Contact: Patrice Sayre

ISU SUSTAINABILITY ANNUAL REPORT

Iowa State University is pleased to report on sustainability accomplishments over the past year. With more than 36,000 students, faculty and staff on campus, the university must be working continuously and creatively to find new ways of reducing resource consumption and challenge ourselves to greater levels of environmental stewardship. Through coursework, research, day-to-day choices in operations and support, and community involvement, ISU is a leader in sustainability. This report covers the highlights of this last year.

Planning and Development

Vision: Each institution will demonstrate a commitment to sustainability in its campus master plan, incorporating environmental stewardship.

Progress on Goals:

LEED Certification: All major projects (new buildings and major capital renovations) initiated after April 1, 2009 shall meet or exceed the U.S. Green Building Council's guidelines for silver level LEED certification.

- ✓ In April 2011, a Coordinator of Sustainable Design and Construction was named to aid in the integration of sustainability in capital projects.
- ✓ To assist in decreasing the urban heat island effect of campus buildings, all new buildings are required to include either a "green" (vegetative) roof or a highly reflective white membrane roof. This standard also applies to all reroofing projects.
- ✓ Addition of LEED certified buildings and buildings being designed toward a minimum certification of LEED Gold. A summary of current LEED buildings includes the following:

PROJECTS COMPLETED	LEED LEVEL	STATUS
Morrill Hall Renovation (2008)	Silver	Complete
College of Design- Foundations Pavilion (2010)	Platinum	Complete
Chemistry Facilities - Hach Hall (2011)	Gold	Complete
PROJECTS IN PROGRESS		
Biorenewables Complex – Biorenewables Lab	Gold	Pending Certification
Recreation Facilities Expansion & Renovation	Gold	Construction
College of Veterinary Medicine Phase 2 – Small Animal Hospital Renovation & Addition	Gold	Design
Biorenewables Complex – Agriculture & Biosystems Engineering	Gold	Design
Troxel Hall	Gold	Design
Football Training Facility	Silver	Planning
Curtiss Hall-Phase I – Student Services Mall (LEED CI – Interior Design and Construction)	Gold	Construction
Curtiss Hall-Phase I – Harl Commons (LEED CI)	Gold	Design

- **Planned:** Design and Construction Services is planning a number of initiatives that demonstrate a commitment to sustainability related to LEED including:
  - Developing standards for sustainable design into all small projects designed by staff.
  - Developing standard specification for demolition waste diversion requirements and goals to be used in all bid projects.
  - Iowa State University, the City of Ames and CyRide have worked collaboratively to develop an Intermodal Facility located on university land adjacent to the ISU campus and Campustown Business District. The Intermodal Facility serves as a central hub for multiple modes of transportation including, pedestrians, bicycles, taxi, ride share programs, airport limo service, inter-city bus service. CyRide routes are within a city block of the facility as well. The partnership effort sought and acquired grant funding through FTA, designed and bid the facility. The facility and site are under construction and scheduled for completion in June 2012.

Electronic Business Solutions

- ✓ The university general catalog and campus directory are only available online and no longer printed.
- ✓ Student Counseling Services and Campus Room Scheduling join Accounting Services in going paperless in their record keeping and operations.
- ✓ In cooperation with the Government of the Student Body, the Memorial Union's Event Authorization process (including signatures) is scheduled to be online and fully paperless by Fall 2011.
- ✓ ISU Dining has converted three of 8 dining room menus from paper to electronic with a fourth being converted during Summer 2011 and planning for full conversion in progress.
- ✓ ISU Dining is testing a "Text and Tell" system for suggestions and feedback rather than the traditional paper system.
- ✓ The Department of Residence has greatly reduced its paper use through increased reliance on and expansion of their intranet system for staff communications. In addition, through increased use of and reliance on social media, paper usage for student communications has also been reduced significantly.
- ✓ The Center for Excellence in Learning and Teaching (CELT) in collaboration with Information Technology Services is offering an on-line course evaluation option for all colleges. In 2010 61,850 paper "bubble sheet" evaluation forms were eliminated through this paperless alternative.

- **Planned:** In partnership with the Government of the Student Body, the Memorial Union's Event Management Office has a set a goal of going fully paperless for all operations in FY12, which will encompass room scheduling, event authorization, and overall operations. Through an online system, not only will operations become less consumptive and more efficient, customers will have 24/7 online access to check room availability and make reservations.

Purchasing

Vision: Each institution shall adopt a campus-wide environmentally preferable purchasing plan that is consistent with best practices in higher education. These policies will increase the purchase of products with a reduced environmental impact, while balancing the purchase decision with fiscal responsibilities.

Progress on Goals:

Source Reduction

- ✓ ISU Dining, through Food Stores, now uses Ecolab dish cleaning products that are solid, dissolvable tablets with no external packaging.
- ✓ ISU Dining offers students the option to purchase "green" to-go containers in all residence halls dining facilities. The containers provide students a reusable, non-disposable option for "meals to go". Clean containers can also be used at detail campus dining locations. After the initial purchase of a container, students exchange used containers at dining centers for a clean one, refill, and repeat. Containers were introduced Fall 2010 and in their first year, nearly 2,000 have been sold to students, faculty, and staff – 1,000 within the first two months.

Buy Local

- ✓ This year $939,242 (12%), up from $500,000 (10%), in local products were purchased in the areas of produce, meat, honey, eggs, dairy, popcorn, and condiments. A new local item being explored for 2011-12 is farm-raised tilapia.
- ✓ Department of Residence utilized locally-produced energy efficient windows for a remodeling project in one of three campus apartment communities.

Green Goods and Services

- ✓ To date 90% of all university cleaning supplies are green certified.

E-procurement

Purchasing has incorporated additional commitment e-procurement that has had a significant sustainable impact on the entire campus community. The following measureable results have been realized:

- ✓ Reduced the number of invoices processed through Accounts Payable by 31% over the past 10 years.
- ✓ Reduced the number of checks written for procurements by 31% over the past 10 years.
- ✓ Reduced postage (mailings) by 73% over the past 5 years (through online posting of bids, computer emailing of purchase orders to vendors and departments, and e-procurement (CyBuy and P-Card).
- ✓ Reduced the number of purchase orders written and processed by 25.6% in the past five years and 85% in the past 10 years (from 62,916 to 9,474) due to developing strategic long-term contracts and implementation of e-procurement solutions (CyBuy and P-Card).
- ✓ Significant paperwork reduction has been achieved through e-procurement solutions while ISU expenditure volumes have increased 59%.

Energy and Climate

Vision: Institutions shall commit to pursuing climate neutral operations through energy efficiency, conservation, on-site generation and strategic procurement of clean and renewable energy.

Progress on Goals:

Metering

Iowa State University has completed most of its planned metering additions. Additional metering is installed as part of major building remodeling projects or as new buildings are constructed. Iowa State's metering of campus utilities is currently at the following percentages:

- ✓ 100% of electricity is metered
- ✓ 90% of steam is metered
- ✓ 90% of chilled water is metered
- ✓ 50% of potable water is metered

Energy Portfolio

- ✓ Iowa State University has signed a contract to purchase up to 10 percent of its electrical energy from a wind farm located in northern Story County. This is a joint contract with the City of Ames, who will purchase up to 15 percent of its electrical energy. Through this joint contract, campus coal consumption was reduced by 4,825 tons in 2010.
- ✓ Iowa State University completed test burns of wood pellets and wood chips on two of its boilers in the fall of 2010. The test burns were successful and demonstrated that these boilers could burn up to 15% clean wood products without significant effects on capacity or unacceptable effects on boiler emissions. Permitting the boilers with the DNR to burn these products can be done without major efforts. However, the cost of the wood products is higher than coal and will result in increased utility costs to the campus.
- ✓ The three Regent institutions have collaborated on a joint Environmental Strategies Study. This study will identify alternatives to meet recent and proposed environmental regulations that affect each of the campus power plants. Phase 1 of the study will be completed by June of 2011 and will identify 5-6 alternatives for each campus. The next step will be for each campus to select 2-3 projects for further analysis. Ultimately each campus will select a final alternative to modify its power plant to meet the new regulatory requirements by the compliance date of March 2014. All alternatives will reduce air emissions from the campus power plants.
- ▪ **Planned:** Iowa State University is planning to obtain the necessary permits to burn clean wood products and would pursue this further if the economic situation changes to where wood can be added without impacting utility costs significantly.
- ✓ Iowa State University has joined the Environmental Protection Agency's Green Power Partnership focused on reducing the environmental impacts associated with purchased electricity use.
- ✓ Iowa State University has joined Environmental Protection Agency's Combined Heat and Power (CHP) Partnership. The CHP Partnership is a voluntary program seeking to reduce the environmental impact of power generation by promoting the use of CHP. The Partnership works closely with energy users, the CHP industry, state and local governments, and other clean energy stakeholders to facilitate the development of new projects and to promote their environmental and economic benefits

- ✓ The Iowa State University Alumni Center is taking part in the 2011 Energy Star National Building Competition focused on improving the energy efficiency of commercial buildings.
- ✓ Information Technology Services has joined EPA's Low Carbon IT Power Campaign Power Management Pledge, focused on reducing the energy consumed by information technology equipment, and was named as one of the top 5 campaign contributors in 2011.
- ✓ In partnership with the City of Ames Electric Services and the Iowa Energy Group, the Iowa State University Greek Community has kicked off a *Greeks Go Green* initiative initially focused on increasing the energy efficiency of housing in the Greek Community.
- ✓ The Memorial Union has implemented a "smart" powerstrip program aimed at eliminating phantom energy.
- ✓ To date, 13 campus energy efficiency projects, providing an annual ROI of $170,898, have been funded through Iowa State University's Live Green Revolving Loan Fund (http://www.livegreen.iastate.edu/loan). The Live Green Revolving Fund was recently highlighted in the Sustainable Endowment Institute's publication, "Greening the Bottom Line: The Trend Toward Green Revolving Loan Funds on Campus" (http://greeningthebottomline.org/).
- ✓ As part of classroom remodeling standard procedures, Facilities Planning and Management has added the inclusion of energy efficient lighting updates which includes ballasts, light bulbs, and occupancy sensors. To date 50% of classrooms have gone through this enhanced remodel program.
- ✓ Thirty-three Green Teams (http://www.livegreen.iastate.edu/involved/teams/) have been formed on campus and are exploring how to save energy in their individual colleges, major administrative units, or buildings, and to develop strategic plans and goals that support energy savings and sustainability.
- ✓ Facilities Planning and Management has formed Energy Efficiency Teams to complete energy audits in all campus buildings on focused areas of opportunity. Common space lighting audits were the focus of this year's audits. FP&M also maintains an energy consumption tracking website that allows individual campus building energy consumption (as well as total university consumption) to be available for information and awareness 24/7. http://www.fpm.iastate.edu/utilities/billing/benchmarks_building.asp
- ✓ Department of Residence has been working toward implementing building automation systems for lighting and HVAC systems for campus housing. To date, four residence halls (20%) have automation systems that have resulted in a 50% reduction of lighting usage in hallways during limited- use hours (11pm-6am) and HVAC "set spread" of 6-8 degrees.
- ✓ As part of campus housing remodel and renovation standard procedures, Department of Residence has included energy efficiency as an area of primary consideration for each project. As a result, lighting timers have been installed in seven residence halls (30%) to reduce hallway lighting by 50% during non-peak hours (11pm-6am). Timers coupled with automation systems are reducing lighting by 50% in half of the university's residence halls. In addition to reducing lighting, focus is also given to upgrading inefficient lighting, eliminating unnecessary lighting (for example the removal of can lights and the collective use of over 9kw of energy), encouraging responsible use of lighting by residents (through the installation of 6800 light switch "Save Energy Turn Off the Lights" covers); replacing inefficient windows, siding, and fan coil units, and replacing 211 top load washing machines with front load models resulting in a 50% reduction of energy and water usage.

- ✓ During the 2010 winter break, Facilities Planning and Management spearheaded the continuation of the holiday shut-down opportunity for campus buildings to incorporate additional energy savings opportunities during the 11-day winter break. Forty-seven buildings took part, resulting in an energy savings of $38,000 and a two-year holiday break savings of over $150,000.
- **Planned:** ISU Dining and the Department of Residence are investigating the implementation of a "smart" powerstrip program.
- ✓ ISU Athletics, with assistance from Environmental Health and Safety, replaced a 40 year-old chiller in Hilton Coliseum resulting in the removal from operation and capture of over 700lbs of chlorofluorocarbons (CFCs).
- ✓ Facilities Planning and Management has installed 11 additional solar trash compactors on central campus to replace conventional trash cans. The Department of Residence has also added 30 solar compactors around the residential housing areas for a total of 42 solar trash compactors currently being utilized on the Iowa State University campus. In addition to reducing trash pick-ups by a ratio of 5:1, the compactors "clean notification system" has eliminated all fuel usage and emissions except when the compactor is full and ready for pick-up.
- ✓ University Transportation Services has increased their hybrid vehicles by 20% since last year and the total fleet now includes over 200 vehicles that are low- and no-emissions vehicles.
- ✓ Mulching kits have been added to all University mowers thus allowing on-site reuse, and reducing emissions related to transporting material to the University Compost Facility.
- ✓ Through a student-driven initiative, and in partnership with University Transportation Services and Parking Division, Iowa State University will offer a campus car sharing program through WeCar (a subsidiary of Enterprise) starting Fall 2011. Car sharing programs offer a short-term car rental opportunity to any student, 18 or over, to allow students an alternative option for transportation besides bringing an additional car onto campus.
- ✓ University Transportation Services researched and developed a new procurement policy to replace compact vehicles with alternative midsize vehicles. This change was made to lower costs (compact vehicles cost more to run then a midsize vehicle) and increase E-85 consumption.
- ✓ Veenker Memorial Golf Course has increased their use of electric vehicles in place of gas-powered golf carts and small utility vehicles, purchased new greens mowers that use an electric reel drive system, and replaced two gas-powered dump trucks with diesel trucks.
- ✓ Parking Division has eliminated one vehicle from their fleet, as well as implemented more walking and biking routes for parking enforcement. The result is a reduction of 10,089 miles driven in one year.
- ✓ Cy-Ride has replaced 17% of its fleet (12 buses) with Hybrid buses resulting in an annual savings of 23,000 gallons of fuel and a reduction of 210,513 kilograms of CO_2.
- ✓ Members of the student organization, ISU Biobus, are making biodiesel from used ISU Dining cooking oil and providing biodiesel to CyRide for use in their fleet.
- ✓ Through a student-driven initiative by the student organization Engineers for a Sustainable World, ISU took part in the EPA Game Day Recycling Challenge in 2010– focused on diverting game day waste. ISU was the only Regent Institution to participate in this year's event and one of six Big 12 schools to participate. Of 75 participating schools, ISU ranked 21st in greenhouse emissions reduction.

- **Planned:**
  - Through a student-driven initiative, discussions are taking place with Outdoor Recreation Services regarding the opportunity to offer a bike sharing program for students, faculty, and staff.
  - As supply is available, Facilities Planning and Management will test the use of the student-produced biodiesel in their fleet.

Materials and Recycling

Vision: Regent institutions shall reduce the volume of materials and resources consumed, and reuse or recycle resources and materials whenever possible, with the long-term objective of contributing to the development of a waste-free society.

Progress on Goals:

Recycling

- ✓ The University Compost Facility has the capacity to process 15,000 tons of materials annually, including animal farm manure and bedding, campus yard waste, biomass research waste, and food waste from campus dining facilities. 2010 compost production was 7,800 tons. All finished compost is utilized for campus projects.
- ✓ Facilities Planning and Management have added mulching kits to all mowers, thus allowing on-site reuse and reducing materials taken to the University Compost Facility.
- ✓ Department of Residence recycled 900 mattresses in 2010, allowing 94% of materials to be reclaimed. In addition, the recycling company with whom they contracted returned 20% of their profits back to the University and community (10% ISU General Scholarship Fund and 10% United Way of Story County). DOR also found recycling outlets for 480 sets of non-reusable dorm room furniture.
- ✓ University Marketing recycled weather damaged banners that had previously hung on campus buildings and on University Boulevard (and had no viable reuse or recycling options) into tote bags this past year and offered them for public sale at the University Bookstore.
- ✓ Facilities Planning and Management is de-manufacturing non-reusable classroom furniture to take advantage of commodity recycling opportunities.
- ✓ Iowa State University's TreeCYcle Program has salvaged 4,000 board feet of reusable lumber from downed campus trees in 2010 (a total of 7,000 board feet since the start of the program). This lumber is utilized for campus projects including award frames for the annual Live Green Excellence in Sustainability Awards, materials for sustainable furniture courses, and furniture for campus buildings and operations.
- ✓ The Department of Residence multi-commodity recycling program (mixed paper, redeemable cans and bottles, plastics, and wet board) collected over 44 tons of material during 2010.
- ✓ Facilities Planning and Management has added a "layer" to its online campus map menu options which shows all campus recycling locations for white paper, newspaper, and cardboard.
- ✓ In partnership with Food Stores and Goodwill, ISU Dining added a recycling program for all of their "waste" uniforms.
- ✓ The Memorial Union Hotel provides all of its used pillowcases for reuse through the non-profit organization "Little Dresses for Africa".

- ✓ Facilities Planning and Management offered a "Green Your Scene" cleanout event during the 2010 summer semester to encourage recycling opportunities for unwanted materials. Through this collection (which included targeted waste streams of paint, appliances and mixed paper), nearly 30 tons of materials were recycled.
- ✓ Through the Department of Residence's SAVE (Simple Act Vital Effect) Move Out recycling/reuse program 175 grocery bags of food were provided to local food pantries and three truckloads of other household items (including ~600 pounds of clothing) were donated to local charities.
- ✓ ISU Athletics, through a partnership with a local non-profit Cans 4A Cause offers beverage container recycling at all home football games and for all winter season events at Hilton Coliseum.
- ✓ ISU Dining offers various surplus supply containers (cottage cheese containers, plastic buckets, etc.) to students, faculty, and staff and local farmers and residents for reuse.
- ✓ Information Technology Services has implemented initiatives which focus on reducing the need for physical assets (as well as increasing power savings) including:
  - o Server consolidation - using virtual servers and centralized storage to reduce the power demand, cooling demand, number of physical servers, heat output, and physical space requirements. Currently, consolidation is occurring at a ratio of approximately 20 virtual servers per physical server (total of 400 servers). In moving forward, the goal is approximately 50 virtual servers per physical server.
  - o Virtual desktop environment - replacing desktops with thin clients as they near the end of their lifecycle. In addition to reducing the amount of physical assets, thin clients use far less power (over 80% on average) than a standard desktop computer. Additional benefits include a longer product lifespan, less noise pollution, and less heat output. ITS has deployed over 200 thin clients and 400 virtual desktop sessions to date.

- **Planned:**
  - o Facilities Planning and Management is investigating further enhancement of their online campus map "recycling layer" menu option to include additional campus recycling efforts.
  - o Through collaboration between Parks Library and the Government of the Student Body Sustainability Committee, a pilot project focusing on the feasibility of expanding campus recycling opportunities through single-stream recycling, will be implemented in the library starting Fall 2011.

Conserving

- ✓ Information Technology Services offers tracking of total paper usage within designated printing "environments". This has been implemented on all ITS managed student, faculty, and staff printers.

Materials

- ✓ Facilities Planning and Management offered a "Green Your Scene" cleanout event during the 2010 summer semester to encourage recycling opportunities for unwanted materials. Through this collection (which included electronics as a targeted waste stream), over 51 tons of materials were recycled.
- ✓ Through a collaboration of the Iowa Department of Transportation and the Iowa Department of Natural Resources Waste Exchange Program, University employees were invited to take part in a recycling event during Earth Week for personal electronics.
- ✓ Through ISU Dining's increased reusable mug discount of 35¢, implemented in April

of 2010, an average of 90 disposable coffee cups are kept out of the daily waste stream.

- ✓ In collaboration with ActivUS, a student organization with a focused campaign to phase out the use of disposable water bottles, ISU Dining has provided reusable water bottles for a "bottle exchange event" as well as installed refill stations in two of its campus convenience stores. In addition, through an ISU Design and Construction Services requirement in 2010, a refill station must be available on the first floor of any new construction or major renovation building project. As a result these initiatives, a total of 26 refill stations are now available in various campus locations.
- ✓ The Frederiksen Court Community Council organized and facilitated a holiday decorating event for one of the university's dining café locations involving the creation of decorations made from recycled materials.
- ✓ An increased consideration of purchasing items in bulk, for example University Transportation Services' purchase of bulk washer fluid, has reduced waste significantly through multiple campus units and operations.
- ✓ The student residence hall organization, the GreenHouse Group, implemented a recognition program for residence hall floor Recycling Chairs who have gone above and beyond in their support and expansion of recycling. Five chairs (out of 130) were recognized in 2010.
- ✓ Through a student-driven initiative by the student organization Engineers for a Sustainable World, Iowa State University took part in the EPA Game Day Recycling Challenge in 2010 – focused on diverting game day waste. ISU was the only Regent Institution to participate in this year's event and one of six Big 12 schools to participate. Of 75 participating schools, ISU ranked 39th in overall waste diversion and 26th in per capita diversion.
- ✓ Through a partnership with Waste Management, the student organization, the GreenHouse Group, has established a beverage container recycling initiative, "Get Caught Green Handed", at Iowa State University's annual VEISHEA event.
- ✓ Through a student-driven and managed initiative by the student organization, the GreenHouse Group, Iowa State University took part in the international recycling competition, Recyclemania in 2011. ISU was the only Regent institution to participate in this year's event and ranked 96 out of 145 in the Benchmark Division with an average per capita recycling rate of 4.36 pounds.
- ✓ ISU Dining has expanded their donation of "day-old" items to include five dining café locations and provides support to community programs and organizations including Food at First (a free meal program) and Youth and Shelter Services.
- ✓ The Frederiksen Court Community Council sponsored a t-shirt collection event aimed at reducing the university's waste stream. Over 2,000 t-shirts were collected from the university community and will be distributed to local, national, and international people in need through Cross Ministries.
- ✓ ISU Dining has expanded their food waste composting program to include the suites at Jack Trice Stadium, resulting in the diversion of an additional 1,000 pounds from the waste stream.
- ✓ ISU Athletics has eliminated all paper towel waste in Jack Trice Stadium through the installation of hand dryers.
- ✓ ISU Dining has started offering used coffee grounds to students, faculty, and staff and local farmers and residents for reuse.

- ✓ ISU Athletics, through a partnership with a local non-profit Cans 4A Cause has started offering beverage recycling containers to student organizations to promote

and increase event recycling.
- ✓ ISU Dining sponsored an Earth Week FreeCycle Event offering students, faculty, and staff the opportunity to trade, donate, and take unused personal items (including clothing, small appliances, and misc. household and residence hall room items) and reduce the university's waste stream.

Transportation

Vision: Regent institutions shall develop transportation strategies that increase fuel efficiency and reduce fuel use, air pollution and carbon dioxide emissions while providing opportunities for alternative transportation including bicycle and pedestrian infrastructure.

Progress on Goals:

Emissions
- ✓ University Transportation Services have increased their hybrid vehicles by 20% since last year and their total fleet includes over 200 vehicles low and no emissions vehicles.
- ✓ University Transportation Services researched and developed a new procurement policy to replace compact vehicles with alternative midsize vehicles. This change was made to lower costs (compact vehicles cost more to run then a midsize vehicle) and increase E-85 consumption.
- ✓ Veenker Memorial Golf Course has increased their use of electric vehicles in place of gas powered golf carts and small utility vehicles, purchased new greens mowers that utilize an electric reel drive system, and replaced two gas powered dump trucks with diesel trucks.
- ✓ University Transportation Services is actively tracking the number of people traveling in each vehicle. With that knowledge the department is able to better match the appropriate sized vehicle with the customer's request. UTS also calls customers when they see people are going to the same location to determine if the customers could car pool.
- ✓ University Transportation Services continues to work with Risk Management and the other regents institutions to investigate other insurance options so additional people can ride in a university vehicle thus savings money.
- ✓ University Transportation Services processed 398 one way rentals to and from airports for staff. Offering staff this alternative allows UTS vehicles to be open for other customers to use thus allowing us to purchase fewer vehicles.
- ✓ University Transportation Services has been informing and working with customers transporting people to and from the Des Moines airport to consider using Executive Express (the new airport shuttle) that departs from the Memorial Union every two hours.
- ✓ University Transportation Services has provided information to the insurance actuaries to assist in the possibility of additional insurance coverage for the University to accommodate Regents' fleet vehicles to transport other state, county, municipal, and governmental staff and officials on coordinated travel. The vice presidents are currently reviewing these additional insurance options.
- ✓ University Transportation Services is currently working with Risk Management to finalize a new Fleet Safety Policy which will include the vehicle idling policy section.

Alternative Transportation
- ✓ The Council on Sustainability hosted a series of Dinner Discussions focused on

sustainable transportation covering a number of topics and opportunities including alternatives to commuting alone, and encouraging walking and biking.

- ✓ Information Technology Services implemented Microsoft Communication Server (OCS) which offers instant messaging and video conferencing capability along with telephone, voice mail and email services. In addition, online opportunities for live presentations and training sessions are also now available through Adobe Connect and Microsoft Live Meeting.
- ✓ Change has been implemented to the Iowa Administrative Code allowing electric bicycles under 750 watts to be treated as a traditional bicycle and therefore able to comply within Parking Division's bicycle requirements and inclusion.
- ✓ University Transportation Services is currently working on a new rate structure for van pool riders to help encourage van pooling to campus. This new structure will allow for a set rate for riders and include scratch cards for parking if they rider needs to drive a personal vehicle for a day here and there.
- ✓ University Transportation Services logs where people are going on trips and does contact departments to ask if they can carpool or find a more efficient way to get everyone to the same event.
- ✓ University Transportation Services offers Large Passenger Van Class to train drivers how to handle a larger vehicle so a department may only need to rent one vehicle instead of two.
- **Planned:** Through a student-driven initiative, discussions are taking place with Outdoor Recreation Services regarding the opportunity to offer a bike sharing program for students, faculty, and staff.

Water and Landscape

Vision: Regent institutions shall pursue water saving and efficiency measures, including collection technologies and re-use mechanisms.

Progress on Goals:

Irrigation Water Consumption

- ✓ ISU Athletics has installed a web-based irrigation central control system that utilizes an on-site weather station.
- ✓ Veenker Memorial Golf Course has become independent of treated water for irrigation purposes, instead using irrigation pond run-off storage (60%) and university wells (40%).
- ✓ Mulching kits have been added to all University mowers to reduce the need for irrigation.
- **Planned:** New construction projects have not redirected reclaimed stormwater (graywater) for irrigation of turf since current campus policy restricts irrigation of campus lawn areas. Reclaimed stormwater is currently collected for purposes considered of higher use than irrigation. Consideration of using reclaimed stormwater for irrigation would be explored by Iowa State should policy change, as this is a best management practice.

Organic Campus

- ✓ Veenker Memorial Golf Course has adopted an Integrated Pest Management

Program specifically focused on chemical use on the golf course.
- ✓ Veenker Memorial Golf Course has replaced traditional fertilizer with an organic fertilizer for 50% of all fertilizer applications at the golf course.

Stormwater Management
- ✓ ISU Athletics in partnership with Facilities Planning and Management, and Environmental Health and Safety have developed an extensive storm water management plan for the planned Cyclone Sports Complex, which will dramatically improve stormwater runoff on the current site. Highlights of the plan include bioswales, native plantings, and water detention and retention features.
- ✓ Facilities Planning and Management has begun implementation of the University's Emerald Ash Borer Readiness Plan which will establish a more diversified balance of shade tree species throughout campus.
- ✓ Facilities Planning and Management completed 148 tree plantings this past year consisting of a combination of shade, evergreen, and flowering species.
- ▪ **Planned:** Iowa State University will be establishing a working committee to unify best management practices for storm water management and grounds maintenance into a collective university management plan.

Sustainability in the Curriculum

Public Universities

Vision: Regent institutions will pursue a sustainable future through the curriculum by:

- o Providing educational opportunities for students to facilitate their acquisition of the knowledge, skills, and collaborative work ethic necessary to engage effectively in public discourse and policy debate and in other hands-on problem-solving in matters relating to environmental, social, and economic sustainability;
- o Providing educational programs that prepare students for sustainability-related careers (e.g. in wind power and other green industries, biobased energy and other biobased products, governmental organizations, international economic or policy organizations, non-governmental organizations, farmers, researchers, engineers, writers, or teachers);
- o Providing opportunities for students to participate in sustainability-related research, the "greening" of campus infrastructure, civic engagement, and internships;
- o Exposing students to ideas and issues related to a sustainable, balanced, and ethical future for the planet and its inhabitants, including (1) the dynamics of biological population growth and decline in the natural world, predator-prey models, overexploitation of natural resources, and energy balances; (2) how human behavior affects the natural world and the ability of earth to sustain life; and (3) the stochastic interplay of human and natural factors in determining the long-run population growth path for human and non-human species; and
- o Helping students understand how to make informed rational decisions as consumers, workers, resource owners, and citizens electing government officials by taking into account the effects of human actions on human welfare in this and future generations.
- o Helping students think in terms of economic, social, political, and environmental sustainability, as well as environmental health.

Progress on Goals:

1. Increase efforts to recruit high school students, as well as professional and graduate students, who are seeking an education in sustainability at an institution that practices sustainability.
   - ✓ Sustainability is an important part of messaging that is presented through college and departmental recruiting events. Clean water, sustainable agriculture, sustainable lifestyles, sustainable manufacturing, and sustainable communities are all specific examples of recruiting element themes.
   - ✓ Iowa State University was included in "The Princeton Review's Guide to 311 Green Colleges: 2011 Edition".
   - **Planned:** In accordance with AASHE STARS sustainability curriculum designation, all applicable courses at Iowa State University will be denoted and further designated as sustainability related or sustainability focused. This information will be available on the Live Green website as well as incorporated in the online university catalog.
2. Increase the sustainability experiences for freshmen through first-year seminars, core general education requirements, or living/learning communities.
   - ✓ Core education learning outcomes
     - o Engineering - develop system-level solutions to complex problems that include sustainability constraints.
   - ✓ Living/Learning Communities
     - o A sustainability themed learning community is under development for implementation in 2012.
3. Make sustainability a part of all orientation programs on campus.
   - ✓ Training for all dining employee (including students) incorporates sustainability.
4. Form curriculum workshops to engage and assist faculty and teaching assistants in integrating sustainability into general education and, as appropriate, undergraduate and graduate programs.
   - ✓ The 3rd Annual ISU Symposium on Sustainability was held on February 21-22, 2011 offering students, staff, and faculty the opportunity to learn about Iowa State's sustainability accomplishments, initiatives, and activities of the past year, hear from those who have taken an active role in ISU's Live Green! initiative, and gain awareness from national and international sustainability keynote speakers.
   - ✓ Several academic programs, including mechanical engineering, have incorporated sustainability themes throughout the curriculum by incorporating such elements into design and project courses.
5. Continue to participate in national efforts to understand and promote sustainability education, such as the National Teach-in Day for Climate Change and Sustainability, the workshop on sustainability education sponsored by the Association for Advancement of Sustainability in Higher Education, and the Consortium on the place of sustainability in Global Learning Leadership sponsored by the Association of American Colleges and Universities.
   - ✓ Three students attended the AASHE 2010 Creating Sustainable Campuses and Communities Conference and one faculty member attended and presented – "Building a Solar House for Interdisciplinary Learning of Sustainability" (through sponsorship by the Council on Sustainability).
   - ✓ ISU's solar car team, Team PrISUm, placed 4th (out of 10) in the Formula Sun Grand Prix (in Indianapolis) and 11th (out of 15) in the American Solar Challenge (an 1100 mile race, from Tulsa, OK to Chicago, IL) during the 2010-2011 academic year.
   - ✓ Many engineering undergraduates are involved in Engineers Without Borders

and Engineers for a Sustainable World where they develop sustainable engineering solutions to local problems in the developing world.

- ✓ The Industrial Assessment Center (in mechanical and industrial engineering) involves students at all levels in conducting one day assessments of small to medium sized manufacturing facilities in a five state region to improve energy utilization, productivity, and waste reduction.
- ✓ The ISU Student Chapter of the National Electrical Contracting Association is taking part in an international Green Energy Challenge focused on increasing the energy efficiency of a campus student housing facility.

6. Increase the curricular offerings in sustainability to undergraduates through majors, minors, certificates, internships, service learning, and living/learning communities.
   - ✓ A sustainability minor proposal has been approved by the College of Liberal Arts and Sciences and is expected to be approved by the Faculty Senate early in FY 2012.
   - ✓ Grant funding has been awarded to the World Languages and Cultures Department to combine a minor in World Languages and Cultures with a new Global Resource Systems major in the College of Agriculture.
   - ✓ A Master of Design in Sustainable Environments proposal has been presented to the Graduate College Curriculum Committee and is currently under review.
   - ✓ The Department of Mechanical Engineering is leading an effort to develop an engineering minor in energy systems.
   - ✓ Electrical and Computer Engineering faculty members have received a three year grant from NSF ($400,000) to support an undergraduate summer research experience program in wind energy science, engineering and policy beginning in summer 2011.
   - ✓ Through class assignments, students in the Colleges of Liberal Arts and Sciences and Human Sciences, focused on building sustainability in community, two student initiatives - a community clothing swap (Closets Collide) and a student-managed campus food bank for students (SHOP – Students Helping Our Peers) - are established and successful community initiatives.
   - ✓ Two sustainability internships were offered through the Live Green! initiative in FY 2011, and focused on marketing and communications and campus and community engagement.
   - ✓ Parks Library provided a sustainability internship focused on creating sustainability-themed educational resources for library patrons.
   - ✓ ISU Dining established a student Sustainability Coordinator position.
   - ✓ Landscape Architecture students designed and created a model “green” roof, providing hands-on education and awareness opportunities for students, faculty, and staff as well as the general public.
   - ✓ The VEISHEA Planning Committee offers an annual VEISHEA Service Day featuring a variety of local opportunities to support and further sustainability in the Ames community. One opportunity, *Stash the Trash,* was provided in partnership with Keep Iowa State Beautiful, and engaged over 1,000 volunteers and captured 266 bags (4 tons) of litter at this year’s event.
   - ✓ Department of Residence, in conjunction with the student organization, The GreenHouse Group, is developing a Peer to Peer Education Component Toolkit specifically focused on incorporating sustainable practices and decisions into daily activities.

   - ✓ College of Agriculture and Life Sciences’ Greenlanders Green Team is focusing efforts on a method to calculate a baseline estimate of the carbon stored or

sequestered on university lands. The project is led by Natural Resource Ecology and Management faculty, with the majority of the work performed by two undergraduate students participating in the Science with Practice program.

7. Continue to support incorporating sustainability in the curriculum and in faculty research.
   - ✓ Industrial Engineering PhD student Nan Gao, was selected as one of four finalists of the 2011 Production and Operations Management Society College of Sustainable Operations Ph.D. Proposal Award Competition and named runner-up (second place) at the 22nd Annual POMS Conference held April 29 to May 2, 2011. His research is on closed loop supply chain design for uncertain carbon regulations and random product flows.
   - ✓ Industrial Engineering faculty member Sarah Ryan received research funding from January, 2011 – August, 2013, under an initiative of the Power Systems Engineering Research Center on "The Future Grid to Enable Sustainable Energy Systems." Her focus is on optimization for long-term planning with increasing penetration of renewable resources.
   - ✓ Industrial Engineering faculty members Frank Peters, Matthew Frank, John Jackman, and Aerospace Engineering faculty member Vinay Dayal are conducting research to improve the manufacturability of wind turbine blades with a long term goal of reducing the cost of wind energy to be more competitive with GHG methods of producing electricity.
   - ✓ Industrial Engineering faculty member Lizhi Wang is a co-PI on an NSF-funded project, "21st century national energy and transportation infrastructures: balancing sustainability, costs, and resiliency (NETSCORE-21)".
   - ✓ Industrial Engineering faculty member Guiping Hu is involved in related research: "Techno-economic, lifecycle analysis on advanced bioenergy pathways," Bioeconomy Institute, Principal Investigator. 07/2011 - 06/2013.
   - ✓ Industrial Engineering faculty member Guiping Hu is involved in related research: "Mapping potential food sheds in Iowa: a system optimization modeling approach," Leopold Center for Sustainable Agriculture, Principal Investigator. 02/2010 - 01/2012.
   - ✓ Aerospace Engineering has purchased a rapid prototyping machine, allowing them to fabricate parts at low cost, with little waste. It replaces other more conventional manufacturing techniques that are less energy efficient and which create substantial waste material.
8. Encourage departments to offer interdisciplinary courses related to sustainability.
   - ▪ Besides an ongoing commitment to the highlighted accomplishment areas noted in last year's report, there are no further updates to report as related to interdisciplinary sustainability courses for this year.
9. Offer courses that address specific issues related to sustainability, including encouraging students to be knowledgeable and responsible citizens and preparing students to pursue sustainable practices in their professions. Topics that can be addressed are environmental restoration and preservation, LEED construction practices, efficient operation and control of mechanical and power systems, alternative power sources, and sustainability incorporated in the design of human environments.
   - ✓ Arch 245, 341, 342, 343, 445, Building Science and Technology sequence: sequence was revised to include sustainable and green design principles.
   - ✓ Arch 597, Urbanism Theory: engages issues of social equity, informal systems, and ecological systems with respect to spatial structures beyond the scale of the

individual building or site.

- ✓ Arch 601, Sustainable Building Design: new required graduate design studio in architecture that pertains to Net-Zero design principles. The studio addressed the post-flood reconstruction of the New Bohemia in Cedar Rapids.
- ✓ ArtID 267, 367, 463, Studios in Interior Design: Sophomore Residential design studio includes the requirement for Universal Design coupled with a sustainable approach to both interior finishes and construction. The Junior Studio in Assisted Living actually requires sustainable materials and construction as well, as does the Senior Level Corporate Design Project and The HDR Healthcare Option Studio. HDR, in particular, has been especially keen on updating information we have to reflect the most current thinking and practices regarding sustainable design in healthcare.
- ✓ ArtID 350, 353, 352, Materials and Assemblies: Lecture class involves a fully sustainable approach to the material assembly, building techniques and lighting.
- ✓ ArtIS 360x, Sustainable Furniture Design.
- ✓ CRP 432, Community Planning Studio II: required undergraduate planning studio that developed a Sustainability Plan for Fairfield, Iowa
- ✓ CRP 532, Community Planning Studio: required graduate planning studio that developed VA Hospital Campus Reuse Plan in Knoxville, Iowa
- ✓ Dsn S 546 section 3, Green Campus and Building Planning and Design for a Small Tribal College: Campus design for a potential new university for the Cheyenne and Arapaho Nations of Oklahoma based on green design principles and potentially "off-the-grid."
- ✓ Dsn S 546 section 5, Haiti Competition Studio: issue-based design examining how to address issues such as sanitation, environmental degradation, and education through design thinking.
- ✓ Dsn S 546 section 9, Zero-Energy Building and Sustainability: a design studio that utilizes a fast-paced integrated design method to design a modest, high-performance office and training center and related site development, engaging students with industry, building professional and building owners to assess the viability of affordable zero-energy sustainable building.
- ✓ EE 303. Energy systems and power electronics, in identifying decision problems within power systems that affect and are affected by economic, environmental, and socio-political influences.
- ✓ EE 459/559. Electromechanical wind energy conversion and grid integration
- ✓ EE 552, Energy system planning, the impacts of all power generation technologies are identified in terms of their costs and their environmental influences (water use, land use, nuclear waste, "criteria" pollutants, and CO2 emissions), a legislative history of the EPA and the clean air act amendments is presented, and the US SO2 Cap and Trade program is described.
- ✓ I E 441. Course includes a brief discussion of sustainability. Students write an assignment discussing realistic constraints and ramifications related to sustainability for their specific capstone design projects, and discuss same in their final project reports.
- ✓ LA 302, Ecological Design at the Regional Scale: required undergraduate studio that addresses sustainability on multiple levels from stormwater mitigation to the design of local food systems. Students visited Fairfield Iowa to tour sustainable businesses, wind-generated electrical plants and an off-grid ecovillage.

10. Sponsor Town Hall meetings on campus to discuss curricular efforts related to sustainability. No updates at this time.

11. Create sustainability enhancements for graduate and professional degree students through certificates, internships, or research partnered with green industry, government agencies, or non-government organizations.
    - ✓ The Department of Mechanical Engineering is leading an effort to develop a coursework-only master's degree in energy systems to provide professional development opportunities for working engineers.
    - ✓ Parks Library provided a sustainability internship focused on creating sustainability-themed educational resources for library patrons.
12. Increase opportunities for sustainability education through stand-along certificates for returning students, certificates through distance education, or cooperative agreements with community colleges. No updates at this time.

Sustainability in Economic Development/Research/Outreach:

Vision: To pursue a sustainable future through economic research development and outreach by:

- o Becoming a world leader in research related to the strengths of the three public universities.
- o Helping Iowa businesses understand challenges and opportunities of a carbon-limited world.
- o Developing and improving alternative energy sources.
- o Serving as models and consultants to local, state, regional, national, and international industries, governments, and communities in issues related to sustainability.
- o Developing public policy and practices for sustainable agriculture, community education for a sustainable lifestyle, sustainable tourism, solutions to problems of solid waste, reduction of pollution in metal casting, bioremediation of hydrocarbon contaminated soils, understanding ground water and surface water contamination, use of embedded sensors and software for systems control, use of geographic information systems to assess water quality and ecological damage, environmental threats to public health, and multimedia to communicate findings of sustainability research to the public.

Progress on Goals:

1. Expand external funding of sustainability research.
    - ✓ Iowa State University researchers have won an additional 24 grants worth a total $11 million from federal agencies awarding money from the American Recovery and Reinvestment Act (ARRA) for a total of 54 grants and $27.38 million to date. Examples of research awards for sustainability research are:
        - o $500,000 to improve Energy Education in Iowa (on all levels of education)
        - o $495,173 to create a methodology for determining best candidates for energy efficiency investments
        - o $2,583,333 to update steam and hot water boilers in two locations at Iowa State University
        - o $4.5M to improve the HVAC system in one of our animal research labs
        - o $1.8M to renovate a Chemical and Biological Engineering department lab
        - o $40,489 to research dislocated employment due to green initiatives
        - o $99,913 to research soil response during earthquakes and tsunamis
    - ✓ The Bioeconomy Institute established campus wide initiatives in microalgae technologies for sustainable agriculture and biobased products; hybrid

processing technologies; and energy systems analysis.

- ✓ The Center for Biorenewable Chemicals continued to establish Iowa State University as the recognized national and international leader in biomass production and processing to bio-based products by building from the successes of the biorenewables-focused research centers, and hosting national and multinational corporation visits to ISU.
- ✓ 21st Century National Energy and Transportation Infrastructures: Balancing Sustainability, Costs, and Resiliency (NETSCORE21): This 4-year, $2M project was funded by the National Science Foundation as one of their Emerging Frontiers in Research and Innovation (EFRI) projects. The immediate objective of this work is to identify US infrastructure investment plans to 2050 in terms of power generation technologies, energy transport and storage, and hybrid-electric transportation systems, identifying when to build, where, which technologies, and how much of each, to achieve desirable balance between sustainability, costs, and resiliency. Data and software to achieve this have been developed and we are now identifying portfolios of energy resources and energy/vehicular transportation systems for various futures, considering both conventional and non-conventional energy supply options, including wind, solar, hydro, nuclear, coal, hydrogen, geothermal, biofuels, biomass, and gasification, together with hybrid electric vehicle and train systems for both freight and passengers. We are applying the same approach to study the infrastructure needs of Iowa. The long-term objective of this work is to provide a national blueprint, together with a modeling process, that drives state and federal energy policy, research, and investment for the next 40 years and beyond.
- ✓ College of Design faculty are engaged at multiple levels from product development to analysis of regional and state policy. Faculty members in Integrated Studio Arts are collaborating with material and plant scientists to develop new bio-based materials. Faculty in the Department of Architecture are examining air movement in passively-conditioned building spaces to improve energy efficiency and human health and comfort. This effort resulted in proposals to NSF and DoE. Faculty in Landscape Architecture and Community and Regional Planning recently completed work examining the efficacy of Ethanol and Biodiesel Plant locations, while students and faculty in Community and Regional Planning conducted research on manufacturing clusters in support of Iowa's wind energy production growth. Faculty are also conducting research on the availability and production of affordable housing across the state of Iowa.
- ✓ ISU faculty received an ARPA-e grant to study how algae can be used for advanced biofuel production. During the first year of the ARPA-E project Dr. Spalding and his team have demonstrated enhanced traits, including improved productivity and increased oil content, for the microalga, Chlamydomonas. This alga was chosen for its genetic tractability, enabling the genetic recombination and stacking of selected or engineered traits to enhance the potential for long-term sustainability of microalgae-based production of renewable bioproducts, including biofuels. Although further enhancement of oil content will be needed to make Chlamydomonas competitive with genetically-intractable, wild algae selected solely for high oil production, they have been able to demonstrate the value inherent in the ability to genetically combine desirable traits, similar to crop breeding.
- ✓ The Center for Crops Utilization Research (CCUR) and the BioCentury Research Farm provide a platform for development and commercialization of sustainable,

biobased technologies in biomass production, collection, densification, and storage; biochemical and thermochemical processing; and biobased product manufacturing. Bio-oil, biochar, and vegetable oil extraction using water are example research projects.

- ✓ The Center for Building Energy Research facilitates interdisciplinary research teams with the goal to reduce energy consumption in buildings, and optimize the design process and energy management. CBER also works to understand climate change impact on building energy consumption.
- ✓ An interdisciplinary team with participants from the College of Engineering, the College of Agricultural and Life Sciences, and the Institute for Research and Technology has received a three-year NSF award to promote research efforts at the undergraduates in the area of wind energy sciences, policy and engineering.
- ✓ The Iowa Energy Center (IEC) received a $495,173 ARRA grant in FY 11 from the Iowa Office of Energy Independence to conduct a state-wide public facility energy benchmarking pilot project. This project will yield a framework for on-going building energy efficiency research.
- ✓ The Iowa Water Research Center sponsors and promotes water quality research and outreach by funding competitive seed grants addressing critical water quality issues in Iowa and student engagement with water conservation projects that support a wide range of water educators in agencies and schools. This year, 2 seed grants were funded supporting 5 graduate and 4 undergraduate students.

2. Continue to work with other educational leaders at all levels and leaders in the private sector to develop a statewide science and technology plan to reposition Iowa for workforce development and to capitalize on the unique strengths of each of the three public universities.
   - ✓ ISU Dining provided hands-on specialty training to food professionals from the Fairfield School District.
3. Sponsor seminars for industries in wind energy, biofuels, solar and other renewable energies, biobased energy, and other biobased products.
   - ✓ The Iowa Energy Center sponsored 14 conference and small demonstrations in across the state of Iowa focused on energy efficiency and renewable energy technologies.
   - ✓ As part of a collective partnership between the Iowa Renewable Energy Association and the Regent Institutions, ISU provided in-kind sponsorship of the 2011 IRENEW Expo and Symposium Event.
4. Work with students and businesses to exploit opportunities made available by the promotion of sustainability.
   - ✓ *Wind Energy Research Experience for Undergraduates*: A 3-year $400k "Research Experience for Undergraduates" (REU) summer program for exposing undergraduates to research in Wind Energy Science, Engineering, and Policy (WESEP) has been recently funded by the US National Science Foundation. The program is designed to enable undergraduate (UG) students to aspire to leadership in wind energy research that contributes to the workforce needed for enhancing use of renewables in meeting national energy needs.
   - ✓ A group of architecture students from the Iowa State University's College of Design spent the summer of 2010 in Berlin to study issues of climate change and sustainable urban development. The group was led by Ulrike Passe, director of the IPRT's Center for Building Energy Research and an assistant professor of architecture at Iowa State.
   - ✓ CBER is collaborating with the National Renewable Energy Laboratory (NREL) and Iowa DNR on the installation for a data acquisition system on the 2009 Solar

Decathlon house, which is opened in summer 2011 as the Iowa Honey Creek State Park Activity and Interpretive Center promoting building integrated renewable solar energy.

5. Conduct an ongoing series of high profile workshops on sustainability, available to the public, including major international conferences on renewable energy and water resources.
   - ✓ In June 2010, ISU hosted U.S. Biochar Initiative 2010 Conference, Ames, IA.
   - ✓ In September 2010, ISU hosted the first Symposium on Thermal and Catalytic Sciences for Biofuels and Biobased Products.
   - ✓ The Center for Crops Utilization Research (CCUR's)'s Biopolymers and Biocomposites Research Team hosted the 2010 Midwest Biopolymers and Biocomposites Workshop.
   - ✓ The Iowa Energy Center conducted a national NH3 (Ammonia) Fuel Conference in Romulus, Michigan highlighting ammonia research conducted by ISU and UI researchers.
   - ✓ The Iowa Water Research Center convened a state water conference linking multiple stakeholder groups with multiple and sometimes competing water interests; the theme of the conference was; 'More Water to Manage' and over 460 people participated in this conference.
   - ✓ ISU Extension partnered with Iowa Energy Center, MidAmerican Energy Co., Touchstone Energy Cooperatives of Western Iowa, Plymouth County Farm Bureau, Plymouth County Economic Development, and USDA Rural Development to host the Wind and Solar Energy Conference in Plymouth County on March 2, 2011. Approximately 158 farmers, landowners, community leaders, bankers, local officials, and business leaders, as well as high school and community college students and instructors, came to learn about these renewable resources.
6. Exploit the creative resources of the Internet to share the vision, knowledge, and practices and to invite engagement in these challenging issues of the 21st century.
   - ✓ Development and dissemination of an online monthly newsletter, *Live Green Monthly* that highlights sustainability initiatives and efforts of Iowa State University including research and engagement opportunities.
   - ✓ The Solar Decathlon Data Acquisition system will make real time energy data available through the internet.
7. Assist in the implementation of sustainable practices by firms and government agencies, including the identification of cost-effective environmentally-friendly processes that are economically sustainable to generate a normal rate of profit.
   - ✓ Bioeconomy Initiative faculty members have established an Initiative for a Carbon Negative Economy with funding from the College of Engineering's Venture Fund that involves faculty from leading U.S. universities and representatives from industry.
   - ✓ ISU Faculty and staff collaborated with colleagues at UWM, Purdue, UNL, UMN to secure $25M from USDA to support a research, education, and outreach program titled: Sustainable Production and Distribution of Bioenergy for the Central USA.
   - ✓ The Iowa Energy Center is piloting a web-based public facility energy benchmarking project to systematically determine the best building candidates for further energy efficiency / economic analysis and improvement. This benchmarking methodology could have significant positive impact on cost-

effective energy efficiency improvements in Iowa's public building stock.

- ✓ Center for Building Energy Research and IPRT Company Assistance Program conducted energy efficiency audits with a major Iowa based global logistics company.
- ✓ The Leopold Center conducted workshops, listening sessions, surveys and focus groups with more than 1,000 Iowans to develop the Iowa Local Food and Farm Plan that contains 34 recommendations focused on supporting and expanding local food businesses in Iowa. The plan was submitted to the Iowa Legislature in January 2011, and several recommendations already have been adopted.

8. Develop new methods of analysis for evaluating the sustainability of alternative natural and built environments within different economic systems.
   - ✓ The College of Design engages in the development and testing of models of sustainable development through active learning, research, and outreach activities. Engagement based studios bring together students and faculty with communities, organizations, and practice to work on challenging problems. A number of studios focus on issues of sustainability. In Architecture, one example is the "Bridge Studio" to develop prototypes for affordable, energy-efficient, single-family housing. More details on sustainable, affordable housing in flood-affected neighborhoods of Cedar Rapids, which was the focus of this year's Symposium on Affordable Housing and Disaster Resilience: may be found http://www.news.iastate.edu/news/2011/apr/CoDHousingSymp. In the Department of Community and Regional Planning undergraduate studio, students worked with the City of Fairfield, IA to develop a sustainability plan, while in the graduate studio, students worked with Knoxville, IA to develop prototypes for economic development and facility reuse in the face of the closure of their VA Hospital campus. In the Department of Landscape Architecture students are working with residents of the 6th Avenue District in Des Moines on issues of social and economic sustainability through food systems and civic space production.
   - ✓ IPRT's Center for Building Energy Research has a grant from the Center for Global and Regional Environmental Research (CGRER) at the University of Iowa to study the impact of regional climate change on building energy performance. This understanding will be crucial to develop sustainable buildings and will lead to tools that can incorporate the uncertainty and risk of changing climate data into building design and energy management.
   - ✓ The NDE Group of IPRT's Iowa Companies Assistance Program has supported several Iowa companies in assessing the quality and uniformity of their bio-based products. As companies look at new markets and new products, the ability to assess their products and processes nondestructively can be a critical step in demonstrating viability.
   - ✓ College of Agriculture and Life Sciences' Greenlanders Green Team is focusing efforts on a method to calculate a baseline estimate of the carbon stored or sequestered on the university lands. The project is led by Natural Resource Ecology and Management faculty, with the majority of the work performed by two undergraduate students participating in the Science with Practice program. The research protocol, initial data collection and modeling are substantially complete for forested properties. A review of the work will be performed by on campus peers. The next phase will focus on land actively managed for agricultural purposes, with the final phase focused on developed campus properties
9. Develop and transfer new technologies that conserve energy, matter, and, in particular, water, air, minerals, and other natural resources.

- ✓ IPRT's Center for Building Energy Research is a partner in the retrofit of a historic commercial building in the Sherman Hill District of Des Moines, Iowa. The developer, Chaden Halfhill (Indigo Dawn LLC and Silent Rivers, Inc.), has begun construction on the project called "Green and Main," a retrofit of a small-scale building with intentions of receiving LEED platinum certification. CBER's role is to help the project reach its energy efficiency and educational goals.
- ✓ CBER will monitor the energy performance of the 2009 Solar Decathlon house.
- ✓ The Leopold Center for Sustainable Agriculture, ISU's ABE (Dept. of Agricultural and Biosystems Engineering) and external partner Iowa Soybean Association completed economic and environmental performance evaluation for a new on-farm technology - denitrifying bioreactors – that is compatible with existing cropping practices and captures nitrate in water from underground tile drainage lines at the edge of fields, yielding water that is much cleaner when it enters Iowa streams and rivers.
- ✓ Extension and Fairfield are promoting sustainable living and energy efficiency with a shared employee who encourages and facilitates community sustainability programs initiated by businesses, industry, and other organizations in Fairfield and throughout 23 southeast Iowa counties. Fairfield's Iowa Power Fund Grant from the Iowa Office of Energy Independence provides primary funding, with additional support from private contributions, the City of Fairfield, and ISU Extension. From backyard conservation workshops to promoting sustainability at community events, the partnership is helping move Fairfield's "Go Green" strategic plan from concept to reality. The city's goals include creating and maintaining a sustainability culture; creating jobs, wealth, and opportunities for investment with sustainable development; and achieving sustainable community design, public policy, and infrastructure.
- ✓ Iowa State University Dining Services, Department of Residence, Facilities Planning and Management, University Compost Facility, and student organization, The GreenHouse Group, were awarded the 2010 Governor's Environmental Excellence Award and Special Recognition Award in Water Quality for their exemplary efforts in waste reduction, recycling, and supporting local business.

10. Sustain and create industries that drive the world's economic engines to improve the quality of life.
    - ✓ Joint research efforts are in place to improve the manufacturing and inspection of wind turbine blades with TPI, a Newton-based manufacturer.
    - ✓ The Iowa Energy Center / ISU BECON facility has provided a setting for pilot-scale bioenergy research and demonstration for ISU researchers and Iowa-centered start-up companies.
    - ✓ CBiRC has helped nurture start-up companies from ISU technology in sustainability, and have helped create several start-up companies (Avello and Glucan Biorenewables).
    - ✓ The IPRT Company Assistance R&D cost sharing program facilitated collaborations between five Iowa companies with researchers from 3 ISU colleges for research and development projects in technologies related to energy efficiency of buildings, bio-based fuels and chemicals, and fuel efficiency of diesel engines.

    - ✓ Extension efforts are helping advance the federal BioPreferred program and biobased products. In 2010, ISU Extension and USDA facilitated three public meetings with more than 400 stakeholders to talk about this program that

requires all federal agencies to give preference to biobased products if they are reasonably available, reasonably priced, and meet performance standards. Extension supported USDA efforts at the GSA Expo conference by providing biobased product training to more than 2,000 federal, state, and local procurement officials on the potential for biobased products in green purchasing. Also because of ISU Extension efforts, 23,000 branded, biobased products from more than 2,200 U.S. manufacturers and vendors now are available through the BioPreferred program. Growth in the federal market for biobased products will enable manufacturers to produce biobased products more economically in commercial markets and spur development of new products.

11. Continue to develop and grow programs that are directed at sustainability for the nation and the developing world.
    - ✓ Through a shared position with the City of Ames, the Director of Sustainability is facilitating the City of Ames Sustainability Task Force focused on increasing the engagement of the Ames community in sustainability. Initial focus of this seven sector, 13 member task force is the reduction of electrical consumption.
    - ✓ There is a variety of research and curricular initiatives underway on the ISU campus that focus on furthering sustainability, as described throughout this report.
12. Provide public education to increase energy and resource conservation and the recycling and reuse of material.
    - ✓ The Iowa Energy Center conducts and sponsors public education programs centered on energy efficiency and renewable energy technologies.
    - ✓ Through sponsorship support from the Council on Sustainability, the College of Design hosted “A Week of Sustainable Cities” during Fall 2010, which featured the “Toward Sustainable Cities - Berlin Summer Academy 2010: Design Towards a Low-carbon Life Style” Exhibition, public lectures, and the opportunity for campus and community dialogue and engagement.
    - ✓ Through sponsorship support from the Council on Sustainability, the College of Design offered a free, public event, “Affordable Housing and Disaster Resilience Symposium” during Spring 2011 focused on strategies for continued development of sustainable neighborhoods and affordable housing in flood affected areas.
    - ✓ The Council on Sustainability hosted a Sustainability Forum featuring discussions led by student attendees of the AASHE 2010 Creating Sustainable Campuses and Communities on sustainability topics including student sustainability engagement opportunities, funding sources for campus sustainability projects, and sustainable transportation.
    - ✓ IPRT’s Center for Building Energy Research is a partner in the retrofit of a historic commercial building in the Sherman Hill District of Des Moines, Iowa. The developer, Chaden Halfhill (Indigo Dawn LLC and Silent Rivers, Inc.), has begun construction on the project called “Green and Main,” a retrofit of a small-scale building with intentions of receiving LEED platinum certification. CBER’s role is to help the project reach its energy efficiency and educational goals.
    - ✓ In 2004, the city of Le Claire was accepted into the Partnering Landscape and Community Enhancement (PLaCE) program offered through ISU Extension and the ISU College of Design’s Institute for Design Research and Outreach (IDRO). The community was paired with Iowa State community planning students who developed a comprehensive plan to address growth, transportation, the river and recreation, downtown revitalization, and tourism. Six years later, the city has

completed phase one of a multimillion-dollar streetscape enhancement. According to Rick Reed, a member of the economic development board for the Le Claire Chamber of Commerce, PLaCE has been a catalyst for positive development in the community.

- ✓ Development and dissemination of an online monthly newsletter, Live Green Monthly that highlights sustainability initiatives and efforts of Iowa State University including research and engagement opportunities.
- ✓ Ongoing development of a Live Green! website that highlights sustainability initiatives and efforts of Iowa State University including research.
- ✓ Completion of the 3rd Annual ISU Symposium on Sustainability on February 21-22, 2011. The symposium offered students, staff, and faculty the opportunity to learn about Iowa State's sustainability accomplishments, initiatives, and activities of the past year, hear from those who have taken an active role in ISU's Live Green! initiative, and gain awareness from national and international sustainability keynote speakers.

13. Strengthen public education to reduce soil erosion, increase the use of best management practices regarding pesticides and fertilizers in agriculture, and to increase energy efficiency on farms.
    - ✓ The Leopold Center for Sustainable Agriculture and the Iowa Learning Farms created and promoted several educational materials and programs on soil erosion and lower use of chemicals, including cover crop systems for Iowa video, the award-winning Troubled Waters video and the launching of the Conservation Station, a mobile learning center that travels the state educating Iowans about the importance of soil and water.
    - ✓ ISU Extension collaborates with extension services from other Midwestern states in the annual Midwest Composting School to train composting operations on best management practices. Participants include engineers, consultants, farmers, agribusiness professionals, commercial composters, and regulators. Participants attend a combination of in-class and field activities, working in teams to learn how to use problem-solving tools they can apply in their daily operations. In survey results, all participants rated the school as good or excellent; 99 percent of the participants found the education useful for their composting operations.
    - ✓ As Iowans consider organic and vegetable production as possible sustainable alternatives to conventional agriculture, ISU Extension's Ag Decision Maker website provides data, budgets, and decision tools on topics such as developing whole-farm and enterprise records, making the transition to organics, and pricing for profit. In addition, ISU Extension specialists present educational sessions on these materials. As a result, clients have indicated they plan to keep track of time and costs of production, evaluate and choose the right mix of products, and develop budgets for signature crops.

Other Sustainability Efforts:

In addition to the above noted functional areas, Iowa State University has been very involved in identifying, planning, and facilitating opportunities for faculty, staff, and

students to engage in sustainability events, initiatives, and awareness building over the past year. These opportunities have not only included the campus community; they have also included collaborative opportunities with the Ames community. The highlights of this campus and community engagement have included the following:

Campus Engagement:

For students:

- Permanent appointment of a Director of Sustainability to the Government of the Student Body Cabinet.
- Establishment of a Government of the Student Body Sustainability Committee.
- Participation in the Campustown Action Association focused on revitalizing the Campustown community.
- Participation the City of Ames Sustainability Task Force (via the GSB Sustainability Director) focused on increasing the engagement of the Ames community in sustainability with initial focus on the reduction of electrical consumption.
- Participation in the National Electrical Contracting Association's Green Energy Challenge – international event focused on increasing the energy efficiency of a campus student housing facility (via the ISU Student Chapter of the National Electrical Contracting Association).
- Completion of a t-shirt collection event aimed at reducing the university's waste stream and providing clothing to communities in need (via the Frederiksen Court Community Council).
- Completion of a FreeCycle for students, faculty, and staff (via the ISU Dining Sustainability Coordinator).
- Participation in "Live Green at the Memorial Union" events increasing education, awareness, and engagement opportunities (via the Live Green interns).
- Partnership of Government of the Student Body, in providing a paperless Memorial Union Event Authorization process.
- Implementation of the Greeks Go Green Initiative focused (initially) on increasing the energy efficiency of housing in the Greek Community.
- Completion of a Battery Collection Competition and Battery Recycling Education and Awareness Event (via SIFE – Students in Free Enterprise).
- Establishment of a campus car sharing program.
- Production of biodiesel (via the student organization, ISU Biobus), from used cooking oil to be utilized in campus and community public buses, and participation in the Earth Day Launch Party (featured in U.S. News and World Report's list of "10 College Campuses Getting Creative for Earth Day".
- Participation in the EPA Game Day Recycling Challenge – national competition focused on large event waste diversion (via the student organization Engineers for a Sustainable World).
- Participation in Earth Hour – international event focused on raising awareness regarding energy use – (via The GreenHouse Group).

- Participation in Recyclemania – international competition focused on campus waste diversion (via The GreenHouse Group).
- Commitment to sustainability in the 2011 annual community Fashion Show – sustainability was this year's theme and was woven into the entire Fashion

Week event including a Central Campus tie-dye event, a recycled materials design competition, and stage curtains made from recycled materials.

- Commitment to sustainability in the 2011 annual community Modern Dance Company event, Barchje – sustainability was this year's theme and was woven into the entire performance, "Project Earth: Dance, Nature and Sustainability".
- Establishment of a community clothing swap event (via Closets Collide).
- Establishment of a beverage container recycling initiative, "Get Caught Green Handed" as part of annual VEISHEA event (via The GreenHouse Group).
- Establishment of a student-managed campus food bank for students (SHOP – Students Helping Our Peers).
- Establishment of two Live Green internship positions.
- Participation in the American Solar Challenge and Formula Sun Grand Prix (via Team PrISUm).
- Development of VEISHEA and Earth Day Campus Sustainability Tours (via Leaders for a Sustainable Community).
- Development of sustainability-themed reference resources through a graduate and undergraduate internship at Parks Library.
- Development and dissemination of an online monthly newsletter, Live Green Monthly that highlights sustainability initiatives and efforts of Iowa State University including research and engagement opportunities.
- Implementation of a single-stream recycling campus expansion pilot project (via the Government of the Student Body Sustainability Committee).
- Participation in Raketober Fest (via The GreenHouse Group) focused on raising awareness about composting.
- Participation in a disposable water bottle sculpture contest (via ActivUS) focused on raising awareness about disposables in the waste stream and alternatives to using disposables.
- Participation in VEISHEA Service Day opportunities including Keep Iowa State Beautiful's Stash the Trash community event.
- Participation in a Student Sustainability Visioning Session held during the 3rd Annual Symposium on Sustainability Event, February 21-22, 2011.
- Participation in Global Fast (via Engineers for a Sustainable World) focused on ending extreme global poverty through sacrificial living and effective giving. ISU's Global Fast project focused on increasing access to clean and reliable water resources through giving up a meal and donating its value.
- Completion of individual, class, and organizational projects focused on the following sustainability topics:
  - Carbon Footprint
  - Solar Lighting
  - Expansion and Diversification of Campus Recycling
  - Sustainability campus education and awareness promotions and products (including press releases, website design, social marketing, event publicity, how-to guides, living green tips, informational presentations and interpretive signage for campus sustainability products and processes)
  - Waste Management
  - Waste Diversion
  - Water Availability
  - Water Quality
  - Water Conservation
  - Energy Conservation

- ❖ Sustainable Fashion
- ❖ Sustainable Food Supply
- ❖ Sustainable Transportation
- ❖ Sustainable Funding

For faculty and staff:

- Participation in Earth Week State and Federal Employees Electronics Recycling Event.
- Participation in Keep Iowa State Beautiful's annual Stash the Trash community event.
- Participation in Global Fast.
- Participation in VEISHEA "Get Caught Green Handed" recycling event.
- Participation in VEISHEA and Earth Day Campus Sustainability Tours.
- Opportunity for faculty and staff involvement on newly established Campus Sustainability Working Group – which included the completion of a Sustainability Planning Document.
- Participation in Faculty and Staff Sustainability Visioning Sessions held during the 3rd Annual Symposium on Sustainability Event, February 21-22, 2011.
- Development and dissemination of an online monthly newsletter, Live Green Monthly that highlights sustainability initiatives and efforts of Iowa State University including research and engagement opportunities.
- Participation in the National Electrical Contracting Association's Green Energy Challenge – international event focused on increasing the energy efficiency of a campus student housing facility.
- Participation in the Campustown Action Association focused on revitalizing the Campustown community.
- Establishment of a Wellness Subcommittee of the VP of Student Affairs Green Team focused on social sustainability opportunities including support of the student food bank and workplace safety.
- Completion of a t-shirt collection event aimed at reducing the university's waste stream and providing clothing to communities in need.
- Completion of a campus FreeCycle event.
- Implementation of the Greeks Go Green Initiative focused (initially) on increasing the energy efficiency of housing in the Greek Community.
- Participation in a Battery Collection Competition and Battery Recycling Education and Awareness Event.
- Development of a campus car share program.
- Participation in the EPA Game Day Recycling Challenge – national competition focused on large event waste diversion.
- Participation in Earth Hour an international event focused on raising awareness regarding energy use.
- Participation in community clothing swap events.
- Participation in the establishment and support of a student-managed campus food bank for students.
- Design and implementation of a single-stream recycling campus expansion pilot project.

Community Engagement:

- Keep Iowa State Beautiful's Stash the Trash community event
- VEISHEA "Get Caught Green Handed" recycling event.
- VEISHEA Campus Sustainability Tours
- National Town and Gown Association's Annual Conference
- City of Ames Sustainability Task Force
- Greeks Go Green Initiative
- Ames EcoFair
- AMOS (A Mid-Iowa Organizing Strategy) Sustainability Panel Discussion
- Kate Mitchell School Community Garden
- Campustown Action Association
- Intermodal Facility
- Various educational, training, and awareness events and opportunities (tours, lectures, dinners, hands-on training, and service learning) are offered to the Ames community by ISU Dining.