

## **Report to the President: Status of Environmental Sustainability Activities, 2014**

*Note from the author:*

This report is intended to provide a snapshot of the College's past and current practices and policies regarding environmental sustainability, some of the gaps in action, and the challenges the College faces to improve its environmental practices. It should serve as a working document that will be modified as I continue to serve as director of sustainability, and I plan for it to become the starting place for a community conversation on sustainability and all of our roles.

When I was hired in February, my directive was to focus a significant portion of my time on reducing the College's carbon footprint and improving the College's practices regarding environmental sustainability. As this report illustrates, the College has made great strides in these areas thanks to the work of numerous dedicated staff, faculty, and students; much of this work has been performed with volunteer labor or outside of employees' regular job descriptions. However, the challenge of meeting the goals of carbon neutrality by 2035 and drastically improving our practices will require more than the devoted effort of a few people. It will require community members to self-monitor their behaviors and daily activities at the College, i.e., individual consumption of energy and water, types and quantities of materials purchased, modes of waste disposal, and frequency and means of travel. It will also require a significant investment in our infrastructure to eliminate use of fossil fuels for energy; the creation of a consistent and clear waste system across the entire campus so that good habits are easy to form; improved storm-water management practices to minimize the impacts of our current and future development; the capture and reuse of rain- and gray water to reduce the use of drinking water for non-potable purposes; and the development standards and policies to guide our future actions.

These changes will not happen overnight, and they will require difficult, complex choices and creative thinking. I look forward to working with each of you as we take on this challenge as a community. I will be reaching out to each department in the coming year, but in the meantime, please feel free to contact me directly to start the conversation.

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## A Synopsis of the College's History of Action Regarding Sustainability

### Timeline of Action

- 1990s Founding of Earthlust
- 1992 Environmental Studies program established  
Recycling service begins
- 1999 First purchase of renewable energy credits (RECs)
- 2007 Sustainable Planning Sub Committee forms
- 2008 Ad Hoc Committee on Sustainability forms  
Composting food waste from dining halls begins
- 2010 President Chopp signs the American College and University President's Climate Commitment (ACUPCC)  
College signs on to the Association for the Advancement of Sustainability in Higher Education Sustainability Tracking, Assessment & Rating System (AASHE STARS) program  
Climate Action Planning Committee is formed
- 2012 Sustainability Committee made a standing committee  
*Climate Action Plan* is released
- 2013 *Climate Action Plan* progress report completed
- 2014 Sustainability director hired

Swarthmore College has a long history of action on environmental sustainability. From the College's oldest environmental student group Earthlust—founded in the 1990s and responsible, in part, for the College's purchase of RECs—to recent efforts in energy conservation, composting, and political action, it is clear that stewardship of the Earth's resources is an important part of the College's legacy and identity.

Institutionally, Swarthmore College recognizes the importance of addressing climate change, using natural resources in a sustainable manner, and educating its community to be responsible stewards of the environment. It has captured this commitment to operational sustainability in the *Strategic Directions for Swarthmore College* document by stating simply: "Invest in sustainable environmental practices, including minimizing greenhouse-gas emissions from the College's own operation and preserving the Crum Woods." Regarding education and a curricular commitment, students and faculty established an Environmental Studies Program in 1992 that supports an interdisciplinary minor and offers courses to students at large.

In 2010, the College's institutional commitment to environmental sustainability intensified with President Rebecca Chopp's signing of the American Colleges and

University Presidents' Climate Commitment (ACUPCC). This commitment propelled the formation of the Climate Action Planning Committee and the development of a *Climate Action Plan* for the College, which set the ambitious goal of carbon neutrality by 2035. As part of its commitment through the ACUPCC, the College also set the interim target of a 50 percent reduction in net emissions by 2015. Outside of the climate commitment, the College has not yet set formal, measurable goals and targets for the conservation of natural resources.

### **Past Initiatives**

*The following captures key initiatives the College has undertaken, many of which are still ongoing. Please note: This is not a comprehensive list of all activities.*

#### *Energy*

- Energy resources represent a significant part of the heat-plant budget and the bulk of the College's carbon contribution to the atmosphere. In the heat plant, the College has greatly reduced its use of no. 6 fuel oil, which has greater carbon intensity than natural gas.
- The College invested in new low-mono-nitrogen-oxides boilers at the heat plant in 2004 and is currently experimenting with high-efficiency, gas-fired condensing boilers with efficiencies approaching 96 percent.
- The College has implemented numerous building retrofits and conservation measures. For example, all of the lighting improvements completed in College buildings since 2008 have combined savings of approximately 492,407 kWh and 466,000 pounds of carbon dioxide annually.
- The College offsets 100 percent of its electricity use through the purchase of RECs in the form of wind power.
- The College invested in a Siemens building management system, which has netted millions of dollars in avoided costs and provides data that enables the College to participate in power-reduction programs.
- The College has a heating and cooling policy that maintains rooms at temperatures within the comfort range of 68–70 degrees during winter months and 75–78 degrees in summer months.

#### *Water (use and quality)*

- In an effort to manage storm-water runoff, the College has installed porous pavement, rain gardens, infiltration beds, and underground infiltration systems that help to absorb rainwater. It has also constructed five green roofs, totaling approximately 31,000 square feet, to absorb rainwater, while also providing natural habitat.
- The College uses some of its captured rainwater for landscape irrigation and has installed low-flow showerheads, toilets, and faucets as well as high-efficiency laundry units and dishwashers.
- Integrated pest management is the preferred means of treating the campus grounds. In 2010, the College began an extensive project to maintain the five-

acre field between Mertz Hall and Magill Walk with nutrient-rich compost instead of standard synthetic herbicides and fertilizers.

### *Waste management*

- The College offers single-stream recycling. It also recycles batteries, toner cartridges, computers, consumer electronics, appliances, and rubber tires in special collection locations or at particular times of the year.
- The student-led Good Food Project and the Green Advisers group manage the day-to-day compost efforts on campus. Essie Mae's Snack Bar, Kohlberg Coffee Bar, and the Science Center Coffee Bar also offer compostable cups, lids, coffee-cup sleeves, and napkins. By composting kitchen scraps and post-consumer waste, the College diverts more than 200 pounds of waste a day.
- Used cooking oil is collected from Sharples Dining Hall and sent to a facility that produces biodiesel.
- The student-run Trash to Treasure sale collects items donated from student dorms and sells them to the local community. The proceeds are donated to charity.

### *Transportation*

- Very few students are allowed to bring a car to campus. Ninety-seven percent of students live in College housing, and the rest live within walking distance of campus.
- A substantial number of faculty members and administrators live within walking distance of campus. The College is adjacent to the Swarthmore train station, which is a short ride from Philadelphia and connects to the Amtrak rail system.
- The College participates in TransitChek, which allows employees to purchase transit passes with pretax dollars.
- The College operates shuttles to help community members access nearby colleges, the airport, and local shopping destinations.
- Bicycle racks are provided throughout campus, and students operate a bike-share program.

### *Food*

- Dining Services buys food directly from a number of local farmers and food producers and also works with a number of local, privately owned-and-operated food distributors. Each of these companies features locally produced items, provides employment to area residents, and each supports its own community.
- Dining Services also participates in the Farm to Institution Program, which provides resources that allow the College to buy more from local farmers.
- The College's main food supplier (Feesers Inc.) is based in Harrisburg, Pa., and offers many Pennsylvania brands.

## **New Initiatives Underway**

*The following is a list of initiatives the College has implemented in the last six months.*

### *Energy*

- Facilities management recently received clearance to abandon no. 6 fuel oil and convert the heat plant to burn no. 2 fuel oil and natural gas. This conversion will put the College in a better position to experiment with bio-fuels and low-nitrogen fuels, if it chooses to do so.
- This summer, the College kicked off the Sustainability Framework study, whose primary purpose is to create a sustainability building standard for the College's new buildings and major renovations. A major component of this work will be an in-depth energy study for the College to use to set appropriate energy benchmarks for its current and future buildings as well as recommending infrastructure improvements and renewable-energy opportunities.
- Working with the Green Advisers, more drying racks for clothing will be available this semester for students to use in dorms instead of mechanical dryers.

### *Water*

- The College acknowledges that its planned growth will also affect the amount of impervious surface on campus. In addition, campus topography that provides natural areas of water collection may be more appropriate and effective for storm-water management. For these reasons, the Sustainability Framework will also help set campuswide storm-water management goals as well as evaluate and identify low-impact development and water-receiving landscape opportunity areas. This holistic view will enable the College to take advantage of the natural features of the campus, improve its watersheds, reduce the impact of runoff on Crum Woods, and ameliorate runoff problem areas (e.g., areas of frequent flooding).

### *Transportation*

- A car-sharing program, operated by Zipcar, will launch in September. By providing a vehicle for employees and students to use to run daily errands or attend off-campus meetings, this program could entice members of the College community, who can feasibly get to campus by another means to leave their cars at home.

### *Waste management*

- The College is looking into a partnership with a local company to compost organic waste off site; this could enable the College to expand composting to more locations on campus and to offer the service year-round.

### *Overall*

- The Sustainability Committee is launching a new program, the Green Initiatives Fund in September. This fund will provide a means for members of the Swarthmore community (students, staff, faculty, and alumni) to initiate projects on campus that contribute to the College's environmental sustainability.

## **Challenges and Gaps**

*The following summarizes the main challenges the College faces in reducing its carbon footprint and in implementing sustainability initiatives. It also lists potential gaps that have yet to be addressed.*

### *Energy*

- The campus is growing in both population and building square footage. This will, in turn, increase energy demand, presenting a serious challenge to maintain a downward progression in the College's greenhouse gas emissions without a major investment in new infrastructure.
- The College's infrastructure is fragile as demonstrated by this past winter. With climate change, it is likely that severe weather events are going to occur more often, rather than irregularly.

### *Transportation*

- The College's suburban location makes reducing emissions from employee commuting behavior a challenge.
- Air travel related to the study-abroad program and staff responsibilities (e.g., admissions and development) are part of the College's core business. It is unlikely that the use of technology (such as telepresence) could ever replace the need to travel for these purposes. The greenhouse gas emissions associated with these activities will need to be offset to achieve carbon neutrality.
- The topography of the campus and the distance between some buildings makes walking seem infeasible or undesirable for some members of the campus community.

### *Waste management*

- The student Green Advisers organization performed a waste audit in November 2013 of Kohlberg Hall and the Science Center. It found that, of everything thrown in the trash, only 37 percent was actually garbage. The rest could have been recycled or composted. And of everything that could have been composted, only 7.6 percent of it was actually put in the compost. This indicates that there is substantial room for improvement in waste management at the College, both from an infrastructure and a behavioral perspective.
- The College's waste-management system is inconsistent, unclear, and confusing to users. A system of paired trash, recycling, and composting bins

- with a consistent look and clear messaging is necessary, so that users know what to do and are encouraged to create good habits. New, paired waste bins were purchased for some areas of Kohlberg and Parrish halls. This is a positive step, but thorough planning and funding allocations are essential to implementing a consistent and clear system campuswide.
- The College should look for opportunities to reduce the complexity of the products used in food service; simple actions like removing a plastic straw from a compostable cup occur only infrequently and threaten to contaminate the compost system. If possible, all food service items (utensils, plates, cups, lids, straws, stir sticks, etc.) used in Essie Mae's and other coffee bars should be compostable to reduce confusion.

### *Water*

- Worldwide, water availability is as pressing an issue as carbon dioxide emissions. From accounts of a dwindling groundwater supply in the Colorado River basin to extreme drought this summer in California, water conservation is a dire need in many communities. It has not reached that point in the Swarthmore region, but hotter and drier summers under climate change also put our region at risk of drought and diminished groundwater recharge. Although the College is taking some steps to conserve water, the infrastructure investment for many water conservation strategies, such as the use of gray water to flush toilets, is likely to be a tough sell (particularly when compared with investments in energy infrastructure) in a mild climate.

### *Procurement*

- Procurement at the College is largely decentralized. Individual departments are authorized to purchase supplies and hire vendors as they deem appropriate for their staff, faculty, and students. Although this flexibility may have advantages, it also means that the purchase of environmentally friendly goods and services varies greatly across the College. Until purchasing is centralized and/or College standards are developed, understanding the environmental implications of the College's purchasing decisions and making improvements in this area will take considerable time and will need to be tackled department by department.

### *Food*

- Much of the food served at the College is locally sourced, and Dining Services primarily works with local vendors. The College could consider sourcing more organic foods and free-range animal products. The College also offers vegetarian and vegan options at every meal, but it could consider holding meat-free dinners to raise awareness that meat consumption leaves a far greater carbon footprint than a vegetarian/vegan diet. It could also consider producing more food on-site.

## Progress Toward Climate Neutrality

### Clarification about the College's Greenhouse-Gas Emissions Inventory

The College's greenhouse-gas emissions inventory does not comprehensively represent all of the College's activities that contribute to climate change. It is common practice when compiling this type of inventory to draw a boundary on the activities included and to restrict the inventory to those activities that generate carbon dioxide emissions on site or during the course of business. However, the manufacturing and distribution of every product and machine used on campus as well as the management of the resulting waste all result in greenhouse-gas emissions. Similarly, the systems used to treat and distribute the public water supply require large amounts of energy, resulting in emissions. Greenhouse-gas emissions are also produced during the production and distribution of the food eaten on campus. Carbon dioxide release is inherent in nearly every human activity.

Swarthmore College's first greenhouse-gas inventory, which tracks emissions from 2005–2008, was developed by the Center for Sustainable Communities at Temple University. The College's greenhouse-gas inventory for 2010 (completed in house) updated and expanded the inventory developed by Temple and served as the baseline assessment for Swarthmore's *Climate Action Plan*. Since the initial inventory, the College has compiled updates for 2011 and 2013. Figure 1 displays the College's emissions profile for 2010, 2011, and 2013.

Figure 1: Swarthmore College Greenhouse-Gas Emissions Profile 2010, 2011 and 2013

<b>Greenhouse-gas emissions</b>	<b>2010</b>	<b>2011</b>	<b>2013</b>
Scope 1 (MT eCO <sub>2</sub> )	5,472	4,868	5,770
Scope 2 (MT eCO <sub>2</sub> )	6,690	6,744	7,826
Scope 3 (MT eCO <sub>2</sub> )	3,404	3,169	3,809
<b>Gross emissions (MT eCO<sub>2</sub>)</b>	<b>15,565</b>	<b>14,781</b>	<b>17,405</b>
Offsets (MT eCO <sub>2</sub> )	-3,172	-6,149	-9,393
<b>Net emissions (MT eCO<sub>2</sub>)</b>	<b>12,393</b>	<b>8,632</b>	<b>8,012</b>

Scope 1: Direct carbon dioxide emissions (eCO<sub>2</sub>) from campus heat-plant boilers, generators, chillers, vehicles, and refrigerants.

Scope 2: Indirect eCO<sub>2</sub> attributed to purchased electricity.

Scope 3: Indirect eCO<sub>2</sub> including employee air travel, employee commute, and study-abroad air travel.

(eCO<sub>2</sub> = carbon dioxide equivalent; a metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential.)

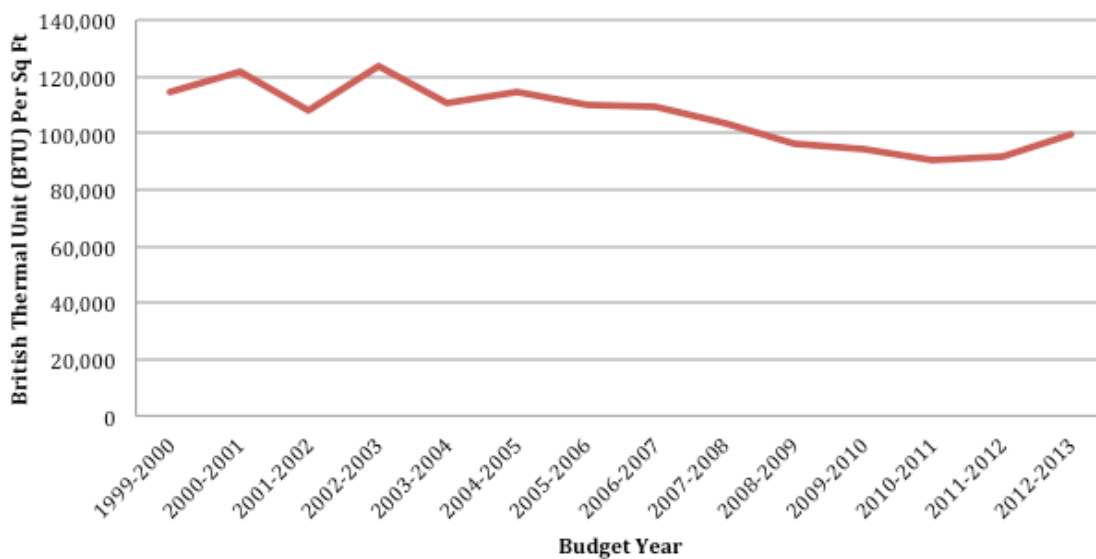


With only three points of comparison, it is difficult to draw conclusions from Figure 1. The main positive result is that the College is meeting its interim target of a 50 percent reduction in net emissions by 2015. This is being achieved through the purchase of RECs and, to a small degree, by the College's composting program. The College has purchased RECs in the form of wind power since 1999. This commitment has gradually increased so that 100 percent of the College's greenhouse-gas emissions generated from its electricity use are offset by RECs.

The College does not have consistent and complete emissions information before 2010, but it does have historic building heating and electricity use data. The College has been on a downward trend in its direct emissions and emissions from electricity use since 2005. After the renovations and new construction completed between 1990 and 2000, the College grew to 1,238,593 square feet. In the decade following, the campus continued to grow, adding approximately 250,000 square feet of academic, dormitory, and support space. Given this growth, the reduction of energy use since 2005 is impressive.

The decline in the College's greenhouse gas emissions can be attributed to a reduction in the use of no. 6 fuel oil, which has greater carbon intensity than natural gas; to building retrofits and conservation measures; and to actively managing the College's spaces through its Siemens building management system. As just one example of the College's energy conservation measures, the second floor of McCabe Library was fitted with stack light switches that turn on lighting only when needed. From the start of classes in September 2013 to date, the McCabe conversion alone saved more than 150,000 kWh and eliminated 71 tons of carbon. All of the combined lighting improvements completed in College buildings since 2008 save approximately 492,407 kWh and 466,000 pounds of carbon dioxide annually.

Figure 2: Energy Use per Square Foot by Budget Year



The campus is continuing to grow in population and building square footage, which will, in turn, increase energy demand. In spite of steady progress in reducing the energy use per square foot, as shown in Figure 2, the College may be reaching a plateau in what it can achieve without major infrastructure changes.

The College will likely see the impact of the construction of the Matchbox and the Dana/Hallowell in-fill projects in its next greenhouse-gas emission inventory update. However, weather patterns also confound the data; unusually hot summers or unusually cold winters, such as winter 2014, can impact energy use significantly, in maintaining comfortable temperatures in the campus buildings.

This past winter also demonstrated the fragility of the College's infrastructure. Natural-gas deliveries were suspended several times to relieve supply demands on the pipeline system. The electric-grid operator also called for voluntary reductions in power use on the coldest days in January. When the main electric service to the College failed on Feb. 5, the inherent danger that an extended winter blackout imposes on a facility with a 24/7-student population was made clear. With climate change, it is likely that severe weather conditions are going to become a more frequent occurrence, and the College needs to ensure its resiliency and ability to adapt to this changing climate and subsequent weather events.

To continue to shrink the College's carbon profile—or even maintain stability—will require significant investment in new technologies for building heating, cooling, and lighting. The initial cost of these improvements is frequently a point of contention, but the College must move beyond this as the primary factor in decision making, if it truly values its carbon-neutrality commitment. One method to assist with the cost of these projects would be to adopt a voluntary carbon tax (using best available estimates on the social cost of carbon) where the College taxes itself for the generation of carbon dioxide emissions. This tax revenue could then be allocated for carbon-reduction projects on campus. The carbon tax rate, which could vary by the carbon intensity of different fuel types, would also be factored into the cost estimates of the College's capital projects.

Keeping in mind the impact of planned growth on carbon dioxide emissions, the College kicked off a Sustainability Framework project this summer. The purpose of this study is to create a sustainability building standard for the College's new buildings and major renovation projects. The College has currently committed to building all new construction to Leadership in Energy and Environmental Design (LEED) Silver standard or better. Two buildings have been LEED certified: the Science Center and the Wister Center. The Wister Center achieved LEED Gold status. Alice Paul and David Kemp residence halls meet LEED criteria, but the College did not pursue certification for those buildings.

In general, the College community has expressed dissatisfaction that the College has not fully committed to LEED as a building standard and only used LEED Silver as the construction benchmark, particularly with regard to energy consumption. Thus, a major component of the Sustainability Framework will be an in-depth energy study to set appropriate energy benchmarks for its current and future buildings as well as to recommend infrastructure improvements and renewable energy opportunities.

As more than 70 percent of the College's gross emissions are from building energy use, this has been and should be the primary focus of the College's carbon-reduction efforts. The remaining emissions relate to transportation, including fuel use by College-owned vehicles, employee air travel, employee commutes, and study-abroad air travel. Although many of these transportation activities are difficult to modify, the College is making strides to reduce vehicle use and the carbon contribution of vehicles used for College activities. Launching the car-sharing program, operated by Zipcar, is part of this effort as this program could entice members of the College community, who can feasibly get to campus by other means, to leave their cars at home. However, this program alone is unlikely to have a noticeable impact on the College's transport emissions.

Creation of a van-pool/ride-share program, modifications to employee transit incentives and housing benefits, and disincentives like parking fees are other initiatives the College should consider; these strategies have been successful in other communities to reduce employee-commute emissions. Nonetheless, the majority of transportation emissions will need to be offset to achieve carbon neutrality as employee flights and student study-abroad air travel are vital parts of the College's operations.

The College also needs to consider establishing fleet standards and policies to ensure vehicles purchased are as fuel efficient as possible, while meeting the College's needs. Increased sharing of vehicles between departments and within departments should also be evaluated. With rightsizing (optimizing fleet size and composition), the College's fleet can discover savings from cost and environmental perspectives.

## **Initial Ideas and Best Practices for Future Consideration**

*The following offers some initial ideas the College could consider to further its efforts at carbon neutrality and overall environmental sustainability.*

### *Energy*

- Reduce fossil-fuel use on campus through district energy systems (combined heat and power), geothermal, and renewable energy generation. Specific recommendations will come out of the Sustainability Framework.
- Ensure that all new buildings and major renovations meet or exceed the energy standards established by the Sustainability Framework. Pilot innovative new projects such as a net zero energy residence hall.
- Conduct energy audits of faculty/staff housing owned by the College. Consider innovative financing strategies to pay for improvements and to address split (tenant-landlord) incentives.

### *Waste management*

- Create a consistent waste system (with clear signage) for the entire campus.
- Partner with a local business to expand composting to a year-round service offered in all buildings on campus; expand materials accepted for compost, including meat and dairy.
- Only offer compostable utensils, lids, straws, etc., in the snack bar and coffee bars. Or offer reusable plates, cups, and silverware in as many food service locations as possible (Essie Mae's?).
- Eliminate bottled water on campus; install water-bottle refilling stations indoors and outdoors.
- Increase opportunities for recycling of electronic waste. Consider the creation of a centralized recycling area on campus that accepts all items that can be recycled.
- Eliminate use of Styrofoam products on campus.
- Offer leasing of appliances (e.g., mini refrigerators) to students to reduce the number purchased and then donated to Trash to Treasure each year.

### *Water*

- Increase collection of rainwater for landscape irrigation.
- Use gray water and rainwater for non-potable uses in buildings, such as flushing toilets.
- Increase use of storm-water management/low-impact development techniques, such as permeable pavers instead of traditional asphalt for parking lots.

### *Transportation*

- Evaluate the feasibility of a van-pool/ride-share program.
- Expand employee transit incentives and housing benefits; consider disincentives like parking fees.

- Create a fleet, right-sizing standard and policy.
- Install a solar-powered, electric-vehicle recharging station.

#### *Procurement*

- Develop environmental standards and policies for procurement.
- Look for opportunities to share resources within and across departments (with the goal of purchasing less).

#### *Food*

- Increase food production on campus.
- Expand the offerings of organic and free-range ingredients and/or products.
- Hold meat-free dinners to raise awareness that meat consumption has a far larger carbon footprint than a vegetarian/vegan diet.