GREEN ROOTS

THE SUSTAINABLE LAWRENCE INITIATIVE

Annual Report 2011-2012

I. Introduction and Overview

Green Roots: The Sustainable Lawrence Initiative was launched officially at the Matriculation Convocation on September 25, 2008. The goal of the initiative was to focus the attention of the university at large on issues pertaining to sustainability. To that end, a committee was formed and charged with task of coordinating university operations and programming related to sustainability.

In the spring of 2010, upon the recommendation of the Faculty Committee on University Governance, Green Roots was approved by the faculty of Lawrence University as a presidential committee. The official title is the President's Committee on Environmental Sustainability. The structure and charge of this committee can be found in the faculty handbook and is included in Appendix A.

This report outlines the efforts and accomplishments of the committee in 2011-2012, and puts those activities in context of the committee's work from 2008-2011. This report is intended as an overview of the campus community's most recent sustainability achievements, but also an archive of the previous four years.

In brief, major new initiatives and accomplishments for 2011-2012 include:

- The installation of "Joan's Windmill" – a 50-kilowatt wind turbine that began supplying energy to the Bjorklunden lodge in December 2011. Between the first date of operation and the most recent electricity reading, the turbine has produced approximately 60% of the lodge's electricity.
- The installation of a 20-kilowatt solar array on the top of Hiett Hall in September 2011, which has generated enough power on some days to offset half the residence hall's electricity demands.
- Ranked 44th in the nation on the Sierra Club's fifth annual "Cool Schools" ranking. This is an improvement of 62 places over 2010's 106th-place ranking.
- Faculty and students attended the Upper Midwest Association for Campus Sustainability (UMACS) Conference in September and the American Association for Sustainability in Higher Education (AASHE) Conference in October. At UMACS, we discussed the possibility of our campus hosting the conference in Spring 2013.
- A $5 per term ($15/year) Sustainability Fee, proposed and approved by students. The fee was approved by the Board of Trustees in February 2012. Green Roots (or a representative from the committee) will play an advisory role for distributing and investing the fund. The Sustainability Fee will be collected beginning Fall 2012, and is scheduled for assessment and possible renewal after three years.
- A fourth straight year of decreased energy use for campus buildings (excluding Bjorklunden. Controlling for the square footage of campus buildings and the average temperature of the seasons, we had a 1.3% decrease in 2011 over 2010. This represents a 44% decrease since 2002 (the first year we began recording these data).
- Lawrence's first outdoor recycling enclosures have been made and delivered, and student volunteers stained and finished them. Following the guidelines of the purchasing policy crafted by Green Roots in 2010, the enclosures were produced by a

local woodworker from locally-sourced materials. The cost for local production was approximately 60% less than buying from an online vendor.

- Renovated two residence halls (Plantz and Trever) and the Wellness Center in compliance with the new Green Building/Renovation policy proposed by Green Roots in 2011.
- Thanks to a donation from an alum (Kirby Corkill, '11), six high-efficiency LED lighting fixtures were installed for the parking lot next to the chapel. The fixtures are estimated to conserve over 4,000 kilowatt-hours per year.
- Declared 2011-2012 the Year of Biodiversity on campus, which involved a number of faculty/student collaborative events, including an invasive species pull and the erection of bird houses across campus.
- All residence halls were outfitted with individual electricity and water meters to replace multi-building collective meters), which allowed us to organize an energy competition for the large residence halls. The overall winner was Kohler Hall, with a 6% reduction in electricity and 8% reduction in water use (per capita).
- Placed 19th nationally and 1st in Wisconsin (out of 339 institutions in our division) in the 2012 *RecycleMania* competition (Per Capita division), with a total of 37.82 lbs recycled per person and overall recycling rate of 30%.
- Sponsored a series of speakers in spring term, all of which crossed disciplinary lines. The goal of the speaker series was to reach out to audiences that might not be typically drawn to environmental events.
- The second annual E-Waste Sweep at the end of spring term. Based on feedback from last year's inaugural event, the event focused on students, faculty and staff instead of the broader Appleton community. Even with a much smaller pool, we collected an estimated 3,500 lbs of electronic waste.

II. Committee Membership

Because the GR initiative is campus wide, representation from multiple divisions of the college, non-teaching faculty, and students were included. This year, the committee expanded to include a representative from the Campus Life office to facilitate better communication between Green Roots and students in the residence halls.

The committee for 2011-2012 consisted of the following members:

- Jason Brozek, Chair and Faculty Associate to the President (Government and Environmental Studies)*
- Jodi Sedlock (Biology and Environmental Studies)
- Kathleen Isaacson (Library)
- Greg Griffin (Campus Center Director)
- Dan Meyer (Director of Facilities Services)
- Christina Martinez (Ormsby Residence Hall Director)
- Chelsea Johnson (Greenfire representative LU '12, Term I only)
- Hilary Haskell (Greenfire representative, LU '12, Terms II and III)
- Will Meadows (LUCC representative; LU '12)

III. Green Roots and the 2010-2020 Strategic Plan

Section 4 of the 2010-2020 Strategic Plan is to "Invest in and Promote Sustainability," which involves creating, "a community that fosters informed discussion about environmental sustainability, uses natural resources wisely, and promotes stewardship of the Earth."

To that end, the plan outlines four major objectives –

1. Create a permanent structure with responsibility for assessing sustainability efforts, proposing initiatives, and nurturing a campus-wide culture of conservation and sustainability.
2. Integrate educational opportunities with sustainability efforts.
3. Reduce use of fossil fuel-derived energy (or carbon footprint) by 25% of the 2003-2008 average.
4. Promote Lawrence's commitment to environmental stewardship.

Overall, Green Roots has successfully begun implementing the sustainability-related elements of the Strategic Plan. To address the goals of the plan, Green Roots adopted four pillars in 2011-2012:

1. Energy and water conservation
2. Energy production
3. Consumer choices (including institutional choices, such as construction and maintenance, and end-of-life choices, such as recycling)
4. Integrating sustainability in the curriculum, and reaching out to new audiences

As the list of activities and achievements below demonstrates, the committee has made progress in all four of these areas, which brings the university closer to achieving the objectives of the 2010-2020 Strategic Plan.

Within each of these areas the committee worked to identify and prioritize opportunities. In our efforts to coordinate sustainability efforts and to publicize them, we worked in collaboration with students, faculty, and existing campus groups like Facilities Services, Campus Life, Technology Services, Dining Services, Development, Bjorklunden, Communications, Admissions, Greenfire, LUCC Committee on Environmental Responsibility, and others.

The remainder of this report is organized according to these four pillars, with further divisions by sub-sections within each major area.

1. Energy and Water Conservation

A. Electricity and Natural Gas

The historic energy use data and greenhouse gas emission inventory for main campus was updated to include the 2011 calendar year. Current and historical data back to 2002 on use of natural gas and electricity, demographics of the university, building sq. footage was gathered in consultation with Facilities Services and the Office of Institutional Research. Bjorkluden has been has not yet been included in the analysis, but will likely be added in the 2012-2013 annual report so that the influence of the wind turbine can be better assessed.

The use of electricity and natural gas at the Appleton campus has decreased over the last 9 years by 2% and 41% respectively (Figure 1). During that same time period, however building square footage increased by 16% with the addition of Hiett Hall in 2003 and the Warch Campus Center in 2009, and the full-time student population has grown from 1,283 to 1,500. Temperatures also change from year to year, as reflected by the heating degree day trend line (Series 3 in Figure 1) Normalizing the total energy use data by square footage and temperature proxies (HDD and CDD – cooling degree days) allows direct comparison between years (Figure 2). These data indicate a 43% reduction in combined energy use per square foot per HDD + CDD since 2002. This suggests that our efficiency in energy use has improved dramatically over time.

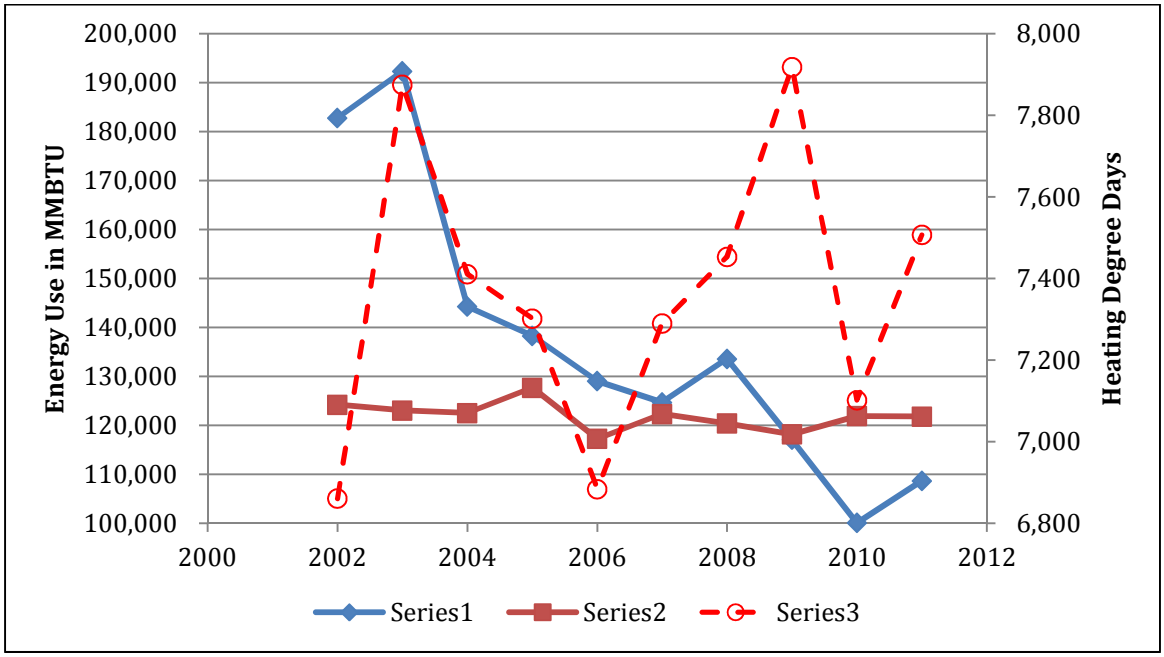


Figure 1: Historical trend of energy use, including natural gas (series 1) and electricity (series 2) (our two primary contributors to CO_2 emissions) and heating degree days (series 3) for each year. As you can see, our natural gas use spiked in 2011, but this was in response to a large number of heating degree days.

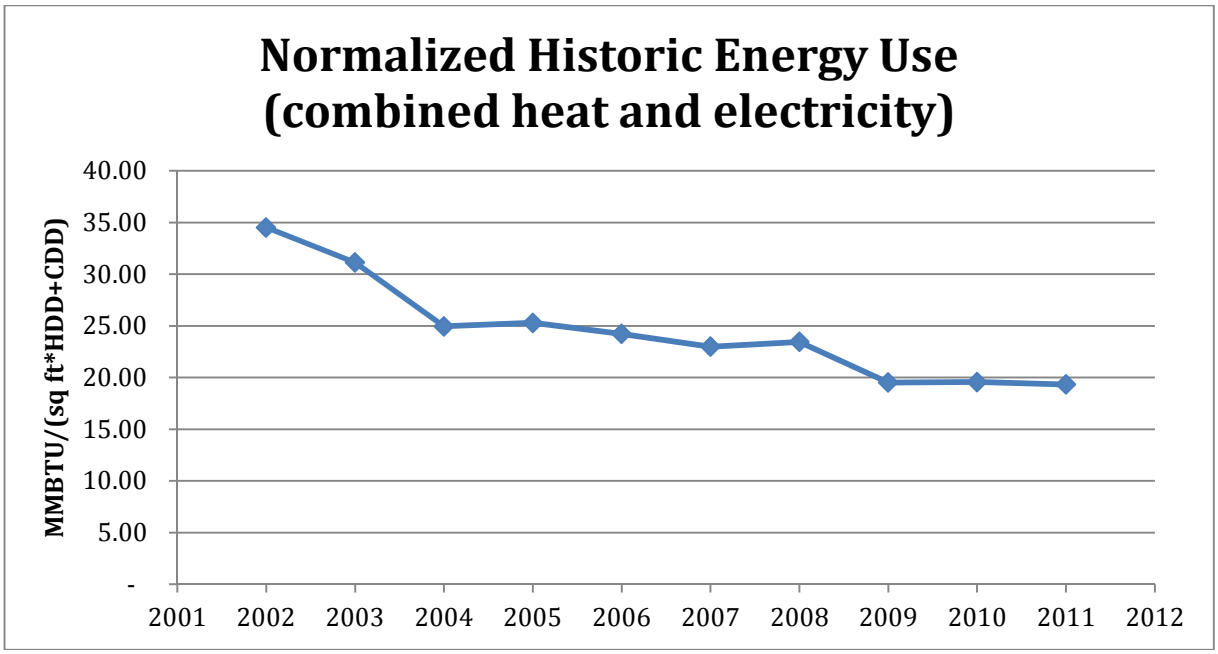


Figure 2: Combined natural gas and electicity expressed as megaBTUs (decatherms) from 2002 through 2011. The energy use has been normalized by square footage and the summ of heating degree days (HDD) and cooling degree days (CDD).

The biggest reductions are clearly on the use of natural gas. Electricity consumption has remained roughly flat in the past 9 years. However, this is against a backdrop of an enlarging campus community. The student body has increased by 12% over that time period. When this is considered there is a reduction of approximately 13% in electricity consumption and nearly a 50% reduction in combined energy use per square foot per HDD + CDD per student since 2002.

Improved efficiency in natural gas use can be attributed to three main factors. First, both the WCC and Hiett hall were built to at least LEED silver standards (though certification was not sought for Hiett). Our new buildings are simply more energy efficient than the older ones and this underscores the importance of adding energy efficiency measures in all building renovations and new buildings. The second factor is the move to a distributed rather than a centralized heating system, which started in 2005-06. The most recent change was the implementation of a new HVAC policy in April of 2009 and the change in academic calendar in which the campus is closed from Thanksgiving until just after New Year's Day. Together these changes reduced consumption of natural gas by ~10% over 2008 (normalized by HDD).

It deserves mentioning that these reductions in energy consumption save the university large amounts of money. If consumption since 2002 grew proportionally to the size of the institution, the university would be spending roughly twice as much on energy today (not adjusted for changes in energy prices).

To estimate carbon emissions – the primary source of global climate change - these data were analyzed using the Campus Carbon Calculator™, a tool developed by Clean Air-Cool Planet Inc.

This is the accepted methodology by which over 600 colleges and university track and report their carbon emissions to AASHE. An analysis of our emissions sources last year indicated that the vast majority of CO_2 is was produced through the use of electricity and natural gas for the main campus. Based upon last year's data, travel made up approximately 10% of our emissions. Other institutions of similar size report that these will make up 10-15% of the carbon emissions. The contributions from these sources are relatively low, problematic to track, and difficult to mitigate, so we have excluded them from the present analysis. We believe that efforts directed at reducing the use of electricity and natural gas (heating and hot water) will have the largest proportional effect on reducing our carbon foot print.

Lawrence has reduced its scope 1 and scope 2 (natural gas and electricity) gross greenhouse gas emissions by approximately 27% since 2002 . On a per square foot basis greenhouse gas emissions have dropped 41% over the same time period. Some of this reduction is due to a proportion of renewable energy in the fuel mix that Wisconsin Energies (WE) uses to make electricity. With the exception of our purchase of renewable energy directly through WE, the energy mix is beyond our control. Within our control, however is how much energy we use on campus. In the past 9 years we have made great strides towards energy efficiency, which have directly reduced our greenhouse gas emissions.

In April 2011, WE Energies conducted an energy audit that included all of the primary residential, academic and administrative buildings on campus. The auditing team observed current practices and made recommendations across eight categories, including building envelopes, lighting fixtures/controls, food service, information technology and future construction. Recommendations were categorized according to estimated cost, availability of rebates/external funding, and size of impact. The lengthy final report will be a valuable resource to focus our energy conservation efforts as we move forward.

Thus far reductions in electricity consumption have not been on pace with those for natural gas. A few trial efforts like a "slay the vampires" campaign against devices that draw power when on standby mode was launched in the fall of 2009 and Instructional Technology Services has experimenting with smart power strips that are on motion sensors. The effects of these pilot projects are too small to measure. However, as per the WE Energies auditors suggestions, replacing all lighting with lower wattage fluorescents (or LEDs) should be phased in and all lecture halls should be equipped with motion sensors and timers to control lights when not occupied.

Facilities Services and Green Roots continue to search for opportunities in the realm of energy efficiency. For example, small house attics were insulated during summer 2011 in conjunction with updated fire suppression systems, and the steam lines in the boiler house received new insulation. Additionally, when Plantz and Trever residence halls were renovated in the summer of 2011, they were equipped with LED lighting, per the Green Building Policy, which represents a large energy savings. Kirby Corkill (LU '11), the founder of Jarvis Corporation, approached Green Roots in September 2011 about donating enough LED s to light a medium-sized parking lot. With Kirby's help, Facility Services installed six LED fixtures for the parking lot next to the chapel in the fall of 2011. The six LED fixtures have a total energy draw of 744W, compared to the previous halogon system's 1800W. Assuming a daily average of twelve lit hours, this

represents an annual savings of 4669kWh. Lighting across the rest of campus is primarily done with fluorescent or compact fluorescent (CFL) bulbs, and most classrooms and offices are equipped with motion sensors.

More significant additional reductions in energy use will require substantial investments in infrastructure such as placing the Music Drama center on its own boiler system, as well as additional investments in on-site production of energy such as wind and solar.

However, there are still potentially large gains to be made by engaging the student body in energy conservation measures, rather than relying simply on infrastructure.

Each of the seven major residence halls was fitted with an individual electricity (and water) meter in the fall of 2011 (one of the primary recommendations of the WE audit.) These meters allow real time monitoring of energy use and can be used to gauge per capita consumption among the dorms. We took advantage of this new stream of data to organize a Conservation Competition for the large residence halls (controlling for the number of students in each hall). We worked with Residence Life staff (including hall directors and RLAs) to encourage residents to conserve water and electricity by taking shorter showers, unplugging chargers when not in use, powering down computers at night, and other simple behavioral changes.

The competition ran from the beginning of February through the end of Winter term. The overall winner of the competition was Kohler Hall, which had a 6% reduction in energy use (per capita, compared to a January baseline, and controlled for heating degree days) and 8% reduction in water use (per capita, compared to a January baseline). All seven participating residence halls saw a decrease in both categories, although some of the decreases were marginal (0.5-1%). In future years, more extensive advertising and education may help the large hall competition reach the scale of reductions we saw in 2010's small house competition (which were 10-15% below a baseline measurement).

Additional conservation in the residence halls could be motivated by a display in the lobby of each dorm's real-time energy usage. Research has shown that this type of feed back results in 5-10% savings in energy usage, simply because people can see what they are using in real time (Darby, 2006). Connecting students with the impact of their lifestyles, in a fun but meaningful way, could also result in significant energy savings.

B. Water

Water use on campus is driven by five primary sources – laundry facilities, showers, toilets, dining services, and grounds keeping. Conservation practices were initiated in 2008, including a decision not to serve bottled water on campus. Additionally, Bon Appétit is using modern, water-efficient appliances as part of the dining and food-preparation facilities in the Warch Campus Center. This is in addition to the other water-efficient fixtures that were installed as part of the Campus Center's construction. The campus center scored 4 out of 5 possible points in the LEED Water Efficiency Category, including points for water-efficient landscaping, water-efficient appliances, and overall reductions in expected usage. Without major investment in

infrastructure or facilities, the efficiency of water use on campus is now primarily an issue of behavior.

The main residential uses of water are in showers, laundry, and flushing toilets. Fortunately, as of late 2011, each residence hall is now outfitted with an individual water meter, so Green Roots and Facility Services can better track water usage and identify high-usage areas. The data provided by these individual water meters was included in the Residence Hall Conservation Challenge. Although this year's competition focused primarily on electricity use, residents were encouraged to save water by taking shorter showers and not letting sinks run when not in use.

Water-saving infrastructure changes are being made as well. Toilets are replaced with low flow models whenever renovations are made. Low-flow shower heads were explored, but there were concerns that (1) the initial financial outlay to fit every shower in the student residence houses and halls was not feasible, and (2) in the past, low-flow heads were replaced by students with less efficient showerheads. However, as existing showerheads wear out and replacements are purchased, the Green Purchasing Policy developed in 2010-2011 advises Facility Services to purchase and install low-flow models. Likewise, the recently-adopted Building and Renovation Policy (see below) encourages new construction and major renovations on campus to meet LEED Silver or similar certifications, of which a major component is water efficiency. Recent renovations on campus (the Wellness Center, Trever and Plantz halls) all included low-flow, high-efficiency water fixtures, in line with the green building policy.

Campus laundry facilities are maintained by Mac-Gray Intelligent Laundry Systems. All washing machines and driers provided by Mac-Gray are high-efficient, Energy Star-rated appliances. As a corporation, Mac-Gray is committed to sustainable practices, including water conservation. They note on their website that managing environmental impact, "is a corporate priority that calls for knowledge, and the commitment of our employees and business partners to treat the environment with a sense of responsibility."

The main use of water for the campus grounds comes in irrigating the athletic fields and the Sustainable Lawrence University Garden (SLUG). All athletic fields are watered using automated, programmable sprinklers under a policy of "weather-informed irrigation" – watering during periods of lower potential evapotranspiration (early in the morning, for example) and when rain is not in the forecast. In 2008, Megan Bjella presented ideas about water usage on athletic fields, developed as part of an independent study project. At this time, the Athletic Department recommends against cessation of watering on athletic fields, because of the need to maintain high-quality and safe playing surfaces. However some fields like the softball and baseball fields will be not be watered during the summer because they will not be used for competition until the next spring. The Football and Soccer Fields, however, need to be maintained throughout the summer. Other lawns around the campus are not watered regularly. SLUG has adopted a water efficient drip irrigation system for approximately ½ of the garden. Oren Jakobson, the student manager of SLUG for 2010-11, reports that the company that manufactures this drip irrigation system does not support the type of intensive planting that SLUG does, and for the foreseeable future, drip irrigation will need to be supplemented with traditional watering. A rainwater harvesting system has been set up to capture rainwater from the 12'X24' garden shed.

2. Energy Production

A. Wind Power

Based upon an initial independent study project by Steve Schnorr (LU‘10), a wind assessment of the Bjorklunden property was performed by Kettle View Renewable Energy. Bjorklunden was chosen over the main campus due to space limitations at the main campus, city ordinances against such structures, and because the wind resource is superior along the lakeshore. The assessment indicated that a refurbished 95kW unit would produce approximately ½ of the lodge’s electricity and would have a payback of just over 7 years with state and utility incentives. Unfortunately the refurbished units were very difficult to acquire, so in the fall of 2010 we shifted focus to a new 50kW Endurance E3120. The Development Office raised ~$170,000 by December 2010 as part of the More Light! campaign. Grants from Focus on Energy and the Door County electricity utility WPS were fully funded, brining the total to $370,000. Green Roots committed an additional $15,000 to cover any potential cost over-runs from installation or non-warranty repairs/replacements.

Kettle View Renewable Energy won the bid to install the turbine, and work began on the turbine site (the intersection of trails west of the lodge) in the summer of 2011, and the turbine began producing power on December 8, 2011. “Joan’s Windmill,” as the turbine has been named, was dedicated at a ceremony at Bjorklunden in May 2012.

Initial estimates were that the 50kW turbine would provide 30-40% of the lodge’s energy demands, but actual production has greatly surpassed expectations. In the six months between December 8, 2011 and May 8, 2012, the turbine has produced almost 41,000 kilowatt-hours (kWh) of electricity, which constitutes over 60% of the lodges energy demand over this period. Depending on the weather and demand from lodge residents, the turbine has produced over 80% on some days. This proportion is likely to decrease during the summer months when air conditioning demands are higher, but it is likely that the total production for 2011 will greatly surpass initial expectations. The payback is estimated to be 10-12 years, while the lifespan of this turbine is 20-30 years.

Kettle View Renewable Energy is currently working with Endurance (the turbine manufacturer), Technology Services and Facility Services to provide remote access to data on power generation (one of our requirements when we solicited bids for installation). Our plan is to make that information easily accessible on the LU website and at a display in the lodge for students, faculty, staff, guests, and prospective students.

A wind site assessment was also performed by West Wind Renewable Resources for bluff near the practice field at Alexander Gymnasium. The site assessor noted that the site has good wind speed, particularly for a site within city limits, and wind power for the gym is feasible. However, immediately after the site assessment was completed, WE Energies, our local power utility, announced that they would no longer be offering monetary support for renewables. Due to this unexpectated change, erecting wind turbines on campus is option is no longer economically feasible under the present funding possibilities. If those possibilities change, or if WE changes their policy, then this might be the best future option for renewables If the grant program returns

in the future, we suggest further investigating the possibility of small, tilt-up turbines (like those produced by Renewegy, a manufacturer based on Oshkosh). In addition to an attractive payback period, turbines in this location would make a visible public statement about our commitment to sustainability. The initial site assessment indicated that, after rebates, a small 20-kilowatt turbine might cost as little as $45,000, which might make this an attractive option for the new student Sustainability Fund (which is explained further below).

B. Solar Power

In the 2009-10 academic year the university commissioned professional assessments of solar photovoltaic (PV) panels. Two first-year students, Austin Federa (LU '13) and Will Meadows (LU'12) worked with Northwind Renewables to assess the feasibility of installing solar panels on campus. The students also worked with Green Roots to apply for external grants from WE Energy and Focus on Energy. Together, they garnered approximately $18,000 in funding. The remaining $10,000 was funded by Facilities Service, Green Roots, and LUCC. A relatively small 2.94 kW solar array for use in courses was installed over the week of April 19th and began producing power in May. To date, the array has generated over 8,000 kWh of electricity and reduced our CO_2 production by over 16 tons.

In January of 2011, Samuel Flood (LU '11) suggested that Green Roots get in touch with Solar Innovations Inc. This company offers attractive deals to non-profits and schools for PV systems up to 20 kW. Green Roots penned grants to the state program WI Focus on Energy, and to WE Energies and amassed approximately $65,000 in funding (unfortunately, it was shortly after securing these funds that WE eliminated this grant program). This, combined with a non-profit rebate through Solar Innovations, brought the final cost of the 20 kW array down to ~$12,000. Installation on Hiett Hall began in mid-July 2011 and the solar panels were operational when students returned to campus in September. Since then, the solar panels have produced over 18,000 kilowatt-hours of electricity, with low points in the winter months and high points in the spring, summer and fall. May 2012 has been the most productive month so far, with over 3000 kilowatt-hours produced – nearly as much as the smaller PV array produced in all of 2011. When conditions are favorable, this is enough to cover over half of Hiett Hall's electricity demands. The payback on the initial investment is ~6 years over a useful life span of 30-40 years.

C. Other On-site Production

Three other feasibility studies were initiated in 2010-11; cogeneration, geothermal, and solar thermal.The study of installing a co-generation system on the existing LU boiler system suggested that this option was not cost effective at this juncture. If the boiler house and boilers are ever upgraded, co-generation should be re-explored. Likewike, an initial assessment of a geothermal system indicated that (1) the compact size of campus made it very difficult to find an appropriate site for this project, and (2) the low return on investment and lengthy payback period make geothermal a poor choice for on-site generation at this time.

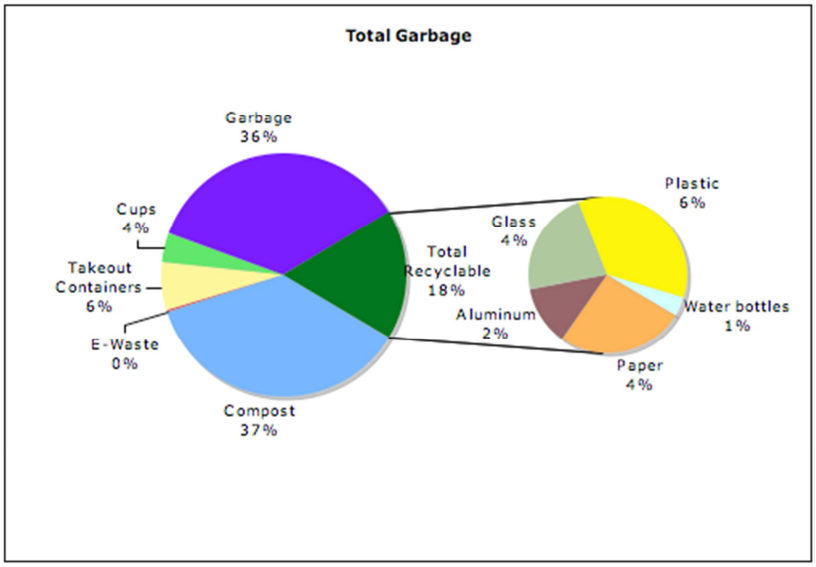
A solar thermal assessment was performed also by Northwind Renewables in May of 2010 to determine the effectiveness of offsetting some of the Buchannan Keiwitt center's pool heating. The study showed that a solar thermal array on top of the wellness center could supply ~10% of the heat needed, and would have a payback period (after state and utility rebates) of approximately 7 years. As noted, however, the termination of the WE grant program makes funding very difficult. If the grant program returns in the future, we suggest further investigating the possibility of solar thermal heat for the pool.

3. Consumer Choices

A. Waste Reduction and Recycling

Our waste diversion rate as reported by Waste Management remained at approximately 30% this year. This figure, however, is misleading because it is based on the volume of the containers and the number of times it is emptied to determine the cumulative amounts. Unfortunately, this system is inadequate for recording our actual waste production and documenting the effects of any changes. However, the 2011 ENST 300 Symposium on Environmental Topics class worked in conjunction with Green Roots to determine the broad characteristics of our solid waste stream and proposed innovative solutions to some of our problems.

The ENST 300 class conducted a university-wide waste audit in the winter of 2011.Three dorm buildings, three academic buildings, the Warch Campus Center, outdoor garbage receptacles, and those from a basketball game were chosen to represent a point count of Lawrence University's waste stream. The results indicate that 18% by weight of the contents of garbage cans was recyclable and that 37% was compostable (Figure 4). Of the recyclables paper and plastic make up the largest proportion. Bags designated as recyclable material were also collected and sorted. Only about 4% of the material in recycling bins is garbage. Students surveyed indicated that in general there is poor understanding about what could be recycled and where to recycle.



Based upon these data, a number of suggestions were made:

1. More education/training of incoming and existing students is necessary.
2. There must be a consistency in design and placement of recycling signage and containers.
3. Outdoor recycling bins need to be added to campus.
4. Better recycling options (more containers placed next to garbage) need to be provided at athletic events.
5. Better education/training of new and existing students on use and availability of reusable drink and take out containers.
6. Use the information desk at WCC as a clearing house for e-waste.
7. The large amount of compostable material in the waste stream could be captured by an industrial composter.

In 2011-2012, Green Roots addressed two of these issues. After a walkthrough of residence halls and campus buildings confirmed that recycling signage was confusing, incorrect, and often simply missing, we worked with the Communications office to design a new, standard single-stream recycling poster for all campus buildings that addresses many of the questions and concerns students have about how to recycle on campus (see below).

Additionally, LU's first outdoor recycling enclosures have been made and delivered, and student volunteers helped stain and finish them. Following the guidelines of the Green Purchasing Policy, twelve recycling enclosures were produced by a local woodworker (Travis Gauger, of TG Woodworks) from 200+ year-old oak trees that were cut down as part of a highway expansion project. The cost for local production was approximately 60% less than buying from an online vendor.

In May 2011, Sophie Leppanen (LU '11), a member of the ENST 300 course, with the help of Greg Griffin, put together a community-wide electronics recycling event. At the event, student volunteers and staff from Facility Services collected approximately 12,000 lbs of electronic waste for recycling from the university and Appleton community. Based on feedback from the inaugural event in 2011, we decided to focus on students, faculty and staff instead of the broader Appleton community for the second annual electronics recycling event in May 2012. Even with a much smaller pool, we collected an estimated 3500 lbs of electronic waste this year. All e-waste is being responsibly recycled by 5R Processors (www.5rprocessors.com). Additionally, in an event run simultaneously with the e-waste sweep, we partnered with student volunteers for Hope Phones, an organization that collects no-longer-used cell phones to use for health care services in the developing world.

We participated once again in the 2012 RecycleMania competition (Per Capita division), and placed 19th nationally (out of 339 institutions in our division) and 1st in Wisconsin. Over the 8-week competition, we recycled 37.82 lbs per person, with an overall recycling rate of 29%. .

Other waste reduction efforts on campus include the move to 100% recycled paper for all copier paper and university letterhead, as well as a policy by Technology Services that all copiers and printers default to double-sided printing. This change involves no additional cost to the university and uses a local supplier for the letterhead. Additionally, re-use of materials on campus is facilitated by a student run thrift store called the Magpie, a new student organization called FixIt that focuses on repairing consumer items, and *ListIt@Lawrence*, a web resource where students, faculty, and staff can buy and sell used items.

B. Transportation

For 2011-2012, Lawrence continued to run shuttles to destinations of interest 5 days a week and to and from Alexander Gymnasium. A bike rental program at the Warch Campus Center was deemed successful and some students are seeking funding for additional bikes. Additionally, the university no longer subsidizes student parking in off campus garages, to discourage students from bringing personal vehicles to campus.

In 2011, the LU Ride Board (a community carpooling resource) became part of the new *ListIt@Lawrence* web resource where students can share offers and requests. This is a major technological improvement over the previous Ride Board (simply a corkboard with pins and paper), but we will continue to evaluate the new system.

C. Food

In the fall of 2009, Lawrence University partnered with Bon Appétit (BA) to provide institutional food service. Their mission statement is to *make food choices that celebrate flavor, affirm regional cultural traditions, and support local communities without compromising air, water or soil, now and in the future.* Specifically, they have a corporate goal of sourcing at least 20% of the food purchased from a 150 mile radius. Approximately 8% of food purchase was local for the 2009-10 academic year. This improved 15.5% in 2010-11 and they nearly reached their target of 20% in 2011-12. Other highlights of the previous two years include:

- Eliminating all plastic knives, spoons and forks from the café, and replacing them with FSC certified wooden cutlery
- Partnering with Greenfire for a month-long re-useable coffee mug campaign
- Adding the following local/sustainable vendors:
    - Gebhart Organic Beef
    - Century Sun Oil (Organic Sunflower Oil)
    - Riese Hog Farm
    - Hidden Valley Farm (Lamb)
    - Grassway Organic Turkey
- Replacing the "Box Lunch" program with a plated box lunch that uses zero disposables
- Reducing the use of plastic "to go" containers by switching to paper bags and paper wraps in the Café and brown bag lunches in the café.

BA also runs innovative campaigns in its dining halls such as the Low Carbon Diet and a Food Waste Minimization program (see www.bamco.com/page/3/sustainable-food-service.htm). Collaboration between SLUG and BA diverts approximately 30 tons of kitchen prep waste per year from the landfill to the SLUG compost operation. BA has also worked with Green Roots to eliminate the sale of bottled water on campus and provide BPA-free reusable water bottles. Efforts to minimize packaging and waste generated primarily at the snack bar are ongoing. Reusable clam-shells are available for a one-time $4 purchase, but unfortunately, are rarely used. In 2011, an additional $0.25 discount was given to diners who used the clamshells for carry out, but the effects were marginal.. Reusable stainless steel hot-beverage containers are also available for purchase in WCC. Greenfire helped promote the use of these (or any reusable hot beverage container) by giving discounts to beverages purchased with the mugs in February 2011.

The ENST 300 Symposium on Environmental Topics class conducted an intensive assessment of food waste at Andrews Commons. The weights of plate scrapings at total of four lunches and four dinners were recorded over a two-week period. Drinks were not measured. The results indicate that the per capita food discard is fairly consistent between lunches and dinners. With a mean of 2.9 ounces and a high and low of 4.4 oz and 2.2 oz respectively. These data are within the range of previous year's plate scrapings conducted by Greenfire using a slightly different methodology. Greenfire found an average per capita waste of 2.6 oz in 2008-09 and 2.4 oz in 2009-10. These amount to approximately 250-300 lbs of waste per meal. This waste is compostable and could be diverted from the wastewater stream (all food waste goes into a garbage disposal and becomes part of the water waste stream). An industrial composter with the

capacity for this level of waste would cost approximately $60,000, and at this point is not economically feasible.

D. Construction, Renovation and Maintenance of Buildings

The Gold LEED-certified Warch Campus Center officially opened in the fall of 2009. As the campus moves into a renovation phase over the next decade the committee discussed the opportunities that would come with retrofit of existing buildings. The end result was the following sustainable building policy, which was endorsed by the president's cabinet:

> "Ongoing building maintenance and operation as well as renovation shall incorporate principles of sustainable design, building, and operation including energy efficiency, indoor air quality, water conservation, construction site and waste management, and use of local materials. All new construction shall be designed to meet or exceed LEED Silver standards or at an equivalent level to those of a comparable rating system."

This policy has already been implemented in a number of new and ongoing building renovations, including the use of high-efficiency LED light fixtures in Coleman Hall and the Wellness Center, recirculated-heat HVAC systems in the bathrooms of Trever and Plantz Halls, and low-flow water fixtures in those renovations. Additionally, the policy helped inform a thorough energy audit and renovation plan for Wilson House and SLUG house, conducted by Jacob Esch ('11) in the summer of 2010.

As the university moves forward with additional new construction and building renovations, the building policy will become increasingly important. Practices are being put into place to inform bidders, contractors and subcontractors of this policy so they can include our goals into their estimates.

Additionally, as we move forward with construction and renovation, the issue of construction waste is significant. On this front, students in the ENST 300 symposium on waste reviewed current practices to ensure the continuation of currently sustainable practices and proposed a system to better record and track post-renovation materials flows.

4. Integrating Sustainability across the Curriculum and Reaching Out to New Audiences

A. Student Sustainability Fee

After gauging interest with a student survey, the LUCC Environmental Responsibiity Committee facilitated a student initiative called the Lawrence University Sustainability Fund. This fund establishes a separate fee of $5.00 per student, per term ($15 per year) committed exclusively to

sustainability-related infrastructure changes. The Sustainability Fund was approved unanimously by the LUCC General Council, and was approved by the Board of Trustees in February 2012. In the final proposal, Green Roots (or a representative from the committee) will play an advisory role for distributing and investing the fund. The Sustainability Fee will be collected beginning in the fall 2012, and is scheduled for assessment and possible renewal after three years.

B. Interdisciplinary Speaker Series

Green Roots arranged and co-sponsored a series of speakers in spring term (primarily for Earth Month in April), all of which crossed disciplinary lines in some way. The goal of the speaker series was to reach out to audiences – primarily students - that might not be typically drawn to environmentally-themed events. The six speakers were:

- James Balog, an award-winning environmental photographer and director of the Extreme Ice Survey, who spoke about climate change, his ongoing project photographing glacial retreat, and the role of art in the national environmental conversation. This was an incredibly well-attended event, with an estimated 250 members of the campus and Appleton community in attendance.
- Jay Roberts (LU ’92), Associate Professor of Environmental Studies and Director of the Center for Environmental Action at Earlham College, who gave a lecture titled, "The University of Nowhere: The Education of Place and the Place of Education in Sustainability Studies"
- Taggart Siegel and Jon Betz, the director and producer of *Queen of the Sun: What are the Bees Telling Us?,* a documentary about the global bee crisis and colony collapse disorder. They spoke and answered questions from students after two screenings of their documentary.
- Helen Fields, a journalist and science writer, who spoke about her experience documenting the work of climate scientists on board the USS Healy on a six-week trip through the Bering Sea.
- Pete Nelson, the founder of Treehouse Workshop, who spoke about sustainable, small-space living and the challenge of working with city codes and regulations to build non-traditional types of houses.

C. Sustainability Guide

As a service to new and current students, Sophie Patterson (’11) wrote a tri-fold booklet titled “A Guide to Sustainability at Lawrence”, which includes information on recycling, ride shares, environment student groups, and other student-centered sustainability efforts (attached as Appendix B). After minor updates, the sustainability guide will be distributed to new students through a collaboration between GR and the Campus Life office, and relevant excerpts will be posted on the Campus Life website. Sophie also developed a sustainability tour for the admissions office. This tour is an option in addition to the standard tour for visitors to campus.

D. Sustainability-themed Community Read

The sustainability-themed community read that began in Spring 2010 with Novella Carpenter's Farm City: The Education of an Urban Farmer grew substantially in Spring 2011, with approximately 110 students, faculty and staff participating (a 10% increase over the 2010 community read). The group read Ellen Ruppel Shell's Cheap: The High Cost of Discount Culture, which explores the environment, social, political, and economic costs of consumerism in the US. Over the four-week course, students, faculty and staff discussed quantity versus quality, shopping at outlet malls, dumpster diving, and wearing hand-me-down clothing. One student put the ideas from the book into action by organizing a volunteer trip to Goodwill. In 2011-2012, Green Roots gave the primarily responsibility for the campus Community Read to the Committee on Public Occasions, primarily because of the opportunity to integrate Community Read with the convocation series.

E. Biology and Biodiversity

The members of Green Roots declared 2011-2012 the Year of Biodiversity on campus, which integrated a series of related events. In the fall, there was an invasive species pull, a native species cooking event, and birdhouse painting. In the spring, volunteers constructed a bat-house (which is currently erected next to SLUG), and arranged apiary tours with students and the director/producer of *Queen of the Sun: What Are the Bees Telling Us?* The committee plans to continue these efforts into 2012-2013, and in particular, to pursue National Wildlife Federation certification as an "Urban Wilderness Zone".

Appendix A

The University Committee on Environmental Sustainability

Members: Three faculty members, one of whom will be appointed by the president and designated as chair; two student representatives (appointed by LUCC, one of whom shall be a member of the LUCC Committee for Environmental Responsibility); the Vice President for Student Affairs (or a designate of that office); and the Director of Facilities Services (or a designate of that office). Faculty committee members will serve staggered multi-year terms.
Purpose: To improve the environmental sustainability of Lawrence University by continuing with existing efforts related to university operations and promoting environmental awareness, and by exploring new opportunities in these areas. The committee will be responsible for:

1. Identifying and addressing environmental sustainability challenges for Lawrence University;

2. developing procedures for periodic review and revision of environmental sustainability initiatives;

3. record keeping on all environmental sustainability efforts;

4. reporting to the Lawrence community and external agencies on the state of environmental sustainability at Lawrence;

5. promote awareness of environmental sustainability related issues.

To these ends, the committee will:

1. advise the president and cabinet on matters relating to environmental sustainability;

2. promote student, faculty, and staff engagement in improving the environmental sustainability of Lawrence;

3. prepare and publish on the Lawrence website an annual report of environmental sustainability efforts;

4. sponsor, on an annual basis, workshops, symposia, or other events for faculty, staff, students, and the broader Fox Cities community on environmental sustainability related themes.

Duration:
The form and function of this committee will be reviewed after three years by the President, the Faculty Committee on University Governance, and the committee itself. At that time, this ad-hoc review group will recommend a long-term structure to ensure the continuance of environmental sustainability efforts at Lawrence.

Appendix B

II. Get Involved!

On-Campus Organizations: Lawrence has numerous groups to join. Attend meetings, look online, and talk to other students to see if you want to get involved.

LUERC: The LU Environmental Responsibility Committee is a policy-oriented group dedicated to environmental awareness and energy issues. Have an idea for a change on campus but need funding? Check out their Environmental Initiative Grant!

Greenfire: Centered on student-activism, members work to increase environmental awareness on-campus. Become friends with the club on Facebook to learn more about their events!

SLUG: The Sustainable Lawrence University Garden is dedicated to practicing sustainable agriculture and providing fresh produce to the Lawrence Dining Service. Learn more at *http://www.lawrence.edu/org/slug*

GreenRoots: GreenRoots is a committee of faculty, staff, and students who work to improve sustainability at Lawrence. Read more at *http://www.lawrence.edu/committee/greenroots*

ORC: The Outdoor Recreation Club gives students affordable and fun opportunities to get off campus and interact with the natural environment. Trips include skiing, canoeing, hiking, backpacking, and many more.

McCarthy Co-op: Stop in at 122 N. Union Street for a vegetarian-friendly dinner every Friday at 6:30pm. Everyone is welcome!

For a full list of extracurriculars Lawrence offers, see the Campus Life Student Involvement Guidebook. If no organizations exist that incorporate your interests, create your own!

III. Spend time off-campus!

Community Service:
Get to know your surroundings by volunteering in the community.
- Contact the Volunteer and Community Service Center (VCSC) if you need help finding opportunities. It is located on the second floor of Raymond House.

Go Outside: Appleton has some great natural areas to explore. Try visiting (by car or bike) Bubolz Nature Preserve, High Cliff State Park, or the Lawrence Riverwalk.

Transportation:
LU Shuttles: Free shuttles going to locations such as Woodman's and the Fox River Mall are offered multiple times a week. Look for posters around campus.

Ride Share: On the fourth-floor of the campus center is a ride-share board. Here you can offer or ask for a ride.

Public transportation/bus: The Fox Valley offers decent and inexpensive public transportation. You can plan your trip at www.myvalleytransit.com.

Bike: Biking is great option when the weather is nice. Most places in Appleton are accessible by bike, the landscape is flat, and it is good exercise.

- **Don't have a bike?** Bikes, helmets, and locks can be rented at the info desk in the campus center.

LAWRENCE in THE POWER OF STUDENT ACTION

A Guide to Sustainability at Lawrence

Written for Lawrence Students by Lawrence Students

What is Sustainability?

- A widely accepted definition created by the UN Brundtland Commission on Environment and Development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
- How does this apply to life at Lawrence? ... In 2008 Lawrence President Jill Beck announced GreenRoots: The Sustainable Lawrence Initiative, spurring a movement of increased environmental awareness and sustainability initiatives on-campus.
- Sustainability is more than just LEED certified buildings; it is making thoughtful decisions, realizing the relationships to your surroundings, and recognizing your impact as an individual and as part of a college campus.

Reduce Consumption:

Many individuals choices can minimize the amount of waste at Lawrence .

1. **In Your Room:**
   - Use Compact Florescent Light bulbs (CFLs), they are provided at any dorm's front desk
   - Shut down your laptop if you're not using it within the next half hour
   - Unplug electronic devices: just having them plugged in uses energy
   - Residences should be kept at 68°F during October through April. If your room is too hot or cold see an RLA. Do not open windows or crank the thermostat

2. **In the Bathroom:**
   - Conserve water: report leaks, turn off the water while brushing your teeth, sing somewhere other than the shower
   - Talk to your floor about invoking an "if it's yellow let it mellow" policy
3. **In Your Classes**:
   - Buy used textbooks
   - See if your teachers will let you e-mail an assignment rather than printing it out. When you have to print, do it double-sided.

4. **While Dining**:
   - When eating in the WCC use the plates, ceramic mugs, and metal silverware provided.
   - Remember your eyes might be bigger than your stomach. Go back for seconds instead of taking too much the first time
   - Eat less meat! In 2006, a United Nations Report proclaimed the meat industry "one of the top two or three most significant contributors to the most serious environmental problems, at every scale from local to global."
   - If taking out food, use the reusable clam-shells provided by Bon Appétit, as well as reusable coffee mugs and water bottles.

Be a Conscious Consumer:

1. **Make Informed Decisions:** Before going to the Store. Think about:
   - where the product you are buying was shipped from and who was it was made by
   - what corporation you are supporting with your money, what organizations it supports, how its employees are treated, and whether or not it benefits the Appleton economy.

Websites like *http://www.newdream.org/marketplace* and *http://www.greenamericatoday.org/programs/responsibleshopper* can help you gather this type of information.

Best ways to deal with waste:

Trash: There are garbage cans spread out around campus, use them!

General Recycling: Lawrence has single stream recycling. This means you can deposit aluminum/plastic labeled 1-7/glass bottles and cans, used paper, cardboard, and even the take-out containers for the café, all into the same bin!
- Pizza boxes cannot be recycled, put these in the trash.

Electronic waste: Batteries, cell phones, and CFLs need to be recycled separately. At the front desk of every dorm is a drop-off container for used batteries. Recycle other waste through the WCC info desk.

Composting: Over one ton per week of pre-consumer food waste from the campus center, various small houses, and local businesses is composted by SLUG then used in the campus garden.

Look around your dorm for 'free boxes'. These are a place to trade clothing and other goods. If there isn't one on your floor, talk to your RLA and start one!