

CHAPTER 3

Environmental Policy Reports

The creation and use of policy, on many different levels, is imperative to for sustainability. Policy is defined as “a program of actions adopted by an individual, group, or government, or the set of principles on which they are based” (Encarta Dictionary). Colby-Sawyer College can be guided or directed by policies on both federal and state levels which affect the College’s overall environmental impact. The Green Buildings Act of 2007, if passed, will affect any new construction of federal buildings. As our federal government takes a step in the write direction Colby-Sawyer College should follow in its steps, by adopting a similar long term building plan. The Energy Policy Act of 1992 addresses many different areas of Colby-Sawyer College’s operations. The laboratories areas and the implementation of low flow toilets, as of 2005, are the most notable. The Higher Education Sustainability Act (HESA) provides funding to institutions that are taking on the task of becoming sustainable and the American College and University Presidents Climate Commitment is a nation wide initiative which helps to organize campus environmental programs. Colby-Sawyer, being located in New Hampshire, is also affected by many state level policies. The New Hampshire Comprehensive Shoreland Protection Act (House Bill 383) addresses the problem of impervious surface and its impact on surrounding shoreland. With the College being located atop a hill above Pleasant Lake, following House Bill 383 will be vital to the health of our surrounding watershed. The Electric Renewable Portfolio Standard Policy (House Bill 0873) aggressively approaches renewable throughout Hew Hampshire. Finally, the controversial Invasive Species Act (House bill 1258) addresses the use and distribution of invasive plant species throughout New Hampshire. The adoption of policies such as these will direct Colby-Sawyer College in the right direction toward sustainability.

Electric Renewable Portfolio Standard

Anna R. Clark

Overview:

An Act Establishing Minimum Renewable Standards for Energy Portfolios

One of the main concerns for the future involves our relationship with the environment. By abusing what resources we have and may not in the future. It is important to address the matters of high concern; global warming, and climate change. This is not a small issue it is a concern all around the world. By dealing with the issues, it is not a process that can be fixed over night. It is a slow development, a progression that can be altered to help conserve our natural resources and slow down climate change. Through the development of policies it makes our impact smaller on the environment. One of the strategies used by many is thinking globally, acting locally. One Bill that has just been passed into the Senate is the Electric Renewable Portfolio Standard Policy. This is an act instituting minimum renewable standards for energy Portfolios, within businesses and other corporations to adopt to decrease their impact on the environment.

This policy is in committee, it is not finalized yet.¹ The current committee status and committee of Referral within the House, known as Science, Technology, and Energy are working to establish this Bill as a policy. This bill not only is working to establish the minimum electric renewable standards for portfolio, it also states that it will be establishing a commission to study minimum renewable standards for energy portfolios, requiring the commission to make reports to the general court, and requires the use of renewable energy certificates in New Hampshire. This bill supplies the definitions within its chapter consisting of terms that could be misinterpreted or not understood (New Hampshire House, 2007).

Literature Review:

Renewable energy is one of the main focuses that are developing in our society. *Alan McGowan* states in *Renewable Energy Now*, “the United States has the technologies to significantly reduce the rate of increase of carbon emissions into the atmosphere and still power the economy...In other countries, renewable seem to be faring better...It is unclear why the United States seems to be paying less attention to the issue, but it is becoming ever more obvious that we need to do something to curb our enormous appetite for fossil fuels and to reduce the amount of carbon we place in the atmosphere” (McGowan, 2006).

The good news is that even though as a whole the United States may not be enforcing policies, individuals are. Alan H. McGowan states in *Renewable Energy Now*, there is hope. There are many gas stations around the country that offer gas with a ten percent ethanol from plant resources, mainly corn. There is also an increase in the sales of energy efficient hybrid automobiles. As stated in this article, President Bush notes in his January 31, 2006 State of the Union Speech, “that our addiction to oil has turned into a hard habit to break” (McGowan, 2006).

The importance of having renewable resources is not only to benefit the environment; it also is there to protect our future. If the use of fossil fuels continues in the rapid race it has been, the environment is going to suffer as will the people in it. By using

¹ On May 3, 2007, this bill was passed, adopted and signed by the Governor of New Hampshire.

renewable resources, like wind, solar, water, biomass, and geothermal energy, it decreases the size of our impact on the environment and the emissions of fossil fuels. The dependence now on such resources is so high that temperatures are rising there are many problems that may not be solved in time (Energy Information Administration, 2006).

There are many efforts being made by many other businesses, including the U.S. Department of Agriculture (USDA) and Agricultural Research Service that have developed farm-based energy and sustainable agricultural productivity. Similarly, Colby-Sawyer College can make a difference in the environment and the impact on it for this area. The USDA has made an Energy Council to institute policies and main concern related to developing options for energy sources for both consumer and farm utilization, (Asrar, 2006).

These examples show that there is positive support for the development of renewable resource policies. The process of making these policies exist in more and more businesses could take a substantial amount of time. There is a lack of support from vendors that do not consider renewable resources beneficial to their company and income. Through force is one way to slowly gain the support of those using the policies. Unfortunately because the issue of global warming is divisive many of the supporters are not willing to take first hand action unless there is a payoff. Many people and businesses do not want to sacrifice their routines that are made to be effortless and do not require energy from a person, more specifically from something else like machines. This is the mentality of most of the society. It is slowly turning over and becoming a better support system for the use of renewable resources, energy conservation, reducing the uses of fossil fuels, and mass amounts of emissions.

Stakeholders:

Renewable energy sources can be replenished in a matter of time. The impact on the world's energy picture provokes many different opinions who care about this issue and those that are opposed to it. Addressing concerns about the environment makes many opportunities to contribute to the overall cause of concern, global warming. Through creating regulations, it allows for change within other populations and areas that are made aware of how serious and important the environment is. By creating policies it allows for change, or to be made that will contribute to the decrease in the ecological footprints and conserving of the resources also the use of renewable resources. The roles that are made in this process include the people that are aware of the changes that need to be made and can take action and in opposition, those that do not agree. Those that vary in the opinion and do not agree with addressing such changes as far as environmental concern, do not offer as much respect and appreciation for the natural resources that are provided.

Immediate stakeholders include those involved with the economy, Colby-Sawyer College. If the Public Service of New Hampshire adopts a policy like this, then it can contribute through using the policy and decreasing the size of the institutions impact on the environment which it encompasses. Other examples of stakeholders are from the House Bill. Sponsors Representatives Suzanne Harvey, Martha Fuller Clark, Peter Bragdon, James D. Phinzy, David A. Borden, and James M. Garrity. These all play major roles as sponsors. Taking the stands as the people involved, for or against the issue. In this case it is involving a bill, looking to be made a policy for New Hampshire. It would be useful in many ways for Colby-Sawyer College to adopt this policy through the electricity supplier. Other stakeholders would be used as the support system, (New

Hampshire House, 2007). The support system comes from those that support change for the better off of the environment. As far as recent concerns for those involved with the renewable resources issue, there are many people that fill the role as a stakeholder. There is the process that involves those within the House. There are also those involved after the bill has been processed and made into a policy. Companies adopting the Renewable Resource policy and the companies doing business with the suppliers (Colby-Sawyer College) would also be stakeholders. Another example would be the Public Service of New Hampshire. The Energy Service Program is a chain of energy conservation programs, services that are available to the bigger commercial and industrial customers.

Other stakeholders that have shown support include The Department of Resources and Economic Development. Have written and shown their support to this bill, concerning renewable energy and resource standards for the state of New Hampshire. Included in the letter, from the Commissioner George M. Bald, forestry products are a major industry and are important to New Hampshire's economy. Loggers, landowners, truckers, and sawmills are facing times that are of high concern with the loss of certain markets. The markets need to be replaced and consistent for a longer period of time to wood energy. In 2002, the Department of Resource and Economic Development reported on the substandard and underutilized wood supply. One of the conclusions drawn from their report showed that there were no other markets existing to replace wood-fired electricity. The support of creating a minimum renewable standard for energy is useful to the ongoing guarantee of sustainable forestry in New Hampshire (Bald, 2007).

Policy:

Electric Renewable Portfolio Standard is a policy that contributes to the better understanding of renewable resources. House Bill 0873 also supplies the definitions to terms that could be misinterpreted within its chapter also including the class for renewable resources percentage obligations. The economic impact as stated by the Public Utilities Commission and Department of Environmental Services that this bill could increase local, state, and county expenditures by an indeterminable amount in 2008 and years after. This bill will not have a fiscal impact on state, local, and county's income. The Public Utilities Commission and Department of Environmental Services also state that this bill forces electric utilities to obtain a certain percentage of the electricity which they supply to their customers in the renewable energy certificates. There are four classes (Class I, II, III, and IV), that will be used to categorize the renewable energy percentage. (New Hampshire House, 2007).

Class I: new renewable resources including wind, geothermal, ocean thermal, and methane gas.

Class II: solar technologies

Class III: consisting of biomass, woodchips, and methane renewable sources is at a much higher level of percent.

Class IV: hydroelectric renewable sources.

Policy Critique:

Many of the examples given have been about bigger companies switching their policies and making better environmental contributions. However, the contribution is not always at the size it should be. One example in the House Bill is that the classes used, within the policy to categorize the renewable resource use is very small. Class I represents the generation from new renewable resources including wind, geothermal, ocean thermal, and methane gas. Within this class the calendar year percentage of the electricity that they would supply is very small. The increases for the future are miniscule. Class II, solar technologies, shows little difference in percent usage, even within the future. In the 2011, regulations will be at 0.08 percent. Class III, consisting of biomass, woodchips, and methane renewable sources is at a much higher level of percent (Ranging from the year 2008 at 3.5 percent, to 2011 at 6.5 percent). Class IV, small hydroelectric renewable sources percent is small and does not exceed 1.0 percent by the year 2011, (New Hampshire House, 2007). This policy has much more potential than to limit the percents at which changes can be made. The purpose of composing a policy is to enforce change and to make a difference.

With this policy, it seems to be representing the lack of support. If the regulations were changed to a higher level of percent for the use of renewable resources it would show that there is greater support. It seems as though with such small percent for change, there is not much encouragement to use renewable resources. If Colby-Sawyer College were to adopt such policies through the electric supplier in efforts to make change it would make a small difference. This Policy, if enacted could start great change and promote the support of the use of renewable resources. However, the percent is so little that more change is going to take a longer period of time.

One major support system that has developed recently includes the governor of New Hampshire, John Lynch. Lynch informed the legislature of New Hampshire he was in favor of the House Bill 0873. Also the governor has recently joined the national effort to guarantee twenty-five percent of the state energy supplies have to come from renewable resources by 2025. These new standards will help reach the main goals of the House Bill. (Johnson, 2007).

Recommendation:

Adopting this policy would make a difference in the renewable resource use. This policy allows the Public Utilities Commission and the Department of Environmental Services to use the classes as alternative compliance payments for each class one through four. As far as the Public service of New Hampshire adopting this bill, if it becomes a policy, it allows for Colby-Sawyer College to enforce change to better their impact on the environment and decrease the amount of fossil fuels being emitted. As far as this bill however, it seems that there is not much of an incentive to make a bigger change. There is little change from the years 2008 through 2011. A smaller percent is not going to make as big of a difference as enforcing change at a higher percentile. Through Colby-Sawyer College's electric supplier we would be able to make a difference; the only fault is that it is very little. One of the recommendations for the policy makers would be in reference to the emissions versus the use of renewable resources, raise the percent that has to be used.

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Green Buildings Act of 2007

Alexa FitzGerald

Overview:

One of the main concerns of the world today is the issue surrounding global climate change and the human species' contribution to the dramatically increasing CO₂ emissions. The United States alone is responsible for about ¼ of global greenhouse gas emissions. And therefore, given the fact that buildings alone are responsible for over 49% of these CO₂ emissions, sustainable “green” building designs are becoming a more and more attractive alternative to traditional building designs.

Normal buildings waste more energy by not being energy efficient according to different climates or the way that they are constructed in general. For example, if proper windows are not selected when building or restoring a home or professional building, heat will be lost and the energy used to produce the heat will be wasted. When this energy is wasted, it means that more is used for in order to keep the same temperature in the building, meaning that there will be more CO₂ burned into the atmosphere. Not only does this heat loss add toxins to the earth's atmosphere but it is a waste of money, time and resources. This is just one small example of why energy efficiency in buildings is important.

The U.S. Green Building Council established a program called Leadership in Energy and Environmental Design (LEED). This program was established to help private builders and corporate builders learn about sustainable designs and give them the necessary “tools” to work with. It is a voluntary national standard for building performance and sustainable goals. There are four levels on which one can certify depending on how green the building is: certified, silver, gold, platinum. LEED buildings are leading the transformation of the built environment. They have lower operating costs and increased asset value, are healthy and comfortable for their occupants, reduce waste sent to landfills, conserve energy and water, reduce harmful greenhouse gas emissions, qualify for tax rebates, zoning allowances, and other incentives in hundreds of cities, and they demonstrate an owner's commitment to environmental stewardship and social responsibility, (LEED, 2007).

One of the main concerns for building and designing “green” is the cost. Often the idea is shunned because financiers do not like the idea of spending more money than is in original budget. What most people do not know is that by building green and being a more sustainable, energy efficient building, the people funding the project will actually save money in the long run. The extra funds are also spent on important things such as the disposal of wastes from the building site to sounder to cleaner products used in the construction. Also the building supplies often come from recycled materials which help to reduce waste and reuses resources previously disposed of. It is important to know that building green not only strengthens the environment, but it also saves money over time.

According to a cost benefit report on the Capital E website, said that the approximate net benefit of a green building over twenty years is about \$71 per square foot, (Kats, 2006). If this standard was applied to the Curtis L. Ivey Science Center, which is 33,000 square feet, Colby-Sawyer College would save more than two million

dollars over the next twenty years. This is something to seriously for our school consider. Price is generally the issue that scares people away from building green but if you consider that it only costs about three dollars more per square foot and the net gain down the road is as substantial as it is, the initial cost of the project would be well worth it.

Literature Review:

Many articles have been written about this issue because it is clearly something very important that many people are looking into right now. There is a lot of information on subjects from the building design process and construction itself to the global leaders in environmental “green” design. According to Shannon Huecker who writes for the Environmental Magazine, with more than 6000 ‘Passive House’ buildings, Europe is the world leader in standard setting for green design. From green roofs to using photovoltaics to capture solar energy and reduce coal energy use, Germany leads Europe in green design and innovation, (Huecker, 2007).

Big corporations now are following the trend of green designs and a more environmentally friendly outlook and mission. One example given by Marianne Wilson is Staples. According to Wilson, the retailer is savvy to the idea of “reducing its environmental footprint by operating in a more sustainable manner not only for the good of the planet but for the good of the company,” (Wilson, 2006). It has become a partner in the Environmental Protection Agency’s Climate Leaders program and is committed to reducing its greenhouse gas emissions 7% by 2010, (Wilson, 2006). These are great facts that encourage others to follow these leaders to becoming greener. It is a more mainstream idea today and a great thing for a company, individual or institution to have as a goal. Along these same lines, the New York Governor George Pataki announced that there will be environmental measures incorporated into the reconstruction of the World Trade Center, (Governor: World Trade Center Will Use Green Building Design, 2006).

Tom Ramstack, in a Washington Times article, mentions there having been \$792 million of green buildings being constructed in the US in 2000 and today there are about \$7.73 billion worth of green building projects, (Ramstack, 2006). This shows that more people are being educated about green buildings and are taking the extra step to make these changes happen for the betterment of their homes, or professional buildings and also for their community.

There are many aspects of building design and construction and many people working on these kinds of projects. In order to have the most successful outcome, it will be important for the different stakeholders to influence it from the beginning. The stakeholders on this issue are the building owner himself, the architect, mechanical engineer, electrical engineer, structural engineer, interior designer, and fire-safety regulators/inspectors.

In "Code Requirements and Sustainable Design", Ronald Mahlman and his associates state, “The effective incorporation of sustainable design elements requires an integrated, collaborative design process. This process requires the “blending” of all stakeholders involved in a process,” (Mahlman, 2007). By gathering information and ideas from every aspect of the building process from design to construction, the outcome and success of the project is much more likely to succeed. Because one of the main concerns in green building design are fire-code regulations being met, by incorporating

the ideas of the fire-protection engineer from the beginning of the process it will likely eliminate conflict and confusion in this area of the design and construction. Coming back to the idea of cost vs. benefit, four attributes of green building should be considered: increased ventilation control, increased temperature control, increased lighting control and increased daylight. According to Robin Suttell's article on the True Cost of Green Building these attributes have "been positively and significantly correlated with increased productivity. Indoor air quality also has been linked to potential productivity and health gains in work places and educational facilities," (Suttell, 2006). While considering the costs of the buildings there are more things than money to think about. The benefits of these buildings are much more than financial but also health and productivity related. The buildings benefit everyone involved. In an article from Crain's Cleveland Business written by Tim Tibbitts, he reports about a green office building stating that, "while reduced energy costs may be an easily measurable benefit of green building, supporters argue that going green increases worker satisfaction and productivity and decreases absenteeism and turnover," (Tibbitts, 2006). It is hard to argue with good health.

There are already whole cities who have taken it upon themselves to transform into green cities. They do this by implementing tree planting initiatives, using renewable energy sources and building green roofs to detract from large amounts rain water run off and displacement from the impervious surfaces found in cities. Places like Chicago, Seattle, San Francisco, Ithaca, NY, and Portland, OR, as well as a few others have really put sustainable efforts into their culture, (Schneider, 2006).

Policy:

The Green Buildings Act of 2007 was introduced to the House on February 5, 2007 by Senator John Warner of Virginia. The mission of this bill is "To improve efficiency in the Federal Government through the use of green buildings, and for other purposes." If it is passed by the Senate and House of Representatives in the United States Congress, it is meant to set a standard and example for the rest of the country to follow. This bill states that all "major facility" building projects (construction project involving more than 5,000 square feet of space or a reconstruction project that has been assessed to cost half the worth of the building) that are run by federal agencies or are financially supported by state money are required to follow Green Building designs and Leadership in Energy and Environmental Design (LEED) standards that were established by the United States Green Building Council. Under the description of the bill, the term "green building" is defined as a building that during its life time will "reduce energy, water and material resource use and waste, will improve the indoor environmental quality, thermal comfort and lighting that effect occupant health and productivity and will reduce air pollution by using low-emitting materials during the construction," (Warner, 2007). It goes on to say that the building must also "increase the use of environmentally preferable products including bio-based, recycled and non toxic products and for which, during its planning, design, and construction, the environmental and energy impacts of building location and site design are considered," (Warner. 2007).

This policy really looks at the whole process of a building/reconstruction process, from the construction itself and what goes on during it to the life of the building and the effects it will have in the future. What is more important is that it requires the

establishment of a permanent Office of Green Buildings in the government with an Executive Director to see that all of the regulations are acted upon. The bill states that no later than 180 days after it is approved, the Director will have to set up an advisory committee. The 'Green Building Advisory Committee' will be made up of representatives from different government branches including the Environmental Protection Agency, the Office of the Federal Environmental Executive, the Office of the Federal Procurement Policy, the Department of Energy, the Department of Health and Human Services, and other federal agencies that the Director sees as appropriate (Warner, 2007). This is important because it includes and influences many different areas in the government.

According to this bill, it will be the duty of this Executive Director to "establish a national green building clearinghouse [in accordance with section 104], which shall provide green building information through outreach programs, education and the provision of technical assistance," (Warner, 2007). This is a great initiative because it forces the issue beyond just saying that something will happen as is seemingly often the case with environmental issues in the government. If this bill is adapted, action and follow up will be required. The bill also explains that there will be requirements for schools and incentives for schools to build green and use LEED designs for a healthier environment for students (Warner, 2007).

One of the most important issues that this Act touches is the importance in public outreach and education. Because there are many people who are not properly educated in understanding the importance of green buildings, if the government takes action to really get the word out and help people to know and appreciate green design the act will be a much greater success. Warner also writes that not only will the government take an active role in educating people, but also in helping to fund some projects and show the public how to build green (Warner, 2007). Once again this is an example that shows the concrete and well rounded goals of this Act, which will likely make it successful.

Policy Critique:

This is a very strong policy. The fact that there will be representatives from different government agencies working together to advise the Director of the Office of Green Buildings makes the bill stronger because it brings minds from different issues together to make the best possible decisions. The bill also requires the director to set goals and do an audit/evaluation of the project two years after the bill is enacted to ensure that everything is working correctly.

Those who oppose this bill are most likely concerned with finances and how the government will be able to afford funding projects that go on all over the country. It will cost a lot of money and time to hire a new Director and establish a new office and then to implement all that the bill asks for such as setting up educational programs could be difficult to fund. Although this sounds like a great policy, it may be a bit of a stretch to pass immediately. It will be very interesting to see what happens in the next few months.

Recommendation:

Green building design is a smart thing for Colby-Sawyer to consider and invest in because it would greatly decrease the college's environmental footprint and at the same time, it would provide huge long-term savings. Green building is an opportunity for

Colby-Sawyer to use its resources efficiently while creating healthier buildings in which to live and work. "Lower energy and water costs, improved teacher retention, and lowered health costs save green schools directly about \$12 per square foot, about four times the additional cost of going green, and enough to hire an additional full-time teacher," (Kats, 2006). This is something that the college should consider while looking at long term benefits for the school as well as the health of everyone inside them. Right now the college suffers major financial losses in part because of high energy loss and bad overall building efficiency. Using ideas from LEED to renovate old buildings and build new buildings in the future would be great for the college's finances and also for cutting back on its emissions and energy wastes. If nothing else, it can serve as a checklist to keep work on track from design through the construction, commissioning and occupancy of the building.

Buildings have a huge effect on the environment as well as the economy, but perhaps more importantly on the health and productivity of those who live and work in them. "For schools, sustainable design has an added benefit: it provides a better learning environment," (Henrickson, 2006). Colby-Sawyer would benefit greatly by incorporating green design into future building and reconstruction projects. With more natural lighting and better ventilation, productivity of staff and students could greatly increase and make this institution an overall better and healthier place to learn.

A societal shift to becoming better stewards of our environment is taking place all around us. As a part of this "greening" shift, practitioners and stakeholders at all levels of the built-environment community quickly are realizing that innovative building-design solutions are outpacing the language/concepts that have been the foundation of model building and fire code (Mahlman, et al, 2007).

Not only will this likely contribute to the attraction of the institution to prospective students, but Colby-Sawyer College should be a leader in environmental and sustainable design and an example for our community.

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Higher Education Sustainability Act (HESA)
Environmental Education at Institutes of Higher Learning

Stephanie Goggin

Overview:

A green campus is one that integrates environmental knowledge into all relevant disciplines, improves environmental studies course offerings, provides opportunities for students to study campus and local environmental problems, conducts environmental audits of its practices, institutes environmentally responsible purchasing policies, reduces campus waste, maximizes energy efficiency, makes environmental sustainability a top priority in land-use, transportation and building planning, establishes a student environmental center and supports students who seek environmentally responsible careers (Haigh, 2005).

Literature Review:

Education provides a unique role for addressing the critical challenges of living in a sustainable world and creating sustainable development. Institutes for Higher Education(IHE) have a responsibility to generate new knowledge and ideas to train the teachers and leaders of tomorrow. Environmental education has come a long way over the years, evolving from concerns about the environment, to the recognition that barriers were halting progress, to the realization that all educated persons should be environmentally literate and that IHE's should act as role models for this. The most pressing issue concerning environmental education and sustainable development is the gap between the recognition of the problem and the motivation to take action (Haigh, 2005).

The challenge of society is to find a balance between the human and natural worlds which is rooted in environmental education (Goldman, 2006). The University of Georgia tried to implement a required Environmental Literacy Requirement(ELR) in 1992. Six requirements for the ELR courses were set in place:

- Basic scientific principles that govern natural systems using these to understand the limits and major factors associated with the earth's capacity to sustain life
- Linkages among all living things and their dependency on each other as well as the physical environment
- Consequences of human activity on local, regional and global natural systems
- Impact and change within natural systems of life, health and welfare
- Cultural, economic and political forces—both past and present – that affect environmental attitudes and decision making
- Role of ethics and morality in individual and group decision making related to the environment

These requirements were upheld for six years, however in 1998 the six were reduced to two, which are cut down versions of numbers 1 and 3, after faculty complained that the requirements were too strict and too hard to meet, since originally only eight classes met the criteria, although there was the option of taking one of thirteen humanities and social sciences classes in conjunction with one of eighteen natural sciences courses, instead of one of the specific eight, to fulfill the requirement. After the change in the requirements the number of classes able to fill the ELR grew into the hundreds, although without a regulation system for the classes some fell under par. A study few studies of the classes were done by students at the University. The general findings were that both faculty and students felt strongly that the ELR was important to the University, however almost half of both the students and faculty surveyed were not even aware that there was an ELR. The shortcomings of the ELR project were assumed to be generated by the lack of an environmental literacy coordinator to regulate and police the program (Moody, 2005).

A series of movements and developments have paved the way for today's interest in environmental education at IHE's. In February of 2003 the 'United Nations Decade of Education for Sustainable Development,' proposed by Japan, was adopted by the United Nations General Assembly. In 1972 the 'Stockholm Declaration on the Human Environment' was adopted during the United Nations Conference on the Human Environment, which is perceived as the root of Higher Education Sustainability. In 1975 the World's first 'Intergovernmental Conference on Environmental Education' produced the Belgrade Charter of the International Workshop on Environmental Education, which was attended by 68 states, 8 UN agencies and 20 NGOs. In 1990 the Tallories Declaration was endorsed by 280 Universities and 40 Nations, and in 1995 Yale University held the Campus Earth Summit which produced the 'Blueprint for a Green Campus' – an action plan for campus greening. The definition of a green campus produced from this appears at the beginning of this paper (Haigh, 2005).

Preparation of teachers of Environmental Education (EE) is an important part of the process; if educators are not properly trained issues arise with their ability and willingness to teach (Goldman, 2006). If a teacher has: a positive attitude toward teaching environmental issues, enough knowledge on environmental issues and knows how to teach environmental issues then he/she will teach the issues more frequently and at a higher level than if none, one or two of these conditions are met. Teachers of EE have a difficult job as expressing environmental issues is a complex but important job, which most teachers' abilities to teach are lower than preferred by themselves (Chankook, 2006).

The formal education system is responsible for environmental education efforts, which was introduced by The World Commission on the Environment and Development of 1987, which coined the term sustainable development and made it the accepted concept for finding a balance between providing for the present and future needs of society while protecting the environment (Goldman, 2006).

Another term connected to the EE movement is Environmental Literacy (EL), which has been loosely defined as 'a basic functional education for all people, which provides them with an elementary knowledge, skills and motives to cope with environmental needs and to contribute to sustainable development' (Mosley, 2000). An important part to EE and EL is the motivation and action involving problem solving of

environmental issues, teaching the theory and facts is not enough, solutions and ways to find solutions must also be presented. Taking the learning outside of the classroom and into the natural world has become a common practice among EE teachers, and has seen unsurpassed success in igniting interest in the students (Chankook,2006).

The Piedmont Project, at Emory University, has been successful for five years in preparing educators to teach environmental courses and programs at the University. The project accepts applications each year from faculty and administrators to participate in the summer workshop and to prepare new or revise old classes to involve environmental and sustainability themes. Educators who participate in the workshop get a stipend for the development of their course, and participate in brainstorming sessions along with field trips to sustainable sites throughout the summer. The program also includes a session one year after the workshop to evaluate the course over the previous year. While the project has seen tremendous success, sustainability has even been named as a foundational commitment of the University, there have been some issues. The program caters to both environmentally savvy candidates, and novices on the topic, so the issues of reading materials and depth of material covered can be a problem. There have also been logistical setback to some of the courses and programs developed, and they have never been implemented at the University, although over the five years of the program over 100 new or reshaped courses have been woven into the University curriculum. The biggest issue with the project is the inability to find a good assessment tool to measure the impact the project has had on the students (Eisen, 2006).

High schools have also begun to include environmental education in an interdisciplinary way, which prepares students for the EE they may face in college. EE in high school can ignite a student's interest in the field and cause them to pursue it once in higher education. A group of private schools have developed a set of 'rules' that each institution must follow to provide their students with a basic environmental education (Stephens, 2002).

Stakeholders:

Environmental Education affects people of all ages, however, in this case the people most involved in EE would be the Institutes of Higher Education. This includes the administration at the IHE's along with the faculty, and most of all the students. Each of these groups is important in the implementation and success of EE within their institutions. The administrators must approve and endorse the EE programs, the faculty must be willing and capable of teaching them, and the students must be open to learning about it. Other people concerned with EE at IHE's are the community around the institutions, as they can benefit from the knowledge the college imparts through continuing education lectures or through other outreach programs. Environmental education should continue past the school years, and go on to affect the lives of the students involved, so that they can spread their knowledge to their friends, colleagues, children and the general community. Possible opposition to EE could be found in people who believe it is not a pressing enough issue to mandate as part of a college education, including but not limited to; politicians, educators and general citizens.

Policy:

On July 14th 2005 the Higher Education Sustainability Act(HESA) was proposed. This act was aimed at directing the Secretary of Education to provide financial aid to start sustainability programs at IHE's. These programs should develop and implement integrated environmental, economic and social sustainability initiatives, including a multi-disciplinary approach and research initiatives (109th Congress, 2005).

Congress provided a list of eight findings that should be addressed by HESA, including the following; environmental life support systems vital to the nation's economic and social prosperity are increasingly at risk; new research, education and technology are required to achieve a more sustainable environment, economy and social systems; IHE's need to take immediate steps to develop new programs for research, education and technology development concerning sustainability; IHE's have a unique role in the fostering of new knowledge and are uniquely positioned to prepare the future labor force to address the environment and the opportunities for economic, environmental and social sustainability along with being models of sustainability.

The purpose of the money to be provided in grant form was to provide support for faculty, staff and students to establish the programs, to promote research by faculty and students in the sustainability field and to provide support for community research projects for the IHE's to incorporate the community in sustainability programs.

Grants given out could last no more than four fiscal years and must go to eligible institutions, which included 2 or 4 year IHE's which grant undergraduate, masters or doctoral programs and non-profit partnerships with other such institutions. The grants could be no less than \$500,000 and more than \$2 million per institution, and the overall amount for all grants could be more than \$50 million per fiscal year. In order to apply for a grant an IHE must have developed or be in the process of developing a plan for sustainability action on campus including an evaluation component; they must not use the money as a replacement for other funds available for such projects; they must promise to collaborate with local businesses or non-profit sectors in the development and implantation of the sustainability plan.

The funds, once received, should be used to implement practices that test, model and analyze the principles of sustainability; to establish a multi or inter-disciplinary education, research and outreach programs at the institution; support teaching initiatives that focus on integrating environmental, social and economic dimensions of sustainability; to start energy management, green building, waste management, purchasing, toxic management, transportation and other sustainability programs; conduct faculty/staff and administrator training sessions on sustainability and institutional change; and to engage external stakeholders.

Policy Critique:

While promising in nature, HESA has yet to be passed and implemented into policy. Providing funds for environmental and sustainable education is a wonderful idea, although since the act has not been passed it is impossible to determine how effective it would be. The application process seems concrete and containing enough information to determine the depth and promise of the project being funded. If HESA does get passed in the future it will lead to sustainability programs in numerous colleges and universities across the nation, as funding is one of the biggest setbacks to these programs.

The recommendations by congress (not all listed above) cover a good depth of issues concerning environmental and sustainable education. They clearly lay out the issues Congress has found important in environmental education. The inclusion of support in the policy, for teachers and students to further their research and knowledge of sustainable and environmental issues agrees with the need for an interdisciplinary and widespread approach.

Recommendation:

Colby-Sawyer College is well on its way to Environmental Education and Sustainability. With the creation of the Community and Environmental Studies major Colby-Sawyer took a major step toward environmental education, and with the Green ROUTES project the path to sustainability is being uncovered. However Colby-Sawyer is still a long way from obtaining universal environmental literacy for all its students. Currently there is an option of taking an environmental literacy course to fulfill a general education requirement which allows the student to choose two of four categories to take a course in, one of which is environmental literacy. While this does provide an opportunity for students to become environmentally literate, it is not required, and many students are not interested enough to actively pursue environmental courses therefore some students do steer clear of the choice. The recommendation for Colby-Sawyer is to make an environmental literacy course a requirement for graduation, to instill a general knowledge of the environment to the entire student body. It is also suggest that a program similar to the Piedmont Project be started at Colby-Sawyer, to allow faculty to expand their knowledge of environmental education while redesigning courses to meet the new environmental literacy requirement.

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Impervious Surfaces

New Hampshire Comprehensive Shoreland Protection Act

Chris McClellan

Overview:

When discussing the impacts of development on the environment, one of the most salient issues is impervious surfaces. An impervious surface is any surface which prevents precipitation from infiltrating the soil like it naturally would. Impervious surfaces come in a wide range impact levels (levels of imperviousness), from highly impervious surfaces like buildings, parking lots, and roads, to slightly less impervious surfaces like walkways, artificial landscape features, and semi-permeable parking lots. Obviously, the more impervious a surface is, the more impact it has on the environment surrounding it. By an impervious surface blocking the infiltration of water into the soil, any contaminants that are present on the surface are immediately carried away with the water that hits the impervious surface. With impervious surfaces, “water runs off them, not through them. And with that runoff comes a host of problems” (Frazer, 2005). This sort of pollution, pollution that is propelled by water from its original source to its final destination, is referred to as “nonpoint source” pollution. All of this simply means that impervious surfaces pollute, and they do it quickly.

Impervious surfaces are very important to study and monitor carefully because “impervious surfaces are one result of community growth that can be directly measured. It is an important indicator – an understandable measure of our surroundings. It is used to show changes in environmental conditions and to gauge the health of our natural resources” (Bowles, 2002). In order for us to understand the impact of urban sprawl on an environment, we must look at the changes that occur, since “urbanization is an important cause of eutrophication in waters draining urban areas” (Taylor, 2004). This is very precisely and consistently possible through studying impervious surfaces. Studying and classifying impervious surfaces and their impacts has even been suggested as a way to properly control runoff effects in urban environments. According to one article, “the development of a uniform approach to characterization of impervious surfaces would facilitate advances in urban watershed management technology” (Shuster, 2005). By classifying impervious surfaces, we could accurately predict the future impact of a planned development project on the environment in which it is slated to be.

Literature Review:

Impervious surfaces can cause a wide range of problems through the way in which they block natural infiltration of precipitation into the soil. Especially during storm events, when precipitation levels are extremely high and abruptly increasing, “water flow from an impervious surface can lead to stream degradation, habitat alteration, low base flows, and increased toxic loadings from non-point sources” (Thurston, 2003). All of these changes have a pronounced impact on the health of the biology of the stream or water body in which they occur. These changes are especially prevalent in the macroinvertebrates in the system. According to a study conducted in 2004, “Macroinvertebrate communities showed trends of decreased abundance and total species

diversity with increasing urbanization” (Gray, 2004). This all may sound mundane to some, either because they do not care about the health of that particular environment, or because they do not understand the meaning of these changes. However, macroinvertebrates are commonly used as a highly accurate indicator of water quality. If macroinvertebrate health is diminished as a result of impervious surfaces, that indicates a reduction in water quality a “change in the hydrology and geomorphology of streams” (Paul, 2001), which does prove impactful to those who rely on the water in that area for drinking.

Another study, which dissected the relationship between water, polluted by impervious surface-type runoff, and the reproduction and living habits of the fathead minnow yielded similar results. According to the study, “time spent conducting nest and/or egg care activities, average daily spawn attempts, development of male secondary sexual characteristics and male-initiated chasing of female were directly related to percent impervious surface in the watershed” (Weber, 2004). This relationship is similar to that of aforementioned macroinvertebrates, in that the higher the amount of impervious surface was present at a site, the greater negative impact it had on the organisms living in the affected water. This is just another clear-cut sign that implications of impervious surfaces are direct, and undeniable on water systems in the same area.

In addition to altering the water quality in an affected area, impervious surface flow alterations have been known to destroy precious habitat. According to one report: Enhanced runoff causes increased erosion from construction sites, downstream areas and stream banks. Loss of tree cover leads to greater water temperature fluctuations, making the water warmer in the summer and colder in the winter. There is substantial loss of both streamside (riparian) habitat through erosion, and in-stream habitat as the varied natural stream bed of pebbles, rock ledges, and deep pools is covered by a uniform blanket of eroded sand and silt. Engineered responses to flooding like stream diversion, channelization, damming, and piping further destroy stream beds and related habitats like ponds and wetlands (Paul, 2001).

This loss of riparian habitat not only directly lowers the biodiversity and general biological health of an area, but it also exacerbates the pollution issue. The riparian zones, especially slow-flowing wetlands and highly vegetated saturated areas, act as a sort of filter, often filtering out contaminants in the water, before it is sent down stream where many other organisms rely on it. The same report also referenced a startling fact about this concept. They found that, according to the Environmental Protection Agency (EPA), “nonpoint source pollution is now the number one cause of water quality impairment in the United States, accounting for the pollution of about 40% of all waters surveyed across the nation” (Paul, 2001). It is this factor, the pollution factor, combined with the loss of natural habitat, that makes impervious surfaces a highly important issue to address in terms of new development and improvement of existing grounds.

Stakeholders:

Just like any other issue involving humans and the environment, there are opponents and proponents of expansion and development, and the subsequent result of those actions, impervious surfaces. As populations increase, and resources become scarcer, the need for urban expansion will always increase the same. Thus, supporters of continued expansion are the most powerful and plentiful of the stakeholders in regards to

the issue. However, as with any issue, there is another side to the debate. Environmentalists, environmental agencies, as well as state and local governments all have opposing or altered views on the need for expansion and subsequent increase in the amount of impervious surfaces.

The expansionist side of the issue may have the most supporters, and the most money to work with, but there is still mounting evidence proving that the impervious surfaces created through urban expansion have profound effects on the environment. As was mentioned before, there are human and environmental health implications stemming from impervious surfaces, as well as the physical implications of habitat loss and erosion. These aspects work strongly for the environmental side of the issue.

Policy:

Often, the best way to assess the importance of an issue is to see what sorts of policies or laws are being implemented to combat or support it. In the case of impervious surfaces, New Hampshire State House Bill number 383 addresses the issue from a waterfront protection standpoint. As fragile as rivers and streams are, waterfront habitat is even more susceptible to impervious surface runoff pollution and erosion. According to the House, “this bill adds a [50 foot] waterfront buffer requirement and modifies the natural woodland buffer requirement of the comprehensive shoreland protection act” (New Hampshire House Bill 383, 2007). The purpose of a waterfront buffer in this instance, would act to not only preserve the riparian habitat, but also prevent excess erosion and runoff from impervious surfaces being built too close to the water’s edge.

The bill defines a waterfront buffer as simply an area of “natural ground cover... [which] means any herbaceous plant or any woody seedling or shrub less than 3 feet in height. Natural ground cover shall also include naturally occurring leaf or needle litter, stumps, decaying woody debris, stones, boulders, and invasive species” (New Hampshire House Bill 383, 2007). This does not include any type of lawn or manicured ground. Chemicals are prohibited from being used anywhere within the buffer. The buffer also must maintain a specific “tree score”, simply a density of herbaceous cover, to ensure that the buffer is effective.

The bill hits specifically on impervious surfaces when it states that within 250 feet of the reference line (shoreline), the maximum allowed amount of impervious surface is either 30 percent, 25 percent, or 20 percent, based on various characteristics of the vegetation density and quality of the area. In an area with numerous thick, healthy trees, which are densely growing, the percentage of allowed impervious surface is likely to be 30 percent, whereas an area with slightly less dense tree cover, or smaller, more shrubby or grassy growth, the allowed percentage would more likely be 25 or 20. Healthier, bigger trees count for more points towards the aforementioned tree score, and thusly tailor towards a higher percentage of impervious surfaces to be allowed in that given area.

Policy Critique:

New Hampshire State House Bill number 383 addresses impervious surfaces concern at a highly fragile part of the aquatic ecosystem. As has been mentioned before, shorefronts are highly susceptible to erosion and pollution from impervious surface

runoff, and thus should be protection enforced with the utmost concern. This bill makes great strides to try to preserve the shorefront by requiring a dense buffer zone, wide enough to stop a great deal of excess runoff. The addition of the impervious surface area percentage limits, within 250 feet of the shoreline, also bolsters the safety of the area. Limiting the area of impervious surface allowed, and maximizing the amount of natural protection from runoff, this bill does a good job of ensuring shoreline ecosystem health.

Similar measures have been taken by projects like NEMO, the Nonpoint Education for Municipal Offices project, which was created in 1991 to educate towns on effective ways to manage impervious surface runoff and pollution through town planning. NEMO uses GIS, Geographic Information System, and satellite images to calculate the amount and level of impact of impervious surface in an area, and plans ways in which the effects of it can be curbed (Arnold Jr., 1996).

Recommendation:

The impacts of impervious surfaces are undeniable. Both as an environmental concern and a health risk, impervious surface management should be improved, to ensure the well being of humans and the environment. The requirements listed in House Bill number 383 are a good set of guidelines for Colby-Sawyer College to follow. Although the College does not have shoreline to worry about, it is important to remember that the whole campus is on a long sloping hill, and the athletic fields are just uphill from Pleasant Lake. It would not be out of the question to use the waterfront buffer ideas from New Hampshire House Bill 383 to ensure that the College has the proper protection in place for excess runoff, even between the campus and the fields. Considering the specific situation, and the limitations on impervious surface assessed in New Hampshire House Bill 383, one can estimate what sort of guidelines or limitations should be set. Using the tree score criteria addressed in the bill, it would be safe to argue that Colby-Sawyer has a relatively healthy tree score here. The tree score on campus would be low, surely, because that is where the higher concentration of impervious surfaces are, but if one measures the tree score below Kelsey Fields, in what is truly our woodland buffer zone, then there is a healthy tree score. Mostly, the trees in the downhill side of the Kelsey Forest are relatively old and acceptably healthy. There is minimal thinning of the forest below the athletic fields, and there is a good distance of constant forest between the fields and any start of development or disruption before the lake. Colby-Sawyer College could safely limit itself to a 30 percent impervious surface coverage standard, based on an undoubtedly high tree score in our woodland buffer. But it is important to remember that, because of the high concentration of parking lots on our small campus, impervious surfaces are a legitimate concern, one which should be addressed by utilizing the guidelines in New Hampshire State House Bill number 383.

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Invasive Species

Brian Valle

Overview:

An invasive species, is defined as “a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health,” (US Department of Agriculture, 2006). Such species may include ornamental plants and cultivated plants like burning bush, *Euonymus alata*. It is important to understand how each invasive species affect the native species and, how it affects the overall habitat of an area. Eradication and education on invasive species is necessary for the preservation and restoration of our local native plants.

Literature Review:

The landscape of an area does more than just serve as an aesthetic backdrop. The implementation of native species into the landscape of an area can improve the health of local plants and animals, while creating an aesthetic environment. The implementation of native species landscaping is a relatively new one due to the increased research in this area. According to Brian L. Foster, “Patterns of plant composition and diversity along gradient of productivity, and the mechanisms that produce these patterns, continue to motivate research and fuel debate. Research into this topic has taken on increased meaning in recent decades as habitat modifications and species loss has accelerated, and as the consequences of these changes for ecosystem functioning has become more apparent.” The idea of species diversity and the influence of the surrounding ecosystem on these species is quite complex; however, they are linked closely to the grounds of an establishment. When an establishment is built, it disrupts the present habitat and native species of an area. The effect of this habitat displacement is quite drastic; however, it is the long term effects such as the displacement of natural corridors and the implementation of exotic species in place of native species plants that affect the overall ecosystem (Foster, 2004).

Understanding how non-native plants make their way into our culture and the effects these plants have on our existing species determine how threatening certain species can be. “...the large majority of established exotic plants species in North America have been introduced for landscaping and farming,” (McKinney, 2004). This is because when people travel they have a tendency to bring their plants with them. People may be the sole reason for the implementation of exotic species to an area. “[The] human population size is the variable most strongly correlated with exotic species richness, explaining 69% of the variation in exotic richness. In fact, after human population size, no other variable (neither area nor native species richness) explains any residual variation in exotic richness,” (McKinney, 2004). There is no harmful intention of introducing an exotic species that may threaten the health of the existing habitat. It is important to know how exactly a non-native or alien species is categorized so as to avoid the implementation of such species. “It may be noted that the CBD [Convention on Biological Diversity] applies the expression “alien species” to denote any species which

is introduced into new habitats by human intervention; i.e., a process considered different from the natural process of species migration and establishing in new areas,” (Sandlund, Schei, and Viken, 2001). The common understanding of what a non-native plant is vital to the understanding of what they are doing to our local habitat.

Development and urban sprawl are unstoppable functions of our society at the present time; however, the education and implementation of environmentally friendly actions may lessen the ecological impact created by development on the surrounding area. The importance of native species landscaping was realized and explained in National Wildlife’s April edition in 2006 with the article by Janet Marinelli called Homegrown Biodiversity. She elegantly explains the importance of native species gardening:

When I was a novice gardener I was unable to connect the dots, but I have since realized that as wilderness shrinks and backyard acreage increases, home landscapers play an increasingly critical ecological role. The domestic landscape expands inexorably with sprawl, while natural areas grow ever smaller and more isolated from each other. This habitat fragmentation threatens genetic diversity, because when populations of a species are cut off from one another, inbreeding occurs. One likely result is that many future generations will lack the genetic variation that would help them cope with changing conditions, from global warming to imported insect pests. Our manicured gardens threaten biodiversity in other ways as well. Free of checks and balances that controlled their numbers in their native lands, scores of imported plants jump garden gates and swamp nearby native vegetation. Park and preserve managers struggle daily to control these invasive pests (Marinelli, 2006).

A simple implementation of native species in landscaping can help with many of the concerns of non-native plants. The implementation of native species into cultivated gardens may be an easier transition for an establishment or institution rather than on a private basis. The resistance to native plantings that may be given by individual homeowners is quite understandable. These people have worked hard and take pride in their garden and knowledge of it. With the proper education a common understanding may be reached.

Stakeholders:

The Invasive Species Committee of New Hampshire

- Douglas Cygan (Department of Agriculture, State Entomologist Designee)
- Amy P. Smagula – Voting (Department of Environmental Services Designee)
- Douglas Bechtel – Voting (Environmental Interest Representative)
- Karen Bennett – Voting (Cooperative Extension Representative)
- Lionel Chute – Voting (Department of Resources and Economic Development Designee)
- Robert Eckert (College of Life Science and Agriculture of the University of New Hampshire Designee)
- Marc Laurin – Voting (Department of Transportation Designee)
- Deborah Lievens – Voting (General Public Representative)

George Timm – Voting (Horticultural Interest Representative)
Marilyn C. Wyzga – Voting (Fish & Game Department Designee)

New Hampshire Landscape architects, designers, and construction firms, nurseries, and any other business that currently have back stock of these now regulated plants should be aware of proper removal techniques. Moreover, these businesses will need to follow the Invasive Species Committee and the additions to the invasive species list and plants that will be affected by amendments to House Bill 1258.

New Hampshire residents who may have these plants throughout their property should be aware of the transportation area of House Bill 1258.

Policy:

New Hampshire HB 1258, is a result of President Clinton's Executive Order 13112. The executive order established the National Invasive Species Council, "is responsible for assessing the impacts of invasive species, providing the nation with guidance and leadership on invasive species issues, and seeing that federal programs are coordinated and compatible with local initiatives," (McDonnell, 1999).

One area of the New Hampshire HB 1258 bill, specifically prohibits the sale, distribution, and transportation of Norway maple *Acer platanoides*, Japanese barberry *Berberis thunbergii*, and burning bush *Euonymus alatus* as of January 1, 2007. Other states, in accordance with President Clinton's Executive Order 13112, have created similar invasive species bills which incorporate the same invasives as the New Hampshire HB 1258. This bill was created to "recognize the adverse environmental and economic effects of invasive plant, insect, and fungal species upon the state; to establish the means by which the state shall address and minimize such adverse effects; to promote research and educational activities dealing with invasive species so as to achieve the best possible protection of agricultural, forest, wildlife, and other natural resources of the state and of human health; and to prevent and control the spread of invasive species in the state," (New Hampshire Department of Agriculture, 2005).

The commissioner of agricultural, markets, and food, Stephen H. Taylor in conjunction with the invasive species committee is responsible for enforcing the bill in the state of New Hampshire. Clause three states, in the commissioners' duties outline in the final version of bill 1258 states: " The commissioner shall consult with the invasive species committee and prepare and publish by April 1 annually a list of invasive species deemed to present an immediate danger to the health of native species, to the environment, to commercial agricultural or forest crop production, or to human health. The commissioner shall have authority to prohibit collection possession, importation, transportation, sale, propagation, transplantation or cultivation by any person of any species so listed. Such list shall be known as the "New Hampshire prohibited invasive species list," (New Hampshire Department of Agriculture, 2005). To ensure that the invasive species committee is qualified for the position, key authoritative positions have been identified. They are as follows "the State Entomologist, the Commissioner of Environmental Services, or designee, the Commissioner of Resources and Economic Development, or designee, the Commissioner of Transportation, or designee, the Executive Director of Fish and Game, or designee, the Dean of the College of Life

Sciences and Agriculture of the University of New Hampshire, or designee and three persons appointed by the governor with the advice and consent of the executive council who shall each serve for a term of 3 years. One shall represent horticultural interests, one shall represent environmental interests, and one shall represent the general public," (New Hampshire Department of Agriculture, 2005). The people who currently fill these positions are identified as stakeholders.

Policy Critique:

House Bill 1258, is a great start to the monitoring and the eradication of invasive species throughout New Hampshire, however, this bill simply paralyzes the sale and transportation of certain species, and does not eradicate the invasive from their current non-native habitat of New Hampshire. The species Norway maple *Acer platanoides*, Japanese barberry *Berberis thunbergii*, and burning bush *Euonymus alatus* as of January 1, 2007 are no longer allowed to be sold or transported, yet this bill was created in the spring of 2000. The seven year time gap has allowed for the sale and transportation of these plants in anticipation of House bill 1258. Understanding that businesses such as nurseries and landscape firms may have a back stock of these plants and will lose money as a result of the inability to sell and transport the plants is imperative. Perhaps a smaller time gap would have cut down dramatically on the spread of such invasives. Moreover, the list of invasive plant species may have been small, leaving out some invasive such as Oriental Bitter Sweet *Celastrus orbiculata thunb.* which is a creeping vine that out competes native species for light, water, and space. There are may other invasive like Oriental Bitters which inhabit New Hampshire, yet they are not usually sold in stores like of Norway maple *Acer platanoides*, Japanese barberry *Berberis thunbergii*, and burning bush *Euonymus alatus* .

House Bill 1258 does not address existing plants on private or public land. The real problem is the spread of existing invasive and the control of these plants. This bill is moving in the right direction to control any more growth of these plants; however, there is nothing in place to remove existing invasives. The lack of effort to remove existing invasives is the only flaw within House Bill 1258.

Recommendation:

The idea behind House Bill 1258 is to stop the sale and planned movement of invasive species throughout commercial vendors. It is the idea and premise of this House Bill that should carry over to our campus and perhaps some policy regarding the replacement of invasive and planting of native plant species throughout campus. A comprehensive list of tree species, throughout campus has been compiled, and will function as a tool in the overall eradication of invasive species throughout campus. Priority such as Susan Swamp, which is covered in Oriental Bittersweet, *Celastrus orbiculata thunb.*, may have to be removed by hand over may years to ensure full eradication. Others, like Burning bush are of concern; however, the treatment of these species toward native species is minimal and in turn can be phased out at the convenience of the college facilities department. Finally, old or sick ornamental plants such as the invasive, Norway maple *Acer platanoides*, can be replaced as needed with native plants to the area.

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Laboratories and Facilities: Energy Policy Act of 2005

Geoff Pushee

Overview:

Laboratories are becoming a bigger and bigger topic when talking about their effects on the environment and about writing different environmental policies that will help reduce their risk on the environment. Many organizations especially the United States Environmental Protection Agency are pushing for laboratories and facilities to become more green. Though green labs are extremely beneficial to the environment there is still some slack from some people in supporting them because there is a lot that goes into designing and building these facilities. It is also very expensive to put up these buildings and to make sure that they are being run properly after they have been built. The good thing is that organizations like the EPA are starting to give out more and more money and start more initiatives for people to build these laboratories because of the many environmental benefits of green labs.

These facilities represent an ever-expanding growth opportunity for advanced, environmentally preferred, building technologies. The typical laboratory, for example, uses far more energy and water per square foot than the typical office building due to intensive ventilation requirements and other health and safety concerns. Because the requirements of laboratories and related high performance facilities differ so dramatically from those of other buildings, a clear need exists for an initiative exclusively targeting these facilities (US Environmental Protection Agency, 2006).

This clearly shows why organizations like the EPA are pushing for more and more people to develop green laboratories. They are very beneficial to the environment and the health and safety of the surrounding people.

People are also getting into greening up their laboratories because even though it is expensive to build green labs, it is not necessary to build a brand new laboratory for it to be green. There are things that can be done to green up labs and make them more environmentally friendly. "For example many schools are finding that schools have benefited, both financially and environmentally, from a cooperative effort in which state, county, and local specialists removed stockpiled chemicals. The Environmental Health and Safety Department of the University of Massachusetts at Amherst served as a clearinghouse for proper consolidation and disposal. Bulking reduced the unit cost from what each school would have had to pay working alone. Some chemicals were salvaged for reuse in college laboratories" (A clearinghouse, 1998). This shows that just by cleaning up your labs and getting rid of many of the old built up substances, a school can save money and help the environment, a great option for making labs greener.

"Many schools are not just cleaning up old chemicals within their labs but they are also using things like green chemicals. These are chemicals that do not have as big of an impact on the surrounding environment. These chemicals are a great way to keep labs greener and yet another option instead of building a whole new green facility in just simply greening up old labs. The EPA again here gives out funds to certain people who

want to use these chemicals” (Dunn, 2006). Greening up laboratories is a very difficult process and many people do not show much interest in it. On the positive side there are still a lot of people who want to green up labs and show a lot of support for doing this. It is crucial that policies be written so that most labs do get greened up because many of them do have a significant negative impact on the environment. Organizations like the EPA and colleges and universities like MIT that are leading the way in green labs and greening up labs must continue to spread the word and help to get more and more support for green labs so that this can someday be an environmental concern that we do not have to worry about.

Literature Review:

Labs are a very important topic to consider when looking at environmental policies for places like college’s or universities. They could be one of the most harmful places to the environment on a campus. Labs are not only for science but places like art studios can also have many harmful impacts on the environment. There are many things that come out of these labs that are not only harmful to humans but the environment as a whole. In the past many labs have not been that environmentally friendly or green, but as more people are becoming aware of the serious impacts they can have on our environment, people are starting to make big steps forward in making sure that laboratories around the United States and the world are becoming greener. There are many examples of how things that go on in a lab or things that are in a lab can be extremely harmful to our health and the environment.

Hazardous-materials such as chemicals, chemical by-products, chemical handling supplies (e.g., gloves and spent bottles), paints, and solvents-can cause pollution and present risks to health, safety, and the environment. Flammables, corrosives, toxics, radioactive isotopes, and biohazards are used to teach chemistry, biology, chemical and civil engineering, physics, and geology. Laboratory research in these disciplines, as well as in biomedical and medical fields, also use and generate hazardous chemicals and hazardous materials. Physical hazards such as liquid carcinogens, sharps (used blades and needles), and lasers pose concerns. In addition, regulated and hazardous materials are used and waste is generated outside the sciences in places like photographic developing laboratories and art studios (Hammond, 1998).

As can be seen from this, labs could be a huge environmental risk if they are not properly taken care of. Luckily here at Colby-Sawyer we have a pretty good grip on this issue, but around the world many places are still struggling with making their labs more green. With the development of new environmental policies it will make sure that labs are safe and do not endanger their surrounding environments. It will be necessary for these policies to continue to adapt as labs continue to become more and more advanced in the future.

Transportation and disposal are two of the biggest things that policy makers look at, because this is when the materials actually come in contact with the outside world and can really do some damage. Many policies and laws have been written just for this purpose. M. Wantland notes that the best way to properly dispose of chemicals is

through lab packing. “This is a process in which you categorize small containers of things like chemicals and solvents, and then you set up an inventory of these lab packages. This will help you to know what is what, and you will not be guessing if there are things lying around that are extremely toxic. It also tells that in transportation you should have Transportation Department-approved steel, plastic or fiber drums, and that you should use a licensed waste disposal service so that you know the products are getting taken care of correctly” (Wantland, 2003). This is a good area where policy writers can look into when talking about laboratories.

Stakeholders:

Stakeholders are an extremely important aspect to look at when looking at green labs. Stakeholders are people that have an important role in the issue that is being looked at. Many of the stakeholders that exist when talking about green labs are scientists, law-makers, different organizations, colleges and universities, the government, EPA, and architects. Many of these different groups of people are both opponents and proponents. Some of the stakeholders want to push for green labs because they can see the many benefits whereas on the other hand many people do not agree with greening up labs because they are not that well informed about the issue, and do not understand the benefits of greening up labs. Many of these opponents think that it really expensive and not worth their time, but in reality they can actually save themselves money in the long run by investing and greening up labs. The government has not really shown that much interest in developing a lot of policies that give incentives to green up labs, so many individual organizations need to just take the initiative and do this on their own. If the government gave more incentive to these different stakeholders than probably more and more labs would become greener (Lackey, 2007).

Policy:

The policy chosen for this paper was the Energy Policy Act (EPACT) of 2005, this policy addresses the laboratory issue on a federal level. “This act includes a number of important requirements for federal agencies regarding goals for energy efficiency improvements in existing and new facilities, increased use of renewable energy sources, and procurement of energy efficient equipment in applicable contracts, among other topics” (Federal Roundtable, 2005).

Policy Critique:

This act is a good policy for talking about green labs and green facilities. It is more helpful for making all facilities more green, but it does not help laboratories as much. It does not address any of the chemical aspects of labs like, how to store these materials, clean up old ones, implement green chemicals, and transport the old chemicals. It also is only a policy for federal agencies, it does not mandate any other private labs or facilities.

Though this is a step in the right direction this policy will probably not help to green up labs as much as it could. It will help for the labs to run cleaner and use much more environmentally friendly equipment, along with promoting the use of renewable energy sources. This is a really crucial part to the policy and it could have a larger impact in the whole scheme of things. This might lead to the development of other

renewable resources which could then be distributed throughout the rest of the country and the world. There is probably a lot of opposition to this policy because it will take time and money to change the facilities around. Many people are not going to want to have to do these things because it will make their jobs harder for a little while. Also many people do not care that much about the environment so they will not be that willing to make the changes and might take their time implementing the changes. This policy would be more effective if they mandated when all the changes should be made by. This policy though it will help to make more facilities and labs greener, there are still many things that could be implemented within this policy that would help to further green up labs and make them so that their overall environmental impact is reduced significantly throughout the states.

Recommendation:

It is essential that we continue to keep working to green up laboratories around the country and the world. The EPACT policy is a start in beginning to make labs and other facilities more environmentally friendly. This policy only covers requirements for federal agencies, and hopefully this will carry over into all labs and facilities. Maybe if the policies that were talked about were implemented other things would follow like cleaning up different chemicals within laboratories and using alternative green chemicals that do not impact the environment as strongly. Many chemicals that are used that are harmful and could be looked into and studied to see if there could be an alternative green chemical that could take their place are “absorbents; acids and bases, alloys, buffers, compounds, dyes, enzymes, filter gels, gases, halogen elements and compounds, indicators, labeled organic compounds, metals, neutralizers, proteins, solvents, and tracer products” (Laboratory Chemicals and Standards, 1995). “Also there are alternative processes for manufacturing different chemicals. These chemicals could be used in green labs because the way they were made had no harmful impacts on the environment. These chemicals though they still can be harmful if they are put into the right hands and used and disposed of properly can also decrease the overall impact of chemicals when talking about laboratories” (Anastas, 1996). These chemicals would have a limited impact from production to disposal and this is very crucial in making labs as green as possible. The development of more green chemicals and making the manufacturing process of chemicals more green are two recommendations for a way that labs can continue to become more and more environmentally friendly.

Another recommendation is two simply build new green labs. The implementation of the EPACT policy into these labs would be a good starting point in the development and design. Places like Harvard are starting to green up their labs and make labs greener. “Their recommendation are that when you are building a green lab you must respond to special challenges like implementing sustainability principles in laboratory buildings, intensive energy demands, stringent safety requirements, and highly specific equipment” (Longwood Green Campus Initiative, 2006). With looking at these recommendations and using the EPACT policy when building a new green lab you would have a pretty good base to start with when developing your building. If many colleges and universities follow the lead of Harvard and also more and more policies continue to be developed and implemented then more and more labs will continue to be greener and

the overall environmental impact of laboratories around the country and the world will become less and less.

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Low Flow Toilets: Energy Policy Act of 1992 (2005)

Kris Ramsay

Overview:

“Water is essential to all life on our planet. Surface and ground waters support a variety of human uses including drinking, irrigation of crops and landscapes, industrial processes, domestic applications, and recreation” (New Hampshire Department of Environmental Services, 2007). As human populations and economies grow, global freshwater demand has been increasing steadily. “The increasing demands placed on the global water supply threaten biodiversity and the supply of water for food production and other vital human’s needs” (Pimental, 2004). Today schools, colleges, universities, and other institutions that provide room and board can see significant water and cost savings just by implementing water efficiency practices. This could be as simple as locating leaks, developing maintenance programs, routinely inspecting all plumbing fixtures, and educating the residents at the school about water efficiency. “According to the Environmental Protection Agency, 60 percent of urban water use is residential, and 24 percent is devoted to toilet flushing alone- a total of 4.8 billions of gallons per day across the country is flushed away” (Ogorzalek, 2003).

Traditional toilets use gravity to do their work and used as much as 5-6 gallons per flush. According to Bruce Martin, the inventor of the pressure flush toilet, most of this water is used unnecessarily. Martin developed a model that reduced water use by more than 50 percent, using just 1.6 gallons per flush. Water conservationist saw this as an opportunity to change the law, and they did. In 1992 the Energy Policy Act was adopted and it mandated that all new toilets that were to be installed had to hold 1.6 gallons per flush. All across the nation the newly designed toilets are being replaced and incorporated into new building designs and millions of gallons of water is being saved a day. One limitation to this act is the fact that it did not require the old fixtures to be replaced, (Ogorzalek, 2003).

After doing a water audit here for Colby- Sawyer College it was found that there were 119 high flow toilets (5-6 gallons per flush) and 131 low flow on campus. Though there is more high flow there are still more than one hundred toilets on campus that are using 5-6 gallons of water every time it is used. Meaning the school is wasting a lot of water and basically flushing money down the drain.

Literature Review:

Water conservation around the country is a hot topic especially as people see the price of water going up and the amount of water that is in lakes, ponds, and aquifers going down. Historically, residents of New Hampshire have thought that the state was rich with water and the conservation of water was only something people from arid states needed to worry about. According to the New Hampshire Department of Environmental Services, “In some parts of the state, wells have indeed gone dry. Water levels in some New Hampshire lakes, ponds, aquifers and streams have dropped, largely due to over

mining of ground water supplies” (New Hampshire Department of Environmental Services, 2007).

Water loss is not just a problem in the United States either. Australia is a country who is having a serious loss of water and is taking a few steps to fix it. In “Water Under Pressure: Australia’s man- made water scarcity and how to fix it,” Katie Lahey states that problems and shortages with the water supply system in the country are largely man-made and is having a serious impact on the countries economic growth” (Lahey, 2006). Lahey even claims that that the populations in urban cities in Australia are being offered water restrictions instead of sustainable solutions due to poor planning and management by businesses and individual households. Australia’s Government has passed a Water Efficiency Labeling and Standard Scheme through Parliament. “The new mandatory national Water Efficiency Labeling and Standards scheme is expected to save a single community more than \$600 millions dollars in water and energy bills by 2021,” (Water Scheme, 2005). Consumers and businesses will be able to make informed decisions about which products will help them save water. The scheme will also set minimum water efficiency standards for toilets.

Toilet and urinal flushing typically account for nearly one-third of a building's total water consumption, and this end-use is one of the simplest and lowest cost areas to target for significant water and sewer savings. “The relationship between water price and the installation of low- flow faucets, low- flow toilets, and low flow shower heads were analyzed for apartments and individual households” and the Logit Regression analysis found water prices to be a significant factor at the .05 confidence level in the installation of low flow fixtures (Agthe, 1996). In Oakland California, Judy Monnier faced a tough situation. Monnier is a senior management analyst for the Oakland Housing Authority (OHA), was assigned to find ways to cut utility costs. The OHA was spending more than \$2.5 million dollars annually for utilities, most of which was for water bills at its 3,300 units. After making a few electrical savings renovations Monnier led the charge on the water conservation project. At the 242 sites under renovation, Monnier, “oversaw the modernization of plumbing on OHA’s units: 1,500 ultra low toilets, 2,100 aerators, and 1,100 low flow shower heads were installed over the course of the project” (Ogorzalek, 2003). The savings so far have been astronomical. In 2002, the OHA saved \$189 thousand in water costs and nearly 36 million gallons of water. Though both Australia’s and the OHA’s projects are much larger then just Colby- Sawyer’s campus, if we were to replace all high flow with low flow toilets we would save hundreds of thousands of dollars a year in money and reduce both the amount of water coming and in going out.

Stakeholders:

Water is vital to all human life. Yes we need it to drink but we also use it to wash our clothes, cook with, shower, etc. It is vital to our civilization and yet we all take it for granted. Our society today just goes to that magical sink, turned a knob, and just like that it is flowing from the pipe. When we look at Colby- Sawyers College and our use of water we also need to incorporate the entire town of New London and all the citizens that make it up. In 2000, New London’s year round population was just over 4,000 people. So as we can see that during that student school year the population goes up nearly one fourth, drastically affecting the amount of water that is being used up from the local water

supply. The water that is used up from Colby- Sawyer effects the New London population, local fisheries, and anyone who uses it as well.

By replacing all high flow toilets with low flow toilets we would quickly save money and water. However, today there is still some opposition to the new low flow even in Congress. Ben Lieberman, an Environmental Research Associate for the Competitive Enterprise Institute states, “In addition to costing more than the old versions, the new low-flow models don't work nearly as well. Many people say they have to flush several times to clear out the bowl, which of course defeats the entire purpose of water conservation. Other people have experienced more frequent clogs, and thus increased cleaning and maintenance” (Lieberman, 1998).

Policy:

“The Energy Policy Act of 1992 requires all U.S. plumbing manufacturers and importers to meet or beat the following water-efficiency standards:

- Faucets: 2.5 gallons per minute
- Metered valve faucets: 0.25 gallons per cycle
- Showerheads: 2.5 gallons per minute
- Toilets: 1.6 gallons per flush
- Urinals: 1.0 gallons per flush” (Bourg, 2007).

In 1992 this act was first adopted and brought to the table but it wasn't actually until 1997 that the act was implemented. “The toilets 1.6 gallons per flush is located in section 123 of the act and was last revised in 2005,” (Bourg, 2007). Today all building codes and regulations require that the toilets that are being installed to only hold 1.6 gallons per flush but across the United States you can still find that the majority of toilets that are in households and old buildings have the high flow toilets. This policy was created because of the realization that water is not an infinite source if used to fast and with the population rising we need to conserve all the fresh water we have as much as possible, keeping it clean and sanitary.

Policy Critique:

In general the Energy Policy Act which forced plumbing manufacturers and importers to become more water efficient is seen as a positive one, in turn saving the United States billions of gallons of water used each year. When looking at toilets specifically some earlier versions of ultra-low flush (ULF) toilets designed to meet this standard did have some operational problems and were prone to clogging or required double flushing. Newer ULF toilets have alleviated these problems, and surveys indicate a consumer satisfaction level of greater than 80%. (Bourg, 2007) ULF toilet products are offered in three classifications: 1) flush valve, 2) pressure-assisted, and 3) gravity toilets. In general, the flush valve and pressure-assisted ULF toilets perform better than gravity toilets since they use the water system pressure to assist in their operation. A lot of the time it has been found that the new low flow toilets have not been installed properly. In general the more you spend the better toilet you get. Though you may not want to buy the best or most expensive, in the long run you will save a lot on money and water use. Even if you were to flush the toilet three times you would still be using less money and water

then in a single flush from the high flow toilets. No two models behave the same way and each individual toilet may be a little different depending on the installation. Saving water is always a positive thing especially living in a society who depends upon it for everything.

Recommendation:

Today at Colby- Sawyer the maintenance staff has done a fabulous job replacing nearly all shower heads with the low flow ones using just 2.5 gallons per minute. They also do a good job replacing old leaking pipes, tightening leaky faucets, and in general looking for any areas on campus that wastes water. Colby- Sawyer has even installed a low spray water sprinkler system that is on a timer and shuts off automatically, making sure not to waste any extra water. However; across campus it was found that we still have 119 high flow toilets that do not follow the Energy Policy Act. If the college were to replace all 119 high flow toilets on campus it would not only cut down the amount of money we are paying for water coming in and out of the school but it would also cut down on over a million gallons of water that is being used. Though the calculations do not include what it would cost to have them installed the break even point in terms of money would be 373 days. Also around campus it was found that there are very few urinals because in the past it was an all girls school. The Green ROUTES team has estimated that around the entire campus and dorms, we could easily replace 26 toilets with 1 gallon per flush urinals. By doing this we would again save money and water, hence reducing Colby- Sawyer's Ecological footprint.

If Colby- Sawyer does not feel they have the money to replace the toilets all at once, they could make a plan to replace approx 38 high flow toilets with approx. 30 low flow and 8 urinals each year. This would still significantly reduce the amount of water coming in and out of the school, in turn drastically reducing the cost of water being used for toilets around campus. Once all 119 high flow toilets are replaced with the 93 low flow toilets and 26 urinals, the school could look at its water bills over the past 3-6 years and could determine exactly how much money and water has been saved. Though Colby- Sawyer has 119 high flow toilets and 131 low flow toilets, the high flow toilets costs the school \$28,949 dollars and the low flow only costs \$8,635 dollars. If the high flow were all replaced by low flow the school would be saving roughly 1 million 280 thousand gallons of water a year and about \$21 thousand dollars per year. By making these changes and saving water Colby- Sawyer would not only be helping to reduce its environment impact on campus but throughout the entire town of New London. Water conservation is becoming more and more important every day and it is about time that Colby- Sawyer got on board and got more aggressive in terms of its water conservation efforts.

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The American College and University Presidents Climate Commitment

Stephanie Seavy

Overview:

The Earth's climate is changing at a rapid pace due to anthropogenic influences. The burning of fossil fuels for transportation and industrial purposes, combined with deforestation and biomass burning has dramatically increased the carbon dioxide concentration in Earth's atmosphere. Although the Earth has historically gone through periods of warming and cooling that were characterized by higher and lower levels of CO₂ respectively, currently the atmospheric CO₂ levels are higher than they have ever been before (Hardy, 2003). These historically record high CO₂ levels have put our planet in a position that it has never been before. As a result, we can not be exactly sure how the Earth and the species on it are going to respond. However, the effects of this so called "global warming" have been seen across the globe, from coral bleaching, to sea level rise, to an increase in storm intensity (Hardy, 2003).

On February 2, 2007, the United Nations Intergovernmental Panel on Climate Change declared the evidence of "a warming trend is 'unequivocal,' and that human activity has 'very likely' been the driving force in that change over the last 50 years" (New York Times, 2007). It has become clear that global climate change is the defining challenge of our time. Immediate steps must be taken to fight global warming before it is too late. The way to fight this rapidly approaching problem is to reduce global greenhouse gas emissions. Greenhouse gas emissions include; carbon dioxide (CO₂), methane gas (CH₄), nitrous oxide (N₂O), chlorofluorocarbons (CFC's), carbon monoxide (CO) and nitrogen oxides (NO_x). As the largest emitter of greenhouse gases, the United States of America is morally and ethically obligated to becoming a leader in the fight against climate change (Hardy, 2003).

Literature Review:

America's colleges and universities can act as a leading force to fight global climate change. There are many ways that institutions have and could begin to reduce their greenhouse gas emissions. For example, students at Tulane University created an "energy efficient dorm room appliances" project in 2001. The project involved the creation of a dorm suite that had all energy efficient appliances. The dorm suite was used as an example for other students, staff and faculty about the benefits and energy savings associated with energy star appliances (Tulane University, 2002). Although the project at Tulane only minimally reduced the school's CO₂ emissions it did help raise awareness about the issue.

Middlebury College is an excellent example of a school that has taken progressive steps to fight global warming. In 2005 Middlebury students began an initiative to educate their college community about the threat of climate change. Using creative messaging and events, the students were able to express how global warming would threaten Vermont's ski season. For example, the students made stickers that said "Slush Sucks" and put them on their bikes and rode to the Middlebury Snowbowl ski area to demonstrate their concern about the issue (Middlebury College, 2005).

There are also many energy saving and renewable energy ideas that can be found outside of college and university campuses. The book, Renewables are Ready , presents numerous examples of people creating renewable energy solutions, on large and small scales around the United States of America (Cole et al, 1995). In addition, the book has a section called, “Seek Creative Financing” which gives specific examples of how people and institutions were able to fund their energy conservation projects. For example, Richard Stocken College of New Jersey was able to replace their old heating and air conditioning system with a new geothermal heat pump (which saves the school \$455,000 annually in operating costs) thanks to the EPA’s donation of \$2.3 million and the local utilities contribution of \$1.2 million (Cole et al, 1995). This example shows how large projects that need funding can be achieved by ‘seeking creative financing.’ In most energy conservation projects conducted at colleges and universities funding outside the institution must be located and the Renewables are Ready book offers numerous ideas about how this can be done.

If institutions, such as businesses or schools are actively dedicated to promoting sustainable resource use, they can achieve large annual energy reduction goals (Blok, 2004). This idea is supported by Kornelis Blok’s article entitled, *Improving Energy Efficiency by Five Percent and More per Year*. Blok investigates the feasibility of reducing energy consumption by up to 5 % a year and concludes that such a high rate of energy use reduction is possible if proactive companies are willing to take the steps to do so.

Policy:

The American College & University Presidents Climate Commitment is a high-visibility effort to make campuses more sustainable and address global warming by garnering institutional commitments to reduce and ultimately neutralize greenhouse gas emissions on campus. The effort is modeled after the U.S. Mayors Climate Protection Agreement (ACUPCC, 2007).

The American College and University Presidents Climate Commitment (ACUPCC), is a pact that so far, has been signed by seventy presidents of colleges and universities around the country. The ACUPCC is a commitment for institutions to take specific steps in order to eventually become climate neutral. This Commitment has been designed because institutions of higher education can play a vital role in reversing global climate change. “There is no other institution in society that has the influence, the critical mass and the diversity of skills needed to successfully make this transformation” (ACUPCC, 2007). With over 4,000 institutions of higher learning that have more than 17 million combined students in the United States of America, it is obvious that these schools could be the driving force of change on the critical issue of climate change. The ACUPCC has been developed and coordinated by Second Nature, ecoAmerica, and the Association for the Advancement of Sustainability in Higher Education (ACUPCC, 2007).

Within one year of signing the ACUPCC, the institution must complete a comprehensive inventory of all greenhouse gas emissions (from electricity, to heating, to the commuting and air travel of students, faculty and staff). In addition, this CO₂ footprint must be updated bi-annually after its initial completion. Next, the institution is required to develop an action plan for becoming climate neutral. The action plan must include a target date to achieve climate neutrality, interim steps to reaching the goal, and ways to track progress towards achieving the goal (ACUPCC, 2007). While the goal of climate neutrality is in the process of being reached, the institution must also initiate two out of the six options for tangible actions to reduce emissions. Some examples of the action options include:

- Establishing a policy that will require all new buildings to meet LEED silver standard or higher.
- Establishing an energy-efficient appliance purchasing policy, or begin producing or purchasing 15% of the institution’s electricity from renewable sources.
- Each institution must provide their action plan, inventory, progress reports and updates Association for the Advancement of Sustainability in Higher Education, so the information can be made publicly available.

Policy Critique:

A major weakness of the American College and University Presidents Climate Commitment is that it is not a binding policy. When college and university presidents sign onto the pact, they are not actually responsible for following through with the provisions and making their institutions climate neutral. There is also no guideline for enforcing the deadlines of the commitment, so each institution is technically free to create their own timeline for becoming climate neutral. However, self motivation can be a very powerful tool to create change. Since there is no specific timeline laid out in the Commitment, an institution could potentially decide that their target date for becoming carbon neutral is hundreds of years from now. A target date such as this would make the Commitment ineffective since reduction of global greenhouse gas emissions is an action that must be done within the next few decades in order to stop the progression of climate change.

Although the ACUPCC has some weaknesses, there are also many positive aspects of the Commitment. First, the ACUPCC makes the administration and President of a college and/or university think about how their institution can help fight climate change. The Commitment will greatly help raise awareness about global climate change among college and university administrations. The more awareness that is raised about the issue, the more likely our country will be to start taking drastic actions to reduce our green house gas emissions. If the majority of institutions of higher education in our country become carbon neutral within the next few decades it will certainly be a big step in the effort to fight climate change.

A major benefit of the ACUPCC is that it will help colleges and universities stabilize and reduce their long-term energy costs. The Commitment can also help the institution attract prospective students and excellent faculty who value environmental sustainability. In addition, the Commitment may help schools attract new sources of funding for their environmental initiatives. Community and alumni support can also increase and strengthen when a school signs onto the progressive and forward-thinking Climate Commitment.

Stakeholders:

Nationally and internationally there are many believers of climate change and there are many who do not believe in it. Recently, the issue of global warming has become a hotly debated national issue that has received a lot of media attention. For example, one of the leading figures publicly fighting climate change is former Vice President Al Gore. Gore's movie, *An Inconvenient Truth* even won an Oscar for best documentary of 2006. A major opponent of global climate change is the U.S. Senator of Oklahoma, James M. Inhofe, a former chairman of the Senate Committee on Environment and Public Works and is now a ranking member of the Environment & Public Works Committee. In September of 2006 Inhofe responded to Gore's movie, *An Inconvenient Truth* by calling it, "one of the slickest science propaganda films of all time" (Inhofe, 2007). Inhofe has been very vocal about his opinions on the uncertainty of the existence of climate change and the inclusive research on the subject.

There can be many opponents to climate change within colleges and universities. There may be budget managers or people in the administrations of some colleges and universities that oppose the American College and University Presidents Climate Commitment because it could initially increase costs for the institution. The initial cost increases could stem from the purchase or adoption of new alternative energy sources, such as; constructing a recycling or composting center, a bio fuel plant, a wind tower or purchasing solar panels. Although the initial start-up cost of an alternative energy program could be high, over the years the school would eventually save money when their electricity and heating bills were lower.

There are also many reasons why colleges and universities would be in support of the ACUPCC. So far, seventy College and University Presidents have signed onto the Commitment (Vance, 2007). This number represents large schools like the University of Florida and smaller institutions such as Pennsylvania's Allegheny College. Amy Gutmann, President of Pennsylvania University, remarked, "as educators, universities

and all of higher education have a responsibility to enhance environmental literacy” (Vance, 2007). President Gutmann raises an important point; society at large will benefit from having more environmentally literate people.

Recommendation:

Colby-Sawyer College should adopt the American College and University Presidents Climate Commitment as an actual policy for the College. By making the ACUPCC into a school policy, Colby-Sawyer College would thereby have to follow the guidelines of the Commitment and achieve the goal of becoming climate neutral. Although the American College and University Presidents Climate Commitment asks that each institution, “plan to achieve climate neutrality as soon as possible,” Colby-Sawyer College should make a specific target date for reaching the goal. Creating a specific date for becoming climate neutral will ensure that the Commitment will not be ‘put on the back-burner’ or ignored. In addition to having a specific date for the overall goal, Colby-Sawyer College should create a timeline of dates for when each of the other components of the Commitment will be accomplished. Such a timeline will help Colby-Sawyer College to stay on task and make continual progress towards becoming 100% climate neutral. When dealing with a project as large and multi-dimensional as becoming climate neutral it is important to have clear, specific interim goals that will act as steps towards the final goal. Without these clear, tangible steps it could be easy for Colby-Sawyer College to lose sight of the feasibility of the project.

Colby-Sawyer College should also incorporate the American College and University Presidents Climate Commitment, into the initiatives that are being formed by Green ROUTES and the Re-engineering Committee. Colby-Sawyer College needs to create a long-term vision of sustainability for the College, which will include a reduction of carbon emissions, as well as, reducing water use, waste and green investing. The American College and University Presidents Climate Commitment should be incorporated into Colby-Sawyer’s larger vision for a sustainable future.

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