for the food in the dining halls, it is quite easy to implement this policy. Obviously, the school does not have to completely eradicate meat. It could cut back meat consumption by any percent it deems would have a sizable impact. The dining halls control the supply side of meat eating, so cutting supply will force a cut in meat demand.

Methods in which this program will reduce GHG emissions: This program would drastically cut back on GHG emissions because meat consumption is responsible for a large amount of our country's (and school's) emissions. The reason is because eating meat requires a lot of energy to maintain livestock. Therefore, if we can reduce the amount of meat we eat, we can begin to approach carbon neutrality. I myself love meat more than almost everything in the world. I don't think I'm willing to give up meat, but I am willing to eat less of it.

Individuals/departments who will be responsible for implementing the proposed program: Dining Services could buy less meat to serve in the dining halls. Others who want to take up this program could make signage or host information sessions that discuss what impact meat has on our GHG emissions.

Potential cost savings for the college: This project would reduce the amount the school spends on meat, which can often be costly, and could even reduce the amount students spend on their dining board plans.

Additional community benefits: Eating less meat may encourage people to eat healthier foods. Maybe by eating less meat we can reduce obesity, although here at Bowdoin we seem to generally be in good shape.

Additional information: This article from the Guardian mentions how the UN recommended eating less meat: <http://www.guardian.co.uk/environment/2008/sep/07/food.foodanddrink>

2. Friday Funday!

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Name(s) and affiliation(s) of competitor:: Doria Cole 2009 Physics, Mathematics

Email for primary contact:: dcole2@bowdoin.edu

Description the proposed program: This program would entail decreasing electricity and heating use in academic buildings. On Fridays, a day when there are significantly less classes (especially during afternoon hours), the classes would all meet in one academic building. The building would have all the necessary components for class (i.e. projectors, computers, chalkboards). The other buildings could be shut down for the weekend by reducing heating and lighting in classroom and hallway space.

Methods in which this program will reduce GHG emissions: It would reduce electricity use and heating use. Heating use would decrease emissions from the steam plant.

Individuals/departments who will be responsible for implementing the proposed program: Classroom scheduling would be affected during scheduling, but only the teachers of Friday classes would be affected thereafter. Students wouldn't be affected by the classroom they're in and if teachers are opposed to switching buildings 1 day/week, they wouldn't schedule a class that meets on Fridays.

Potential cost savings for the college: Less heating oil, less spent on REC's.

Additional community benefits: Students would prefer to not have Friday classes.

Additional information:

3. Bowdoin's Alternative Transportation Master Plan

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Name(s) and affiliation(s) of competitor:: Commute Another Way (CAW) Committee: Lesley Gordon, Biology Keisha Payson, Sustainable Bowdoin Nancy Grant, Information Technology Nancy Blumberg, Treasurer's Office Eileen Johnson, Environmental Studies Kacy Hintze, Annual Giving Carmen Greenlee, Library Daniel Hope, Library Sarah Begin, Alumni Relations

Email for primary contact:: LGordon@bowdoin.edu

Description the proposed program: We recommend a comprehensive plan to facilitate alternative methods of transportation (i.e., carpooling, biking, walking, and mass transit) for Bowdoin College employees and students, thereby reducing the College's greenhouse gas emissions, negating future expenses associated with escalating parking demands, and enhancing the safety and beauty of the community. Connect alternative transportation with the 'Be Well @ Bowdoin' program, recognizing its physical and psychological health benefits. Collaborate with McKeen Center for Common Good to explore the connections between transportation, health, and community. • Begin a pilot shuttle service for employees in Brunswick, Portland, and other employee housing hotspots. Shuttle routes and schedules will be determined based on survey results of committed participants; employees would pay a reasonable fee for this service. Bowdoin may directly provide this service or team up with a local transport company. Actively support the proposed extension of the Amtrak Downeaster passenger railway service to Brunswick. Establish a flexible spending account option for employee alternative commuting. Employees can elect to deduct approved alternative commuting supplies from their pre-tax salary, up to the federally approved amount of \$250 per year (e.g., safety lights, helmets, bicycle maintenance.) • Supply a vehicle for carpoolers/walkers/bicyclists that need an "emergency ride home". (GoMaine's emergency ride home is not convenient enough). • Give an incentive to try walking/biking/carpooling to work. This strategy recognizes that once people give alternative commuting a try, they often realize that the benefits greatly outweigh perceived inconveniences. Employees would agree to "try" five times over the course of a month. Upon completion, they will be compensated with time off from work, e.g., 30 minutes for each day they tried. Collaborate with Anthem to establish a premium reduction for employees that commute alternatively. Provide complimentary lockers for employees that commute via bicycling or walking. Loan bikes or sell bikes at discounted price to staff that want to bike to work (so they can try bike commuting without first investing a major amount of money.) Provide bikes to all students that commit to not bringing a car to campus. (Bikes in this program may be a loan, a discount, or a gift with stipulations for the situation whereby students bring cars to campus later on in their studies.) Re-investigate covered or indoor parking for bicycles. Modestly increase the cost of student vehicle registration. This increased income should be committed to funding sustainable transportation efforts at Bowdoin. Expand the Yellow Bike Club to provide an increased number of bikes for use; replace the combination lock system with a more reliable and secure solution. Include other tiers of using bikes for departments and dorms and individuals. Pilot an alternative work schedule where appropriate: The college would consider promoting telecommuting and/or four ten-hour workdays. Work with local nonprofits and the town of Brunswick to improve pedestrian infrastructure (e.g., bicycle lanes and crosswalks).

Methods in which this program will reduce GHG emissions: Employee transportation represents 8% of carbon footprint. By reducing the number of employees that drive individually to work, we will directly reduce emissions. Additionally, many employees report the tendency to circle around campus in the morning, searching for open parking spaces— this idling and extra driving will be eliminated as more people choose alternative commuting. Alternative transportation will also negate the need to create additional parking lots— building and maintaining asphalt parking is extremely energy-intensive. Improving mass transit and creating a more pedestrian-friendly community will greatly reduce the number of students bringing cars to campus.

Additionally, as the community at large is encouraged to utilize alternative transportation, reductions in GHG emissions will be felt at a larger geographic scale.

Individuals/departments who will be responsible for implementing the proposed program: This is a collaborative effort, and all departments are encouraged to participate. We envision the Commute Another Way Committee playing a major role, as well as Sustainable Bowdoin, the McKeen Center for Common Good, and Environmental Studies. Facilities Management, Human Resources, Annual Giving, and the Yellow Bike Club will also be key players.

Potential cost savings for the college: The College is currently facing the prospect of building additional parking to meet the current and future demands of employee commuting. By improving alternative transportation, this expensive undertaking will be rendered unnecessary (quality surface parking lots cost up to \$5,000 per space to build; annual maintenance costs are a minimum of approximately \$200 per space.) The College will save money by reducing the need to purchase carbon offsets for transportation (by joining the American College & University Presidents Climate Commitment, the college committed to planning to achieve carbon neutrality). The reduced stress and lifestyle improvements associated with alternative commuting will create a happier and healthier workforce, which translates into higher productivity and a lower turnover rate. Enhancing Bowdoin's reputation as a leader in campus sustainability will further attract investment.

Additional community benefits: Creating a pedestrian-friendly campus with mass transit links to Portland and beyond will have reverberating effects on the larger Midcoast Maine area -- attracting and maintaining a vibrant community and improving the quality of life for thousands of Brunswick residents. There will be innumerable quality of life benefits to Bowdoin College and Brunswick community members: improved air quality, safer streets for bikers and walkers, less traffic, reduced stress levels, the emotional well-being associated with a close-knit community, and improved physical health for bikers and walkers.

4. Rogue Toilets: A Funny, But Nonetheless Serious, Problem

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Name(s) and affiliation(s) of competitor:: James Lindsay Class 09 Major Physics and History

Email for primary contact:: jlindsay@bowdoin.edu

Description the proposed program: The automatic toilets installed throughout campus are designed to improve hygiene. However, these toilets are also wasting a large amount of water. Due to the sensitivities of the motion detecting software and/or the placement of the motion detector, these toilets execute one to three false flushes whenever used. Through an informal survey, I estimate that, on average, each use is accompanied by at least one false flush. The remedy is very straightforward. To eliminate false flushes the software may be reprogrammed and/or the sensor lowered and placed in a more appropriate position. The software could be redesigned to execute the flush more conservatively by employing longer delays or motion detection from further away. If the sensor was relocated, false flushes which result from normal movements and prostrations would easily be avoided. I too find the whole premise of toilet design very humorous, but if these toilets are used only once daily for 200 days by Bowdoin students they are wasting over a half million gallons of water each year(1700 students * 1.6 gal * 200 days.) The solution is not difficult. Let's flush this problem away.

Methods in which this program will reduce GHG emissions: At the surface it may not be immediately clear how water conservation leads to reduced GHG emissions. However, according to United States EPA an estimated 3% of domestic energy use (56 billion kilowatt hours) is expended on drinking water and wastewater services. By reducing the water load that Bowdoin demands from the water infrastructure, less energy will be required by local power plants and water pumps. The reductions in electrical use will cut Bowdoin's GHG emissions.

Individuals/departments who will be responsible for implementing the proposed program: A private company or the computer science department could be hired to redesign the motion detector software. Facilities could easily relocate the motion sensor. Once installed, neither measure should contribute to normal upkeep.

Potential cost savings for the college: If 500,000 gallons of water are saved yearly, then Bowdoin can expect to save \$6,000 annually according to the water rates posted on maine.gov. Further savings may be realized were the federal government to make a strict analysis and tax on emissions.

Additional community benefits: The community benefits are enormous! False flushes can be some of the most startling and disruptive events in a person's entire working day! The collective misery of all students and faculty demands a prompt solution. More seriously, if these changes were enacted it is hoped that the community would not notice at all. A minor inconvenience would be lifted from one's life, and GHG emissions would be removed from the sky.

Additional information:

5. Turn-off the Computers

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Name(s) and affiliation(s) of competitor:: Doria Cole 2009 Physics, Mathematics

Email for primary contact:: dcole2@bowdoin.edu

Description the proposed program: Shut down the computers in labs and classrooms when not in use (i.e. overnight, during day).

Methods in which this program will reduce GHG emissions: By decreasing the use of electricity, we'll decrease the amount of carbon put into the atmosphere.

Individuals/departments who will be responsible for implementing the proposed program: Academic departments. If computers in Searles need to be used by faculty, they can turn them on and off as desired. This would happen in every academic classroom. Additionally, computer labs users would turn off computers when they were finished or they could be shut down automatically when the labs close (i.e. 10 PM).

Potential cost savings for the college: Cost of electricity and amount of REC's to be bought would be decreased significantly.

Additional community benefits: Computers work better if shut down periodically

Additional information: I thought of this when I re-entered a lab in Searles for the first time in 1 week. My lab partner was the last one logged into the computer and it hadn't been used and/or shut down since the same class one week prior.

6. Renewable Hot Water

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Name(s) and affiliation(s) of competitor:: Spencer Nietmann 2011 Biology and Environmental Studies

Email for primary contact:: snietman@bowdoin.edu

Description the proposed program: This program seeks to reduce the energy Bowdoin uses to heat water for showers.

Methods in which this program will reduce GHG emissions: Based on some quick calculations with help from the Bowdoin physics department,

Individuals/departments who will be responsible for implementing the proposed program: This program would be implemented by facilities management, and would likely be supported by contracted help.

Potential cost savings for the college: Solar panels involve a significant initial investment, but require minimal monetary inputs thereafter. Rather than spending a given amount per year on hot-water heating, then, this program would require an initial investment that would be followed indefinitely by years of free hot water. In a word, the initial cost would be repaid in a few years, and every subsequent year

Additional community benefits: As an institution of higher education, Bowdoin should also be an example for sustainable living. Visible solar panels would help to assimilate students, faculty, staff, and Brunswick community members into renewable energy culture.

Additional information:

7. Take Back the Tap

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Name(s) and affiliation(s) of competitor:: Emma Cape, Fall 2009, ES/Anthro Major, Co- Organizer for the Bowdoin Evergreens.

Email for primary contact:: escape1986@gmail.com

Description the proposed program: Here at Bowdoin, we pride ourselves on our commitment to sustainability. We believe water should be safe, accessible, and affordable for all; that water is a human right and basic public service, not a corporate commodity. Bottled water does not fit within that commitment. These bottled brands are no cleaner and no safer than tap water, and yet they cost anywhere between 240 and 10,000 times the tap water price. At the same time, these bottled water corporations are extracting a vital natural resource, transporting it from around the world, and putting it in plastic bottles, with devastating environmental and economic impacts in communities nationwide. Therefore, I would like to propose a program in which we A) Eliminate disposable water bottles at campus events and in dining services, B) Support alternatives to bottled water on the Bowdoin College campus, including at express meals, and C) Support policies that promote and protect local access to clean water. While the alternatives to disposable water bottles could take on different forms, specific suggestions would be: to provide each Bowdoin student with a free reusable water bottle, to provide affordable replacement bottles at the Bowdoin bookstores for students who lose theirs, to update water fountains in campus buildings, and to replace disposable water bottles at campus events with reusable pitchers or other containers of local water. Brunswick's water quality exceeds national standards in all areas, there is no reason not to support the local system.

Methods in which this program will reduce GHG emissions: It takes about 163 mL of oil to produce your standard size personal disposable water bottle, some of which is released during the production process. Plastic bottle production in the United States annually requires about 17.6 million barrels of oil. In addition, the GHG emissions for the transportation of these reusable bottles is quite significant. Those emissions would be eliminated through implementation of this program. More information and statistics can be found at www.takebackthetap.org

Individuals/departments who will be responsible for implementing the proposed program:Dining Services, Academic Departments, and Facilities would be responsible for various aspects of the program. A number of Academic Departments have already endorsed the elimination of bottled water at their events.

Potential cost savings for the college: Last year dining services alone purchased about 22800 bottles of water. Academic Departments and Dining Services can both save money by eliminating the cost of disposable bottled water from their budget, and instead promoting consumption of bulk beverages. (Students can fill their reusable water bottles with tap water or alternative beverages at the soda machines at Express Meals. So promoting this would reduce the need for disposable bottled beverages in general.) Perhaps some of the money saved from reducing or eliminating purchase of disposable water bottles can go towards the purchase of reusable bottles for students.

Additional community benefits: In addition to helping the campus to fulfill its goals of sustainability, this program would also be showing support for the wider Maine Community, such as Kennebunk which is involved in a legal battle with Nestle of Poland Springs. It will even benefit the international community, as large bottled water companies like Nestle have been embroiled in controversies and violations elsewhere, both in the U.S. and countries as far away as Ethiopia.

Additional information: kgCO² emissions of various options may easily be compared using this tool:
[http://www.nef.org.uk/greenco2calculator.h tm](http://www.nef.org.uk/greenco2calculator.htm)

8. Operation Powerdown

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Name(s) and affiliation(s) of competitor:: Emma Cape, Fall 2009, ES/Anthro Major

Email for primary contact:: escape1986@gmail.com

Description the proposed program: Many of the approximately 3500 computers connected to Bowdoin's network are left on at full power, screen saver, or sleep mode in-between uses, and at night when there is no use for an extended period of time. This program would result in significant power-saving on computers that have been idle for a certain length of time. The aim is to do this without danger of loss of data, and without an unacceptable number of error messages or other unfavorable user interaction. The program would also be no cost for the college. Getting people to change their behavior and remember to shutdown computers after use is difficult. An automatic method would be more efficient. Many free programs available online allow a central manager (ITS) to shutdown all network computers at a certain time. However, that does not account for computers left idle during the day. Some programs available, however, offer more flexibility that would be well-suited to a large operation such as the college. PowerDown, a software program based in the UK, works as the following: PowerDown consists of two batch files and two freeware utilities. The software, run from a centralized location on the network, does the following: issues a command to shut down when a network computer has been idle for X minutes of time, BUT first checks that nobody is logged in, and that the computer has not opted out of power-saving (for administrative computers that must be kept on continuously, and also an option for owners of personal computers who wish to maintain more personal control.) More information can be found here: <http://www.liv.ac.uk/csd/greenit/powerdown/index.htm> The information also indicates that this program may have the ability to shut off devices connected to the computer, as well.

Methods in which this program will reduce GHG emissions: Right now, most computers in Bowdoin labs are set to hibernate when idle. But, there are many staff, faculty, classroom, and student computers that may not even be set to hibernate when idle. Having a program on a network that defaults to powering down idle computers is an efficient solution both from a temporal and monetary standpoint.

Individuals/departments who will be responsible for implementing the proposed program: Information Technology, which has informed me that from a technical standpoint, such a program would be rather simple to implement.

Potential cost savings for the college: Implementing PowerDown or a similar program would take up relatively little time for the existing IT staff, and would potentially provide the college with significant energy savings which would translate into thousands of dollars worth of monetary savings.

Additional community benefits: It could make members of the Bowdoin community more aware of the wastefulness of leaving on unused appliances, and of the various power options for computers, while simultaneously not requiring individuals' time to figure out how to set more climate-friendly operations. Maybe it would even have some small impact on how many hours Bowdoin students spend procrastinating on facebook. On a more serious note, perhaps in conjunction with implementing and notifying the Bowdoin community about the PowerDown program, an awareness campaign could be run on the benefits of unplugging other currently unused electronic appliances.

Additional information:

9. The sustainable floor

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Name(s) and affiliation(s) of competitor:: Abriel Ferreira 2010, Government and Music Major

Email for primary contact:: aferreir@bowdoin.edu

Description the proposed program: From water pumps powered by children playing on merry-go-rounds in Africa to speed bumps in London that generate electricity when cars drive over them, there is a growing trend of harnessing kinetic energy from human movement. In my home country of the Netherlands, there is a dance club with a dance floor made out of recycled materials that generates energy from people dancing on it. The Sustainable Dance Floor at the WATT club in Rotterdam is made up of a series of tiles that make a slight vertical movement when danced on. Smart electronics and this energy and converts it electricity. The electricity powers lights in the dance floor as well as the energy meter, so that patrons can see how much their dancing is contributing to the electricity in the club. The excess electricity is used to fuel the rest of the nightclub. Every person is able to produce 2-20 Watt, depending on people's weight and activity. Though it would be extremely cool to have these in the basements of social houses, in the pub, or connected to the colorful lights at Supersnacks, I believe that the college could use this technology more efficiently if it had tiles like these in places people frequented everyday, for example in the Union or in the lobbies of Thorne and Moulton. The energy used wouldn't necessarily have to go to lighting up the tiles or an energy meter and could simply go to running electricity within each building, although the lighting features are certainly educational. They make participants more aware of their positive impact as well as encouraging them strive to create the maximum amount of energy.

Methods in which this program will reduce GHG emissions: The program reduces GHG emissions by generating energy not from carbon based fuels but from human movement.

Individuals/departments who will be responsible for implementing the proposed program: The physics and ES departments, facilities, possibly dining services.

Potential cost savings for the college: This would depend very much on where the technology was located and what it is connected to. The savings in electrical bills should be noticeable.

Additional community benefits: This would certainly be unique to the area, and could attract eco-tourists to Brunswick! It could also be made into a great educational and interactive tool for all ages.

Additional information: The speed bump idea would also be great to implement, since cars are a lot heavier than people and could generate more gravitational energy. I realize that the town of Brunswick and not the college would be responsible for implementing that on the roads. If the existing tile technology for the dance floor doesn't suit our needs, we could perhaps look more closely at the way these speed bumps are designed (I believe liquid is pushed into some kind of electricity generating system when the bump is driven over).

10. Regenerative Tower Elevators

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Name(s) and affiliation(s) of competitor:: James Lindsay Class 09 Major: Physics and History

Email for primary contact:: jlindsay@bowdoin.edu

Description the proposed program: Replace the tower elevators with regenerative elevators such as the Otis Gen2. If successful, all campus elevators could be replaced with regenerative elevators when replacement was needed.

Methods in which this program will reduce GHG emissions: Regenerative elevators recapture the potential energy of the 1-ton elevator car as it descends. The energy is generated by operating its induction motor in reverse and through further capture of the waste heat involved while braking. These regenerative technologies allow for electrical savings from 50-75%. The electricity is typically fed back into the building's electrical grid to be dissipated by local electrical loads. The tower would be the most appropriate place to install these elevators because of its height, frequency of use, and currently aged elevators. By curbing electrical use in the tower, Bowdoin will consume less electricity and thereby emit less GHG emissions.

Individuals/departments who will be responsible for implementing the proposed program: These elevators would receive funding through approval by the board of trustees or through federal stimulus dollars. Once funded, the elevators would be installed by a qualified construction and contractor group. After the installation, facilities would be responsible for checks and maintenance as they are now.

Potential cost savings for the college: Elevators, such as those in the tower, reach the end of their life span every 25 years. Considering that the tower was constructed in 1964, it is safe to assume that the tower elevators must be replaced within the next decade. The greater cost for the regenerative elevators, when compared to conventional devices, would likely be recouped through electrical savings. Because, a regenerative elevator does not require a major change in design, maintenance costs may remain constant.

Additional community benefits: Hopefully, the electrical savings incurred through the elevators' use will be publicized thereby heightening the public's awareness of energy use and the potential for savings.

Additional information:

11. Renewable Hot Water Heating

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Name(s) and affiliation(s) of competitor:: Spencer Nietmann 2011 Biology and Environmental Studies

Email for primary contact:: snietman@bowdoin.edu

Description the proposed program: This program seeks to reduce the energy Bowdoin uses to heat water for showers. Specifically, it involves using either geo-thermal or solar energy (or some combination of the two) to heat water. If solar energy was used, solar panels would be installed on freshman dorms and/or the Field House.

Methods in which this program will reduce GHG emissions: Based on some quick calculations with help from the Bowdoin physics department, it takes ~910000 Joules of energy to heat 5 gallons of water from 50 degrees Fahrenheit to 90 degrees Fahrenheit. This is well over twice as much energy as is needed to accelerate an average sedan from 0 to 60 mph! If we can use solar or geothermal energy in heating water, we will be less reliant on oil and natural gas and will therefore reduce our GHG emissions.

Individuals/departments who will be responsible for implementing the proposed program: This program would be implemented by facilities management, and would likely be supported by contracted help.

Potential cost savings for the college: Solar panels involve a significant initial investment, but require minimal monetary inputs thereafter. Rather than spending a given amount per year on hot-water heating, then, this program would require an initial investment that would be followed indefinitely by years of free hot water. In a word, the initial cost would be repaid in a few years, and every subsequent year would provide hot water at no additional cost.

Additional community benefits: As an institution of higher education, Bowdoin should also be an example for sustainable living. Visible solar panels would help to assimilate students, faculty, staff, and Brunswick community members into renewable energy culture.

Additional information: I may have submitted an incomplete version of this proposal. If so, please ignore that one. This is complete proposal.

12. Bathroom Betterment

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Name(s) and affiliation(s) of competitor:: Rebecca Perez '12, Mary Ridley '12, Jade Hopkins '12

Email for primary contact:: jhopkins@bowdoin.edu

Description the proposed program: Bowdoin Ballad of Bathroom Betterment The bathrooms at Bowdoin are ever so wasteful We'd rather for them to become more tasteful. The way to achieve this sustainable feat Is outlined below with meter and beat. First, we would like to address the lights, That let us see on these cold winter nights. The shower lights that never turn off Are something at which we've begun to scoff. We feel like if we had a sensor or switch, We could turn on or off and control which is which. The way that we currently light up the shower Is using up the maximum power. It's uneconomical to leave the lights on, Wasting power when everyone's gone. Any way else would waste less than this Â– A sensor or switch would not be amiss. The sensor in the main bathroom, too, Needn't be on all the day, through and through. If a switch could control the sensor's light, Then we could turn it on only at night. Also to throw away a paper towel Is not eco-friendly and should be a foul. For if we recycled these sheets in a bin, We could lessen our impact on the world we are in. Better yet, if hooks could be installed, Then all paper towels could be recalled, For people would bring cloth towels instead To dry off their hands before heading to bed. A” And what of the guests to the floor? A” You may ask? Hand dryers for them will complete the task. We know some money will have to be spent But we shouldn't regret a single cent As we will save money, and power, and trees In the future from making these changes, so please Look into the requests we have laid out in rhyme And make our bathrooms come into their prime.

Methods in which this program will reduce GHG emissions: Saving electricity, lessening paper towel use and therefore reducing greenhouse gas emissions as well as saving trees.

Individuals/departments who will be responsible for implementing the proposed program: Housing maintenance

Potential cost savings for the college: Savings in electricity and paper towel costs

Additional community benefits: A decrease in consumption from the college, which will allow for a model for the community

Additional information:

13. Basic insulating of old off campus buildings.

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Name(s) and affiliation(s) of competitor:: Marko Melendy Science Center

Email for primary contact:: mmelendy@bowdoin.edu

Description the proposed program: I'm proposing an update of simple insulation to make the old houses Bowdoin owns and operates off campus much more energy efficient. I'm not talking about raising a roof or something as involved as that. I'm thinking more along the lines of windows, doors as well as small things. Take my place for example. I live in faculty house and I've spoken with several other people who have lived or are living in Bowdoin housing and most have some similar stories. The windows in my place are probably the original ones installed. They have the lead weights on the sides to help go up and down. This means the sides are not well insulated there needs to be a space for the weights to go up and down. When its cold, the air just blows out of the rope holes like air-conditioning. The windows themselves are old thin single pane glass. The add-on storm window frames have come away from the house in several windows killing the insulation value. One window in the upstairs hallway is not even glass. Its a thin piece of plastic that my young son could probably push out. The door leading to the unheated attic is the same as you might find on an interior closet instead of an insulated external door. The undersides of the counters and the sliding doors have large gaps that let cold air in from un- insulated spaces (you can feel it every time the wind blows). Small pads can back the outlets and switches for pennies apiece but can make a difference in a drafty house. Four of my outlets did not even have a cover plate. Even adding a door to separate upstairs and downstairs air spaces in homes with an old single zone heating system can reduce the amount of wasted heat generated to keep un occupied areas warm. I have placed digital thermometers with data logging in both the upstairs and downstairs to track the heat use. I usually get a 6 to 8 degree F difference between the two. I have had as high as 10F. So to be at 68 downstairs, we tend to run at least 75 upstairs and sometimes as much as 78. This makes for an uncomfortable bedroom. Fortunately for us, unfortunately for Bowdoin, the house leaks heat so fast that shortly after we turn the heat down to the low 60's a while before going to bed, the upstairs cools to the high 60's. When I replaced the old windows in my previous home, I had an oil consumption reduction of about 25%. The windows paid for themselves in about 3 years and we lowered our carbon footprint to boot. Bowdoin pays for the heat so it doesn't hurt us so much as we just hate to see the waste and try to keep the heat down anyway. The 11 windows that I had replaced took a team of two people about a half a day to install but I there will be more effort required in my faculty house. I'm guessing the college owns dozens of old/historic houses/buildings. If so, from what I've seen and heard, there may be a significant number that have still not been updated to newer standards of energy efficiency. I think using less oil in the old houses and offices will lower Bowdoin GHG emissions and carbon footprint.

Methods in which this program will reduce GHG emissions: Making all the buildings not have modern windows more air tight and energy efficient will require less oil and electricity to heat and cool. In addition, all the little thing from insulating fixtures to stopping up holes in walls can add up. This will save money and reduce Bowdoin's GHG emissions.

Individuals/departments who will be responsible for implementing the proposed program: Facilities or whomever has responsibility for maintaining the old off campus housing and offices. Also some responsibility goes to whomever makes the money available for such preventative maintenance.

Potential cost savings for the college: If I used about 25% less oil in my old house I imagine the saving to Bowdoin could be similar. I don't know how much oil Bowdoin buy in a month during the winter for this group of buildings but it must be substantial. Given the large number of building, there will probably be a variety of

conditions from good to bad so this would need to be assessed. Also, preventative maintenance should reduce the amount of future maintenance. For example, my current attic heats up as a result of some of these issues and this causes the roof to get really big ice dams that back up water and cause leaks in two different rooms, one significant. These spots have not leaked during rain. These leaks surely will cause damage over time. The more work is done, the more consumables are used and resources used, not to mention the 7 loads of laundry to do when the clothes closet leaks. This costs more money and increases our carbon footprint.

Additional community benefits: All oil burned causes some degree of air pollution. Oil is delivered in big trucks on our roads, reducing this has multiple benefits. There would also be a benefit to the part of the Bowdoin community that lives in these houses in terms of a better living environment.

Additional information: I have also heard some of this information from students in housing. Maybe some of these older buildings purchased for student housing could also benefit from such things as windows, storm doors or at least air tightening and stopping sources of drafts.

14. Bowdoin: Leading the Way in Renewable Energy

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Name(s) and affiliation(s) of competitor:: Colin Joyner Athletics

Email for primary contact:: cjoyner@bowdoin.edu

Description the proposed program: Bowdoin is acquiring several hundred acres of land from the Brunswick Naval Air Station. With that land, develop an organic garden, a wind mill field, and a solar power field. In addition, retrofit fitness center equipment to be energy producing to power the Fitness Center. On the Naval Air Station land, develop an organic garden that includes a year round greenhouse with student and community employees. The organic garden increases the percentage of local food used by the Dining Service and reduces the transportation carbon footprint. Place fifty plus windmills in the open airfield space. The science department performs world- class research on wind energy and the field of Renewable Energy becomes a prominent major at Bowdoin drawing first-rate minds in the field. Also build a Solar Panel field which creates similar research opportunities and energy production for the college. Consider expanding to wave and tidal flow technology off the nearby coast of Maine. Place hot water solar panels on Farley Field House, Lubin Squash Center, Watson Hockey Arena, and all other buildings that would work and be appropriate. Combined with the Solar Panel research being done on the Naval Station land, this new hot water solar panel project provides students with research opportunities in the Renewable Energy field. As an additional project, retrofit stationary bikes, treadmills, elliptical, etc with batteries to capture the energy created by students using this equipment in the new Fitness Center. The energy could be used directly to light the building.

Methods in which this program will reduce GHG emissions: Local food = less carbon via transportation. Electricity generated by wind and solar power reduces purchased electricity. Heat gathered by hot water solar reduces emissions from natural gas and oil heating. Electricity produced from treadmills and bikes in the fitness center will power electricity in the building.

Individuals/departments who will be responsible for implementing the proposed program:Dining Service
Facilities Sciences Athletics Development Career Planning Student Activities Outing Club

Potential cost savings for the college: Just as Renewable Energy has come to the forefront of the Economy, it is likely that Bowdoin could receive federal contributions to fund these projects. Also, since these projects are energy producing, they pay for themselves. Alumni would be ecstatic to donate to this cause to see Bowdoin lead the way in this field of opportunity. Hot water solar panels reduce heating costs. Wind and solar power save electricity cost of the college. As technology improves for storing wind and solar power into battery power, Bowdoin can continue to reduce it's electricity consumption. Bowdoin students power their own Fitness Center's electricity running and biking to maintain their wellness. A beautiful circle of energy conservation combined with improving wellness.

Additional community benefits: Employment for Brunswick citizens. Direct contact with cutting edge renewable energy technology and practice. The attraction of top renewable energy minds and interest as Bowdoin comes to the forefront of the movement.

Additional information:

15. Up On The Roof Program

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Name(s) and affiliation(s) of competitor:: Brett Gorman, Class of 2011, Economics and History Major

Email for primary contact:: bgorman@bowdoin.edu

Description the proposed program: Bowdoin College has 118 buildings on its campus, comprising almost 2 million square feet of space. This program calls for the examination of the roofs of each of these buildings to determine whether they are suitable for either a) a solar energy system or b) a green roof system. Solar power: the orientation of the roof of each building should be studied to see if solar panels can be feasibly placed, arrayed and connected in order to convert sunlight into electricity. The orientation of the panels may be adjusted during the year to maximize their efficiency. Electricity generated may be used by that building, or other buildings on the campus. Electricity generated during months when buildings are unoccupied can be “banked” through the Central Maine Power grid and given back to the building or the College as a whole when the buildings are occupied and use power. (There are also solar systems that can generate hot water, instead of electricity.) Green roof system: the structure of the roof of each building should be studied architecturally to see if it can sustain, or economically made to sustain, a green roof system. Such a system consists of the placing of soil and planting vegetation in a garden format on the roof so as to i) insulate the roof of the building— saving heating costs in winter months, ii) improve air quality by emitting oxygen in the air, iii) lower the temperature of the air surrounding the building during summer months, iv) reduce storm runoff, v) provide sound insulation, and vi) beautify the campus. In readying a roof for a green roof system, layers of vapor protection, thermal insulation and drainage are installed. Such systems are very popular in Canada and on the west coast and have been known to increase the useful lives of the roofs themselves.

Methods in which this program will reduce GHG emissions: Solar power: A typical home uses about 7200 kilowatt hours of electricity per year (according to Revision Energy, Portland, Maine). If you assume that six dorm rooms equate to a typical home, then depending on the orientation of the roof and the array of solar panels installed, it would require approximately 25 panels occupying about 300-400 square feet of roof space to support those six dorm rooms. (Though the size and capabilities of solar panels vary, one which is approximately 3x5 feet generates approximately 300 kilowatt hours of electricity per year.) Revision Energy has stated that every kilowatt hour of electricity, generated by fossil fuel, generates 1.28 pounds of green house gases. Thus the solar generation of 7200 kilowatt hours of electricity would save nearly 5 tons of green house gases. Green roof system: There are intensive systems of green roofs and extensive systems of green roofs. Intensive systems require architecturally strong roofs and feature deep soil to sustain lawns and plants. They can be park-like and can grow vegetables. The extensive systems typically have lesser maintenance requirements and feature self-sustaining plants that require little fertilizer and minimal weeding. One study by Greenroots.org showed that a square yard of grass generates oxygen to support one human with their yearly oxygen requirement, and will remove about 4 pounds of airborne particulates per year. Savings in heating and cooling were examined by Karen Liu in Ottawa, Canada; she found that a six inch extensive green roof reduced heat gains by 95% heat losses by 26%, compared to a reference roof.

Individuals/departments who will be responsible for implementing the proposed program: I would envision a team consisting of the Bowdoin Facilities Management department, engineers and architects familiar with Bowdoin’s buildings, Environmental Studies faculty, interested students, and representatives from companies that can supply solar power and green roof services would undertake a study to determine feasibility. Adding to the team representatives from organizations that have installed such systems would be desirable too.

Potential cost savings for the college: Solar power: According to Electric Power Monthly, as of February 2009, Maine ranks in the top ten of costliest states for Average Cost per Kilowatt hour (\$13.81 vs. \$9.73 National Average). While there will be a significant up-front cost to install any solar system, there is savings in the years ahead as the solar panels last 25 years. Perhaps there is a way for Senators Snowe and Collins to get legislation passed that would give the college the same type of economic benefit available to corporations and individuals for installing such solar systems. Green roofs: In addition to the obvious heating cost saving, it may be possible to grow vegetables on intensive green roofs, which can be sold or used by the school. An academic course may be offered to students or the community at large on the installation and benefits of green roofs. Legislation was just introduced in Congress that would give tax credits for green roofs. Grants may also be available. As a condition to an outside vendor being chosen to supply the solar power or green roof systems, the companies should be required to hire Bowdoin students interested in these new industries as part of the installation team – defraying cost and potentially creating summer jobs and useful experience. Ongoing maintenance can be performed by interested students.

Additional community benefits: Consideration should be given to getting the Brunswick community involved in the solar energy aspect of the project. With greater buying power the cost per solar panel installed will be less. Perhaps the tax credits not currently available to the College can be passed on to those in the community that can use it.

Additional information:

16. Rooftop Greenhouse Project

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Name(s) and affiliation(s) of competitor: Kathryn Samantha Nichols, 2009, ES-biology major.

Email for primary contact: knichol2

Description the proposed program: Our idea was for a rooftop greenhouse project on the roof of Thorne dining hall. Rooftop gardens are often practical and attractive alternatives to an industrial-type roof, however in Maine they are often less practical because of weight concerns with the addition of snow in the winter, plus they are limited only to the warmer seasons. By enclosing the space as a greenhouse many of these snow and weight concerns would be addressed. There are a variety of light soil options, or even hydroponics systems to keep the weight down and maintain structural integrity. Even an unheated greenhouse can grow winter greens and some root vegetables during the winter, and it provides an excellent place to start seedlings during the early spring. A rooftop greenhouse would have the added benefit of any heat lost from the building underneath, and would also help the building maintain its own heat better. The roof of Thorne is a flat, south facing roof that would be great for this purpose. There is plenty of light because the nearby road eliminates much of the tree cover, and its proximity to the dining hall would have many benefits. To address the issue of access to the roof a simple stair on the side of the building near the loading dock would be practical and easy to add. The enclosed nature of the greenhouse would address any safety concerns about falling off the roof. To prevent blocking the view from the windows of Thorne the greenhouse could either be designed so that it is set back from the windows, or the windows could be incorporated into the greenhouse so that they look out through the glass ceiling.

Methods in which this program will reduce GHG emissions: First and foremost a greenhouse for the dining hall would be a step toward reducing the food miles of our dining hall and encouraging local production. Additionally it would provide a buffer to heat extremes that affect Thorne, retaining heat that might be lost in the winter and buffering high heat during the summer. If there was interest in heating the greenhouse during the winter to expand production, the adjacent slanted roof slopes southward and would be the ideal location for solar water heaters (solar water heaters on the roof of Thorne might be a great idea for the dining hall whether or not there is a greenhouse, as it would help cut many of the cost of heating the water for dishes and such). Additional benefits to this program would be a reduced use of pesticides and chemicals in the cultivation of our food. The roof is also an ideal place for this project because it is not particularly visible to the public, and therefore aesthetics are less important. With less concern for aesthetics the greenhouse project could use far more reclaimed materials to build the structure.

Individuals/departments who will be responsible for implementing the proposed program: There is opportunity to bring a variety of groups from around campus into this project. Academically the art and architecture classes could play a valuable role in choosing materials, coming up with designs and working out logistics. The ES or Biology departments could be drawn in to do research with dining regarding what foods to produce, how to maintain efficiency and how to use effective and responsible pest controls. Obviously this would also be a great opportunity to further the collaboration between Bowdoin Dining and the Organic Garden project, as well as with Sustainable Bowdoin.

Potential cost savings for the college: Heat costs would be an important side effect of placing a greenhouse structure in such a convenient location. But also the school would no longer have to pay a premium for the goods it produces in order to get high quality, local produce which would benefit not only the students in the dining hall but also the dining hall image.

Additional community benefits: There are many ongoing educational benefits, particularly right next to the children's center for members of both the Bowdoin and town community.

17. Consolidated Fall Break

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Name(s) and affiliation(s) of competitor:: Paul Schaffner Psychology

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Description the proposed program: Continue fall break as a two-day (Monday Tuesday) suspension of academic activities, but reschedule it to the beginning of Thanksgiving week.

Methods in which this program will reduce GHG emissions: Our students have the equivalent of a full week of vacation each fall, but in two briefer breaks that are, in effect, extended weekends. Moving fall break to the beginning of Thanksgiving week would produce a single, week-long recess. This schedule would benefit the College in several ways. Central to this proposal, it would eliminate GHG emissions generated by student travel. With a single, consolidated fall break, students would travel home (or wherever they go) once each fall term, not twice. I estimate that a consolidated fall break would reduce CO₂ emissions by 867 tons each year. This estimate is based on data from a survey of 23 current students who reported their itineraries during fall break 2008 (19 left campus; 4 did not). Collectively, these students traveled 6018 miles by car, 1080 miles by van/carpool/bus, and 704 miles by train, and spent 47 hours flying. I converted these values into CO₂ emission estimates for all 1,650 resident students, using algorithms at www.carboncounter.org and www.carbonify.com. I assumed that 80% of fall break travel would not occur if we revised the calendar as proposed. (As all 23 students also reported leaving campus for Thanksgiving break 2008, I did not model an increase in travel during a consolidated Thanksgiving break).

Individuals/departments who will be responsible for implementing the proposed program: I have no idea.

Potential cost savings for the college: Bowdoin would incur the costs of shifting from “in-session” to “not-in-session” operational status, once each fall rather than twice.

Additional community benefits: A full-week, consolidated fall break in November would provide at least four further benefits. [1] It would eliminate the gradual erosion of academic engagement we affectionately call “Thanksgiving break creep.” [2] It would enhance students’ well-being at a time when such a boost is needed: toward the end of the term, not less than half-way into it. Furthermore, the net impact of a full week (plus two weekends) ‘off’ may well be more salutary than the aggregate benefits of two very short breaks. [3] It would create new scheduling opportunities for student, alumni, and public events that occur on campus on weekends. In particular, fall break routinely occurs at or near the peak of fall foliage, whereas late-*is* November weekends in Brunswick are not known for much of anything appealing. Why, then, do we send students away from campus on one of its best weekends, and keep them here on one of its drearier ones? [4] It would reduce the aggregate cost of attending Bowdoin for students who do not live nearby. This would add to the overall affordability of a Bowdoin education. True, not all students travel during fall break; some may go somewhere nearer-by if they live far away. But our financial aid students have less choice in what they can do during breaks— and disparities in ‘break travel’ are an acute signal among students of their relative financial well-being. Also, at a time when most people are seeking to contain costs as well as carbon emissions, this added expense seems less justifiable.

Additional information: Bowdoin has published statistics about which activities produce GHG emissions (viz., announcements of this contest). These numbers suggest that student travel to and from campus is not included within the College’s GHG model. If this inference is correct, I believe economists would label student travel an externality, which roughly translates as “Not our problem.” That is, Bowdoin takes ownership of what we do on

campus, but not of what we ask students to do in order to get here (and then leave). But student travel to and from campus occurs in direct response to the academic calendar we set. So it is our problem. After all, Earth is equally harmed by GHG emissions from any source. Student travel to and from campus clearly is an important source of GHG emissions. Such travel is largely determined by Bowdoin's academic calendar. And the calendar is set by College policy. We now schedule four 'break' periods each academic year, and we expect or require most students to leave campus for all of them. Thus we ask a typical student to make five round trips to Bowdoin each academic year. There is little doubt that most students (and others) appreciate and enjoy all four breaks. But times have changed; it is time to consider the value gained from scheduling fall break in October, against the added costs (both environmental and financial) of this schedule

18. Bowdoin Organic Farming Initiative

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Name(s) and affiliation(s) of competitor:: Michael Woodruff '87, Director of the Bowdoin Outing Club and the Schwartz Outdoor Leadership Center

Email for primary contact:: mwoodruf@bowdoin.edu

Description the proposed program: Develop an organic farm incorporating the current Bowdoin Organic Garden. Possible sites include land trust property currently utilized by the Bowdoin Organic Garden, the Thalheimer property on Orr's Island (formerly a farm), and land currently on Naval Air Station Brunswick. This would be a particularly good use for land on the Bowdoin Wind Farm at NASB. The goals of the program would be to: Teach a curriculum based on texts including "The Omnivore's Dilemma" and "In Defense of Food" by Michael Pollan, Barbara Kingsolver's "Animal, Vegetable, Miracle: A Year of Food Life", and the writings of Wendell Berry, Henry David Thoreau, Elliot Coleman and Joel Salatin, among others. This would be a multi-disciplinary curriculum, with numerous departments collaborating/contributing. Create a working farm utilizing best practices of small scale farming to produce the majority of the food supply necessary to feed the Bowdoin student population throughout the year (including year round crops in greenhouses heated by alternative methods).

Methods in which this program will reduce GHG emissions: Utilize low-till (strip) and no-till methods with cover cropping and composting to sequester carbon in the soil, while increasing soil fertility. Utilize low energy inputs (animal traction, alternative fueled tractors, human power) to reduce carbon emissions.

Individuals/departments who will be responsible for implementing the proposed program: Departments should include English, Environmental Studies, Economics, Biology, and Chemistry Bowdoin Organic Garden Local Farmers Interns from Maine Organic Farmers and Growers Association (MOFGA) Journeymans Program Michael Woodruff, Bowdoin Outing Club Dining Service

Potential cost savings for the college: In the near term, this may not produce a net cost savings. However, in the future this program may be a major driver in attracting applicants to the College and provide food security for the College and the surrounding community. When the true cost of producing food becomes reflected in the prices we pay, Dining Service should realize a major cost savings from this project

Additional community benefits: This farm project would be a laboratory for cutting edge development of alternative small farming practices to reduce our reliance on fossil fuel for food production and transport.

Additional information:

19. Programmable Thermostats

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Name(s) and affiliation(s) of competitor:: Kevin Johnson, Manager of Student Employment

Email for primary contact:: kjohnso5@bowdoin.edu

Description the proposed program: Install programmable (digital) thermostats where applicable, particularly in older buildings like Pols, Gustafson, etc.

Methods in which this program will reduce GHG emissions: Currently, the manual thermostats currently in place can be raised or lowered, but this practice depends upon staff remembering to lower the setting when leaving the office at night or before the weekend. Similarly, when returning in the morning, people have the tendency to raise the temperature quite high, to quickly make the building comfortable, but most forget to turn the thermostat down once a desirable ambient temperature is achieved.

Individuals/departments who will be responsible for implementing the proposed program: Housekeeping and Buildings staff could program the thermostats as needed.

Potential cost savings for the college: According to most sources, the "accepted rule of thumb is that for each degree of setback over an eight-hour period, you'll reduce energy consumption by 1%." Furthermore, many programmable thermostats include holiday and weekend settings, which would increase cost savings during longer unoccupied building hours.

Additional community benefits: The Rocky Mountain Institute estimates that the average household could reduce Carbon Dioxide emissions by 1,071 pounds per year if a programmable thermostat is installed. Less carbon emission = happier Maine.

Additional information: Informative links:

http://apps1.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12720

http://www.energystar.gov/index.cfm?c=thermostats.pr_thermostats

http://www.rmi.org/images/PDFs/Climate/C02-12_CoolCitizensBrief.pdf

20. Wind Energy

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Name(s) and affiliation(s) of competitor:: Michael Woodruff '87, Director of the Bowdoin Outing Club and the Schwartz Outdoor Leadership Center

Email for primary contact:: mwoodruf@bowdoin.edu

Description the proposed program: Construction of a power generating wind turbine on a tower attached to the roof of Coles Tower, as both a source of clean energy and as a demonstration for the wind farm on the Naval Air Station Brunswick property that the college will be acquiring. This will be a highly visible demonstration of our commitment to reducing our carbon footprint. This phase of the project should also include a wind feasibility study for possible sites on NASB. The second phase of this project would be the actual design and construction of the Bowdoin Wind Farm. This project may be eligible for federal economic stimulus funding.

Methods in which this program will reduce GHG emissions: Instead of purchasing allegedly green electricity, we will be generating our own, and may be able to become a net supplier to the grid, as opposed to a consumer. In fact, this project might be able to make Brunswick an off-the-grid community!

Individuals/departments who will be responsible for implementing the proposed program: Keisha Payson, Sustainable Bowdoin Departments of Physics, Economics, Environmental Studies, Geology

Potential cost savings for the college: Boone Pickens and Angus King may be able to give us some current numbers that will clearly delineate the financial benefits of this project.

Additional community benefits: As mentioned above, this project may be able to make a significant contribution to Brunswick's electrical power needs.

Additional information:

21. Save the Pines with Bowdoin Turbines

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Name(s) and affiliation(s) of competitor:: Bree Simmons, Assistant Director Outing Club Sander Abbott, Assistant Director Outing Club Michael D. Woodruff, Director Outing Club

Email for primary contact:: bsimmons@bowdoin.edu

Description the proposed program: Install groups of wind turbines on campus and campus property. Suggested locations include, but aren't limited to: Cole's Tower, Coastal Studies Center, Merritt Island and NAS land.

Methods in which this program will reduce GHG emissions: This plan will significantly reduce Bowdoin's dependence on traditional sources for electricity. The energy could be sold back into the grid, or used directly on campus. Wind turbines will also provide power to the campus when traditional sources aren't functioning.

Individuals/departments who will be responsible for implementing the proposed program: Facilities Environmental Studies Department and/or Physics Department

Potential cost savings for the college: Electricity Costs Electric Heating Costs Maintenance Costs

Additional community benefits: Bowdoin will continue to set the example for being environmentally progressive for the Brunswick area community and peer institutions. This will also continue to draw students interested and concerned in environmental matters. This project would provide academic departments and students an incredible opportunity to collaborate, calculate and collect data involved with the project. It will also create jobs for both the installation and implementation of the wind turbines.

Additional information:

22. Paperless Payroll

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Name(s) and affiliation(s) of competitor:: Dan Dowd Security Guard/Museum of Art

Email for primary contact:: ddowd@bowdoin.edu

Description the proposed program: E-mail pay stubs and statements to employees. Further, e mail W-2 forms for 2009.

Methods in which this program will reduce GHG emissions: This will reduce vast amounts of paper usage.

Individuals/departments who will be responsible for implementing the proposed program: Human Resources, IT.

Potential cost savings for the college: This will certainly reduce payroll company costs and also save considerable time for the mailroom.

Additional community benefits: Great PR for the college and community.

Additional information:

23. Office Energy Competition

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Recently Jim Kelley and I were speaking about cost savings measures for the College especially energy savings. We discussed how family members might sit down around the supper table to discuss how they were going to work together to reduce electricity bills, turn the thermostat down, not take so many quick trips to the grocery store, etc. We wondered if the College might consider the same approach to garner grass roots ideas about how to conserve energy – that is, set aside a time (maybe during the Climate Change extravaganza in April) when all of the occupants of a building might gather for an hour or so to come up with energy savings ideas for their campus location.

I work in McClellan, so we might have interested parties from the Controller's Office, Human Resources, Office of Communications, and even some Art faculty. We know the quirks of our building and together, interdepartmentally, we could come up with suggestions to improve our energy efficiency, save waste, etc. For example, do we save any energy by keeping our blinds down on a cloudy day or opening them on a warmer, sunny day during the winter? If we knew the answer to this question, all of us could try to implement it on a daily basis. I'm sure there are many more examples we could come up with – as a "family."

I know the residence halls have energy "competitions" – we could perhaps compete with ourselves by putting new our suggestions for energy savings in place and then comparing past electricity usage/costs with electricity usage going forward. It's just an idea to have employees sit down informally to share ideas about what we can do for 8 hours a day, separately and together, to make a difference. We might be pleasantly surprised by the results of implementing many tiny changes peculiar to individual buildings.

Good luck with the Climate Change competition!

Cindy Bessmer

24. Motion sensor switches for all lighting in offices

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Name(s) and affiliation(s) of competitor:: Jon Wiley Dining Service

Email for primary contact:: jwiley@bowdoin.edu

Description the proposed program: We could install motion sensors to control all lighting in offices - they shut off in as little as 12 seconds when motion is no longer detected. They cost about \$20 @ Lowe's - I've installed 2 at home and they should help reduce my electric bill. I'm sure the College could get them at a reduced cost from one of our vendors.

Methods in which this program will reduce GHG emissions: It would certainly reduce our energy consumption, especially given the fact that many of us are part of the "aging work force" and sometimes forget to turn off lights, no matter how well-intentioned we are!!

Individuals/departments who will be responsible for implementing the proposed program: The FM electricians most likely

Potential cost savings for the college: Monthly energy consumption would be reduced - not sure how long the "payback period" would be

Additional community benefits: Would reinforce community perception of College as committed to reducing the carbon footprint, also would serve to support local businesses.

Additional information:

25. Bottled water reduction

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Name(s) and affiliation(s) of competitor:: Andrea Richards, communications

Email for primary contact:: arichard@bowdoin.edu

Description the proposed program: Replace purchased bottled water from Crystal springs with on location water filters/coolers.

Methods in which this program will reduce GHG emissions: This would reduce emissions from trucks traveling between the Crystal Springs bottling plant and Bowdoin College. It would also leave the groundwater Crystal Springs uses where it belongs.

Individuals/departments who will be responsible for implementing the proposed program: facilities

Potential cost savings for the college: Cost savings would result from the reduced/eliminated contracts with Crystal Springs, but I am not sure whether this would offset the installation and maintenance of the new system.

Additional community benefits: Fewer jammed fingers and sore backs from lifting water bottles onto the coolers

Additional information:

26. Decreased plow areas

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Name(s) and affiliation(s) of competitor:: Mike Grim Facilities / Grounds

Email for primary contact:: mgrim@bowdoin.edu

Description the proposed program: Decrease snow-plowed areas on campus by limiting plowing inside quad areas. Do not plow any diagonal walks, plow only the outside walks around the quads.

Methods in which this program will reduce GHG emissions: Less plowing = less fuel and emissions.

Individuals/departments who will be responsible for implementing the proposed program: Facilities / Grounds

Potential cost savings for the college: Less Fuel; less salt / sand; less turf repairs in the spring. Less chance of damage to sprinkler system on Cleveland Quad.

Additional community benefits: Less salt runoff, less soil damage.

Additional information

27. Human provided energy

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Name(s) and affiliation(s) of competitor:: Christian S. Derbyshire -- Dining Service - Thorne- Late Night Meal Coordinator

Email for primary contact:: cderbysh@bowdoin.edu

Description the proposed program: Using human power instead of machines/vehicles whenever possible: When I went to school in the '60's and '70's, about 5% of my classmates were obese; this has grown to over 30% in a modern classroom. During that same time frame, an automobile was about 0.1% efficient. That is, for a gallon, or 10LBS of gasoline, 9.99 pounds of pollutants were produced. Today, and automobile is about 10% efficient (a 100-fold increase) producing only 9 pounds of pollutants for a gallon of gas. If school children used and rode bicycles the way they did in the sixties and seventies, this greater automobile efficiency could have a substantial impact on the environment. However, increases in population and a vastly more sedentary life- style have largely negated the efforts of the government and auto manufacturers to reduce actual pollutants in the air. On the side, this has also resulted in a less healthy population, and a huge increase in the presence of the medical INDUSTRY in our daily lives. Here at Bowdoin, most faculty and staff drive fewer than five miles to get to work each day. For a fit person on a bicycle, this is about 15 to 20 minutes of riding, but even for an average person, the time investment in a five- mile ride would only be about half an hour. If every Bowdoin employee used a bicycle or walked when the weather was good, this would result in over 1,000,000 pounds of pollutants NOT going into the air each year (based on 25MPG, 5000 students and employees, and 100 "good" days per year. This would also result in a significantly healthier Bowdoin community. Here at Thorne, I see another significant area where GHG could be reduced, and this would apply to many facilities on campus: currently we use a floor machine after breakfast, lunch, and dinner to clean the floors, regardless of how soiled those floors might be. Again, there are well over 100 days per year when manual mopping (with a bucket and mop) could be used instead of the floor machine; this, too, would result in a healthier Bowdoin community and a substantial reduction in electric usage!

Methods in which this program will reduce GHG emissions: Reducing direct output of pollutants from automobile emissions, and reducing electrical utility demand for which generation results in GHG.

Individuals/departments who will be responsible for implementing the proposed program: Dining service (if approved or desired)

Potential cost savings for the college: See above.

Additional community benefits: Health benefits for all participants; less congestion on streets and highways; a reduction in the potential for fatal accidents.

Additional information:

28. Re-Green the Greens

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Name(s) and affiliation(s) of competitor:: Sarah Morgan, Information Technology

Email for primary contact:: smorgan@bowdoin.edu

Description the proposed program: There's a lot of grass on campus, and Facilities does a fabulous job of keeping it trimmed, lush and green. But all the green might not be so green, after all. I know that mowing my .4 acre lawn uses a fair amount of gasoline, so I can only imagine how much fuel is used to keep Bowdoin's lawns looking so great. Therefore, I am proposing to reduce the amount of mowed grass on campus. Don't worry, I'm not proposing that we leave giant brown pits around campus. We still have to compete with Colby, after all! What can take the place of the grass? Well, I have some ideas: 1. Art Garden! There could be an outdoor space to showcase outdoor sculpture by Bowdoin students, faculty, and maybe even staff. The foundation could be something that requires little maintenance, such as crushed stone, natural pavers stones, or recycled rubber. 2. Okay, the Art Garden was my big idea. But I bet we could do something like replace grass with some low-growing, low-maintenance ground cover. 3. So, now I'm running low on more ideas. How about this? Kind of like the Adopt-a-Highway program, departments around campus can sign up to take care of a section of grass, and they have to do it with reel mowers. This could be a team-building activity for departments, and assist with wellness initiatives, as the reel mowers can provide a good workout.

Methods in which this program will reduce GHG emissions: The main benefit of this program would be to reduce the amount of gasoline used to maintain the campus grounds.

Individuals/departments who will be responsible for implementing the proposed program:Not sure, but I suspect it will need to be overseen by Facilities.

Potential cost savings for the college: Again, the cost savings here would be the price of gasoline, and perhaps some equipment maintenance. If departments got involved and got more fit, perhaps there would be a fringe benefit in reduction of health insurance costs.

Additional community benefits: Art Garden! Who wouldn't want to bring a lunch and sit in the Art Garden on a sunny day?

Additional information:

29. Rooftop Garden for the Heating Plant

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Name(s) and affiliation(s) of competitor:: Sarah Conly Department of Philosophy

Email for primary contact:: sconly@bowdoin.edu

Description the proposed program: I propose a rooftop garden for the central Heating Plant. A rooftop garden for the Heating Plant would make the central campus area more attractive, draw attention to Bowdoin's sustainability efforts, improve the environment and can reduce operating costs, including heating and cooling. Rooftop gardens are increasingly popular for both aesthetic and practical reasons.

Methods in which this program will reduce GHG emissions: Rooftop gardens reduce the carbon dioxide effect by absorbing carbon dioxide and releasing oxygen. Indirectly, such gardens typically reduce both heating and cooling costs for the building they are on.

Individuals/departments who will be responsible for implementing the proposed program: Employees who work on the physical plant would be needed for gravel and soil installation. Actual planting could be done by students and other volunteers. Suggestions for plants could come from biologists, gardeners, and Dining Services (could they use fresh basil, fresh cilantro, even fresh tomatoes? Undoubtedly.) Garden designs could come from art students (or anyone with an artistic bent.) Alumni might want to donate for plants or benches. The whole community could be involved.

Potential cost savings for the college: First, as above, it reduces heating and cooling costs. Such gardens also reduce rainwater runoff, which makes less load for the sewer system. (They also improve the quality of run-off, as bio-filtration systems.) And, they can lengthen the life of the roof, by providing protection from UV-rays and extreme temperature differences.

Additional community benefits: The new fitness center will afford great views of campus--and looking down at a rooftop garden would be more soothing and pleasant for all than looking down at asphalt roofing (and plans for rooftop gardens can be extended to other flat roofs in the area.) Employees in the Heating Plant can take a relaxing break in a garden. And, such an innovative and attention-getting response to environmental need would attract notice to Bowdoin's sustainability efforts among potential students and media. And, it would create a memorable impression on Bowdoin students which they would take with them into the world.

Additional information: Rooftop Gardens really work, even in cold climates--the city of Chicago is actively promoting them. Installation costs are generally \$10 to \$12 a square foot, cheaper than getting new kitchen counters! And a lot more useful.

30. Bowdoin Battles Climate Change

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Name(s) and affiliation(s) of competitor:: Elizabeth (Libby) Wilcosky '10 Government & Legal Studies and Spanish

Email for primary contact:: ewilcosk@bowdoin.edu

Description the proposed program: In order to achieve maximum reductions, this program aims to address many different sources of greenhouse gases while focusing most on electricity and fuel usage which make up the vast majority of the college's emissions (81%). Recognizing that many changes will need to be made by individuals, the program will also include an educational program during orientation for freshmen that will encourage them to practice sustainability. A central part of reducing emissions comes from conservation itself. While there is already good dialogue on campus about turning off the lights and recycling we need to do even more. Some buildings on campus remain lit all night long even if they are closed and unoccupied. While some lights might be necessary for security reasons, we should limit the lights and make sure they are energy efficient light bulbs. Another area where improvement could be made is through heating. While lowering set temperatures by a few degrees in winter and raising them in the summer has been a good way to reduce fuel usage, more improvements can be made. People often times complain that their rooms are too hot and they're forced to open the window to keep a pleasant temperature. This is a huge waste of energy that could be avoided if the rooms were set to a lower temperature. Another way to conserve energy could come if people had an alternative to the dryers. We could have simple clothes drying racks in the laundry rooms so people could save \$1.50 and save some energy. One final thought is if there was a way to guarantee that electricity and fuel would not be burned over break times when no-one is occupying residence halls. One way to encourage students to unplug appliances and lower their thermostats would be to charge them a room damage fee if this does not happen. Another approach is to encourage efficiency. So that less fuel for heating can be used, we should make efforts to improve insulation. Shades and blinds should be used in the summertime to keep buildings cool. During the winter months shades should be drawn at night and open during the day to prevent heat loss and capture sunlight, respectively. The college could also look into replacing windows and improving insulation in buildings that are currently very leaky. Energy efficient light bulbs should be made available to students at all times so they can have the most efficient lighting possible for their personal lights as well as those installed in the room. To lessen the impact of employee commute, more carpool parking spaces should be offered. The yellow bike program should be expanded and if possible, extended to the town of Brunswick so that residents can become more efficient as well. Has anyone invented a bike that can work in the snow? Because that would also be very helpful. We should also think about subsidizing the cost of the Concord Trailways bus tickets so students have more incentive to take the bus rather than drive whenever possible. We should also look into buying renewable energy credits from reputable companies to offset some of the emissions that we cannot completely eliminate. If these could come from local companies we would be supporting our community at the same time. A final important part of this program will be education. I've witnessed students driving short distances because they think that this small act of polluting won't make a difference. Every little action counts. Many people might not know that certain electronics use electricity even when they're turned off. By giving our incoming freshmen information about sustainability during orientation they can create sustainable habits for their four years at Bowdoin and beyond. There should also be talks of sustainability with faculty and staff so they are aware of changes they can make. Ultimately, we need people to care about this issue. One way to make people more aware of their actions is to have them fill out a survey to calculate their carbon footprints.

Methods in which this program will reduce GHG emissions: By using less electricity and fuel, fewer Greenhouse gases will be released into the atmosphere. Since the way buildings are heated varies so much depending on the building, there should be a way for students and faculty to report inefficiencies so that they

can be fixed. No room on campus should be too warm. Similarly, the college should consider allowing individual thermostats in rooms with a cap temperature for the winter and base level for the summer. That way if people wouldn't mind setting their individual thermostats even lower than the college wide level of 68 degrees in the winter, the college could save even more energy. Encouraging carpooling, bike-riding or taking the bus will all help to reduce our carbon footprint. Our education program can begin once people first arrive to campus. Following pre-orientation trips around the beautiful state of Maine the need to preserve our environment can really be connected to actions in our everyday lives.

Individuals/departments who will be responsible for implementing the proposed program: A variety of different people will be needed to make sure this program succeeds. Changes such as renovations or purchasing of renewable energy credits that require significant funds will probably need to be addressed by people in charge of the budget then implemented by the sustainability office. Things such as education of incoming freshmen can be conducted by proctors in association with Eco-Reps. There should also be a person who can be contacted when students, faculty or staff feel that there is a very inefficient situation that should be addressed (such as an overactive heater). Many of these things must be implemented by each of us individually which is why the educational program is so important.

Potential cost savings for the college: By reducing our consumption through conservation we will see direct savings since less energy will be used. Any potential costs, such as purchasing drying racks will presumably be paid for over time by lower energy bills. Efficiency may take more money to implement if renovations are being done or high numbers of light bulbs purchased, but these improvements should also pay for themselves over time.

Additional community benefits: If we are able to extend the yellow bike program to the town of Brunswick, we can provide alternatives to cars for people who live and commute in town. Since there is no bus system and walking is not an option, people will often simply drive. By reducing our emissions we will be improving the air quality for all members in the town as well. Finally, if we are able to invest money in local renewables, then we are supporting our local economy as well

31. Reduce heat leaks in Jewett Hall and other leaky buildings

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Name(s) and affiliation(s) of competitor:: Sharon Pedersen Information Technology

Email for primary contact:: pedersen@bowdoin.edu

Description the proposed program: Stop heat loss by applying low-hanging fruit principles of the Charlie Wing energy audit program to Jewett Hall, and other buildings that are equally heat-loss. Most obvious, the southeast door doesn't close properly, and even when it does you can feel frigid air roaring through the crack around it in winter. There are surely many other easily-fixed areas that are contributing to heat waste in Jewett and other buildings on campus.

Methods in which this program will reduce GHG emissions: By reducing heat loss and cold infiltration, it will take less fuel to heat buildings, and that will reduce emissions.

Individuals/departments who will be responsible for implementing the proposed program: Facilities Management

Potential cost savings for the college: Less fuel used for heating buildings.

Additional community benefits: People who work in Jewett Hall and other buildings will be warmer, less exposed to drafts, and able to work better.

Additional information:

32. Turning off the heat in entry ways to buildings

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Name(s) and affiliation(s) of competitor:: Damon Gannon, Bowdoin Scientific Station

Email for primary contact:: dgannon@bowdoin.edu

Description the proposed program: Most buildings on campus have entries where there are 2 sets of doors. This design serves as an airlock, separating the heated indoor air from the cold outdoor air. But most of these entries are heated, which defeats the purpose of the air lock. Much of the heat in the entry escapes to the outdoors. Simply turning off the heat in these entry areas can reduce heat loss.

Methods in which this program will reduce GHG emissions: Increase heating efficiency

Individuals/departments who will be responsible for implementing the proposed program: Facilities Mgmt.

Potential cost savings for the college: Reduced heating costs.

Additional community benefits: Implementation doesn't require any investment of equipment.

Additional information:

33. Interlace

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Name(s) and affiliation(s) of competitor:: Elsbeth Paige-Jeffers 2010 Double-Major in Visual Art and French

Email for primary contact:: epaige@bowdoin.edu

Description the proposed program: I plan on creating an outdoor installation using rope, recycled/used plastic bottles, and two trees on the quad. I will use the two trees as braces, between which I will use rope to create a series of interconnections, entanglements, and knots resembling lace or a web. I will adorn the web with the used plastic bottles, in a fashion similar to putting beads on a string. I plan on using both whole and deconstructed bottles, devoid of their labels as to avoid any brand-name association which detracts from the installation. I hope for the aesthetic to be organic, almost wet and glittery in appearance. I also plan on making the installation quite large, reaching up the trees at least 10 or 15 feet.

Methods in which this program will reduce GHG emissions: Art holds a unique position in our society. It can reach across theoretical and intellectual divides to influence and inform people. I hope that creating something beautiful will help to communicate effectively with the campus and community. I hope that my installation will inspire people to think about their consumption of plastic bottles, which are prolific around campus and in our region of the world. The size of the installation, its prominent location, and the sheer number of bottles included will represent the amount of energy it takes to produce a plastic bottle (47 million gallons of oil is consumed to produce the bottles that Americans drink out of each year. This is enough oil to take 1-billion pounds of carbon dioxide out of the atmosphere), the amount of energy it takes to dispose of a plastic bottle, and the space a plastic bottle takes up in a landfill (86% of plastic bottles used in the U.S. end up in landfills, where they will take up to 1,000 years to biodegrade). All statistics taken from <http://www.allgreenthings.com>.

Individuals/departments who will be responsible for implementing the proposed program: I am currently enrolled in an independent study in installation art through the Visual Arts Department. I will be personally responsible for obtaining the necessary materials and installing the work. My faculty advisor is Wiebke Theodore.

Potential cost savings for the college: If all students were to abandon use of plastic bottles and become more conscious of their consumption of plastic in general, there would be less tonnage of recycling left to the college to deal with and process.

Additional community benefits: As a piece of art, my installation will reach beyond a simple or narrow application. It will inspire people to think critically about their lives, the pressure they place on the environment, and what they can improve. It is easy for people to discard technical or scientific suggestions regarding green habits because they are often difficult to understand. A work of art is interpretative and language-less; it will reach everyone on a level suitable to them.

34. Re-cycling Electricity

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Name(s) and affiliation(s) of competitor:: Nathan Morrow, Class of 2009, Physics Major

Email for primary contact:: nmorrow@bowdoin.edu

Description the proposed program: Implement the use of power generators connected to exercise bicycles and potentially rowing machines. Distribute bikes in traditional gym locations and additional residential locations.

Methods in which this program will reduce GHG emissions: The power provided by the student workouts will provide a minor, but very real reduction of outside GHG emitting power plant usage.

Individuals/departments who will be responsible for implementing the proposed program: Athletics and Facilities

Potential cost savings for the college: Reduction of electricity bill.

Additional community benefits: Students will have an additional incentive to exercise and live a healthy life, along with learning GHG awareness from posted project documentation.

Additional information:

35. Student Ideas

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From: Jeffrey Alger
Sent: Thursday, February 12, 2009 8:52 AM
To: Keisha Payson
Subject: Energy efficiency - just a thought

1. Students are unable to lower the thermostat setting in our rooms, even though there is often a barred-off thermostat present in the room anyways. I know I've run into situations where the room has been too hot, and have actually had to open the window to cool it off. In January. In Maine. I can't imagine that does much for heating bills, and I'd rather be able to just turn down the heat. I doubt I'm the only person who's run into this problem.
2. I read recently about an energy company somewhere in California I think which started mailing report cards to customers - it ranked their energy usage next to the "typical" energy usage for others in their situation. I have to wonder if students wouldn't have better energy practices if they simply got some recognition when they did a particularly good job, and a gentle nudge when their room was consuming far above average. It might not help at all, but it also could help quite a bit.
3. You might want to look into Building Dashboard if you haven't already. It's basically a glorified smart meter plus interface, a la Google Power Meter (which is unfortunately still in closed beta).

<http://buildingdashboard.com/>

<http://www.luciddesigngroup.com/institutional.php> for a list of some other colleges using this; you could call and ask whether they think it's been worth it.

4. You might want to procure a handful of watt-hour meters and let students sign them out if they want to test the energy usage of devices. For example, I have no clue how much energy my computer consumes when it's on and running intensive calculations, on but just idling, in standby, in sleep, or off. I have no clue how much the refrigerator takes, the TV takes, or anything of that sort. I could buy one of these devices and test, but that's about \$30 out-of-pocket for something I'd probably use once in the next year.

-J.J. Alger '09

36. Investment in a Wind Turbine

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Name(s) and affiliation(s) of competitor:: Rachel Dicker 2009, Biology

Email for primary contact:: rdicker@bowdoin.edu

Description the proposed program: Bowdoin would do itself and the environment a great favor by investing in a wind turbine (an approximately \$2 million project). This amount seems extraordinary, especially in today's economic setting, but I am of strong belief that a wind-powered turbine would pay for itself in electricity savings in a matter of a decade or less, and would significantly reduce the College's carbon emissions, while making the College only the second institution of higher learning in the state (and the 1st south of Aroostook County) to utilize this sustainable form of alternative energy.

Methods in which this program will reduce GHG emissions: The American Wind Energy Association states that wind turbines can reduce carbon dioxide emissions (the most problematic GHG) by 300 million pounds, or 1500 tons, per year. According to Wackemagel and Rees, this amount is equal to the amount absorbed annually by a 500-acre forest (1996).

Individuals/departments who will be responsible for implementing the proposed program: President Mills' Climate Commitment Advisory Committee will be essential in gaining support for and carrying out the wind turbine project.

Potential cost savings for the college: Electricity usage is the College's largest cause of GHG's (43%). This percentage is huge, and electricity is by no means cheap. Installation of a wind turbine could lower electricity use by 50-90% (American Wind Energy Association), and would therefore significantly lower Bowdoin's large electricity bill for each year of use. After several years, the wind turbine will have more than paid for itself.

Additional community benefits: The town of Brunswick and surrounding area will benefit in several important ways. First, the installation of a wind turbine is a huge step in the right direction toward carbon neutrality, and will decrease carbon emissions right here in Brunswick. In addition, wind turbines are not unsightly or loud, are easy to install, and do not take up a great deal of room. As at the University of Maine at Presque Isle, Bowdoin's installation of a wind turbine will bring fantastic press to the surrounding community. Also, Bowdoin's environmentally-friendly example will provide an outstanding model for the region. By taking this step forward toward carbon neutrality, the College will be committing to its pledge to reduce carbon emissions and will set the stage for other institutions in the area to move in the same direction.

Additional information:

37. Replace the 24 hour hall lights with motion sensors

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Name(s) and affiliation(s) of competitor:: Spencer Eusden

Email for primary contact:: seusden@bowdoin.edu

Description the proposed program: Replace the hall lights in dorms and other buildings, which are left on 24/7, with a motion sensor based lights system, similar to the ones in the bathrooms of some dorms i.e. West Hall.

Methods in which this program will reduce GHG emissions: By reducing the time that the lights are on we could reduce the amount of energy used at Bowdoin.

Individuals/departments who will be responsible for implementing the proposed program: In order to implement the program the motion sensors would have to be installed by facilities management or some other electrician contracted by the college.

Potential cost savings for the college: This motion sensor system will initially cost the college money, but the reduction in energy used will help pay for the system and reduce the cost for lighting the college.

Additional community benefits: Also having these lights off during the night when no one is around will decrease the amount of ambient light pollution. Further more students often complain about the amount of ambient light coming into their room from the hall during the night. Plus this would help us see the stars even better.

Additional information:

38. Green Cones for Bowdoin

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Name(s) and affiliation(s) of competitor:: Emma Chiappetta, sophomore, math major

Email for primary contact:: echiappe@bowdoin.edu

Description the proposed program: The Green Cone can process about 20 pounds of food per week. It has the ability to break down meat and dairy products as well as other compostable material. It is about 2 feet tall with an underground composting basket. Microbes fuel the process of composting in this system. It has great effects on the environment. It limits food wastes by about 20% and reduces methane production. The only downside is that there is a slight odor associated with the composting process. It would be great if Bowdoin could install several more Green Cones across campus. While the dining halls do a good job of composting their food wastes, there are many on campus residences with kitchens that create a lot of food waste too. If there were cones at some of the social houses, Brunswick Apartments, Pine Street Apartment, and Harpswell apartments, each of these residences could reduce their kitchen wastes by 20% lowering the overall waste coming from the school. This would be a whole lot waste going toward the local landfills. This installation would be very cost effective as well. If Bowdoin were to install just 8 cones, it would be a cost to the school of only \$544. Since there are no labor costs, maintenance costs, or monthly costs, this would be the only major payment that need be made. Each week, 160 pounds of additional waste could be saved. Each residence could either donate their soil to the school, or use it to build its own garden. Either way, it is a win-win situation.

Methods in which this program will reduce GHG emissions: It limits food wastes by about 20% and reduces methane production. How it works: http://www.greencone.com/how_it_works.asp?prid=10

Individuals/departments who will be responsible for implementing the proposed program: Bowdoin facilities or Bowdoin Eco-Reps could be responsible for purchasing and installing the cones, but they don't require much labor after that. Students living in the residences with greencones would be responsible for their own waste.

Potential cost savings for the college: Each Greencone costs about \$68, so it is a very inexpensive project.

Additional community benefits: This program would also help teach students about composting and hopefully introduce them to a composting system that can be used in their own homes later in life.

Additional information:

39. Stop Wasting Energy By Leaving Campus Computers On!

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Name(s) and affiliation(s) of competitor:: Sophomore, Government Major

Email for primary contact:: Geasterb@bowdoin.edu

Description the proposed program: So far as I can tell, When the H-L Library closes at night, the staff ONLY log out the computers and leave them on. I have been in the Electronic Classroom late enough several times and noticed that as I'm packing up that the library staff member (a student in every case I've seen) goes around logging out the computers but not turning them off. One time I asked the staff member why that is and he said "I don't know.. that's what they tell us to do, just log them off." Another time I asked a different staff member who was doing it and he said "I have no idea man I think IT has to access them at night so they need them turned on or something like that." If we had the staff turn off those computers at night it would save a lot of wasted energy. There should also be signs on computers at 24 hour labs like the Kanbar lab or the Coles Tower Lab that don't have staff that say something along the lines of "Please shut down your computer when you finish using it if it is after midnight/closing"

Methods in which this program will reduce GHG emissions: Turn off all Campus Computers at night.

Individuals/departments who will be responsible for implementing the proposed program: IT, Administration.

Potential cost savings for the college: A lot of cost savings. I don't have in-depth knowledge how the computer system works here, but I feel that it is unnecessary to leave the computers on. At every other institution, office, etc. that has an IT department that I have been a part of they turn off their computers at night. I feel like IT (being the smart computer people that they are) can find some way that they don't need to keep the computers on at night when no one is using them (that is of course only if the story one of the staff at the library told me is true). Also, simple signs like I mentioned earlier on computers that aren't monitored by staff could also help reduce waste by leaving computers on. Its a lot of energy we could be saving that we are the moment just needlessly wasting!!

Additional community benefits: None.

Additional information: I'm wondering that if it is H-L's policy not to turn off computers at closing then there is a pretty good chance they do the same thing at closing at other places like the Hatch Science Library. If that is the case, then Bowdoin could save even more energy by turning them off at night.

40. Energy Conservation Incentive

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Name(s) and affiliation(s) of competitor:: Evan Boucher, 2011, religion and philosophy.

Email for primary contact:: eboucher@bowdoin.edu

Description the proposed program: In order to curtail Bowdoin's energy usage as well as maximize our current funds, I propose that we further the "Energy Conservation Month" program. In order to do this, or at least analyze the feasibility of this, one must note the various energy usages on campus. I propose that Bowdoin College analyze energy usage based on the individual rather than the total energy used per building. I believe that if Bowdoin analyzed how much energy each building on campus used without inhabitants, it would make the energy competition more efficient. Over winter break, Bowdoin should analyze how much energy each building on campus uses without inhabitants to measure the heat used in the dorm. This will allow a level playing field for the conservation challenge measured on appliance and light use rather than merely the amount of energy not used in subsequent months. The building with the lowest percentage increase per individual will be declared the winner. The amount of money saved in energy may be partially given to the dorm/building month after month. This will save Bowdoin money as well as lower our carbon footprint and provide a monetary incentive to dorms/buildings to save energy as well as save Bowdoin money.

Methods in which this program will reduce GHG emissions: By providing a psychological egoistic incentive, it will provide greater

Individuals/departments who will be responsible for implementing the proposed program: Bowdoin Facilities and Residential Life.

Potential cost savings for the college: When dorms/buildings use less energy, they save the college money.

Additional community benefits: It will provide friendly competition.

Additional information:

41. Wildflowers

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Name(s) and affiliation(s) of competitor:: Emily Tong Class of 2011 Major: Environmental Studies and Visual Arts

Email for primary contact:: etong@bowdoin.edu

Description the proposed program: I propose that the college should substitute as much of the clean cut grass with instead natural wild grass and wild flowers. The main quad should remain cut due to its use by students, however grass on the periphery of buildings and in areas where grass does not need to be cut (ie. round-about by Moulton Union, in various triangles between paths, etc.) should be substituted.

Methods in which this program will reduce GHG emissions: This will reduce GHG emissions by reducing the amount of grass the college will have to cut, therefore reducing the amount of gas used by lawn mowers. The wildflowers and wild grass will also reduce the amount of watering needed since it is a more natural ecosystem less prone to drying out. Finally, if this proposal was taken on, it will only have to be cleared once a year in the late fall to prevent secondary growth.

Individuals/departments who will be responsible for implementing the proposed program: This could be implemented by the Bowdoin College groundskeeping crew.

Potential cost savings for the college: This would save a lot of money on gas, water, as well as just general keeping up of the clean cut grass. This will be beautiful in a very natural way, and allow for reduction of resources.

Additional community benefits: The ecosystem of wildflowers could potentially be interesting to study by Bowdoin College or other schools nearby. I also believe that straying from the norm that pristine, clean, and well groomed grounds are what makes a campus beautiful. This beauty could be achieved without the environmental costs of current maintenance.

Additional information: Thanks so much.

42. Overnight Interior Lighting Program

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Name(s) and affiliation(s) of competitor:: Michael Rodrigue Dining Service

Email for primary contact:: Michael.Rodrigue@Bowdoin.edu

Description the proposed program: Adding motion-sensors to the interior lighting of all buildings ,except for living quarters .In other words , all classrooms , function rooms , overnight if a person does come in to use the room , the lights will come on . When the person leaves , the lights will go off .

Methods in which this program will reduce GHG emissions: A lot of lights will be off while no one is in the room

Individuals/departments who will be responsible for implementing the proposed program: Facilities?

Potential cost savings for the college: I don't know this . I do know that when I come in to work at 5a.m. I see several buildings completely lit up. We could use much less electricity if motion sensors were installed , but I don't know how much exactly .

Additional community benefits: The community will see that we are doing something about over-consumption .

Additional information:

43. Student vehicle and parking restrictions

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Name(s) and affiliation(s) of competitor:: Jonas Crimm 2010 ES/Gov major

Email for primary contact:: jcrimm@bowdoin.edu

Description the proposed program: This was an idea I thought up for Environmental Economics and Policy last fall as a way to reduce emissions from student vehicles. There are two components: First, Bowdoin would create a new student parking policy, under which student parking on the main campus would be restricted to 5 or 10 minutes. Student parking (longer-term) would be restricted to lots at the periphery of campus (Farley) and at campus-owned apartments and college houses (for residents only). This policy would have to be policed and enforced with a fine, which could cover initial policing costs. This policy aims to reduce student driving between locations on campus- to disincentivize both driving and bringing cars to campus. Second, Bowdoin would dramatically increase the student vehicle registration fee. Bowdoin's vehicle registration fee is one of the lowest in the NESCAC; raising this fee would further disincentivize bringing cars to campus.

Methods in which this program will reduce GHG emissions: By discouraging both on-campus driving and bringing vehicles to campus, this policy would reduce GHG's from student transportation.

Individuals/departments who will be responsible for implementing the proposed program: Unknown

Potential cost savings for the college: Revenues from fines and increased vehicle registration fee could potentially cover the program cost.

Additional community benefits: Less vehicles on campus, more on-campus parking for visitors.

Additional information: This program should be supplemented by expanding both the Yellow Bike Club and ZipCars.

44. Paper Towel Recycling

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Name(s) and affiliation(s) of competitor:: My name is Ethan Nonomura. I am in the class of 2012 and have not yet declared a major.

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Description the proposed program: Bowdoin has taken some really fantastic steps toward becoming carbon neutral, taking such extensive steps as recycling napkins. Although it is great to recycle napkins, it has a small impact because few napkins are used and they are often too heavily soiled to recycle. If we are capable of recycling napkins, why not recycle other similar paper products? Nearly all bathrooms on campus have paper towel dispensers, yet paper towels are never recycled. This results in mass amounts of waste being produced merely from washing our hands. Paper towels have very similar composition to napkins, so there is probably no reason why we could recycle one and not the other. In fact, paper towels usually do not even get soiled, merely being used to wipe water off of hands. This leaves them in great condition to be recycled. This could be our first step toward reducing paper towel waste. The next step would be a move toward having students keep reusable and washable towels in the bathroom so that they can avoid using paper towels to dry their hands in their own bathrooms. This is no different from using reusable shopping bags--people can simply have their own cotton towel in the bathroom and as such avoid using paper towels. These two improvements combined could greatly reduce paper costs for Bowdoin and the environment.

Methods in which this program will reduce GHG emissions: This program will involve the using less paper on a daily basis and recycling more of the paper that is used. Both of these actions result in lowered GHG emissions because less energy is used to manufacture paper in the long run. Additionally, the use of less paper results in less deforestation. Forests are a carbon sink, so reducing deforestation effectively reduces GHG emissions.

Individuals/departments who will be responsible for implementing the proposed program: I expect that if this plan was implemented, it would take the efforts of the entire Bowdoin community to make it effective, but the housekeeping staff would play a particularly important role. Everybody would need to cooperate to recycle and begin to use reusable towels, but the most important part of the implementation of this plan would involve furnishing all or most of the bathrooms with recycling bins. After that step was completed, the housekeeping staff would have to coordinate their cleaning routine to include taking the paper towel recycling bin and properly disposing of the paper towels so that they can be recycled. This would probably involve recycling them through the same program that recycles the napkins in the dining halls, so it could involve facilities management moving the bags of recyclables and bringing them over to where the dining hall napkins are collected.

Potential cost savings for the college: This program will have an initial cost of purchasing recycle bins for the restrooms and it will probably have a regular cost to recycle the paper towels, however I expect these prices to be negligible. These prices could possibly be negated by the reduced expenditures on paper towels if students start using reusable towels instead of paper towels.

Additional community benefits: I expect that, as with the napkin recycling bins, the most important effect this program will have on the community will be to remind everybody that they are wasting paper when they use paper towels. The use of paper towels to dry hands has become so common at Bowdoin that people fail to recognize that there is anything unusual or wrong about the action. Simply having a recycling bin in the bathroom will remind the Bowdoin community that every time they use a paper towel, they are affecting the

environment. At the very least, even if people keep using paper towels, perhaps they will not use several feet of paper towel every time they wash their hands when they could dry their hands with only a few inches.

45. No mowing areas

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Name(s) and affiliation(s) of competitor:: Mike Grim, Facilities, Grounds

Email for primary contact:: mgrim@bowdoin.edu

Description the proposed program: Have several areas around campus set as no mowing / decreased mowing areas. Example: Bath Road, Bowdoin Pines area; Observatory Road south of New Men's Soccer Field; West side of Chamberlain Hall; West entrance to Whitier Stadium; etc.

Methods in which this program will reduce GHG emissions: If we can designate at least 2 - 3 acres of land as no mow areas, we use less gas / diesel = less exhaust created.

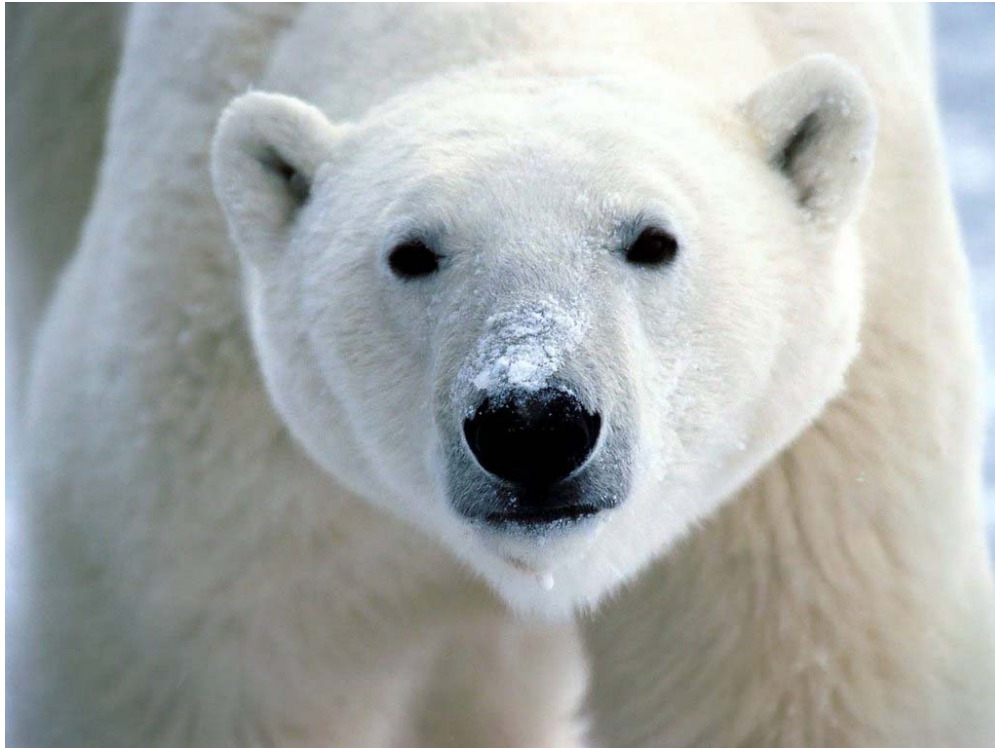
Individuals/departments who will be responsible for implementing the proposed program: Facilities

Potential cost savings for the college: Save on fuel costs.

Additional community benefits: Creates "wild" areas

Additional information:

**The Multiple Approach Plan for Neutralizing
Bowdoin College's Carbon Footprint**



Bowdoin's Mascot the Polar Bear is facing extinction due to climate change

Jeffrey Bush
Geology and Environmental Studies Major
Bowdoin College Class of 2010
Plan Submitted March 1, 2009

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¹ Brunswick Naval Air Station

² Reduced Emissions from Deforestation and Degradation

Introduction:

If anthropogenic emissions of greenhouse gasses (GHG) can not be significantly reduced in the near future, the global climate is likely to be irreversibly thrown out of flux, causing severe ramifications for the entire world. Solving a problem this severe requires action on international, national and local levels. Doing its part, Bowdoin College has made a commitment to work towards reducing global emissions by working towards carbon neutrality. However this, even for Bowdoin College is no small task, and the most successful approach will be one that seeks to reduce carbon emissions from as many different sources as possible. The idea is that smaller reductions across the board will require a smaller change in lifestyle, and thus make the changes more successful in being integrated into the daily lifestyle of members of Bowdoin College's community. By making reductions from electricity use, heat use, transportation energy, and emissions from dining Bowdoin College can significantly reduce its carbon emissions. On top of these reductions remaining emissions can be offset through carbon sequestering programs and investments.

Many of these efforts to neutralize Bowdoin's greenhouse gas emissions can be done in conjunction with courses offered at Bowdoin, bringing the multiple benefits of enhancing student's learning opportunities, and reducing or offsetting emissions. Programs can also be done in conjunction with community partners, providing benefits to both the Brunswick Community and Bowdoin College.

Part I: Electricity

Electricity use at Bowdoin College accounts for 43 % of its total carbon emissions. The following are suggested plans for how Bowdoin College could reduce its electricity use without significant lifestyle changes. By reducing its electricity usage the college could reduce both GHG emissions as well as money spent on electricity.

Reducing non-functional electricity use:

In many places on campus electricity is being used that is not going towards functional purposes. One major example of this is computers. There are computers in academic buildings all over campus, including Hawthorne and Longfellow Library, Druckenmiller, Kanbar, Hatch Library, Smith Union, Coles Tower, and Searles Hall, and Adams Hall that are constantly on. In some cases these computers are used frequently enough that it makes sense to have them be always on when the building is on, however there are many places where computers are left on and go unused for extended periods of time, particularly when the buildings are closed. I suggest that either Information Technology (IT) or the individual departments in each building change the settings for all Bowdoin Computers so that the computer shuts off the hard disk and hibernates after 20 minutes of non use. Although in each case this is only a small reduction in electricity use, it should add up to a significant reduction if the settings are applied to all computers on campus.

In addition to reducing use from computers, Bowdoin could significantly reduce the amount of electricity used for lighting. There are many places in campus buildings where Facilities and Management could install motion sensors that only turned on the lights when someone was in the area. This could save significant power in buildings like Druckenmiller as well as bathrooms across campus. Although the reduction may be small it would be a contribution that would require little lifestyle change and cost to the college.

Expanding Efficient Refrigerator Use:

Efficient mini-refrigerators use significantly less electricity than standard ones. The college currently has a program where it loans energy efficient mini-refrigerator to students to use for the year. This program has taken significant steps to reduce electricity use from refrigerators in student dorms, however it could do more, since a significant number of students still use inefficient refrigerators since they are cheaper, and they don't have to give them back at the end of the year. To motivate students to take advantage of this program the Sustainable Bowdoin could offer perks to students who take advantage of the refrigerator loan system. Perks could be in the form of a raffle, café gift certificates, or pizza. Perks could also be given to students who actually unplug their refrigerators during breaks. Students are currently encouraged to do so but frequently the hassle of removing everything from the fridge prevents them from unplugging it. These perks could be what it takes to motivate students to "power down" over break. This would have significant electricity use reductions since in electricity use during the 8 weeks that the college is on break.

Sustainability Training during Orientation:

The college could also significantly reduce its electricity use by integrating sustainable living training into orientation for first year students. Significant electricity consumption could be reduced from phantom power as well as teaching lifestyle awareness. Many students are not aware that things like microwaves, cellular phone chargers, televisions, and speakers use considerable amounts of power when they are not in use. By unplugging these things when not in use, or by having them on switched outlets, a considerable amount of electricity use can be reduced. Using switched outlets to minimize phantom power is something that can effectively reduce phantom power without a significant lifestyle change. Also by having all students be more aware of the amount of electricity that each particular activity consumes could help reduce electricity use from lighting, heating of shower water and space heater use.

The eco-rep program is already in place and helps teach first years about reducing their consumption. This program has succeeded in its missions however it has the most success reaching students that are already

interested in sustainability, not the ones that would be willing to participate but don't have the interest to take the initiative. By creating a more formal instruction period, the college could more effectively teach new living habits. There are still a considerable number of students who are interested or willing to reduce their consumption but they just don't have the proper instruction. By incorporating "sustainability training" in orientation the office of Residential Life could help first years develop habits of living more sustainably. Instruction could be done by Proctors and RA's or by large lectures as an event during orientation.

This "sustainability training" would have the added benefit of teaching students who might not be reached by the eco-rep program about recycling habits and reducing waste from paper cups, towels and other disposable items. Bowdoin could also offer "sustainability training" lectures to non first year students and members of the Brunswick community in hopes of reducing their electricity consumption and thus GHG emissions.

Wind Turbine:

As a part of a physics class or independent study project, students and faculty could look into the potential of installing a wind turbine to generate electrical power for the college. Students could take measurements of wind patterns and look into how to most efficiently transfer that energy into electricity. This project would get students involved in the issue as well as potentially producing a GHG emission free source of power for the college.

Part II: Heating

Fuel use to heat college buildings accounts for 38% of the college's GHG emissions. This means that the college can reduce its GHG emissions by reducing the amount of heat that the college uses. The two best ways to do this, without making significant sacrifices, are small cuts in heating across campus, and increasing the efficiency of how the college's buildings use heat. Like with reducing electricity use, in addition to reducing emissions, reducing heating use will save the college money spent buying fuel and offsets to that fuel's carbon emissions.

Reductions:

Although it may come encounter opposition by those not willing to make the lifestyle change, slightly lowering this thermostats to all college buildings (except the art museum) could provide a significant reduction in the amount of fuel burned for heating. Facilities and Management would be in charge of the project. Even a change by one or two degrees Fahrenheit could have a significant reduction in the amount of fuel consumed by the college for heating.

Additionally the college could reduce fuel consumption by lowering thermostats in college buildings during the night and for hours when the buildings are closed. This would also have a significant reduction in the amount of fuel burned for heating.

Efficiency:

The college could also significantly decrease the amount of fuel that it burns for heating if it improved the efficiency of some of its buildings. Coles tower for example is notorious for having irregular heating. Students often leave windows open because the rooms can get unbearably hot. Hawthorne and Longfellow Library has been known to have the same problem. The college has the opportunity to significantly reduce its emission if it can recognize which buildings are wasting heat and then solve the problem. This would likely be a job for facilities and management, as well as private contractors. Although hiring a private company would be costly, having the job done right will save the college significant amounts of money on heating costs.

Part III: Transportation

Bowdoin College also has significant GHG emissions from combustion for transportation. This includes the direct impacts of student, faculty and staff commutes, as well as college sponsored travel. There are also the indirect emissions from students traveling to and from their non-Bowdoin homes. With a significant proportion of students living outside the north east, this usually means airline travel, which is a significant GHG emission source. Reducing emissions from transportation can be done by rearranging the college's schedule, facilitating carpooling and sustainable commuting, and increasing the efficiency of college vehicles.

College Break Scheduling:

Bowdoin College currently has a two day vacation for fall break and a three day holiday for Thanksgiving. This means that many students make the commute home for both breaks. For some, the emissions from this commute are not so large since they live near the school, but for others traveling outside of New England, this is a significant source of GHG emissions. By getting rid of fall break and offering a full week off for Thanksgiving the college could reduce emissions from transportation since many students would be only traveling home once, rather than twice during the fall semester. Although it would be hard to measure the exact emissions reduction from this change the reduction would be significant. The change would show that the college's commitment to carbon neutrality is genuinely about fighting the threat of climate change not just having the recognition of being carbon neutral on paper. It would show that the college is committed to the issue whether the emission reductions are measurable or not.

Carpooling and Sustainable Commuting:

The college could also have significant emission reductions if it worked to facilitate carpooling and sustainable commuting for faculty, staff, and students. The Information Technology department or the Computer Science department could undertake the project of designing a social networking website for the community that would be designed to facilitate carpooling. Individuals in the Bowdoin community, as well as the Brunswick community, could create profiles with information about the route and schedule of their daily commute, in hopes of finding individuals with similar information and thus facilitating carpooling. The site could be made in conjunction with Google maps to give visual representation of where people are going, as well as making it more appealing to use. There could be privacy setting to help people control who can see their information. Safety considerations would have to be addressed but the project has potential to bring people in the Bowdoin College community as well as Brunswick community together to reduce emissions from combustion during commutes. Not only would there be a benefit to the climate but the site could also have a secondary social benefit, bringing people in the community together and having them interact with each other more. Additionally the project could be incorporated as an independent study, a college course, or a summer project for a student. This gives the third added benefit of promoting Bowdoin's primary objective, education. It would be a hands on learning experience as well as a service learning project.

The College could also introduce the "Sustainability Commitment Awards". An annual or bi-annual award to staff and faculty members who show note worthy commitment towards maintaining a sustainable lifestyle by carpooling, commuting by bicycle or other methods of reducing their emissions from travel. The program could be expanded to emissions outside of commuting if it is initially successful. The awards would hopefully inspire positive competition among faculty and staff to reduce emissions, as well as introduce the issue and get people more conscious about their emissions.

Vehicle Efficiency:

The college could also work towards replacing college vans with hybrid vehicles. Although it may take a long time to do so affordably, taking small steps towards using more efficient vehicles will correlate to a direct reduction in emissions from combustion for auto travel.

Part IV: Dining

If you account for the lifecycle of all the food that is consumed at campus dining halls, as well as the energy that goes into cooking and serving it Bowdoin Dining racks up a substantial amount of GHG emissions. This means that there is a significant potential for Bowdoin Dining to reduce its GHG emissions by changing what they serve, and how they serve it.

Reducing Tray Use:

Experiments at other colleges and universities across the country have shown that removing trays at dining halls leads to less food being consumed and less food being wasted. It also means that less energy is used for doing dishes since there are no trays to wash. Removing trays has the one disadvantage of being a change in habit, something that many Bowdoin students are likely to initially resist. Students are used to being able to get everything they want with only one trip to the food serving area. This is why I propose removing trays for Breakfast and Lunch meals only, as an experiment. Students generally eat less at these meals so would be less inconvenienced by not having a tray. Then if the program is successful in the long run, trays could be removed for dinner as well. The program would have to be given sufficient time for students to get used to the new lifestyle before it was deemed a success or not, since it is likely to initially be unpopular. However, removing the trays from two thirds of the meals will help Bowdoin reduce its emissions by reducing energy used to heat water for washing trays. Additionally, students are likely to eat less and waste less, reducing the GHG emissions from the transportation and manufacturing of the food that they eat. This plan will also save the college money on the water bill, the heating of that water, as well as money spent on food.

Beef Consumption:

Bowdoin Dining could also significantly reduce its GHG emissions by reducing the amount of beef that it serves. Corn fed beef is a significant GHG emitter. The methane that they produce is 24 times as potent of a green house gas as carbon dioxide. Grass fed beef however, is a much more climate friendly food. Grass sequesters carbon into the soil since its roots go straight down. Although grass fed beef is still a net green house gas emitter, it is a much more climate friendly option than corn fed beef. Thus Bowdoin Dining could reduce its emissions by both reducing the amount of beef that is served, and serving more grass fed beef instead of corn fed beef. Money saved from not buying as much beef could be used to pay for the more expensive grass fed beef.

Part V: Offsets and Investments

Reducing Bowdoin's carbon emissions is an important step towards carbon neutrality; however the college can not feasibly reduce its emissions to zero. To achieve carbon neutrality the college must offset its emission by investing in projects that have negative net carbon emissions, that is, projects that sequester carbon

Airline Offsets:

Airline travel produces very high levels of GHG emissions. Bowdoin College has the indirect effect of causing many students to take airlines to get to college. Although emissions from these commutes are not direct emissions from the college, the college could still do something to help reduce the impact on the climate. By acting as an agent between organizations willing to sell carbon offsets for airline travel and students and their parents, Bowdoin could advertise for these offsets to incoming students. By encouraging those who travel to Bowdoin by plane to offset their emissions, if they can afford it, the college will show its commitment to reducing GHG emissions that it indirectly caused.

Another measure that Bowdoin could take to offset its emissions is to buy carbon credits to offset all airline travel that sponsored by the college. For example buying offsets for visiting lecturers or for trips by college faculty. Airline travel is a major GHG emitter and offsetting these emissions would be a big step towards achieving carbon neutrality.

Reforestation of BNAS land:

Bowdoin has acquired a significant amount of new land from the soon closing Brunswick Naval Air Station. Originally forested land much of this land was cleared to make runways for the Air Station. This means that there is a potential to reforest the land, and in doing so, sequester a net amount of carbon into biomass. By reforesting some of this newly acquired land the college could both offset emissions from other sources and have an amazing learning tool for students. Environmental Studies and Ecology classes could study the reforested area, learning about biomass measurement techniques and how to measure the growth of a forest. They could also investigate the amount of biomass that gets sequestered into the soil. These classes would measure the net biomass growth per year and be able to tell the college how much carbon dioxide has been sequestered by the project in that year. Deciduous North American Forest is known to have in the order of 100 tons of CO₂ per hectare (Botken et al.³) and Bowdoin College currently outputs around 600 tons of CO₂ per ha per year (<http://www.bowdoin.edu/sustainability/emissions>). Although it would take several years for the forest to become fully grown, this does show that that about every six hectares of land that is reforested is equivalent to one year's emissions. Over the long run this could offset a significant amount of Bowdoin's carbon emissions. It would also have the distinct advantage of engaging students and teaching them about Environmental Science in a hands on interactive way.

REDD Carbon Credits:

When looking to buy carbon offsets for its emissions Bowdoin should consider buying Reduced Emissions from Deforestation and Degradation (REDD) credits. These credits work by having non government organizations (NGOs) work to prevent deforestation in areas of the world where it is a significant problem, particularly the tropics. By working to create alternative activities to deforestation for local people to make their livelihoods these NGOs are preventing carbon emissions, protecting biodiversity, and helping work towards sustainable development. One example would be teaching efficient farming techniques so that people didn't have to practice slash and burn agriculture of the carbon rich tropical rainforests. Because REDD credits are slightly more complicated than your typical reforestation project they have not yet been accepted by the international involuntary carbon market making them about one tenth the price of typical carbon credits. As REDD credits are becoming more popular the price is steadily increasing. This means that Bowdoin has the opportunity to invest in REDD credits and offset its emissions for one tenth of the price that it would offset

³ Botken et al. "Biomass and carbon storage of North American Deciduous forest". Biogeochemistry Vol 20: no 1 pp. 1-17. 1993.

them by other credits. REDD credits also have the added benefits of helping protect biodiversity in tropical rainforests and working towards sustainable development in third world countries in the tropics.