

Coe College

American College and University Presidents
Climate Commitment

Plan for Climate Neutrality

January 2010

Preface

This document represents an initial draft designed to stimulate conversation about priorities, ideas, timelines, and resources necessary to move Coe College toward climate neutrality and enhance the college's environmental stewardship. It should be viewed as a dynamic document, which we anticipate will change as circumstances and technologies evolve, while keeping the end goal in sight.

Thanks are due to Katie Rogers for getting momentum going, President James Phifer for initiating this process by signing on to the American College and University Presidents Climate Commitment. Thanks also to Vice President Mike White and Director of Physical Plant Lisa Ciha for their past work and for providing information necessary for this project. Mary Knudsen carried out the survey of commuting habits along with her Statistical Analysis class.

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History and Current Context

Coe College has a long history of engagement with environmental issues, both in the curriculum and in campus operations. This is consistent with the mission of the college, which states:

It is the mission of Coe College to provide students an education of superior quality that aims at preparing them for life following graduation. Our reason to exist as an institution is to ready students intellectually, professionally, and socially to lead productive and satisfying lives in the global society of the 21st century.

The most important component of the program outlined in this document is the opportunity to provide superior preparation for our students. Many institutions are recognizing that educating students about sustainability, and offering opportunities to utilize that education, is a critical need for citizens of the 21st century.

Coe's recycling program began in the 1970's with Professor Floyd Sanford working with student volunteers, and eventually with work-study students. The program has enjoyed considerable success over the years, winning a grant from the local solid-waste agency in the 1990's for equipment, and receiving an award from the Iowa Recycling Association in 2002 for Best School Recycling Program. The college has also made significant strides in recent years by instituting limits on printing while also moving to the use of 100% recycled paper in all computer labs. More than over 6,000 pounds (greater than 3 tons) of computer and network equipment are currently recycled each year. All of Coe's outdated technology is recycled by a licensed company that disposes of monitors, printers, computers and network equipment in an environmentally safe way.

Efforts at minimizing solid waste are particularly evident in Coe's cafeteria. Led by Sodexo manager Tom Wiesler, the cafeteria began composting all food waste after a 2005 remodeling and installation of appropriate equipment. The composter compresses all food waste and takes out the water, essentially leading to fewer trips to the dump and smaller amounts of garbage. All cafeteria grease is supplied to a biodiesel producer, no disposable cups are used in the cafeteria, and the facility has been trayless since May 2009, resulting in a significant reduction in food waste. The food service also has instituted an aggressive "buy local" campaign, which includes working with Coe students in developing a Coe Garden.

Coe students have been a critical driving force for environmental activism on campus. The current student environmental group has, in addition to working on the Coe garden, launched a project called CoeBIKES! The program uses donated bikes that are available for students, faculty and staff to check out and use free of charge. The college received a \$1,000 grant from Rockwell Collins to use for repairs, locks, paints and helmets. Coe also has an Eco-House, where students with environmental interests can

experience cooking local foods, minimizing waste and energy usage, and provide programming for the local community.¹

The college has been pursued a number of opportunities to reduce consumption of electricity in recent years. Campus computers and monitors go into hibernation mode when they've been idle for more than one hour. The computer and monitor come back to life when users hit the space bar on the computer. This saves the college over \$10,000 per year in electrical use. In 2006, Coe replaced half of its old servers with new, efficient blade servers with shared storage. The college is saving \$4,800 of electrical use every year with this arrangement. During the same year, Coe started purchasing more efficient data projectors that use less power and have extended life bulbs (with less mercury). The older projectors used 700 watts every hour they were on and the bulbs lasted 1,200-1,500 hours. The new projectors use 300 watts per hour and have a lamp life of 2,500 hours. After an audit by Alliant Energy identified promising energy savings opportunities, the college replaced lighting in the Clark Racquet Center court area. The annual cost savings from replacing the lights is approximately \$11,000, which will pay for the project in six years. Nearly all exit lights on campus now operate with energy-efficient LEDs, and ballasts in fluorescent lighting on campus have been converted to more energy-efficient versions.

Interest in environmental issues extends into the curriculum and research interests of the faculty as well. The college has a rigorous environmental science program, based in the biology and chemistry departments, that prepares students for graduate school in environmental science or for careers in consulting and government service. Research opportunities include studying eastern Iowa water quality, developing an inventory of the urban forest in Cedar Rapids utilizing GIS and GPS technologies, studying urban deer populations, assessing the ozone depleting potential of CFC alternatives, or examining the role of microorganisms in bioremediation of sub-surface contamination. Funding for these projects has been provided by local, state, and federal governments, as well as private sources. The college also has an unusual resource in the Coe Wilderness Field Station. Located five miles north of Ely, Minnesota, it is adjacent to the largest and most pristine wilderness area in the eastern half of the United States. Coe assumed control of the Station after the Associated Colleges of the Midwest (ACM) decided to discontinue operation. Groups paddle directly by canoe from the field station to the edge of the Boundary Waters Canoe Area Wilderness in about two hours. Visitors can paddle to Ontario's Quetico Provincial Park in about eight hours. Summer courses at the Station allow students to observe and study one of the few unfragmented wilderness areas in the Midwest. In part, the enthusiasm of faculty who have taught at the field station has led to a renewed interest in development of an environmental studies program at Coe, which is in process.

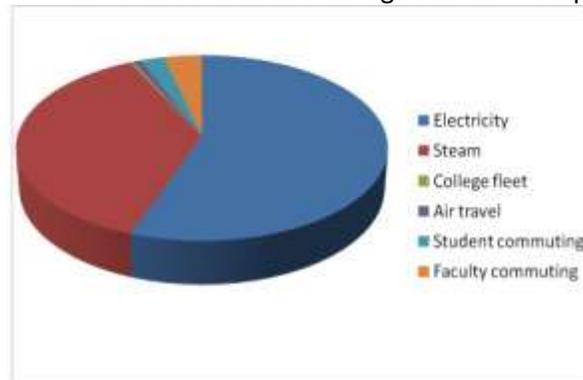
ACUPCC Engagement

Conversations with faculty, and, in particular, with students, led Coe’s president, James Phifer, to become a charter signatory of the American College and University Presidents’ Climate Commitment (ACUPCC) in 2007. In addition to the formation of the Sustainability Council (which includes faculty, staff, and students) to oversee Coe’s participation, President Phifer agreed to three “tangible actions”:

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. Participate in the Waste Minimization component of the national RecycleMania competition, and adopt 3 or more associated measures to reduce waste.

As part of the ACUPCC process, a greenhouse gas inventory was undertaken and submitted in 2008. While the details are available at the ACUPCC website², some of the results will be highlighted in this report. As shown in Figure 1, electricity and heating contributed the largest share of the carbon emissions.

Figure 1. Contributions to Coe College’s carbon footprint



Coe’s emissions were, in general, comparable to other private colleges in the upper Midwest as shown in Table 1.

Table 1. Carbon dioxide equivalent (CO₂e) emissions of comparable institutions

Institution	Total	Per FTE	Per 1000 Square Feet
Coe College	12,044 metric tons of CO ₂ e	10.4 metric tons of CO ₂ e	14 metric tons of CO ₂ e
Luther College	17,672 metric tons of CO ₂ e	7.2 metric tons of CO ₂ e	12.6 metric tons of CO ₂ e
Central College	10,351 metric tons of CO ₂ e	6.7 metric tons of CO ₂ e	11.2 metric tons of CO ₂ e
Macalester College	26,824 metric tons of CO ₂ e	14.2 metric tons of CO ₂ e	21.2 metric tons of CO ₂ e
Drake University	19,665 metric tons of CO ₂ e	4.7 metric tons of CO ₂ e	10.6 metric tons of CO ₂ e

The next step in the ACUPCC process is, of course, developing an action plan to achieve climate neutrality. The process spelled out in the ACUPCC agreement is shown below.

1. Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:
 - i. A target date for achieving climate neutrality as soon as possible.
 - ii. Interim targets for goals and actions that will lead to climate neutrality.
 - iii. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
 - iv. Actions to expand research or other efforts necessary to achieve climate neutrality.
 - v. Mechanisms for tracking progress on goals and actions.

Climate neutrality - defined as “as having no net greenhouse gas (GHG) emissions” - is to be achieved by “eliminating net GHG emissions, or by minimizing GHG emissions as much as possible, and using carbon offsets or other measures to mitigate the remaining emissions.”³ This is clearly a challenging goal, which was described in Centre College’s action plan as being a “generational” aspiration.⁴ The National Wildlife Federation, which has been active in assisting colleges in developing plans for reducing their impact on climate change, has suggested a minimum of reducing greenhouse gas emissions by 2% per year.⁵ Using the 2007/8 inventory as a baseline, the suggested timeline for achieving climate neutrality at Coe is:

- 25% reduction by 2020
- 50% reduction by 2030
- Neutrality by 2050

While climate neutrality is a challenging goal, there are a number of benefits as well. The ACUPCC does an excellent job of laying out the moral imperative for higher education to address these issues⁶; however, many of the actions proposed in this plan are fiscally responsible in an increasingly uncertain energy market. Many moves toward energy efficiency pay for themselves in less than ten years, and diversification of energy sources will reduce the impacts of volatility in energy markets on the college’s budget.

Item iii of the action plan listed above is “actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.” The goals laid out in this plan offer a remarkable number of opportunities for students to gain valuable experience in the context of their liberal arts education, and for faculty to integrate “high-impact practices”⁷ into their classrooms. The American Association of Colleges and Universities (AACU) has identified a list of active learning practices which have been shown to improve student outcomes - and all of them could be implemented around the type of topics outlined in this plan. What are the best methods of financing energy-efficiency

projects? Can we build a mathematical model of a building's energy sources and sinks? What are the ethical obligations of this generation to the next generation with respect to energy usage? What are the best methods to convince people to change behaviors? Implementing this plan, and making it a key part of the Coe experience, offers an opportunity to truly "... ready students intellectually, professionally, and socially to lead productive and satisfying lives in the global society of the 21st century."

Action Plan for Climate Neutrality

Working assumptions

As is apparent from the inventory, the primary sources are heating, electricity, and faculty commuting; thus, those will be the primary focus of the plan. The new strategic plan indicates an intention to grow the college slightly (1300 students) in the next few years; this may have an impact on some resources and must be kept in mind. In general, actions suggested in this plan will be divided into short-term (within 5 years), medium term (within 10 years), and long term (>10 years). We believe these options are realistic ones for Coe College based on our current knowledge of both the institution and the current energy environment.

Overall needs

While guidance of these efforts by the Sustainability Council has the merits of engaging members of the campus community and drawing on multiple sources of expertise, there are also problems of asking faculty and staff to commit time that is already committed elsewhere, of continuity, and of lack of expertise in key areas. One approach to addressing these issues would be to have a paid staff person dedicated at least partially to dealing with these issues. With full-time commitment comes the opportunity to dig more deeply into the issues addressed in this report as well as time to pursue funding sources which Coe has not currently tapped. The College of St. Benedict has a Sustainability Fellow who is a recent graduate, with hopes of eventually having a staff position.⁸ This type of position could address current issues on Coe's campus regarding the recycling program, add additional expertise for addressing energy issues, and also offer opportunities for student internships.

Heating

One of Coe's greatest challenges in the past year also offers a key opportunity for moving us toward climate neutrality. Coe has, along with much of the downtown Cedar Rapids business district, obtained steam for heating from a centralized coal-fired steam plant operated by Alliant Energy. This has consistently been an inexpensive, reliable source of heat for users including local hospitals, Quaker Oats, and Cargill. The flood of 2008 destroyed that steam plant, and, after some deliberation, Alliant chose not to rebuild this facility. In response, Coe has partnered with St. Luke's Hospital to build a shared facility.⁹ The new facility, which is planned as a silver LEED certified building, will utilize natural gas rather than coal, and will thus significantly reduce Coe's carbon footprint. The facility is planned to be on-line by fall 2010. Assuming the same energy usage as in the 2007/8 greenhouse gas inventory, the switch from 80% coal/20% natural gas used by Alliant to 100% natural gas in the Coe/St. Luke's plant will result in a 35% decrease in carbon emissions due to steam, and a 12% reduction overall in Coe's overall emissions. It is doubtful that any other one single action could have had as dramatic of an effect on our emissions in the short term.

However, there remains much that needs to be done in terms of reducing our carbon footprint with respect to heating and cooling needs.

- Heating - Short Term

- Basic building audits - at present, we do not have a method for identifying which buildings are most or least energy efficient. Steam is not metered to individual buildings, and there is no program of systematically assessing which buildings need attention. The use of blower-door tests would be helpful in assessing needs.
- Weatherization - many of our buildings need basic building shell improvements such as insulation and replacement of windows. However, simple weatherization techniques such as caulking to eliminate drafts might help lessen some heating issues.
- New hoods in Peterson Hall - While expensive, it appears that some renovation is likely to take place in Coe's science building, Peterson Hall. The building has a significant number of fume hoods which exhaust conditioned air to the outside. A report from Lawrence Berkeley National Laboratory¹⁰ estimates that energy savings of 50-75% are possible by upgrading to fume hoods with newer available technologies.
- Hot water - If not already, insulate exposed pipes and hot water storage tanks and heaters.
- Setpoints - The Association for the Advancement of Sustainability in Higher Education (AASHE) suggests "...comprehensive implementation of no cost/low cost operational measures - e.g. temperature set-points, equipment run-times and building occupancy hours, etc.; that push the envelope, i.e. risk complaints."¹¹ Clearly, reducing building temperatures in the winter by a degree or two, and increasing summer temperatures by the same amount requires support at all levels. In some cases, it may require repair of building thermostats.
- Winter break "hard" energy shutdown - While the possibility of an extended winter break has been considered, it may be worth reconsidering in developing future academic schedules. Western Kentucky University was able to realize substantial savings by turning off lighting and substantially reducing heating during their winter break.¹²
- Green roof - As funding becomes available, a vegetated roof on Gage Memorial Union would reduce heating and cooling needs (relative to the current roof) and also provide an extended lifetime for the roof. In addition to beautifying the current facility, it could also provide an excellent research and education opportunity if properly instrumented.

- Heating - Medium Term

- Adequate facilities staffing levels - AASHE points out that it is critical to have adequate numbers of personnel - especially HVAC controls technicians, heating and power plant operators, mechanics and electricians - to maintain efficient operations of campus equipment.
- Recommissioning - New buildings are typically commissioned to insure that building systems - heating, cooling, electrical - are working as specified in the building contract. Periodic recommissioning of all existing buildings is also necessary to optimize energy efficiency.
- Solar water heating for natatorium - On campuses where detailed energy audits have been carried out, maintaining a comfortable temperature in the swimming pool and

surroundings is often a source of significant energy usage. Solar water heating is well suited to reducing the energy load of this particular need. Using an efficient system to pre-heat water could result in significant energy savings. Centre College is investigating this option.¹³ They may use a power purchase agreement in which an outside company purchases and installs the equipment, while the college enters into a long-term agreement to purchase the hot water produced.

- Heating - Long Term

- Building shell improvements - As campus buildings are renovated, a high priority should be placed on installation of modern windows and installation of insulation. (On a recent day when it was 12.0°F outside, the wall to the outside of one of our academic buildings was 55.4°F, the window surface was 40.0°F, and air temperature inside was 66.0°F.) These steps might eliminate or reduce use of electric space heaters in offices.
- Major repair of steam distribution lines on campus - The first snowfall always clearly indicates areas where the steam distribution system is losing heat. While repair of this system would be costly, it needs to be carried out to reduce losses in our heating system. Cornell University documents the model they use for maintaining their much larger system.¹⁴
- Geothermal - a number of local schools have been installing geothermal systems as one method of reducing heating and cooling costs.¹⁵ As new buildings are built or major renovations are undertaken, this option should certainly be explored.

Electricity

In general, electricity is used on campus for lighting, to run HVAC equipment, and for limited heating purposes. Lighting may well be the largest consumer - "...data from electric consumption at U.S. colleges and universities compiled by the Electric Power Research Institute, in which lighting constitutes 47 percent of total electricity (including exterior lighting)".¹⁶ Energy consumption and efficiency opportunities should be a primary focus when negotiating vending machine contracts, office equipment purchases, and maintenance contracts.

- Electricity - Short Term

- Submetering - Currently, electricity is billed for most of the "old" campus as one unit. As a result, it is difficult to identify buildings that use more energy than others. In contrast, on the new campus, each building is individually metered. The EPA identifies this as a "best practice" for colleges and universities,¹⁷ and Alliant offers sub-metering as a service.¹⁸ In addition to identifying which buildings need the most attention, colleges can also carry out competitions between dorms to reduce energy usage (see, for example, Lewis and Clark's Eco-Olympics).¹⁹
- Education to reduce usage - While it is also useful to attempt to modify behavior with respect to other activities, such as heating/cooling and recycling, there is significant potential to engage and change individual behaviors with respect to electricity usage. Considerable creativity is called for - flyers and e-mails alone will not be sufficient.

- Voluntarily audit and “certify” electrical use in offices, dorm rooms, with rewards to the winners. This would require minimal equipment to measure electrical use and a team of volunteers to carry out the measurements.
 - Shut off campaigns before breaks. Remind students and staff to turn off and unplug computers, printers, chargers, and other devices that draw current when not in use.
 - Discourage use of printers/appliances in dorm rooms. While not as convenient, provide appliances for common use on each floor. An alternative is to rent energy efficient refrigerators, microwaves, and other common appliances on campus.
 - Appoint environmental educators in the dorms. These “designated and trained student environmental representatives in individual dormitories” can be effective advocates for sustainable behaviors.²⁰ ()
- Lighting retrofitting - Lycoming College utilized a lighting energy service company (ESCO) to evaluate, install, and pay for a campus-wide lighting upgrade.²¹
- Central air conditioning in Greene Hall - In the coming renovation of Greene Hall, the installation of efficient central air conditioning would likely result in a net energy savings by eliminating window air conditioners. Many of the window air conditioners are inefficient in addition to allowing leakage.
- Energy Star purchasing – continue to make sure that all appliances purchase meet (or, preferably, exceed) Energy Star standards
- Electricity - Medium Term
 - Ventilation and cooling - as mentioned above, as buildings are remodeled, attention should be directed at updating the hardware used for HVAC with an eye toward efficiency. It may also be worthwhile to consider installation of occupancy, humidity, fume, and carbon dioxide sensors (so that equipment would only be operated when needed).
- Electricity - Long Term
 - Installation of photovoltaics - While it may not be feasible to install other types of renewable energy sources, such as wind, on Coe’s campus, photovoltaic cells are a reasonable possibility. Cedar Rapids receives approximately 4.5 kWhr/m²/day, which is considered “good” for installation of photovoltaics.²² The New Bohemia project, in the Czech Village neighborhood of Cedar Rapids, offers an excellent model and proof of concept for the idea.²³
 - Wilderness Field Station - Coe’s Wilderness Field Station already has a very modest electricity demand, which is currently supplied by a diesel generator. Given the relatively small load, its needs might be supplied by a photovoltaic array, thus making this facility effectively climate neutral.

Transportation

As shown in Figure 1, Coe's transportation sector is relatively small relative to electricity and steam. Nevertheless, there is a significant contribution from faculty commuting. Left uncounted in the 2007/8 inventory was the impact of transportation to sites for study abroad.

- Transportation - Short Term
 - o Vanpool - Investigate leasing a van for faculty/staff to van-pool from Iowa City. This need not cost the college anything, but could be facilitated by the institution.²⁴
 - o CoeBikes - The establish of a bike loan library by the student Environmental Club has been very popular, but plagued by logistical problems of check-out and maintenance. Support to help this program improve and expand would require very modest resources.
 - o Low-emission vehicles for Physical Plant - As pickups and utility vehicles need replaced, the college should evaluate replacing them with hybrids and/or electric vehicles.
 - o Holiday car pool program – facilitate the formation of car pools for students travelling to common destinations.
- Transportation - Medium Term
 - o Enhanced teleconferencing capabilities - While face-to-face meetings will always be necessary, the college should explore ways of enhancing our ability to participate in remote meetings. For example, ACM program meetings might well migrate to this model, which would save energy expenditures and faculty/staff time.
- Transportation - Long Term
 - o Faculty/staff housing - One possibility for re-development of the neighborhood adjacent to Coe would be the offering of incentives to encourage faculty and staff to live within walking distance of the college. While this is a long term possibility, it would also add substantially to the "community" feel of the college.

Curriculum and Education

As noted in the introduction, Coe already has a great deal in place with respect to educating students about environmental issues. In recent years, courses on environmental ethics, environmental economics, and environmental literature have been added to the course offerings. May Term courses and First Year seminars have included excellent offerings focusing on sustainability. What is needed to move ahead is both support and organization for these courses. Coe has submitted a request for federal funding which, in addition to addressing some of the needs identified above, would include funding for faculty development in this area. Workshops, support for course development, and support for research would advance our offerings substantially. In addition, a group of faculty is currently developing a proposal for an environmental studies program, which would expand our offerings to a wider group of students than the current environmental science program.

It is also important to point out that as the college develops expertise in sustainability, opportunities for student internships in the community will open up as well. The types of knowledge and skills that students can obtain through participating in projects on campus are readily transferrable to non-profits

and small businesses in the community. For example, an Allegheny College student helped a local synagogue become the first climate-neutral synagogue in the nation.²⁵

Offsets

At the end of the day, since Coe is limited in its ability to actually generate energy from renewable sources, it will be necessary to offset our greenhouse gas emissions to reach carbon neutrality. There is wide agreement that institutions should not use offsets until they have exhausted the possibilities for “real” reductions. When Coe reaches that point, there are a number of options which could be pursued.

- Second Nature - Alliant Energy has a program called Second Nature which allows residences and businesses to obtain their energy from renewable sources by paying a premium to do so.²⁶
- Wilderness Field Station - Another method of offsetting carbon emissions involves “tying up” carbon in forests. While simply owning forested land does not typically constitute an offset, one could make the case that our purchase of the land on which the Wilderness Field Station sets prevented considerable portions of the land from being cleared for development.
- Invest in projects that reduce carbon consumption - In evaluating opportunities for Oberlin College to offset its carbon emissions, the Rocky Mountain Institute pointed out that by investing in weatherization of low-income homes in its neighborhood, Oberlin could reduce CO₂ outputs substantially. This could harness volunteer efforts as well as financial contributions, and contribute to community good-will as well.

Other Areas

While not explicitly included in the effort to achieve climate neutrality, true sustainability will also include efforts to enhance recycling and minimize solid waste. Attention should also be paid to conserving water, minimizing stormwater runoff, and minimizing pesticide use on college grounds. These actions reflect the campus’ overall commitment to environmental stewardship, and will provide excellent opportunities for student engagement and education.

Conclusion

The challenge of becoming a carbon-neutral campus is substantial, and will require sustained effort on the part of the campus community for an extended period of time. It will require continued commitment on the part of college’s administration, but it will also require commitment by faculty, staff, and students to be successful. It also offers us an opportunity to lead in our local community and in the community of higher education. Our mission calls us to “ready students intellectually, professionally, and socially to lead productive and satisfying lives in the global society of the 21st century.” By taking on this challenge, we are committing to doing exactly that.

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