

Chapter 5

Policy Recommendations

Overview

The sustainability policies detailed in this report were designed with several criteria in mind. Initially, the ACUPCC and STARS reports were used to create specific policy ideas. Signatories of the ACUPCC are required to significantly change the sustainability actions and infrastructure of their institutions. These changes must correspond to a decrease in CO₂ emissions. In the pursuit of carbon neutrality, the following steps have been outlined by the ACUPCC in order to decrease emissions:

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

1. Within two months of signing this document, create institutional structures to guide the development and implementation of the plan.
2. Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update the inventory every other year thereafter.
3. Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:
 - A. A target date for achieving climate neutrality as soon as possible.
 - B. Interim targets for goals and actions that will lead to climate neutrality.
 - C. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
 - D. Actions to expand research or other efforts necessary to achieve climate neutrality.
 - E. Mechanisms for tracking progress on goals and actions.

II. Initiate two or more of the following tangible actions to reduce greenhouse gases while the more comprehensive plan is being developed.

1. Establish a policy that all new campus construction will be built to at least the U.S. Green Building Council's LEED Silver standard or equivalent.
2. Adopt an energy-efficient appliance purchasing policy requiring purchase of ENERGY STAR certified products in all areas for which such ratings exist.
3. Establish a policy of offsetting all greenhouse gas emissions generated by air travel paid for by our institution.
4. Encourage use of and provide access to public transportation for all faculty, staff, students and visitors at our institution

5. Within one year of signing this document, begin purchasing or producing at least 15% of our institution's electricity consumption from renewable sources.
6. Establish a policy or a committee that supports climate and sustainability shareholder proposals at companies where our institution's endowment is invested.
7. Participate in the Waste Minimization component of the national RecycleMania competition, and adopt 3 or more associated measures to reduce waste.

III. Make the action plan, inventory, and periodic progress reports publicly available by providing them to the Association for the Advancement of Sustainability in Higher Education (AASHE) for posting and dissemination.

Naturally, these criteria are important for Colby-Sawyer as it is a signatory of the ACUPCC. These elements lay down a framework of policies that need to exist. Although Colby-Sawyer is not currently participating in the STARS program, STARS is a good guideline detailing some specific initiatives that contribute to a decrease in emissions and an increase in sustainability. Here is a summary in two tables, illustrating our current compliance with the ACUPCC and STARS report and our compliance with these two following the implementation of tier policies. Table 1 represents compliance with the seven ACUPCC action steps listed on the previous page. Colby-Sawyer only needs to meet two of these, while more comprehensive plans are being implemented. Table 2 represents our current compliance with the STARS report and compliance following the implementation of our recommended policies. Based on these tables, by complying with two policy recommendations from any of the three policy recommendation tiers, Colby-Sawyer would be in compliance with all but one of the ACUPCC requirements.

Table 1. Compliance of ACUPCC criteria before and after policy implementation

ACUPCC	Before Policy Implementation	After Policy Implementation		
	2009	Tier 1	Tier 2	Tier 3
1	N		Y	
2	N	Y		
3	N			
4	N			Y
5	N			Y
6	N		Y	
7	N	Y	Y	

NOTE: Y Represents Compliance N Represents Non-Compliance

The criteria for placing policies in tiers came not only from meeting STARS and ACUPCC requirements. Prior to developing our policy recommendations, members of GreenROUTES met with budget managers in the college to get a better sense of financial constraints and other limitations. Community support, capital expenditure, timeline and infrastructure were also considered when creating policies. We categorized policy recommendations in three time-based tiers. These tiers are an indication of the ease of implementation within certain time period, and do not represent a ranking of importance. Tier 3 policies are as important as Tier 1 policies, but the implementation may require more capital and implementation may take longer.

Table 2. Compliance of STARS criteria before and after policy implementation

STARS	Before Policy Implementation	After Policy Implementation		
	2009	Tier 1	Tier 2	Tier 3
Co-Curriculum Education	N	Y	Y	Y
Curriculum	N	Y	Y	Y
Faculty and Staff Development and Training	N			
Research	N			
Dining Services	N	Y	Y	Y
Energy and Climate	N	Y	Y	Y
Buildings	Y	Y	Y	Y
Grounds	N	Y	Y	Y
Materials, Recycling and Waste	N	Y	Y	Y
Purchasing	N			
Transportation	N			Y
Investment	N		Y	Y
Planning	N			
Sustainability Infrastructure	N	Y	Y	Y
Community Relations and Partnership	N			
Diversity, Access and Affordability	Y			
Human Resources	Y			
Trademark Licensing	N			

Tier 1

Policies in this tier can be implemented within one year. These policies have limited capital requirement, meet ACUPCC requirements, and should have a significant impact in a short time period. These policies are considered the major contributors to the College's transition toward sustainability and represent changes that are already in motion at the College¹.

Tier 2

Policies ranked in this tier meet ACUPCC requirements and can be implemented within two to three years. These policies are tier two because they may take longer to implement or may have more capital cost. These may build on the efforts made through the implementation of tier one policies, and will help form opportunities for the future implementation of the tier three policies.

Tier 3

Policies ranked in this tier are estimated to be implementable within five years or more. This ranking is for policies which will require the most extensive amount of input and collaboration of multiple college departments. Infrastructure of Colby-Sawyer may have to change in order for Tier 3 policies to take effect². These policies may require larger amounts of funds to implement.

Data Recording Policy

To establish monthly recordkeeping protocols that will facilitate collection of data that are required to complete the Greenhouse Gas Inventory as well as providing status updates to the president.

As GreenROUTES 2008 completed the Greenhouse Gas Inventory (GGI) we found that the data was very scattered and a lot of it was unrecorded. As a requirement of the ACUPCC the GGI needs to be completed every fiscal year, making the recording of this data very important. This policy is treated separately because it does not fall under a particular focus area.

Every year Colby-Sawyer College needs to update their GGI, a step required by the ACUPCC. This will require that all the data that has been collected by GreenROUTES 2008 needs to be updated regularly for analysis. The table below (table 3) lists the data that need to be recorded annually. Included in this table are the offices responsible for collecting the data as well as the unit of measure needed for the GGI.

Recording this data is very important to the college because it sets a baseline which will help to determine if Colby-Sawyer College is lowering emissions and meeting the goals of the ACUPCC. Every month the President should see a report on the data that is of most importance. The data that should be recorded on monthly should include: propane, electricity, paper consumption, air travel, gallons of gasoline, and gallons of diesel used at Colby-Sawyer College. These areas are the most important for

Colby-Sawyer College because they are the institutions greatest sources of CO₂ emissions. This report should detail the amount used by Colby-Sawyer and the amount of CO₂ that was released into the atmosphere. This information should be presented along with the previous month and the previous years graphs. This way the President can understand how much the college is using compared to previous years, and months. This will give the President a status report on how the college is doing. It is important to note that some information does not belong to a specific department. This will be up to the President to decide who is responsible for records this data.

Data recording is very important for Colby-Sawyer College's effort to lower emissions. Without data there is no way of knowing if Colby-Sawyer College is moving in the right direction. It is highly important to develop infrastructure to house the data that are needed so that the GGI can be completed on time.

Table 3. Data Needed to Complete Colby-Sawyer's Greenhouse Gas Inventory

Data	Office	Unit of Measure
Operating Budget	Treasurer	\$
Energy Budget	Treasurer	\$
Full Time Students	Registrar	Count
Part Time Students	Registrar	Count
Number of Faculty	Human Resources	Count
Number of Staff	Human Resources	Count
Faculty/Staff commuting	Human Resources	Miles
Faculty/Staff air travel	Human Resources	Miles
Physical Size	Facilities	Square Feet
Gasoline	Facilities	Gallons
Diesel	Facilities	Gallons
Refrigerants	Facilities	Pounds
Organic Fertilizers (Nitrogen)	Facilities	%
Organic Fertilizer	Facilities	Pounds
Inorganic Fertilizer (Nitrogen)	Facilities	%
Inorganic Fertilizer	Facilities	Pounds
Solid waste	Facilities?	Tons
Propane	Business	Gallons
Electricity	Business	KWh
Waste Water	Business	Gallons
Paper	Vice President Admin. ?	Pounds
Student Bus TravelBus travel miles	Athletic Department	Miles
Student Air Travel	Athletic Department	Miles
Student Study Abroad Air miles	Student Affairs	Miles
Student Commuting	?	Miles
Carbon offsets. Forest preservation	?	MT eCO2

NOTE: Red outline indicates data not currently recorded.



Tier 1
Policy Recommendations

Tier 1 Policies



T1 Policy 1: Campus-wide incandescent light bulb ban

The “No Incandescent Bulb” policy requires students to use compact fluorescent light bulbs rather than inefficient incandescent lighting. With annual savings near \$12,000 and 100 metric tons of CO₂ and the ability to enforce it with routine inspections make this policy a great first step in reducing emissions and energy expenditure.

Over two hundred years of refining and developing incandescent lighting technology has only brought its energy efficiency up to 10%. The other 90% of the energy escapes unused as heat. This policy would have immediate savings potential and a tremendous positive impact on emissions. In a campus light bulb survey conducted by GreenROUTES in 2008, the ratio of students to incandescent bulbs was 1:1, despite the number of students who received compact fluorescent light bulbs from freshman orientation 2008. Assuming that average Colby-Sawyer student stays on campus for about 244 days out of the year and their 1000 collective incandescent light bulbs burn for 6 hours daily at a rate of \$.116/kWh, this costs the college \$15,242 annually. The amount of energy this takes is 121,191 kWh, which is roughly 1.6% of the college’s total emissions (table 4).

A ban prohibiting incandescent light bulbs in dorms would save the college just under \$12,000 per year and 103,719 kWh per year based on the same assumptions. Based on our 2007 emissions, this policy would reduce CO₂ emissions by 100 metric tons or roughly 1.3% each year. This policy could be easily enforced as well. During routine fire safety inspections, a small fine could be charged to students found using incandescent lamps. Ten years after this policy is set, CSC would have saved over \$73,274 and 631,680 kWh. The table below shows the annual and life cycle savings of compact fluorescents compared to incandescent bulbs based on regional electricity rates and consistent assumptions. Alternately, the college could purchase these 1000 compact fluorescent bulbs for around \$2,000³ from any number of online resources. This would greatly decrease the public outcry of forcing students to buy more pricey bulbs, and the college would still save \$10,000 in electricity annually.

Table 4. Energy Savings Using Compact Fluorescent Bulbs as Opposed to Incandescent Bulbs

	1000 CFL Bulbs	1000 Incandescent Bulbs	Savings
<u>Annual Operating Costs</u>			
Energy Cost	\$3,701	\$17,028	\$13,381
<u>Life-Cycle Costs</u>			
Energy Cost	\$15,172	\$70,023	\$54,851

NOTE: This table is based on a \$.13/kWh electricity rate and 244 days per academic year that students are using 60W lamps 6 hours/day. Made using http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorCFLs.xls#iv

T1 Policy 2: Biomass Heating Purchasing Policy

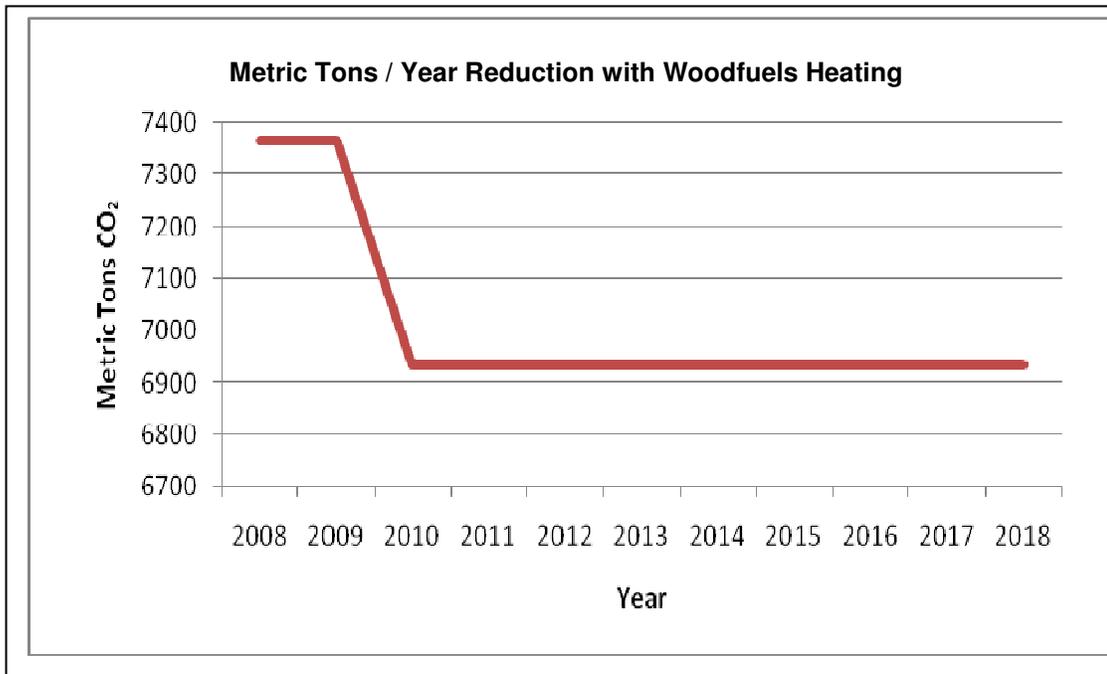
Woodfuels, a sustainable and carbon neutral biomass heating service provider, has developed a proposal to supply Colby-Sawyer College with a wood pellet heating system. We recommend that the college replaces 80,000 gallons of propane with wood renewable wood pellets. This policy requires that Colby-Sawyer sign onto this proposal, which would save the College money and reduce the annual CO₂ emissions by at least 433 metric tons.

According to previous research and through the calculations made with the CA-CP carbon calculator, Colby-Sawyer emitted 2,841 metric tons of CO₂ in 2008 from propane combustion alone. Two contributors to this heavy emissions rate are Ivey and Hogan. Eliminating the emissions from these buildings would cut that number by 15%, saving 433 metric tons of CO₂ annually.

Fortunately for Colby-Sawyer, Woodfuels, a sustainable, carbon neutral wood pellet heat service provider, has made contact and proposed a ten year contract. The contract proposes that the boiler and 24/7 service are provided free of charge as long as Colby-Sawyer purchases Woodfuel's wood pellets which are usually cheaper than propane Fig 2.1 The benefit of this business model is very obvious because the savings are immediate; but that is not the only attractive aspect of the model. Since Woodfuels is a small scale sustainable biomass provider, their methods of harvesting trees and providing carbon neutral heating has a much lighter impact on the environment. Signing on to this contract will also mitigate future carbon tax policies as well as contribute to the local economy.

A ten year contract with Woodfuels could save the college approximately \$500,000 to over \$1,200,000. An additional benefit to these savings is effective metering and logged data that will help the school keep records pertaining to energy savings, financial savings, and CO₂ emissions. At the end of the ten year service contract, Woodfuels offers three options: extend the existing contract for an additional five years under the then-current pricing and adjustment program; purchase the boiler systems at a Fair Market Value price, together with a five-year maintenance and fuel supply agreement; or have the boilers and associated infrastructure removed by Woodfuels at its sole cost and reasonable restoration of the site⁵.

Fig.1 Metric Ton Reduction per Year with Woodfuels Biomass Heating



NOTE: The Graph above shows the reductions of CO₂ over a ten year contract assuming 433 metric tons of CO₂ reduction. Calculations consistent with CA-CP model.

T1 Policy 3: Energy Star Appliance Purchasing Policy

This policy requires purchasing Energy Star approved appliances around campus in the common areas and student dorm rooms, as well as placing a ban on student appliances that are not Energy Star rated. This policy would satisfy both an ACUPCC requisite as well as a STARS report credit.

It is widely known among the student body that the refrigerators, stoves and microwaves are largely unused due to the prevalence of personal appliances. The lack of communal refrigerator use was documented by GreenROUTES in 2006 to assess the need for such refrigerators. If students are to bring their appliances with them when they have operating appliances available, then standards need to be in place so that we are not carelessly emitting thousands of extra pounds of CO₂ into the atmosphere on a yearly basis. The same inspections that ensure the students are not using incandescent bulbs could be applied to this policy. If the college is to enforce such a policy, it will have to lead by example and replace the communal appliances to energy star certified appliances. The monetary benefits alone from performing such an upgrade are enough to classify this policy as a Tier 1.

The potential energy savings to be gained from replacing the appliances on campus and especially within the dorms has large saving potential. Colby-Sawyer College uses approximately 25 washers, 25 dryers and 31 refrigerators in communal areas around campus. This number does not include the large number of small personal appliances (i.e. small refrigerators, microwaves etc.) that

students bring with them. An estimate provided by energy star's government website⁶ suggests that an energy star rated appliance can save \$75 per year. So if the 81 campus appliances were replaced with energy star rated appliances, Colby-Sawyer College could save as much as \$6,075 every year. Of the ACUPCC's recommended courses of action is the replacement of all non- Energy Star appliances.

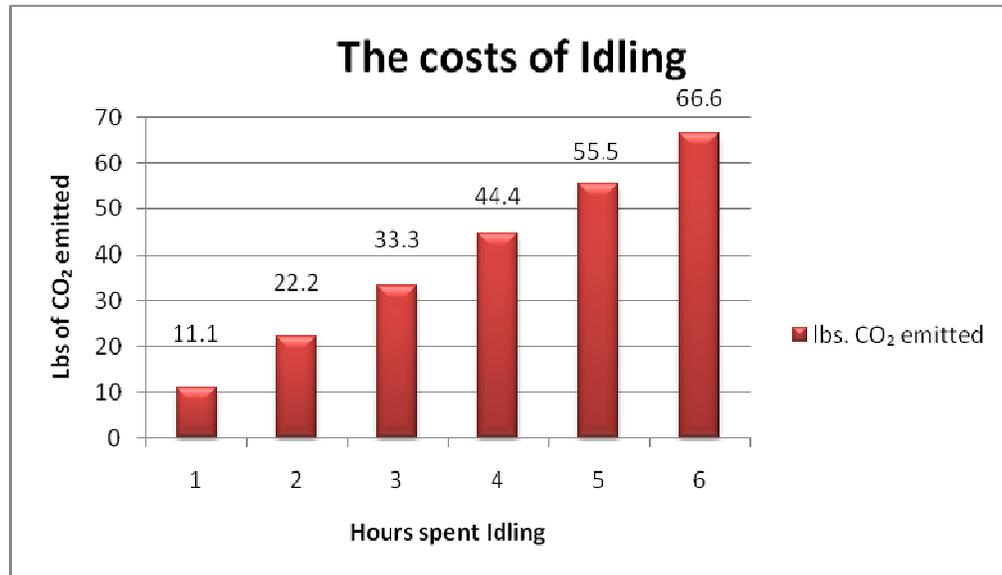
T1 Policy 4: No Idling Policy

This policy seeks to enforce a tight “no idling for longer than 10 seconds” rule for all vehicles on campus. The main targets of this policy are charter buses for sports teams, but it should not exclude vehicles in the college fleet. Each gallon of diesel and gasoline combusted releases 22.2 lbs and 19.1 lbs of CO₂ respectively, making idling harmful to the environment.

Buses and Colby-Sawyer vans frequently idle their engines for hours on campus. The result is wasted emissions, wasted resources, wasted money, dirty air and an unpleasantly loud noise. Furthermore, it is illegal under NH law to have an engine running while a vehicle is unattended and unlocked under RSA 265:72. Idling for more than 10 seconds uses more fuel than shutting off and restarting the engine. An average diesel bus will use half a gallon during one hour of idling. Assuming the vehicle idles for 4 hours, it will combust 2 gallons of diesel fuel and emit 44.4 lbs of CO₂ over the course of the sporting event or tour⁷. If GreenROUTES had been able to account for these emissions, the 7,637 metric ton footprint may have exceeded 8,000.

The New London Energy Committee passed a no idling policy on January 2, 2008. Included are exemptions from this policy. Emergency vehicles and town vehicles shall be permitted to idle only when their tasks require lighting. Also, all vehicles may idle long enough to defrost the windshield. Diesel vehicles are permitted to idle to warm up the vehicle for 5 minutes if the temperature is below 32F, or 3 minutes if above 32F. If the temperature is below -10F, diesel vehicles will not be subject to the 'no idling' policy. Campus safety officers are responsible for administering a small fine to violators.

Fig 2. Emissions from Idling



NOTE: This graph assumes a diesel bus in 1 hour of idling consumes .5 gallons of diesel and that one gallon of combusted diesel emits 22.2 lbs of CO₂.

T1 Policy 5: Set All Computers to Function At Low Power

Computer processors consume large amounts of electricity at Colby-Sawyer. Setting the computers and locking them to a power saving setting could reduce energy costs and emissions.

Computer processors embody 75% of the energy it will consume in its lifetime.⁸ Simply put, the energy that goes into making the pieces for computers and the costs of shipping pieces all over the world result in energy intensive upstream costs. Furthermore, the amount of heat that the computers emit is high. A policy requiring all computers on campus to conform to low power settings would reduce emissions from the largest emission scope. Howard Community College (HCC)⁹, with 2020 computers on campus for student use, saved \$50,000 (\$24.75 / computer) in just one year by setting the power setting on all the computers. In HCC's case, each computer's savings would be around \$24.75. If the same savings were extended to Colby-Sawyer College, then the 950 student computers and approximately 450 college-owned computers located around campus would save \$37,125 annually. One of the only ways to ensure that students were abiding by these power standards is to implement those settings during computer certification. Money saved could be used to replace the desktop computers with even more efficient laptops, adding onto savings. Since there are no initial investments required for this policy, the benefits would be substantial and immediate.



TI Policy 6: No Invasive Species Policy

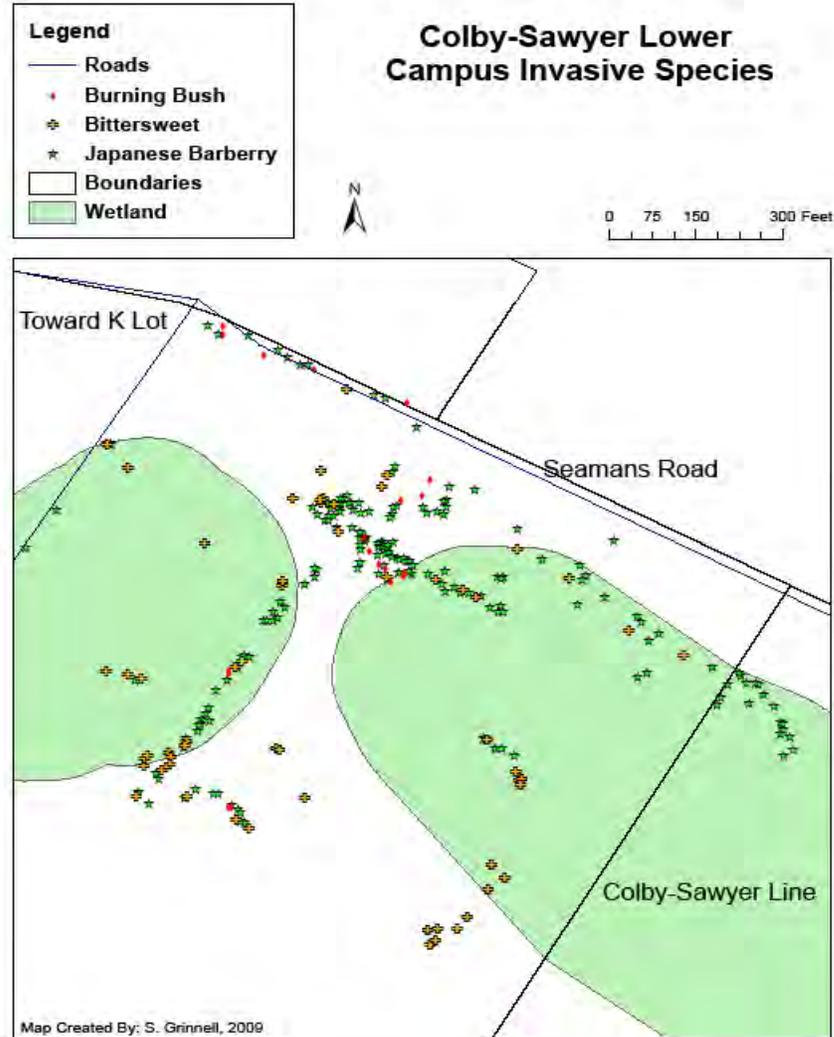
No more invasive species will be planted or transplanted on the Colby-Sawyer Campus

Among the plant and tree species found on Colby-Sawyer's campus, there are several that appear on the Department of New Hampshire Agriculture's invasive species list. An invasive species (or alien invasive) is characterized by its ability to out-compete and damage native species health in a given area. New Hampshire currently prohibits the collection, importation, transportation, sale, propagation, transplantation or cultivation by any person of Norway Maple, Burning Bush and Japanese Barberry as of January 1, 2007¹⁰. Some of the invasive species found at Colby-Sawyer include: Japanese Barberry (*Berberis thunbergii*), Norway maple (*Acer platanoides*), Burning Bush (*Euonymus alatus*) and Oriental Bittersweet (*Celastrus orbiculata*).

A 2007 study done on the effects of Invasive species states that, "These species, such as *Berberis thunbergii* (Japanese barberry) and *Acer platanoides* (Norway maple) are able to survive and reproduce in shaded environments more successfully than their native counterparts and can therefore dominate forest understories¹¹. Evidence for this rapid successful spread can be seen at Colby-Sawyer College (Fig 3). Seeds from these plants are distributed by natural processes such as runoff, wind and birds. The lower part of Colby-Sawyer has an extremely dense population of Invasive species that are rapidly succeeding. This area is problematic because it puts extra strain on native species. The understory in this area is ideal for invasive species to flourish.

There is growing attention to the problem of invasive species. Green Mountain College has recently created an in depth Invasive Species Management plan. The New Hampshire Department (NHDA) of Agriculture recently published a document discussing some issues with invasive species and how to define them. Norway maple, Japanese barberry, and Burning bush have traditionally been heavily used for ornamental landscapes, but they still possess all of the characteristics attributed to "invasive species". "In several New England states, these species have caused significant impacts to the natural environment, which has resulted in the loss of habitat and the decline of native species diversity. These preceding species were evaluated by the New Hampshire Agricultural Committee in accordance with the invasive species criteria and were found to pose an immediate danger to the state and, therefore, are being proposed as prohibited"^x. Recently (After this state policy was made), a Burning Bush was transplanted to Rooke Hall from somewhere else on campus. This type of action displays disregard for the environment, the law, and initiatives that are trying to solve the problem of invasive species.

Fig 3. Invasive species on lower campus



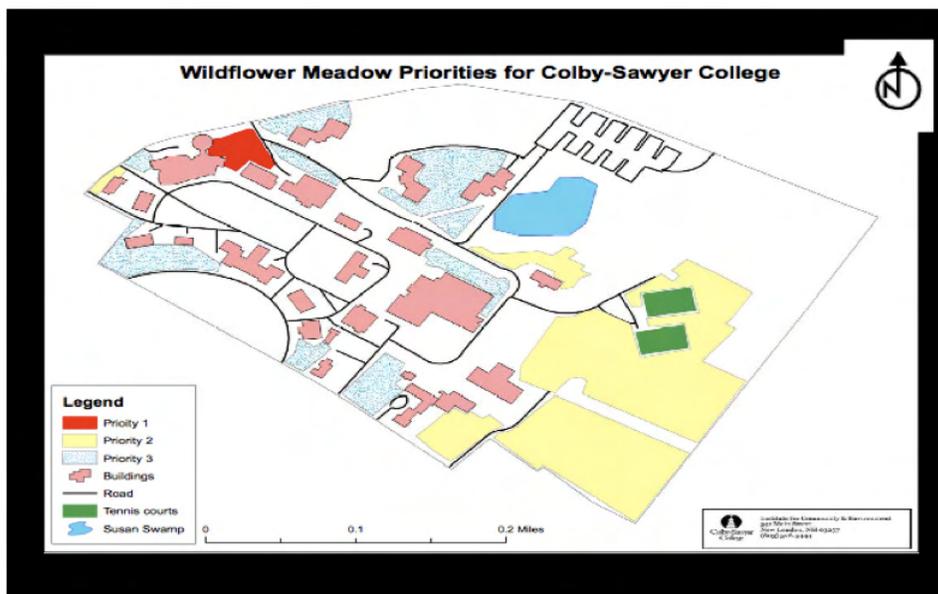
T1 Policy 7: Natural Landscaping Policy

Colby-Sawyer will replace existing landscaping with wildflower meadows

A report in the 2008 Higher Education Associations Sustainability Consortium discussed the concept of planting wildflower meadows in place of maintained lawns. Entitled "Grow a Culture of Sustainability," four community college presidents described how they have integrated greener practices into college operations. "Sometimes that means overcoming resistance. Kathleen Schatzberg, president of Cape Cod Community College, said that when the college turned regularly mowed lawns into meadows, some on the campus complained that they looked unkempt or worried about the effect on those with allergies"¹². This may be a legitimate concern in some cases however, like other institutions that have made this decision, it's understood that the initiative is making a statement about the culture of

the school. It will also make campus more natural and it will save money over time. The 2006 Green ROUTES team explored the idea of planting wildflower meadows around campus, and created some potential locations for these meadows. “The creation of Wildflower meadows throughout the campus will create more scenic views and relieve some of the costs and pressure of the lawn maintenance crew. Moreover, the creation of these meadows provides natural corridors throughout the surrounding area”¹³. After doing more research, the conclusion was that, a significant amount of money can be saved on an annual basis by eliminating the maintained lawns and gardens on campus. In the previous report, students identified three priority areas where wildflower meadows should be established. Using these priorities, a price was figured based on the amount of money that is currently being spent to keep these areas maintained.

Figure 4. Wildflower Meadows Priorities Map



The priority 1 (red) was chosen because it has a low initial expenditure and it is located at one of the school entrances. It will be seen and recognized there, which will lead to a better environmental identity for the College. Priority 2 (yellow) includes all of the maintained fields behind Ivey, around the Tennis courts, and behind the lodge. The priority 3 area (light blue) includes nearly every other maintained lawn on upper campus, excluding the Burpee and Best quads. The larger areas will be more money initially, but there will be a faster and larger return rate.

Table 5. Wildflower Meadow Priorities Breakeven

	Priority 1	Priority 2	Priority 3
Breakeven (Days)	348	208	231
Annual Lawn Care	\$393.00	\$12,357.00	\$5,067.00
Wildflower Installation	\$403.00	\$8,754.00	\$3,583.00
Wildflower Annual Care	\$66.00	\$1,459.00	\$598.00

Planting wildflowers in the first priority area would result in a \$327 dollars savings each year (Table 5). The savings in changing the priority two areas however, amounts to an annual savings of \$10,898. The breakeven time for the 2nd priority will break even in 208 days. If Colby-Sawyer exchanged all maintained landscaping with flower meadows it would save over \$15,000 in maintenance fees in second year. Not only would the school be saving nearly \$16,000 dollars annually but it would be improving its environmental stewardship and saving an undetermined amount of emissions from lawn equipment.



T1 Policy 8: Food Service Transparency

By 2010 Colby-Sawyer College dining services will have a comprehensive budget with complete documentation of origin of all food and a full website with all information displayed.

To meet the requirements of the STARS report, an institutional sustainability assessment tool, Colby-Sawyer College needs to take steps in increasing transparency. To fulfill Operations Credits (OP 5-7) Colby-Sawyer College needs to document where its food comes from and how much is spent on it. OP Credit 5 is the amount of local food that Colby-Sawyer College buys. Colby-Sawyer does not purchase any local food, because the college has no documentation about where the food comes from. Colby-Sawyer would have likely qualified for the STARS credits but without significant documentation the school receives no credit.

A comprehensive budget would categorize the groceries that Colby-Sawyer College purchases providing the institution with a framework on which to base our food purchasing decisions from. Currently there is no budget for each area, so there is no way of knowing the amount of money spent in each area. STARS OP Credit 5, for example, captures the amount of local food that an institution purchases. This information is not captured currently in the dining hall. By knowing the percentage of local food, Colby-Sawyer College will be able to purchase more sustainably. The same is true for Organic and Fair Trade coffees.

Food is something that affects everyone, so the information about where the food comes from should be readily available to the community. For example Plymouth State University (PSU), who also has contracts with Sodexo, has a website that is dedicated to how they are making their campus more sustainable¹⁴. They include a list of initiatives in the dining hall that will create a more sustainable environment. Along with these initiatives they provide a list of local and regional vendors, where they are located and what they supply PSU. They go into detail about the Fair Trade items that are available to the students. Getting away from food, they go into detail about their efforts to recycle, and waste prevention. Plymouth State University is an example of a sustainable dining hall that increases their transparency to the current students and perspective students. Increasing transparency at Colby-Sawyer College will provide more information to the community and administration on our efforts to increase relations with the local community. This will also show the perspective and current students Colby-Sawyer College's effort to have a more sustainable dining hall.

For Colby-Sawyer College it will be important to document where all of our food comes from, create a comprehensive budget, and increase the transparency of this information for this institution to more sustainable as well as meet the OP Credits 5-7 of the STARS Report.

T1 Policy 9: Elimination of Non-Reusable Mugs

Eliminate all non-reusable cups in the dining hall, by providing students with mugs.

Colby-Sawyer College students are large consumers of non-reusable mugs. Our take out of beverages and food is very high, so Colby-Sawyer College needs to look into a way to make our take out more sustainable. Currently we are consuming about 3,000 non-reusable mugs per week. Green ROUTES estimated that students are on campus for 35 weeks, which means that over the course of a year students consume 105,000 non-reusable mugs. This cost Colby-Sawyer about \$3,120 per year. To initially supply every student with a reusable mug it would cost about \$2,340 for 1,500 mugs. Ever year after the initial purchase Colby-Sawyer College would only have to purchase about 450 mugs costing \$625.74 each year. This is a savings of \$2,495 annually.

It may not be realistic to completely do away with the non-reusable, but providing students with an alternative and rewarding them for using it we can slowly wean ourselves off of non-reusable mugs. By providing students with mugs we would be able to reduce the amount of non-reusable mugs which will still save the college money.

T1 Policy 10: Reduction of Containers by Buying In Bulk

Buying condiments in bulk, and having a central condiment station would lower the amount of container waste in the dining hall.

Our nation creates 208 million tons of waste annually¹⁵. Currently Colby-Sawyer College has a ketchup bottle on every table. If Colby-Sawyer College were to create a centralized condiment station, or two, they would be able to reduce the amount of bottles that are in use around the dining hall. By creating a station or two there is the possibility that Colby-Sawyer College would also reduce the amount of condiment waste per plate because people will have to think about going up and getting the condiments. Buying in bulk will save the college money, as well as reduce the waste coming out of the dining hall.



Waste & Consumption

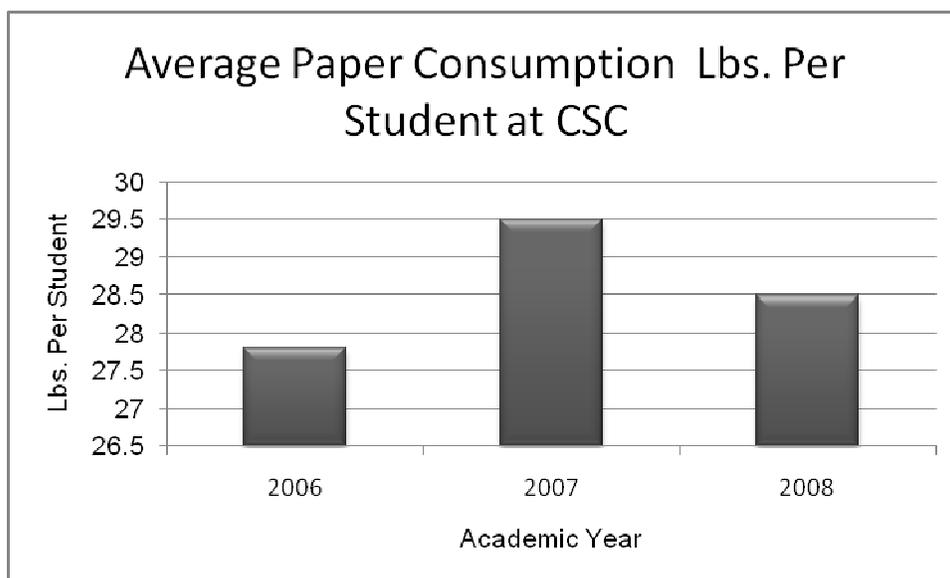
T1 Policy 11: Eliminate Personal Printers and Switch to Central Printing Systems

Purchase central printing systems to reduce paper consumption and emissions.

Central printing systems will reduce both paper consumption cost and emissions by 35-50%. Owning fewer, more advanced printers set to duplex print will allow teachers and students to printing double-sided; resulting in a dramatic reduction of paper consumption. Colby-Sawyer College spent \$17,000 on printing paper in the 07-08 academic year. Each student used approximately 3,000 sheets of paper this academic year. By eliminating personal printers and switching to central printing systems, all papers, packets, test, and handouts could be printed double-sided theoretically reducing the amount of paper consumed by 50 percent. If Colby-Sawyer College reduced its paper consumption by only 35% through duplex printing, it could save the college \$5,800

Pull printing is another option the replacement printers could also offer. Pull printing requires students and faculty to physically walk up to the printer, swipe a card and confirm that they want their printing task to be executed. This helps to eliminate accidental printing of documents not needed. Pull printing is one more effective way central printing systems can help to reduce the consumption of paper on campus. Hewlett Packard has already come to Colby-Sawyer and shown interest in completing a comprehensive assessment of how their products could help Colby-Sawyer make steps towards sustainability. Their assessment would outline exactly where each central printer would be located and what the savings associated would be. This policy is a simple way to reduce paper consumption significantly.

Fig 5. Average paper consumption

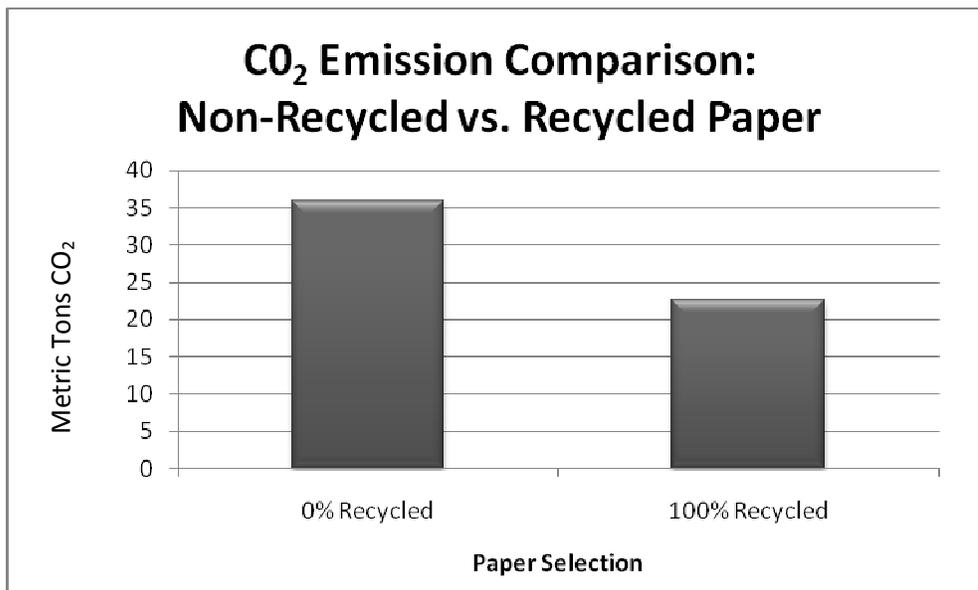


T1 Policy 12: Purchase only 100% recycled paper.

Colby-Sawyer College will purchase only 100% recycled paper.

The switch to 100% recycled paper will lower our college's carbon emissions from paper by 37% with only a nine percent increase in cost. This policy complies with OP Credit 22 of the STARS report. Currently Colby-Sawyer College does not purchase any recycled paper. Using the Clean Air Cool Planet calculator it showed that purchasing 100% recycled paper will lower the college's carbon emissions from paper by 13 metric tons, or a 37% reduction. The price increase associated with switching to recycled paper is approximately nine percent. Non-recycled paper costs an average of \$5.49 per ream, while 100% recycled costs \$5.99 per ream. Changing all purchased paper to 100% recycle will cost the college and additional \$905. This additional cost can be quickly paid back for if some of the other cost savings suggestions in this document are put into effect. The break-even analysis for this policy would be less than a year if the central printing systems were used. Implementing this policy is both simple and effective. Switching to only 100% recycled paper will have an immediate effect on the college's emissions from paper. This policy will also help the college to gain credit for the STARS report.

Fig 6.CO₂ emission comparison

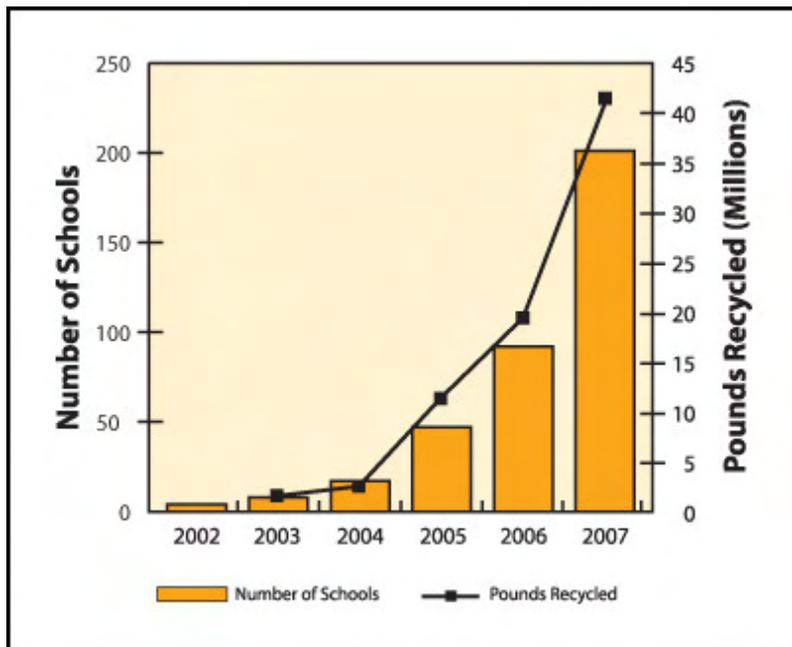


T1 Policy 13: Participate in Recyclemania

Join Recyclemania, a nationwide recycling competition for colleges and universities.

The ten-week competition will help to raise awareness on campus, along with completing one of the tangible actions recommended by ACUPCC. Recyclemania is a friendly competition to see which college or university can collect the largest amount of recyclables per capita, the largest amount total recyclables, the least amount of trash per capita, or have the highest recycling rate. The event was created by the College and University Recycling Council (CURC). Over a ten week period schools report their trash data to the recycling council. Currently 512 schools are registered for the 2009 Recyclemania competition¹⁶. These schools are located all over the United States. Colleges participating in Recyclemania located close to Colby-Sawyer College include: Plymouth State University, Keene State College, and Dartmouth College. The main goals of the Recyclemania competition are lowering waste generated on campus, increase recycling participation by students and faculty, and raise awareness of waste management and recycling programs on campus. The event is highly recommended by both the Presidents Climate Commitment and the STARS report. Participating in Recyclemania would be a simple way to fulfill one component of the Presidents Climate Commitment. Bringing Recyclemania to Colby-Sawyer College will help to push forward Tier two policies in the future. As awareness of recycling efforts heightens on campus so will the possibilities to increase initiatives to better the campus recycling programs. The competition relies on colleges recording exact data concerning solid waste and recycling. This policy will be a perfect way to start recording and diverting the colleges waste away from landfills, and also to start raising a level of excitement towards recycling in our college community. The figure below (Figure 7) shows how the competition has been able to recycle over thirty-five million pounds of recyclables. The growth in participating schools is a direct reason why Recyclemania has become so successful.

Fig 7. Pounds of Waste Recycled by Schools Participating in RecycleMania



Source: <http://www.recyclemania.org> The graph below shows the steady increase of schools participating in Recyclemania along with the increase of pounds recycled each year.

T1 Policy 14: Increase the knowledge and use of Blackboard® on campus

Hold a seminar for all professors on the paper reduction capabilities of blackboard.

Creating a general comfort level between teachers and students on blackboard is very important. This policy requires professors to attend a short seminar training about the capabilities of blackboard and its paper reduction possibilities. Blackboard is a tool that can be used to convey syllabi, reading assignments, and homework descriptions to students electronically. This allows less paper to be printed and takes away the chance of students losing their printed copy causing them to print another. Blackboard is already taught to students as first-year students and with continued use from teachers their knowledge and ability will grow. As teachers begin to use blackboard they will begin to print less and submit more papers electronically. Eliminating printed syllabuses for example; each student on average receives a 6 page syllabus for each of their 5 course each semester. Each student receives on average 30 pages of syllabus each semester or 60 pages each academic year. Currently, there are around 1,000 students enrolled at Colby-Sawyer College. If each student receives an estimated 60 pages of syllabuses each academic year; this means the college prints approximately 60,000 pages for just syllabi. If the college was to introduce a policy stopping the printing of only syllabi, the college could save \$700 each year from purchasing paper and reduce CO₂ emissions by 0.8 Metric Tons. These calculations use the same assumptions and calculation methods as the Clean Air Cool Planet spreadsheet. This policy is a simple approach to reduce paper consumption and increase students and teachers knowledge of blackboard.



Culture, Curriculum & Investment

T1 Policy 15: Establish a Sustainability Coordinator Position

Colby-Sawyer College will establish a Sustainability Coordinator within the existing infrastructure. The responsibilities of this position will include leading sustainability efforts at the institution, connecting stakeholders and providing continuity and progress within the college community¹⁷. The Sustainability Coordinator is also expected to collaborate with the institution's Sustainability Committee¹⁸.

The strategic plan and learning outcomes of Colby-Sawyer have been modified to include sustainability in areas such as Student Development and Facilities. With the implementation of energy-saving projects and amendments to the strategic plan to incorporate sustainability, it would be beneficial to establish a position for a Sustainability Coordinator as they will have the responsibility of being involved in these projects and promoting sustainability within the College.

Middlebury College has an established position for a Sustainability Coordinator, which may be used as one model by Colby-Sawyer in establishing this position. At Middlebury College this position was created as the result of the need for a staff member to manage the College's newly created recycling program; as the program grew Middlebury recognized the need for a specific staff position to coordinate and manage their new sustainability program¹⁸. The benefits of creating a sustainability coordinator position are visible in the implementation of a project completed by Middlebury College in 2009. The Sustainability Office developed an annual greenhouse gas inventory and reporting system and the College adopted a resolution to become carbon neutral by 2016. In 2007 construction for a biomass plant began, and the plant was recently put into full operation in 2009. Middlebury calculated that this project will reduce their emissions by 40%, or 12,500 metric tons of carbon, and replace more than one million gallons of #6 heating oil annually. The price the College pays for the fuel oil is \$1.50 per gallon,¹⁹ which means Middlebury will also be saving \$1,500,000 in projected oil costs. Sustainability officers at Middlebury were a major contributor to the implementation of this project, thus demonstrating the benefits of having such officers at Colby-Sawyer which would help in the process of implementing such sustainable projects.

Examples of sustainability coordinator positions established at different Colleges are included on the basis of the relevance of each position's established responsibilities and duties. One example of a sustainability coordinator position is that of Muhlenberg College located in Pennsylvania²⁰. Many of the requirements listed for the coordinator position at Muhlenberg College would be beneficial for a sustainability coordinator at Colby-Sawyer. As the college is in the process of developing a climate action plan, it will be necessary to integrate sustainable aspects into the existing master plan. A sustainability coordinator could organize sustainable efforts on campus and help to promote greening efforts throughout the College community. The other responsibilities mentioned correlate strongly with other policies being recommended for Colby-Sawyer, and if this position were established, it would further the efforts of enforcing these other policies as well.

The cost of establishing a sustainability coordinator position must also be considered in terms of the responsibilities and duties of the position to determine an appropriate salary. The Association for the Advancement of Sustainability in Higher Education provides information on a survey completed in 2005 as well as another survey completed in 2008, which recorded data on the salaries, placement of the position within the college structure, and the source of the funding to provide the salary of this position at colleges and universities in the United States and Canada²¹.

These surveys show that many more institutions have been establishing this position since 2004²⁰, and the main responsibilities of these positions include overall sustainability coordination, working with students, energy efficiency and management, recycling and waste reduction, and community outreach²⁰. Many of these positions report to either a facilities department or vice president of business administration, and their positions were funded through a “general fund,” which included money from sustainability endowments and private donations²⁰. Average salaries for sustainability positions were based on the education and experience of individuals who hold these positions. Higher pay positions were those of individuals with more education and experience, which received an average salary of \$42,700, and lowest paid positions received about \$19,000. Colby-Sawyer may decide how much experience their sustainability coordinator needs to have by evaluating the time frame of when sustainability initiatives plan to be implemented at the College and pay them accordingly.

T1 Policy 16: Incorporating Sustainability in new student orientation

Colby-Sawyer College will incorporate the concept of sustainability in new student orientation activities. It will distribute informational materials and sustainable products to students during the designated orientation period.

Colby-Sawyer handed out free mugs to students at the beginning of the 2008 academic year to reduce the use of non-recyclable Styrofoam cups²². Compact fluorescent light bulbs were also given out at the beginning of the 2008 academic year. As the College is working to lower its emissions, it is important to instill a sense of sustainable awareness in new students. Though more environmentally friendly materials such as personal reusable mugs and compostable cups have been provided, students need to be told what responsibilities the College’s commitment entails for them. One example students should be informed about during orientation is the College’s shift to a tray-less dining system.

During the beginning of the 2008 academic year, the College provided each new student with one compact fluorescent light bulb. The College should offer to sell the light bulbs individually at very low cost, such as a dollar, as is the practice at Luther College in Iowa²³. The sale for the light bulbs could begin during orientation, and last for a couple of weeks. Luther College, which provides light bulbs for sale to students, has student-run workshops during orientation to start teaching incoming students about living sustainably²⁴. Plans are being made for a sustainability table at Colby-Sawyer during orientation which will provide information of about campus sustainability, as well as student skits with sustainability themes.

T1 Policy 17: Incorporate and Identify Sustainability in the Curriculum

Sustainability courses currently offered by the institution will be identified in the course catalog as well as compiled into a list and published and made publicly available on the College website¹⁷.

Colby-Sawyer College currently has sustainability-related courses such as the Biology course “Interactions in Ecology,” the Business Administration course “Introduction to Organizations (Environmental),” and multiple Environmental courses including “Environmental Issues,” and “Climate Change”²⁴. With such courses already listed in the course catalog there should not be much difficulty in better identifying these courses. It will only be a matter of compiling a list, and providing the existing course descriptions including sustainable aspects of each course.

Examples of other colleges which have been compared to Colby-Sawyer College have adopted their own versions of this policy, including Green Mountain College, located in Poultney, Vermont, which includes sustainability courses within its course catalog in similar areas as Colby-Sawyer College, including Business and Biology²⁵. This college’s catalog identifies each course throughout the offered course listings that incorporate sustainability in the catalog²⁶. Oberlin College, in Oberlin, Ohio also provides proper identification for the sustainability courses it offers in its course catalog²⁷.

Incorporating sustainability within the College curriculum will be an essential component for transitioning Colby-Sawyer into a sustainable institution. The major consideration for every function of the College is how it will most benefit the students. In the College’s goal to enrich and expand the minds and intellects of the individual students, it also considers aspects of sustainability; some of the goals of Colby-Sawyer’s strategic plan are to instill sustainable “habits” within the individual students as well as the entire College community. In offering courses on sustainability throughout the curriculum, the College will be providing a link between diverse academic areas, and developing a common understanding of the concept of sustainability in the entire student body.

Green Mountain College is used as a comparison for this policy not only because it identifies sustainability within its curriculum, but because it also demonstrates links between its areas of study, and the foundation it provides for the entire student body to develop an understanding of sustainability concepts. This College combines the skills liberal arts colleges encourage in students, with knowledge and skills they gain concerning sustainability which they will need in the world beyond their college experience²⁸.

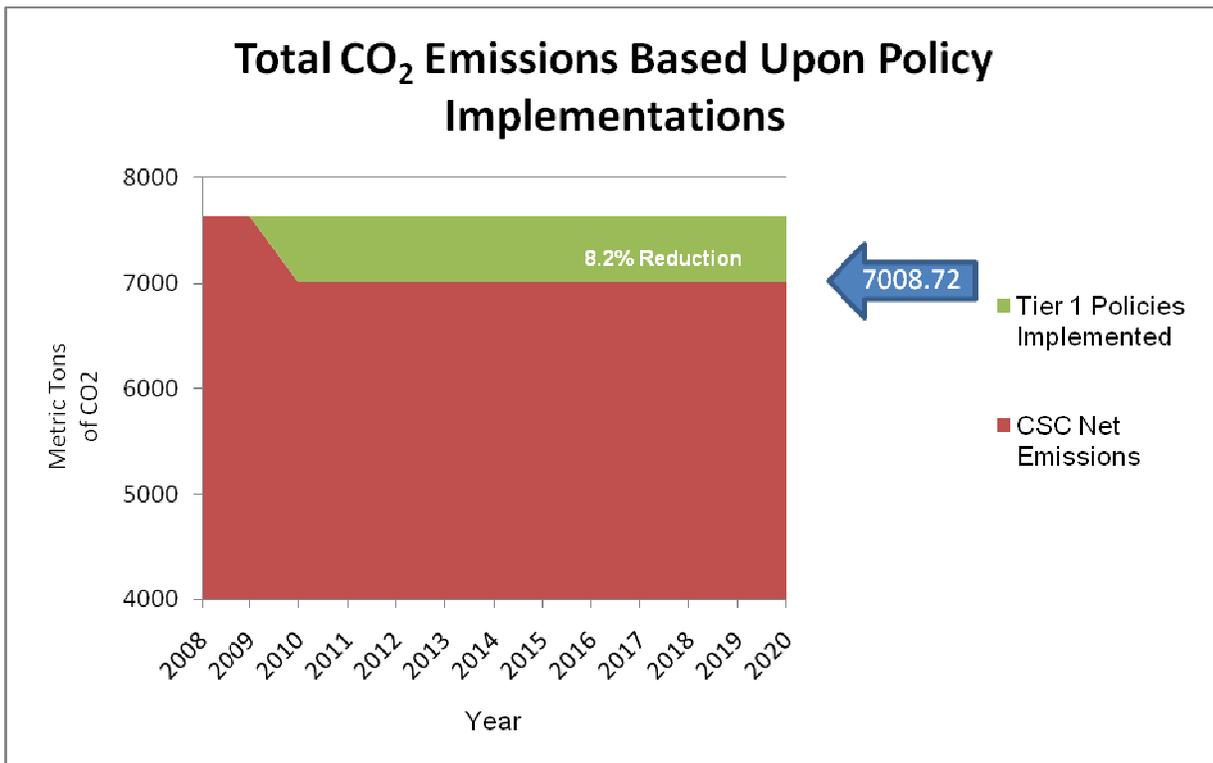
Offering sustainability courses within the curriculum at Colby-Sawyer College will promote the learning outcomes the College strives to teach every student. Students are expected to use the knowledge that they gain during their college career, and developing an understanding of sustainability will provide knowledge that each student will have the opportunities to employ throughout their lives both at the College and after. During the time students spend at the College it is also expected that they will develop a better understanding of themselves and recognize the responsibilities they have to themselves, to society, and to the environment in which they live²⁹. Throughout their education students will distinguish links between the multiple disciplines they study, and incorporating sustainability into the curriculum will encourage students to recognize the link sustainability also has with these many different areas.

Tier 1 Total Savings

Table 6. Tier 1 Total Savings

Tier 1 Policies	Saving (\$)	Reduction in Emissions (Metric Tons of CO₂)
Campus-wide incandescent light bulb ban (T1 Policy 1)	12,000.00	100.0
Woodfuels Renewable Heating (T1 Policy 2)	850,000.00	501.0
Energy Star Appliance Purchasing Policy (T1 Policy 3)	6,075.00	
Power Saving Computer Use (T1 Policy 5)	37,125.00	
Eliminate Non-Reusable Mugs (T1 Policy 9)	2,495.00	
Eliminate Personal Printers and Switch to Central Printing Systems (T1 Policy 11)	5,800.00	12.6
Purchase only 100% recycled paper (T1 Policy 12)		13.0
Increase the knowledge and use of Blackboard® on campus (T1 Policy 14)	700.00	0.8
Total	914,195.00	627.0

Fig 8. Total CO₂ Emissions Based on Tier 1 Policy Implementation



Tier 1 Summary

The Tier 1 policies are recommended by GreenROUTES to be implemented in the first year. These policies are a way to reduce Colby-Sawyer College’s greenhouse gas emissions with limited financial requirements. The figures below look at the financial savings and CO₂ reduction possibilities through implementing Tier 1 policies. The saving assumptions were based on current conditions and did not build cost increase into the calculations; making the savings estimations more favorable over the long term. Table 6 looks at policies that create a quantifiable monetary savings and emissions savings. The GRAPH illustrates Colby-Sawyer College net emission reduction by implementing Tier 1 policies. If Colby-Sawyer College implemented all Tier 1 policies the college could reduce its emission by 8.2 % (627 pounds of CO₂).



Tier 2
Policy Recommendations

Tier 2 Policies



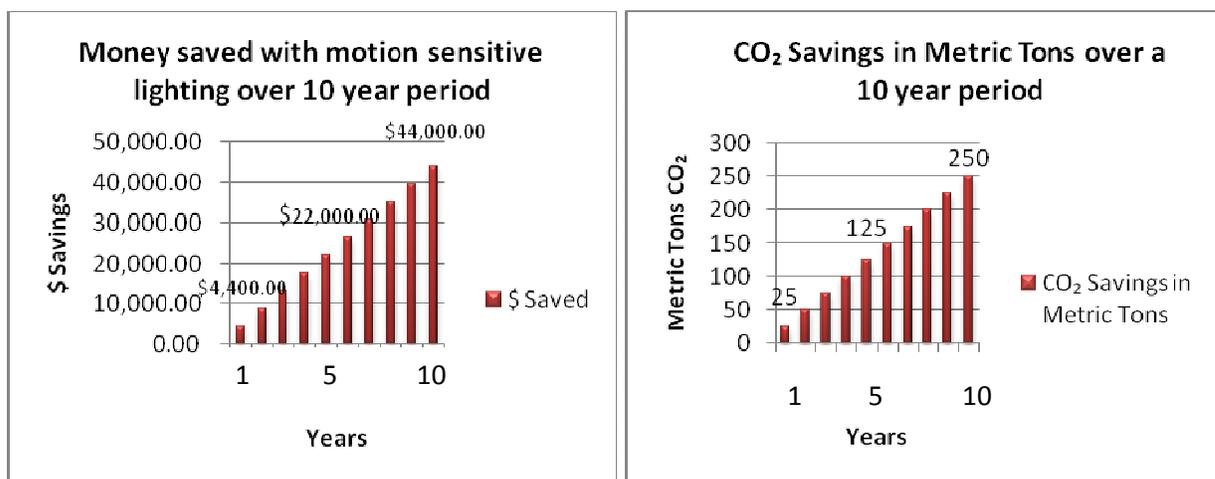
T2 Policy 18: Install Motion Sensitive Lighting

Replace light switches with motion sensitive devices in classrooms.

If Colby-Sawyer invested in motion sensitive lighting, as recommended by GreenROUTES 2006-2007, the college would already have saved approximately \$8,800 if 40 classrooms were upgraded after the assessment. After 10 years, the savings would approach \$45,000 and 380,000 kWh. Assuming that 1.5 pounds of coal are needed to produce 1 kWh³⁰, these cumulative savings would prevent 260 metric tons of CO₂ from being released.

Educating professors and students on how to properly use these switches is absolutely vital to their effectiveness. If people start to use the manual override switch then this will become a waste of money. However, if properly used, this investment ensures substantial savings to Colby-Sawyer and a lighter footprint.

Fig 9. Emissions and Monetary Savings with Motion Sensitive Lights Over a 10-year Period



NOTE: \$110 on average per classroom per year (GreenROUTES,2007). Electrical rate is \$.116/kWh. Calculations performed using www.metric-conversions.org³¹

T2 Policy 19: Employ LEED Standards on all New Buildings

The ACUPCC outlines specifically that all new construction on signatory campuses shall be at least the U.S. Green Building Council's LEED Silver standard *or equivalent*. If Colby-Sawyer chose to receive LEED certification, the college would qualify for OP Credit 1 on STARS report.

Green building design has become a popular way to reduce emissions and save money in colleges that are trying to become environmentally friendly. GreenROUTES 2006-2007 stated that each sq. ft. of green building space costs only \$3 more and the Capital E website suggests as much as \$66 / sq. ft. of energy savings over a 20 year period. However, campus buildings are meant to last for at least 100 years. Based on the previous calculations, \$330/ sq. ft. is an appropriate savings estimate. Applied to a 33,000 sq. ft. building such as Ivey would save the college as much as \$10.8 million over its lifetime. Building green would also give Colby-Sawyer more points in the STARS report under OP credit 1 as well as the ACUPCC.

Keene State, also an ACUPCC signatory, has recently invested in building a 51,300 sq. ft. green dorm³². Pondsider III earned a LEED silver certification, which, using the previous values would save nearly \$17 million in 100 years. According to keeneweb.org, the building incorporates super-insulated walls, motion-sensor lights, dual-flush toilets, and recycling rooms on each floor and also features glass walls to maximize natural sunlight. The LEED checklist of sustainable building practices presents many opportunities to choose from to reach a level of certification. The categories under which the LEED points fall are sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality and LEED innovation credits.

T2 Policy 20: Purchase Heat Retaining Pool Cover

Colby-Sawyer shall invest in a 10x10 outer layer density pool cover to reduce up to 70% of the heat loss in the Hogan pool.

Fig. 10 Pool Cover



While the pool cover is a costly investment, thinking green often requires considering the long term outcomes of policies and investments. If Colby-Sawyer were to purchase a pool cover capable of trapping 70% of the heat lost by the pool, it would pay for itself in less than 2 years and continue to save the college roughly \$3,000 and 6.5 metric tons of CO₂ every year.

www.fillionassociates.com/images/Riverside%20pool%20cover.jpg³³



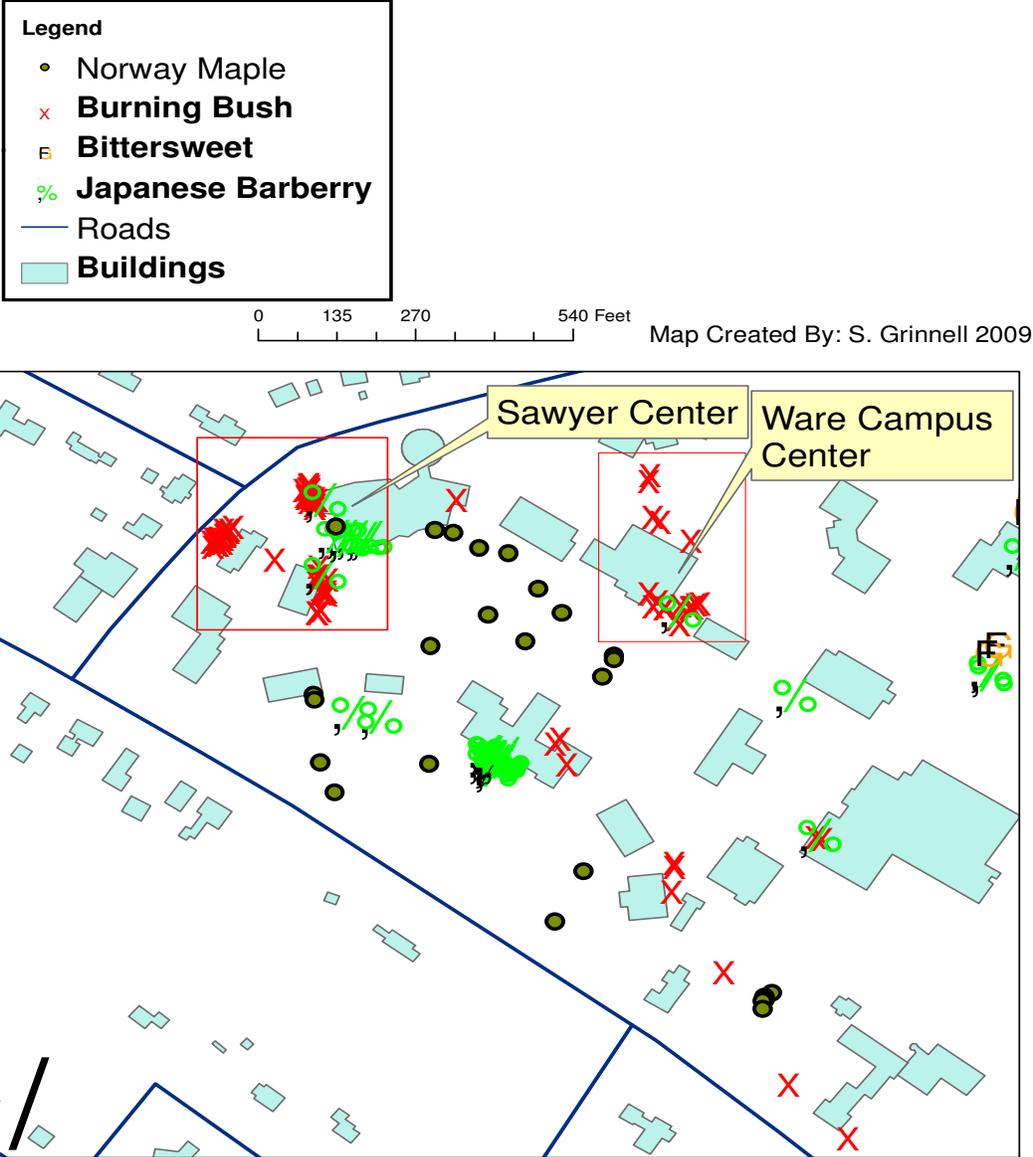
T2 Policy21: Native Species Recapture

Remove 50% of invasive species on upper campus over a two year period

Colby-Sawyer College is in the process of establishing a tree nursery for growing native New Hampshire tree species. This nursery will serve as a resource for grounds-keepers to pull from, decreasing the amount of money that is spent on buying trees and plants. This map (Figure 10) details the areas where the majority of invasive species are found at Colby-Sawyer. The red line represents the target areas for invasive species replacement in the next 2 years. There are a few reasons why these plants will be extracted first. The locations of these areas are seen by many people walking through or driving past campus. Removing these species first, will communicate the change that is occurring at Colby-Sawyer. As seen on the map, the primary shrub found in these areas is Burning Bush, a tall, distinct and highly visible species. Extracting them will be more effective in setting a sustainable image for Colby-Sawyer College that can be seen from the road. Removing the shrubs in these areas also takes priority over removing larger species such as Norway Maple, because the Norway Maple trees will have to be replaced with native trees from the nursery. It will take longer than smaller plants for one of these trees to have a large enough root base and diameter for transplant. The Natural Sciences Department and the Nursery Plan will determine what species will replace Invasive species.

Fig 10. Colby-Sawyer Invasive Species on Upper Campus

Colby-Sawyer Upper Campus Invasive Species



T2 Policy 22: Organic Fertilizers Only Policy

Only fertilizers that are USDA certified for organic crop production will be used on Colby-Sawyer property

In the STARS report one point is awarded to the college or university for using organic fertilizer for landscaping around campus opposed to regular fertilizers. The U.S. Department of Agriculture (USDA) has established a list of harmful materials that cannot be used in organic farming operations. These chemicals are linked to human health problems, such as cancer. Exposure risks are increased for grounds staff and people with chemical sensitivities³⁴. Many other schools including Middlebury and Green Mountain College have taken the initiative to eliminate the amount of chemicals and CO₂ they are putting into the environment, through the use of non-organic fertilizers. AGGRAND is an organic fertilizer recommended by the USDA. The USDA website describes the fertilizer and discusses some of the benefits and properties opposed to non-organic fertilizer. "AGGRAND Natural Fertilizer is a multi-purpose liquid product that is ideal for all-around use on flowers, vegetables, fruits, lawns, shrubs, trees and field crops. Adding natural ingredients to the soil increases microbial activity. Soil microbes fix the nutrients needed for plant growth and release them slowly as plants need them. On the other hand petrochemical fertilizers are often high in soluble salts that are detrimental to soil microbes and plants alike: They decrease microbial activity and plant nutrient uptake. Although these fertilizers are high in nitrogen, phosphorus and potassium (NPK) the plant-use efficiency is very low³⁶ AGGRAND fertilizer is 5% Nitrogen³⁶ Colby-Sawyer uses organic and synthetic fertilizers, however even the synthetic fertilizers exceed 20% Nitrogen in most applications. If Colby-Sawyer switched to AGGRAND fertilizers we would restrict over 2,100 lbs of Nitrogen and 3.9 metric tons of CO₂. In a ten year period, Colby-Sawyer would save over 38 metric tons of CO₂.



T2 Policy 23: Organic Garden

Establish an organic garden on the Colby-Sawyer College that will provide us with produce and act as a teaching tool for a variety of departments.

Many colleges in New England have been successful in establishing gardens on campus including Middlebury College,³⁵ and Dartmouth College³⁶. The growing season in New England is not extremely conducive to our time here as students but in the fall it will be able to provide us with some produce. Developing a garden on campus would require that a member of the Colby-Sawyer College community would need to oversee the project. This could also be an internship opportunity to a student. The size of the project depends on the amount of land the college is willing to provide for the project. The size of the garden also depends on the number of people who are working the project. Middlebury College's organic garden is three acres³⁷, this gives us an idea about the size our garden should be. Our suggestion is to start out with a garden less than one acre, giving us room to expand as the project progresses. The size of the garden will also depend on the location of the garden on campus. Our suggestion here would be to locate the garden near the native plant nursery. This would centralize cultivation practices on campus, which would help to organize our efforts.

The garden could be used as an interdisciplinary tool for many majors. The Environmental Science and Biology students would be able to use it to conduct experiments, test soils, and learn more about agriculture and the environment. Business majors can conduct risk analysis and cost benefits with each different vegetable. They could run the farm like a small business and see how accurate they were in their assumptions. Many other majors will be able to use the garden as they see fit.

Other parts of our community, such as the dining services would be able to utilize the garden not only for produce but as a place to compost waste. Faculty members who want to compost would be able to bring their compost to the garden. An on campus garden would benefit the college by adding a teaching tool, a waste disposal system, and a food provider.

T2 Policy 24: Reclaim Danforth Greenhouse

Transform the greenhouse space located in Danforth into a small productive garden space for students to learn, and for growing some produce in the off season.

In the back of Danforth the greenhouse space has been neglected. This space could be used to provide a small amount of vegetables to the dining hall during the winter months. Like the organic garden in the summer months this small greenhouse can be used as an interdisciplinary tool for all majors at Colby-Sawyer College. Instead of having Environmental Science and Biology students grow vegetables

for a short period of time in course experiments, they would be able to get them to produce a fruit. This will take some work so that the space is back in working conditions, and because the greenhouse is not facing south grow lights are going to be needed to be installed. Adding grow lights will cost the college about \$30 per light³⁸. They would require energy that would produce emission but the emission produced could be less than emissions from transportation. The plan here would be to revamp the space so that more extensive research can be conducted and produce grown. Figure 11 below, is the Danforth space currently; our plan would be to transform this space to produce food for the college. The stone floor is a good quality because when wet it is not slippery, and it provides easy cleanup. The handicap ramp allows access for all community members, and it would be easy to pull out the produce. The accessibility of the space makes it an ideal spot for a small greenhouse. Infrastructure would need to be put in place depending on the produce that is going to be grown. These small changes would help to transform this dead space into an interdisciplinary tool for the college.

Fig 11. Danforth Atrium





Waste & Consumption

T2 Policy 25: Recycle 75% of Non-Hazardous Construction and Demolition Materials.

For all new construction and demolition waste created on campus the college must divert at least 75% of its waste away from landfills and incinerators.

This policy will complete OP Credit 16 of the STARS reports, and also fulfill one constituent of the Construction Waste Management in the Leadership in Energy and Environmental Design (LEED) for New Construction rating system. This policy will also directly link to tier one policy 13. After the college begins to complete the Tier 1 Policies for waste and consumption the Tier 2 policy will fall right into place. If the college wants a competitive score on the Recyclemania score card policies must be put in place to make sure as much material is recycled as possible. Through diverting 75% of the colleges non-hazardous construction and demolition materials the college is accumulating massive amounts of recycled waste for the competition. Recycling materials instead of grouping all construction and demolition waste as garbage can save the college money. The five major materials on jobsites that the college will be able to recycle are wood, drywall, paper, metal, and concrete. Each of these five materials, which makeup a large percentages of every building on campus can be recycled. All of which can be recycled for little or no, cost saving the college money by diverting these materials away from expensive landfills. This policy will help the college gain a higher score on the Recyclemania score card and save money at the same time. This policy also completes one more credit for the STARS report and follows the guidelines of the LEED New Construction rating system.



Culture, Curriculum & Investment

T2 Policy 27: Establish Green fund

Colby-Sawyer College will establish a fund for campus sustainability projects, within Annual Giving.

The major benefit of creating a green fund at Colby-Sawyer is that it would help address the monetary aspects of implementing policies and initiatives that will help the College reach its goals and fulfill its commitment to the ACUPCC. The Annual Giving program provides information on what donations will be used for, and allows for easier transactions of donations, and establishing a green fund within this program is possible according to Chris Reed, Director of Annual Giving. Placing the fund within Annual Giving will provide a greater opportunity for donations and would raise outside awareness of the fund's existence. A Green Fund will provide a resource to finance projects at the College; green funds at other colleges demonstrate the impact of establishing this type of fund. The "Clean Energy Revolving Fund" of Macalester College, provides a blueprint for designing a campus greening fund, and recommendations for a green fund at Colby-Sawyer using this example include, a committee designated for management of the fund, and using multiple sources of funding such as gifts from outside donations, department donations, and alumni donations and student fees³⁹.

The green fund at Green Mountain College demonstrates another structure for a green fund, as this College finances the fund through a portion of student tuition; students pay a fee per semester.⁴⁰ Student fees would be an excellent resource for the green fund at Colby-Sawyer, as an estimated eighty-nine percent of the College's revenue comes from student tuition. However, the sources for the fund should not come exclusively from the students, as the entire College community will be involved in the decision-making process for the projects financed by the fund.

The costs of establishing a green fund should include enough capital to begin facilitating projects. The green fund of Macalester College puts the money saved from projects into the fund to have money available for future projects³⁹. To determine the amount of capital needed to start a Green fund at Colby-Sawyer College, estimated costs should be determined for the projects which are being considered first. Colby-Sawyer has already begun projects including replacing the windows of all the older residence halls to improve heating. The costs of energy-saving projects should be calculated to determine the capital needed for establishing this fund. The amount of money needed to establish a green fund varies according to a College's financial constraints. An example of this variation is the capital accumulated to create the fund at Macalester College which was \$100,000, and the University of Maine, which was allocated \$300,000 by the Board of Trustees to establishing a green fund³⁹.

A revolving green fund could work at Colby-Sawyer College with a committee to manage the fund, including members of the Sustainability Committee, members of the Student Government Association, members of the faculty, and members of administration. This committee would review and guide projects, and be responsible for submitting project proposals to the Board of Trustees. The committee would also keep the College community and administration updated on progress of individual

projects. Committee members would be appointed, and receive the title for their position but not necessarily monetary compensation.

T2 Police 28: Establish Sustainability-Related Competition

Colby-Sawyer will coordinate and oversee a “Lights Out” competition each semester; the competition will be held on two designated dates.

It is tradition that every year the President of Colby-Sawyer randomly selects a day during the first couple weeks of classes to announce a “Mountain Day.” This event does not currently host any activities related to sustainability, but some could be incorporated as the event involves the College community spending time in the natural environment.⁴¹ The more recent, sustainability-oriented, “Lights Out” event was coordinated and hosted by GreenROUTES during the fall semester of the 2008 and 2009 academic year, and will be performed again near the end of the spring semester. The event involves turning off the lights in all of the residence halls at a specified time. Each dorm competes against the others, and GreenROUTES and members of the Student Government Association, inspect each dorm from the outside to determine the winner, which is announced in campus-wide email.

Other examples of this event include the town of New London, as well as Duke University, which hosted a similar event called, “Do It in the Dark.”⁴² Sustainability competitions, like the Lights Out event, encourage the College community to become involved in the institution’s concern for sustainability. The event brings the College community together, informs the community around the college, and perspective students about Colby-Sawyer’s strive to become more sustainable. The event will also be a reminder of the Colby-Sawyer’s signing of the American College and University President’s Climate Commitment.

Colby-Sawyer will install electricity meters for the individual residence halls and the daily meter readings for each hall will be posted on the College website for public view and updated on a daily basis. The “Lights Out” competition will be judged by a committee of students, who will record the readings from the individual residence hall meters during the event and compare them to readings for the same dates from previous years. The results of the competition, including every hall, will be posted on the College website. Showing the students their meter readings will educate them about their energy consumption and give them a better understanding of their contribution to the overall emissions of the College.

T2 Policy 29: Sustainability Pledge

Colby-Sawyer will give first year students the option to take a sustainability pledge during their convocation ceremony. The pledge states, “I ____ (Name) ____ pledge to explore and consider the environmental consequences of my lifestyle and strive to improve the health of all communities and ecosystems that I am a part of.”⁴³

Implementing this pledge will demonstrate the College’s commitment to sustainable practices to all parties outside the campus community, and instill a sense of purpose within the student body to help meet the goals of the commitment the institution made in signing the ACUPCC in 2006. Many other colleges and universities, including Bates College, Massachusetts College of Liberal Arts, and the University of Pennsylvania, have adopted the sustainability pledge of the Graduation Pledge Alliance.

This organization has more than one hundred participants and is a project of the Bentley University Alliance for Ethics and Social Responsibility, aiming to promote environmentally conscious lifestyles after graduation⁴³.

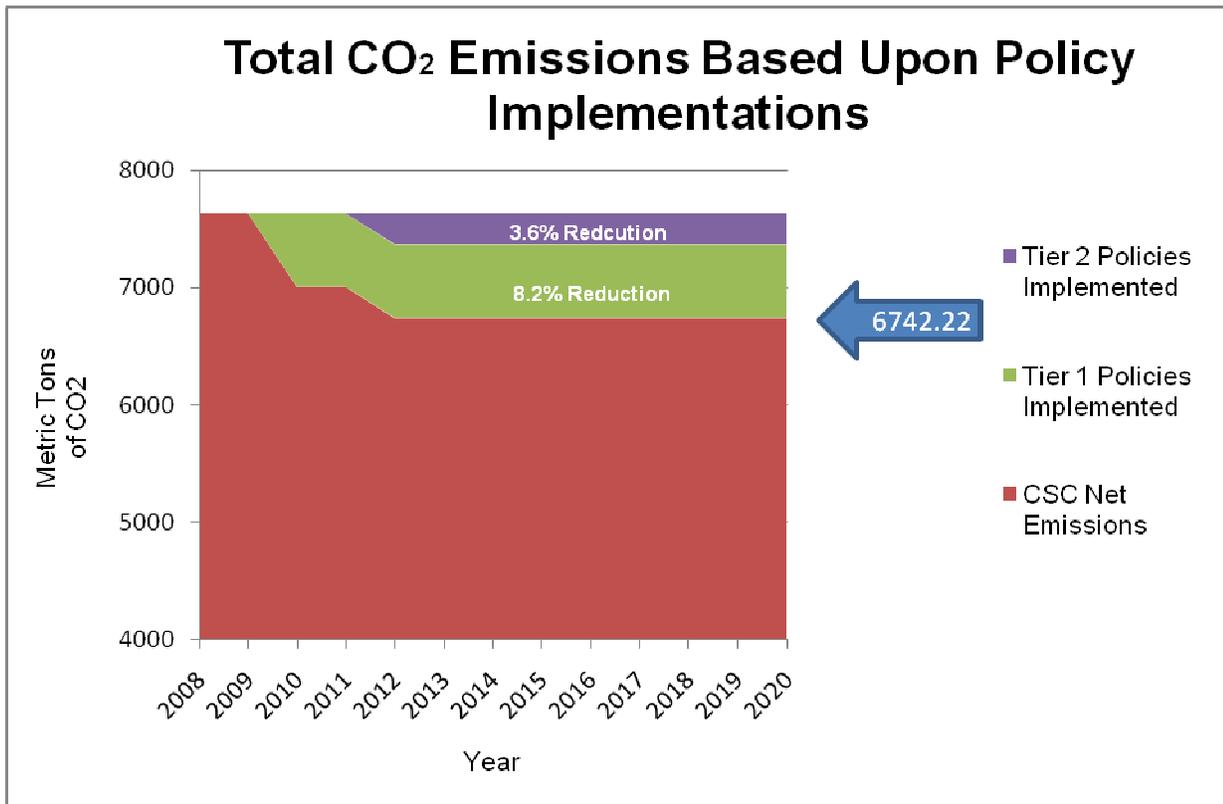
In adopting such a pledge at Colby-Sawyer, webpage for the pledge can be added to the College website, where students can log in and add their name to the pledge list. The webpage will show the pledge, an explanation of what it means, and links to websites concerning sustainable living practices. Students will be instructed on how they can sign up for the pledge on the College website during orientation, and participants will receive a ribbon through campus mail. An ongoing list of participants in the current semester, as well as the lists of past semesters, will be available for public view on the College website. A pledge has not been approved for commencement ceremonies as yet, but the implementation of a pledge during convocation may provide motivation to establish one for commencement.

Tier 2 Total Savings

Table 7. Tier 2 Total Savings

Tier 2 Policies	Saving (\$)	Reduction in Emissions (Metric Tons of CO₂)
Motion Sensitive Lighting (T2 Policy 18)	45,000.	260.0
Heat Retaining Pool Cover (T2 Policy 20)	3,00.	6.5
Total	48,000.	266.5

Fig 12. Total Emissions Based on Tier 2 Policy Implementation



Tier 2 Summary

The Tier 2 policies are recommended by GreenROUTES to be implemented within the two or three years. These policies are a way to continue reducing Colby-Sawyer College's greenhouse gas emissions. Tier 2 policies are recommended after Tier 1 policies because they will require more time to be implemented. The saving assumptions were based on current conditions and did not build cost increase into the calculations; making the savings estimations more favorable over the long term. The TABLE below looks at policies that create a quantifiable monetary savings and emissions savings. The GRAPH below illustrates Colby-Sawyer College net emission reduction by implementing Tier 1 & 2 policies. If Colby-Sawyer College implemented all Tier 2 policies the college could reduce its emission by 3.6 % (266 pounds of CO₂).



Tier 3
Policy Recommendations

Tier 3 Policies



T3 Policy 30: Renewable Energy

This policy requires that Colby-Sawyer utilize a renewable energy source to reduce the emissions from fossil fuel derived electricity. This policy satisfies both ACUPCC requisites as well as a STARS report credit.

The ACUPCC presents this policy as one of the options to developing a climate neutral college. Renewable energy is one of the high scoring attributes on the STARS report. OP credit 9 states that the renewable energy source needs to be located on campus, and from there, the higher the percentage of the campus that renewable power generates, the more points are earned.

Solar

Solar electrical generation could be Colby-Sawyer's answer to meeting ACUPCC requirements, reducing emissions and saving money. One suggestion is to use a photovoltaic (PV) system to serve as a backup system for the Information Resources (IR) servers,. First, assume that the server needs 50 kWhs and that the school gets an average of three to five hours of sunlight each day. This means that the array size needs to be 10,000 watts with a 12,500 Ah battery bank⁴⁴. The system to support these requirements would cost the college \$69,105 after a 30% tax rebate. Under the best circumstances (5 hours of sunlight/day), this system would pay for itself in under 2 years, reducing Colby-Sawyer College's annual electrical consumption by 109,500 kWh (\$14,235 annual savings) and reducing total emissions by 103 metric tons. However, if the solar exposure is only three hours per day, it would take just under 4 years to pay off at a rate of 54,750kWh / year (\$7,118 annual savings). The assumption for these calculations is that the electricity rate stayed at \$0.13/kWh. If the electricity rate were to rise, the payback time for this system would be even shorter.

Fig 13. PV panels

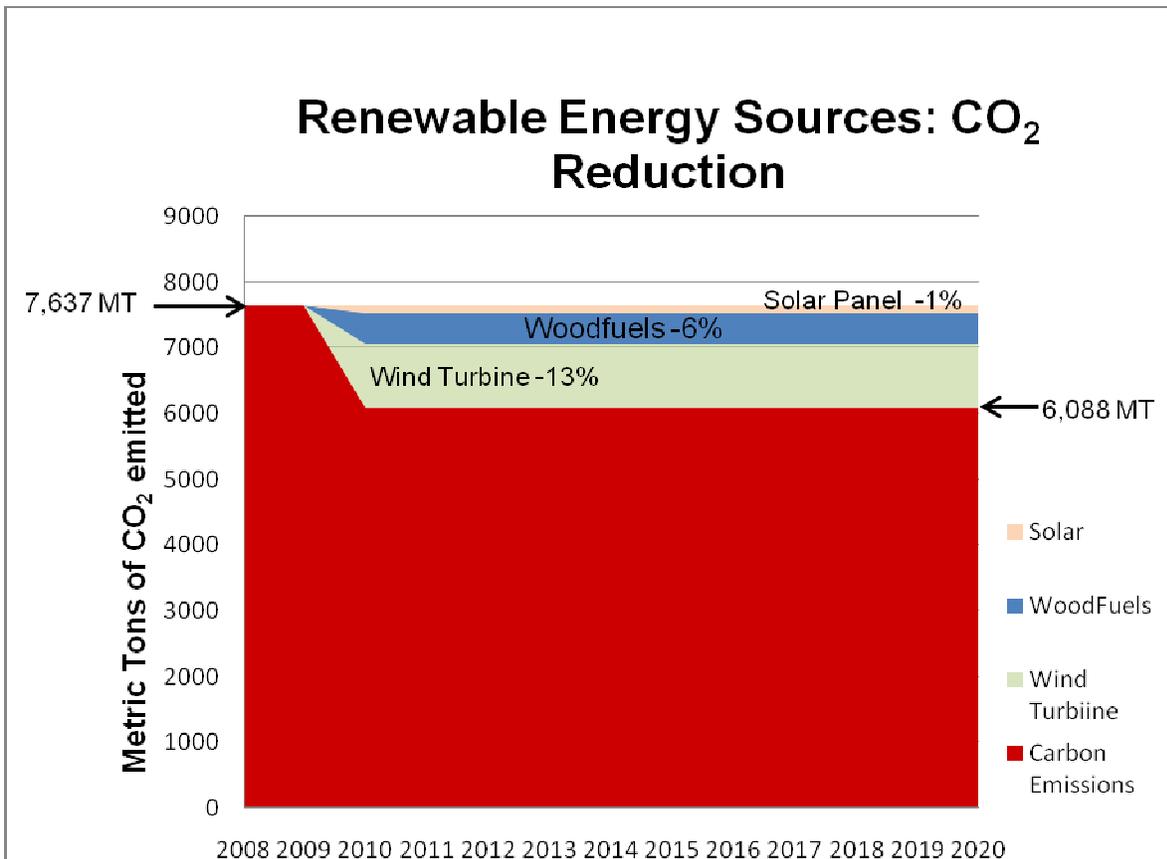


SOURCE: www.cleanair-coolplanet.org/renewable_tree/pv.php

Wind

Another source of energy, and potentially more practical for Colby-Sawyer College, is a wind turbine. If Colby-Sawyer invested in a \$1.2 million 1MW wind turbine, assuming that the annual operating cost is \$20,000 and the discount rate was 5%, this institution would save approximately 971 metric tons of CO₂ per year and nearly 30,000 metric tons in a 30 year life span (figure 14). The amount of electricity a facility this large could generate would eliminate much of Colby-Sawyer College’s electric bill. Due to the energy savings, and despite the large initial investment, this project would still breakeven in less than 8 years. Once the breakeven has been reached, the wind turbine would save the college \$130,000 per year. Portsmouth Abbey, a college on the Rhode Island coast recently invested in a Vestas wind turbine which has been partially subsidized (\$450,000) by the Rhode Island Renewable Energy Fund⁴⁵. Their projections are similar to Colby-Sawyer’s; producing 1.2 million kWh annually, about 40% of the college’s needs saving \$100,000 every year. Again, the assumption for this calculation is that the electricity rate stayed at \$0.13/kWh. If the electricity rate were to rise, the payback time for this system would be even shorter.

Fig 14. Combined Effect of Implementing Renewable Energy Sources on Campus



NOTE: All three policies would reduce our CO₂ emissions by more than 20%

T3 Policy 31: Zip Ride

This policy requires advertising Zip Ride to students on campus as an alternative to bringing their own vehicles.

The Zip Car idea was first brought up by GreenROUTES in 2007 when they tried to ensure a way for students to be able to have access to a car despite the expected student growth at Colby-Sawyer while at the same time mitigating vehicle emissions at the college by having fewer cars on campus. This idea has only become more applicable since 2007 due to the increase of vehicles on campus during the 2008-2009 academic year. However, Zip Car has limited uses in a rural setting. Zip Ride, on the other hand, is far more suited to college applications. The college would have Zip Ride vehicles that were utilized only by the college. Furthermore, the students, faculty and staff would be able to participate in a carpool network on campus that is not privacy violating and easy to use.

T3 Policy 32: Dorm Energy Metering

This investment requires purchasing energy meters for each dorm and building to measure electricity consumption

Without a gauge to monitor electric consumption, Colby-Sawyer is flying blind when it comes to measuring energy conservation. Being able to quantify energy savings by dorm is the only sure way to know which investments and policies are paying off and which need adjustment or reconsideration. The college could implement energy saving incentive driven competitions between dorms. The downside to this investment is the initial installation and equipment fee. If an electrical meter was installed on each dorm, local contractors estimate a cost of \$10,000. This could be paid for with the savings from switching to compact fluorescent lighting from just one year. Once the meters were installed, students, faculty and decision makers could determine which of their habits and behaviors are costly and which save.



T3 Policy 33: No Vehicles on Upper Campus

Colby-Sawyer will close off the upper interior campus to vehicle traffic and remove paving from these areas.

There are several major concerns associated with vehicle traffic within the Colby-Sawyer College campus. The first concern is that the roadways going through campus are creating unnecessary emissions and pollution. Green Mountain College and Proctor Academy have both set up policies and infrastructure to support a vehicle free campus. Colby-Sawyer is fairly small in terms of the distance between dorms and class rooms. Creating a no vehicle policy on campus would only mean that students would have to walk or ride bikes around campus instead of driving.

The second issue which arises here is that in addition to the unnecessary vehicle traffic occurring on campus, there is also an unnecessary amount of pavement. Impervious surfaces like pavement create runoff in storm events which distributes various pollutants and chemicals. Once the vehicle free policy is created, it will be much easier to justify the removal of pavement. Roads would be replaced with dirt or pebble walkways.

Some of the issues with this proposal include alternative parking and emergency responders. Some infrastructure will need to be established to account for the decrease in parking spots and dorm accessibility for the fire department. This policy includes the removal of the roadway that runs in front of Colgate, next to Ware, around Burpee and back toward Reichold. The parking area between Sheppard and Burpee will also be removed. This policy will save the College a significant amount of resources in the winter, because these large areas will not need to be plowed and maintained.

T3 Policy 34: Non-Potable Water Use Policy

Colby-Sawyer will use a water catchment system to utilize water for irrigation on Mercer field and the surrounding lower campus.

In the STARS report, a point is awarded if non-potable water is used for maintaining fields and grass, instead of treated, potable water that could be used for drinking. Colby-Sawyer College spent \$41,175 dollars on water in 2007-2008 and used 13,581,006 gallons of water (figure 15). Conserving potable water means conserving money and potable water that could be used for drinking. Rain-water catchment systems could be constructed to capture the water from a roof. The cost of rainwater catchment is variable, because there are several options and factors to consider. In ground holding systems tend to be more expensive. Cost can also vary depending on the desired uses of the water. "A complete (catchment & cleaning) system (not including the roof) can cost \$20,000, albeit with

sophisticated filtering and purification components, whereas a system used for watering plants may run only \$200⁴⁶. The system that should be considered for the college is a gravity fed system used only for irrigation of Mercer Field and the surrounding landscaping.

Fig 15. Total Gallons of Water Consumed at Colby-Sawyer

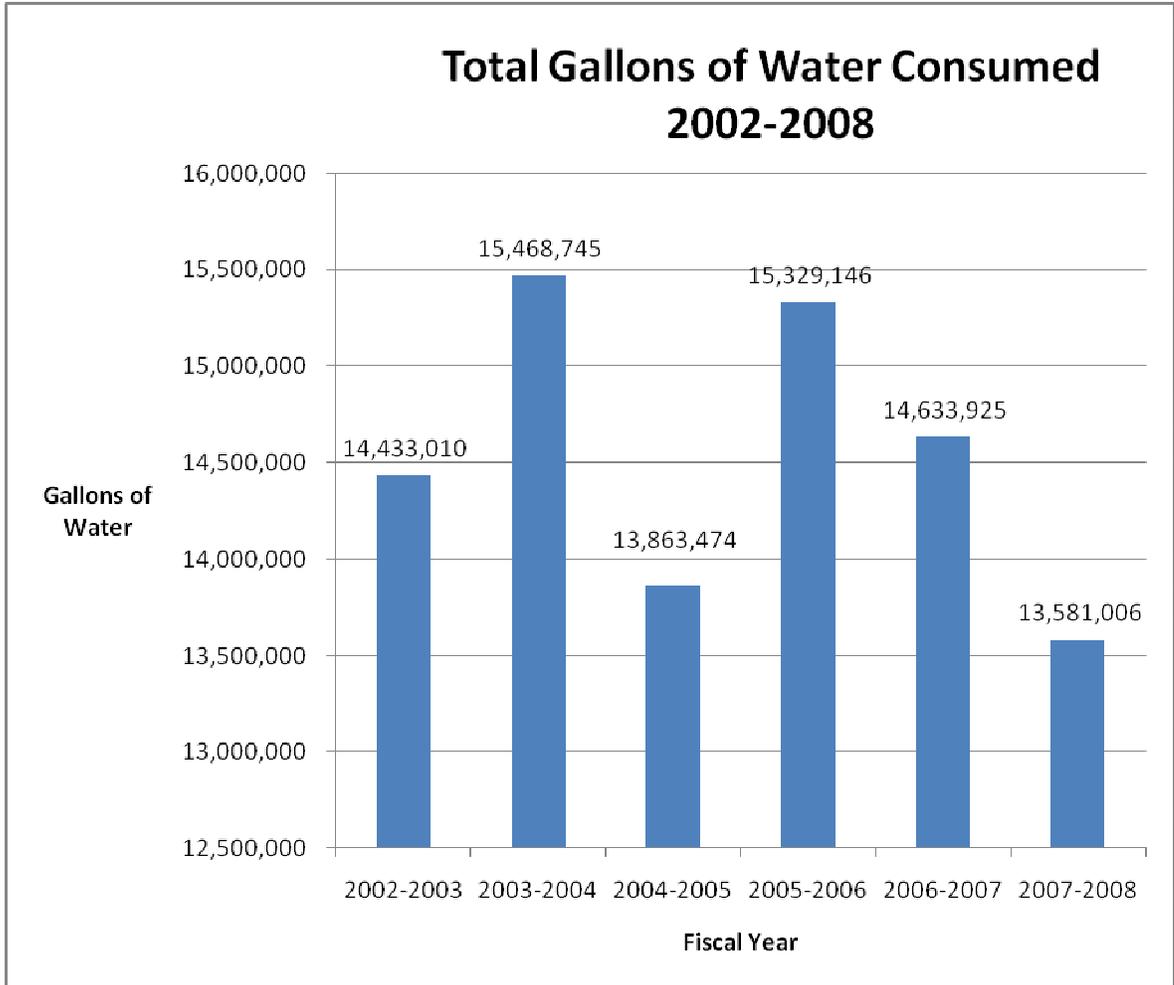


Fig 16. Water Catchment System



The ACRSA (American Rainwater Catchment System Association) discusses some potential systems to consider. A business named Rain Water Solutions designed the catchment project seen in figure 33.1. This is a commercial building 125' x 80' equaling 10,000 square feet of roof surface. Based on a local 30-year rainfall history, each half of the roof has the potential to collect 9,375 gallons of water per month or 112,500 annually. The system has a capacity of 10,500 gallons (2 x 5250 gallons) and tanks have backup supplies of well water. The automated backup will maintain a minimum of 3,200 gallons in the system⁴⁷. At Colby-Sawyer, this system would be ideal for Lawson Hall. The total square footage of both the roofs on Lawson is around 8,400. Based on the average rainfall for New London, these roofs would capture more than 200,000 gallons of water annually. This number of gallons is equivalent to the amount of water used in the Sawyer Center in 2007-2008. This is also an ideal location because it can utilize gravity and it is only 400 feet from the center of Mercer field, decreasing the amount of hose that is required. Establishing a water catchment system would save Colby-Sawyer over \$600.00 and 200,000 gallons of purchased water annually. A system on top of Hogan would save nearly 200,000 gallons and about \$600 dollars. A system on Ware could save over 150,000 gallons and nearly \$500. Annually, the savings only represents about a 1.5% of the water budget and 1.5% of the total gallons used by Colby-Sawyer from 2007-2008. This project does not yield outstanding savings, however using a catchment system shows that Colby-Sawyer is willing to utilize natural renewable systems opposed to using systems that require an input, regardless of how small the input is.



T3 Policy 34: Efficient Kitchen Design

When a new dining hall is being constructed, it should be designed to be the most efficient in the way that it is constructed and in its lay-out.

Colby-Sawyer College is growing, and soon the dining facility is going to be either expanded or completely reconstructed. Middlebury College recently built a new dining facility³⁶. The design of this kitchen was for it to run efficiently and was built sustainability. Colby-Sawyer College would be entitled to build a LEED certified building (T2: policy 19), this policy states that the lay out of the kitchen would be taken into consideration as well. Middlebury College installed variable speed fans over stoves, these only turn on when really needed which help to lower electricity use³⁶. The freezers motors produce heat; at Middlebury College they use this heat to heat the mechanical room. Air conditioners sensors were installed to allow for adjustments as demand subsided. These steps to thoroughly think out the layout of the dining facility would help to reduce the cost of the building, and make it building more comfortable.



Culture, Curriculum & Investment

T3 Policy 35: Establish Sustainability Courses in All Academic Departments

All academic departments offer at least one course related to or focused on sustainability¹⁷.

Colby-Sawyer already has these types of courses offered in more than one department, including Environmental Studies, Business Administration, Humanities, and Natural Science⁴⁸. Requiring all departments to have a minimum number of sustainability related courses will uniformly spread concepts of sustainability across the curriculum. Preventing disconnect among the departments with linked courses, will provide the college community with a foundation in sustainable learning. As Colby-Sawyer already offers sustainability courses in some departments, it also meets part of the criteria for “Sustainability courses by academic departments” listed on the STARS report for sustainability related and focused course credits¹⁷. Green Mountain College incorporates sustainability into all departments, which also ensures that all faculty members understand the institution’s “core values” in sustainability^{25,49}. Though Colby-Sawyer does not include sustainability in its core as yet, the College President’s signing of the ACUPCC in 2006, will offer more opportunities to make future changes such as the one stated in this policy.

T3 Policy 36: Sustainability Study Abroad Program

The program concentrates on sustainability, in social, economic, and environmental aspects, or examines an issue or topic using sustainability as a lens, it concentrates on sustainability as a component or module, it concentrates on a key sustainability principal, or focuses on addressing sustainability challenges¹⁷.

Colby-Sawyer is currently affiliated with sustainability related study abroad programs including the School for Field Studies and Washington Internship Institute. The College expects students to reach learning outcomes through study abroad experiences, including the outcome to “enrich and deepen self-knowledge”⁵⁰. Participating in sustainability study abroad programs will further this outcome because these experiences will help students to better understand their responsibilities to both “themselves, society, and the earth.”⁵¹ Like Colby-Sawyer, Green Mountain College has affiliations with such programs; it provides a link to an organization called “Cool Works” on its website²⁷, and this organization provides further links to opportunities for internships and jobs that are concerned with sustainability. Though Colby-Sawyer does not currently offer a major in sustainability, having a connection with an organization that focuses on the topic will give students the opportunity to study sustainability. One such organization that focuses on sustainability is called, “Living Routes,” which offers programs around the globe⁵².

T3 Policy 37: Committee on Investor Responsibility

The institution has a formally established and active body that makes recommendations to the Board of Trustees, or sub-committees, on responsible investment opportunities across asset classes, including proxy voting¹⁷.

A committee on investor responsibility would help Colby-Sawyer to make responsible investment decisions which promote sustainability²⁷. The College has an investment committee which reviews the institution's financial portfolio, but it does not currently have a committee specifically for responsible investing. We propose that the Board of Trustees appoint a person to review the investment portfolio for sustainable investments.

T3 Policy 38: Screen for Non-Socially Responsible Investments and Invest in Positive Sustainability Investments

The institution conducts a negative screening of its entire investment portfolio; this may take the form of prohibiting investment in an industry, or participating in a divestment effort. The screen also includes selling affected direct holdings and writing a letter to all fund managers to do the same. While screening for negative investments, the institution strives to include sustainability investments in its portfolio²⁷.

Colby-Sawyer performs screening only for poor returns on their investments, but because they already perform this process, it may be possible to implement a screening on negative investments as well. During the process of screening for socially responsible investments, the College may replace negatively screened funds with socially responsible ones. As better investments must be reviewed in order to find new funds in cases where it is determined that certain funds need to be dropped, socially responsible investments could be implemented in their place.

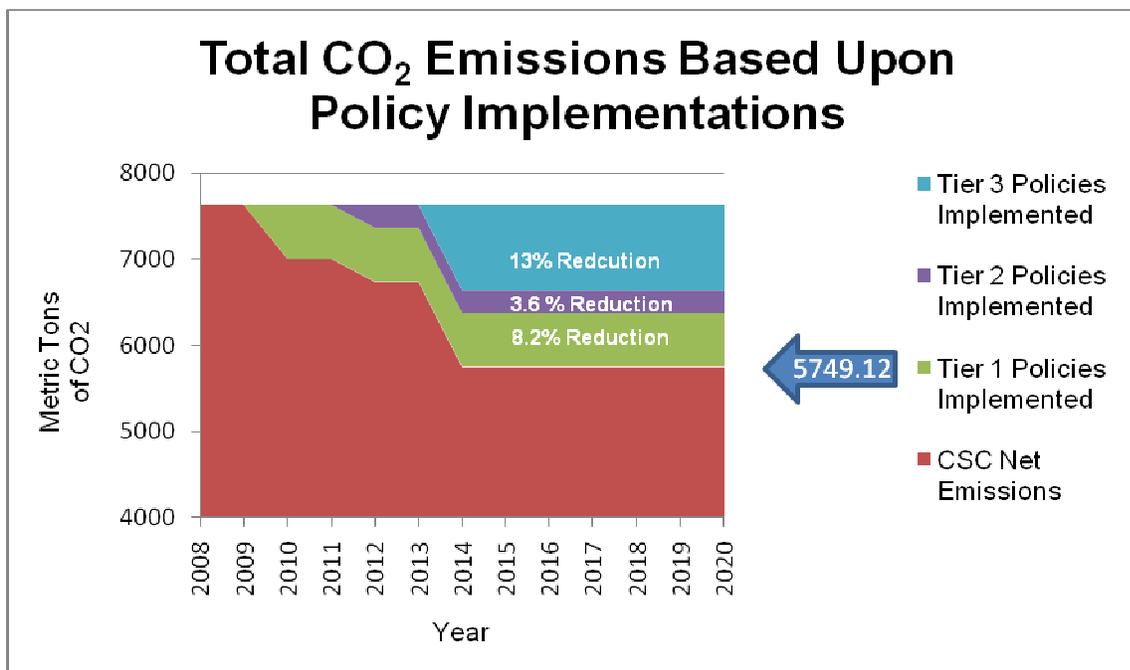
Analysis was conducted by GreenROUTES in conjunction with members of the Business 321 class in 2006, and it was concluded that investing some of Colby-Sawyer's endowment in socially responsible, or "Green," funds would be beneficial as the returns for these funds did better in comparison to existing funds the College was invested in³¹. A similar analysis was completed again by GreenROUTES and members of the Business 321 class in 2008, and the results also demonstrated that green funds performed somewhat better than the existing Colby-Sawyer funds. We propose that the college investigates possibilities to invest at least a certain percentage of the portfolio in Green funds.

Tier 3 Total Savings

Table 8. Tier 3 Total Savings

Tier 3 Policies	Savings (\$)	Reduction in Emissions (Metric Tons of CO ₂)
Renewable Energy <i>Wind Option</i> (T3 Policy 30)	130,000	971.1
Renewable Energy- <i>Solar Option</i> (T3 Policy 30)	10,201	76.0
Total	140,201	1,047.1

Fig 17. Total CO₂ Emissions Based on all Policies



Tier 3 Summary

The Tier 3 policies are recommended by GreenROUTES to be implemented within five years or more. These policies are the final step suggested by the GreenROUTES team to continue reducing Colby-Sawyer College's greenhouse gas emissions. Tier 3 policies are more cost and time intensive, but they also have a huge CO₂ reduction impact if implemented. The saving assumptions were based on current conditions and did not build cost increase into the calculations; making the savings estimations more favorable over the long term. Table 8 above looks at policies that create a quantifiable monetary savings and emissions savings. Figure 17 illustrates Colby-Sawyer College net emission reduction by implementing Tier 1, 2 & 3 policies. . If Colby-Sawyer College implemented all Tier 3 policies the college could reduce its emission by 13% (1,047 pounds of CO₂).

