

## **II. Introduction**

Experts in various disciplines and arenas have shown that human impacts on the environment are creating situations that lower the capacity of Earth to support humanity and other life forms, and that in certain key arenas the situation is likely to deteriorate. Efforts to mitigate the problem have revolved around the concept of humanity living in a sustainable fashion.

Although there are various definitions of sustainability, the basic meaning is living in a way that ensures that future generations enjoy the benefits of a healthy environment and social well-being. Sustainability is not limited to environmental concerns but rather integrates three dimensions: ecological integrity, social justice, and economic well-being. It is also not limited to merely preserving resources. It also includes positive steps toward ecological, social, and economic health.

UW Oshkosh has been making significant steps towards a sustainable future. Progress towards campus sustainability can be traced back to strategic planning that occurred earlier in the decade. As a result of that planning, the university developed a series of statements and guiding principles have influenced our efforts. The UWO **Vision** includes the goal of being “a national model as a responsive, progressive and scholarly public service community known for its accomplished record of engaging people and ideas for common good.” One of our sets of **Core Values** is “Social Awareness and Responsiveness. We believe that educators and students should explore and engage the challenges that confront regional, national and global communities, using their intellectual and creative capabilities to understand, investigate and solve problems. Social awareness will allow us to respond to domestic and international needs for equitable and sustainable societies.” By endorsing the **Earth Charter**, UW Oshkosh has committed itself to the principles of ecological integrity, social and economic justice, and democracy, nonviolence, and peace. The Charter states that “we must decide to live with a sense of universal responsibility, identifying ourselves with the whole Earth community as well as our local communities.”

Over the last five years, the institution has created campus master plans, conducted an environmental audit, and made material investments in staff and infrastructure. The university today is acknowledged as a regional leader in operations, teaching, and campus events related to sustainability. The Higher Learning Commission, during a recent reaccreditation visit, specifically recognized the distinctiveness of our “green and sustainable initiatives”. However, until now, the university had not developed a sustainability plan to help coordinate and guide further transitions.

In higher education, the notion of sustainability has special meanings. University Leaders for a Sustainable Future (ULSF) has stated that: “‘Sustainability’ implies that the critical activities of a higher education institution are (at a minimum) ecologically sound, socially just, and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally sound and socially just society. The institution would function as a sustainable community, embodying responsible consumption of food and energy, treating its diverse members with respect, and supporting these values in the surrounding community.”

As this definition suggests, there are various aspects to sustainability in higher education. Four dimensions are often highlighted: teaching, research, operations, and outreach, with the notion of sustainability having different nuances in each. The Presidents Council on Sustainable Development has added that “Education for sustainability is a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, and commitment to engage in responsible individual and cooperative actions. These actions will help ensure an environmentally sound and economically prosperous future.” Education for sustainability, then, seeks to empower students with a deep sense of environmental and social citizenship and with the knowledge and skills needed to work effectively for sustainability. Sustainability in research involves gaining expertise and communicating new ideas that enable society to create a sustainable future. Sustainability in operations involves minimizing our ecological footprint and ensuring an economically and socially just community on campus. Sustainability in outreach includes sharing that knowledge with the broader community, as well as obtaining financial resources necessary to do all of these goals.

### **Team Creation**

On October 2, 2006, Chancellor Wells established a Campus Sustainability Team and charged it with the responsibility of developing an integrated Campus Sustainability Plan (CSP) which would guide the University in an effort to be a leader in responsible environmental stewardship, education, outreach and research. The full text of the Chancellor’s Charge memo is attached in Appendix A, and specific elements, Team Goals, and Plan Goals are listed below:

### **Chancellors Charge**

The Campus Sustainability Plan will:

- ❖ Indicate how the plan is an outgrowth of UW Oshkosh’s Governing Ideas, an endorsement of Earth Charter, and a recognition of the university’s responsibility to work toward a sustainable future.
- ❖ Help ensure that our campus sustainability is comprehensive, including operations, teaching, research, and outreach.
- ❖ Make substantive recommendations for achieving sustainable operations and sustainability education based on environmental audits and needs assessments.
- ❖ Increase the sense of environmental and social citizenship of UW Oshkosh as a whole and as one goal of our students’ education.
- ❖ Cultivate awareness and appreciation on campus of sustainability, its relevance throughout the university, our responsibility to promote it.
- ❖ Be distributed for consideration by governance groups, vice chancellors and deans.

### **Team Goals**

In accomplishing the team charge, the Team will pursue the following goals:

- ❖ Maximize campus ownership of the planning process and the resulting plan;
- ❖ Involve internal and external University constituents in the on-going operational planning and refinement process;
- ❖ Analyze the current level and significance of sustainability in operations, teaching, research, and outreach;
- ❖ Analyze the resources being used for campus sustainability and estimate additional resources

- needed;
- ❖ Clarify the notion of campus sustainability, learning from how other campuses and organizations conceptualize sustainability and put sustainability into practice; and
- ❖ Establish criteria for UW Oshkosh to be a model institution dedicated to sustainability.

### **Sustainability Plan Goals**

The proposed goals should:

- ❖ be easy to measure, so as to hold UW Oshkosh accountable for progress
- ❖ avoid confusion with broad strategies and action plans
- ❖ align with, or minimize conflicts with, other university strategic and operational plans
- ❖ share responsibility and benefits with the whole University
- ❖ be engaging and strategic
- ❖ demonstrate a grounding in baseline data and needs assessments
- ❖ apply both internally and externally to university-related activities.

### **Team Membership**

Twenty six members of the campus community participated in the plan development. The Campus Sustainability Team comprises a wide spectrum of students, faculty and staff who were selected because of their expertise and commitment to work together toward sustainability goals. Listed below are the members who have served on the Campus Sustainability Team:

Steven Arndt (Co-Captain, Facilities Management)  
 David Barnhill (Environmental Studies)  
 Michael Burayidi (Geography & Urban Planning)  
 James DeDecker (student)  
 Iryna Depenchuk (student)  
 Cathy Deringer (Grounds Crew, Facilities Management)  
 Jessi Dresen (student)  
 Steve Dunn (Business Administration)  
 Jim Feldman (Environmental Studies)  
 Tom Fojtik (Residence Life)  
 Marcy Hauer (Chemistry Stockroom)  
 Chuck Hermes (Facilities Management)  
 Jim Johnson (Purchasing)  
 Tamara Jones (student)  
 Jacob Jungers (student)  
 Michael Lizotte (Co-Captain, Aquatic Research Laboratory)  
 Colleen McDermott (Biology & Microbiology)  
 Greg Olson (student)  
 MaryBeth Petesch (COEHS)  
 Dan Potratz (student)  
 Andy Robson (L & S Dean's Office)  
 Olesya Savchenko (student)  
 Adam Stern (student)  
 Dani Stolley (Foundation)

Marty Strand (University Dining)  
Mark Streufert (Facilities Management)  
Abby VanStraten (student)  
Michelle Wentz (Residence Life)

### **Plan Development Process**

The Campus Sustainability Plan (CSP) was developed as a result of a year long effort by team members. Listed below are highlights of that effort:

October 2006: Chancellor's charge to the team

November 2006 to February 2007: Team divides into four squads based upon Operations, Research, Teaching and Outreach components of the plan. Squads meet on a regular basis to research, analyze and develop potential recommendations for the plan.

April-May 2007: Team performs an on-line ranking exercise of assembled recommendations.

June 2007: Team co-chairs meet with Chancellor to provide a status update on the plan.

June – August 2007: Writing team begins work on the creation of a draft plan with a completion date of late August 2007. The writing team is composed of the following individuals: Steven Arndt, Michael Lizotte, David Barnhill, and Jim Feldman.

August –November 2007: Draft plan reviewed by various governance groups, and other entities. Plan placed on the web for public comment. Conducted workshop with Johnson Controls. Revisions to plan based upon feedback from campus community.

January 2008: Anticipated completion of revisions. Final version of plan placed on the web.

### **Plan Organization**

The Campus Sustainability Plan contains an Executive Summary, an Introduction, six sections containing specific recommendations (Organization, Operations, Teaching, Outreach, Research, and Assessment), and a Conclusion. The recommendation sections are organized in a similar fashion, starting out with a long term vision, an introduction, major goal, history of campus activity, and an action plan. The action plan contains recommendations for achieving the stated goals. Specific recommendations are categorized as either possible today ("initial consideration"), requiring more time ("within three years"), or long term (defined as 5 years or greater). The appendices contain more detailed information regarding components of the plan.

### **III. Organization**

**A. Introduction.** To be effective in making sustainability a more significant part of the campus, we need to formalize and institutionalize the university's commitment to sustainability by creating structures and positions that assist in the development, coordination, and oversight of the sustainability initiative. The Campus Sustainability Team considers the recommendations in this section of the plan to be crucial to launching a coordinated effort to carry out the campus sustainability plan. Success in all other areas of the plan is dependent upon sound organization and structure.

**B. Long-term vision:** To have positions, offices, and programs sufficient to support initiatives for, and enhance the importance of, sustainability in all facets of campus life.

**C. Goal:** To establish an organization capable of supporting campus sustainability initiatives as soon as is feasible, but within twelve months of the adoption of this plan.

**D. History:** In recent years, sustainability efforts at UW Oshkosh have been supported by various individuals, offices, and programs, from the Chancellor to student volunteers. A Campus Sustainability Intern position was started in 2005 with financial support from Johnson Controls, which focused on auditing the energy and water use on campus (the position is no longer active). The ES Program established a Green Events Coordinator in 2006 to coordinate sustainability events on campus. In 2006 the Chancellor established the Campus Sustainability Team to create a sustainability plan for the campus. However, this work has generally been done by individuals on top of a full slate of other duties and obligations, making support of sustainability conflict with regular job performance. In addition, we have proceeded without someone who coordinates and has expertise in all the aspects of sustainability. As a result, there is inadequate development and coordination of all the various aspects of sustainability on campus.

**E. Action plan recommendations.**

In order to adequately carry out the ambitious goals contained in this plan, the following organizational changes should be implemented as soon as possible:

**Initial Consideration (First Year)**

- *Create a permanent Campus Sustainability Council, with representation from across campus, to advise campus leaders on sustainability initiatives and to provide oversight of sustainability efforts.*
- *Create a permanent full time position with the title of Campus Sustainability Director. This individual will be tasked with responsibility for coordination across all sustainability related activities. The individual will possess an advanced degree in an appropriately related field and have expertise in energy, environmentalism, ecology and sustainability.*
- *Establish Unit Level Sustainability Coordinators from each functional area. Coordinators will be trained in sustainability initiatives and policies and act as*

*a local resource and sounding board for sustainability related matters.*

- *Designate sustainability responsibilities for Administrators to institutionalize the university's commitment to sustainability.*

### **Within Three Years**

- *Establish a Campus Sustainability Endowment Fund to provide a method for donors to contribute to sustainability and to provide a reliable and continuing source of funds for the future.*

These five recommendations would combine to provide the attention, effort, and resource gathering needed to accomplish specific recommendations listed elsewhere in this plan.

## **F. Organizational Relationships**

While the CST generated many specific ideas about how the organizational recommendations might be implemented (see Appendix C) several are critical to understand how the recommendations are linked:

### **1. Campus Sustainability Council**

The council shall report to both the Vice Chancellor for Academic Affairs and the Vice Chancellor for Administrative Services. The council shall oversee, provide direction to, and evaluate the efforts of the Campus Sustainability Director. It also may assist the Director in certain matters, take leadership in special issues (such as the curriculum), and advise campus leaders on sustainability initiatives. The leadership of the council could be shared (e.g. co-chaired) by staff with demonstrated commitment to sustainability representing both teaching and operational aspects of the university. The goal would be to provide a balanced, well-informed, and objective leadership for this administration-advising body.

The council makes recommendations to the Vice Chancellor for Academic Affairs and Vice Chancellor for Administrative Services on:

- priorities for sustainability plan goals
- soundness of an annual plan and budget drawn up by the Campus Sustainability Director
- campus wide sustainability procedures and policies
- membership in off-campus sustainability organizations or initiatives
- performance of the director.

### **2. Campus Sustainability Director**

The director shall report to the Campus Sustainability Council regarding progress towards the achievement of sustainability goals and objectives. The director could have other stand-alone duties, such as:

- foster coordination and communication between individuals and units
- collect and manage data vital to implement and assess the Campus Sustainability Plan, including an annual environmental audit
- assist and support efforts of students by supervising interns and

- collaborating with student groups
- seek funding and manage grants and contracts
- lead on sustainability training, outreach and publicity (e.g. website, presentations, press releases, events)
- assist faculty teaching by providing information and sharing expertise
- facilitate collaboration with other universities and outside organizations
- assist with sustainability research
- teach a course in sustainability.

### **3. Campus Sustainability Coordinators**

The coordinators would extend the director's capacity to inform the campus community and receive feedback by:

- transferring information to and from major functional areas of the campus
- receiving more training to be able to serve as resource specialists.

### **4. Administrators**

Administrators could call on the director and council to develop and implement strategies for meeting sustainability goals in the area of responsibility. The director, council, coordinators and administrators could all play roles in creating and fostering alliances with surrounding communities, groups and businesses.

## **G. Funding Options**

The human resources described above will need financial and institutional support. The recommendation to establish a fund would provide one instrument for focusing resources, e.g. by collecting donations, revenues, or cost-savings. This would be in addition to using existing means to procure funding through the state, grants, and contracts. Discussions could also be undertaken with the UW Oshkosh Foundation and student organizations about ways they might wish to contribute to fundraising. Regardless of which funding sources are identified, the human resources are a prerequisite to being able to request and manage any financial and institutional resources.

## **H. Budget Recommendation**

An appropriate level of funding will be required for successful implementation of Campus Sustainability Plan. To support the human resources listed above, UW Oshkosh will need to establish an office for the director (space, equipment, supplies, and clerical support). Student assistants would be extremely valuable given the scope (e.g., auditing, planning, outreach) and the importance of student involvement and engagement. The director should have a travel and conference budget (for themselves and campus representatives) and should be provided with funds to host meetings, workshops and training sessions for the campus community. Council chairs (or the units they are re-assigned from) should also be compensated.

Listed below is the recommended budget for the first year of this initiative:

**Salaries**

Salaries (1 FTE Director, 0.5 FTE Program Assistant)	<b>\$90,000</b>
Student Assistants	<b>\$21,000</b>

**Office Start-up (one-time cost)**

Equipment and Website Development	<b>\$5,000</b>
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**Supplies and Expenses**

Consumables	<b>\$2,000</b>
Travel and conference attendance	<b>\$6,000</b>
Memberships	<b>\$2,000</b>
Hosting Programs and Workshops	<b>\$14,000</b>
Compensating units for council chair time	<b><u>\$10,000</u></b>
<b>TOTAL</b>	<b>\$150,000</b>

While the budget recommendation is significant, it is by no means out of line for implementing such a major initiative. This initial budget recommendation is considered the minimum funding level necessary to launch this strategic initiative. It is highly probable that additional resources may become necessary to support the initiative in future years. This first Campus Sustainability Plan is not intended to assess costs, benefits, or sources of funding for each recommendation; however, these dimensions should be considered carefully for any and all initiatives the university chooses to implement.



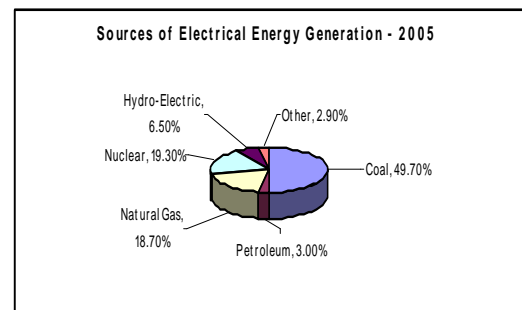
## **IV. Operations**

The operations section of the plan contains eleven sub-sections covering a wide range of activities.

**Long Term Vision:** UW Oshkosh will conduct all aspects of campus operations in a fashion that is ecologically sound, socially just, and economically viable. The campus will assume a leadership role in the effort to create a truly sustainable campus with the goal to have a net zero impact upon the climate and environment.

### **A. Electrical Energy Management and Conservation**

**1. Introduction:** One aspect of life in the developed world is a reliance on electrical energy characterized by extremely high levels of electricity energy consumption, as compared to developing countries. The majority of electrical power generated in the United States (and Wisconsin) is from burning fossil fuels, such as coal, natural gas and oil, to create electrical energy. The bi-products of the combustion process are indisputably linked to the growing problems of air pollution and global climate change. Another major fraction of electricity is generated by nuclear power plants, with growing, unmet needs for proper disposal of nuclear wastes. While a shift to sustainable sources of energy will eventually mitigate some of these problems, immediate efforts can also be taken to reduce the consumption of electricity on campus.



**Sources of Electricity in U.S**

**2. Goal:** To become a national role model for electricity conservation through the rigorous implementation of emerging technology to increase efficiency, and the application of policy-based conservation practices to reduce waste. Our goal is to reduce overall electrical consumption 20% from 2005 levels by 2012.

**3. History:** UW Oshkosh has a significant record of achievement related to electricity conservation.

a. Wisconsin Energy Initiative (WEI) – UW Oshkosh participated in a statewide energy efficiency program called the Wisconsin Energy Initiative (WEI). The program teamed state agencies with energy companies and involved the performance of a series of energy efficiency retrofits to existing facilities. (See Appendix D for details)

b. Other renovations projects funded through the state All Agency program have contributed to energy conservation:

- (1) Replacement of old, inefficient building chiller systems with a central chilled water plant in 2001 and 2006. This plant serves the major core of the campus.
- (2) Replacement of the old inefficient chiller system serving the main dining facility, Blackhawk Commons, in 2006.

c. Energy Management Practices: The facilities management department has aggressively managed the energy consumption within existing facilities by:

- (1) Utilizing the computer energy management system to schedule the heating and cooling of facilities based on occupancy and use. This is particularly important on weekends, evenings and during summer school.
- (2) Programmed thermostats to provide temperatures of 69 degrees in the winter and 74 degrees in the summer.

d. Awards and Recognition: The University of Wisconsin Oshkosh received an EPA Energy Star award in 2005 for devising a method to place computers into a sleep mode when not in use.

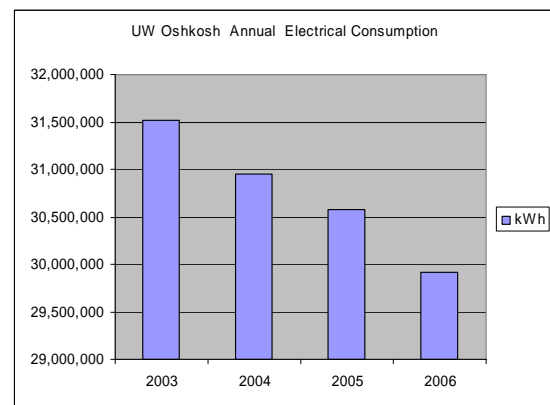


#### **4. Results.**

From 2003 to 2006, UW Oshkosh has reduced its annual electrical consumption from 31.5 million kWh to 29.9 million kWh, which equates to a **5%** **drop** during that time period.

By reducing electrical consumption by this amount, the following emissions are avoided on an annual basis over as compared to emissions in 2003:

Carbon Dioxide: 1,200 tons  
Sulfur Dioxide: 10 tons  
Nitrous Oxide: 4 tons



#### **5. Recent State Government Initiatives**

Wisconsin Executive Order 145, April 11, 2006, directs state agencies to:

- a. meet electricity efficiency (per square foot) goals of a 10% reduction from FY05 energy consumption levels by FY08, 15% reduction by FY09, and 20% reduction by FY10.
- b. establish programs for energy analysis of state owned buildings and identify reduced energy use.
- c. permit performance contracting for energy and operational cost savings.
- d. ensure that new state facilities are constructed to be 30% more energy efficient than commercial code.

As a result of this executive order, UW Oshkosh is currently working with three other state campuses (UW Stevens Point, UW Green Bay, and UW River Falls) and officials from the Department of Administration to develop a Request for Proposals (RFP) for Energy Conservation Services and Guaranteed Energy Savings Projects. The goal of this effort is to retain an Energy Services Company (ECO) at each campus that will perform an energy audit and then implement energy savings projects. The recommendations in this plan will be shared with the audit team for inclusion in the report findings.

#### **6. Action Plan**

The 20% energy reduction mandate contained in Executive Order 145 provides the rationale, support and justification for the specific action plan goals contained in this section. This

action plan is divided into three sections based upon priority. (See Appendix E for details and justification for these proposals)

**Initial Consideration (First Year):**

- *Review, verify and update campus audit data. Identify the campus facilities with the highest electrical energy consumption per square foot.*
- *Provide facility electrical usage feedback and education to campus users.*
- *Turn off unnecessary lights during non teaching periods.*
- *During low useage periods (summer, interim, weekend) consolidate classroom useage to the most energy efficient buildings that meet course requirements.*
- *Replace all incandescent exit signs with LED signs.*

**Within Three Years**

- *Phase in the replacement of old, energy in-efficient equipment with Energy Star rated items. Require all new purchases of certain high energy consuming devices (i.e. refrigerators) to be Energy Star Rated.*
- *Establish guidelines for the connected (plug) load in all campus facilities.*
- *Permanently reduce light levels in hallways/corridors of all academic buildings by as much as 20%.*

**Future Consideration ( Five years or greater):**

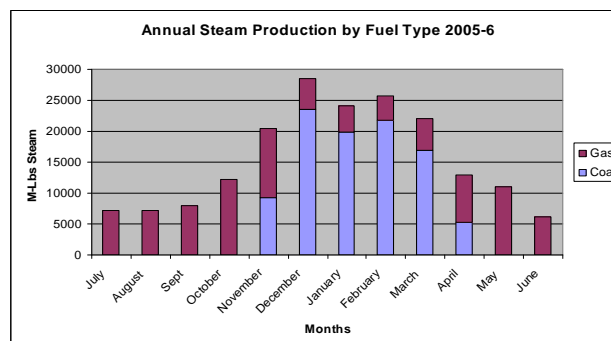
- *Convert pneumatic control systems to direct digital control (DDC).*
- *Convert or replace energy inefficient facility HVAC systems.*
- *Initiate studies of more efficient lighting options (e.g. LED) to estimate when retrofiting will be feasible.*
- *Determine the viability of installing a Thermal Ice Storage Facility.*
- *Install green roofing to reduce summer heat loading during renovations of existing buildings and as part of new construction.*

## **B. Campus Heating**

**1. Introduction:** The Heating Plant, located on the north side of the campus, provides steam to all campus buildings throughout the year for heat, hot water and process uses at Blackhawk Commons and the Halsey Science Complex. The primary fuels for making steam are low-sulfur coal and natural gas. These fossil fuels are a significant contributor of greenhouse gases. Coal is the primary source for creating steam in the winter months while natural gas is the primary fuel used to provide steam over the warmer periods. Wisconsin Dept. of Natural Resources permit requirements stipulate the burning of a 10% mix of natural gas along with the coal during the winter months. The graph provides an illustration of the typical fuel consumption pattern for the heating plant.



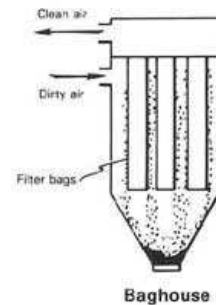
**2. Goal:** To reduce the annual consumption of fossil fuels for heating by 50% from 2000 levels by 2012.



**3. History:** Over the last six years, there have been a number of major renovations to the heating plant that have had a positive impact upon operational efficiency and environmental quality.

a. Controls Upgrade: In 2001 the controls system for the heating plant was upgraded to modern, digital based technology that allow for more precise control and monitoring of the combustion process.

b. Baghouse: In 2002, an environmental controls system, or baghouse was added to the heating plant exhaust system. Baghouses are fabric collectors that use filtration to separate dust particulates from dusty exhaust gases. They are one of the most efficient and cost effective types of dust collectors available and can achieve a collection efficiency of more than 99% for very fine particulates.



c. New natural gas boiler: In 2004, the existing 40 year old 15,000 lb/hr natural gas boiler was replaced with a new 25,000 lb/hr natural gas unit. This upgrade in capacity allowed for a better match of summer steam demand to available production capability.

In addition to the above mentioned facility upgrades at the heating plant, the following changes were made to improve the efficiency of the heating process:

d. Beginning in 2003, Facilities Management began to aggressively schedule the energy management system with the goal to heat and ventilate buildings only as necessary.

e. In 2005, mechanical technicians lowered and calibrated thermostats campus wide. In

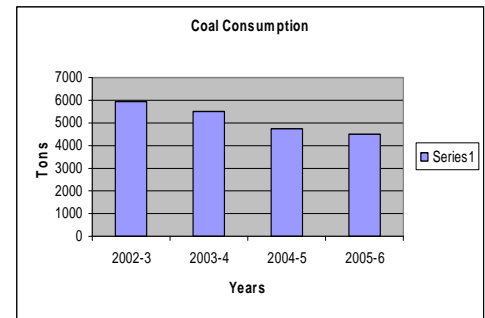
the process, they discovered and corrected numerous operational problems that were causing wasteful and uncomfortable levels of heating and cooling.

f. On an annual basis, steam traps are inspected and repaired. In 2005, as part of the Wisconsin Energy Initiative, the campus replaced and upgraded a significant portion of the campus inventory of steam traps.

#### **4. Results**

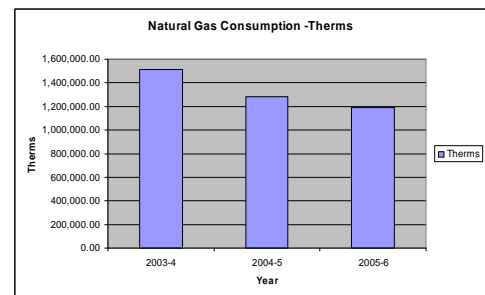
##### **a. Coal Consumption**

Annual coal consumption has dropped from 5,927 tons over the heating season of 2002-3 to 4,494 tons in 2005-6. This equates to a **24%** drop over four years. In addition, the exhaust from the heating plant is free from fine dust particulate that causes respiratory irritations and illness. This analysis factors in variations due to climate fluctuations. All of the reductions can be attributed to actual conservation/efficiency measures as opposed to a reduction based upon milder winter temperatures.



##### **b. Natural Gas Consumption:**

Annual natural gas consumption has dropped from 1,511,303.50 therms in 2004 to 1,192,987.2 therms in 2006. This equates to a **21%** drop in consumption over three years.



**5. Action Plan:** In order to achieve the stated goal to reduce the annual consumption of coal and natural gas by 50% from 2000 levels by 2012, a concerted effort must be made to significantly reduce our heating demand and consumption patterns. UW Oshkosh has already demonstrated that conservation works. This action plan is divided into three sections based upon priority. The following items are recommended (See Appendix F for details and justification):

##### **Initial Consideration:**

- *Review, verify and update campus audit data. Identify the campus facilities with the highest thermal energy consumption per square foot.*
- *Provide facility thermal energy usage feedback and education to campus users.*
- *During low useage periods (summer, interim, weekend) consolidate classroom useage to the most energy efficient buildings that meet course requirements.*

##### **Within Three Years**

- *Assess the possibility of burning alternative biomass fuels at the campus heating plant.*
- *Install solar hot water heaters at appropriate locations throughout the campus. Suggestions include Albee Hall and the Residence Halls.*

**Future Consideration (Five years or greater):**

- *Install alternative heating and cooling systems at facilities not connected to the central system.*
- *Replace older, single pane windows with high efficiency, low e, double or triple pane windows at appropriate locations such as Clow Classroom and Faculty Tower Complex.*

## **C. Sustainable Energy**

**1. Introduction:** Sustainable energy sources are those whose stock is rapidly replenished by natural processes, and which aren't expected to be depleted within the lifetime of the human species. Sustainable energy sources do not involve combustion of fossil fuels and therefore do not contribute directly to global warming or other degradation to the environment. They also avoid the use of nuclear fuels, and usually avoid direct production of toxic wastes. Sustainable energy technologies vary greatly in terms of embodied energy used and pollution emitted in building and maintaining equipment, or in the production of biofuels. Thus institutions need to proceed with caution and thorough studies before adopting and choosing amongst these new technologies.



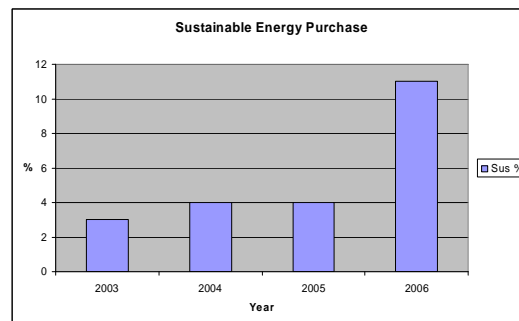
**2. Goal:** UW Oshkosh is pursuing the ambitious goal of becoming 100% independent of fossil fuel energy for electricity, heating and cooling.

**3. History:** UW Oshkosh has a significant record of achievement as a leader in the promotion and use of sustainable energy.



### **a. Sustainable Power Purchase**

- (1) In 2003, UW-Oshkosh became the first Wisconsin university to join the Environmental Protection Agency's Green Power Partnership after it signed an agreement with its local utility, Wisconsin Public Service (WPS) Corp., to make renewable energy at least 3 percent of its annual energy purchase.
- (2) In 2004, UW –Oshkosh increased its commitment to at least 4 percent of its annual energy purchase.
- (3) In 2006, UW – Oshkosh increased its commitment once again to purchasing 11 percent of its annual energy from renewable sources (approximately 3.3 million kWh).



### **b. Awards and Recognition:**

- (1) 2003 EPA Leadership Award: The eleventh university nationwide to be presented with this national award and the first Wisconsin university to join the Environmental Protection Agency's (EPA) Green Power partnership, receiving the EPA's Green Power Purchaser Award in 2003.
- (2) 2003-2004 National Wildlife Federation Campus Ecology Recognition Award
- (3) UW Oshkosh ranks 23<sup>rd</sup> among all US colleges and universities using renewable energy, and, for the past four consecutive years, has led all state agencies in the purchase of alternative energy.

## **4. Related Legislation**

a. Wisconsin, 2005 Act 141, enacted into law on March 17, 2006, directed the Dept. of Administration to:

- (1) set energy standards for all energy consuming equipment purchased by state agencies.
- (2) develop energy standards for construction of state buildings.
- (3) establish goals for certain state agencies to purchase at least 10% of their total electricity from renewable energy sources by December 31, 2008, and at least 20% by December 31, 2011.

b. On September 27, 2006, Governor Doyle selected four campuses (including UW Oshkosh) to take part in a pilot program to become energy independent of fossil fuels by 2012. Upon completion, the schools will be the first state owned facilities capable of acquiring or producing renewable energy equivalent to their consumption.

### **5. Action Plan**

Based upon the Governor's directive, UW Oshkosh has an overall goal of becoming 100% independent of carbon based fossil fuel energy by 2012. The campus, in consultation with the three other state universities, is working with the Department of Administration and our local utility company, Wisconsin Public Service Corp., to develop a plan to achieve this goal. Campus Sustainability Team has prepared the following list of recommendations for generating sustainable energy on campus that will contribute to achieving this goal (See Appendix G for justifications for these proposals).

#### **Initial Consideration**

- *Perform engineering analysis of campus heating plant, and other campus facilities necessary to develop a plan for transitioning away from fossil fuels for heating and electrical consumption.*

#### **Future Consideration (Five years or greater):**

- *Install integrated photovoltaic panels (solar panels) where feasible*
- *Explore the possibility of installing a small, demonstration wind turbine on campus.*
- *Study the feasibility of installing a biomass production facility to provide on-campus electrical generation*
- *Study the feasibility of installing biodiesel peak load shaving generators*
- *Evaluate the potential for the use of pressure reducing steam turbines in the campus central plant or at individual buildings, for electrical generation*



## **D. Fresh Water Conservation**

**1. Introduction:** Water conservation refers to reducing use of fresh water, through technological or social methods. The goals of water conservation efforts include:

- **Sustainability** – To ensure availability for future generations, the withdrawal of fresh water from the ecosystem should not exceed its natural replacement rate.
- **Energy Conservation** – Water pumping, delivery and wastewater treatment facilities consume a significant amount of energy.
- **Habitat Conservation** – Minimizing human water use helps to preserve fresh water habitats for local wildlife and migrating waterfowl, as well as reducing the need to build new dams and other water diversion infrastructure.

Water used at UW Oshkosh is from Lake Winnebago, one of the largest lakes in the world. Thus, the campus does not have a major sustainability issue in terms of water supply. However, the water used at UW Oshkosh is processed by the City of Oshkosh to drinking water standards, an expensive process given how little of the water use is for human consumption. Thus, there is also a **financial benefit** to water conservation measures that provides a major incentive to conserve on the use of municipal drinking water to flush toilets, bathe, clean, and irrigate plants.

**2. Goal:** To reduce overall water consumption levels by 50% from 2000 levels by 2012.

### **3. History**

a. 2000-2001: Water conservation measures:

- (1) Replaced 1,005 older 4.18 gallon per flush (gpf) toilets with 1.6 gpf toilets.
- (2) Installed low-flow faucet restrictors on sinks throughout the campus.

These efforts resulted in savings of over **11 million** gallons per year.

b. 2004-5: Replaced natural grass football field at Titan Stadium with an artificial grass surface that requires no irrigation. This effort resulted in an estimated savings of **0.85 million** gallons per year.

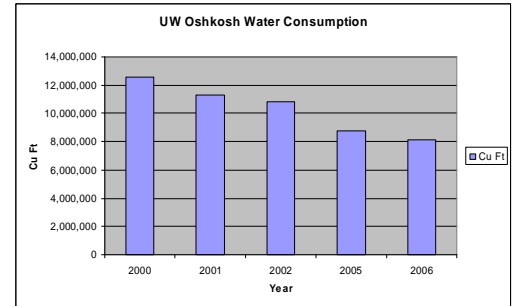
c. 2005-6: Water conservation measures

- (1) Retrofitted water-cooled systems at Blackhawk Commons, Scott and Gruenhagen with air cooled equipment
- (2) Replaced 63 older 4.18 gpf toilets with 1.6 gpf toilets
- (3) Installed 5 waterless urinals

These efforts resulted in savings of 6 million gallons per year.

#### **4. Results**

a. The cumulative effect of these efforts resulted in a **35%** drop in water consumption between 2000 and 2006. . These improvements now save UW Oshkosh over \$100,000 per year in water costs. In 2000, annual water consumption for the campus was 12,559,490 cubic feet. In 2006, that annual consumption level dropped to 8,143,000 cubic feet. The graph below illustrates this achievement:



#### **5. Action Plan:**

In order to meet the stated goal of reducing water consumption by 20% from 2006 levels by 2012, the following additional steps should be taken:

##### **Initial Consideration:**

- *Review, verify and update campus audit data. Identify the campus facilities with the highest fresh water consumption per square foot.*
- *Provide water usage feedback and education to campus users.*

##### **Within Three Years**

- *Publicize and encourage student, faculty, and staff to report water waste on campus.*
- *Install next generation waterless or low flow urinals in appropriate locations throughout the campus. It is estimated that each waterless urinal eliminates the consumption of over 45,000 gallons of water annually.*
- *Install the next generation of low flow toilets throughout the campus. Extreme low flow/dual flush toilets are now being manufactured that utilize less than 1.3 gallons per flush.*

##### **Future Consideration (Five years or greater):**

- *Plan and plant landscaping so that water for irrigation may be acquired from storm water basins or ponds rather than using municipal drinking water.*
- *Reduce irrigation needs through landscape design, composted mulch, and other programs designed to conserve water in places where municipal drinking water is the only available water source.*

## **E. Storm Water Management**

**1. Introduction:** Storm water runoff is coming under increasing scrutiny as both a source of pollutants to lakes and streams, and as a cause of depleted groundwater resources. Commercial parcels typically create more runoff per square foot than most other land uses, due mostly to large areas of impervious surfaces such as roofs and parking lots

### **2. Related Legislation**

In February of 2007, UW Oshkosh submitted an application to receive a Wisconsin Pollutant Discharge Elimination System (WPDES) permit that governs the discharge of storm water from campus into the local storm water sewer system. The need for this permit developed in response to several Federal and State regulations pertaining to protection of clean water, including the Federal Clean Water Act 1972 and Wisconsin DNR Regulations NR 151, NR 216, and NR 116. The goals are derived from the requirements stipulated by the DNR as a result of regulations and WPDES permit requirements.

**3. Goal:** Reduce the amount of total suspended solids (TSS) coming off of the campus by 20% before 2008 and 40% before 2013. (2006 baseline)

### **4. History**

Prior to the enactment of the WPDES permit requirements, the University of Wisconsin Oshkosh had undertaken the following steps related to storm water management:

- a. Developed a storm water management plan (currently in final draft status, awaiting DNR approval).
- b. Performed routine semi – annual cleaning of parking lots.
- c. Performed routine litter patrols of the campus
- d. Required the mandatory installation of silt fences around construction sites.

**5. Action Plan:** As has been the case with other sections, this action plan is divided into items that should receive immediate consideration and items that require a longer time horizon. In order to accomplish the goals listed in section C, the following recommendations should be enacted:

### **Initial Consideration:**

- *Perform SLAMM modeling to determine baseline data for stormwater reduction goals.*
- *Partner with the City of Oshkosh on storm water permit conditions. One possibility might be that the University will take responsibility for public education and outreach and the City will take responsibility for illicit discharge detection and elimination.*
- *Implement DOA-DSF erosion control standards for all capital projects (new construction and maintenance and renovation) and report all incidents to the DOA-DSF Project Manager and/or Construction Representative.*
- *Implement DOA/DSF civil engineering and sitework design guidelines for all capital projects (new construction and maintenance and renovation)*

- *Install educational and informational signage designating all rain gardens constructed and stencil appropriate “no waste dumping” near all storm water inlets.*
- *Conduct ongoing storm water public education and outreach program. Schedule public education events to coincide with Earth Charter Community Summit and Earth Day activities.*
- *Develop a web page devoted to Storm Water Management education.*

### **Within Three Year**

- *Consider a reduction in the use of ice melting salts on sidewalks and roads. Increase the use of sand to mitigate slipping hazard.*
- *Disconnect roof drains from storm water systems and divert water to ponds and other storm water retention devices.*
- *Create Biofilters at all existing storm drains to filter storm water as necessary to reduce suspended solids. Perform all other related mitigation projects designed to reduce the percentage of suspended solids in storm water.*

### **Future Consideration (Five years or greater)**

- *Consider the installation of green roofing to mitigate storm water runoff on existing buildings and as part of new construction.*
- *Install underground cisterns to collect rooftop rain water for later use in irrigation.*
- *Monitor the development of porous pavements. When a suitable product comes available, install and test on campus.*



**Green Roofing**

## **F. Facilities Planning, Renovations and Construction**

**1. Introduction:** Construction and renovation projects impact campus sustainability in numerous ways. While the work is occurring, the university is responsible (directly or indirectly) for causing major increases in the use of materials, the energy used by construction equipment, air pollution from equipment, disturbance of soils, sediment runoff to local waterways, and generation of solid waste. Decisions made in the design and building phases will strongly affect these impacts, and will continue to affect the energy and maintenance costs of the building throughout its lifetime. The complexity of construction create multiple chances for setbacks to campus sustainability, but the opportunity to replace and repair poorly designed buildings can also allow for major improvements in campus sustainability.

The impact of sustainability upon the building design and construction process includes recent development of rating systems. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System, established in 1994, provides a framework of design standards for assessing building performance through a variety of environmental indicators.

The LEED rating system addresses six major areas:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design Process



LEED recognizes achievements and promotes expertise in green building design and construction through a comprehensive system offering project certification, professional accreditation, training and practical resources.

LEED certification of construction projects is based upon a scoring system with a set of required “Prerequisites” and a variety of “Credits” in the six major categories listed above. Buildings can qualify for four levels of certification:

- Certified - 40 to 50% of non-innovation points
- Silver – 50-60%
- Gold – 60-80%
- Platinum – over 80%

LEED certification is obtained after submitting an application documenting compliance with the requirements of the rating system.

**2. Goal:** Energy efficient and sustainable design standards shall be utilized on all new construction and applicable renovation projects undertaken after 2007. As of that deadline, all construction and renovations projects shall seek to meet or exceed a LEED “Silver” level of sustainability.

### **3. History**

a. Several recent construction projects have been constructed in accordance with LEED design standards. These projects include the Renovations to Taylor Hall, the construction of the Student Recreation and Wellness Center, and the South Campus Parking Ramp.

b. The program design guidelines for the New Academic Building contain very aggressive energy goals. An excerpt is listed below:

“In order to support the Governor’s stated goal “to identify and implement technologies capable of replacing external power supplies currently serving their locations”, and in order to explore the physical, functional and cost implications of such a goal, the A/E will be expected to develop a program and conceptual design alternatives that will significantly reduce energy loads, increase operational efficiency and incorporate renewable energy sources, in addition to meeting the sustainable design goal of achieving a performance level equivalent to a LEED silver rating.”

### **4. Related Legislation**

a. Wisconsin, 2005 Act 141, enacted into law on March 17, 2006, included a provision to “develop energy standards for construction of state buildings.”

b. On August 1, 2006 the DOA Division of State Facilities released a document entitled “Sustainable Facilities Guidelines” that applies for the design of all new state facilities. The guidelines are based on the LEED Rating System and

“...are designed to promote and ensure that state facilities are constructed and renovated in a sustainable manner, starting with initial project planning and continuing through occupancy and operation”

**5. Action Plan** As has been the case with other sections, this action plan is divided into items that should receive immediate consideration and items that require a longer time horizon.

#### **Initial Consideration:**

- *Design and build all new facilities and perform all renovations to LEED Silver standards.*

#### **Within Three Years**

- *Obtain LEED certification for all new construction and renovation projects.*

#### **Future Consideration (Five years or greater)**

- *Monitor the development of other sustainability and energy efficiency construction guidelines (i.e Energy Star, ASHRAE, Building Code) Adopt best practices regarding sustainable building design and construction as they develop.*

## **G. Transportation**

**1. Introduction:** Conventional transportation systems, based largely upon the internal combustion engine, are major contributors to both global climate change and local air pollution. Sedentary lifestyles, supported by automobile commuting, are considered a leading contributor to an obesity epidemic in the US. Acknowledgement of this problem has led to the development of several strategies for creating healthier and more fuel-efficient transportation systems.



Transportation is often neglected in campus planning (with the exception of automobile parking), though a few urban campuses have found ways to influence student and staff choices. Given that automobile transportation is the leading means by which an American burns fossil fuels and emits toxic air pollutants, university efforts that can help staff and students adopt less harmful transportation options will reduce the amount of pollution indirectly caused by a campus. For many commuting students, the costs of maintaining and using an automobile for transportation may be the second highest cost of college attendance after tuition (equalling the cost of dorm housing); thus, transportation options may impact classroom success, retention and graduation rates for students with financial difficulties (e.g. working long hours or unable to pay tuition). UW Oshkosh is the second smallest campus in the UW system, and parking lots seriously diminish aesthetics and green space. Transportation also provides a significant opportunity to build stronger links to the City of Oshkosh, which can play a major role by providing public transportation and improving the infrastructure and traffic enforcement that enable and encourage pedestrian and bicycling options.

The campus also maintains a wide range of vehicles for business use (automobiles and trucks), transporting groups (buses), deliveries, teaching and research including automobiles, trucks, vans, buses and boats.

**2. Goal:** To reduce automobile trips to campus by 20% by 2012, through incentives and improvements in sustainable alternatives.

### **3. History**

a. The 1999 campus master plan acknowledges the need to make the campus more pedestrian and bicycle friendly. The plan calls for re-routing traffic around the perimeter of the campus, closing Algoma Boulevard, and creating a pedestrian mall.

b. A comprehensive parking plan was developed in 2003-4 to address a perceived shortage of on-campus parking spaces. While the plan does not promote sustainable transportation practices, it provides a precedent for future planning activities. This plan advocated the construction of two parking ramp buildings, and the conversion of current parking lots to be converted into green space. The first parking ramp is under construction in 2007.

c. In 2003, UW Oshkosh began contracting with the Oshkosh Transit System to allow all students, Faculty, and Staff to ride the city public bus system for free with a campus identification card.

d. In 2006, the university made a decision to convert the campus fleet to E-85 compliant vehicles. All new vehicle purchases will be able to operate on E-85, an ethanol based fuel. The older, gasoline only vehicles will be phased out over time.

e. In 2006, the Facilities Department switched to a 10% biodiesel/90% diesel fuel mix for all vehicles and equipment that operate on diesel.

f. Many new bike racks have been purchased and installed throughout campus over the past several years.

g. A ride sharing board is in use at Dempsey Hall.

**4. Action Plan** . In order to accomplish the goals listed in this section, the following recommendations should be enacted:

**Initial Consideration:**

- *Create a comprehensive Campus Transportation Plan to balance the needs of all commuters to campus.*
  - *Partnership with the City of Oshkosh is essential.*
  - *Rising use and parking of bicycles and mopeds should be addressed.*
  - *The parking fee price structure should be reviewed and revised to reflect the true costs of parking and/or market rates (e.g. responsive to supply and demand) and avoid subsidizing automobile drivers. There should be substantial financial savings for commuters who carpool.*
  - *A significant amount of Compact car parking spaces (e.g. 25%) should be designated in every parking lot. They should be located at the preferred spots near building entrances.*
  - *Create incentives such as preferential parking for hybrid, high efficiency and biodiesel vehicles.*
  - *Establish incentives to encourage students to not bring a vehicle to campus. One suggestion was that a student who elects not to bring a vehicle to campus would get his/her first choice in the selection of a residence hall.*
- *Designate a Director of Transportation Services. This should be more than a title change for the Director of Parking, as “parking problems” will become one of many equally important factors in a sustainable transportation plan.*
- *All campus vehicle purchases shall be fuel efficient and environmentally friendly. For now, that means the campus is limited to the purchase of E-85 compliant, high miles per-gallon vehicles. The State of Wisconsin limits purchases to American-made vehicles, thus the most efficient vehicles and hybrids on the market cannot be acquired. If and when state policies change, the campus should revise this recommendation.*



**Within Three Years:**

- *Develop an education program geared to all campus constituents regarding the true cost of automobile ownership. More than just the purchase price – fuel, maintenance, insurance, registration fees, impact on the environment.*
- *The health dimensions of transportation choices and the benefits of walking and biking for exercise should be emphasized to students, faculty and staff through education and incentive programs.*

**Future Consideration (Five years or greater):**

- *A substantial research initiative must be launched to improve the understanding of the travel behavior and demand of the campus population. This information will impact planning priorities and focus areas for campus improvements. Transportation behavior and choices will be strongly influenced by the availability of housing, shops and entertainment on and near the campus.*
- *Create adequately designed facilities for pedestrians and bicyclists.*
  - *sidewalk and path width that can accommodate large numbers of socializing students/staff (more than single-file traffic).*
  - *bike lanes (e.g. minimum 5-feet width) on campus and on adjoining streets.*
- *Provide shuttle bus services at key travel times of the year. For example, bus service to Outagamie Airport could be provided at the Winter Recess and at the beginning and end of each school year.*
- *Purchase electric powered Cushman/Mule and pedal-powered vehicles wherever feasible for on-campus travel.*

## **H. Purchasing**

**1. Introduction:** Purchasing - the acquisition of goods and services on the best possible terms, has historically been based on two criteria, price and quality, with the view to maximizing benefits for the procuring organization. Sustainable, or “green” purchasing broadens this framework to ensure that quality criteria includes minimal adverse environmental and health impacts. In making a sustainable purchasing decision, the entire life cycle costs (financial, environmental, and social) of the product are taken into consideration. The life cycle takes into account extraction, production, manufacturing, distribution, operation, maintenance and disposal. Many “green” products are competitively priced with their conventional counterparts, are of comparable quality, and have one or more of the following attributes:



- High Content from Post-Consumer Recycled Materials
- Low Embodied Energy (consumed to extract, manufacture, distribute and dispose)
- Recyclable
- Non-toxic
- Energy Efficient
- Durable and/or Repairable
- Produced in an Environmentally- and Socially-Sustainable Manner

**2. Goal:** Develop and follow sustainability-focused purchasing policies in more than 50% of spending for campus materials and equipment by 2012.

### **3. History:**

At the present time, the campus purchasing process is quite de-centralized, with departments and individuals making independent purchasing decisions. Although there are proscriptive state purchasing guidelines, including directions on which vendors are to be utilized for specific products, there is no major emphasis on sustainable purchasing.

a. The following items are currently purchased with recycled content in accordance with the state contract guidelines:

- \* Toilet Paper
- \* Copier paper
- \* Computer Monitors
- \* Photo Copiers

b. Over the past several years, incandescent lights have been replaced with compact fluorescents fixtures in many of the Residence Halls.

c. Custodial Services began purchasing environmentally safer cleaning chemicals in 2006.

d. Food vendors, campus retail stores, and Dining Services have made some sustainable products (e.g., fair trade, organic, local, cruelty-free, etc.) available for sale and special events.

**4. Action Plan** In order to accomplish the goals listed in this section, the following recommendations should be enacted:

**Initial Consideration:**

- *Develop a sustainability-based purchasing policy that stimulates the purchase of cost competitive (based on broad accounting standards, e.g. life cycle analysis) products and services. Products and services covered by this policy would have a reduced effect on human health and the environment compared to competing products or services that serve the same purpose.*
  - *Establish a sustainability purchasing committee with the mission to research attributes of current campus purchasing patterns, identify alternatives, and to make recommendations. The committee should revisit and update their recommendations on an annual basis, or as necessary.*
  - *The UW Oshkosh Purchasing Department should track and record sustainable purchasing efforts and prepare a report highlighting performance on an annual basis.*
  - *Collaborate with UW System on pilot projects that demonstrate sustainable purchasing policies, particularly when state policies interfere with best practices; continuously, share the information with UW System, other institutions, and vendors to improve state policies and preferred vendor contracts.*
  - *Make sustainable products and services easily available in convenience or “captive audience” situations (e.g. less harmful detergents in dorm laundry rooms, sustainable choices in dining halls and vending machines, etc.)*
- *Produce and annually update a “green” guide to purchasing that provides a list of recommended environmentally friendly products or services. The guide should cover a wide variety of materials and equipment, including Energy Star-rated office equipment, kitchen equipment, laundry equipment, and vending machines.*

**Within Three Years:**

- *Educate the campus community about sustainability purchasing programs and policies.*

**Future Considerations (5 years or greater):**

**None noted**

## **I. Solid Waste Management**

**1. Introduction:** Solid waste is generated by every part of the campus. It includes materials purchased by the university, materials carried in from off-campus, and materials grown on campus. Solid waste from UW Oshkosh is destined for landfills, and is currently trucked long distances because of a tri-county landfill agreement.



The amount of solid waste produced can be cut in a number of ways that can be categorized by the “3R’s”: Reduce, Re-use, or Recycle. Reduce refers to conservative practices that cut back the amount of materials used and wasted. Re-use refers to passing along items that can still serve a function, be valued by another user, or have salvageable parts. Recycling is the reprocessing of saving used materials and forming them into new products; composting is a form of recycling for biodegradable materials. To illustrate printing paper solid waste can be cut by double-sided printing (Reduce), saving bad print jobs for scrap paper notes (Re-use) or setting it in the recycling bin when finished. The 3R’s prevent useful material resources from being wasted, reduces the consumption of raw materials, reduces energy usage, and reduces associated greenhouse gas emissions required to generate virgin product.

**2. Goal:** Reduce production of municipal solid waste by 30% from 2000 levels by 2012.

### **3. History of Recycling**

UW Oshkosh has had an operational recycling program since the early 1980’s. Currently, the campus recycles paper, newspaper, cardboard, printer cartridges, oil, cans, bottles, and scrap metal. UW Oshkosh recycles approximately 10% of its total solid waste stream, which places it at the low end of regional campus recycling efforts.



Recently, campus recycling efforts have been hampered due to contamination of recycled materials with other waste. Where contamination has occurred, the entire load is rejected to the landfill, negating the recycling efforts of most of the campus community.

### **4. Action Plan**

#### **Initial Consideration:**

- *Develop a Solid waste Management Plan that includes responsible disposal of municipal and hazardous wastes, increases re-use and recycling, and works with other elements of the campus to reduce the amount of solid waste created.*
  - *Create a 3-R’s (reduce, re-use, recycle) oversight committee. Membership should include students, faculty and staff. The committee will be tasked with developing policies and programs, provide oversight of 3R’s efforts, and report on recycling performance relative to campus generation of municipal solid waste.*
  - *Add more recycling receptacles, especially outdoor stations (currently lacking on campus).*
  - *Develop infrastructure and confidence in information technologies (e.g. university servers and portable media; backup software) that can reduce printing and photocopying (and their production of waste paper).*

- *To create incentives for students to reduce paper use in computer labs, change printing policies to “pay as you go” cost charging beyond a reasonable number of pages; reduce that level as electronic storage technology improves.*
- *Recycle at all campus events such as athletic competitions, concerts and graduation ceremonies.*
- *Get campus involved in green recycling competitions amongst campus groups or with other institutions, such as a Recycling Olympics.*
- *Develop policies and collection sites for harmful and hazardous consumer wastes (e.g. batteries, electronics, light bulbs, paints/polishes/removers, cleaners, lighters, medicines, etc.).*
- *Enhance Residence Hall recycling and re-use efforts, especially on move-in and move out days. Provide bins for food, clothing, shoes, furniture, computers, CD’s, paper, cardboard, etc.....*

#### **Within Three Years:**

- *Develop a campus wide education effort geared toward the 3R’s that includes e-mails, posters, and fliers. Inform campus of how they can help the campus reach its goal of a 30% reduction in the campus solid waste output.*

#### **Future Consideration (Five years or greater):**

- *Replace single-side printers with double-side printers, and install scanners to replace (some) uses of photocopiers, and thus reduce paper consumption.*
- *Eliminate take-away food containers that cannot be recycled or composted (e.g., Styrofoam cups, most plastics, aluminum foil) and replace with recyclable plastics, biodegradable (plant-based) plastics, and unwaxed paper products.*
- *Compost all garden waste.*
- *Create a campus wide rummage sale to increase re-use.*
- *Institute “pay as you throw” trash removal policies for dormitory residents, retail operations on campus, and other units; may require special equipment (though a low tech solution is to sell standard bags with tags).*

## **J. Food Services**

**1. Introduction:** A large expenditure of time, money and energy routinely goes into the growing, harvesting and preparing of food for the campus community. This area of campus operations consumes a significant portion of resources and generates large volumes of waste material. Due to its unique characteristics, this particular area of campus operations is an excellent candidate for the adoption of focused and appropriate sustainable practices. One distinctive aspect is that most of food services are provided through contractors, who could be asked to meet sustainability goals and performance standards. Contract negotiation periods (e.g. 2007-08) are a particularly important time for instituting reforms in dining services.



A wide range of approaches are being developed by producers to sustainably grow food. The American public is familiar with the health and environmental benefits of organic farming (avoiding artificial pesticides and fertilizers). They are less familiar with the benefits of locally-grown (avoiding environmental costs of transportation), humanely-grown (avoiding the diseases, pharmaceuticals, and ethical challenges associated with confined animal factories), or fair-trade (avoiding the oppression or deprivation of farmers and people who work on farms or in food processing factories). Heavy consumption of meat and dairy products deserve special attention in the US, as this activity is a leading source of water pollution (from animal wastes) and habitat loss (most U.S. grain is used for animal feed). The other special consideration for Americans is the rapid rise in the consumption of calories, which requires that more food be grown, processed, transported, and prepared – and is leading to a health crisis of truly large proportions. Thus campus food services have a crucial educational role (positive or negative) in teaching students that food choices matter for health, environment, and society.

**2. Goal:** Food Services will minimize the environmental and social impacts of their operations (including indirect impacts of suppliers) while continuously providing a variety of nutritious and sustainably –grown foods.

**3. History:** UW Food Services has already taken some steps towards the attainment of this goal. Listed below are some of the operational practices currently in place:

- a. Food is batch cooked to minimize food waste.
- b. Produce is purchased having already been cleaned. This saves water and keeps the produce fresher.
- c. The campus food committee has an education policy that encourages students to “eat what you want, but clean your plate” i.e., don’t waste food.
- d. The existing refuse/pulper system recycles and minimizes the use of water.
- e. There have been several purchases of new equipment, including a new dish washing machine that uses 30% less water and energy than the old machine.

f. There have been several renovation and improvements to interior lighting that have had a beneficial impact upon energy consumption. For instance, a new timer has been installed on interior lighting. In addition, they have removed and eliminated 60% of interior track lighting throughout the facility. Finally, they replaced halogen lighting to fluorescent lighting over the salad bar because it was heating the lettuce.

g. Fair trade, organic coffee is sometimes sold at the Reeve Memorial Union.

h. Due to a suggestion from a student group, Food Services offered an organic food night as a substitution to a premium food night (typically steak) in the Spring of 2007.

i. The Earth Charter Community Summit and other special events in Reeve Union have been able to order dinners made from fair trade, organic, and/or locally grown foods.

j. UW Food Services has begun to demonstrate an interest in purchasing fair trade, organic foods, and locally-grown foods, when available.

#### **4. Action Plan**

##### **Initial Consideration:**

- *Declare UW Oshkosh to be a Fair Trade University.*
- *The upcoming Dining Contract for campus food services should include sustainability goals, benchmarks, and timetables.*
  - *Discussions with dining services, Sodexo, and others, suggest this could involve: Shell eggs from free range chickens, Liquid eggs from cage free chickens; Organic milk from humanely treated cows; Fair trade coffee; Biodegradable utensils, flatware, and other disposable items.*
  - *Increase offerings of well-labeled, sustainably-produced foods (locally grown, organic, fair trade, humanely-grown), including fruits, vegetables, grains, dairy, eggs, and meat.*
  - *One goal should be to provide an a constant reminder that people have sustainable food choices.*
  - *Provide an organic option at all meals.*
  - *Institute a “Meatless Monday” or other programs campus-wide to educate students about healthy vegetarian options and potential to reduce their environmental impacts.*
  - *Purchase certified sustainable fish, using expertise of organizations such as the Monterey Bay Aquarium’s Seafood Watch Program and the Marine Stewardship Council.*
  - *Investigate the purchase of compostable flatware and plates for Reeve Union and Blackhawk Commons.*
  - *Purchase and utilize environmentally friendly cleaners and detergents throughout all food service operations.*

**Within Three Years:**

- *Develop a plan for the disposal of popular, and possibly sellable, food wastes (e.g., coffee grounds).*
- *Engage consultants (e.g., Food Service Technology Center) to provide a thorough review of our food services operations, and to provide recommendations for improvements and advice on the purchase of energy efficient equipment and processes.*

**Future Consideration (Five years or greater):**

- *Compost appropriate food wastes.*
  - *Identify an appropriate site to conduct composting operations*
  - *Establish a process to segregate appropriate materials for composting (e.g. minimal meat or oils) and transportation of materials to the site*
  - *Investigate the use of vermiculture (worm husbandry)*
  - *Use compost in campus gardens and greenhouses.*



## **K. Grounds Maintenance**

### **1. Introduction**

The beautifully landscaped grounds of the University of Wisconsin Oshkosh campus support a surprisingly wide diversity of local and regional species. The 170.5 acres of campus grounds provide a pleasing backdrop for educational activity and are a source of great pride for the campus community. The goal of the grounds shop is to provide aesthetically enjoyable outdoor facilities for all students, staff, and visitors. The campus has been one of the largest and best maintained waterfront sites, admired even in a city with extensive waterfront parks.



Grounds keeping at UW Oshkosh has many challenges. The task is wide-ranging and seasonal, including: landscape design and installation; tree, shrub, and flower bed maintenance; turf and Athletic Field maintenance; snow and ice removal, sidewalk and roadway maintenance; and material hauling and debris collection. The campus is in a dense urban area, and a significant portion of the campus is former industrial land with degraded soils. The campus is crowded, and heavily traveled; within the UW System, UW Oshkosh has the third largest population (ca. 13,000 students and staff) on the second smallest campus (ca. 130 acres on the main campus), for a ratio of about 100 users per acre. The campus is tri-sected by three busy city streets, that raise air and noise pollution levels, create pedestrian bottlenecks that lead to heavy foot traffic off walkways, and make it difficult for maintenance crews to move vehicles around the campus. Sustainable grounds landscaping and maintenance practices can have a significant positive impact upon the environment and play a major role in overall campus sustainability efforts.

**2. Goal:** Increase biodiversity and usable green space of the campus while reducing dependence on fossil fuels, other extracted minerals, chemical fertilizers and pesticides.

### **3. History**

Many sustainable practices have been in use for several years, including:

- a. All diesel tractors operate with 5% bio-diesel.
- b. Leaves are mulched into turf areas in the fall.
- c. All wood landscaping refuse is run through a chipper and converted into mulch for re-use in campus flower beds.
- d. The campus uses an environmentally safer ice melting chemical treatment on sidewalks.
- e. Plantings are appropriate and compatible for this area and environment.
- f. The campus utilizes compost created at a nearby state facility, Winnebago Mental Health Center, to maintain flower beds.
- g. Educational plantings of diverse plants species and native prairie have been installed.

h. Riverfront native trees and vegetation have been retained and encouraged along the WIOWASH Trail and Shapiro Park on campus.

#### **4. Action Plan**

##### **Initial Consideration:**

- *Develop policies to ensure that sustainability is one of the key decision –making components for landscape design, maintenance and management.*
- *Enlarge composting site to enhance composting capacity.*
- *Increase the amount of perennial planting throughout the campus, to replace plantings of annual plants that require disturbing the soil one or more times a year.*
- *Increase the planting of native species, and remove invasive non-native species on campus.*
- *Investigate the possibility of using less ice melt chemicals and more sand to keep walkways safe for pedestrians during winter months.*

##### **Within Three Years**

- *Increase the number of rain gardens to increase groundwater infiltration throughout the campus (which will decrease stormwater runoff).*
- *Create more natural prairie areas such as exist near Halsey Science Building, allowing for aesthetic considerations (e.g. more flowering plants) in some landscape designs.*
- *Test environmentally safer herbicides to determine their effectiveness; if the products work, the campus should discontinue the use of conventional chemical herbicides, such as Roundup.*
- *Replace traditional grass with a newer variety that is drought resistant and requires little mowing (no maintenance lawn).*
- *Install drip irrigation in all flower beds to reduce water use.*

##### **Future Consideration (within 5 years):**

- *Build a greenhouse facility to propagate plants and increase the amount of available plant material. If a greenhouse was available, the campus would be able to re-use existing plants rather than throw away and purchase new each year. (Greenhouse facilities would support other recommendations in this plan, such as the campus gardens listed under food services and research needs.)*

## **V. Teaching**

The University of Wisconsin Oshkosh is, first and foremost, a teaching institution. In our formal education, we can do much more to ensure that students attending UW Oshkosh have taken classes that provide them with a refined understanding of sustainability, and a concrete set of skills with which to tackle these complex issues.



In the classroom, sustainability has a broad meaning that touches a wide array of disciplines and methodological approaches. It is a big-tent concept that embraces the ideas of financial security, social justice, and environmental responsibility. The Presidents Council on Sustainable Development has stated that “Education for sustainability is a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, and commitment to engage in responsible individual and cooperative actions. These actions will help ensure an environmentally sound and economically prosperous future.” Education for sustainability, then, provides students with a sense of environmental and social citizenship and with the knowledge and skills needed to work effectively for sustainability. Achieving this goal requires that students encounter the key concepts of sustainability multiple times throughout their college careers, and in a variety of venues. Courses that focus on sustainability should not be limited to a few programs or to a single college; rather, they can and should be taught across all Colleges and Departments.

However, learning does not stop when students leave the classroom. It also takes place in residence halls, guest lectures, campus events, and research experiences. Therefore, this section of the report suggests a variety of ways that UW Oshkosh can improve the way that it teaches sustainability both inside the classroom and outside of it.

**Long Term Vision:** Link the university’s formal teaching mission and informal teaching opportunities to develop understanding, attitudes and habits that promote sustainability.

### **A. Curriculum.**

**1. Introduction:** The central act of a university is to offer courses that allow students to expand their knowledge, sharpen their intellectual skills, enrich their lives, and become more effective citizens. A curriculum that engages students in the issues of sustainability can achieve all these goals, and is particularly relevant to developing local and global citizenship in a troubled world.

**2. Goal:** Sustainability should be a recognized, emphasized, and common theme across colleges, departments and general education initiatives. Students should have extensive and diverse opportunities to study sustainability in their coursework.

**3. History:** Some departments have for decades been teaching courses that involve issues of sustainability, while other departments have started courses related to sustainability in recent years. Just a few examples include Anthropology 348: Economy, Nature and Culture; Biology 104: Ecosphere in Crisis; Chemistry 103: Environmental Chemistry; Economics 360: Environmental Economics and Policy; English 343: Nature Writing; Geography 314:

Environmental Conservation, Geology 150: Environmental Geology; History 326: American Environmental History; Nursing 361: Human Health & the Environment; Political Science 395: Global Environmental Politics; Religious Studies 362: Religion and Earth Ethics; Social Work 105: Social Work Ethics in a Diverse Society; Sociology 347: World Systems and Global Inequality; Women's Studies 365: Gender and Nature.

Thus various departments already have been addressing issues of sustainability. The number of sustainability courses at UW Oshkosh has grown steadily in the past decade, catalyzed by the development and growth of the Environmental Studies (ES) Program. The Environmental Studies Program was initiated in 1996 as a minor with new courses. In 2002 the program began offering a major in environmental studies, further expanding the presence of sustainability courses on campus. The ES program is an interdisciplinary program and works with many other departments. This collaboration extends to shared courses, comparisons of course content and faculty discussions that have helped make environmental themes more prevalent in UW Oshkosh courses.

#### **4. Action plan recommendations:**

UW Oshkosh should expand the number of courses that address sustainability issues (including courses with a section on sustainability and those that make sustainability a primary issue). UW Oshkosh also should help faculty and students to better recognize the sustainability dimension of existing courses.

#### **Initial Consideration:**

- *Offer ongoing faculty colleges that assist faculty from a wide range of disciplines in integrating sustainability into courses.*
- *Create a web page that has information about how other campuses have integrated sustainability into their courses, departmental curriculum, and liberal arts requirements.*

#### **Within Three Years**

- *Create a web page that has information about how teachers at UWO have a sustainability component in existing courses or created new courses related to sustainability.*
- *Provide diverse avenues for faculty to learn about sustainability and how it can be integrated into courses, including possibly hosting U.W. system colloquia or regional conferences on sustainability in the curriculum.*
- *Assess the existing UWO courses and curriculum for breadth and depth in addressing sustainability issues.*
- *Develop a plan to hire new faculty in a broad range of disciplines with interest and expertise in sustainability.*

#### **Future Consideration (Five years or greater):**

- *Consider ways to ensure that every college student encounters the concept of sustainability. One possible way to accomplish this is to make sustainability an aspect of our Liberal Education Reform, including the possibility of a general education requirement that concerns sustainability.*

- *Encourage and facilitate departments adding a sustainability component in the departmental curriculum.*
- *Consider the possibility of developing one or more graduate programs in sustainability.*

## **B. Extra-curricular Awareness Raising Across Campus**

**1. Introduction:** Learning about sustainability can take place outside of the classroom. Events that raise awareness of sustainability can occur in the residence halls, at Reeve Union, in department meetings, faculty colleges, and in many other places across campus. While there are some initiatives of this nature occurring on campus, they could be better organized, coordinated, and publicized, and their number and variety could be increased.



**2. Goal:** To raise awareness of students and staff through participation in campus sustainability activities that take place outside of the formal classroom. Doing so will increase our chances of generating a campus-wide commitment to sustainability.

**3. History:** There have been some initiatives of this nature, in a variety of settings, across campus. For example, each year the campus hosts substantial celebrations of the Earth Charter and Earth Week (see the Campus Events section, below). There has also been some activity on sustainability awareness in the residence halls, such as the 2006 ECO Games, which focused on recycling and attendance at related speakers and movies on campus.

**4. Action Plan/Recommendations:** (See Appendix H for details and justification regarding recommendations)

### **Initial Consideration (First Year):**

- *Develop sustainability programs in the residence halls. This might include*
  - *programs to reduce solid waste generated during move in and move out days.*
  - *Require all residence hall Community Advisors to coordinate one sustainability program each year, providing them with models, contacts, and special funds for these events.*
- *Include sustainability in the first year experience and orientation program.*
- *Inaugurate competitions focused on sustainability amongst campus groups (e.g. dorms, clubs, departments, etc.) and with other institutions.*

### **Within Three Years**

- *Develop a Student Sustainability Leaders Program in which students serve in paid positions as student sustainability educators.*
- *Include concepts of sustainability, and campus sustainability initiatives, in employee training and orientation.*

## **C. Campus Events**

**1. Introduction:** Extra-curricular campus events can be an effective way for students, faculty, and staff to learn about sustainability and develop a commitment to it. UW Oshkosh offers a rich array of campus events, some of which concern sustainability issues, but more could be done.



**2. Goal:** To offer a large number and wide variety of well-attended events that teach and promote sustainability, and to coordinate and promote those events.

**3. History:** Over the years, the university has offered events that were at least indirectly related to sustainability, even if the idea was not explicitly involved in the events or their promotion. Over the last decade, students, faculty, and staff have helped create events directly and explicitly related to sustainability. The annual Earth Charter Community Summit in October has become the largest Earth Charter event in the country. Every April, the university sponsors an Earth Week celebration. A Fair Trade Festival occurs a week after Thanksgiving. The College of Business has offered Green Business Symposium. This strong tradition of such campus events at UW Oshkosh forms the foundation for even more sustainability activities.

### **4. Action plan recommendations.**

#### **Initial Consideration (First Year):**

- *Ensure that current sustainability events have adequate support and are promoted appropriately. Seek to make the events even more attractive to the greater Oshkosh community.*

#### **Within Three Years**

- *Use other major events (e.g., athletic competitions, concerts, ceremonies) as opportunities to demonstrate sustainability through waste reduction, recycling, etc., and to promote sustainability in general.*
- *Have a campus-wide sustainability calendar that is widely available on and off campus.*

#### **Future Consideration ( Five years or greater):**

- *Host state, national, or international conferences*



## **D. Internships, Service Learning, Volunteering**

**1. Introduction:** One of the best ways that we can ensure that our students are aware of sustainability issues and able to tackle these complex problems when they enter the workforce is to provide them with hands-on experience in sustainability. Many advantages will accrue from increasing the opportunities for our students to have outside-the-classroom, skill- and resume-building experiences that focus on sustainability. This will better serve our students, strengthen our relationships with the community, focus our research agenda on sustainability, and create a mechanism to devote increased time and labor to sustainability initiatives.



**2. Goal:** To expand the opportunities for UW Oshkosh students to garner hands-on experience in a wide range of sustainability initiatives by increasing the number of available internships, service learning, and volunteer experiences.

**3. History:** Across campus, there has been a wide variety of opportunities for students to pursue student internships, service learning, and volunteering. Departments such as Biology have offered various internships analyzing environmental problems. Several students in 2003 completed a campus environmental audit, which won recognition from the National Wildlife Federation's Campus Ecology Program. From 2005 to 2007, Johnson Controls supported a Campus Sustainability Coordinator internship to monitor energy use on campus. A Green Events Coordinator was established in 2006. Student environmental groups such as the Student Environmental Action Coalitions have been major players in campus events. However, there is no centralized coordination of these opportunities, which could be promoted as diverse ways students can actively pursue sustainability on and off campus.

### **4. Action Plan:**

#### **Initial Consideration (First Year):**

- *Survey existing internships, service learning, and volunteer opportunities to determine which ones are related to sustainability.*
- *Revive and expand the UW Oshkosh environmental audit and the internship associated with it. This would provide more information to support sustainability initiatives and give students valuable experience.*

#### **Within Three Years**

- *Develop an internship program specifically related to sustainability, including internships both on and off campus.*
- *Develop new service learning opportunities related to sustainability, in particular those that cross departments and divisions.*



**Future Consideration ( Five years or greater):**

- *Encourage departments and student organizations to develop new volunteer opportunities directly related to sustainability.*
- *Utilize UW Oshkosh's off-campus properties as a way to provide internship and research opportunities for our students.*

## **VI. Research**

**A. Introduction:** As noted in the Chancellor's charge to the Campus Sustainability Team, a university has "a unique role as an institution that develops expertise in the science, technology, and policies of sustainability as well as in the philosophical basis for sustainability." Ongoing research is an important means of developing such expertise and ideas. One of the core values of UW Oshkosh is "Social Awareness and Responsiveness ... that educators and students should explore and engage the challenges that confront regional, national and global communities, using their intellectual and creative capabilities to understand, investigate and solve problems."



The Research section of this plan is primarily a vision of future opportunities. Some areas of current research (e.g. ecology, business operations, environmental history) are critical for defining the need for sustainable institutions and communities. However, the university currently carries out very little research with direct applications to creating a sustainable institution. Thus, the research capacity of the university would need to expand in particular strategic directions to have direct impacts on the institution and to provide students with a more complete picture of sustainability.

As a large university with substantial research capacity, UW Oshkosh is capable of supporting significant applied, theoretical, and creative scholarship for developing a sustainable society. Certain facilities and academic areas have existing, if untapped, potential for immediate use in sustainability research, while some key fields of study are constrained by a lack of specific infrastructure or expertise.

**Long Term Vision:** Scholarly activities by faculty, staff and students generate and test ideas for creating a sustainable future.

**B. Goal:** To develop and maintain research and scholarship that supports campus sustainability efforts, contributes to the professional development of staff, and challenges students to apply their emerging skills and knowledge.

**C. History:** UW Oshkosh has a significant faculty, staff and facility resources in a number of disciplines relevant to sustainability, including the natural sciences (biology, chemistry, geology, microbiology), social sciences (anthropology, geography, economics, political science, sociology), applied professions (business, public administration, urban planning), humanities (e.g. communication, history, philosophy, religious studies), and interdisciplinary programs (environmental studies). With respect to sustainability research, many other departments and programs cover disciplines relevant to sustainability (e.g. physics, psychology, education), but have not recruited faculty who study sustainability-related topics.

Faculty in some fields (particularly the sciences) have received substantial grants and contracts from external funding sources to conduct their research, equip facilities, and pay staff and students. However, the goals of faculty research are primarily driven by personal curiosity,

opinions of disciplinary peers, and/or the mission of the funding agency; thus their research agenda is rarely focused on institutional goals or needs such as sustainability. This situation is not particular to UW Oshkosh, and would be found at any university supporting research and scholarship.

There are institutional sources that have funded research related to sustainability. The university supports a large significant Faculty Development Fund that primarily funds faculty research projects. These projects are defined by the interests of the proposing faculty, who must convince their university peers (rarely disciplinary peers) that it is solid scholarship. Faculty Development funding has been used to study local ecosystems and communities, work with local companies on managing their operations, and to train staff and students. The university has also supported student research to compile the UW Oshkosh Environmental Audit. UW System grants have also been acquired by staff and faculty for research related to solid waste management.

#### **D. Action Plan**

Recommendations for specific research topics, particularly studies relevant to campus operations (e.g., composting, landscaping, energy efficiency, transportation options, etc.) have been covered in other sections of this plan. The recommendations below focus on general ways to encourage research in sustainability.

#### **Initial Consideration:**

- *Create a web page that has information about past and current research on sustainability among UWO faculty.*
- *Create a web page that has information about funding sources for sustainability research.*

#### **Within Three Years**

- *Explore ways to encourage research focused on sustainability, including awards and rewards for best sustainability research and an annual sustainability research presentation.*
- *Provide avenues for faculty to learn about current research in sustainability, such as an interdisciplinary sustainability research speaker series.*
- *Create a web page with information about how scholars at other campuses have conducted research relevant to sustainability.*
- *Develop a Geographical Information System (GIS) database for campus property*

#### **Future Consideration (Five years or greater):**

- *Purchase/lease off-campus land for research activities not compatible with the small, crowded main campus due to space, noise, odor, safety, and other concerns (e.g. Campus Farm and Technology Site).*
- *Develop and maintain a sustainability research clearinghouse website, including communication tools and databases for expertise (on campus and; collaborators), project ideas and problem-posing (campus and community), etc.*

- *Increase dissemination of research findings through public meetings.*
- *Add faculty expertise in relevant engineering fields (could be associated with other UW campuses or colleges)*

## **VII. Outreach**

### **A. Introduction:**

Outreach has several functions. First, it is the means by which UW Oshkosh can more widely share its knowledge of sustainability. The UW Oshkosh Vision statement includes the goal of being “a national model as a responsive, progressive and scholarly public service community known for its accomplished record of engaging people and ideas for common good.” UW Oshkosh also has endorsed the Earth Charter, which states that “we must decide to live with a sense of universal responsibility, identifying ourselves with the whole Earth community as well as our local communities.” Increased outreach efforts can benefit a public in need of sustainability education, operational examples, and leaders. Thus outreach has the potential to educate citizens about how they might improve their lives and communities, and about how the university can serve as a model and testing site for possible solutions.



Second, outreach is critical for UW Oshkosh to become better known in Wisconsin and across the country. The reputation of UW Oshkosh as a leader in sustainability has grown rapidly, but public perceptions continue to lag behind campus accomplishments.

Third, outreach helps us obtain the resources necessary to accomplish all campus sustainability goals, by informing donors, investors, partners, legislators, and other parties capable of assisting the university.

**Long Term Vision:** UW Oshkosh is well-known throughout the region and country as a source of information and inspiration about sustainability.

**B. Goal:** To develop and maintain sufficient outreach efforts so that the sustainability lessons learned by UW Oshkosh are known, appreciated, understood, and used by the public.

**C. History:** UW Oshkosh has a significant record of achievement in three areas of outreach related to sustainability: events, website publication of their Environmental Audit, and publicizing the purchasing of electricity from alternative energy sources.

The Oshkosh Earth Charter Community Summits (see [www.uwosh.edu/earthcharter](http://www.uwosh.edu/earthcharter)), have been hosted by UW Oshkosh annually since 2001. Numerous fairs, panel discussions, speakers, movies, plays, and dinners have highlighted sustainability themes. Ranking as the largest event of its kind since its inception, the 6 to 10 day event is cited as a national model. In 2005, the summit included hosting a statewide sustainability conference. UW Oshkosh has also hosted Earth Day and Earth Week activities each spring since the 1970's. While their focus has been primarily on educating the UW Oshkosh students and staff, events have been open to the public. Thus UW Oshkosh currently maintains major week-long efforts to schedule events each fall and spring semester.

An Environmental Audit of the campus was completed in 2003 and developed into a website

(see [www.uwosh.edu/environmentalaudit](http://www.uwosh.edu/environmentalaudit)) to increase university staff and public awareness of campus sustainability issues. This resource has proven useful for campus planners and for students studying campus environmental issues.

Beginning in 2003, UW Oshkosh has gained recognition as a national leader in green power, being the largest purchaser of alternative energy in Wisconsin (currently 23<sup>rd</sup> in the nation), starting with 3% of electricity and increasing to the current 11%.

These and other achievements have been recognized by several awards, including the EPA Green Power Purchaser Award (2003, one of 11 nationally, first in Wisconsin), National Wildlife Federation Campus Ecology Award (2004), and the EPA Energy Star Award (2005).

#### **D. Action Plan**

It is important to note that the CST defines the audience for outreach as those outside the immediate campus community. Informal education of UW Oshkosh students was considered under a broad definition of Teaching, while staff training was considered part of Operations.

#### **Initial Consideration (First Year):**

- *Raise UW Oshkosh profile as a leader in sustainability with consistent representation at local, regional and national meetings and conferences related to sustainability.*
- *Establish a physical location for sustainability staff and their activities, including outreach (e.g. a Center for Sustainability).*
- *Increase the community outreach and involvement component of ongoing speakers and events such as Earth Charter Community Summit and Earth Week.*
- *Create a university website on sustainability activities, highlighting the campus but considering use by the broader community.*

#### **Within Three Years**

- *Review materials currently used to promote UW Oshkosh and its programs for potential to add sustainability information, messages, appeals, images, etc.*
- *Create presentation materials (e.g., booth display, posters, Powerpoint files) summarizing campus sustainability efforts, and train staff who will represent the university.*

#### **Future Consideration ( Five years or greater):**

- *Develop and install signs (black & yellow UW Oshkosh style) designating sustainability-related places, structures, etc. (e.g. alternative fuel storage; environmental parks; rain gardens; off-campus preserves, etc.)*
- *Develop and install kiosks and other illuminated information sources on structures and walkways describing either green technology or sustainability concepts, particularly along routes frequented by the public (e.g., riverfront trail;)*

## **VIII. Assessment**

**A. Introduction.** This Campus Sustainability Plan is a pioneering effort for UW Oshkosh. The future includes putting this plan into motion, reconsidering priorities, and adding fresh ideas that will emerge. The future will lean heavily on assessment of 1) campus conditions (including areas not well studied at present); 2) the efforts to improve sustainability; and 3) the organizational support. Below we describe a number of approaches to assessment and how they might be applied.

**B. Long-term vision:** UW Oshkosh acquires and uses sufficient information to guide and make understandable its sustainability efforts, planning, and decision-making.

**C. Goal:** To establish the means to assess campus sustainability and provide information to students, staff and community.

**D. History.** The first attempt at a comprehensive assessment of elements of campus sustainability was the Environmental Audit produced in 2003. The audit was conducted largely by students with input from staff, and has been available as a website for planning and educational use. While some parts of have been updated, the need for a thorough update and expansion is overdue. More recently, UW Oshkosh has joined organizations that invite or require assessments related to campus sustainability. As a member of the American Association for Sustainable Higher Education (AASHE), UW Oshkosh applied and was selected as a pilot campus for a new assessment tool based on a point-earning system (Sustainability Tracking, Assessment, and Rating System, or STARS). UW Oshkosh is also a signatory to the American College & University Presidents Climate Commitment, which requires regularly reporting of campus greenhouse gas emissions.

**E. Action Plan Recommendations.** In order to provide the information needed for decision-making, program and organization evaluations, prioritization, education, outreach, and accountability, the following assessment approaches should be implemented:

### **Initial Consideration (First Year)**

- *Expand the Campus Environmental Audit to all relevant areas of campus operations and develop the capacity for regular updating and review.*
  - *Continue to provide educational opportunities, e.g., student internships.*
  - *Determine and prioritize topics that can benefit from professional review and contract for needed studies (e.g. professional energy audits slated for completion under the Governor's Energy Independence Initiative).*
  - *Maintain a strong website for dissemination and use of information*
- *Provide feedback data and information to help elicit ideas for problem-solving and conservation, and to motivate and reinforce changes in behavior and decision-making criteria.*
  - *Utility (electricity, water, heat, etc.) usage data to financial agents (directors, chairs, managers, administrators) and dorm residents.*
  - *Paper usage data to students using and paying for computer laboratories*

- *Waste production and recycling statistics for all campus members*
- *Develop guidelines and expectations for internal reporting from the campus community to cognizant staff and for periodic summarizing and dissemination.*
  - *Add a section on sustainability to the UW Oshkosh Annual Report*
  - *Produce an Annual Energy Report for campus-wide discussion of conservation, consumption trends, investment choices, future plans, and the importance of staff/student cooperation and innovation*
  - *Develop a system to collect and act on reports of inefficiency and waste in some operational areas (e.g. water, lighting, heating, solid waste), and develop a system to collect and act on sustainability ideas from the community.*
- *Develop processes for external reporting to allow for independent review and for comparison with peer institutions.*
  - *Continue to use the Sustainability Tracking, Assessment, and Rating System (STARS) from AASHE, if it continues past the pilot stage.*
  - *Continue to report campus greenhouse gas emissions to the American College & University Presidents Climate Commitment organization.*
  - *Where appropriate, consider external reporting requirements before committing UW Oshkosh to sustainability-related campaigns, petitions, groups, etc.*
  - *Seek opportunities for independent review (e.g. through established organizations, or following university guidelines used in other programmatic reviews).*
  - *Collect, analyze, and disseminate results from any external reporting that allows for comparison of UW Oshkosh to peer institutions.*

The resources needed for this effort include labor, website, and outreach materials. Labor could be provided by the Director of Sustainability, the Campus Sustainability Council, and student interns as recommended earlier in this plan under Organization. A sustainability-focused website has been recommended above, and will be a cost-effective and convenient tool for assessment in two ways. First, a website would be the one effective way to collect input from the campus community. Second, a website will be the primary method for sharing results from assessment activities. Finally, some of the results from assessment should be developed into various outreach materials for presentation to the broader community, campus supporters, legislators, and institutional peers.



## **IX. Conclusions and Top Priorities**

The preceding sections are organized to present the recommendations in terms of current UW Oshkosh organization and staff responsibilities. Given the large number of recommendations presented, it is difficult to grasp the overall magnitude of the task of creating a more sustainable campus. Thus, there remains a need to analyze the recommendations in ways that will help decision makers compare recommendations on similar timescales and that require similar actions.

The Campus Sustainability Plan is comprehensive and ambitious, and includes many recommendations for initial consideration, within three years, and future consideration. While all of the recommendations would help make UW Oshkosh more sustainable, some are critical, especially as we begin the process of implementation. Shown below is a short list of top priorities, some covering multiple recommendations, that could produce immediate results across a wide range of sustainability issues:

- Organizational Infrastructure to Support Sustainability
- Planning in Key Operational Areas
- Sustainability Audit
- Teaching of Sustainability
- Residence Hall Programs on Sustainability
- Websites
- Fair Trade
- Energy Independence Study and Implementation
- Food Contracting
- Community Gardens and Composting Facilities
- Construction Standards

In the discussion below, these priorities will be highlighted in **bold**.

### **A. RECOMMENDATIONS FOR INITIAL CONSIDERATION**

Most of the specific recommendations of the Campus Sustainability Team could be initiated immediately and completed in one year if resources are available. Short term recommendations will need to be prioritized to determine which will actually be attempted in the coming year, and which might be postponed. The remaining short-term recommendations need to be considered carefully in terms of implementation. The categories below should not be read as a strict chronological or priority order (e.g. that all studies should be completed before starting any awareness-raising). There are issues identified (e.g. purchasing, transportation, formal courses) where it would be prudent to complete a study before developing a policy or plan, but where some obvious initiatives could be implemented. For an example related to purchasing issues, a single year could include a 6-month purchasing guidelines study followed by a 6-month policy development process, while a separate project works with an intern to develop a sustainable purchasing guide and website based on current contracts and vendors.

Priorities in the short-term include:

### **A1. ORGANIZATIONAL DEVELOPMENT**

The Team strongly recommends the development of formal organizational structures and lines of responsibility for campus sustainability. While this new organization would have responsibilities for implementing the entire Campus Sustainability Plan, its charge should include direction to begin studies and plans on priority topics, and to update and expand the Environmental Audit.

**Organizational Infrastructure to Support Sustainability:** Because of their central role in catalyzing campus sustainability and providing accountability, a set of organizational recommendations will strongly influence how the sustainability plan could be carried out. UW Oshkosh needs to formalize and institutionalize the commitment to sustainability by creating structures and positions that assist in the development, coordination, and oversight of the sustainability initiative. The crucial recommendations are for the creation of a Campus Sustainability Council, with representation from across campus, and a permanent, full-time position with the title of Campus Sustainability Director.

**Planning in Key Operational Areas:** The Campus Sustainability Council and Director, with assistance from responsible administrators and staff, should begin drafting plans in key operational areas. The Team has identified the three priority areas as transportation, purchasing, and solid waste management. These areas were chosen because: 1) they affect nearly everyone in the campus community; 2) studies are needed to understand current practices and behaviors of the campus community; and 3) each has major impacts on use of resources and land and the production of pollution and wastes. Developing campus plans in these three areas will require significant time and resources, and input from across campus. Other campus sustainability issues are fairly well understood, but lack plans or policies with sufficient specificity or established lines of responsibility. These include issues that have been the subject of previous study (e.g. electricity and water consumption) and those where solutions are well known from the experience of other institutions. Thus in the cases of energy, food, construction, and student residence we can move directly to developing plans and policies.

**Sustainability Audit:** One of the most effective tools in monitoring and assessing our commitment to sustainability is an ongoing Sustainability Audit of campus water, energy, and resource use. The audit needs to be updated, and expanded. Basic information about the institution is lacking or is not in use for sustainability analyses – information necessary to make plans and policies in many areas. About 20% of the recommendations generated were for studies on the current state of sustainability at UW Oshkosh. A comprehensive Sustainability Audit will serve: 1) as a primary vehicle for assessment of operations and sustainability programs; 2) to summarize and disseminate information for decision-making and prioritization of sustainability efforts; and 3) to provide extensive educational opportunities in the form of student internships.

### **A2. AWARENESS RAISING**

This category covers recommendations related to formal and informal teaching, as well

as outreach. In deference to the formal policies for implementing major changes in formal teaching, curriculum recommendations have been listed below as long-term issues that require studies, plans and policies before implementation can proceed. However, the following priority topics should be addressed immediately:

**Teaching of Sustainability:** The teaching mission of any university includes the imperative to find a place in the curriculum for important emerging subjects such as sustainability. UW Oshkosh should offer faculty development opportunities that assist faculty and teaching staff from a wide range of disciplines to learn about sustainability, understand how it is related to their disciplines, and integrate this new understanding into their courses. A faculty college with this goal will be offered first in May 2008. But it is important that such opportunities be repeated and institutionalized until faculty and teaching staff have been able to fully incorporate sustainability across the curriculum by increasing the number of courses related to sustainability and optimizing the exposure of students to this issue.

**Residence Hall Programs on Sustainability:** Much of the informal learning on campus occurs in the residence halls, and a significant part of our ecological footprint is found there. The Director and Campus Sustainability Council should work with Residence Life staff to encourage programming in the residence halls that both encourages students to incorporate sustainability in their daily lives, and also raises the profile of sustainability on campus. The Teaching Section of the plan offers many specific recommendations for programs to initiate sustainability-related events, competitions, First-Year Experience, and orientations for dormitory residents. There also Operations recommendations to improve facilities for residents (e.g. pedestrian and bike infrastructure) and provide utility use feedback to theses on-campus consumers.

**Websites:** The Internet can be an effective tool for publishing information about sustainability to the campus community and beyond. Specific recommendations in the plan suggest that UW Oshkosh should create websites to provide: 1) information about the research and teaching of sustainability on campus; 2) resource use feedback to the campus community (periodically and summarized in the Audit mentioned above); 3) information about UW Oshkosh sustainability initiatives and achievements; and 4) a schedule of sustainability events.

**Fair Trade:** For imported goods, Fair Trade is an internationally recognized term to describe food, crafts, and other items that are produced in a way that provides a just and dependable living for growers and workers using environmentally sustainable practices. By declaring itself a Fair Trade University, UW Oshkosh would more effectively promote awareness of this socially important international movement on campus, and would encourage other campuses to follow our lead.

### **A3. FACILITIES AND CONTRACTING**

Many significant recommendations were generated in this category, but nearly all should be considered long-term goals. However, many require decisions and policies be set immediately in order to ensure that progress can be made as opportunities arise.

### **Energy Independence Study and Implementation**

UW Oshkosh is one of four campuses currently involved in an engineering analysis to develop a plan to phase out all dependence upon fossil fuels for heating and electricity. Participation in this effort has placed UW Oshkosh at the forefront of higher education sustainability efforts in the Midwest. Successful implementation of the plan's recommendations could provide leadership and direction to others wishing to pursue energy independence.

### **Community Gardens and Composting Facilities**

Community gardens provide learning opportunities for students, research opportunities for faculty, student internships, and an important connection between the campus and the wider Oshkosh community, not to mention healthy food. UW Oshkosh should work with students and Oshkosh community members to plan a community gardens and composting program and begin to develop these facilities as soon as possible.

### **Food Contracts**

The dining services contract is a critical area for developing greater sustainability on campus, both in terms of the ecological footprint of the campus and engaging students in sustainable practices. Incorporating goals for sustainably-produced foods (e.g. organic, locally produced, humanely processed, fair trade) and disposable items (e.g. compostable, recyclable) into the contract would be a major step forward for the university in terms of our impact on the planet and modeling our commitment to sustainability.

### **Construction Standards**

The adoption of sustainable building design and construction standards (e.g. LEED) is another important way to demonstrate the universities commitment to sustainability. Our new facilities will educate future generations as to the importance and practical aspects of sustainable engineering and architectural design.

## **B. MID-TERM RECOMMENDATIONS (3-5 years)**

A smaller number of recommendations have been identified in the plan for implementation in 3 to 5 years. In some cases, implementation needs to wait for studies, planning and policy development. In other cases, the time is needed to develop understanding and support in the campus community.

### **B1. Organizational Development**

The most striking need for organizational development in the mid-term will probably be to fill needs on a project-by-project basis. In particular, student intern programs, and their funding, should be established and institutionalized.

### **B2. Awareness Raising**

The plan includes a number of recommendations to broadly educate the campus community about sustainability practices. Such education efforts could require planning, production of written materials, training strategies, and incentives. For some topics, models and materials may already exist. This campus education effort is necessary to

ensure that: 1) the campus community understands the reasons for any changes; and 2) infrastructure and staff resources are in place to help with any transitions. The educational efforts described above for dormitory residents will provide important lessons about how to develop programs for students, serving as an incubator for broader informal education efforts that should start within 3-5 years.

Within 3-5 years, the university should also be able to assess the impact of faculty development on the teaching of sustainability on campus. At that point, it should be possible to assess more specific needs for faculty development and the need to hire faculty in particular fields. We also anticipate that increased faculty engagement with sustainability issues will increase scholarship and research in sustainability; thus the recommendations to seed, expand, and reward sustainability research would be most effective in the mid-term.

### **B3. Facilities and Contracting**

The mid-term recommendations for facilities focus on management changes expected to take time or require more study, and on equipment upgrades anticipated in that time frame. Management policies that could be accomplished mid-term include adoption of sustainable building certifications for all construction, purchasing policies for sustainable products, and building energy management improvements (e.g. hallway lighting). Infrastructure improvements could include installation of existing technologies (solar hot water heating; double-sided printing), continued efficiency upgrades to next-generation plumbing and electrical devices, and pro-active replacement of inefficient electrical devices.

## **C. LONG-TERM RECOMMENDATIONS (5 or more years)**

Given sufficient time (such as five years) and resources, UW Oshkosh could achieve the following goals:

### **C1. Organizational Development**

Planning and policymaking in certain sustainability areas will clearly require more time to produce and implement. It will also be a challenge to establish a means of funding sustainability investments at a state institution that is subjected to short-term (i.e. biennial) budgeting. For the latter, the university should pursue ways of recovering and reinvesting the cost savings from conservation practices.

While most staffing recommendations could be started immediately, one would clearly require more time to plan and implement: to add expertise in fields of engineering relevant to sustainability. Since UW Oshkosh has no school, department or faculty positions associated with engineering, this would require major discussions with UW System and possibly collaborations with other UW institutions. Postponing this action also has the benefit of seeing whether UW Oshkosh researchers and teachers have been able to forge collaborations off-campus that can fill some of this expertise gap.

### **C2. Awareness Raising**

Major discussions amongst the faculty regarding formal teaching would be needed to

address recommendations to maximize the number of students taking formal sustainability courses, and to develop graduate programs in sustainability.

Some forms of awareness-raising will require investments in facilities, staff, materials, and incentives. The highest recommendations were to build kiosks and signs to explain campus sustainability infrastructure and actions.

### **C3. Facilities and Contracting**

Many of the recommendations for buildings and grounds are considered long-term goals because they depend on major investments, state budget approvals, or might be best achieved under upcoming refurbishment and construction projects. Issues that present a challenge to all of society will require major operational and technological changes to meet recommendations to reduce energy consumption, shift to renewable energy sources, and reduce solid waste generation. Long-term planning should focus on improvements that would continue to upgrade following current best practices (energy and water efficient devices). UW Oshkosh also needs to be prepared to take advantage of new technologies when feasible (e.g. solar photovoltaic panels; bio-fuel use for heating). Finally, there are long-term projects that can be accomplished most efficiently during major reconfigurations of the campus, such as developing new facilities (sustainability office; greenhouse; off-campus research sites), improving the campus infrastructure (pedestrian and bicycle paths, landscaping to manage stormwater), and pursuing overdue upgrades based on existing technology (composting; increasing event-driven mass transit).

## **C. EXPECTATIONS FOR PROGRESS**

In order for UW Oshkosh to demonstrate, maintain, and build its capacity to educate, lead and inspire, it must take seriously the challenge of becoming sustainable in environmental and social terms, in addition to paying attention to the financial bottom line. While early efforts at UW Oshkosh have produced financial savings and national recognition, the institution needs to recognize that sustainability remains a challenging standard that no university has yet achieved. The four dimensions originally conceived for a sustainability plan are in very different stages of development. Operations is very advanced in certain areas, with support from state initiatives (e.g. energy), which should give us confidence about future success in areas that are less well developed. By building on the momentum of past successes, it is reasonable to envision the following progression to a sustainable UW Oshkosh:

- achieve substantial and widely understood operations and policies
- develop extensive and intensive sustainability teaching
- faculty development and the hiring of new faculty
- increase capacity for sustainability research and outreach

This progression should not be interpreted as discrete, sequential steps, but as overlapping waves that provide the impetus and means to build a sustainable institution in a sustainable community in a sustainable world.

## **X. Table of Goals and Recommendations**

### **ORGANIZATION**

**Goal:** To establish an organization capable of supporting campus sustainability initiatives as soon as is feasible, but within twelve months of the adoption of this plan. The main recommendations to support this vision and goal are:

#### **Initial Consideration (First Year)**

- *Create a permanent Campus Sustainability Council, with representation from across campus, to continue to advise campus leaders on sustainability initiatives.*
- *Create a permanent full time position with the title of Campus Sustainability Director. This individual will be tasked with responsibility for coordination across all sustainability related activities. The individual will possess an advanced degree in an appropriately related field and have expertise in energy, environmentalism, ecology and sustainability.*
- *Establish Unit Level Sustainability Coordinators from each functional area. Coordinators will be trained in sustainability initiatives and policies and act as a local resource and sounding board for sustainability related matters.*
- *Designate sustainability responsibilities for Administrators to institutionalize the university's commitment to sustainability.*

#### **Within Three Years**

- *Establish a Campus Sustainability Endowment Fund to provide a method for donors to contribute to sustainability and to provide a reliable and continuing source of funds for the future.*

### **OPERATIONS**

#### **A. Electrical Energy Management and Conservation**

**Goal:** To become a national role model for electricity conservation through the rigorous implementation of emerging technology to increase efficiency, and the application of policy- based conservation practices to reduce waste. Our goal is to reduce overall electrical consumption 20% from 2005 levels by 2012.

#### **Initial Consideration (First Year):**

- *Review, verify and update campus audit data. Identify the campus facilities with the highest electrical energy consumption per square foot.*
- *Provide facility electrical usage feedback and education to campus users.*
- *Turn off unnecessary lights during non teaching periods.*
- *During low useage periods (summer, interim, weekend) consolidate classroom useage to the most energy efficient buildings that meet course requirements.*
- *Replace all facility incandescent exit signs with LED signs.*

### **Within Three Years**

- *Phase in the replacement of old, energy in-efficient equipment with Energy Star rated items. Require all new purchases of certain high energy consuming devices (i.e. refrigerators) to be Energy Star Rated.*
- *Establish guidelines for the connected (plug) load in all campus facilities.*
- *Permanently reduce light levels in hallways/corridors of all academic buildings by as much as 20%.*

### **Future Consideration ( Five years or greater):**

- *Convert pneumatic control systems to direct digital control (DDC).*
- *Convert or replace energy inefficient facility HVAC systems.*
- *Initiate studies of more efficient lighting options (e.g. LED) to estimate when retrofitting will be feasible.*
- *Determine the viability of installing a Thermal Ice Storage Facility.*
- *Install green roofing to reduce summer heat loading during renovations of existing buildings and as part of new construction.*
- *Determine the viability of installing a Thermal Ice Storage Facility.*
- *Install green roofing to reduce summer heat loading during renovations of existing buildings and as part of new construction.*

## **B. Campus Heating**

**Goal:** To reduce the annual consumption of fossil fuels for heating by 50% from 2000 levels by 2012.

### **Initial Consideration:**

- *Review, verify and update campus audit data. Identify the campus facilities with the highest thermal energy consumption per square foot.*
- *Provide facility thermal energy usage feedback and education to campus users.*
- *During low useage periods (summer, interim, weekend) consolidate classroom useage to the most energy efficient buildings that meet course requirements.*

### **Within Three Years**

- *Assess the possibility of burning alternative biomass fuels at the campus heating plant.*
- *Install solar hot water heaters at appropriate locations throughout the campus. Suggestions include Albee Hall and the Residence Halls.*

### **Future Consideration (Five years or greater):**

- *Install alternative heating and cooling systems at facilities not connected to the central system.*
- *Replace older single pane windows with high efficiency, low e, double or triple pane windows at appropriate locations such as Clow Classroom and Faculty Tower Complex.*



### **C. Sustainable Energy**

**Goal:** UW Oshkosh is pursuing the ambitious goal of becoming 100% independent of fossil fuel energy for electricity, heating and cooling..

#### **Initial Consideration**

- *Perform engineering analysis of campus heating plant, and other campus facilities necessary to develop a plan for transitioning away from fossil fuels for heating and electrical consumption.*

#### **Future Consideration (Five years or greater):**

- *Install integrated photovoltaic panels (solar panels) where feasible.*
- *Explore the possibility of installing a small, demonstration wind turbine on campus.*
- *Study the feasibility of installing a biomass production facility to provide on-campus electrical generation.*
- *Study the feasibility of installing biodiesel peak load shaving generators.*
- *Evaluate the potential for the use of pressure reducing steam turbines in the campus central plant or at individual buildings, for electrical generation.*

### **D. Fresh Water Conservation**

**Goal:** To reduce overall water consumption levels by 50% from 2000 levels by 2012.

#### **Initial Consideration:**

- *Review, verify and update campus audit data. Identify the campus facilities with the highest fresh water consumption per square foot.*
- *Provide water usage feedback and education to campus users.*

#### **Within Three Years**

- *Publicize and encourage student, faculty, and staff to report water waste on campus.*
- *Install next generation waterless or low flow urinals in appropriate locations throughout the campus. It is estimated that each waterless urinal eliminates the consumption of over 45,000 gallons of water annually.*
- *Install the next generation of low flow toilets throughout the campus. Extreme low flow/ dual flush toilets are now being manufactured that utilize less than 1.3 gallons per flush.*

#### **Future Consideration (Five years or greater):**

- *Plan and plant landscaping so that water for irrigation may be acquired from storm water basins or ponds rather than using municipal drinking water.*
- *Reduce irrigation needs through landscape design, composted mulch, and other programs designed to conserve water in places where municipal drinking water is the only available water source.*

## **E. Storm Water Management**

**Goal:** Reduce the amount of total suspended solids (TSS) coming off of the campus by 20% before 2008 and 40% before 2013. (2006 baseline)

### **Initial Consideration:**

- *Perform SLAMM modeling to determine baseline data for stormwater reduction goals.*
- *Partner with the City of Oshkosh on storm water permit conditions. One possibility might be that the University will take responsibility for public education and outreach and the City will take responsibility for illicit discharge detection and elimination.*
- *Implement DOA-DSF erosion control standards for all capital projects (new construction and maintenance and renovation) and report all incidents to the DOA-DSF Project Manager and/or Construction Representative.*
- *Implement DOA/DSF civil engineering and sitework design guidelines for all capital projects (new construction and maintenance and renovation)*
- *Install educational and informational signage designating all rain gardens constructed and stencil appropriate “no waste dumping” near all storm water inlets.*
- *Conduct ongoing storm water public education and outreach program. Schedule public education events to coincide with Earth Charter Community Summit and Earth Day activities.*
- *Develop a web page devoted to Storm Water Management education.*

### **Within Three Year**

- *Consider a reduction in the use of ice melting salts on sidewalks and roads. Increase the use of sand to mitigate slipping hazard.*
- *Disconnect roof drains from storm water systems and divert water to ponds and other storm water retention devices.*
- *Create Biofilters at all existing storm drains to filter storm water as necessary to reduce suspended solids. Perform all other related mitigation projects designed to reduce the percentage of suspended solids in storm water.*

### **Future Consideration (Five years or greater)**

- *Consider the installation of green roofing to mitigate storm water runoff on existing buildings and as part of new construction.*
- *Install underground cisterns to collect rooftop rain water for later use in irrigation.*
- *Monitor the development of porous pavements. When a suitable product comes available, install and test on campus.*

## **F. Facilities Planning, Renovations and Construction**

**Goal:** Energy efficient and sustainable design standards shall be utilized on all new construction and applicable renovation projects undertaken after 2007. As of that deadline, all construction and renovations projects shall seek to meet or exceed a LEED “Silver” level of sustainability.

### **Initial Consideration:**

- *Design and build all new facilities and perform all renovations to LEED Silver standards.*

### **Within Three Years**

- *Obtain LEED certification for all building and renovation projects.*

### **Future Consideration (Five years or greater)**

- *Monitor the development of other sustainability and energy efficiency construction guidelines (i.e Energy Star, ASHRAE, Building Code) Adopt best practices regarding sustainable building design and construction as they develop.*

## **G. Transportation**

**Goal:** To reduce automobile trips to campus by 20% by 2012, through incentives and improvements in sustainable alternatives.

### **Initial Consideration:**

- *Create a comprehensive Campus Transportation Plan to balance the needs of all commuters to campus.*
  - \* *Partnership with the City of Oshkosh is essential.*
  - \* *Rising use and parking of bicycles and mopeds should be addressed.*
  - \* *The parking fee price structure should be reviewed and revised to reflect the true costs of parking and/or market rates (e.g. responsive to supply and demand) and avoid subsidizing automobile drivers. There should be substantial financial savings for commuters who carpool.*
  - \* *A significant amount of Compact car parking spaces (e.g. 25%) should be designated in every parking lot. They should be located at the preferred spots near building entrances.*
  - \* *Create incentives such as preferential parking for hybrid, high efficiency and biodiesel vehicles.*
  - \* *Establish incentives to encourage students to not bring a vehicle to campus. One suggestion was that a student who elects not to bring a vehicle to campus would get his/her first choice in the selection of a residence hall.*
- *Designate a Director of Transportation Services. This should be more than a title change for the Director of Parking, as “parking problems” will become one of many equally important factors in a sustainable transportation plan.*
- *All campus vehicle purchases shall be fuel efficient and environmentally friendly. For now, that means the campus is limited to the purchase of E-85 compliant,*

*high miles per-gallon vehicles. The State of Wisconsin limits purchases to American-made vehicles, thus the most efficient vehicles and hybrids on the market cannot be acquired. If and when state policies change, the campus should revise this recommendation.*

**Within Three Years:**

- *Develop an education program geared to all campus constituents regarding the true cost of automobile ownership. More than just the purchase price – fuel, maintenance, insurance, registration fees, impact on the environment.*
- *The health dimensions of transportation choices and the benefits of walking and biking for exercise should be emphasized to students, faculty and staff through education and incentive programs.*

**Future Consideration (Five years or greater):**

- *A substantial research initiative must be launched to improve the understanding of the travel behavior and demand of the campus population. This information will impact planning priorities and focus areas for campus improvements. Transportation behavior and choices will be strongly influenced by the availability of housing, shops and entertainment on and near the campus.*
- *Create adequately designed facilities for pedestrians and bicyclists.*
  - \* *sidewalk and path width that can accommodate large numbers of socializing students/staff (more than single-file traffic).*
  - \* *bike lanes (e.g. minimum 5-feet width) on campus and on adjoining streets.*
- *Provide shuttle bus services at key travel times of the year. For example, bus service to Outagamie Airport could be provided at the Winter Recess and at the beginning and end of each school year.*
- *Purchase electric powered Cushman/Mule and pedal-powered vehicles wherever feasible for on-campus travel.*

**H. Purchasing**

**Goal:** Develop and follow sustainability-focused purchasing policies in more than 50% of spending for campus materials and equipment by 2012.

**Initial Consideration:**

- *Develop a sustainability-based purchasing policy that stimulates the purchase of cost competitive (based on broad accounting standards, e.g. life cycle analysis) products and services. Products and services covered by this policy would have a reduced effect on human health and the environment compared to competing products or services that serve the same purpose.*
  - \* *Establish a sustainability purchasing committee with the mission to research attributes of current campus purchasing patterns, identify alternatives, and to make recommendations. The committee should revisit and update their recommendations on an annual basis, or as necessary.*

- \* *The UW Oshkosh Purchasing Department should track and record sustainable purchasing efforts and prepare a report highlighting performance on an annual basis.*
- \* *Collaborate with UW System on pilot projects that demonstrate sustainable purchasing policies, particularly when state policies interfere with best practices; continuously, share the information with UW System, other institutions, and vendors to improve state policies and preferred vendor contracts.*
- \* *Make sustainable products and services easily available in convenience or “captive audience” situations (e.g. less harmful detergents in dorm laundry rooms, sustainable choices in dining halls and vending machines, etc.)*
- *Produce and annually update a “green” guide to purchasing that provides a list of recommended environmentally friendly products or services. The guide should cover a wide variety of materials and equipment, including Energy Star-rated office equipment, kitchen equipment, laundry equipment, and vending machines.*

**Within Three Years:**

- *Educate the campus community about sustainability purchasing programs and policies.*

**Future Considerations (5 years or greater):**

**None noted**

**I. Solid Waste Management**

**Goal:** Reduce production of municipal solid waste by 30% from 2000 levels by 2012.

**Initial Consideration:**

- *Develop a Solid waste Management Plan that includes responsible disposal of municipal and hazardous wastes, increases re-use and recycling, and works with other elements of the campus to reduce the amount of solid waste created.*
  - \* *Create a 3-R’s (reduce, re-use, recycle)oversight committee. Membership should include students, faculty and staff. The committee will be tasked with developing policies and programs, provide oversight of 3R’s efforts, and report on recycling performance relative to campus generation of municipal solid waste. Add more recycling receptacles, especially outdoor stations (currently lacking on campus).*
  - \* *Develop infrastructure and confidence in information technologies (e.g. university servers and portable media; backup software) that can reduce printing and photocopying (and their production of waste paper).*
  - \* *To create incentives for students to reduce paper use in computer labs, change printing policies to “pay as you go” cost charging beyond a*

*reasonable number of pages; reduce that level as electronic storage technology improves.*

- \* Recycle at all campus events such as athletic competitions, concerts and graduation ceremonies.*
- \* Get campus involved in green recycling competitions amongst campus groups or with other institutions, such as a Recycling Olympics.*
- \* Develop policies and collection sites for harmful and hazardous consumer wastes (e.g. batteries, electronics, light bulbs, paints/polishes/removers, cleaners, lighters, medicines, etc.).*
- \* Enhance Residence Hall recycling and re-use efforts, especially on move-in and move out days. Provide bins for food, clothing, shoes, furniture, computers, CD's, paper, cardboard, etc.....*

#### **Within Three Years:**

- Develop a campus wide education effort geared toward the 3R's that includes e-mails, posters, and fliers. Inform campus of how they can help the campus reach its goal of a 30% reduction in the campus solid waste output.*

#### **Future Consideration (Five years or greater):**

- Replace single-side printers with double-side printers, and install scanners to replace (some) uses of photocopiers, and thus reduce paper consumption.*
- Eliminate take-away food containers that cannot be recycled or composted (e.g., Styrofoam cups, most plastics, aluminum foil) and replace with recyclable plastics, biodegradable (plant-based) plastics, and unwaxed paper products.*
- Compost all garden waste.*
- Create a campus wide rummage sale to increase re-use.*
- Institute "pay as you throw" trash removal policies for dormitory residents, retail operations on campus, and other units; may require special equipment (though a low tech solution is to sell standard bags with tags).*

### **J. Food Services**

**Goal:** Food Services will minimize the environmental and social impacts of their operations (including indirect impacts of suppliers) while continuously providing a variety of nutritious and sustainably –grown foods.

#### **Initial Consideration:**

- Declare UW Oshkosh to be a Fair Trade University.*
- The upcoming Dining Contract for campus food services should include sustainability goals, benchmarks, and timetables.*
  - \* Discussions with dining services, Sodexo, and others, suggest this could involve: Shell eggs from free range chickens, Liquid eggs from cage free chickens; Organic milk from humanely treated cows; Fair trade coffee; Biodegradable utensils, flatware, and other disposable items.*

- \* *Increase offerings of well-labeled, sustainably-produced foods (locally grown, organic, fair trade, humanely-grown), including fruits, vegetables, grains, dairy, eggs, and meat.*
- \* *The goal should be to provide an a constant reminder that people have sustainable food choices.*
- \* *Provide an organic option at all meals.*
- \* *Institute a “Meatless Monday” or other programs campus-wide to educate students about healthy vegetarian options and potential to reduce their environmental impacts.*
- \* *Purchase certified sustainable fish, using expertise of organizations such as the Monterey Bay Aquarium’s Seafood Watch Program and the Marine Stewardship Council.*
- \* *Investigate the purchase of compostable flatware and plates for Reeve Union and Blackhawk Commons.*
- \* *Purchase and utilize environmentally friendly cleaners and detergents throughout all food service operations.*

**Within Three Years:**

- *Develop a plan for the disposal of popular, and possibly sellable, food wastes (e.g., coffee grounds).*
- *Engage consultants (e.g., Food Service Technology Center) to provide a thorough review of our food services operations, and to provide recommendations for improvements and advice on the purchase of energy efficient equipment and processes.*

**Future Consideration (Five years or greater):**

- *Compost appropriate food wastes.*
  - \* *Identify an appropriate site to conduct composting operations*
  - Establish a process to segregate appropriate materials for composting (e.g. minimal meat or oils) and transportation of materials to the site*
  - \* *Investigate the use of vermiculture (worm husbandry)*
  - \* *Use compost in campus gardens and greenhouses.*

**K. Grounds Maintenance**

**Goal:** Increase biodiversity and usable green space of the campus while reducing dependence on fossil fuels, other extracted minerals, chemical fertilizers and pesticides.

**Initial Consideration:**

- *Develop policies to ensure that sustainability is one of the key decision –making components for landscape design, maintenance and management.*
- *Enlarge composting site to enhance composting capacity.*
- *Increase the amount of perennial planting throughout the campus, to replace plantings of annual plants that require disturbing the soil one or more times a year.*

- *Increase the planting of native species, and remove invasive non-native species on campus.*
- *Investigate the possibility of using less ice melt chemicals and more sand to keep walkways safe for pedestrians during winter months.*

### **Within Three Years**

- *Increase the number of rain gardens to increase groundwater infiltration throughout the campus (which will decrease stormwater runoff).*
- *Create more natural prairie areas such as exist near Halsey Science Building, allowing for aesthetic considerations (e.g. more flowering plants) in some landscape designs.*
- *Test environmentally safer herbicides to determine their effectiveness; if the products work, the campus should discontinue the use of conventional chemical herbicides, such as Roundup.*
- *Replace traditional grass with a newer variety that is drought resistant and requires little mowing (no maintenance lawn).*
- *Install drip irrigation in all flower beds to reduce water use.*

### **Future Consideration (within 5 years):**

- *Build a greenhouse facility to propagate plants and increase the amount of available plant material. If a greenhouse was available, the campus would be able to re-use existing plants rather than throw away and purchase new each year. (Greenhouse facilities would support other recommendations in this plan, such as the campus gardens listed under food services and research needs.)*

## **TEACHING**

### **A. Curriculum.**

**Goal:** Sustainability should be a recognized, emphasized, and common theme across colleges, departments and general education initiatives. Students should have extensive and diverse opportunities to study sustainability in their coursework.

### **Initial Consideration:**

- *Offer ongoing faculty colleges that assist faculty from a wide range of disciplines in integrating sustainability into courses.*
- *Create a web page that has information about how other campuses have integrated sustainability into their courses, departmental curriculum, and liberal arts requirements.*

### **Within Three Years**



- *Create a web page that has information about how teachers at UWO have a sustainability component in existing courses or created new courses related to sustainability.*
- *Provide diverse avenues for faculty to learn about sustainability and how it can be integrated into courses, including possibly hosting U.W. system colloquia or regional conferences on sustainability in the curriculum.*
- *Assess the existing UWO courses and curriculum for breadth and depth in addressing sustainability issues.*
- *Develop a plan to hire new faculty in a broad range of disciplines with interest and expertise in sustainability.*

**Future Consideration (Five years or greater):**

- *Consider ways to ensure that every college student encounters the concept of sustainability. One possible way to accomplish this is to make sustainability an aspect of our Liberal Education Reform, including the possibility of a general education requirement that concerns sustainability.*
- *Encourage and facilitate departments adding a sustainability component in the departmental curriculum.*
- *Consider the possibility of developing one or more graduate programs in sustainability.*

**B. Extra-curricular Awareness Raising Across Campus**

**Goal:** To raise awareness of students and staff through participation in campus sustainability activities that take place outside of the formal classroom. Doing so will increase our chances of generating a campus-wide commitment to sustainability.

**Initial Consideration (First Year):**

- *Develop sustainability programs in the residence halls. This might include*
  - \* *Programs to reduce solid waste generated during move in and move out days.*
  - \* *Require all residence hall Community Advisors to coordinate one sustainability program each year, providing them with models, contacts, and special funds for these events.*
- *Include sustainability in the first year experience and orientation program.*
- *Inaugurate competitions focused on sustainability amongst campus groups (e.g. dorms, clubs, departments, etc.) and with other institutions.*

**Within Three Years**

- *Develop a Student Sustainability Leaders Program in which students serve in paid positions as student sustainability educators.*
- *Include concepts of sustainability, and campus sustainability initiatives, in employee training and orientation.*

### **C. Campus Events**

**Goal:** To offer a large number and wide variety of well-attended events that teach and promote sustainability, and to coordinate and promote those events.

#### **Immediate Consideration:**

- *Ensure that current sustainability events have adequate support and are promoted appropriately. Seek to make the events even more attractive to the greater Oshkosh community.*
- *Use other major events (e.g., athletic competitions, concerts, ceremonies) as opportunities to demonstrate sustainability through waste reduction, recycling, etc., and to promote sustainability in general.*
- *Have a campus-wide sustainability calendar that is widely available on and off campus.*

#### **Future Consideration (within 5 years):**

- *Host state, national, or international conferences*

### **D. Internships, Service Learning, Volunteering**

**Goal:** To expand the opportunities for UW Oshkosh students to garner hands-on experience in a wide range of sustainability initiatives by increasing the number of available internships, service learning, and volunteer experiences.

#### **Initial Consideration (First Year):**

- *Survey existing internships, service learning, and volunteer opportunities to determine which ones are related to sustainability.*
- *Revive and expand the UW Oshkosh environmental audit and the internship associated with it. This would provide more information to support sustainability initiatives and give students valuable experience.*

#### **Within Three Years**

- *Develop an internship program specifically related to sustainability, including internships both on and off campus.*
- *Develop new service learning opportunities related to sustainability, in particular those that cross departments and divisions.*

#### **Future Consideration ( Five years or greater):**

- *Encourage departments and student organizations to develop new volunteer opportunities directly related to sustainability.*
- *Utilize UW Oshkosh's off-campus properties as a way to provide internship and research opportunities for our students.*

## **RESEARCH**

**Goal:** To develop and maintain research and scholarship that supports campus sustainability efforts, contributes to the professional development of staff, and challenges students to apply their emerging skills and knowledge.

### **Initial Consideration:**

- *Create a web page that has information about past and current research on sustainability among UWO faculty.*
- *Create a web page that has information about funding sources for sustainability research.*

### **Within Three Years**

- *Explore ways to encourage research focused on sustainability, including awards and rewards for best sustainability research and an annual sustainability research presentation.*
- *Provide avenues for faculty to learn about current research in sustainability, such as an interdisciplinary sustainability research speaker series.*
- *Create a web page with information about how scholars at other campuses have conducted research relevant to sustainability.*
- *Develop a Geographical Information System (GIS) database for campus property*

### **Future Consideration (Five years or greater):**

- *Purchase/lease off-campus land for research activities not compatible with the small, crowded main campus due to space, noise, odor, safety, and other concerns (e.g. Campus Farm and Technology Site).*
- *Develop and maintain a sustainability research clearinghouse website, including communication tools and databases for expertise (on campus and; collaborators), project ideas and problem-posing (campus and community), etc.*
- *Increase dissemination of research findings through public meetings.*
- *Add faculty expertise in relevant engineering fields (could be associated with other UW campuses or colleges)*

## **OUTREACH**

**Goal:** To develop and maintain sufficient outreach efforts so that the sustainability lessons learned by UW Oshkosh are known, appreciated, understood, and used by the public.

### **Initial Consideration (First Year):**

- *Raise UW Oshkosh profile as a leader in sustainability with consistent representation at local, regional and national meetings and conferences related to sustainability.*
- *Establish a physical location for sustainability staff and their activities, including outreach (e.g. a Center for Sustainability).*
- *Increase the community outreach and involvement component of ongoing speakers and events such as Earth Charter Community Summit and Earth Week.*
- *Create a university website on sustainability activities, highlighting the campus but considering use by the broader community.*

### **Within Three Years**

- *Review materials currently used to promote UW Oshkosh and its programs for potential to add sustainability information, messages, appeals, images, etc.*
- *Create presentation materials (e.g., booth display, posters, Powerpoint files) summarizing campus sustainability efforts, and train staff who will represent the university.*

### **Future Consideration ( Five years or greater):**

- *Develop and install signs (black & yellow UW Oshkosh style) designating sustainability-related places, structures, etc. (e.g. alternative fuel storage; environmental parks; rain gardens; off-campus preserves, etc.)*
- *Develop and install kiosks and other illuminated information sources on structures and walkways describing either green technology or sustainability concepts, particularly along routes frequented by the public (e.g., riverfront trail;)*

## **ASSESSMENT**

### **Initial Consideration (First Year)**

- *Expand the Campus Environmental Audit to all relevant areas of campus operations and develop the capacity for regular updating and review.*
  - \* *Continue to provide educational opportunities, e.g., student internships.*
  - \* *Determine and prioritize topics that can benefit from professional review and contract for needed studies (e.g. professional energy audits slated for completion under the Governor's Energy Independence Initiative).*
  - \* *Maintain a strong website for dissemination and use of information*

- *Provide feedback data and information to help elicit ideas for problem-solving and conservation, and to motivate and reinforce changes in behavior and decision-making criteria.*
  - \* *Utility (electricity, water, heat, etc.) usage data to financial agents (directors, chairs, managers, administrators) and dorm residents.*
  - \* *Paper usage data to students using and paying for computer laboratories*
  - \* *Waste production and recycling statistics for all campus members*
- *Develop guidelines and expectations for internal reporting from the campus community to cognizant staff and for periodic summarizing and dissemination.*
  - \* *Add a section on sustainability to the UW Oshkosh Annual Report*
  - \* *Produce an Annual Energy Report for campus-wide discussion of conservation, consumption trends, investment choices, future plans, and the importance of staff/student cooperation and innovation*
  - \* *Develop a system to collect and act on reports of inefficiency and waste in some operational areas (e.g. water, lighting, heating, solid waste), and develop a system to collect and act on sustainability ideas from the community.*
- *Develop processes for external reporting to allow for independent review and for comparison with peer institutions.*
  - \* *Continue to use the Sustainability Tracking, Assessment, and Rating System (STARS) from AASHE, if it continues past the pilot stage.*
  - \* *Continue to report campus greenhouse gas emissions to the American College & University Presidents Climate Commitment organization.*
  - \* *Where appropriate, consider external reporting requirements before committing UW Oshkosh to sustainability-related campaigns, petitions, groups, etc.*
  - \* *Seek opportunities for independent review (e.g. through established organizations, or following university guidelines used in other programmatic reviews).*
  - \* *Collect, analyze, and disseminate results from any external reporting that allows for comparison of UW Oshkosh to peer institutions.*

## **XII. Glossary**

- **Alternative Energy:** Energy sources different from those in widespread use at the moment, which are referred to as conventional. Alternative energy sources include solar, wind, wave, tidal, hydroelectric, and geothermal. Although each has its drawbacks, none of these energy sources produces significant air pollution, unlike conventional sources.
- **Bio-Diesel:** A type of biofuel that can be used in place of diesel fuel in modified engines. Biodiesel (fatty acid alkyl esters) is a cleaner burning diesel replacement fuel produced (by transesterification) from natural, renewable sources such as new and used vegetable oils and animal fats. A common form of biodiesel is rapeseed methyl ester (RME), which is derived from rapeseed oil.
- **Biofiltration:** A pollution control technique using living material to capture and biologically degrade process pollutants. Common uses include processing waste water, capturing harmful chemicals or silt from surface runoff, and microbiotic oxidation of contaminants in air.
- **Biomass:** Refers to living and recently dead biological material which can be used as fuel or for industrial production. Most commonly, biomass refers to plant matter grown for use as biofuel, but it also includes plant or animal matter used for production of fibres, chemicals or heat. Biomass may also include biodegradable wastes that can be burnt as fuel.
- **British Thermal Unit(BTU):** Any of several units of energy (heat) in the HVAC industry, each slightly more than 1 kJ. One BTU is the energy required to raise one pound of water one degree Fahrenheit, but the many different types of BTU are based on different interpretations of this “definition”. The power of HVAC systems (the rate of cooling and dehumidifying or heating) is sometimes expressed in BTU/hour instead of simply watts
- **Chiller:** A device that removes heat from a liquid via a vapor-compression or absorption refrigeration cycle. This cooled liquid flows through pipes in a building and passes through coils in air handlers, fan-coil units, or other systems, cooling and usually dehumidifying the air in the building. Chillers are of two types; air-cooled or water-cooled. Air-cooled chillers are usually outside and consist of condenser coils cooled by fan-driven air. Water-cooled chillers are usually inside a building, and heat from these chillers is carried by recirculating water to outdoor cooling towers.
- **Composting:** The controlled aerobic decomposition of biodegradable organic matter, producing compost. The decomposition is performed primarily by aerobic bacteria, helped by larger creatures such as ants, nematodes and oligochaete worms.
- **Connected Load:** The sum of the ratings of the electricity consuming apparatus connected to a generating system.
- **Controller:** A device that controls the operation of part or all of a system. It may simply turn a device on and off, or it may more subtly modulate burners, compressors, pumps, valves, fans, dampers, and the like. Most controllers are

- automatic but have user input such as temperature set points, e.g. a thermostat. Controls may be analog, or digital, or pneumatic, or a combination of these.
- **Ethanol:** Also known as *ethyl alcohol* or *grain alcohol*, a colorless liquid that is produced by the fermentation and distillation of starch crops, such as corn, barley, that have been converted into simple sugars. Its chemical formula is  $C_2H_5OH$ . Ethanol can also be produced from cellulosic biomass such as trees and grasses and is called bioethanol. It is most commonly used to increase octane and improve the emissions quality of gasoline and is also used as an alternative fuel.
  - **E-85:** Ethanol can be blended with gasoline to create E85, a blend of 85% ethanol and 15% gasoline. E85 and blends with even higher concentrations of ethanol, E95, for example, qualify in the US as alternative fuels under the Energy Policy Act of 1992 (EPAct). Vehicles that run on E85 are called flexible fuel vehicles (FFVs) and are offered by several vehicle manufacturers.
  - **Energy Audit:** A survey that shows how much energy is used in a facility. It helps identify inefficiencies and ways to use less energy. A energy audit will pinpoint where a facility is losing energy and determine the efficiency of a facilities heating and cooling systems.
  - **Geothermal energy:** Heat from the Earth's interior that is a potential source of energy. The commonest way of capturing the energy from geothermal sources is to tap into naturally occurring hydrothermal convection systems where cooler water seeps into the Earth's crust, is heated, and then rises to the surface. When heated water is forced to the surface, it is straightforward to capture that steam and use it to drive generators.
  - **Geothermal Heat Pump:** A type of heat pump that uses the ground, ground water, or ponds as a heat source and heat sink, rather than outside air. Ground or water temperatures are more constant and are warmer in winter and cooler in summer than air temperatures. Geothermal heat pumps operate more efficiently than conventional or air-source heat pumps.
  - **Green Power:** A popular term for energy produced from clean, renewable energy resources.
  - **Greenhouse Gases:** Those gases, such as water vapor, carbon dioxide, tropospheric ozone, methane, and low level ozone that are transparent to solar radiation, but opaque to long wave radiation, and which contribute to the greenhouse effect.
  - **Green Roofing:** A **green roof** is a roof of a building that is partially or completely covered with vegetation and soil, or a growing medium, planted over a waterproofing membrane. It may also include additional layers such as a root barrier and drainage and irrigation systems. The term "green roof" may also be used to indicate roofs that utilize some form of "green" technology, such as solar panels or a photovoltaic module. Green roofs are also referred to as eco-roofs, vegetated roofs, living roofs, and greenroofs.
  - **HVAC:** An acronym that stands for "**heating, ventilation, and air conditioning**". HVAC is sometimes referred to as "climate control" and is particularly important in the design of medium to large industrial and office buildings such as sky scrapers and in marine environments such as aquariums,

where humidity and temperature must all be closely regulated while maintaining safe and healthy conditions within.

- **Kilowatt (kW):** A standard unit of electrical power equal to 1000 watts, or to the energy consumption at a rate of 1000 joules per second.
- **Kilowatt Hour (kWh):** A unit or measure of electricity supply or consumption of one thousand watts acting over a period of one hour. The kWh is a unit of energy.  $1 \text{ kWh} = 3600 \text{ kJ} = 3412 \text{ Btu}$ .
- **Leadership in Energy and Environmental Design (LEED):** A list of standards and certification scheme for environmentally-sustainable construction developed by the US Green Building Council (USGBC). The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is presently the most popular and respected guide for green building in the United States. It evaluates environmental performance from a whole-building perspective over a building's life cycle, providing a definitive standard for what constitutes a "green building."
- **Light Emitting Diode (LED):** A semiconductor light source. LEDs can produce a very bright light for a small amount of power. They are used in many applications e.g. car break lights, traffic lights, but white coloured LEDs are a relatively new technology.
- **Low emissivity (low-E) Glass:** Glass that has a low-emissivity coating applied to it in order to control heat transfer through windows. Windows manufactured with low-E coatings typically cost about 10–15% more than regular windows, but they reduce energy loss by as much as 30–50%.
- **Methane:** A colorless, odorless, tasteless gas composed of one molecule of carbon and four of hydrogen, which is highly flammable. It is the main constituent of natural gas that is formed naturally by methanogenic, anaerobic bacteria or can be manufactured, and which is used as a fuel and for manufacturing chemicals.
- **Photovoltaic:** Pertaining to the direct conversion of light into electricity. The word "photovoltaic," first used in about 1890, is a combination of the Greek word for light and the name of the physicist and electricity pioneer Allesandro Volta. So, "photovoltaic" can be translated literally as "light-electricity." The conversion of sunlight to electricity using photovoltaic (PV) cells, also known as solar cells, is based on the photoelectric effect discovered by Alexander Bequerel in 1839. The photoelectric effect describes the release of positive and negative charge carriers in a solid state when light strikes its surface.
- **Solar Hot Water Heating System:** Solar water heating systems include storage tanks and solar collectors. There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't. Most solar water heaters require a well-insulated storage tank. Solar storage tanks have an additional outlet and inlet connected to and from the collector. In two-tank systems, the solar water heater preheats water before it enters the conventional water heater. In one-tank systems, the back-up heater is combined with the solar storage in one tank.
- **Thermal Ice Storage:** Refers to a number of technologies that store energy in a thermal reservoir for later reuse. They can be employed to balance energy demand



between day time and night time. The thermal reservoir may be maintained at a temperature above (hotter) or below (colder) than that of the ambient environment. The principal application today is the production of ice, chilled water, or eutectic solution at night, which is then used to cool environments during the day.

- **Wind Turbine:** A wind energy conversion device that produces electricity; it typically has one, two, or three blades. Wind turbines can be classified into the vertical axis type and the horizontal axis type. Most modern wind turbines use a horizontal axis configuration with two or three blades, operating either downwind or upwind.