Grinnell College Sustainability Plan

5 December 2013

Grinnell College Sustainability Planning Committee

Liz Queathem and Chris Bair, co-chairs; Jon Andelson, Gwenola Caradec, Melisa Chan, Vince Eckhart, Elizabeth Hill, Cori Jakubiak, Phillip Jones, Liza Morse, Meggy Schmitt, John Whittaker, Lesley Wright

Modified and updated by Queathem, Bair, & Andelson 17 July 2017

Executive Summary

Environmental sustainability, especially climate change, is a crisis challenging the entire globe. Grinnell College can take actions to increase its environmental sustainability in several areas that will also strengthen its resilience and reinforce its message of social justice. **We recommend the creation of an Office of Sustainability that, together with the EcoCampus Committee, can oversee and implement sustainability efforts. Bolded items are areas where we could make large advances quickly.**

1. Energy, emissions, and travel.

- **Replace current electricity sources with renewables by exploring relationships with providers such as Trusted Energy or Arcadia.**
- **Build to at least LEED Silver standards for energy use in all new construction and renovations.**
- **Consider divesting the College's investments from fossil fuels.**
- Use Green Funds for pilot projects that, if successful, can be integrated into the College's budget on a larger scale.
- Sub-meter all campus buildings for steam, electricity, and chilled water, starting with electricity.
- Use more carpooling, telecommuting, and teleconferencing.
- Increase use of electric cars, and charge them using solar panels.
- Consider purchasing offsets for air travel, which emits large amounts of greenhouse gases.

2. Water use, runoff, and landscaping.

- **Develop a Landscape Master Plan for campus that minimizes runoff while increasing native species and prairie.**
- **Use structures such as rain gardens, bioswales, green roofs, and pervious pavers to increase infiltration and reduce stormwater runoff.**
- **Maximize use of rainwater to replace City water that is pumped from an aquifer.**
- Consider geothermal heating/cooling wherever possible to minimize water use in heating and cooling.
- Educate students about water use via methods such as shower timers.

3. Food.

- **Increase our use of organic, local, and/or humanely sourced food.**
- **Purchase pork from sources other than concentrated animal feeding operations.**
- **Increase the size of the Student Garden and consider a College Farm.**
- **Make sustainable foods part of Dining Service's mission, and flag the importance of sustainable foods in job descriptions at the highest level.**

4. Solid waste and recycling.

- Use strategic placement of recycling, compost, and trash bins to make it easier to recycle and compost.
- Educate students, faculty, and staff about what goes into each bin.

- Conduct trash and recycling audits for each building.

5. Behaviors.

- **Sub-meter buildings so that we can evaluate behaviors and determine where we can make the largest gains.**
- **Develop an education program via mechanisms such as residence hall competitions.**
- **Reward the inhabitants of buildings who successfully institute behavior-based increases in sustainability.**
- Give people the feedback they need in order to motivate behavioral change by making the results of their actions transparent.
- Make it easy for people to do the right thing by placing the most desirable option first.
- Use self-governance to let students set their own goals via the Student Environmental Committee, individual student residence halls, and other student groupings.

6. Communication.

- Develop and implement a Sustainability Communications Plan.
- Make sustainability visible on the front page of the College's website.
- Schedule weekly or biweekly website updates.

7. Curriculum.

- **Develop interdisciplinary sustainability courses on Water, Foods, and Emissions.**
- **Seek funding to enhance curricular offerings through entities such as the Margaret A. Cargill Foundation.**
- **Develop targeted projects (e.g., the sustainability of CERA; the biogeochemistry and biodiversity of the College's campus, of the city, and of the surrounding agricultural landscape; or comparisons with ecosystems and built environments around the world) that relate sustainability to where we are and our place in the global community.**

Preface: The Genesis of the Grinnell College Sustainability Plan

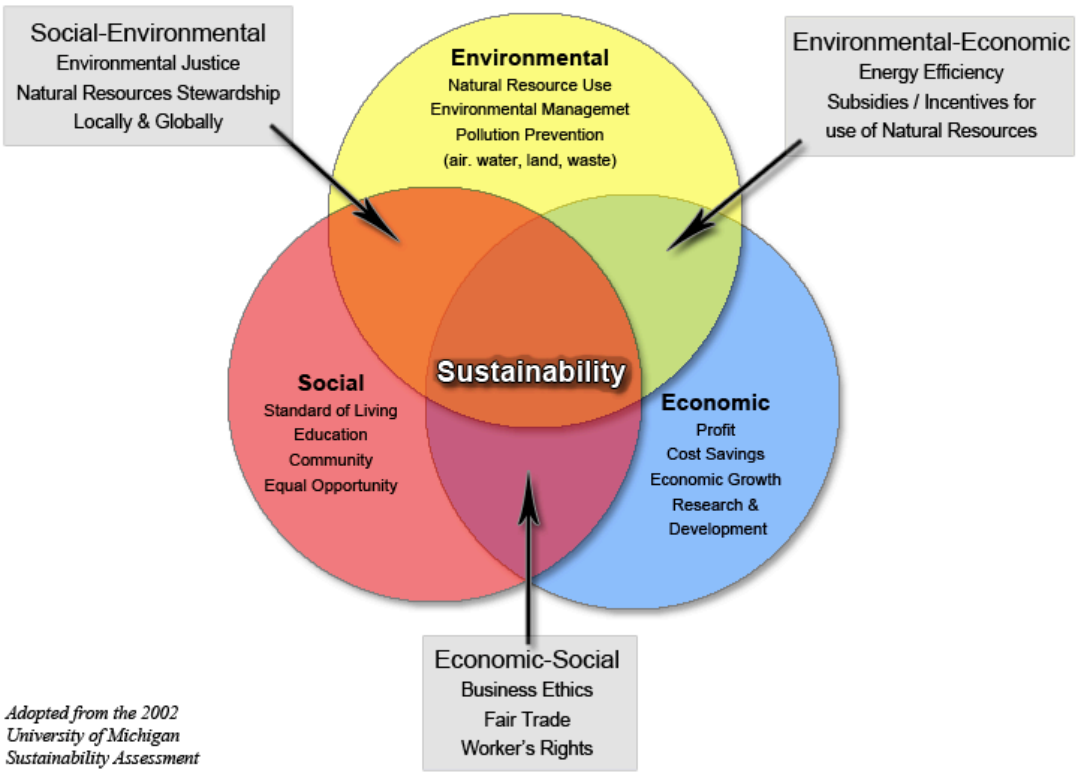
In the spring of 2011, President Raynard Kington appointed the *Environmental Responsibility and Sustainability Advisory Committee*, giving the following charge: "To further Grinnell College's goals of environmental responsibility by assessing current conditions, policies, and actions and advising the President of Grinnell College on strategies for furthering those goals, in ways that are consistent with the college's mission and core values." Areas under consideration were to include, but not necessarily be limited to:

- Energy consumption and carbon emissions
- Water use, quality, and run-off
- Landscaping and prairie plantings
- Waste reduction and diversion
- Goals for new construction and renovated buildings
- Community education for environmentally-friendly behaviors
- Business and academic processes (printing, mailing, etc.)
- Committee organization and other governance issues linked to environmental responsibility
- Integration of sustainability into education, including course content, majors and concentrations, and data repositories
- Local foods

Later in 2011, President Kington helped the College take a large step toward sustainability when he joined the presidents of over 600 institutions in signing the American College and University Presidents' Climate Commitment (ACUPCC). Signatories acknowledge the responsibility of higher education institutions to model the reduction of greenhouse gas emissions. In addition to requiring Grinnell College to set a date to bring its net carbon emissions to zero, the ACUPCC provides an opening for discussing the broad role of sustainability in the contemporary liberal arts education. Now that President Trump has stated his intention to withdraw the United States from the Paris Climate Commitment, the responsibility for reducing the U.S.'s contribution to greenhouse gases has fallen to individual states, cities, and other institutions.

As a liberal arts institution, we recognize that environmental sustainability represents only one of the three important areas of sustainability that must simultaneously be addressed. Without economic sustainability, Grinnell College will eventually cease to exist. Like environmental sustainability, social sustainability is crucial to our mission and our vision. We envision that all three pillars of sustainability will play an important role in the College's strategic planning.

The Three Spheres of Sustainability



Environmental Sustainability Planning and Strategic Planning. Many aspects of the College's mission, including the pursuit of knowledge for "the well-being of individuals and society," and preparing students who can "serve the common good," can be advanced by integrating environmental sustainability more visibly into the College's policy, infrastructure, behaviors, and curriculum. Furthermore, concurrently with this committee's work, the College as a whole undertook a strategic planning process, led by the Strategic Planning Steering Committee. Taking advantage of this coincidence in time, this Sustainability Plan charts a vision of sustainability for the College that supports both our core mission and the six strategic directions (or underlying themes) identified during strategic planning.

Strategy 1: Enrollment *– Attract, enrich, and graduate a diverse and talented student Community.*

We seek to demonstrate clearly that the College exemplifies the principles that it professes, both because it is the right thing to do, and in order to attract students who evaluate us relative to our peers. By making our sustainability efforts genuine, transparent, far-reaching, and imaginative, we hope to achieve gains in recruitment, as well as embodying our commitment to social justice and saving money for the College.

Strategy 2: Teaching and Learning *– Re-envision our commitment to a liberal education and its value in the 21st century.*

Any meaningful short-list of 21st-century challenges includes intersections of human needs and rights (economic and social sustainability) and threatened environmental quality (food and population; water scarcity; climate change; ecosystem degradation; energy; public health). Addressing these challenges requires students with the perspective, knowledge, and skills to restore, sustain, and improve the quality of human life and the natural systems on which it depends. While a subset of the necessary skills will come from practical disciplines such as engineering and business, more complete—and likely more successful—sustainability education could be the distinctive contribution of liberal arts institutions in general, and Grinnell in particular.

Strategy 3: The Grinnell Learning Place *– Build learning spaces that encourage collaboration, creativity, and inquiry.*

As we improve our physical facilities, and construct teaching and learning environments that can take us forward into the future, we aspire for them to embody our values. Our ecological footprint represents the costs we impose on the rest of the world because of the way we choose to live. Constructing buildings with a small footprint, and making footprints visible, can connect us to the larger world while demonstrating powerfully what we think is important.

Strategy 4: Post-graduate Success *– Instill an orientation to the future and intentionally connect the Grinnell educational experience to post-graduate endeavors.*

Sustainability by its very nature demands that we consider the future. Through considering responsible stewardship of global resources, providing expanded opportunities for internships, making explicit the pervasiveness of sustainability issues, and encouraging the incorporation of sustainability across the curriculum, we can prepare our students for this cutting-edge and interdisciplinary realm as they move into the workforce. They will be able to take issues of sustainability into any work environment, and work for improvements in any occupation.

Strategy 5: Alumni Engagement and Philanthropy *– Foster life-long learning and contributions of alumni in the College's intellectual life, service, mentorship, and advising.*

We already know that many of our alumni work in sustainability fields, and studies carried out by the consulting firm "Art and Science" indicate that our alumni are distinctively interested in contributing to environmental causes. We propose the cultivation of our alumni through demonstrating that the College as an institution lives the ideals that they already espouse, inviting alumni back to campus for sustainability-themed events, and offering them opportunities to reconnect more closely to the College via internship sponsoring, mentoring, advising, and opportunities to contribute materially to our sustainability infrastructure and education.

Strategy 6: The Management of Grinnell's Human and Infrastructure Resources *– Transform administrative practices to maintain continuous, collaborative, and adaptive planning for the College.*

This Sustainability Plan includes action steps for progress towards long-term sustainability. More importantly, the Plan is a living document that requires continual reevaluation and goal setting that can respond flexibly to rapidly changing technologies, marketplaces, and regulations. We envision a form of shared governance where administrators, faculty, students, alumni, and staff all have a voice in shaping the particular forms in which sustainability is embodied in the physical structures of the College, and practiced in our everyday behaviors and purchases.

Assembling this document. Tasked with developing a Sustainability Plan, the Committee formed six Work Groups.

- The Behavioral Work Group considered the behavioral aspects of the areas listed above. This group sought to identify behaviors that directly affect sustainability, and how best to provide incentives that promote positive change.
- The Educational Work Group, like the Behavioral Work Group, worked on multiple components, identifying opportunities and obstacles relating to the use of campus and community as subjects of study.
- The Travel Work Group worked to obtain quantitative data on College travel, in order to determine how we can be most efficient, and calculate what will be required to offset our travel needs.
- The Facilities Work Group dealt with the Facilities components of energy, building construction and renovation, water, waste generation and processing, grounds/landscaping, and storm-water management.
- The Local Foods Work Group investigated how best to integrate local and sustainable foods into Dining Services, minimize waste production and maximize energy efficiency related to food services, and promote local foods in the broader community.
- The Business and Processes Work Group considered issues relating to paper use, computer settings, purchasing, and recycled content/green materials procurement.

In what follows, we use the Work Groups' findings to describe the current status, four-year goals (i.e., the length of a student's college career) and ultimate goals, and possible action steps for **9 areas of college operations related to environmental sustainability**. List order connotes relationships between areas, not priority.

Underlying these specifics is a vision of a "Sustainable Grinnell College" that:

- Engages students, faculty, and staff in reducing the campus' environmental footprint by using our sense of place in this particular landscape to live, work, eat, and consume other resources sustainably—in short, living sustainably in place
- Increases sustainable energy use and reduces consumption until the College becomes carbon neutral
- Teaches sustainability as a pervasive principle for public good

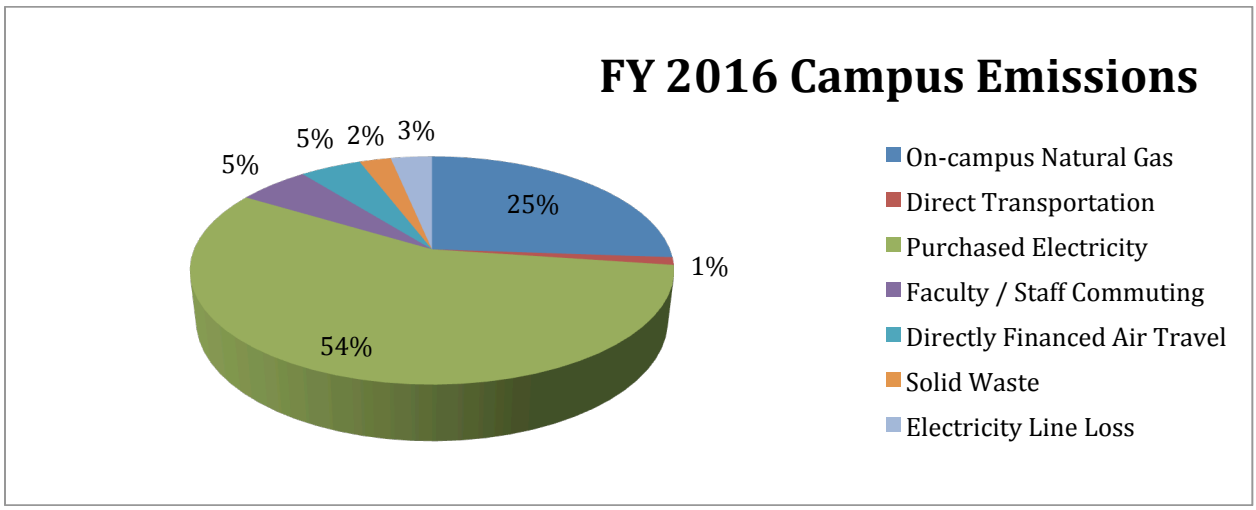
Sustainability Area 1: Energy, Emissions, and Construction Standards

Background and Current Status.

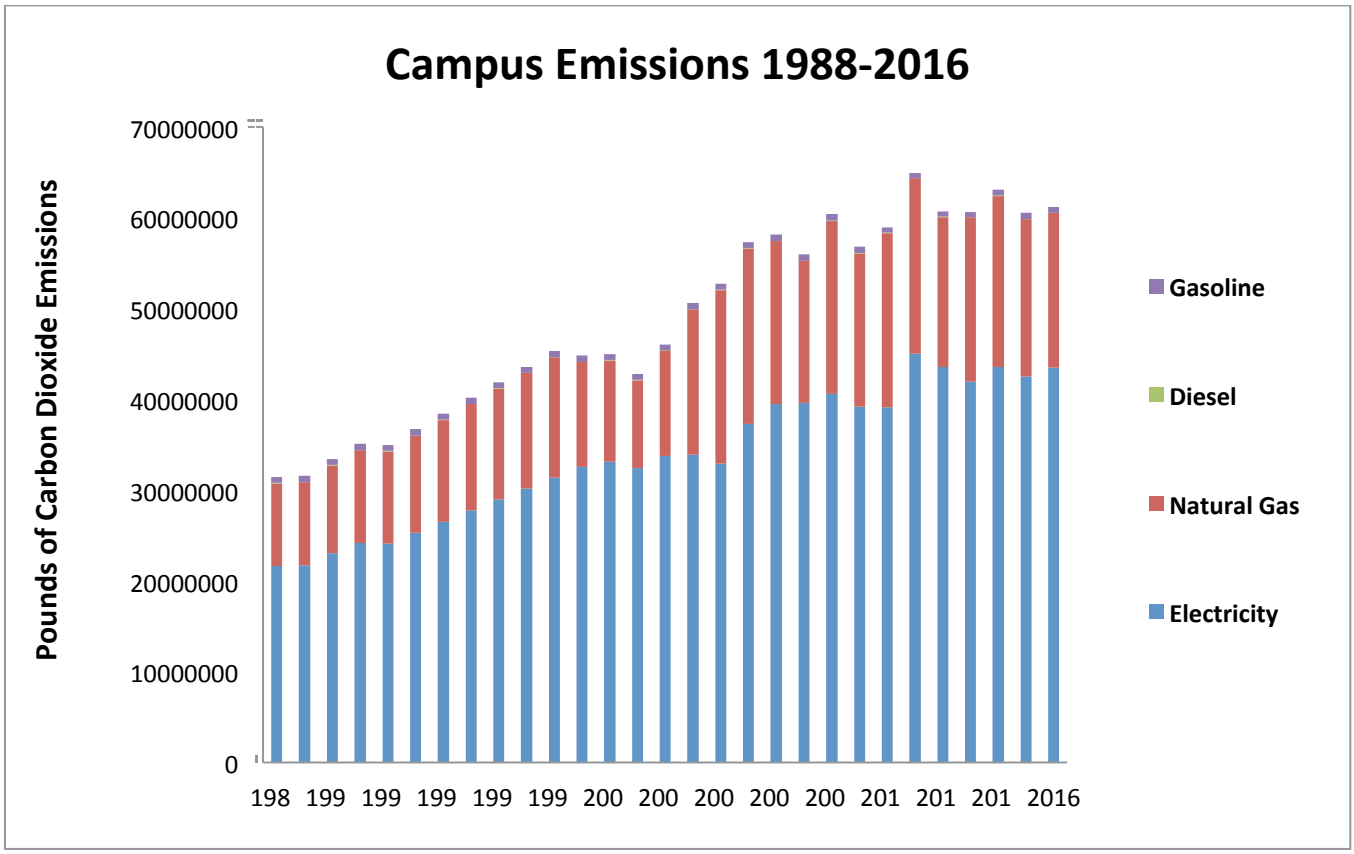
Energy is required for heating, cooling, lighting, transportation, and a host of other human activities. (We treat the energy-related area "Travel" under a separate heading.) The majority of the College's energy comes from coal (the source of most of our purchased electricity) and natural gas, both so-called fossil fuels. Using fossil fuels not only contributes to greenhouse gas emissions that are changing Earth's climate, but also incurs severe environmental costs in the extraction process. Emissions – that is, gasses and particulates from combustion – both jeopardize human health and represent the primary causes of the ecologically and humanly destructive process of rapid global climate change. Hence, emissions are probably the best-known and most common target of sustainability efforts. Emissions perforce go hand in hand with energy, as they are by-products of the combustion that until recently provided virtually all energy for heating, cooling, mechanical processes, transportation, and electricity.

Sustainability analysts divide emissions into categories that recognize distinctions between direct emissions, produced by an institution on-site, and emissions that are produced by some other entity but ultimately can be traced to consumption by the institution. Scope 1 emissions are directly produced via on-site combustion of fossil fuels for heating and for transport by institution-owned vehicles, and Scope 2 emissions are produced by the energy sources that provide an institution's electricity. Scope 3 emissions stem from outsourced activities such as employee travel, production of purchased materials, and contractor vehicles. The Second Nature agreement holds institutions responsible for Scope 1 and Scope 2 emissions.

The College's FY2016 emissions included approximately 63,000,000 pounds (28,576 metric tons) of CO_2 equivalents. Almost 60% of the emissions were due to electricity consumption, with an additional 25% coming from natural gas combustion. Clearly, our sourcing of electricity represents the first target for reducing emissions, with on-campus natural gas coming in second. Commuting, air travel, and solid waste account for a relatively trivial fraction of our emissions.



To look at the data another way, if we partition emissions according to whether they are caused by electrical sourcing, or by burning gasoline, diesel, or natural gas, electricity again comes out on top. Although natural gas is relatively clean-burning compared to many fuels, it comes in second as a source of greenhouse gases, as we use substantial quantities in our heating plant.



The recent trend at the College has been to use more energy, but to use it more efficiently. Since the early 1990s the campus has doubled the square footage of its buildings. Total energy consumption increased in the following two decades, but our new facilities (and the operations of our existing ones) have become more energy efficient. During FY 2016, campus consumed 1,411,684 therms of natural gas and 21,752,361 kwh of electricity.

Several of the College's newer buildings and recent renovations have increased energy and water-use efficiency, increased use of local materials, and other sustainable features (e.g., storm-water storage; day-lighting), earning LEED recognition at levels from Certified (East Campus dormitories, Joe Rosenfield Center [JRC]) to Silver (Noyce Science Center Phase II, Athletics Phase II), to Gold (Conard Environmental Research Area [CERA] Environmental Education Center). This is an excellent starting position, and we have some opportunities to explore that can help us to meet our eventual goal of net-zero greenhouse gas emissions. Because we have explicitly included sustainability as a design principle, the new buildings that are being built now

will have a longer useful lifespan, save money now and throughout their lifetimes, and illustrate our commitment to social justice through minimizing our environmental footprint. For these buildings, the College has engaged architectural firms that have won major awards for their innovative green design work, and the College's carbon footprint will benefit accordingly. For example, the Humanities and Social Studies Center, designed by EYP, will more than double the physical footprint of the ARH-Carnegie complex, but will consume very little more energy than the original building. Furthermore, the geothermal wells that will help to heat and cool the HSSC can also be used to reduce heating costs in the adjacent Noyce Science Center, the Joe Rosenfield Center, and the new Admissions and Financial Aid building, thereby reducing the emissions of all of those structures.

The ACUPCC has evolved into the organization Second Nature, but the primary goals of the organization are the same: achieving climate neutrality by a target date that we choose, but no later than 2050. This means the College aspires to net-zero greenhouse gas production, through a combination of conservation, changes in energy sourcing toward renewables, and purchasing offsets ("green tags") in which a second party would mitigate our excess CO_2 production (e.g., by planting trees).

In addition to the emissions targeted by Second Nature, the College indirectly contributes to emissions worldwide through its investments in companies that sell fossil fuels. For this reason, many educational institutions have divested from fossil fuels, and the Board has put together a task force that is studying the best approach for Grinnell, to be supported by a College Advisory Committee that will provide opportunities for review and engagement of this work on campus.

We advocate achieving climate neutrality primarily through direct actions rather than offsets, developing College policy to avoid environmental impacts, rather than mitigate them, whenever feasible. We are currently exploring whether the company Trusted Energy might be able to develop a combination of wind and solar projects that could meet all our electrical needs, so it is possible that the purchase of offsets will not be necessary to bring us to net zero. Should offsets become necessary, the College might consider purchasing offsets either resulting from renewable energy generated in the region, or via an offset program outside of the region that could help the College fulfill its educational mission as well.

Thus, we recommend strategies to replace fossil fuels with renewable energy sources wherever feasible. We aspire to meet our on-campus energy needs through renewable sources and to minimize those needs and all of their costs—financial as well as environmental—through thoughtful design and operations of campus buildings and infrastructure, including education about behavioral changes that can reap energy savings and reduce emissions.

Recent developments at the College include a Student Government Association (SGA) Green Fund and an EcoCampus Green Fund, both of which can be used for sustainability-related pilot projects to determine whether particular emissions-reducing initiatives might be feasible on a larger scale. In addition, a Trustees' Task Force on the Divestment of Fossil Fuels has been appointed to consider the College's use of, and investment in, fossil fuels. An advisory committee made up of students, faculty, staff, and alumni will recommend documents, data, and experts for the Task Force to review and consult during the 2017-18 academic year. Finally,

prairies sequester significant amounts of carbon, so any increases in prairie plantings associated with landscaping changes will help offset our emissions.

Ultimate Goals:

1. Approach carbon neutrality with regard to Scope 1 and Scope 2 emissions by 2040.
2. Reduce total electricity and natural gas consumption on campus by 25% from FY2012 levels within 10 years.
3. Use Green Funds to investigate pilot projects for possible adoption campus-wide.

Four-year Goals:

1. Obtain 60 % of campus electricity from renewable resources.
2. Submeter half of our residence halls for electricity.
3. Reduce non-renewable energy consumption in submetered residence halls by 15%.

Action Steps:

1. Continue the work of the Trustees' Task Force on the Divestment of Fossil Fuels in analyzing how the College should comport itself with regard to fossil fuel use and investments, with support from faculty and staff.
2. Explore a relationship with Trusted Energy that could potentially provide all of our electricity through a combination of a solar farm close to campus and purchase of wind energy from wind farms in northwest Iowa.
3. Continually assess renewable energy opportunities including, but not limited to, solar hot water, solar photovoltaics, wind, and geothermal, as technologies, markets, and regulations evolve.
4. Conduct in-house energy audits for potential lighting upgrades and building automation schedules (i.e. turning off lights and changing thermostat settings based on time of day and season).
5. Generate an educational campaign aimed at reducing energy consumption via behavioral changes by students, staff, and faculty.
6. Toward that end, sub-meter all campus buildings (mechanically or virtually) with respect to steam, electricity, and chilled water, starting with electricity.
7. Investigate third-party audits for large-scale energy upgrades and performance contracts.
8. Design master planning policies that place sustainability at the forefront as a design principle for all campus construction.
9. Regardless of whether we formally seek LEED Silver certification, we seek to build to the standards that would be necessary to achieve it.

Sustainability Area 2: Travel

Background and Current Status: For the purpose of this plan, travel at the College is defined by transportation directly funded by the College, and faculty/staff commuting. In FY 2013, roughly 11% of College emissions were generated from travel. Faculty/staff commuting accounted for almost 6%, directly financed air travel for just over 5%, and the remainder of directly financed travel was well under 1% of total emissions.

Ultimate Goal: Eliminate or offset all emissions from College travel.

Four-year Goal: Reduce travel-related emissions by 10%.

Action Steps:

1. Consider purchasing carbon offsets for airline travel.
2. Encourage telecommuting and teleconferencing.
3. Continue to increase the fuel efficiency of fleet vehicles.
4. Increase carpooling by faculty and staff who do not reside in Grinnell via a GrinnellShare-based tool, and explore opportunities for formal carpooling, possibly using the Des Moines Area Rapid Transit program for Des Moines residents, and seeking other tools for residents of Iowa City and Cedar Rapids, such as RideShare.
5. Investigate a Bike Share system that uses PCards for access.
6. Consider charging a fee for parking tags that could be waived for hybrid or electric vehicles.
7. Install a solar charging station for electric vehicles.

Sustainability Area 3: Water Consumption

Background and Current Status: Grinnell's generally abundant rainfall may give the impression that reducing water consumption is unimportant in our part of the world. In fact, the City of Grinnell obtains its piped water not from surface waters, but from the Cambrian-Ordovician Sandstone aquifer. This water source could be considered renewable if recharge and withdrawal rates were the same, but at present, groundwater is being withdrawn at a much greater than sustainable rate. The water level of the aquifer in Poweshiek County has dropped by between 0 and 40 feet since 1978, depending on the precise location, but in some areas of Iowa the aquifer's water level has already dropped by more than 120 feet. Conservation of this resource will help prevent the increased cost of drinking water treatment if the City has to switch from well water to surface water, which in Iowa is so contaminated by agricultural runoff that at times Des Moines city water nitrate levels exceed the federal drinking water standard even after treatment. In addition, the use of municipal water requires payment for water treatment before effluent can be routed back into surface waters, so its overuse is expensive for the consumer. Finally, ecosystems on campus and downstream benefit from maximizing the infiltration of water into landscapes, and minimizing the flow of water that passes into watersheds via storm water and sanitary sewer systems.

The College consumed 5.4 million cubic feet (40.6 million gallons) of water in FY 2010. Student residences accounted for the largest portion, approximately 1/3 of the total (see table).

Category	Annual water consumption (cubic feet)	Percentage
Total Campus	5,425,600	100%
Student Housing	1,721,100	32%
Boiler/Chiller Plants	1,342,000	25%
Academic Buildings/Offices	1,291,500	24%
Athletic Fields	580,000	11%
JRC	491,000	9%

The College has installed several conservation technologies and practices in the recent past, the most substantial being a reverse osmosis machine in the boiler plant. The College's water supply is very high in mineral content, which can cause problems in a steam heating system. Installing a reverse osmosis machine removes minerals from water before it enters the boiler system, allowing water to be recycled within the system for much longer periods. This innovation reduced consumption by approximately 40% in its first year.

Additional conservation measures include rainwater capture and storage in the Environmental Education Building at CERA, the Noyce Science Center, and the largest system, storing up to 35,000 gallons, at the Bear Recreation and Athletic Center. This gray water is used for irrigation and flushing of toilets. A large new cistern is planned to collect runoff from the HSSC for gray water use, as well as a small green roof. Low-flow shower heads and dual-flush toilets are utilized in the East Campus Dorms now and are added to older dorms when they are renovated. Dining Services uses a number of water conservation technologies in their dishwashing system, including a recirculated rinse cycle and recirculated slurry that pulls food waste into a pulper. The dishwasher is also shut down when not in use.

Ultimate Goals:

1. Maximize use of rainwater to offset consumption from the groundwater aquifer.
2. Reduce overall tap water consumption by 50%.

Four-year Goals:

1. Insure all faucets and shower heads are low-flow.
2. Reduce consumption by 10%.

Action Steps:

1. Inventory all faucets, showerheads and toilets.
2. Create an educational campaign about water conservation in the dorms.
3. Continue to identify water savings opportunities in the chiller and boiler plant.
4. Continue to pursue geothermal to further reduce water use in the chiller plant.
5. Develop an awareness campaign using shower timers to make people aware of water use.

Sustainability Area 4: Water Runoff and Landscaping

Background and Current Status: With an average year's precipitation of 36 inches, approximately 117 million gallons of water falls on the main campus. Prior to US settlement of Grinnell, the landscape of this area was tallgrass prairie. Such a landscape infiltrated most of the rainfall that fell, discharge to streams being largely via slow-moving groundwater. Row crops, tiling, stream channelization, and urban development areas have caused increased flooding in Iowa by impeding the ability of the landscape to capture rainfall and snowmelt by infiltration, as well as increasing the loads of eroded soil and leached nutrients that are deposited into waterways. We seek to improve the way that the College handles storm water by increasing infiltration and reducing the silt and nutrient loads that the College sends downstream.

Both topography and land use affect runoff. The campus' level topography likely reduces runoff, relative to a comparable hilly area. The main College campus (excluding CERA, the Old Glove Factory, Facilities Management, and the Library Storage facility) encompasses approximately 120 acres. Three-quarters of that total is covered with vegetation, consisting of athletic fields as

well as traditional urban landscaping such as lawns and garden beds. The nature, arrangement, and management of urban vegetation have diverse environmental impacts, including direct impacts on microclimate, water quality, air quality, wildlife habitat, fossil fuel emissions, building energy demand, educational opportunities, food production, safety, and quality of life. Despite this vegetation, run-off is substantial because 25% of the campus surface is impervious, and in the College's extensive lawns, as in virtually all conventional lawns, shallow roots and soil compaction reduce infiltration. Mitigating these problems are substantial current efforts to reduce storm water discharge from campus, including rainwater collection systems in the Noyce Science Center and the Bear Athletic Center, as well as a planned system for the HSSC. In addition, prairie plantings assist infiltration on campus, especially around the storm sewer intakes at the Soccer and Softball fields. Approximately 2% of the main campus surface is covered in prairie plantings. The central Noyce Science Center courtyard is largely planted in Iowa natives. (On the other hand, of approximately 1000 trees on campus south of 10th Ave., less than 30% are native to Grinnell's region.) Except for the athletic fields, most vegetated areas on campus receive no supplemental irrigation, and lawns receive minimal fertilizer or pesticides. Irrigation of the competition football field is supported by storm-water collection from the Bear Athletic Center. A swale constructed south of the Safety and Security parking lot promotes storm-water cleaning and infiltration.

The following landscaping recommendations stem from three overarching principles: (1) reducing resource inputs; (2) using place-appropriate plants; and (3) landscaping for function in addition to appearance. From these principles follows the preference for landscaping with native plants, a practice that generally reduces resource inputs, avoids contributing to the spread of invasive exotic species, provides habitat for native animals such as songbirds and butterflies, and creates educational opportunities and a distinctive sense of place. This preference does not mean reconstructing natural plant communities on a grand scale, and it certainly does not mean eliminating types of traditional landscaping (e.g., lawns) that serve important recreational and esthetic functions. It also does not imply that non-native species lack all educational or esthetic value. Instead, it means a commitment to judiciously weave more native plants and communities into a plan that accomplishes multiple functions (e.g., storm-water infiltration, microclimate control, education, and food production).

The College is currently developing a Landscape Master Plan that will utilize native plant bioswales to infiltrate runoff from newer buildings. We have hired firms that have achieved prominence through their attention to sustainable design. As part of that Master Plan, we are considering options for a water feature using runoff that would be educational as well as functional. We anticipate that this Landscape Master Plan will greatly reduce runoff from new buildings and increase the use of native species on campus, as well as providing a robust water management framework for the future.

Ultimate Goals:

1 Develop a Landscape Master Plan for campus that minimizes runoff while increasing the amount of land covered with native species and prairie.
2 Mimic predevelopment groundwater hydrology patterns as closely as possible.
3 Consider making campus hydrology visible by "day-lighting" streams that have been driven underground, installing water features and kinetic water sculptures, and creating

interpretive signs that use the infrastructure of the College itself to educate everyone who walks on campus.

4 Site shade trees, windbreaks, and other functional living landscape components to create comfortable campus microclimates and reduce building heating and cooling costs.

5 Minimize the application of fertilizers, herbicides, pesticides, and powered equipment, as well as emissions from lawn maintenance equipment.

6 Maximize urban wildlife habitat potential

Four-year Goals:

1 Curtail the addition of impervious surfaces that contribute to the storm sewer system.

2 Identify opportunities for rain gardens, bioswales, or other infiltration and filtering systems to reduce campus storm water discharge.

3 Incorporate such structures into new construction, including parking lots.

4 Reduce inputs of energy and potable water in campus landscaping by 10%.

5 Upgrade and enlarge the campus vegetable garden.

6 Institute a policy of native- or edible-plant preference for all landscaping maintenance and new projects.

Action Steps:

1 Develop a long-term, adaptive Landscape Master Plan for the campus, using the above ultimate goals as targets, with input from stakeholders that include Facilities Management and the residents (i.e., students) and employees of the main campus..

2 With the aid of a civil engineer and students, develop numbers for runoff from buildings.

3 Create a storm water model of the campus that maps perviousness and storm sewer drainage.

4 Work with the Little Bear Creek Watershed Project to workshop and install a rain garden at EcoHouse.

5 Set a timeline for designing and installing rain gardens to handle runoff from campus buildings.

6 Increase buy-in and participation from stakeholders such as building inhabitants by involving them directly in rain garden design and implementation, to achieve aesthetic as well as functional goals.

7 Include the use of gray water wherever possible in new building construction and renovations.

8 Consider attractive rain gardens and water features on campus in places where water currently pools during heavy rains.

9 Identify strategic locations for rain gardens and swales for storm-water management, adjacent to large areas of impervious surfaces, and begin to install them.

10 Identify locations where turf grass could be replaced with alternative vegetation.

11 Evaluate a potential policy of using pervious paving surfaces where possible.

12 Consider the design and installation of interpretive materials that identify the environmental functions of campus vegetation and highlight the natural history of the College's location.

Sustainability Area 5: Food

Background and Current Status: As essayist and writer Wendell Berry has observed, "Eating is an agricultural act." Since Grinnell College serves over four thousand meals to students every

day, the college is a significant participant in Iowa's -- and the nation's -- food system. The agricultural practices that deliver food to the nation, and to Dining Services in particular, can be evaluated in terms of sustainability. Grinnell College would like to be part of the nationwide movement underway to make U.S. agriculture more sustainable. The problems with industrial agriculture have been well documented. The industrial agricultural practices that have transformed Iowa's landscape are responsible for creating the dead zone in the Gulf of Mexico, increasing the evolution of antibiotic-resistant pathogens, and making Iowa's surface waters at times unsafe, not only for drinking, but for any human contact. Using primarily food streams that are sustainable, and making our decisions visible, would embody our beliefs and make the world a better place through our everyday lives, as well as advertise our values to everyone who visits our physical campus or website.

Dining Services already endorses this goal. In recent years, growing concern among members of the campus community over the negative effects of industrial agriculture, coupled with burgeoning interest in the local foods movement, led to a request that Dining Services increase its use of locally-sourced food. In response, Dining Services developed a "Local Food Statement" that reads in part: "Grinnell College believes that locally grown food has many advantages. Food that is grown and processed close to where it will be consumed can be fresher, healthier and more flavorful. Purchasing locally grown items supports local businesses and farmers and reduces transportation costs, environmental impact, and the use of preservatives. In light of these benefits of locally grown foods, Grinnell College will make reasonable efforts to identify and makes purchases of affordably priced local food products that reflect the College's commitment to environmental responsibility."

Dining Services was recognized by the Sustainable Endowments Institute, which wrote, "Grinnell College dining services uses local, organic products for most staple ingredients, including organic flour and local milk, eggs, herbs, pork, and some fruits and vegetables. Pre- and post-consumer food waste is composted using a pulping machine and donated to a local farm, diverting approximately seven tons of waste each month." We applaud Dining Services for its Local Food Statement and for winning recognition from the Sustainable Endowments Institute. At the same time, we note that Grinnell has room for much improvement. A quantitative assessment of our food supply chain has given us a sustainable foods inventory that can show us the areas where we can make progress most swiftly. Long-term contracts with reliable local growers are necessary to ensure that food demands can be met. We believe that the College's sustainability interests would be best served by identifying local organic growers who could meet as many of the College's food supply needs as possible, and investigating our current Sysco supply stream to ascertain whether there are greener alternatives. Grinnell Heritage Farm and Middle Way Farm are organic farms within two miles of campus, so we suggest developing working relationships with them or with other local farms.

Ultimate Goals:

1 Put policies in place to ensure that we will use local, organic products wherever possible, by developing relationships with local producers through the use of the kinds of contracts that are customary among producers and users of local organic foods.
2 Make Grinnell College an acknowledged leader among institutions of higher learning in our sustainable food policies and practices.

Four-year Goals:

1. Make clear the importance of sustainability in the job description for the head of Dining Services.
2. Purchase meat from farmers who farm in a manner that is reasonably humane and environmentally responsible. In particular, because industrially produced pork has been so disastrous for the environment in Iowa and elsewhere, we may wish to avoid pork that is produced by out-of-state companies that use Iowa-based confined animal feeding operations, even though it might technically qualify as "local."
3. Develop relationships with local organic producers to ensure that the College will have as constant a supply of ethically produced foods as possible, along with a backup plan that can be used in years when local food production is inadequate to meet our needs.
4. Meet the standards of commonly used sustainable food services, such as Bon Appetit.
5. Consider signing the Real Food Campus Commitment.
6. Investigate the pros and cons of developing a freezer system so that staff can be retained through the growing season to process and freeze for later use the produce that is most available during the summer.

Action Steps:

1. Enter into contracts with local vegetable producers (especially producers using organic methods) to increase the proportion of local vegetables to 15% of all vegetables served by 2018.
2. By 2018, source at least 25% of our meat from suppliers certified by one of four humane programs, Animal Welfare Approved, Food Alliance, Humane Farm Animal Care, or Global Animal Partnership, meeting the same standards as Bon Appetit.
3. Fill the Local Food Coordinator position, have the position jointly supervised by Jon Andelson and the head of Dining Services, and give the position a budget to expand our use of local foods.
4. Support true family farms and environmental initiatives by buying directly from farmers wherever possible, as in Bon Appetit's Farm to Fork initiative. Mid-size farms can be included as suppliers, as long as they produce meat and dairy humanely.
5. Use reusable items in place of disposable items wherever possible.
6. If compostable disposables are used, ensure that they will be composted, rather than ending up in landfill.
7. Purchase seafood in accordance with the Monterey Bay Aquarium's Seafood Watch guidelines for sustainability.
8. Find out what would be necessary to obtain shell eggs from cage-free producers (certified by a 3rd-party auditor).
9. By 2018, ensure that all the pork we consume is produced without gestation crate confinement systems.
10. Develop strategies to avoid meat that has been raised with the use of hormones and antibiotics wherever possible, except where they are necessary for veterinary care.
11. Use the Real Food calculator for quantitative assessment of our progress at least every two years.

Sustainability Area 6: Solid Waste and Recycling

Background and Current Status: Grinnell College sends hundreds of tons solid waste to the landfill annually (330 tons in FY 2012), but the College also diverts a substantial amount of potential waste by recycling and composting. Though the College does not track all its recyclables and composting, an annual "snapshot" recycling contest provides some information. Participating institutions share and compare solid-waste data collected during a 10-week period, beginning the final week of January. Grinnell's 2012 snapshot counted 2.4 tons per week of recycling, 1.5 tons per week of composted food waste from the JRC Marketplace, and 3.5 tons per week of waste sent to the landfill. Thus during that period, Grinnell kept half its solid waste from reaching the landfill.

Our accounting of solid waste is incomplete. The above "snapshot" estimates do not account for the end-of-year waste generated at student "move out" in May, or the associated efforts to reuse and recycle items at that time. They also miss non-traditional recyclables such as batteries, printer cartridges, cell phones, and burned out fluorescent bulbs, as well as used oil from Dining Services (which is collected and turned into biodiesel) and "yard" waste that goes to the city compost facility.

Ultimate Goals:

1. Become a zero-waste campus.
2. Reduce overall consumption by 50%.

Four-year Goals:

1. Increase landfill diversion rate to 60% by making it easier to recycle and compost than to throw things away.
2. Work within the curriculum (e.g., the Technology Studies Concentration) to develop ways to give individual members of the campus community immediate and intuitive feedback on behaviors that generate waste.
3. When the College purchases plates, utensils, and other items that are labeled as compostable or recyclable, ensure that they are composted or recycled, rather than sending them to landfills.

Action Steps:

1. Conduct trash and recycling audits for all buildings on campus.
2. Create a plan for placement of bins that will maximize diversion from landfill.
3. Give custodians the staffing, equipment, and training they need in order to handle changes in work flow.
4. Create signage to educate building occupants of recycling locations.
5. Through Dorm Environmental Coordinators and other outlets, generate a successful education campaign about campus consumption and recycling system.

Sustainability Area 7: Behaviors

Background and Current Status: The majority of our faculty, staff, and students support sustainability in general, but it is difficult to make meaningful changes without feedback about the effects and consequences of current behaviors. We recommend the installation of electrical, gas, and water sub-metering initially, to give people the feedback they need in order to determine what changes in behavior would reap the most benefits. Once we have data, we can focus our programming on the behaviors that cost us the most.

Ultimate Goals:

1 Use design first to make it harder for behaviors to reduce sustainability. Wherever possible, design infrastructure in such a way that people do not need to make a conscious decision in order to conserve energy and resources.

2 Give people the feedback they need in order to motivate behavioral change by making the results of their actions transparent.

3 Make it easy for people to do the right thing by placing the most desirable option first.

4 Use self-governance to let students set their own goals via the Student Environmental Committee, individual student residence halls, and other student groupings.

5 Consider rewarding the inhabitants of buildings who successfully institute behavior-based increases in sustainability.

Four-year Goals:

1 Install energy sub-metering for all buildings, but especially student residences, and effectively communicate the data that are gathered.

2 Review successful design projects that have been developed elsewhere, and learn from their examples.

3 Incorporate local materials into construction projects.

4 Make sustainable landscaping part of every building design from the earliest stage onward.

Action Steps:

1 Develop an education campaign to promote sustainable behaviors.

2 Hire designers and architects who have demonstrated their creativity and commitment to principles of sustainable design.

3 Issue reusable water bottles during New Student Orientation.

4 Phase in the greenest possible option for hand dryers in restrooms across campus.

5 Seek out ways to give students immediate feedback about food waste in the Marketplace.

6 Connect the Center for Careers, Life, and Service; Alumni Office; Prairie Studies; Environmental Studies; and Sustainability Planning Committee in a partnership to create a consolidated green-collar jobs and internships resource database.

7 Certify 30% of offices/departments under the Green Office Program.

8 Remove plastic shopping bags and plastic water bottles from campus.

9 Declare campus Styrofoam-free.

10 Eliminate use of non-reusable dining ware.

11 Create an online Green Suggestion Box as part of the Sustainability web page.

12 Institute use of the Green Passport Program among our students, faculty, and staff.

13 Add 1% to all travel budgets to pay for carbon neutrality.

14 Develop a central sustainability information database where data can be compiled, sorted, displayed, and exported into data subsets. Ideally this could be viewed via a web-based interface.

15 Educate all students in best practices for recycling and make recycling the preferred method of disposal for all waste.

16 Set zero waste as a goal at the end of every school year.

17 Develop a culture of less water use.

Sustainability Area 8: Communications

Background and Current Status: In order to build the relationships with current students, alumni, staff, and faculty that are necessary in order to increase sustainability at the College, we must ensure that a broad array of information-disseminating techniques can be used, and that information is frequently and reliably updated.

Ultimate Goals:

1. Develop and implement a Sustainability Communications Plan.
2. Foster close relationships with the Communications, Admissions, and Alumni offices so that all information about sustainability is readily available to the broader non-resident College community.
3. Develop more efficient and effective means of communicating within the on-campus community, as well as more broadly.

Four-year Goals:

1. Make sustainability visible on the front page of the College's website.
2. Devise ways for students to make their sustainability efforts visible on the College website.
3. Have a camera present at every sustainability event to send photographs with captions to Communications. This should include informal student-organized events, as well as broader events such as symposia.
4. Report on other academic programming that is related to sustainability (e.g., talks for Environmental Challenges & Responses, Prairie Studies, agriculture, Environmental Studies, or Global Development Studies, where appropriate).

Action Steps:

1. Determine who in Communications will be responsible for upkeep of the Sustainability website.
2. Schedule website updates once per week.
3. Tie substantive projects to giving opportunities for alumni and other College allies.
4. Develop interpretive signage that advertises and highlights sustainability on and off campus.
5. Consider instituting and publicizing sustainability-related merit scholarships and alumni awards.

Sustainability Area 9: Curriculum

Background and Current Status: Promoting sustainability is congruent with the College's core values, inspired by our "strong tradition of social responsibility and action" and commitment to "learning from and communicating with the world beyond the campus." Sustainability is not yet, however, truly a cross-cutting theme across the Grinnell curriculum. There is no policy that guides Grinnell academics with respect to sustainability, nor is there consistent communication among courses that concern it. Student access to current sustainability-focused and sustainability-related courses is also somewhat constrained by pre-requisite structures. At present, the majors with the largest number of courses focused on or related to sustainability are ANT, BIO, CHM, ECN, HIS, and PHY. A broad vision of sustainability (including social sustainability) would include others such as EDU, POL, and SOC.

Ultimate Goals:

1 Formally acknowledge and promote the common ground on sustainability issues that is shared by several current concentrations and centers (e.g., Global Development Studies, Environmental Studies, Prairie Studies, and Policy Studies).
2 Work with the above entities to create additional courses, student research opportunities, and co-curricular and extracurricular activities related to sustainability. Place a special focus on collecting data on campus and local sustainability, and sharing this information both within the College and in the broader community.
3 Link alumni with campus by drawing on their sustainability expertise as a curricular and co-curricular resource.

Four-year Goals:

1 Develop and promote the idea of Living Sustainably in Place, emphasizing the importance of understanding how best practices must vary around the globe, and the interconnection among nations and geographical regions.
2 Formulate a policy for sustainability education at the College. Teach students to analyze the societal origins, as well as current challenges, regarding global and local resource use, social justice, citizenship, morality, and human values.
3 Add new courses that address campus sustainability explicitly by placing the College's sustainability efforts into global perspective (e.g., via course-embedded travel).

Action Steps:

1 Develop sustainability courses on Water, Foods, and Emissions, and make arrangements to have them taught.
2 Conduct a faculty survey to identify courses that address sustainability issues in ways not necessarily reflected in course titles and descriptions.
3 Take greater advantage of the College's location (an environmentally degraded but fertile nexus of agriculture) and its regional, national, and international programs as opportunities for sustainability education.
4 Enhance sustainability education in the humanities (e.g., by adding expertise in environmental ethics).
5 Consider ENV cross-listing of more courses (and new courses) outside the existing structure.
6 Increase access to sustainability courses by adding courses and changing prerequisite structures.
7 Create more opportunities for advanced work in sustainability.
8 Propose targeted projects (e.g., the sustainability of CERA; the biogeochemistry and biodiversity of the College's campus, of the city, of the surrounding agricultural landscape) that could relate sustainability to where we are.
9 Institute a 2-year Sustainability Fellowship (similar to the Mellon post-docs) that rotates among Environmental Studies, Prairie Studies, Policy Studies, Technology Studies, and Global Development Studies (as well as potentially among departments that offer sustainability courses), preferably offered to College alumni who could come back and do good things on campus after earning an advanced degree.
10 Partner with or purchase a local farm for studies of sustainable agriculture, agroecology, and food systems, and to enhance campus dining.
11 Expand campus and community gardens, and open them up to course work.

The Future—Sustaining the Grinnell College Sustainability Plan

When the initial draft of the Plan was completed, the work to achieve the Plan's goals began. For the remainder of the 2013-14 academic year, the committee members who were not faculty on the Ecocampus Committee merged with Ecocampus, initiating the above action steps. Going forward, informed by best-practice advice from the American Association for Sustainability in Higher Eductation, we recommend the following.

1 **Create a permanent standing Sustainability Committee** with FOC-appointed members of the faculty (i.e., what were Ecocampus representatives), staff from critical areas (Facilities Management—including the Sustainability Coordinator; College Services; Dining, Student Affairs; President's Office; Alumni Relations), and students. This Committee will be responsible for overseeing and updating the Plan, preparing annual reports, soliciting community input, communicating progress, and advising decisions that affect components of the Plan. Leadership from the President's Office is very important.

2 **Follow a policy of consulting the Sustainability Committee on major decisions** that fall under its purview. If the College is serious about sustainability, we need to incorporate it into the development and planning process.

3 Carry out an assessment every two years and post our progress on the AASHE website.

4 Treat this Plan as a living document, modifying it as required in response to new challenges, changes in policy, and technological advances. The Committee will maintain previous iterations of the Plan, so that we can see our progress.

List of Acronyms

ACUPCC: American College and University Presidents' Climate Commitment
AASHE: American Association for Sustainability in Higher Education
CERA: Conard Environmental Research Area
DNR: Department of Natural Resources
FOC: Faculty Organization Committee
HSSC: Humanities and Social Studies Center