Climate Action Plan

for the University of Minnesota, Twin Cities

Version 1.1 - December 2011

UNIVERSITY OF MINNESOTA
Driven to Discover℠

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December 23, 2011

Great universities respond to great challenges. They create the innovations, discoveries, and new ways of knowing and expression that are essential for solving intractable problems. They achieve the improbable and they make the impossible, possible.

Today, there is perhaps no greater set of challenges than those surrounding humanity's impact on and relationship in the environment. World population recently exceeded 7 billion and is expected to rise to 9 billion by mid-century. At the same time people around the world are also becoming more affluent, further increasing demand for a limited supply of energy, food, and raw materials. Greenhouse gas emissions continue to rise impacting the climate and the natural systems supporting our communities. The list of issues goes on but at the core they all concern one thing: how do we sustain and grow prosperity without impairing the natural resources and systems on which our prosperity and the prosperity of future generations depend? This is a challenge that the University of Minnesota is particularly well equipped to address through our research, teaching, outreach, and operations.

Through our research we are creating a more sustainable future. Everyday University researchers are pursuing investigations that offer great promise for technological advances and new understanding in areas ranging from renewable energy to land use, public policy to agriculture. Our faculty's groundbreaking scholarship is addressing the great sustainability challenges of the twenty-first century.

Through our teaching and public engagement we are educating the next generation, and sharing our expertise, knowledge, resources, and discoveries with communities across the state and around the world. Graduates of the University develop the knowledge and skills required to address environmental issues, and we offer specialized majors, minors, and graduate programs so students may further develop their abilities in regard to environmental and sustainability issues. Our public engagement programs bring the University's expertise to urban, suburban, and rural communities to help develop sustainable solutions to local challenges.

Through our operations we are reducing emissions to and negative impacts on the environment. Our campuses are reducing energy use, increasing recycling, expanding the use of sustainable transportation, and utilizing renewable energy. Our actions lessen the environmental impact of the University's campuses, avoid increased costs, and serve as a model for other organizations.

In my inaugural address I challenged the University to re-invent the land-grant vision of the nineteenth century to meet the global needs of the twenty-first century. Developing, disseminating, and demonstrating sustainable pathways to prosperity are critical parts of meeting this challenge. As part of our commitment to this issue, I am pleased to reaffirm the University's participation in the American College and University Presidents' Climate Commitment and to submit this climate action plan for the Twin Cities campus.

Sincerely,

Eric W. Kaler
President

Foreword

In December 2010 the University of Minnesota, Twin Cities published its first climate action plan to affirm and advance the institution's participation in the American College and University Presidents' Climate Commitment. The plan laid out aspirational goals and broad strategies for reducing, and ultimately eliminating, the campus' net greenhouse gas emissions by mid-century. The climate action plan also identified activities in research, education, and outreach to create the knowledge, skills, and abilities that will be necessary to arrest global climate change and adapt to a changing planet.

Since publishing last December, the Twin Cities Sustainability Committee has been working to refine the original climate action plan and hone in on specific strategies that will most effectively reduce emissions over the next ten years. As a result, ten specific strategies have been identified for implementation. The following document amends the original climate action plan to include these specific strategies and their impacts.

Combined, the ten strategies are projected to reduce greenhouse gas emissions by an estimated 313,100 metric tons of CO_2 equivalents over the next decade. This reduction is nearly 50% of total greenhouse gas emissions relative to the campus' 2008 inventory.

In addition to reducing emissions, pursuing these strategies will help the University avoid increased costs. Combined, the strategies are projected to help the University avoid increased annual operating costs of almost $20 Million annually by 2021, largely by lowering utility bills and reducing maintenance.

These represent bold but achievable goals that can be accomplished with the concerted effort of the University community and its supporters. We thank the members of the Twin Cities Sustainability Committee, subject matter experts from the faculty and staff, members of the University community at-large, and external partners for their contributions in developing this plan to guide us through the next decade and beyond.

Michael Berthelsen
Associate Vice President
Facilities Management

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Co-Chairs of the Twin Cities Sustainability Committee
December 2011

Introduction

The American College and University Presidents' Climate Commitment (ACUPCC) was formed by a small group of higher education institutions concerned by the growing scientific consensus that the earth's climate is rapidly destabilizing. Scientific evidence indicates that destabilization is likely the result of human activities, such as the use of fossil fuels like gasoline, diesel, natural gas, and coal which increase the concentration of CO_2 and other greenhouse gases in the atmosphere. The ACUPCC signatories recognize global climate change as the defining challenge of the 21st century. The commitment also acknowledges the important role universities play in research, education and modeling solutions relative to this challenge. Since its inception, the ACUPCC has grown from 12 founding members to over 660 signatories. University presidents around the country have united around the scientific consensus about adverse impacts of climate destabilization and global warming.

In January 2008, President Robert Bruininks signed the ACUPCC for the university system because the commitment was closely aligned with the strategic direction set by the Board of Regents Policy *Sustainability and Energy Efficiency*, as well as other University efforts and initiatives underway. By joining the ACUPCC, the President agreed the University would strive to achieve climate neutrality – i.e. to reduce greenhouse gas emissions from current levels to net zero – and that the institution would develop a plan for achieving this goal.

The University's decision to become an ACUPCC signatory is part of a legacy of environmental stewardship and sustainability. Over the last 25 years the campus has been implementing sustainable practices in daily operations and these efforts have yielded positive impacts on various measures of sustainability. Some highlights:

- In 1984 a recycling program was initiated and by 1991 the campus implemented its "Quad" system for waste and recycling sorting. The campus now recycles over 40% of its waste and the rest is used in a municipal facility as a feedstock in energy generation.
- Beginning in 1995 the University began purchasing flex fuel vehicles and fueling them with ethanol or biodiesel. When hybrid vehicles became available, University Fleet Services began purchasing those vehicles as well. Today the campus has over 150 vehicles using biofuels and more than 50 hybrid vehicles in the fleet.
- In 1998 the campus began a significant overhaul of the Southeast and St. Paul Steam Plants, which reduced coal from 100% to less than 30% of the fuel used for on-campus heating and cooling. Changing the fuel mix and installing state-of-the-art controls substantially reduced emissions from the facilities.
- University Dining Services began trayless dining in residence halls in 2008 resulting in significant water savings and a reduction in food waste.

The institution has also taken steps to solidify sustainability as a strategic priority for the university system through a series of administrative actions including:

- Adopting the Board of Regents Policy, *Sustainability and Energy Efficiency*, in 2004.
- Joining the Chicago Climate Exchange, a voluntary and legally binding cap and trade exchange for encouraging market based solutions to reduce greenhouse gas emissions (http://www.chicagoclimatex.com/).
- Forming the Institute on the Environment, a center for discovering solutions to the planet's biggest environmental problems through new approaches.
- Integrating sustainability into the undergraduate curriculum through a liberal education requirement and creating a sustainability minor open to any undergraduate.
- Creating sustainability goals, outcomes, and measures for the University of Minnesota system.

The ACUPCC is a natural extension of and complement to these efforts. Combined, these initiatives and many others have contributed to the University being a national leader in sustainability. In fact, the University of Minnesota, Twin Cities was among the first large research institutions to become a signatory to the ACUPCC and it was the first Big 10 institution to do so. Since the University signed the commitment, two other Big 10 schools have joined – Ohio State University and the University of Illinois at Urbana-Champaign – and other Big 10 institutions have engaged in similar efforts to reduce their emissions.

In addition, joining the ACUPCC aligns with similar, recent initiatives by the State of Minnesota. In 2007, Governor Tim Pawlenty signed into law the Next Generation Energy Act, which established a goal of reducing greenhouse gas emissions in the state to 80% of 2005 levels by 2050. The Act also established a goal of achieving annual energy savings equal to 1.5% of annual retail sales of electricity and natural gas. That same year, the legislature and governor established that utilities across the state had to derive a certain amount of their power from renewable sources. Xcel Energy, provider of electricity to the University of Minnesota, has to obtain 30% of their power from renewable resources by 2020. Over the last decade the legislature and governor have also enacted rigorous building energy efficiency standards for all facilities constructed or undergoing substantial renovation using state bonding money (http://www.mn2030.umn.edu/). Many University capital construction projects are subject to these standards.

As the land grant institution of Minnesota, the University's implementation of the Regents' policy along with participation in ACUPCC creates tangible benefits to the taxpayers and residents of the State. The University is taking a lead role in modeling how to reduce and eventually eliminate greenhouse gas emissions. Through a number of strategies, the University is becoming even more energy efficient and identifying cost effective technologies for reducing emissions. This enables the institution to use its resources more efficiently. Furthermore, as the land-grant institution of Minnesota, the University is uniquely positioned to

develop, demonstrate, and share these solutions with individuals and organizations around the state. Finally, as one of the larger purchasers of goods and services in Minnesota, the University has the opportunity to facilitate the growth of local jobs associated with a green economy, and advance state and regional efforts to create energy independence.

Emissions Profile

The first milestone of the ACUPCC was to conduct a comprehensive greenhouse gas emission inventory for the campus. The first Twin Cities campus emission inventory (Appendix E) was compiled by a student to fulfill an academic course requirement in Civil Engineering and the Sustainability Studies Minor.

The first step in calculating the greenhouse gas emissions for the campus was defining the boundary. The University of Minnesota-Twin Cities is made up of three campuses: East Bank, West Bank, and St. Paul. The boundaries for the campus were set as any building for which the University provides heat. Because the University steam plant provides electricity and steam to the University of Minnesota Medical Center, Fairview, the initial inventory also included energy emissions from that facility even though it is not owned by the University.

The University of Minnesota chose the Clean Air-Cool Planet (CA-CP) Campus Carbon Calculator as its primary greenhouse gas inventory measurement tool. University Facilities Management has maintained records for the campus steam plant since 1998 and those emissions were third party verified for participation in the Chicago Climate Exchange. Fuel, energy, and refrigerant factors in the CA-CP tool were adjusted to match those used in the verified records. Other factors of the tool were modified to meet the needs of the University of Minnesota. It was estimated that the University produced approximately 642,000 metric tons CO_2 equivalents in 2008. The largest sources of emissions were those generated by the electricity provider, Xcel Energy, for purchased electricity, followed by the on-campus steam plants. Combined, these sources represent approximately 80% of the emissions (Figure 1) associated with the University's activities.

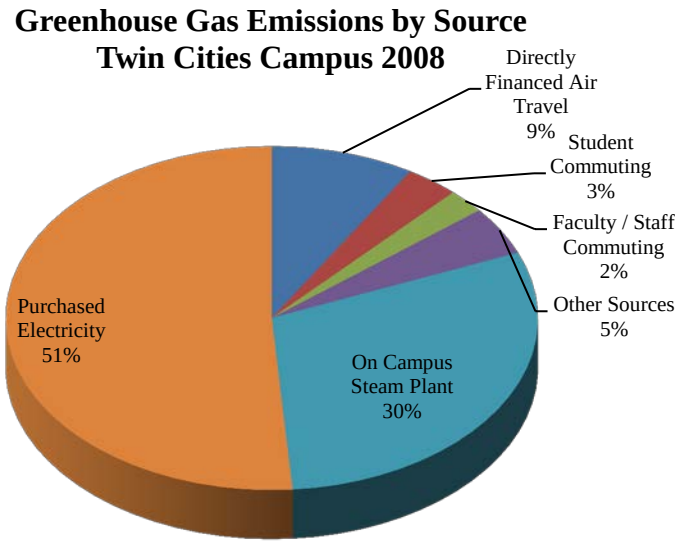


Figure 1

The ACUPCC follows the World Resources Institute/World Business Council on Sustainable Development Greenhouse Gas Protocol Initiative, which organizes emission sources into categories called "Scopes." Scope 1 includes sources of emissions directly owned or operated by the University. Scope 2 covers indirect greenhouse gas emissions that are a consequence of activities that take place within the organizational boundaries of the institution, but occur at sources owned or controlled by another entity. Scope 3 includes any indirect emissions not covered in Scope 2. The following table details the emissions sources by scope that were included in the campus' greenhouse gas inventory in 2008.

Table 1 – Emissions Sources by Scope

Scope 1	Scope 2	Scope 3
On Campus Steam Plant	Purchased Electricity	Faculty/Staff Commuting
Direct Transportation	Purchased Natural Gas	Student Commuting
Refrigerants & Chemicals		Directly Financed Air Travel
Agriculture		Wastewater
		Paper

Scope 2 emissions are currently the largest portion of the University's greenhouse gas emission inventory and most of the emissions in this scope are attributable to purchased electricity from Xcel Energy. Scope 1 emissions are the second largest portion of the campus greenhouse emission inventory and the steam plants on the East Bank and St. Paul campuses produce most of the emissions in this category. Emissions under Scope 3 are among the most difficult to quantify and to influence because systems to track emissions from these sources are under-developed and many of the variables affecting these emissions are outside the direct control of the institution.

**Greenhouse Gas Emissions by Scope,
Twin Cities Campus 2008**

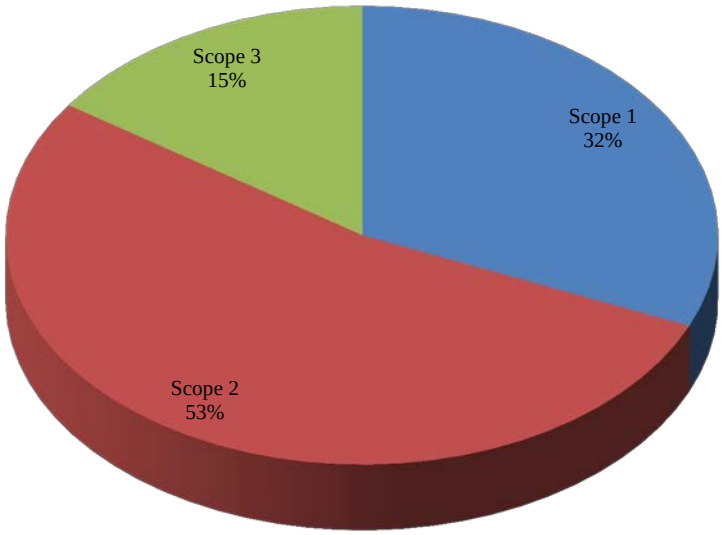


Figure 2

Greenhouse gas emissions in Scope 2 are directly affected by the fuel mix and the amount of electricity used on-campus. Approximately 50% of the electricity provided by Xcel Energy is generated using coal as the fuel source. Coal emits more CO_2 than other fuels used for electricity generation, such as natural gas.

Emissions due to operation of the on-campus steam plants are also directly impacted by the type of fuel used and the number and types of buildings on campus. The steam plants use natural gas, coal, biomass, and fuel oil in their operation.

University Accomplishments

Over the last decade, the Twin Cities campus has engaged in a number of efforts to improve the efficiency of campus utilities, reduce energy demand, and decrease emissions. These include:

- Steam Plant Renovations. In 1998 the campus began a significant overhaul of the Southeast and St. Paul Steam Plants. The improvements included installing a state-of-the-art circulating fluidized bed boiler to provide greater fuel flexibility and reliability, and adding a baghouse to substantially reduce emissions. As a result of these upgrades the University reduced coal use from 100% to 30% of the fuel used in the steam plants.

- Improving Infrastructure. In 2004 and 2005 a large upgrade and consolidation of the St. Paul Chiller Plant was conducted yielding annual cost savings of $1,000,000 and reducing CO_2 emissions by 3,300 metric tons. Other distributed systems, ranging from compressed air to computer servers, have been consolidated or upgraded yielding significant reductions in energy use and emissions.
- Building Recommissioning and *It All Adds Up*. Beginning in 2008, Facilities Management set goals for two complementary efforts to shrink energy use across campus. Building recommissioning is an effort to make energy-efficiency improvements in up to 40 buildings per year. Improvements include modifying building system schedules and replacing building components with more energy efficient ones. While the behind the scenes work of recommissioning is being done, the Power Police, a group of student volunteers, conduct individual office energy audits and educate building occupants about energy use. Complimenting these efforts is *It All Adds Up*, a campaign to raise awareness within the campus community about energy use and to encourage the community to use energy more efficiently. Since 2009, these efforts combined have resulted in over 11,000 individual pledges to conserve energy, and they have helped the University avoid more than $4.6 million in energy costs and release 50,000 fewer tons of CO_2 into the atmosphere annually.
- Recycling and Waste Management Practices. In 1984 a recycling program was initiated and by 1991 the campus implemented its "Quad" system for waste and recycling sorting. The campus also has a robust reuse program that collects unwanted supplies and equipment, and makes those items available to other University units and the general public. As a result, the campus diverts over 40% of its waste.
- Energy Efficiency in Residences. Housing and Residential Life has purchased Energy Star washers and other appliances for all the residence halls, and the washing machines use cold water only.
- Energy Efficiency in Dining. University Dining Services has installed dish washing equipment to reduce energy needs, implemented trayless dining in all residence hall facilities, and has worked with vending machine contractors to substantially reduce energy use of vending units.
  Efficient Vehicle Fleet. Beginning in 1995 the University began purchasing flex fuel vehicles and fueling them with E85 or B20. When hybrid vehicles became available, University Fleet Services began purchasing those vehicles as well. Today the campus has over 150 vehicles using E85 and B20 biofuels, and more than 50 hybrid vehicles, including two buses, in the fleet.
- Alternative Modes of Transportation. The University of Minnesota Twin Cities campus is the third largest traffic generator in Minnesota with 80,000 visitors a day to campus. The office of Parking and Transportation consistently promotes transportation modes that reduce

emissions such as walking, biking, carpooling, and subsidized busing. In addition, Nice Ride MN, one of the largest bicycle share programs in the United States, entered its second year of operation last year with 11 stations on campus.

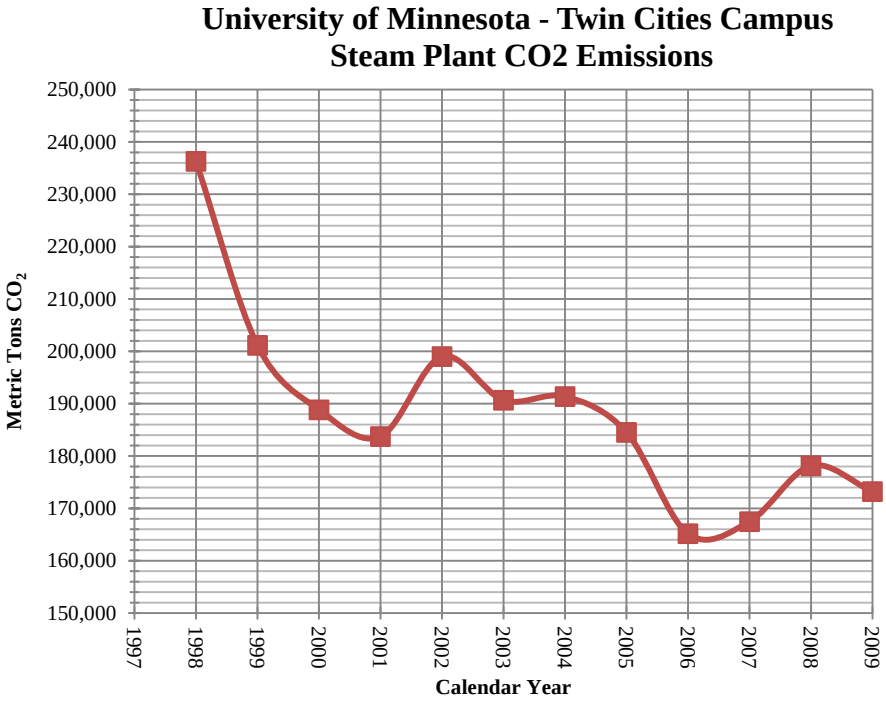


Figure 3

Climate Action Plan Development Process

The CAP is the product of a number of related initiatives over several years whose cumulative effect is to advance sustainability broadly at the institution. These efforts, which are the foundation of the CAP, include:

Board of Regents Policy: Sustainability and Energy Efficiency:
This policy, adopted in 2004, defines sustainability as a "continuous effort integrating environmental, social and economic goals through design, planning and operational organization to meet current needs without compromising the ability of future generations to meet their own needs." It commits the University of Minnesota to incorporate sustainability into teaching, research, outreach and operations under the direction of six guiding principles: leadership, modeling, operational improvements, energy efficiency, research and education and outreach. The comprehensive nature of the policy supports decisions that will create healthier communities for the people of Minnesota. The Pollution Prevention and Waste Abatement Policy dated June 1992 helped shape development of many principles in this policy.

Energy Management Principles: Informed by the Regents' policy, in 2005 the University's Energy Management department established a set of guiding principles – Reliability, Environmental Stewardship and Cost Control. They serve as the paradigm for decisions on how to provide utility services to the campus.

Professional Sustainability Staffing:
In 2008, the Twin Cities campus added full-time professional staff focused on advancing sustainability efforts within operations and the curriculum, and additional staff has been added since.

Systemwide Sustainability Goals, Outcomes, Measures and Process:
In April 2008 University of Minnesota President Robert H. Bruininks established a 23-member systemwide committee composed of faculty, staff and students. The committee proposed goals and performance measures aligned with each guiding principle to facilitate implementation of the Board of Regents policy. The report from the Sustainability Goals and Outcomes Committee is found in Appendix F.

Twin Cities Sustainability Committee:
In April 2010, President Bruininks formed a committee of faculty, staff and students on the Twin Cities campus. The committee was charged with taking steps to advance sustainability broadly and implement the policy and goals on campus. The committee's mandate included completion of the campus' climate action plan.

The Twin Cities Sustainability Committee began meeting in the summer of 2010. Subcommittees were formed to develop specific sections of the CAP, including energy/operations, education/outreach and research.

As an initial step, the subcommittee on energy and operations proposed a date for climate neutrality and reduction targets, which was adopted by the Twin Cities Sustainability Committee. The committees then sought input broadly from the campus community on how to achieve climate neutrality. This input was collected through a variety of channels including:

- In-person forums with students, staff, and faculty.
- Presentations to existing faculty, student, and staff governance bodies.
- Meetings with groups of employees that would be directly involved in the implementation of various emissions reduction strategies.
- An online form where any member of the community could submit ideas.

A complete list of the meetings held is available in Appendix A. A list of all ideas generated is available online at www.sustainTC.umn.edu.

With assistance from a team of finance and energy management professionals, the Twin Cities Sustainability Committee worked during the winter and spring of academic year 2010 - 2011 to evaluate approximately 30 of the most promising ideas (Appendix B). The analysis was based on criteria the committee identified,

which aligned with the Energy Management Principles of reliability, environmental stewardship, and cost control.

The committee's criteria used for the evaluation process included (Appendix C):

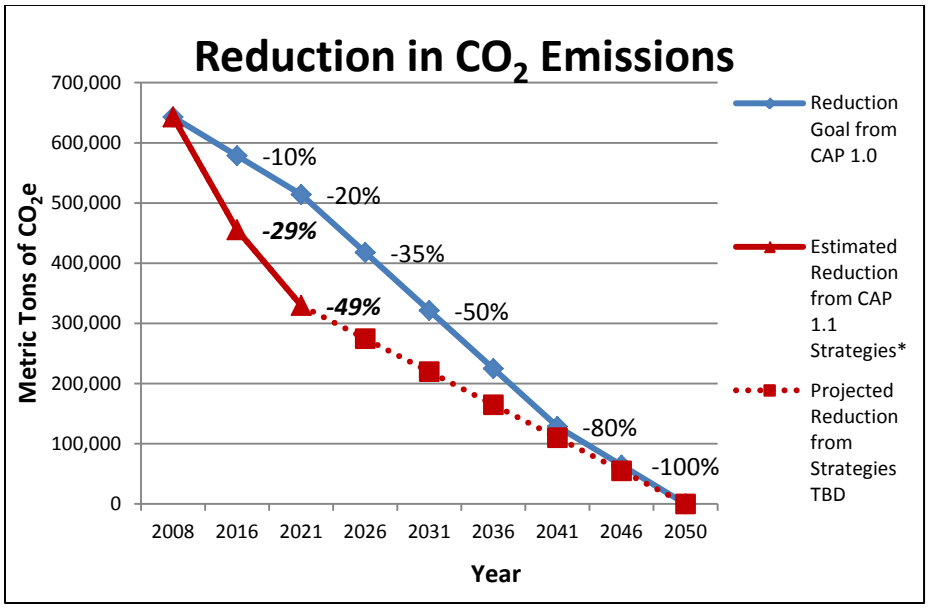
- Greenhouse gas reduction. How much does the strategy reduce emissions in terms of total annual reduction and cost per ton of CO_2 reduced?
- Opportunities for shared funding. Are there grants or other financial resources that can subsidize the cost?
- Synergies. Does the strategy align with research, outreach, or education, or with existing initiatives and goals?
- Ease of implementation. How feasible is the strategy?
- Visibility. Is the strategy visible to the community and will its visibility positively affect related efforts?
- Return on investment. Assuming some strategies are debt financed, does the strategy provide a return on the money invested and if so, over what time period?
- Cost to implement and own. What is the initial cost of implementing the strategy and the annual cost or savings?
- Reliability. If the strategy replaces existing equipment, sources of energy, transportation options, etc. how reliable is it relative to the current approach?

The criteria will continue to be reviewed and modified as the committee analyzes more strategies in the future in order to improve the effectiveness of the process. Based upon these criteria, the committee chose strategies to implement in the next ten years at the University. The new strategies were then circulated broadly to students, staff, faculty, and community members. A complete list of the meetings held is presented in Appendix A. After meeting with the University community, the CAP was updated into version 1.1.

The committee will continue to review strategies to reach climate neutrality, especially as new technologies emerge and become cost-competitive. The CAP is intended to be a living document that is reviewed every two years and adjusted accordingly.

Emissions Reduction Goals

The following chart details the emissions reduction goals for the campus with an ultimate goal of becoming climate neutral by 2050. The original goals contained in V 1.0 are included with the accelerated reductions based on the mitigation strategies identified in CAP 1.1. The goals are expressed as a percent of CO_2 equivalents reduced relative to a 2008 baseline:



*Relative to 2008 baseline, using current energy use and emissions.

Figure 4

In keeping with the spirit of the ACUPCC, these targets outline a set of aggressive, aspirational objectives for the campus to achieve in the next 40 years.

Mitigation Strategies

The University anticipates using the following strategies to achieve the CO_2 reduction goals.

Strategies for 2011-2016

(Est. Savings[1]/Simple Payback[2]/ CO_2 Reduction[3])

Computer Energy Efficiency **$386,000/Less than 1/4,000**

The University runs Active Directory software on most of its computers. This software will be used to shift computers to less energy intensive modes when they are not in use, saving approximately $40/year/computer.

[1] Estimated annual operating costs (in dollars) avoided or saved by 2016.
[2] Period of time, in years, that it will take for the net annual financial savings to pay back the upfront costs required to implement the strategy. Some of the strategies listed involve several projects with different paybacks. In these cases, the highest payback period is listed.
[3] Estimated annual metric tons of CO_2 equivalents reduced by 2016.

Lighting Efficiency **$544,000/10/5,400**
University parking facilities will be equipped with more efficient lamps and bulbs, and motion sensors will be installed to reduce energy usage when unoccupied, while still ensuring occupant safety. On 1 million gross square feet of campus buildings, interior lighting energy needs will be reduced through re-lamping and better occupancy controls.

Building Recommissioning **$2,508,000/4/48,000**
Energy Management will continue an extensive building recommissioning program, tuning up every building once every five years. Recommissioning involves adjusting fan schedules, installing room occupancy sensors, upgrading HVAC equipment, and other retrofits. The initial recommissioning process typically results in 5-15% energy savings per building.

Sustainable Building 2030 **$3,185,000/15/35,900**
The University applies the energy and carbon emissions performance targets set by Minnesota 2030 Sustainable Building Standards (SB 2030) for all construction and major renovation projects receiving state funding. Projects paid through other funding sources also incorporate SB 2030 or are constructed to be equivalent to a minimum of LEED Silver in their design and construction. The University will continue implementing the state standard on these buildings, lowering carbon emissions and increasing efficiency.

Laboratory Energy Efficiency **$1,661,000/17/55,900**
In laboratories, the amount of air exchanges per hour and the flow of fume hoods will be reduced, while maintaining a safe atmosphere for building occupants. In addition, ultra-low temperature freezers will be set at a higher temperature that will not compromise their effectiveness, but will decrease their electrical consumption.

Reduce Campus Size **$3,500,000 /9/11,000**
The University plans to decommission approximately 500,000 gross square feet of University space on campus within the next five years by utilizing space more efficiently. Reducing the amount of buildings in operation will save on maintenance, repair, and operational costs as well as eliminate their associated emissions.

Reduce Coal Usage **Varies/NA/27,300**
The University plans to reduce coal usage at the Southeast Steam Plant on the Minneapolis campus by 85%, which reduces the total fuel mix to about 4% coal. The University will continue to evaluate options to eliminate coal from the fuel mix on campus.

Renewable Energy Pilot Projects **To Be Determined**
Renewable energy projects will be installed on campus as funds become available to test for their reliability and cost-effectiveness on the University grid. As renewable technologies improve and enter the market, the Committee will evaluate further inclusion in the campus' Climate Action Plan.

Projected CO_2 Reduction by 2016….……..187,500 tons CO_2/year

Strategies for 2017-2021

Projects from the initial five years will continue to be implemented and add to reductions in the campus' emissions. Continued projects include:

	(Est. Savings[4]/Simple Payback[5]/ CO_2 Reduction[6])
Building Recommissioning	**$2,887,000/ 4 /52,400**
Sustainable Building 2030 Guidelines	**$3,837,000/ 15 /57,200**
Laboratory Energy Efficiency Projects	**$3,322,000/ 17 /111,900**
Reduce Campus Size (additional 500,000 GSF)	**$7,000,000 / 9 /22,000**
Renewable Energy Pilot Projects	**To Be Determined**

In addition, new projects are proposed for implementation between 2017 and 2021, including:

Combined Heat and Power Plant **TBD – In Design/TBD /65,000**
The University will build a 14MW Combined Heat and Power (CHP) plant to augment the University's Southeast Steam Plant. The CHP will generate electricity and use the excess heat produced to create steam for the campus' heating and cooling needs, increasing efficiency and reducing waste during the energy generation process.

Window Replacement **$409,000/ 27 /4,600**
Single pane windows will be replaced with double paned windows on approximately 100,000 square feet to improve the building envelope and reduce heating loss.

Projected CO_2 Reduction by 2021…….313,100 tons CO_2/year

Strategies for 2022 and Beyond

The technologies and policies that will enable a carbon neutral future are constantly and rapidly evolving. Given this, it is difficult to project what specific strategies will be part of the University's solution after 2021 for achieving carbon neutrality. The University expects to revise this plan every two years to account for this shifting landscape and to begin the process of identifying strategies for the years following 2021.

[4] Estimated annual operating costs (in dollars) avoided or saved by 2021.
[5] Period of time, in years, that it will take for the net annual financial savings to pay back the upfront costs required to implement the strategy. Some of the strategies listed involve several projects with different paybacks. In these cases, the highest payback period is listed.
[6] Estimated annual metric tons of CO_2 equivalents reduced by 2021.

Education, Outreach, and Research

Education and Outreach

The American College and University Presidents' Climate Commitment calls on signatories to take "actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students." Sustainability education appears prominently as a guiding principle in the University Regents' policy on sustainability and it is already present in students' educational experiences at the University. Through curricular and co-curricular channels, students learn about sustainability and the environment. These educational experiences contribute to an engaged and informed student body that helps spur efforts to makes the university more sustainable in its operations. They also produce graduates who are prepared to create new knowledge and solve problems in the areas of sustainability and climate neutrality. The following are examples of how sustainability is incorporated into the educational experience of all students:

Curriculum

- Over the past two years, over 600 sustainability-focused or sustainability-related courses were offered with total course enrollment exceeding 70,000 students.
- To earn a degree from the University, all undergraduates must take one course that fulfills an Environment Theme. Environment Theme courses engage students in interdisciplinary studies of issues occurring at the intersection of the natural environment and human society, including the sustainability of personal actions.
- Dozens of academic programs are offered including minors in sustainability studies, corporate environmental management, and sustainable agriculture; majors in environmental design and environmental sciences, policy, and management; and program tracks focused on sustainability in disciplines ranging from global studies to architecture.
- Through the off-campus study program, HECUA – Higher Education Consortium for Urban Affairs, and graduate and undergraduate research opportunities for credit, students are engaging in hands-on projects to further their knowledge of sustainability and apply that knowledge to solve current problems.
- Many graduate courses incorporate sustainability into their curriculum such as GEOG 8101 Proseminar Nature and Society; GEOG 8200 Seminar Urban Geography; GEOG 8211 Environmental Policy; LA 5755 Infrastructure, Natural Systems and the Space of Inhabited Landscapes; MDP 5001 Ways of Knowing and Sustainable Livelihoods; MDP 5002 Research Methods for Sustainable Livelihoods; MDP 5003 Field Study Pre-Departure Seminar; PA 5531 Strategies for Sustainable

Development; SAGR 8010 Colloquium in Sustainable Agriculture; and others across multiple disciplines.

Co-Curricular

- During Welcome Week, an on-campus program designed to complement the orientation experience for first year students, over 5,000 matriculating undergraduates are introduced to sustainable practices, student organizations, and educational programs.
- Housing & Residential Life employs a Sustainability Education Coordinator and 17 volunteer Sustainability Advocates, students who plan and deliver peer-to-peer educational programming on sustainability topics for the 6,500 on-campus residents.
- There are approximately 20 student organizations focused on topics related to sustainability and the environment including Active Energy Club, EcoWatch, Greenlight, GreenBiz, Campus Beyond Coal, Engineers Without Borders, and Minnesota Public Interest Research Group.

Demand for these programs and opportunities are growing, and meeting that rising interest represents one of the greatest opportunities to further integrate sustainability into the educational experience for all students. For several years, operations departments have worked with the sustainability minor and other classes to provide a living lab opportunity for students. The Education and Outreach Subcommittee of the Twin Cities Sustainability Committee has begun to develop more formal living laboratory principles and processes to facilitate and encourage the integration of sustainability education into operations. Additional strategies may include the following:

- Expanding academic offerings and coursework.
- Further integrating sustainability into coursework across multiple disciplines.
- Assessing sustainability literacy and behavior between admission and graduation.
- Providing tools and information that will help students practice sustainable lifestyles.
- Initiating a pledge at convocation or graduation that commits students to living sustainably.
- Having a themed year on sustainability that incorporates events and activities throughout the campus community.
- Beginning a first year reading project around sustainability and related topics.
- Developing incentives for colleges, departments, and faculty to expand their efforts concerning topics of sustainability and climate change

Research

The importance of sustainability research is firmly embedded in the University. The Board of Regents policy on sustainability explicitly promotes research that contributes to sustainability and energy efficiency, and prior to the policy the University research community was already incredibly active and accomplished in this area. Research to accelerate the goal of climate neutrality will succeed if it builds on this strong foundation. By analyzing current sustainability research across the University, the campus can begin to identify areas of strength and opportunity, as well as gaps in existing knowledge, and form a research agenda for achieving climate neutrality.

Proposed areas for focusing research include:

- Technologies for energy creation based on the unique features of the campus, such as a study of hydrokinetic power on the Mississippi River.
- Systems that convert waste to energy.
- Electric vehicle infrastructure such as charging stations and the ability of electric vehicles to serve as electric power sources for the grid during peak hours.
- Stormwater collection and reuse systems.
- Local, state, and federal policies and laws that further sustainability efforts and the particular impact policies have on educational institutions.
- Development and growth patterns at the University to help plan for future needs in office, classroom, research, and housing space.
- Systems integration around water and energy for high performance campus and educational building settings.
- Decision-making frameworks, research informatics infrastructure, and tools to assist the University in determining which climate neutrality strategies to pursue.
- Psychosocial research to identify what triggers people to care about an issue and take action to solve it.
- Interconnectivity between personal and public health and wellness, and sustainability. Potential projects include the effects of environmental and building materials on health and the identification and effects of indoor air quality issues.

Accelerating this research agenda will require targeted incentives and supportive structures, which may be accomplished through some of the following strategies:

- Expand existing units that facilitate sustainability research such as the Initiative for Renewable Energy and the Environment and the Institute on the Environment.
- Create new consortia and informatics infrastructure of centers, departments, and units to further research efforts.

- Designate new sources of internal funding and seed money and finance them by tapping new existing revenue streams like gravel excavation royalties from UMore Park or by dedicating a portion of Indirect Cost Recovery.
- Develop new or utilize existing mechanisms for distributing those funds.
- Increase partnerships with local companies to allow the University to become a test bed for new technologies that move both the company and the University towards sustainability.

Financing

A comprehensive financing plan is not within the scope of the current report, but the committee recognizes that implementing emissions reduction strategies often involves up-front investment. Acknowledging this, the committee anticipates that potential financing may include:

- Grants and Corporate Sponsorships. The University currently receives 20.5% of its funding from sponsored grants and contracts. Grants are often what make groundbreaking research endeavors at the University, including those involving sustainability, possible.
- Philanthropy. The University currently receives approximately 12.3% of its funding from gifts, endowment earnings, and other restricted sources. The majority of those gifts are currently allotted to units and areas already engaged in sustainability initiatives: academic program support, capital improvements, and research and outreach.
- HEAPR. Higher Education Asset Preservation and Replacement is a form of state bonding that applies to the entire University of Minnesota system. It focuses on maintenance and repair needed to extend the life of buildings, and often is applied to energy efficiency projects.
- Utility Rates. Facilities Management charges utility rates for steam, chilled water, and electricity distributed across campus. Some of these rates are available for pursuing projects that can reduce energy demand and emissions.
- Revolving Loan Fund. The University of Minnesota has a revolving loan fund specifically for energy efficiency projects. The $4,000,000 fund can be used for projects that have a five-year payback or less.
- Capital projects for new or large renovations. The University funds many of its new construction and large renovation projects with support of bonding money from the state legislature.

Actual financing options will be identified, and feasibility and implications will be considered as the plan is refined and implemented. Financing and implementation is expected to be an iterative process.

Tracking Progress

Evaluating progress on the plan will be conducted through a variety of channels including:

- Annual report on Sustainability to the President and the Regents.
- Annual Energy Management and Utilities report to the Regents.
- Annual Performance and Accountability Report to the Regents on key University Metrics. Carbon footprint is already one of the reported metrics.
- Updates to the plan and the greenhouse gas inventory which will be conducted every two years.

Appendices

- **Appendix A** – Meetings Held with the Campus Community
- **Appendix B** – List of Strategies Evaluated by the Twin Cities Sustainability Committee and Expert Team for Inclusion in CAP 1.1
- **Appendix C** – Decision Criteria for Evaluating Climate Neutrality Strategies
- **Appendix D** – Sustainability Resources and Links
- **Appendix E** – Twin Cities Campus Greenhouse Gas Inventory, 2008
- **Appendix F –** Systemwide Sustainability: Goals, Outcomes, Measures

Appendix A – Meetings Held with the Campus Community

The following is a list of groups met with to generate ideas for how the campus can achieve climate neutrality during Fall of 2010.

- Minnesota Student Association – October 19
- Senate Consultative Committee - October 21
- Student Forums – October 25 and 26
- University Health and Safety Staff Meeting – November 1
- Capital Planning and Project Management Meeting – November 2
- Energy Management Staff – November 24
- Faculty Forums – November 29 and December 1

The following is a list of meetings held in spring of 2011 to discuss the strategies chosen to implement in the next ten years:

- Council of Academic Professionals and Administrators – April 15
- Student Forums – April 25 and 26, May 5
- Minnesota Student Association – April 26
- Student Senate – May 5
- Neighborhood Forum – May 25

Additionally, the committee included a web form and email link on their website to collect ideas from those unable to attend an in-person meeting.

The Twin Cities Sustainability Committee and its subcommittees also held numerous meetings throughout the semester and committee members contributed to the idea generation and selection process.

Appendix B –List of Strategies Evaluated by the Twin Cities Sustainability Committee and Expert Team for Inclusion in CAP V 1.1

In order to determine specific strategies for inclusion in V 1.1 of the Twin Cities Climate Action Plan, the Sustainability Committee and a team of experts evaluated the following ideas for possible inclusion:

1. Implement power saving settings on 10,000 computers running Active Directory.
2. Improve lighting efficiency in University Parking Facilities.
3. Install variable fan drives on 4 fan motors at the SE Steam Plant and achieve electric savings from being able modulate fan motor speed.
4. Reduce campus size by 1 million gross square feet (sqft).
5. Reduce set point of freezers from -80 to -70.
6. Build a small nuclear reactor to provide electricity to campus.
7. Eliminate the need for some ultra low temp freezers by moving to room temperature, dehydration storage.
8. Reduce lab air changes to 6 air changes per hour.
9. Continue building recommissioning program, recommissioning every building once every 5 years.
10. Improve lighting efficiency from 1.2 watts/sqft to 0.9 watts/sqft on 1,000,000 gross square feet of campus immediately.
11. Convert fume hoods to chemical storage cabinets and remove underutilized hoods.
12. Adjust fume hoods to run at 100 feet per minute.
13. Install large, horizontal turbines to provide electricity to campus.
14. Upgrade fume hoods to low flow (80 fpm) models.
15. Projected impact of Sustainable Building 2030, state building standard.
16. Improve efficiency of building envelope by replacing single pane windows with double pane.
17. Build a small hydro electric facility to provide electricity to campus.
18. Install run around loops and energy wheels to recover energy from vented building air.
19. Buy Windsource Credits from Xcel Energy to offset 100,000 kWh of power needs. Assume the fuel cost rider is $3.50 per 100 kWh.
20. Provide ultra low temp freezers as a service thereby reducing the number of freezers by 25%.
21. Projected impact of accelerating Sustainable Building 2030 standard objectives by 5 years.
22. Eliminate coal in the SE Steam Plant.
23. Build a combined heat and power facility to provide steam and electricity to the campus.
24. Install geothermal wells on 10 acres and heat exchange equipment to provide heating and cooling to campus.

25. Improve lighting efficiency from 0.9 watts/sqft to 0.6 watts/sqft on 1,000,000 gross square feet of campus beginning in year 20.
26. Install one, 400 kW fuel cell.
27. Replace ultra low temp freezers with Energy Star Rated Models.
28. Replace compressed air, pneumatic control systems with electronic systems with higher efficiencies.
29. Install solar PV to provide electricity to campus.
30. Improve efficiency of building by installing white roofs when replacing existing roofs.

The committee then determined which strategies to pursue based on the criteria listed in Appendix C.

For a complete list of all ideas received, please see www.sustainTC.umn.edu

Appendix C – Decision Criteria for Evaluating Climate Neutrality Strategies

During Fall Semester 2010, the Sustainability Committee reached out to the campus community and asked them for suggestions for how the campus can achieve climate neutrality. From this solicitation they received over 150 ideas, of which they chose 30 to evaluate in-depth. In order to evaluate, select, and prioritize the suggested actions, the committee developed the following set of criteria aligned with the Energy Management Principles of reliability, environmental stewardship, and cost control.

- Greenhouse gas reduction. How much does the strategy reduce emissions in terms of total annual reduction and cost per ton of CO_2 reduced?
- Opportunities for shared funding. Are there grants or other financial resources that can subsidize the cost?
- Synergies. Does the strategy align with research, outreach, or education, or with existing initiatives and goals?
- Ease of implementation. How feasible is the strategy?
- Visibility. Is the strategy visible to the community and will its visibility positively affect related efforts?
- Return on investment. Assuming some strategies are debt financed, does the strategy provide a return on the money invested and if so, over what time period?
- Cost to implement and own. What is the initial cost of implementing the strategy and the annual cost or savings?
- Reliability. If the strategy replaces existing equipment, sources of energy, transportation options, etc. how reliable is it relative to the current approach?

The committee used these criteria to choose the strategies to implement within the next ten years at the University of Minnesota. Strategies providing both cost savings and emissions reductions consisted of the majority of strategies implemented into the Climate Action Plan. The strategies will be re-evaluated as the committee revises the CAP every two years. In addition, the selection criteria will continue to be reviewed and modified as the climate action planning analysis proceeds in order to improve the effectiveness of the process.

Appendix D – Sustainability Resources and Links

University Policy and Planning

Board of Regent's Policy *Sustainability and Energy Efficiency*
The Policy incorporates sustainability into teaching, research, outreach, and operations.
http://www1.umn.edu/regents/policies/administrative/Sustain_Energy_Efficiency.pdf

University of Minnesota Systemwide Sustainability Goals, Outcomes, Measures, and Processes Report
This report builds on the Regent's Policy on Sustainability and Energy Efficiency, defining specific goals and outcomes for the entire University of Minnesota system.
http://www.uservices.umn.edu/sustainableU/assets/pdf/UM_Systemwide_Sustainability_Final_Report.pdf

Twin Cities Campus Master Plan
The Master Plan builds a framework for the evolution of the physical campus to include natural features, open spaces, existing buildings and infrastructure, land use relationships, and the network for movement to, from, and around the campus. Guiding principle ten gives priority to developing a campus that is environmentally and operationally sustainable. For the entire plan, see http://www.cppm.umn.edu/assets/pdf/2009_BOR_mp.pdf.

University of Minnesota Policy *Procuring and Supplying Energy*
The University's policy stating Energy Management's Guiding Principles of reliability, environmental stewardship, and cost control.
http://www.policy.umn.edu/Policies/Operations/Facilities/ENERGY.html

University Research and Teaching

Institute on the Environment
The Institute was established in 2006 to help the University address solutions to the Earth's most important problems through cutting edge research, partnerships, and leadership development. The website holds information on their key initiatives, as well as news, events, and blogs.
http://environment.umn.edu/

Sustainability Studies Minor
The University's Sustainability Studies Minor is one of the first in the nation. The minor incorporates social, environmental, and economic aspects into its curriculum through a multidisciplinary approach.
http://sustainabilitystudies.umn.edu/

Salovich Zero + Campus Design Project
The Salovich Zero + Campus Design Project is a collaboration between educational and operational entities on campus to create an interdisciplinary

curriculum focused on modeling the performance of the buildings integrated in the landscape to realize net-positive effects on energy use and stormwater. http://zeropluscampus.umn.edu/

Center for Transportation Studies
The Center for Transportation Studies reports on state-wide transportation emissions reduction strategies, some of which will be applied on a small scale at the University. See Reducing Greenhouse Gas Emissions from Transportation Sources in Minnesota at http://www.cts.umn.edu/Research/Featured/GreenhouseGas/index.html.

Environment Theme
In order to obtain an undergraduate degree from the University of Minnesota, students must take at least one course that meets the Environment Theme Liberal Education requirement. Courses include a broad array of disciplines and help students learn about the problems and solutions to environmental issues. To learn more about the requirement and view a listing of Environment Themed courses, visit http://onestop.umn.edu/degree_planning/lib_eds/fall_2010_requirements/index.html.

Campus Operations

Sustainability and U
To view the progress the University has made in leadership, modeling, operational improvements, energy efficiency, education and outreach, and research, visit our 'Sustainability and U' webpage at http://www.uservices.umn.edu/sustainableU/.

It All Adds Up Energy Conservation Campaign
It All Adds Up is a conservation program begun at the University in 2009. Since its inception, the program has reduced annual energy costs $4.6 million and results in 50,000 fewer tons of CO_2 released into the atmosphere annually. To learn more about the cultural change campaign, building recommissioning, and recycling initiatives, go to http://www1.umn.edu/italladdsup/index.php.

Parking and Transportation
Parking and Transportation encourages use of multiple modes of transportation including walking, biking, busing, ride sharing, and carpool parking. To learn more about the department's efforts towards sustainability in transportation and purchasing, go to http://www1.umn.edu/pts/.

Science Teaching & Student Services Center
The Science Teaching and Student Services Center, completed in 2010, earned LEED Gold certification. Signage throughout the building describes the sustainable construction practices utilized, along with an interactive online tour of the building at http://www.cppm.umn.edu/sustainability/stss/index.htm.

Greenhouse Gas Inventory
The Greenhouse Gas Report for the University of Minnesota Twin Cities as submitted to the ACUPCC can be viewed at http://acupcc.aashe.org/ghg/620/.

Environment and Sustainability Portal
An Environmental and Sustainability portal was created as a landing page for system resources. More information about climate action planning at all University of Minnesota campuses can be found at http://portal.environment.umn.edu/.

External Organizations

ACUPCC
The text of the American College and University Presidents' Climate Commitment (ACUPCC), which President Bruininks signed onto in January 2008, can be found at http://www.presidentsclimatecommitment.org/about/commitment.

Chicago Climate Exchange
The Chicago Climate Exchange is a system that requires emitting members of the exchange to enter a voluntary but legally binding commitment to meet annual greenhouse gas reduction targets. The University became a member of the exchange in December 2004. For more information, visit http://www.chicagoclimatex.com/.

Minnesota Sustainable Building 2030
To learn more about the Minnesota 2030 building standards required for all new and renovated university buildings financed by state bonding funds, visit http://www.mn2030.umn.edu/.

Energy Innovation Corridor
The University of Minnesota is a partner of the Energy Innovation Corridor (EIC). The Corridor includes the area surrounding the incoming Central Corridor Lightrail and will demonstrate sustainable energy and transportation projects. To learn more about the EIC and the University's projects in the corridor, visit http://www.energyinnovationcorridor.com/page/.

SEI Green Report Card
The University of Minnesota was one of two universities to earn straight 'As' on the Sustainable Endowments Institute's Green Report Card, which grades sustainability in administration, climate change and energy, food and recycling, green building, transportation, student involvement, endowment transparency, investment priorities, and shareholder engagement. To learn more about our grade, go to http://www.greenreportcard.org/report-card-2011/schools/university-of-minnesota.

Appendix E –
Twin Cities Campus Greenhouse Gas Inventory, 2008

Document on following pages

University of Minnesota Twin Cities

Greenhouse Gas Inventory

Prepared by Chris Peters

CE 4180/ SUST 3003

Independent Study

Spring 2009

Executive Summary

On January 8, 2008, University President Robert H. Bruininks signed the American Colleges and Universities Presidents Climate Commitment (ACUPCC). The commitment to reduce greenhouse gas emissions and develop a plan to become climate neutral was consistent with existing University energy programs and also with Minnesota statewide goals to reduce greenhouse gas emissions 80% by 2050. The first milestone of the ACUPCC is to conduct a comprehensive greenhouse gas emission inventory for each campus.

As a result of its activities, the University is estimated to produce 642,737 metric tons CO2 equivalents in 2008. A breakdown of those emissions is found in the chart below. The largest sources of emissions were those generated by the electricity provider for purchased electricity, followed by the on campus steam plant. These two sources combined to be approximately 80% of the emissions associated with the University's activities.

The University is currently developing system-wide goals which will fulfill the Regents policy adopted in 2004 and shape its effort to become more sustainable and reduce energy consumption. This will help the University of Minnesota reach the proposed target of becoming one of the ten greenest Universities in the United States.

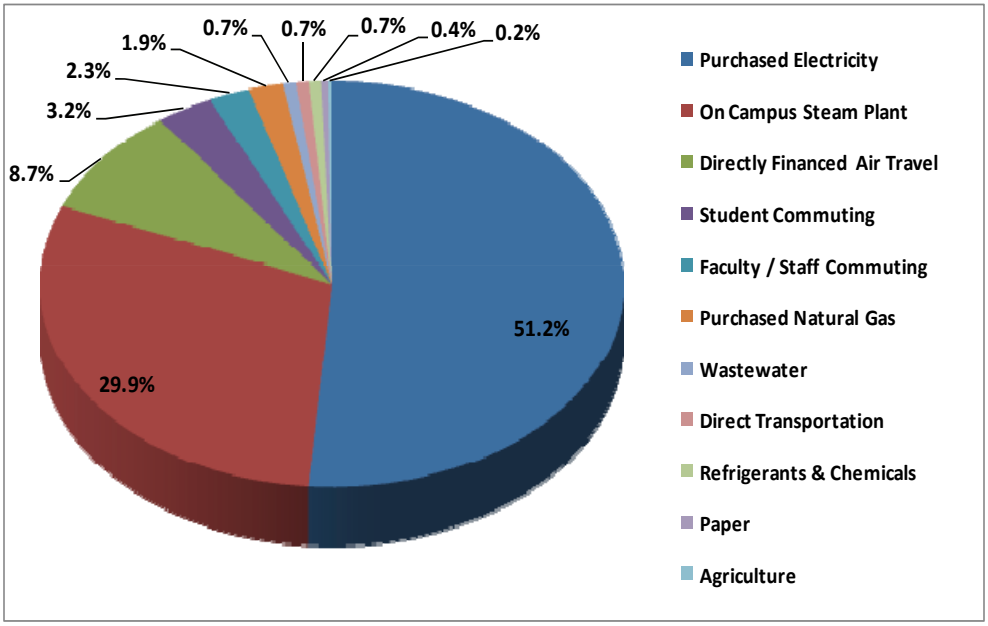


Fig. 1: UMTC Greenhouse Gas Emission Percentages by Source (642,737 metric tons CO2e)

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Thank You

Acknowledgements

This inventory required data from many departments on the University of Minnesota campus. A special thank you is in order for all of the people who provided data, provided guidance, or helped make this inventory possible.

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Jerome Malmquist	Nick Deffley	Leslie Krueger

Thank you to the University Leadership:

University President Robert H. Bruininks

Vice President for University Services Kathleen O'Brien

Introduction

Introduction

On January 8, 2008, University President Robert H. Bruininks signed the American Colleges and Universities Presidents Climate Commitment (ACUPCC). The commitment to reduce greenhouse gas emissions and to develop a plan to become climate neutral was consistent with University energy programs and Minnesota statewide goals to reduce greenhouse gas emissions 80% by 2050. This commitment lays out steps that ensure the University will make progress toward this goal. The University established a sustainability committee that includes students, faculty and staff from departments across campus, to help guide this effort.

The University of Minnesota has a long and impressive history of sustainability on campus. The 2004 Board of Regent's Policy on Sustainability and Energy Efficiency includes a guiding principle focused on energy efficiency. In 2004, the University of Minnesota also joined the Chicago Climate Exchange, a voluntary cap and trade carbon trading system. Since then the University has been developing an aggressive building recommissioning effort to increase energy efficiency. Energy efficiency projects which have reduced steam consumption by over 15,000,000 pounds have been implemented since July 2008 resulting in the avoidance of 1,500 metric tons of steam related CO2. The University steam plant has also started burning oat hulls, a renewable energy source, which allow less fossil fuels burning.

The University of Minnesota has committed to improve sustainability through six guiding principles: education and outreach, energy efficiency, leadership, modeling, operational improvements, and research. Draft sustainability goals and measurements were recently proposed for each for these areas. The proposed goals are comprehensive and address several areas that include reducing total energy use, increasing sustainability related research and promoting student involvement.

Methods

Methods

The University of Minnesota has chosen the Clean Air-Cool Planet (CA-CP) Campus Carbon Calculator as its greenhouse gas inventory measurement tool. The tool was chosen because it was endorsed by the ACUPCC, and it ensures consistent measurements when doing inventories in future years. Some greenhouse gas emission data has been recorded for many years. University Facility Management has maintained records for the campus steam plant since 1998 which have been verified by third party for participation in the Chicago Climate Exchange. Fuel, energy, and refrigerant factors in the CA-CP tool were adjusted to match those used in the verified records. Other sections in the tool were modified to meet the needs of the University of Minnesota.

The first step in calculating the greenhouse gas emissions for the University was defining the University boundary. The University of Minnesota is made up of three campuses: East Bank, West Bank, and St. Pau, so a clear boundary was difficult to establish. The boundaries for the University were set as any building that the University provides heat for. Originally Fairview Hospital was not included in the university boundary. However, because the university provides electricity and steam to the hospital, this initial inventory includes energy emissions from that source.

The following greenhouse gases were counted in the inventory:

- CO2 - Carbon Dioxide
- CH4 - Methane
- N2O - Nitrous Oxide
- Refrigerants

(See the Refrigerants section of this report for a list of the refrigerants in the inventory.)

Emissions are based on GWP (Global Warming Potential). GWP is the amount that the greenhouse gas will contribute to global warming compared to the same mass of CO2. For instance, CH4 has a GWP of 23. One pound of CH4 will contribute 23 times as much toward global warming as one pound of CO2. The term CO2 equivalent is used to describe the total effect of all the greenhouse gases compared to CO2. One pound of CH4 will be equal to 23 CO2 equivalents.

Emissions

Emissions by Scope

Scopes help describe how emissions are produced by the University. Scope 1 refers to emissions from sources directly owned or operated by the University. Scope 2 refers to emissions purchased or consumed by the University. Scope 3 refers to emissions that are not owned by the University, but are indirectly produced due to University activities.

As the chart on the right shows, scope 2 emissions are the greatest contributor to University emissions. Scope 2 emissions are particularly hard to change because the University cannot reduce these emission unless it works with the producer to facilitate a change. Scope 1 emissions are the second greatest contributor to greenhouse gases. The University currently has many active programs designed to reduce scope 1 emissions. Scope 3 emissions are the least out of the three scopes. Scope 3 emissions are also the least accurate. For more information about the sources in each of these scopes see individual source sections on the following pages of this report.

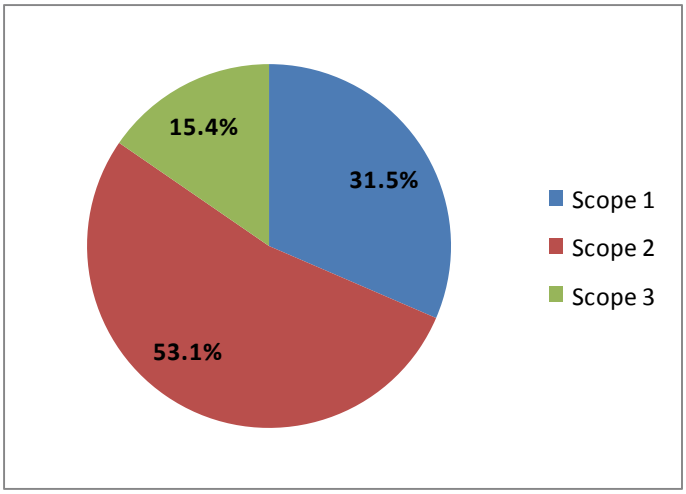


Fig. 5: UMTC Greenhouse Gas Emission Percentages by Scope (642,737 metric tons CO2e)

Table 3: University Scope Breakdown

Scope 1	Scope 2	Scope 3
On Campus Steam Plant	Purchased Electricity	Faculty / Staff Commuting
Direct Transportation	Purchased Natural Gas	Student Commuting
Refrigerants & Chemicals		Directly Financed Air Travel
Agriculture		Wastewater
		Paper

Scope 1: Sources directly owned or operated by the University.
Scope 2: Sources purchased or consumed by the University.
Scope 3: Sourcs indirectly produced due to University activities.

Emissions

Emissions by Source

Using the Clean Air Cool Planet tool, a wide variety of sources of greenhouse gas emissions were identified that were associated with the activities of the University of Minnesota. The largest sources of emissions are from energy. Purchased steam and the on campus steam plant combine to be 81.1% of the University's emissions. Specifics on each of the emission sources can be found on subsequent pages in this report.

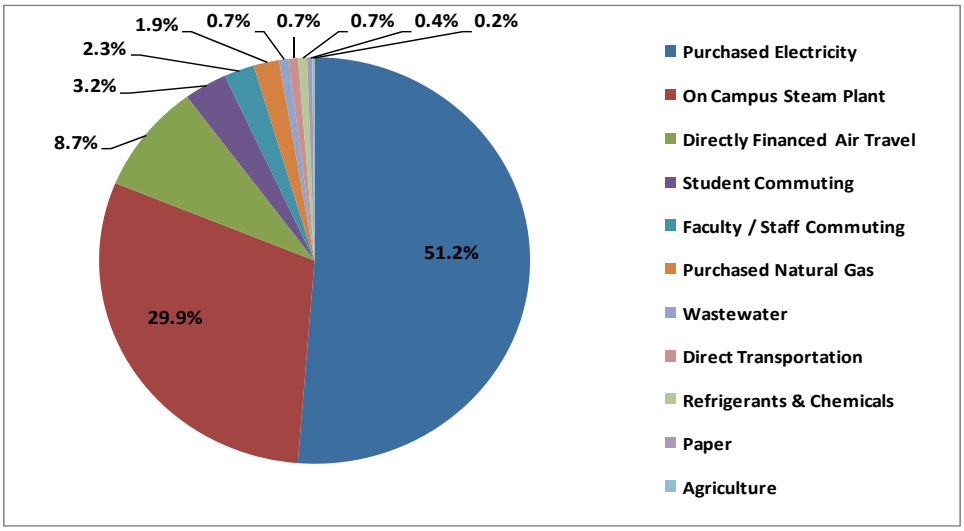


Fig. 4: UMTC Greenhouse Gas Emissions Percentages by Source (642,737 metric tons CO2e)

Table 1: Total University Emissions by Source

Source	mt CO2e	% of Total
Purchased Electricity	329,641	51.2%
On Campus Steam Plant	192,747	29.9%
Directly Financed Air Travel	56,004	8.7%
Student Commuting	20,830	3.2%
Faculty / Staff Commuting	14,630	2.3%
Purchased Natural Gas	12,301	1.9%
Wastewater	4,607	0.7%
Direct Transportation	4,552	0.7%
Refrigerants & Chemicals	4,275	0.7%
Paper	2,422	0.4%
Agriculture	1,179	0.2%

Table 2: University Emissions Offsets

Offsets	mt CO2e
Waste Incineration	-263
Composting	-190

Total Emissions
642,737 metric tons CO2e

Total Emissions

Total Emissions

The total emissions associated with the University of Minnesota Twin Cities operations and activities were estimated to be 642,737 metric tons CO2 equivalent.

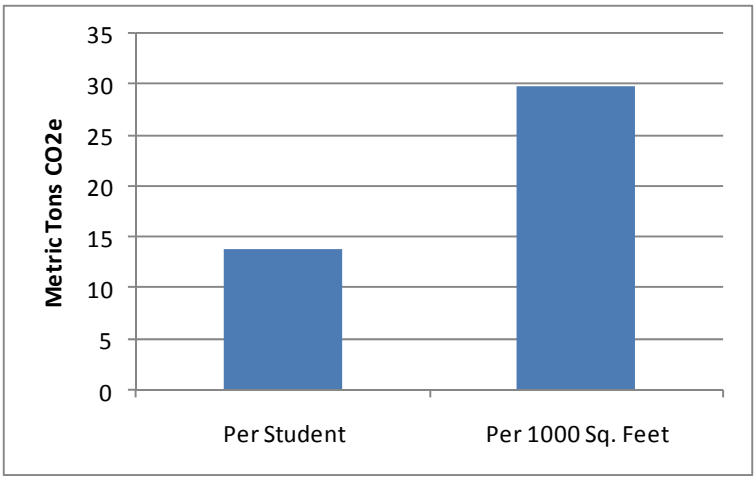


Fig. 2: UMTC Greenhouse Gas Emissions Per Student and Per Sq. 1000 Feet (642,737 metric tons CO2e)

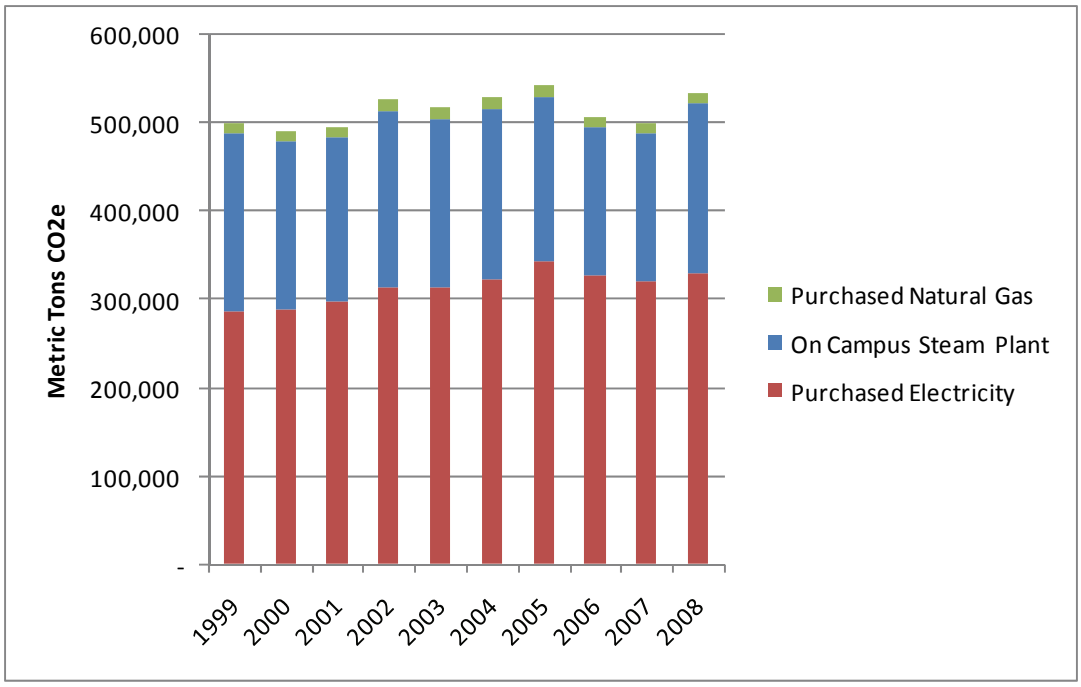


Fig. 3: UMTC Greenhouse Gas Emissions from Energy 1999-2008

Steam Plant

Emissions from the Campus Steam Plant

192,747 Metric Tons CO2e

The campus steam plant is the second largest contributor to the University's greenhouse gas emissions. The steam plant's fuel mix is approximately 70% natural gas, which allows for less coal burning. Other fuels burned include Distillate Fuel #2, Sub Bituminous Coal, Bituminous Coal, and Wood. Starting in 2006, the University also started burning Oat Hulls in an effort to use more renewable energy sources.

The University has made great strides in improving the efficiency of the campus steam plant. Energy efficiency projects which have reduced steam consumption by over 15,000,000 pounds have been implemented since July 2008 resulting in the avoidance of 1,500 metric tons of steam related CO2. Below is a graph of the emissions for the University from 1998 to 2008. The emissions steadily decline until 2008 where there is a jump mostly due to a cold winter.

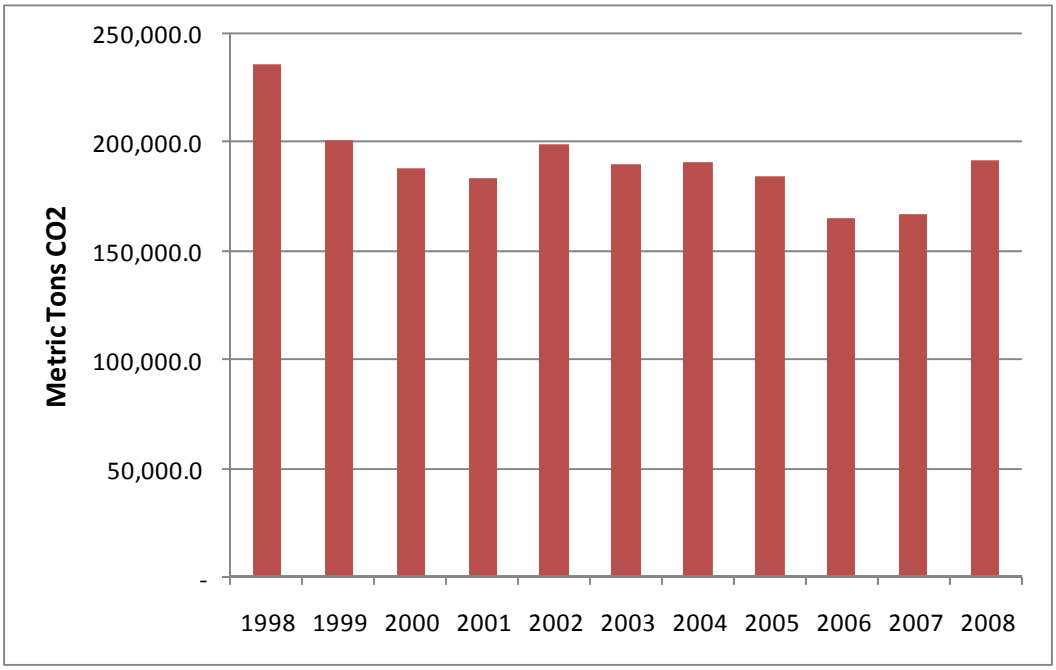


Fig. 6: UMTC Greenhouse Gas Emissions from On Campus Steam Plant 1998-2008

Source: University Facilities Management CCX (Chicago Climate Exchange) Data

Transportation

Emissions from Direct Transportation

4,552 Metric Tons CO2e

The University's direct transportation comes from fleet vehicles and buses. Fleet vehicles include all vehicles owned by the University including cars, utility vehicles, and industrial vehicles. The University bus services are contracted out to First Transit, the same company that runs bus services for the Metropolitan Council.

Reducing emissions is extremely important to fleet services. Diesel vehicles owned by fleet services run on biodiesel blends. Fleet services uses B20 (20% biodiesel) four months per year, B10 three months per year, and B5 five months per year. This practice helps reduce emissions and fossil fuel consumption.

Fleet services also tries to buy the most environmentally friendly vehicles they are able to. Fleet services currently own 75 E85 vehicles representing 15% of the fleet. They have also started buying hybrids vehicles. Currently fleet services also own over 60 hybrid vehicles available for University use or rental.

The University bus system has made efficiency improvements in its busing system. It is estimated that with recent efficiency improvements the busing system is saving 54 gallons per day. The University is actively working with First Transit to make improvements to the bus service.

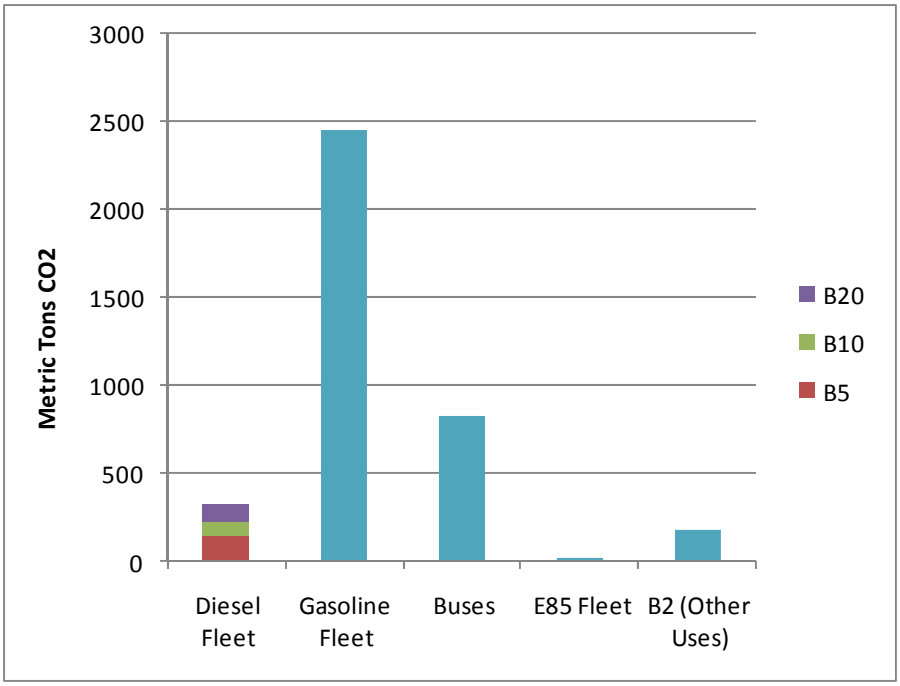


Fig. 7: Emissions from Fleet Vehicles Owned by the University and Emissions from the University Bus System

Sources:

University Fleet Services Fuel Data

First Transit Fuel and Miles data

Refrigerants

Emissions from Refrigerants

4,275 Metric Tons CO2e

Refrigerant emissions are based on GWP (Global Warming Potential). GWP is the amount that the refrigerant will contribute to global warming compared to the same mass of CO2. Refrigerants contribute a very large global warming potential compared to other greenhouse gases like CO2 and CH4. For instance, one pound of the refrigerant R-22 will contribute 1810 times as much toward global warming as one pound of CO2 would. Because of this, the University has made an effort to use refrigerants with lower GWP values. The table on the right shows the refrigerants that the University uses and their GWP.

Table 4: University Refrigerants

Refrigerant	GWP
MP39 SUVA	1100
R-12	10900
R-134A	1430
R-22	1810
R-404A	3780
R-408A	2650
R-416A	1365
R-502A	5600
R-95	11946
RB-276	1569

Sources: University Facilities Management Refrigerant Data
GWPs were taken from IPCC 2007 or individual MSDS sheets

Agriculture

Emissions from Agriculture

1,179 Metric Tons CO2e

Table 4: University Animals

University Animals
233 Dairy Cows
43 Beef Cows
311 Pigs
4 Goats
26 Sheep
30 Horses
84 Turkey

Agriculture at the University contributes to a very small amount of the total emissions. Animals are housed at the St Paul campus. The University has a wide variety of animals as shown in the table to the left. Fertilizers also contribute to greenhouse gases through the production of N20. Fertilizers are used in the agricultural land plots, Les Bolstad golf course, athletics facilities, and campus grounds. The University uses a mix of organic and synthetic fertilizers.

Sources: Animal husbandry - University Environmental Health & Safety
Fertilizer - Purchase Records fromAgriculture Experimental Station, Golf Course Maintenance, Facilities Management, Athletics Department

Purchased Electricity

Emissions from Purchased Electricity

329,641 Metric Tons CO2e

The University's largest sources of emissions is from purchased electricity. Electricity is purchased from Xcel Energy. Records have been maintained for purchased electricity since 1999. The emission factor used was based on the fuel mix that Xcel Energy uses and has been verified by a third party. The factor used (.83 metric tons CO2/MWh) was slightly lower than the commonly used regional factor for Minnesota (0.847 metric tons CO2/MWh).

The University's Facilities Management department is constantly making the University more energy efficient. Facilities Management's staff have implemented energy efficieny improvements which have reduced electricity related CO2 emissions by over 4,700 metric tons since July 2008. Every day, Facilities Management works to reduce greenhouse gases and save the University costs.

The University currently has a goal of cutting total energy consumption by 5 percent from the fiscal year 2008 baseline by the end of 2010. One of the major parts of this effort is electricity conservation. Programs are being put into place that raise awareness of the importance of conserving electricity.

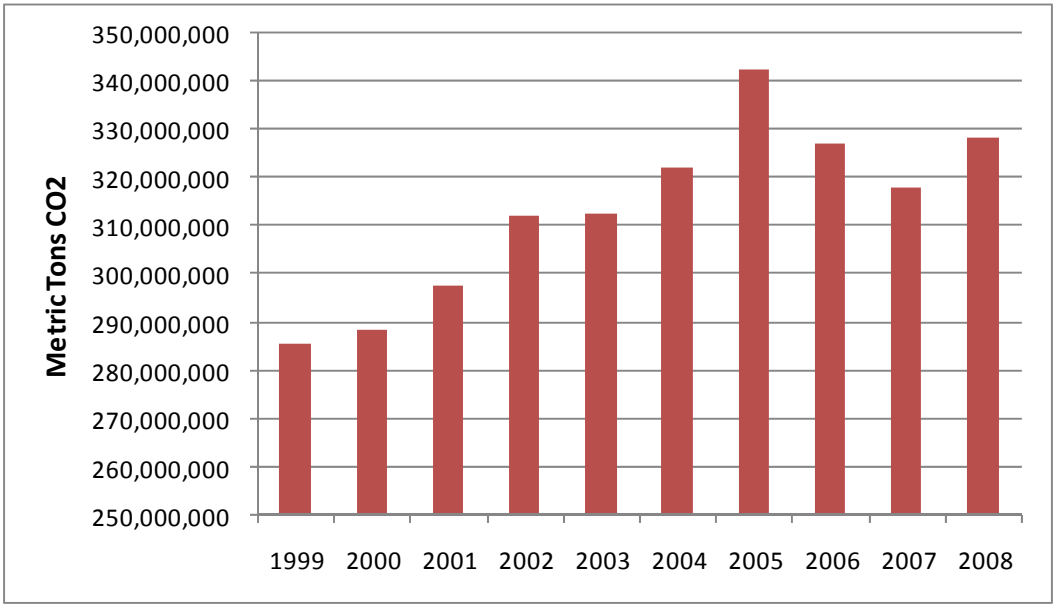


Fig. 8: UMTC Greenhouse Gas Emissions from Purchased Electricity 1999-2008

Source: University Facilities Management Electricity Emissions Data Sheet

Purchased Natural Gas

Emissions from Purchased Natural Gas

12,301 Metric Tons CO2e

A minimal amount of greenhouse gas emissions are emitted due to purchased natural gas. Purchased natural gas only contributes about 0.2% of the University's Emissions.

The University purchases small amounts of natural gas from Xcel Energy and CenterPoint Energy. The University has been keeping track of the small source natural gas it purchases from Excel Energy and CenterPoint Energy since 1999.

Source: University Facilities Management Electricity Emissions Data Sheet

Commuting

Emissions from Commuting

The University is a large commuting school with 75% of students, faculty, and staff living more than two miles away, and 40% living more than five miles away.

The commuting distance for each student were based on distances obtained from US census tract data for the University's students, staff, and faculty. This combined with commuter transportation modes and assumptions shown below allowed the emissions from commuting to be calculated.

Student Commuting Travel Modes

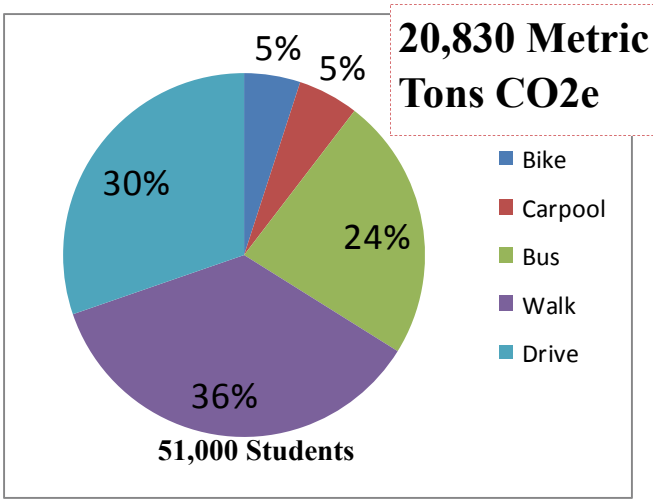


Fig. 9: Student Commuting Travel Modes

Staff and Faculty Commuting Travel Modes

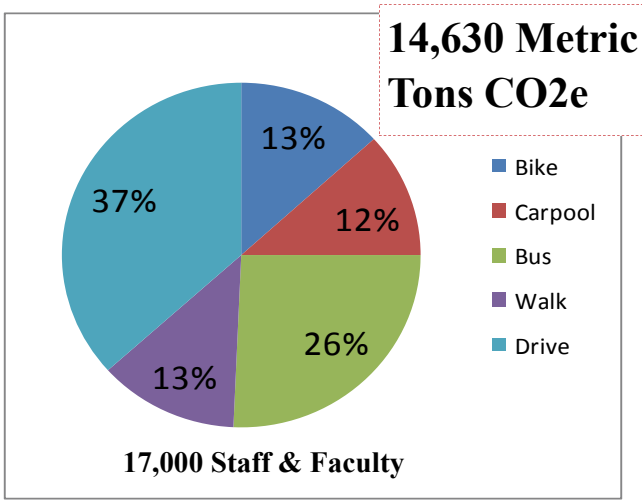


Fig. 10: Staff and Faculty Commuting Travel Modes

Student Assumptions Used

- Commute 2 trips per day
- Commute 5 days per week
- Commute 16 weeks per semester
- Commute 2 semesters per year

Faculty and Staff Assumptions Used

- Commute 2 trips per day
- Commute 5 days per week
- Commute 50 weeks per year

Data Limitations: Census Tract Data is only partially accurate for students; Assumptions also limit data validity.

Sources: Travel Modes & Census Tract Data from University Fleet Services

Air Travel

20,830 Metric Tons CO2e

Emissions from Air Travel

Travel at the University is not purchased through a centralized travel agent or documented through a single enterprise system. Faculty, staff, and students do not currently track miles traveled so methods for estimating travel are based upon generalized factors that convert dollars to miles traveled based on a report from one travel agency that is commonly used by University employees.

The University's emissions from air travel is the least defined since a system is not currently in place to document. To calculate the emissions two estimates were made. One was made by a class during the Fall of 2008. The other was based on partial data from University air travel purchases. Both estimates can be found in the section below. The estimate from the purchasing data was used because it resulted in a more conservative value. The University is exploring options for reducing some travel and for making air travel data more available and accurate for the greenhouse gas inventory.

The two estimates taken together represent a range of the emissions from air travel. until a better system can be put in place. From the two estimates, it is reasonable to conclude that University air travel emissions are somewhere between 15,000 and 60,000 mt CO2 or between 2 and 9 percent of total University emissions.

PA 5721 Class Estimate

A class in the Fall of 2008 did an estimated the amount of air travel emissions from the University. The class used data from one University department and one University college to extrapolate total mileage. The sample represented about 3% of the total University faculty and staff. The emissions were estimated in three calculators, one of which was the Clean Air Cool Planet campus carbon calculator.

Resulting Emissions

17,000 metric tones CO2

Purchasing Data Estimate

Emissions are based on purchases from two widely used campus credit cards. The University currently does not know what percentage of total air travel these credit cards represent.

A factor of 0.22 dollars per mile was used based on a report from a travel agency commonly used by University employees. This was then entered into the carbon calculator tool.

Resulting Emissions

55,000 metric tones CO2

Data Limitations: Data is based on a limited percentage of University staff & faculty; Percentage is also unknown

Sources: Class Estimate - Public Affair 5721 Fall 2008

Puchasing Data Estimate - GE Travel Card and University Purchasing Card Reports

Waste

Emissions from Waste

Incineration

(263) Metric Tons CO2e

The University sends all of its solid waste that isn't composted or recycled to the Hennepin County Reclamation Center in downtown Minneapolis. Waste incineration counts as an offset for the University since the waste is not landfilled, which would produce CH4, and instead it produces energy which replaces fossil fuel burning. The emissions offset factor used was from the CA-CP tool and has not been verified by the University. University Services has programs in place to decrease waste and increase the percentage of waste that is com-

Recycling

The University is nationally recognized as a pioneer in institutional recycling. Since 1984 the University has managed its own recycling program on campus and currently recycles about 12 tons of waste per day. The University has implemented nationally recognized programs like the "Quad System" for making recycling easier and the Organics Recycling Program talked about below.

Organics Recycling

(190) Metric Tons CO2e

Total University composting in 2008 was 493 metric tons. In 2007, the University began collecting food from University residential hall kitchens and on-campus dining locations for composting. The same year they also began collecting biodegradable napkins, kitchen utensils, and food packaging for composting. Lawn waste and small animal bedding are also included in University composting.

Organics recycling is counted as an offset for University emissions because it keeps waste out of landfills, which would produce CH4. In 2008, University composting offset 190 metric tons of CO2 equivalents.

Source: University Waste Management Data

Wastewater

Emissions from Wastewater

4,607 Metric Tons CO2e

The University's wastewater is treated at the Metro Plant in St Paul. Greenhouse gas emissions that include CH4 and N20 are due to the wastewater treatment process. CH4 and N2O are released as water is treated by the aerobic and anaerobic processes as well as by anaerobic digestions. Wastewater treatment contributes a small amount to the Universities total greenhouse gas emissions.

Source: University Facilities Management Utility Data

Paper

Emissions from Paper

2,422 Metric Tons CO2e

The University of Minnesota has two departments that purchase most of the University's paper, University Stores and Printing Services. A graph showing the breakdown of the recycled material content in University paper purchases can be seen to the right. Emissions represent the estimated emissions from the complete lifecycle of the paper.

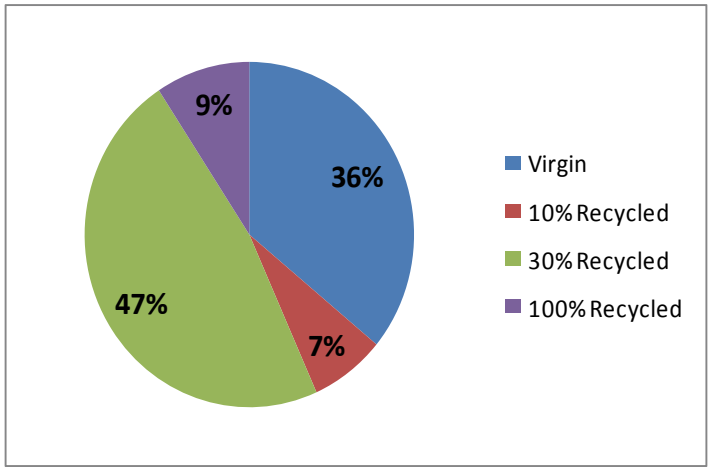


Fig. 11: Recycled Content of University Paper Purchases

Source: University Stores Paper Data
University Printing Services Paper

Appendix 1

Snapshot of Clean Air Cool Planet Campus Carbon Calculator.

MODULE	Summary					
WORKSHEET	Overview of Annual Emissions					
UNIVERSITY	University of Minnesota					
Select Year -->	2008	Energy Consumption	CO_2	CH_4	N_2O	eCO_2
		MMBtu	kg	kg	kg	Metric Tonnes
Scope 1	Co-gen Electricity	-	-	-	-	-
	Co-gen Steam	-	-	-	-	-
	On Campus Steam Plant	2,084,734	191,685,482	21,776	1,894	192,747
	Direct Transportation	53,688	4,467,455	649	237	4,552
	Refrigerants & Chemicals	-	4,274,552	-	-	4,275
	Agriculture	-	-	43,581	597	1,179
Scope 2	Purchased Electricity	3,533,775	328,265,043	2,817	4,431	329,641
	Purchased Natural Gas	19,509,289	9,325,245	102,911	2,058	12,301
Scope 3	Faculty / Staff Commuting	202,634	14,338,985	2,268	807	14,630
	Student Commuting	288,379	20,425,205	3,146	1,123	20,830
	Directly Financed Air Travel	284,226	55,804,154	550	632	56,004
	Other Directly Financed Travel	-	-	-	-	-
	Study Abroad Air Travel	-	-	-	-	-
	Solid Waste	-	(263,010)	-	-	(263)
	Wastewater	-	-	168,813	2,448	4,607
	Paper	-	-	-	-	2,422
Offsets	Additional					(190)
	Non-Additional					-
Totals	Scope 1	2,138,421	200,427,490	66,007	2,728	202,753
	Scope 2	23,043,064	337,590,288	105,728	6,489	341,943
	Scope 3	775,239	90,305,333	174,777	5,010	98,230
	All Scopes	25,956,724	628,323,111	346,511	14,227	642,926
	All Offsets					(190)
					Net Emissions:	642,737

Appendix 2 Source List

Source	Department	Source
On Campus Steam Plant	Facilities Management	CCX Twin Cities Gas & Steam Emissions.xls
Direct Transportation	Transit Services	Miles and Fuel.xls
	First Transit	Miles and Fuel.xls
	Fleet Services	Purchase Records
Refrigerants	Facilities Management	Green house refrigerant issues.xls
Agriculture	Environmental Health & Safety	Email
	Facilities Management	Purchase Records
	Intercollegiate Athletics	Purchase Records
	Ag. Experimental Stations	Purchase Records
	Intercollegiate Athletics	Purchase Records
Purchased Electricity	Facilities Management	Twin Cities Electricity Emissions.xls
Purchased Natural Gas	Facilities Management	Twin Cities Electricity Emissions.xls
Faculty / Staff Commuting	Transit Services	UMN Commuter DATA.xls
Student Commuting	Transit Services	UMN Commuter DATA.xls
Directly Financed Air Travel	Environmental Health & Safety	GE Travel Card & University Purchasing Card Reports
Solid Waste	Waste Management	Email
	Waste Management	Email
Wastewater	Facilities Management	Email
Paper	University Stores	Purchase Records
	Printing Services	Purchase Records
Composting	Waste Management	Email
	Waste Management	Email

Appendix F –
Systemwide Sustainability: Goals, Outcomes, Measures

Document on following pages

University of Minnesota
Systemwide Sustainability
Goals • Outcomes • Measures • Process

UNIVERSITY OF MINNESOTA
Driven to Discover℠
September 2009

UNIVERSITY OF MINNESOTA

Driven to Discover℠

University of Minnesota
Systemwide Sustainability

Goals • Outcomes • Measures • Process

September 2009

The University of Minnesota, founded in the belief that all people are enriched by understanding, is dedicated to the advancement of learning and the search for truth; to the sharing of this knowledge through education for a diverse community; and to the application of this knowledge to benefit the people of the state, the nation, and the world. The University's threefold mission of research and discovery, teaching and learning, and outreach and public service is carried out on multiple campuses and throughout the state.

University of Minnesota Systemwide Sustainability

Goals, Outcomes, Measures, Process

Contents

University of Minnesota Board of Regents Policy on Sustainability and Energy Efficiency

Adopted July 9, 2004

Commitment:

Sustainability is a continuous effort integrating environmental, social, and economic goals through design, planning, and operational organization to meet current needs without compromising the ability of future generations to meet their own needs. Sustainability requires the collective actions of the University of Minnesota community and shall be guided by the balanced use of all resources, within budgetary constraints. The University is committed to incorporating sustainability into its teaching, research, and outreach and the operations that support them.

Guiding Principles:

- Leadership
- Modeling
- Operational Improvements
- Energy Efficiency
- Research
- Education and Outreach

Implementation:

- Goals
- Policies
- Procedures
- Objectives
- Targets
- Indicators
- Measures of Success
- Progress Reports

Board of Regents Policy on Sustainability and Energy Efficiency is found in Appendix A

Sustainability Goals and Outcomes Committee Charge

Summary of Charge from President Robert H. Bruininks
April 2, 2008

Facilitate implementation of the Board of Regents policy by

- Recommending University-wide sustainability goals aligning to the policy guiding principles: leadership, modeling, operational improvements, energy efficiency, research, and education and outreach
- Drafting performance measures and appropriate mechanisms for measuring and reporting progress both in operational units and across the University as a whole
- Supporting each campus's development of campus-wide, ongoing sustainability committees to ensure implementation of the Regents policy.

University of Minnesota Sustainability Goals and Outcomes Committee

The University of Minnesota Sustainability Goals and Outcomes Committee was established by University of Minnesota President Robert Bruininks in spring 2008 to guide implementation of the Board of Regents policy by recommending goals and performance measures and supporting development of sustainability committees on each campus. The committee included students, faculty, and staff from four University campuses. Work teams formed in fall 2008 aligned with the policy's guiding principles. The structure and composition of the committee and work teams is shown in Appendix B. Over six months, the work teams developed data-driven goals and desired outcomes and measures for each guiding principle. Appendix B. Work team members are also noted in the Acknowledgments.

Co-Chairs

Kathleen O'Brien, Vice President, University Services

Deborah Swackhamer, Charles M. Denny Chair of Science, Technology, and Public Policy, Humphrey Institute of Public Affairs; Professor, Division of Environmental Health Sciences, School of Public Health; Co-director, Water Resources Center, UMTC

Committee Members

Jay Bell, Professor, Department of Soil, Water, and Climate and Associate Dean, Academic Programs and Faculty Affairs, College of Food, Agricultural and Natural Resource Sciences, UMTC

Leslie Bowman, Executive Director, University Dining Services, Contract Administration, UMTC

David DeMuth, Associate Professor, Department of Math, Science and Technology, UMC

Jim Dudley, Director of Central Services, Facilities Management, UMTC

Kris Johnson, Ph.D. Graduate Student, Conservation Biology Program, UMTC

Anne Kapuscinski, Professor, Department of Fisheries, Wildlife and Conservation Biology and Director, Institute for Social, Economic, and Ecological Sustainability, UMTC*

John King, Director, Facilities Management, UMD

Holly Lahd, Undergraduate Student, Department of Applied Economics, UMTC

Scott Lanyon, Professor and Head, Department of Ecology, Evolution, and Behavior, UMTC

Allen Levine, Dean and Professor, College of Food, Agricultural and Natural Resource Sciences, UMTC

Jerome Malmquist, Director of Energy Management, Facilities Management, UMTC

Julian Marshall, Assistant Professor, Department of Civil Engineering, UMTC

Lance Neckar, Professor, Department of Landscape Architecture, UMTC

Andrew Phelan, Assistant Director, Environmental Health and Safety, UMTC

Stephen Polasky, Professor, Department of Applied Economics, UMTC

Lowell Rasmussen, Vice Chancellor, Finance & Facilities, UMM

Brian Swanson, Budget Officer, Office of Budget and Finance, UMTC

Elizabeth Wilson, Assistant Professor, Humphrey Institute of Public Affairs, UMTC

Staff

Amy Short, Sustainability Coordinator, University Services

Mindy Granley, Sustainability Coordinator, UMD

Beth Mercer-Taylor, Sustainability Education Coordinator

* Currently Professor of Environmental Studies and Sherman Fairchild Professor of Sustainability Science, Dartmouth

Preface

The test of the University's mettle —and our merit as a top three public research university —will lie in how boldly we take up the challenge in this committee report and how thoroughly we implement its recommendations.

To reach our goal of becoming a top three public research university, the University of Minnesota must act in ways that bring transformational change and achieve transcendent results in response to vitally important problems. When we have done what few other universities have accomplished, and overcome obstacles that few others have scaled, we will have reached our goal. Top three universities don't aspire to their ranking. We do everything we can to make a difference in the world, and the rankings follow.

The work of the students, faculty, and staff in the University Sustainability Goals and Outcomes Committee exemplifies that idea. The committee's work teams have laid out a series of inspirational goals, achievable recommendations, and measurable outcomes that will transform the University of Minnesota and transcend anything done by our peers. The test of the University's mettle—and our merit as a top three public—will lie in how boldly we take up the challenge in this committee report and how thoroughly we implement its recommendations.

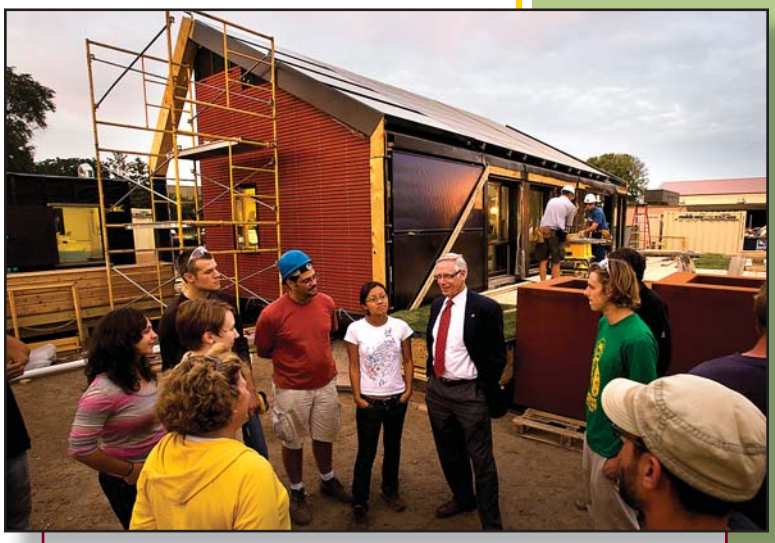
The current financial crisis might make this challenge seem too daunting, but not when we consider the core of the committee's recommendations. Achieving a truly sustainable University of Minnesota will require not a lot of additional investment as much as a fundamental change in campus culture. That change will need to extend from the individual behavior of students, faculty, and staff for whom resource use remains largely an externality hidden from view and someone else's responsibility, to the collective action of the institution, in which decisions often get made without factoring in their environmental effects.

The report outlines several ways of achieving this cultural change within the University of Minnesota. The change begins with the engagement of everyone at the University, at every level—students, faculty, and staff—in almost everything we do on a daily basis, with the right incentives in place to move sustainable behavior from being an exception to the norm. This change in culture will also require the support of the institution's leadership not only in emphasizing the importance of sustainability, but also in attending to the environmental, economic, and social implications of every major decision. Finally, the change will demand our

attending to what, when, and how successes get communicated, using pervasive—and paperless—forms of new media as much as possible.

Behind all of the recommendations in this report lies a shift away from thinking of sustainability as an unavoidable cost to seeing it as an unsurpassable investment in the future of the University. Every dollar spent on improving our collective environmental footprint leverages far more in return by strengthening the resiliency and resolve of this community to do what no other university our size has done. And every step taken to enhance the campus ecosystem moves us several steps further toward a more robust academic ecology. In that sense, this report of the University Sustainability Goals and Outcomes Committee represents not only the conclusions of a sizable group of committed colleagues, but also the commencement of our truly becoming a top three public research university.

Thomas Fisher
Dean, College of Design



Going to the Mall

President Robert Bruininks joins students from a wide variety of majors at the University of Minnesota who have collaborated to build a house powered entirely by the sun. The effort of some 150 University students is part of the 2009 international Solar Decathlon competition in Washington, D.C.

Executive Summary

In July 2004, the University of Minnesota Board of Regents adopted its *Policy on Sustainability and Energy Efficiency*. The policy defines sustainability as "a continuous effort integrating environmental, social, and economic goals through design, planning, and operational organization to meet current needs without compromising the ability of future generations to meet their own needs." It commits the University of Minnesota to incorporate sustainability into teaching, research, outreach, and operations under the direction of six guiding principles:

- Leadership
- Modeling
- Operational Improvements
- Energy Efficiency
- Research
- Education and Outreach

Soon after this sustainability and energy policy was adopted, the University of Minnesota began a strategic planning process. The resulting plan, *Transforming the U*, called for transformative change, better use of resources, exceptional innovation, and a commitment to "measure what we value and then act accordingly." Through this process, the University of Minnesota established the goal of becoming one of the top three public research universities in the world.

In the context of the Board of Regents *Policy on Sustainability and Energy Efficiency* and *Transforming the U*, in April 2008 University of Minnesota President Robert H. Bruininks established a 10-member University of Minnesota Sustainability Goals and Outcomes Committee. Composed of faculty, staff, and students, the committee was charged with 1) facilitating implementation of the Board of Regents policy by recommending goals and performance measures for each guiding principle, and 2) supporting development of sustainability committees on each campus. This report is a summary of the committee's activities and recommendations.

To carry out its charge, the University of Minnesota Sustainability Goals and Outcomes Committee created five work teams focused around the six guiding principles (leadership and modeling were considered together). Over the next six months, the

work teams gathered background information about existing sustainability-related activities at the University, researched best practices from other higher education institutions, familiarized themselves with metrics recommended by the Association for the Advancement of Sustainability in Higher Education (AASHE), and brought their personal and professional knowledge and expertise to bear on the question at hand. In the end, the work groups produced 27 sustainability goals and 74 desired outcomes and measures, along with extensive contextual information and recommendations for next steps.

The committee as a whole reviewed the work team reports and consolidated ideas contained in the reports by bringing together similar goals and objectives to increase robustness and reduce redundancy. The committee chairs and sustainability coordinator further synthesized the work by incorporating comments from campus consultations held in April 2009 and other meetings within the University community during the year. The goals and desired outcomes and measures reported in this report thus reflect the collective work of the committee refined by input from the University community.

Through this process, a few key goals seemed to rise above and represent the overall spirit and intent of the work teams (highlighted on the next page).

These high-level goals and related themes note actions essential to successfully incorporating stewardship for the future into current endeavors as the University of Minnesota carries out its threefold mission of research and discovery, teaching and learning, and outreach and public service on multiple campuses and beyond.

Just as sustainability must be integrated into the University's three-part mission, sustainability must be integrated into the operations that support this mission. We must create a systemwide culture and an enduring ethic of sustainability when developing our policies and procedures and when making day-to-day decisions about our operations. These are important and sound operational practices to ensure environmentally effective development, building management, and transportation decisions; environmentally wise purchasing; and the management of resources for their highest end use and not as waste.

High-Level Goals

The following high-level goals are distilled from the 27 work team goals and reflect key themes that repeatedly surfaced in the work teams' reports.

1. Leadership

As a large public research land-grant university, the University of Minnesota will strive to be a leader in sustainability and energy efficiency.

2. Living Laboratory

The University of Minnesota will serve as a living laboratory as we integrate sustainability across operations, education, research, and outreach.

3. Engagement

The pursuit of sustainability will actively engage all dimensions of the University, and the University will promote activism and engagement related to sustainability.

4. Communication

Transparent and abundant communication will help build awareness of the what, why, and how of sustainability throughout the University of Minnesota community. The University will encourage communication, marketing, and transparency to build awareness and participation.

5. Policies

Uniform policies will help departments and programs adopt best practices for sustainability. The University will establish policies that make best practices (energy, purchasing, etc.) the most desirable choice for all departments.

6. Culture Change

The University of Minnesota community will undergo a fundamental culture change as sustainability is integrated through our programs and practices. The University will nurture a culture that views sustainability as an integral component of all we do.

7. Community Impact

The University of Minnesota's pursuit of sustainability will enhance awareness and adoption of sustainable practices in the broader community. The University will create mechanisms for measuring impacts on campus and beyond. (How does our work change the world?)

8. Integration

The University of Minnesota will integrate sustainability into operational and financial decisions, teaching, research, and outreach.

The important relationship between energy management and our success in advancing sustainability was recognized in the Board of Regents policy through a separate guiding principle on energy efficiency. With respect to operations, we have incorporated, and are committed to continue to incorporate, well-managed and innovative energy programs into our efforts. The University of Minnesota is already widely recognized for innovative renewable energy research and for bringing that knowledge to bear through University of Minnesota Extension and globally through other outreach programs.

Where did we start? Where do we want to go? Where are we now?

Progress toward any goal benefits from the ability to periodically assess position and make midcourse corrections as needed to keep on track. Progress reports as we work to achieve the goals delineated here will ensure transparency and allow us to identify what's working well and, alternatively, what might benefit from a new approach. A sustainability information system will help us compile and analyze data to guide next steps and direct resources to best uses. Institutional structures are also recommended for implementing the plan and reporting. Because of the unique opportunities and constraints present on each campus, campus chancellors will establish campus committees to determine which goals and outcomes are most appropriate for their campus's circumstances, to set corresponding objectives and targets, and to provide reports of progress. A University Sustainability Steering Committee with representation from all campuses will be charged by President Bruininks to oversee implementation at the system level. Cross-campus work groups will be formed when needed to address topics that impact all campuses, to share best practices, to help leverage resources efficiently, and to determine where enterprise solutions are necessary.

The recommendation is also made for the campus committees to report annually on their progress to the systemwide steering committee. The steering committee will integrate inputs and prepare a synthesis report for the Board of Regents in the fall of each year. Appropriate infrastructure and measures will be developed to facilitate the reporting process. This process must reflect the flexibility of this living process. Goals and objectives will be revisited in 5 to 10 years and will be updated based on progress, lessons learned, mandates, and aspirations.

Living Laboratory

A common theme among University Sustainability Goals and Outcomes Committee members was that the University of Minnesota should serve as a "living laboratory" for sustainability. As a living laboratory, the University provides opportunities to develop, test, and share with others novel approaches as sustainability is integrated into teaching, research, outreach, and practice.

Goals

Leadership and Modeling

Goal 1: Be a national leader and pioneering model for sustainability and energy efficient operations among large public research land-grant institutions

Goal 2: Actively advance the transition to a sustainable world economy through research, teaching, outreach, and operations

Goal 3: Inspire and influence the community, nation, and world through innovative sustainable research and practices

Goal 4: Make significant continuous achievements toward sustainability goals and commitments

Goal 5: Embrace an organizational culture and individual decisions that support an inclusive, engaged, active, and sustainable healthy community

Goal 6: Meet all regulatory requirements and support the development of future regulations and policies through technical review, academic study, and practical experience

Operational Improvements

Goal 1: Plan, program, design, construct, and operate University of Minnesota facilities throughout their life cycle to provide restorative impacts to the natural environment and a healthy indoor environment for the University community

Goal 2: Integrate environmental, economic, and social priorities into purchasing and contract decisions

Goal 3: Use lower impact transportation alternatives that increase fuel efficiency, provide more sustainable fuel options, and help reduce the miles traveled on campus, to campus, and as part of the University of Minnesota enterprise

Goal 4: Manage resources for their highest end use by reducing consumption, minimizing waste, and strongly supporting the reuse and highest value recycling of unwanted materials

Energy Efficiency

Goal 1: Reduce energy use

Goal 2: Engage the University of Minnesota community in energy conservation

Goal 3: Pursue climate neutrality and energy efficient operations across the University of Minnesota

Goal 4: Adopt energy-related financial policies which enable the University of Minnesota to be socially, environmentally, and fiscally informed

Goal 5: Contribute to the development of progressive state and federal energy policies

Research

Goal 1: To advance sustainability, nurture cross-disciplinary collaboration and sharing of ideas and perspectives within and beyond the University

Goal 2: To advance sustainability, promote civically engaged, socially informed, and community responsive research and scholarship

Goal 3: To advance sustainability, instill sustainability principles in the research culture of the University of Minnesota; all levels of University leadership should embrace sustainability as a core pillar of the University's mission

Goal 4: To advance sustainability, eliminate institutional barriers and disincentives to interdisciplinary and collaborative sustainability research

Goal 5: To advance sustainability, transform the University of Minnesota into a living laboratory for sustainability

Education and Outreach

Goal 1: Capture the land-grant mission: Sustainability is part of the educational or campus experience of each and every University of Minnesota student

Goal 2: Integrate service learning into the undergraduate and graduate experience, linking students, faculty, University of Minnesota Extension, and community partners

Goal 3: Create and implement curricula and educational programs that address the interface of environment, society, and economy

Goal 4: Develop outreach programs for sustainability education of working professionals in the public and private sector

Communication

Goal 1: Create opportunity for dialogue to discuss global and local sustainability challenges, opportunities available, and the work of the University to advance sustainability

Goal 2: Develop and implement marketing/promotion efforts to engage those who may not be aware of sustainability-focused education, outreach, and research opportunities

Goal 3: Develop and maintain a transparent data management information system to enable decisions utilizing environmental, economic, and social factors

Introduction

As one of the nation's largest land-grant universities, the University of Minnesota has the potential for many and diverse impacts on our environment, society, and economy. In a world with growing population, limited resources, and increasing awareness of the implications of our actions, the need to be deliberate about minimizing our negative impacts and cultivating positive ones is more compelling than ever.

This report focuses on a strategic effort to do just that.

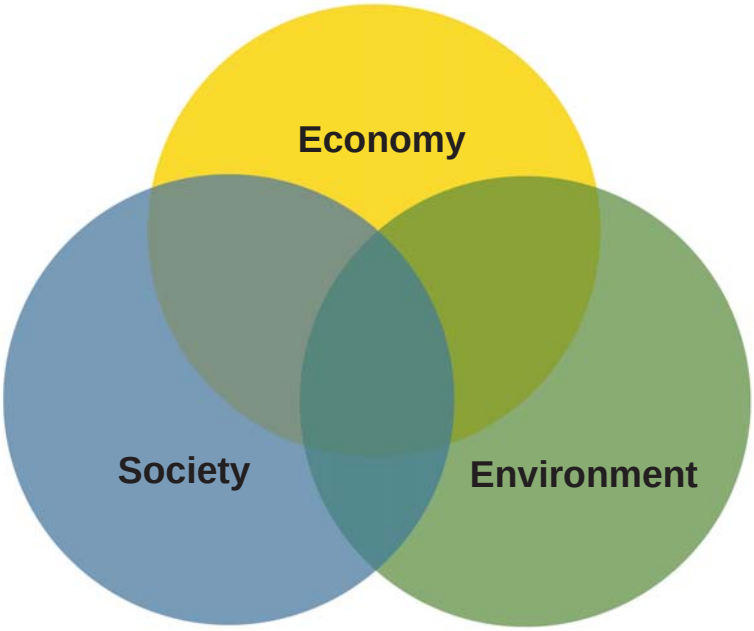
Making decisions that take future generations into account is not a new concept. In the 1980s, convened by the United Nations, the World Commission on Environment and Development (more commonly known as the Brundtland Commission) called for a global commitment to "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Since then, the concept of sustainable development has gradually spread around the world, influencing activities from the construction of sports stadiums in Australia to the management of fisheries off the coast of Newfoundland, and pretty much everything in between. Wherever it arises, the pursuit of sustainability carries with it a call to make the well-being of the social, economic, and biophysical systems of our planet paramount as we pursue more resilient and desirable conditions.

Perhaps nowhere has the summons to sustainability been more compelling than on college and university campuses. Directly impacting millions of individuals each year, indirectly touching the lives of many more, institutions of higher education are recognized internationally as thought leaders and change agents, providing not only research and education to advance knowledge and practice, but also life-altering influences on individuals just moving into adulthood.

Momentum-building measures such as the framing of the international Talloires and Lüneburg declarations, development of the American College & University Presidents' Climate Commitment (ACUPCC), and establishment of the Association for the Advancement of Sustainability in Higher Education (AASHE) have underscored the essential role educational institutions can play in shaping a thriving future. Around the world, hundreds of colleges and universities are working to advance sustainability

Perhaps nowhere has the summons to sustainability been more compelling than on college and university campuses.

in teaching, research, outreach, and operations. However, few academic institutions as large and diverse as the University of Minnesota are attempting to weave sustainability goals across all campuses and integrate them through all four dimensions of teaching, research, outreach, and operations.



What is Sustainability?

The modern definition of sustainability is derived from the definition of sustainable development set forth in the 1987 report of the United Nations' World Commission on Environment and Development titled *Our Common Future*—also known as the Brundtland Report:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs," in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Since then, the concept has evolved to take on the shape of three interlinked spheres of environment, society, and economy (sometimes referred to as "triple bottom line" or "people, planet, and profit") when making decisions for the common good. In its *Policy on Sustainability and Energy Efficiency*, which set the stage for this report, the University of Minnesota Board of Regents defined sustainability as follows:

Sustainability is a continuous effort integrating environmental, social, and economic goals through design, planning, and operational organization to meet current needs without compromising the ability of future generations to meet their own needs.

As a land-grant university, the University of Minnesota is grounded in the principle of valuing the natural, economic, and social systems that sustain us. Through our 158-year history, we have sought to strike the balance that keeps all three thriving.

Much of this work has focused on environmental stewardship in teaching, research, and student activities. In establishing a field station at Lake Itasca in 1909, the University set the stage for research and educational programs focused on benefiting from natural resources while protecting the ability of future generations to do the same. In the 1930s that same field station inspired University of Minnesota undergraduate Raymond Lindeman, whose later studies at the University's internationally renowned Cedar Creek Ecosystem Science Reserve help shaped the field of modern ecology. The Duluth campus is a model for stormwater management and that operational practice has its roots intertwined with the longstanding Sea Grant program, which was proposed as a concept in 1963 by Athelstan Spilhaus, then dean of the Institute of Technology at the University of Minnesota. On the first Earth Day 40 years ago, Twin Cities campus students planned to mark the event by presenting a Declaration of Interdependence and an Environmental Bill of Rights, and hold a mock award ceremony outside Northrop auditorium for local polluters.

Integration of sustainability into campus operations has been, and continues to be, a multifaceted effort. Recycling programs were developed in 1984. A systemwide waste abatement policy adopted in 1992 helped lay the groundwork for an operations culture that values and seeks sustainability. Today we are working to create a systemwide culture of sustainability when developing our operational policies and procedures and when making day-to-day decisions about our operations. We also seek to manifest an ethic of sustainability in environmentally effective development, building management, and transportation decisions; environmentally wise purchasing; and the management of resources for their highest end use and not as waste.

Outreach efforts have long been strong as well. In the 1930s, University of Minnesota Extension 4-H programs began holding conservation camps to train future leaders. Since the 1980s Extension has played a pivotal role in assisting counties as they develop, implement, and enhance waste management and recycling plans, creating easily accessible opportunities for citizens around the state to reduce their ecological footprint. And the Regional Sustainable Development Partnerships, formed 1998, foster resilient communities and strengthen citizen ties to University resources.

Numerous efforts on individual campuses, such as the launching of a major sustainability initiative on the Morris campus in 2000 culminating in the signing of the ACUPCC, and restoration of the Sarita Wetland on the Twin Cities St. Paul campus, have helped build momentum and positioned the University of Minnesota as a leader in grass-roots campus sustainability efforts.

In 2002, a group of interdisciplinary faculty, the Commission on Environmental Science and Policy, brought sustainability to the forefront as an organizing principle when it called on the University of Minnesota, as a major landowner and building operator as well as a land-grant institution, to recognize that environmental science and policy are potentially the largest single unifying subjects across a broad spectrum of administrative units and faculty. The commission report recommended leveraging the broad spectrum of University resources in pursuit of solutions to the complex interdisciplinary environmental problems facing our world. At all campuses, growing interest by students, faculty, and staff in ensuring their University had a positive impact on the environment created a need for better definition and communication about University research strengths and operations. Responding to this thought and action, then–Executive Vice President and Provost Robert Bruininks asked Vice President Kathleen O'Brien and then-Vice Provost Al Sullivan to lead a group of students, staff, and faculty in drafting a policy that would define the path to a sustainable future for the University.

In 2004, in follow-up to and affirmation of this group's work, the University of Minnesota Board of Regents adopted its Sustainability and Energy Efficiency policy.

Soon after this sustainability and energy policy was adopted, the University of Minnesota began a strategic planning process. The resulting plan, *Transforming the U*, called for transformative change, better use of resources, exceptional innovation, and a commitment to "measure what we value and then act accordingly." Through this process, the University of Minnesota established the goal of becoming one of the top three

Board of Regents Policy on Sustainability and Energy Efficiency: Guiding Principles

The Board of Regents policy affirmed that the University of Minnesota is committed to incorporating sustainability into teaching, research, outreach, and operations in the context of the six guiding principles of the policy:

1. Leadership
   Through excellence in environmental education, research, outreach, and stewardship, the University shall strive to be a world leader by promoting and demonstrating sustainability and energy efficiency and by producing leaders and informed citizens.

2. Modeling
   The University shall strive to be a model in the application of sustainability principles to guide campus operations by: (a) meeting and aspiring to exceed all applicable regulatory requirements; (b) preventing pollution at its source; (c) reducing emissions to the environment; and (d) encouraging the use of a life-cycle cost framework.

3. Operational Improvements
   The University shall undertake a continuous improvement process that seeks to meet the operational performance targets, goals, and objectives designed to achieve sustainability.

4. Energy Efficiency
   The University shall undertake a process to increase energy efficiency, reduce dependence on non-renewable energy, and encourage the development of energy alternatives through research and innovation.

5. Research
   The University shall (a) promote innovative, high visibility research projects focused on sustainability and energy efficiency to inform campus operations as a whole as well as the broader community; and (b) promote collaborative projects that include faculty research undertaken in partnership with operations staff, students, public entities, community organizations, and industry.

6. Education and Outreach
   The University shall promote educational and outreach activities that are linked to operational improvements and innovation principles.

public research universities in the world. The process also emphasized the importance of interdisciplinary education and inquiry—an approach that is the foundation of sustainability. Informed by the work of the Commission on Environmental Science and Policy, and recognizing the strength and value of the University's environmental

This report calls for the University of Minnesota, in the context of our commitment to become one of the top three public research universities, to weave sustainability through all we are and all we do.

leadership, the strategic planning process led to the formation of the Institute on the Environment to drive interdisciplinary solutions to complex environmental problems. Integration of sustainability concepts into campus master plans has been completed or is underway.

In the context of the Board of Regents *Policy on Sustainability and Energy Efficiency* and *Transforming the U* and signing the American College & University Presidents' Climate Commitment for the University system, in January 2008 University of Minnesota President Robert Bruininks named Vice President Kathleen O'Brien to lead sustainability efforts and implementation of the policy across the University. In April, he established the University of Minnesota Sustainability Goals and Outcomes Committee to guide implementation of the Board of Regents policy by recommending goals and performance measures and supporting development of sustainability committees on each campus. Co-chaired by O'Brien and Deborah Swackhamer, professor of environmental health sciences, co-director of the Water Resources Center, and Charles M. Denny, Jr., chair for science, technology, and public policy at the Humphrey Institute of Public Affairs, the committee included students, faculty, and staff from four University of Minnesota campuses. Work teams formed in fall 2008 aligned with the policy's guiding principles (Appendix B). Over the next six months, the work teams and committee, guided by input from the broader University community, developed data-driven goals and desired outcomes and measures for each guiding principle.

This document is the committee's report and recommendations.

First and foremost, the committee and this report recognize and celebrate the sustainability-promoting activities that have already taken place on every University of Minnesota campus. These activities, originating with and advanced by students, faculty, and staff as well as administration, have earned the University the highest grade of the Big Ten institutions in the Sustainable Endowment Institute's 2008 report card as well as a "greenness" rating of 91 out of 100 in Princeton Review's *Best 368 Colleges*.

But this report also moves beyond celebrating existing successes. It proposes goals and outcomes to meet the Board of Regents policy, and adds specific strategies for implementation and for measuring success. The committee and work teams identify what challenges need to be addressed, and provide a vision of where we want to go, how we will get there, and how we will know (and tell others) how we're doing. Ulti-

mately, it calls for the University of Minnesota to weave sustainability through all we are and all we do as part of our transformation to become one of the top three public research universities. It invites students, faculty, and staff to work together across campuses and across disciplines to make the University of Minnesota a nationally renowned leader in ensuring that our actions to meet our needs today also protect and sustain the ability of future generations to meet their needs.

The University of Minnesota takes pride in being founded on and grounded in traditional Minnesota values of respect, hard work, education, equal opportunity, innovation, and leadership. Nowhere could these values be more profitably applied than in our commitment to pursue a vision in which sustainability is the organizing principle for all of our endeavors and a key yardstick against which we measure our success. There is much work to do as we move forward, driven by data and a sense of service to the broader community, to create change locally that we believe will ultimately have global significance. But we take pride in having the opportunity to lead the way. Our hope is that this commitment will serve as a lens to focus past successes, current efforts, and newly emerging initiatives into a strong beam of sustainability-promoting education, innovation, and action that will light the way to a brighter, more sustainable future, not only for the University of Minnesota but for peer institutions around the world.

Emphasis: Energy

The Board of Regents acknowledged the important relationship between energy management and our success in advancing sustainability by including in its policy a separate guiding principle on energy efficiency. With respect to operations, we have incorporated, and are committed to continue to incorporate, well-managed and innovative energy programs into our efforts. Solutions for individual campuses depend upon their unique settings and size. What they all have in common is a commitment to take positive steps toward achieving climate neutrality through a setting-appropriate mix of reducing fossil fuel use through energy conservation and deployment of renewable energy sources. This helps us shrink our system's carbon footprint in a cost effective manner and reduce our dependence on non-renewable energy.

The University of Minnesota is already widely recognized for innovative renewable energy research and for bringing that knowledge to bear through University of Minnesota Extension and globally through other outreach programs. These efforts will increase in scope and impact as we strive to lead the way to a more sustainable energy future.

Goals, Desired Outcomes, Measures

What specific goals should the University of Minnesota strive for in the pursuit of sustainability? How will we know when we achieve them?

In response to these questions, five work teams, organized according to the Board of Regents policy's six guiding principles, developed 27 sustainability goals and 74 desired outcomes and measures. As the work team reports were reviewed together, a few high-level goals seemed to rise above to represent the overall spirit and intent of the work teams:

1. Leadership

As a large public research land-grant university, the University of Minnesota will strive to be a leader in sustainability and energy efficiency.

2. Living Laboratory

The University of Minnesota will serve as a living laboratory as we integrate sustainability across operations, education, research, and outreach.

3. Engagement

The pursuit of sustainability will actively engage all dimensions of the University of Minnesota, and the University will promote activism and engagement related to sustainability.

4. Communication

Transparent and abundant communication will help build awareness of the what, why, and how of sustainability throughout the University of Minnesota community. The University will encourage communication, marketing, and transparency to build awareness and participation.

5. Policies

Uniform policies will help departments and programs adopt best practices for sustainability. The University will establish policies that make best practices (energy, purchasing, etc.) the most desirable choice for all departments.

6. Culture Change

The University of Minnesota community will undergo a fundamental culture change as sustainability is integrated through our programs and practices. The University will nurture a culture that views sustainability as an integral component of all we do.

7. Community Impact

The University of Minnesota's pursuit of sustainability will enhance awareness and adoption of sustainable practices in the broader community. The University will create mechanisms for measuring impacts on campus and beyond. (How does our work change the world?)

8. Integration

The University of Minnesota will integrate sustainability into operational and financial decisions, teaching, research, and outreach.

These high-level goals and related themes woven into the work products of the teams note actions essential to our success as the University of Minnesota carries out its threefold mission of research and discovery, teaching and learning, and outreach and public service on multiple campuses and beyond. As a living laboratory, the University provides opportunities to develop, test, and disseminate novel approaches as sustainability is integrated.

The following sections summarize the goals and desired outcomes and measures proposed by each work group. Viewed in whole, the committee and work teams recognized the importance of taking an integrated and comprehensive approach to sustainability to ensure the vitality and longevity of our University, and underscored the importance for the University to play a key role in finding solutions to complex global issues. Some of the work teams' original objectives have been consolidated, bringing together similar goals and objectives to increase robustness and reduce redundancy.

Measures will continue to be developed, refined, and advanced as we make progress toward these goals and desired outcomes and measures, learn from our efforts, and adapt our activities to make the best progress possible at all times and under all circumstances in our quest to become a truly sustainable university.

Reach for the STARS

The Association for the Advancement of Sustainability in Higher Education's Sustainability Tracking, Assessment, & Rating System (STARS) is a standardized tool being used by campuses across North America to assess institutional sustainability as an important step toward enhancing it. University Sustainability Goals and Outcomes Committee work teams were encouraged to consult this inter-institutional framework in developing their own goals and objectives. In many cases, the teams referenced the alignment of goals and objectives developed here with specific STARS criteria.

Leadership and Modeling

Board of Regents Policy Guiding Principle 1:

Through excellence in environmental education, research, outreach, and stewardship, the University shall strive to be a world leader by promoting and demonstrating sustainability and energy efficiency and by producing leaders and informed citizens.

Board of Regents Policy Guiding Principle 2:

The University shall strive to be a model in the application of sustainability principles to guide campus operations by: (a) meeting and aspiring to exceed all applicable regulatory requirements; (b) preventing pollution at its source; (c) reducing emission to the environment; and (d) encouraging the use of a life-cycle cost framework.

As a major land-grant university with socially responsible facilities management and world-class environment and natural resources education, research, and outreach programs, the University of Minnesota has the opportunity to be a leader and role model in the transition to a more sustainable society. Through example and through the network of relationships formed by our students, faculty, and staff, choices we make can set the pace for local, national, and global communities. For this to happen, however, we must first, in Gandhi's words, "be the change we wish to see"—a living laboratory and model in which sustainability is woven through all we are and all we do.

Our vision in the areas of leadership and modeling is that the University will lead the way in making sustainability an organizing principle for all human activity. Experiences here will make sustainability real and relevant to students, staff, and faculty. Our education, research, outreach, and operations will be recognized for innovation and for encouraging entrepreneurial endeavors in sustainability. Our campus community will understand how we measure sustainability, how the University is performing, the complex challenges we face, and the actions we take together to address them. Long-term life-cycle concepts will be integral to operational decisions. Students, staff, and faculty will be leaders and informed citizens who understand the impact of their choices and replicate sustainable practices learned at the University in our communities and families.

The following goals and objectives provide a framework for moving toward this vision of sustainability leadership and modeling, and for assessing our progress as we do.

Leadership and Modeling Goal 1

Be a national leader and pioneering model for sustainability and energy efficient operations among large public research land-grant institutions

Desired Outcomes and Measures

a. The University graduates the largest number of green leaders
   i. Students graduate with community experience related to sustainability
   ii. Students are more aware of sustainability issues and behave in a more sustainable manner than before they came to the University
b. The University undergoes external sustainability assessments, and peer review, recognition, and rankings show progress toward sustainability (for example, the University of Minnesota has achieved a top ranking in reports on green campuses)

Green Groundbreaking
Crookston students Chris Waltz, Marshall Johnson, and Erick Elgin broke ground in more ways than one last fall when they sank a shovel at the site of a new student apartment complex at the University of Minnesota, Crookston. These students led the way for the University of Minnesota's first LEED ® –certified residence facility, Evergreen Hall. Unique green building materials and energy efficiency create a more sustainable Homecoming for students in 2009.

Academic institutions around the world that model sustainable practices are seedbeds for a sustainable future. Because of their large size and broad mission, this effort is both exceptionally challenging and exceptionally compelling for land-grant universities.

Rooted in a track record of outstanding environment-related programs, impelled by existing sustainability efforts at all five campuses, and nurtured by a culture that values social responsibility and hard work, the University of Minnesota is superbly positioned to show the way to integrating sustainability into the fabric of land-grant university culture. Doing so will require transforming existing systems, integrating input across disciplines, and working with many and diverse external partners. Change may not always come quickly, but it will come steady and strong as we lead in a way that provides solid footing for those who follow.

Leadership and Modeling Goal 2

Actively advance the transition to a sustainable world economy through research, teaching, outreach, and operations

Desired Outcomes and Measures

a. Financial, academic, and operational planning and decisions take a long-term life-cycle view and integrate environment, economy, social equity—also known as the "triple bottom line"
b. More research and education focuses on a green economy
   i. The University of Minnesota is aligned with the Minnesota Green Jobs Investment Initiative and the new federal energy economy and green jobs programs
c. By including sustainability, celebrations and events model transformative activities

Sustainability spans three spheres: economy, environment, and society. Many institutions have made progress on one or more of these in one or more program areas. For meaningful results, the University of Minnesota must bring these spheres of sustainability together in an integrated, integral way that interconnects all campuses and endeavors, from socially responsible investing to extending results of environmental research to communities that can implement them on the ground.

Great Green Games

How small is your carbon footprint? Current technology allows us to estimate carbon emissions produced by each unit across the University of Minnesota. Online software makes it possible for individuals to calculate their personal impact as well. Why not make reducing our carbon footprint fun by making it a friendly competition—one department, dorm, class, or ad hoc team against another? "Great Green Games" in which participants race for the smallest footprint and learn how they can reduce their impact on the environment will also help the University ratchet its carbon reduction goals at the same time.

Leadership and Modeling Goal 3

Inspire and influence the community, nation, and world through innovative sustainable research and practices

Desired Outcomes and Measures

a. Institutional efforts support community, social ethic, and economic transitions toward a sustainable community
b. The University of Minnesota demonstrates that sustainable practices work, save money, and improve the community
c. The University of Minnesota measures innovation and provides recognition for leaders and achievements in sustainability

This goal aligns closely with the mission of the University of Minnesota's Institute on the Environment. As with the first two Leadership and Modeling goals, many of the elements are found in other institutions and on individual University of Minnesota campuses. The next step is to bring these together into a way of being that is embedded in our culture.

Cornercopia is a student-driven and -run certified organic farm located on the Twin Cities St. Paul campus. Fruits and vegetables grown there are sold at the campus farmers' market. The farm is used for internships and classes.

Leadership and Modeling Goal 4

Make significant continuous achievements toward sustainability goals and commitments

Desired Outcomes and Measures

a. The University reviews sustainability goals, assesses progress annually, and reports on progress

The University of Minnesota has made solid progress toward sustainability goals and commitments. There is a close tie between achieving the University's social, economic, and environmental sustainability goals and its top-three-public-research-university strategy. Awareness of progress to date is also important if the University is to successfully compete for external funding and attract premier research and students. The challenge for a leading institution like the University of Minnesota is to bring these all together into a synergistic whole.

Leadership and Modeling Goal 5

Embrace an organizational culture and individual decisions that support an inclusive, engaged, active, and sustainable healthy community

Desired Outcomes and Measures

a. Communication goals are met to ensure transparency about sustainable practices
b. Incentive rewards support sustainable choices
c. The University measures social shifts related to sustainability

There is evidence that the campus community is embracing change. On the University of Minnesota Twin Cities campus, the Sustainability Studies Minor, started in 2006, is available to all majors. It currently enrolls 268 students from 17 majors in the core classes and is growing. A number of student groups focus on sustainability and co-sponsor campus events. More than 3,500 individuals and 160 University of Minnesota units have pledged to conserve energy as part of the University's new "It All Adds Up" energy conservation campaign. This campaign is being rolled out initially on the Twin Cities campus and eventually will be available for all campuses.

Some departments have formed green teams; that structure could be institutionalized so they can share tools and best practices. Organizational culture changes are difficult and require key concepts to penetrate into budget decisions and permeate our process

for recognizing and rewarding individual and department performance related to these goals. As we work to weave sustainability through our campuses, it will be important to remember the broad scope of sustainability and link community, social justice, and economic initiatives to sustainability goals and efforts.

Leadership and Modeling Goal 6

Meet all regulatory requirements and support the development of future regulations and policies through technical review, academic study, and practical experience

Desired Outcomes and Measures

a. University operations track and assess applicable regulatory requirements
b. University forums provide regular exchange of ideas and knowledge between academic, operations, and community sustainability leaders in policy areas of interest

Operations at an institution as diverse as the University of Minnesota must meet numerous regulations and standards in areas such as environmental health and safety and energy use. These are tracked through University Health and Safety and in departments impacted. This goal affirms the University of Minnesota's commitment to operate in compliance with applicable regulations. This goal was part of a policy that preceded—and is now replaced by—the Board of Regents Sustainability and Energy Efficiency Policy.

The University of Minnesota is also involved in development of regulations and policies. For example, the University of Minnesota's Center for Sustainable Building Research provided input to the B3 Minnesota Sustainable Building Guidelines (B3-MSBG) and is guiding development and implementation of performance standards for Minnesota 2030, the amendment to B3 that requires new public buildings to move toward carbon neutrality by 2030. The Humphrey Institute of Public Affairs is a leader in shaping the future of public policy—from urban planning to energy, from clean water to social justice. Establishing a process for the exchange of ideas and knowledge among academic, operations, and community sustainability leaders will facilitate practical and creative input to developing policy and regulations founded in principles of sustainability.

Operational Improvements

Board of Regents Policy Guiding Principle 3:

The University shall undertake a continuous improvement process that seeks to meet the operational performance targets, goals, and objectives designed to achieve sustainability.

An overarching goal for University of Minnesota sustainability initiatives is to create a systemwide culture of sustainability when developing our operational policies and procedures and when making day-to-day decisions about our operations. We seek to manifest an ethic of sustainability in environmentally effective development, building management, and transportation decisions; environmentally wise purchasing; and the management of resources for their highest end use and not as waste.

The University has long incorporated strong environmental management practices into its operations for social, economic, and environmental reasons. Going forward, the University will model an ethic of sustainability, demonstrate sustainability principles in all aspects of business and operations, and build an infrastructure that is embedded in all three spheres of a strong environment, strong society, and strong economy. In addition to meeting its purpose—"to make the University work"—areas of operation will serve as a classroom, a model, and a living laboratory for sustainability in education, outreach, and research.

Operational Improvements Goal 1

Plan, program, design, construct, and operate University of Minnesota facilities throughout their life cycle to provide restorative impacts to the natural environment and a healthy indoor environment for the University community

Desired Outcomes and Measures

Energy and lighting impacts

a. Operating energy from buildings is reduced
b. Greenhouse gas emissions from buildings are reduced
c. Heat island impacts are reduced
d. Night sky radiation is reduced

Water resource impacts

e. Potable water use is reduced
f. Wastewater is reduced
g. Stormwater is managed to reduce runoff quantity, rate, and pollution

Building materials, design, and usage

h. Life-cycle impacts of building materials are optimized
i. Our indoor environments are healthy
j. Total campus square footage is optimized
k. Construction waste is recycled

Grounds and siting

l. Pervious surface use is increased
m. Flora and fauna biodiversity is maximized on building sites
n. Soil conservation is maximized

Rah! Rah! Rah!

In September 2009, the new TCF Bank Stadium was awarded LEED ® Silver Certification and became the first certified collegiate or professional football stadium. Features include an extensive stormwater system to filter rain water before it drains into the Mississippi River. Steel was 90 percent recycled and fabricated primarily in Minnesota. Almost all of the construction waste was recycled.

Strategic building planning and design, construction, and operation of indoor and outdoor environments are key to achieving long-term facilities sustainability. Minnesota Sustainable Building Guidelines already apply to University of Minnesota state-bonded buildings. These standards incorporate many of the Minnesota 2030 program elements listed here. To continue to succeed in meeting more stringent guidelines in this area requires a financial model and funding source that allow us to designate money up front for features that provide real savings over the lifetime of each building and system.

The University of Minnesota is fortunate to have a wealth of academic and operational expertise that provides the tools for minimizing adverse impacts on the natural environment and indoor environmental health. With institutional commitment and dedicated resources to make it happen, we can lead the way.

Operational Improvements Goal 2

Integrate environmental, economic, and social priorities into purchasing and contract decisions

Desired Outcomes and Measures

a. An environmentally preferable purchasing (EPP) policy is developed and implemented with criteria that align with social and economic criteria currently used by University of Minnesota buyers
b. Sustainability is part of the University of Minnesota vendor code of conduct

Identifying and tracking environmentally preferable purchasing (EPP) takes time up front, but pays back in the long run in all three spheres of sustainability. Purchasing Services has a sustainability policy that outlines preferred environmental and energy efficient attributes for products purchased. Achieving this goal requires campus- or institutional-level consensus or interaction to evaluate, prioritize, and target EPP products and services. It also requires coordination with existing vendor code of conduct initiatives and interaction with the University Senate Committee on Social Concerns.

Operational Improvements Goal 3

Use lower impact transportation alternatives that increase fuel efficiency, provide more sustainable fuel options, and help reduce the miles traveled on campus, to campus, and as part of the University of Minnesota enterprise

Desired Outcomes and Measures

a. Alternative transportation is increasingly available and use of mass transit is increasingly encouraged
b. Everyone on campus has a wide array of transportation options; safety and convenience for all modes of travel, including walking and bicycling, has increased
c. Housing alternatives for students, faculty, and staff near campus have been encouraged
d. Meeting and distance learning technologies are supported
e. Proper maintenance of fleet and operations vehicles, purchase of fuel efficient or alternatively fueled vehicles, and access to technology to reduce unnecessary travel has increased campus fleet efficiency

Because of differences in needs and circumstances between rural and urban settings, campuses need leeway to set their own targets and strategies in the area of transportation. In any case, fleet vehicle maintenance and operation will be an important part of enhancing vehicle efficiency, as will replacement of retiring fleet vehicles with hybrid or other high miles-per-gallon vehicles.

Operational Improvements Goal 4

Manage resources for their highest end use by reducing consumption, minimizing waste, and strongly supporting the reuse and highest value recycling of unwanted materials

Desired Outcomes and Measures

a. Informed purchasing and resource-use decisions reduce consumption of materials
    i. Fewer goods and services are purchased by University operations
b. Rethinking waste-producing processes reduces waste
c. Reuse of existing resources by individuals and by institutional reuse programs is supported
d. Recycling of a wide range of materials is supported

Waste management procedures are well established, with recycling rates of 20 to 47 percent depending on the campus; improvements will require rethinking and reorganizing how we define and handle waste. As campuses and waste-handling needs grow, we will need to change product use and supply chain management. Infrastructure and staff commitments are needed to support waste reduction and waste diversion targets and to cope with food operation impact.

Purchases of fewer goods will help reduce operational waste and inefficient work practices, and allow us to do more with the resources we do have in support of the University's critical research, teaching, and outreach missions.

Fleet Feat

In 2009, the University of Minnesota fleet was named one of the 100 best fleets in North America by Government Fleet *magazine—for the fifth year in a row. Among the criteria for the award: good stewardship of human, capital, and natural resources. The University of Minnesota was one of only two universities to make the list.*

Energy Efficiency

Board of Regents Policy Guiding Principle 4:

The University shall undertake a process to increase energy efficiency, reduce dependence on non-renewable energy, and encourage the development of energy alternatives through research and innovation.

Climate Neutrality:

The state in which we have no net greenhouse gas emissions from specific sources, achieved by reducing greenhouse gas emissions as much as possible and then using offsets or other measures to mitigate the remaining emissions.

—ACUPCC definition

With fossil fuels a finite resource and global climate change raising the specter of major alterations in Earth's ability to support life as we know it, reducing the use of fossil fuels is integral to shaping a sustainable future.

Each University of Minnesota campus has its own unique combination of strengths and opportunities for enhancing the sustainability of our energy infrastructure. Our overarching goal is to be recognized as a national leader in the pursuit of sustainability, climate neutrality, and the energy efficient operations of our campuses. To achieve this, we will create a comprehensive energy plan for the University of Minnesota that takes into account the unique characteristics of each campus while maximizing efficiency of energy use and identifying a path to climate neutrality. Each campus may have different options based upon circumstances.

Actively engaging our campus communities in energy conservation and integration of energy efficiency into our operations are critical aspects of the system energy plan. Recognizing the importance of research investments, as a land-grant university, model, and mentor, we continue our commitment to conduct renewable energy research through the Initiative for Renewable Energy and the Environment and other research areas and contribute to the development of progressive energy policy.

In summary, we will reduce energy use, increase energy efficiency, increase renewable and low-carbon-footprint energy inputs, measure our carbon footprint, meet American College & University Presidents' Climate Commitment (ACUPCC) milestones, and meet Chicago Climate Exchange (CCX) requirements.

Art from Energy

When the winter wind blows cold over the Pomme de Terre River it brings warmth to the University of Minnesota Morris, thanks to the 1.65 MW turbine operated by the adjacent West Central Research and Outreach Center. Alumna Leiah Stevermer '09 celebrated the renewable-energy icon that represents a leadership commitment to climate neutrality with this original art for UMM's 2007 holiday card.

Energy Efficiency Goal 1

Reduce energy use

Desired Outcomes and Measures

a. Energy use is 5 percent below FY2008 levels by the end of 2010

b. Each campus has unique long-term energy goals and energy plan by 2010

These activities support the Board of Regents Sustainability and Energy Efficiency Policy and our commitment to achieve climate neutrality (and meet ACUPCC milestones). They also provide a real opportunity for immediate savings during current economic times.

Energy Efficiency Goal 2

Engage the University of Minnesota community in energy conservation

Desired Outcomes and Measures

a. Low carbon instructional delivery programs are evaluated by measuring the credit hours per carbon input

Energy conservation is everybody's business. Communication is vital to ensure building energy use is measured and considered in everyday decisions. Kiosks inform occupants about ways to reduce energy consumption. Awareness-building displays with up-to-date performance data and kudos for successes provide motivation for behavior change. Transparency regarding carbon inputs to various educational delivery options helps users make informed choices that minimize their environmental impact.

Campus, Energized

A 1.65 MW wind turbine provides power to most campus buildings at the University of Minnesota Morris. Campus sustainability leaders are now working on developing a biomass reactor in collaboration with the West Central Research and Outreach Center that can use farm crop byproducts to generate steam for heating and cooling. Two additional wind turbine projects are in the works, one near WCROC, and the other as a collaborative effort with the Mille Lacs Band of Ojibwe on the UMM campus. UMM has received wide recognition, including an American Council on Renewable Energy (ACORE) Campus Excellence Award, for its sustainability efforts.

Energy Efficiency Goal 3

Pursue climate neutrality and energy efficient operations across the University of Minnesota

Desired Outcomes and Measures

a. University carbon reduction and renewable energy commitments and requirements are met
   i. ACUPCC goals are met, including developing a comprehensive plan to achieve climate neutrality, inventorying greenhouse gas emissions, and establishing an action plan for becoming climate neutral with short-term and interim goals
   ii. The CCX requirement to reduce CO_2 6 percent below baseline by 2010 is met
   iii. State and federal goals, including Minnesota's 25-percent-by-2025 renewable energy standard, are met

b. By the end of 2010, a University-wide energy master plan has been created that identifies the most effective approach and strategy toward improving energy efficiency of campus buildings and infrastructure and reducing campus carbon footprint, including establishing an energy working committee to review current master plans and develop recommendations on how to migrate to a more comprehensive energy master plan

c. Common auditable measures for energy consumption across all campuses and energy standards have been established, with all buildings metered by 2012, norms for each campus, and a data warehouse for all energy data

Showtime
Energy Showcase events give Energy Management staff the opportunity to explain energy efficiency recommissioning projects and get input from people who work in University of Minnesota Twin Cities buildings. The "It All Adds Up" campaign includes an energy conservation pledge for students, staff, and departments. Student volunteers from the Energy Efficiency Student Alliance measure energy use in offices to encourage people to think about their energy use and power down.

The University of Minnesota should commit to pursuing the desired outcomes and measures applicable to the individual campus. Success should be measured by external assessments, tracking against program milestones, and tracking our own performance for meeting institutional commitments. The feasibility of climate neutrality has not yet been fully evaluated for the University of Minnesota system and may rely on future technological and regulatory advances.

To meet ACUPCC goals, each campus has chosen to meet two interim tangible measures and has submitted a greenhouse gas inventory. These are documented on the ACUPCC reporting site. The University should include interim targets and consider public institution needs in addressing appropriate use of off-campus offsets.

With respect to the energy master plan, the University of Minnesota should incorporate a carbon-neutral goal and timelines into master plans; develop an energy balance matrix that establishes plans for incorporating onsite renewable or low-carbon fuel sources for each campus by 2012; ensure work aligns with the ACUPCC climate action plan; and work with Capital Planning and Project Management to establish energy standards that use a cost-of-energy matrix to drive investment strategies (different returns on investment based on different energy costs and efficiencies).

Energy Efficiency Goal 4

Adopt energy-related financial policies which enable the University of Minnesota to be socially, environmentally, and fiscally informed

Desired Outcomes and Measures

a. The University of Minnesota measures CO_2 in cost-benefit analyses and assigns a value to CO_2 tied to an aggressive world CO_2 index
b. The University has adopted minimum and recommended carbon reduction techniques to be incorporated in new and recommissioned building projects with ROI (return on investment) calculations up to 15 years

Historically, the price consumers pay for energy has not adequately factored in the environmental and social costs of producing, transporting, and using it, or the deferred cost of dealing with the long-term consequences of environmental impacts. By including CO_2 in cost-benefit analyses and energy efficiency in assessments of return on investment, we will strive to internalize these costs and optimize the outcomes for all three spheres of sustainability, rather than emphasizing raw economic considerations while not acknowledging or quantifying potential environmental and social consequences.

Energy Efficiency Goal 5

Contribute to the development of progressive state and federal energy policies

Desired Outcomes and Measures

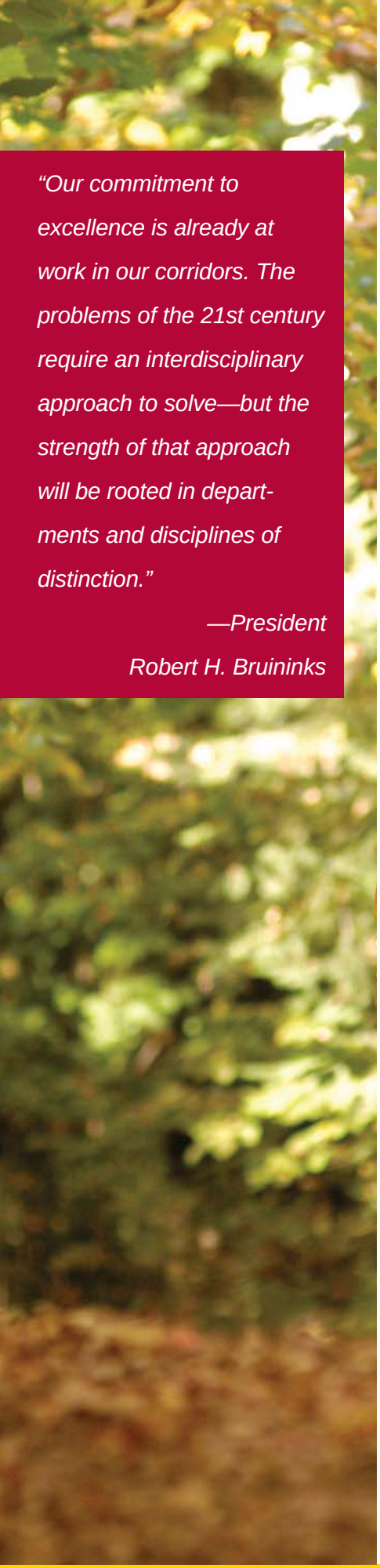
a. A legislative briefing group has been established to discuss pending or future energy-related legislative initiatives with University of Minnesota legislative relations staff

b. The University of Minnesota will demonstrate how to utilize state resources such as Higher Education Asset Preservation and Replacement (HEAPR) funding to enhance energy efficiency, reduce carbon, and work toward sustainability goals

The University of Minnesota has a well-earned reputation as a recognized leader in energy-related research and a stellar force in bringing state-of-the-art science to bear on public policy decisions. By positioning ourselves as a leader in energy policy development at the state and federal level, we can bring these two areas of expertise to bear together on the goal of enhancing sustainability in higher education as well as in other sectors that are key players in our state's and nation's economies and valued contributors to our renowned quality of life.

Sustainable State

As Minnesota works to become more sustainable, policy makers frequently turn to the University for advice. The 2008 *Statewide Conservation and Preservation Plan*, prepared under the leadership of Deb Swackhamer, professor in the Humphrey Institute and School of Public Health, distilled expert insights of more than 75 faculty into a set of comprehensive recommendations to sustain the state's natural resources. *Governance Options for Carbon Cap and Trade Revenue*, developed by Humphrey Institute faculty Steve Kelley and Elizabeth Wilson and colleagues in 2009, is helping the Minnesota Department of Commerce prepare for strategies in carbon market–based efforts to mitigate global warming.



"Our commitment to excellence is already at work in our corridors. The problems of the 21st century require an interdisciplinary approach to solve—but the strength of that approach will be rooted in departments and disciplines of distinction."

—President Robert H. Bruininks

Research

Board of Regents Policy Guiding Principle 5:

The University shall (a) promote innovative, high visibility research projects focused on sustainability and energy efficiency to inform campus operations as a whole as well as the broader community; and (b) promote collaborative projects that include faculty research undertaken in partnership with operations staff, students, public entities, community organizations, and industry.

With its solid track record and exceptional faculty and student resources, the University of Minnesota has a golden opportunity to lead the way in addressing the complex sustainability challenges of the 21st century through research. Ensuring sufficient energy, healthy food, and clean water in the face of climate change, population growth, and increased consumption requires research that addresses environmental, economic, and social perspectives. In particular, sustainability research should seek to identify the critical interactions and feedbacks between human and natural systems, and to understand the ways in which these processes affect long-term sustainability. The University of Minnesota should increase its institutional capacity to conduct applied interdisciplinary sustainability research, and nurture an academic and individual culture that places a high value on research and action for sustainability.

Sustainability research is inherently interdisciplinary. The University of Minnesota has a unique capacity to conduct rigorous, interdisciplinary, civically engaged sustainability research for several reasons. First, we have broad and deep research expertise in numerous fields relevant to sustainability. Second, we are an international leader in interdisciplinary research, with over 300 centers, initiatives, and programs of interdisciplinary research that already generate a large body of publications on critical sustainability topics. Third, as a land-grant institution, the University can leverage a strong tradition of collaboration across the state to create living laboratories in which to pursue sustainability solutions.

Research Goal 1

To advance sustainability, nurture cross-disciplinary collaboration and sharing of ideas and perspectives within and beyond the University

Desired Outcomes and Measures

a. Publication of peer-reviewed collaborative research publications addressing

interdisciplinary sustainability issues and involving researchers from multiple colleges, departments, and units has increased

b. The University has hosted a premier interdisciplinary sustainability research symposium
c. An online "knowledge map" of people and projects related to sustainability research has been inventoried and created
d. Researchers partner with University Services and with sustainability education efforts to use campus facilities for case studies of sustainability issues

Sustainability research is inherently interdisciplinary and complex because sustainability challenges occur at the interface of human and ecological systems and involve trade-offs among environmental, economic, and social benefits. The University of Minnesota is an international leader in interdisciplinary research and continues to reduce barriers to interdisciplinary collaboration. Further efforts in this regard will likely enhance the quality and quantity of sustainability research.

E x 3 = Synergy

Hundreds of business people, policy makers, scientists, and others come together each November at E3, the Midwest's premier energy, economic, and environmental conference. Hosted by the University's Initiative for Renewable Energy and the Environment, a signature program of the Institute on the Environment, the annual event provides a window into new technologies and markets, as well as abundant opportunities to build new collaborations among sectors and disciplines.

Research Goal 2

To advance sustainability, promote civically engaged, socially informed, and community responsive research and scholarship

Desired Outcomes and Measures

a. The sustainability focus and efforts of research and outreach centers, University of Minnesota Extension offices, Regional Sustainable Development Partnerships, and other outreach and public engagement arms of the University of Minnesota have increased to gain input and participation from citizens
b. Diverse cultures and socioeconomic groups within the Twin Cities and across Minnesota are increasingly engaged around sustainability issues
c. Connections and partnerships between the Office of Public Engagement and Office of Research have increased

The University of Minnesota should renew and expand its land-grant mission with regard to sustainability and continue to conduct research that is informed by, embedded in, and applicable to the sustainability issues, concerns, and aspirations of the citizens of Minnesota.

Research Goal 3

To advance sustainability, instill sustainability principles in the research culture of the University of Minnesota; all levels of University leadership should embrace sustainability as a core pillar of the University's mission

Desired Outcomes and Measures

a. A long-term sustainability research committee is established and supported to enhance sustainability research
b. An upper-level administration office for sustainability is established
c. The number and profile of research projects, symposia, peer-reviewed publications, graduate theses, and external grants related to sustainability have increased

All levels of University of Minnesota leadership should embrace sustainability as a core pillar of the University's mission. Sustainability research should become a key component of the intellectual identity of the University of Minnesota through creation of a faculty committee and/or upper-level administrative office, and of the University's research "brand" through communications, marketing, and public relations materials.

Piecing the Puzzle

As renewable energy technologies go mainstream, how will we put all of the puzzle pieces together to create an integrated, reliable source of heating, cooling, and electrical power? Researchers at the University of Minnesota Rochester and Rochester Public Utilities have been developing answers with a collaborative research project known as the Hybrid Energy Systems Study (HESS). To date the partnership has produced a patent as well as a systems study on combining fuel cells and geothermal heat pump technologies.

Research Goal 4

To advance sustainability, eliminate institutional barriers and disincentives to interdisciplinary and collaborative sustainability research

Desired Outcomes and Measures

a. Sustainability is a significant criterion for hiring faculty in relevant departments, and sustainability research and teaching are recognized as positive criteria for performance evaluation in tenure review

b. Research standards for sustainability have been adopted, and research projects are evaluated according to their relevance to and impact on sustainability
c. New programs train the next generation of sustainability researchers by facilitating and funding undergraduate and graduate research and discussion focused on sustainability

Traditional academic structures and organization can present barriers to cross-disciplinary research and collaboration. In cooperation with existing efforts to reduce barriers to interdisciplinary research, the University of Minnesota should encourage amendment or revision of collegiate and departmental incentives, structures, and funding to stimulate and reward innovative sustainability research.

Research Goal 5

To advance sustainability, transform the University of Minnesota into a living laboratory for sustainability

Desired Outcomes and Measures

a. Publication of peer-reviewed collaborative research related to sustainability issues in urban, exurban, rural, terrestrial, and aquatic socio-ecological systems across Minnesota and around the world has increased
b. The use of University property for sustainability research and education is coordinated through standing committees at all major campuses and centers

The University of Minnesota has an established research presence in multiple settings around the state and can capitalize on this diversity of geographic, socioeconomic, and ecological settings to address sustainability questions in a variety of living laboratories. The Twin Cities campus, coordinate campuses, research and outreach centers, University of Minnesota Extension offices, UMore Park, and other excellent research centers all provide unique opportunities to explore and address sustainability challenges within a spectrum of socio-ecological contexts and in partnership with a wide range of citizens and stakeholders.

Creating a Sustainable Community

Sustainable development is front and center as the University moves forward on planning and development of UMore Park, a 5,000-acre site in Dakota County, over the next 25 to 30 years. Guided by the Regents principles for the property, the UMore Park Steering Committee has shaped a vision that includes social sustainability (community gathering space, emphasis on community engagement), economic sustainability (quality schools, workplaces, and shopping areas), and environmental sustainability (earth-friendly landscaping, energy-efficient homes, focus on renewable energy) as integral drivers of the design.

Education and Outreach

Board of Regents Policy Guiding Principle 6:

The University shall promote educational and outreach activities that are linked to operational improvements and innovation principles.

A weaving metaphor informed the efforts of the education and outreach work team. Each fiber has unique character; it is in the weaving, the interconnections, that a rich and strong fabric emerges. In the same way, each academic discipline has its own unique strengths. Our vision is that together University of Minnesota disciplines weave sustainability through the education of every University of Minnesota student. Community members bring their wisdom, truths, and hopes to the process. System-wide initiatives, implementation flexibility, and complementary thought and action guide us as we integrate education, outreach, and community/partner involvement. Together we create a future in which generations to come have options, opportunities, and resilience to thrive.

Education and Outreach Goal 1

Capture the land-grant mission: Sustainability is part of the educational or campus experience of each and every University of Minnesota student

Desired Outcomes and Measures

a. Systemwide initiatives are created that include academic and operational sustainability internships
b. A systemwide summit is held by 2010 for students, faculty, University of Minnesota Extension, community partners, etc.
c. Graduate and undergraduate sustainability-related minors on multiple campuses and first-year and graduate sustainability seminars are established by 2010
d. For residents, sustainability is an explicit aspect of living in student housing and being on campus

The University of Minnesota has already made laudable progress toward this goal. On the Twin Cities campus, University Dining Services employs student interns to educate customers on organic recycling and other sustainability initiatives, and Housing & Residential Life employs a student sustainability education coordinator. The

Sustainable Agriculture minor offers an academic undergraduate or graduate student internship, and two new internships are planned for the Sustainability Studies minor. The Sustainability Studies Minor currently serves around 300 undergraduates. On the Duluth campus, the Center for Sustainable Development offers internships; the Environmental Studies Program mandates a 120-hour internship for graduation; the Center for Environmental Education mandates a 600-hour internship for graduation; and Facilities Management offers stormwater internships.

The desire is to develop internships that span the University system and include experiences on each campus as well as offer an opportunity to include community outreach. Creating new academic internships would require faculty time and strengthened relationships with business and community partners. Collaboration between academia and operations is needed to develop joint opportunities, such as an academic internship that requires hands-on experience in operations at the University or with community partners.

Education and Outreach Goal 2

Integrate service learning into the undergraduate and graduate experience, linking students, faculty, University of Minnesota Extension, and community partners

Desired Outcomes and Measures

a. Service-learning and undergraduate research projects related to sustainability are extended by 2012; student assignments are linked to University of Minnesota operational needs

b. The sustainability focus of service learning projects increases each year to reach 25 percent by 2020; research and outreach centers are used for service learning
c. Undergraduate research projects and applied research projects that address sustainability challenges increase each year to reach 25 percent by 2020
d. By 2012, service-learning relationships with organizations are identified and formalized, building especially on the experience of the Regional Sustainable Development Partnerships, service-learning coordinators, and faculty

A number of University of Minnesota units already match students and faculty with community-based service-learning opportunities. Many have supported sustainability-related projects in past years. Existing formal service-learning and individual projects that focus on sustainability can be readily identified, as can undergraduate research projects. Specific targets may need to be modified depending on the findings.
A formal arrangement for bringing sustainability-focused projects to the attention of faculty and service-learning coordinators could be valuable. Systemwide, an annual summit creates a venue for shared learning across campuses, while University of Minnesota Extension provides a connection to the broader community. The Regional Sustainable Development Partnerships engage directly with community projects; full implementation of the partnership program to cover all of greater Minnesota should be supported.

Targeted funds available through the Office of Public Engagement, the Center for Urban and Regional Affairs, and the Undergraduate Research Opportunities Program could encourage a focus on sustainability. Clean Energy Resource Teams, the Minnesota Institute for Sustainable Agriculture, and Regional Sustainable Development Partnerships all prioritize sustainability.

Students'-Eye View

How does sustainability stack up at the University of Minnesota Duluth? Anthropology professor David Syring gave students in his spring 2009 senior seminar a worldview-expanding task: Spend the semester evaluating various aspects of campus sustainability. The students formed four teams around four themes: waste management, alternative transportation, satisfaction with green construction, and bottled water use. Final reports were posted to the Internet—so people around the world can emulate their approach and benefit from their insights.

Education and Outreach Goal 3

Create and implement curricula and educational programs that address the interface of environment, society, and economy

Desired Outcomes and Measures

a. Capacity is in place for creating and implementing sustainability-focused curricula and educational programs
b. Each campus has an assigned academic sustainability coordinator

This goal includes not only developing courses on sustainability, but also helping interested faculty and other educators integrate sustainability content into existing educational programs.

Academic sustainability coordinators on each campus will develop a plan for implementing education and outreach recommendations. These individuals would also collaborate with community partners, such as the Regional Sustainable Development Partnerships, and seek input from students. University of Minnesota administration could provide training workshops and sustainability postdoctoral positions and professorships, making resources and materials available to interested educators through the sustainability Web site and other venues.

Education and Outreach Goal 4

Develop outreach programs for sustainability education of working professionals in the public and private sector

Desired Outcomes and Measures

a. By 2010, existing University of Minnesota sustainability-related training programs are catalogued, a needs assessment has been conducted to determine what training and certificate programs would be most effective, and programs are prioritized
b. First education programs for working professionals are established with program completion by first cohorts (e.g., certificates) by 2011
c. A mechanism is in place for fostering interaction among past participants and connecting them with current students interested in internship opportunities

Bringing knowledge to the wider community is an important part of the University of Minnesota's mission. Training and programs exist in numerous fields that strongly align with sustainability, including forestry, environmental education, gardening, agriculture, and stormwater.

A team of University experts should assess the need for new outreach programming, taking into account the need for training; the social, environmental, and economic benefits training would provide; and the ability of the University of Minnesota to provide the training. Program development should involve a variety of parties, with University of Minnesota Extension and College of Continuing Education playing key roles. The Office for Public Engagement should also be included in the implementation.

Local Foods

Environmentally, economically, and socially sound food production is a cornerstone of sustainability. The Pride of the Prairie Local Foods Initiative, established in 2001, is a collaborative effort of the University of Minnesota (the Morris campus, West Central Regional Sustainable Development Partnership, West Central Research and Outreach Center, and University of Minnesota Extension), and partners to bring local food to campus, support sustainable agriculture, and forge educational links with local food producers. Localfoods.umn.edu, a resource of the Minnesota Regional Sustainable Development Partnerships and Local Foods Partnership (a project of the Northwest Regional Sustainable Development Partnership), provides a one-stop Web site to strengthen local food economies.

Communication

Communication was identified by each work team and in feedback during campus consultations as a critical element both for engaging the community and for raising awareness. In synthesizing the goals outlined by work teams, the committee noted several key goals and outcomes that aligned under the common theme of communication. These goals have been brought together under this separate section to provide opportunities for confluence of thought and action.

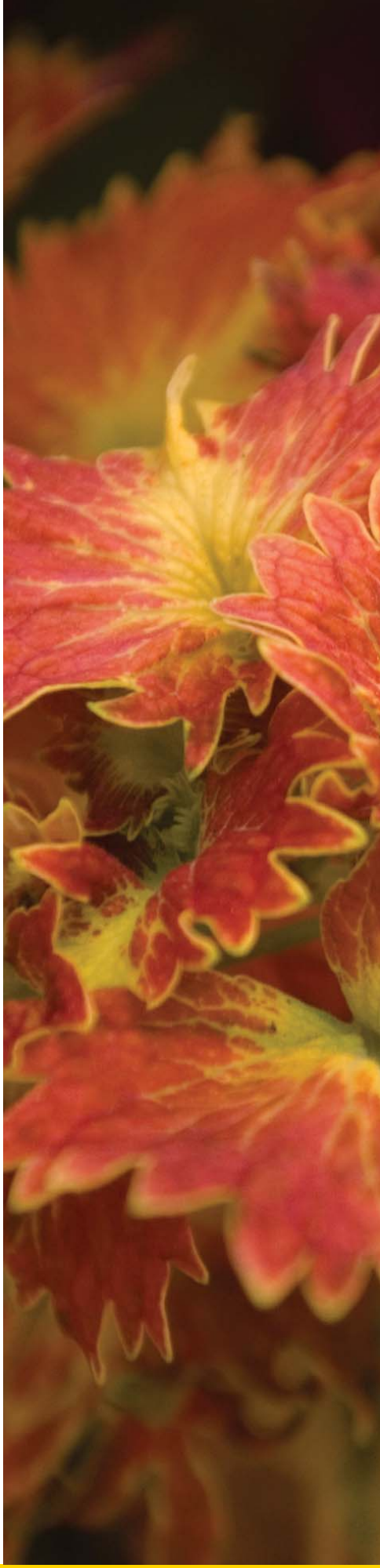
Communication Goal 1

Create opportunity for dialogue to discuss global and local sustainability challenges, opportunities available, and the work of the University to advance sustainability

Desired Outcomes and Measures

a. Communication tools and tracking systems make data related to sustainable practices available to the University community
   i. Building energy use is measured and kiosks inform occupants about ways to reduce energy consumption
   ii. Operational priorities and policies are communicated
   iii. Operational priorities for resource management and waste reduction are communicated throughout the University of Minnesota to maximize success
   iv. Success is monitored for meeting operational goals and to provide feedback (to waste producers, for example)
   v. Systems for tracking University travel are supported
b. Communication and reporting is provided throughout the University and to Resource Responsibility Centers (RRCs) to ensure awareness of policies, priorities, and results of performance metrics discussed in this report

The goals and activities to achieve them have an extraordinarily broad impact, rippling through every aspect of what the University of Minnesota is and does. As a result, in order to maximize engagement and increase awareness of the integration of sustainability into University of Minnesota culture, committee members and sustainability leaders at all campuses identified the need for the president to lead initial communication about this sustainability goals, outcomes, and measures report and the



importance of integrating sustainability into teaching, research, outreach, and operations systemwide. Ongoing marketing, promotion, and two-way communication will be crucial if we are to successfully engage students, faculty, and staff across all campuses, programs, and realms of interest in embracing sustainability as a fundamental and integral way of being for ourselves, our institution, and ultimately our world. The outcomes in this section also address specific operational priorities for providing useful information to individuals, vendors, and others (such as campus waste producers or energy users) to ensure they are informed about their impacts and successes.

Communication Goal 2

Develop and implement marketing/promotion efforts to engage those who may not be aware of sustainability-focused education, outreach, and research opportunities

Desired Outcomes and Measures

a. By 2010, marketing plan and staff are designated to publicize and help implement goals
b. By 2010, a listserv and database of sustainability resources and opportunities have been developed

The University of Minnesota has already publicly promoted many of its sustainability efforts. However, an aggressive and dedicated marketing strategy is needed to engage those who are not aware of the sustainability-focused education, outreach, and research opportunities and to strengthen implementation in the context of the University's overarching social, economic, environmental, and top-three-public-research-university strategies. Good marketing and promotion will be crucial if we are to successfully compete with other research institutions for funding and attract premier research and students.

Various programs, departments, and initiatives develop strong communication platforms, but linking these through a central communications portal will provide a useful tool to individuals seeking information about the University's work. The listserv and database could be built up through contributions from interested parties who would volunteer to locate and identify sustainability-focused resources and opportunities.

Communication Goal 3

Develop and maintain a transparent data management information system to enable decisions utilizing environmental, economic, and social factors

Desired Outcomes and Measures

a. Select performance metrics discussed in this report are measured and reported on an annual basis for each campus
b. Select performance metrics discussed in this report are measured and reported on an annual basis for each Resource Responsibility Center (RRC)
c. Information generated by a sustainability information system is incorporated into annual performance evaluations and budget decision making

Where did we start? Where do we want to go? Where are we now? How shall we proceed? Progress toward any goal benefits from the ability to periodically assess position and make midcourse corrections as needed to keep on track. Annual progress reports will allow campuses and RRCs to identify what's working well and, alternatively, what might benefit from a new approach. A sustainability information system will allow us to readily compile and analyze data to guide next steps and guide resources to best uses. Transparency ensures accountability and gives the many individuals involved in pursuing sustainability a sense of ownership and empowerment that will motivate further action.

"Let us put our minds together and see what life we can make for our children."

—Tatanka-Iyotanka, "Sitting Bull," Hunkpapa Lakota Chief and Holy Man

Implementation and Reporting

In the spring of 2009, forums were held at all campuses to present the proposed sustainability goals and outcomes to students, staff, and faculty. Approximately 300 people attended the forums and an estimated 90 comments were received informally and online. The goals were, for the most part, received with tremendous enthusiasm, and they resonated with the attendees. There was an eagerness to move forward with implementation. Suggestions during and after the forums showed a sense of ownership and interest in incorporating sustainability concepts into individual areas of responsibility. While recognizing the lofty and long-term nature of many of the goals, individuals had many suggestions for tactics and targets to move forward in a practical manner to implement them.

The University Sustainability Goals and Outcomes Committee work teams did a tremendous job of being visionary—of looking forward with a goal of weaving sustainability concepts into the very fiber of our University. While not included in the charge to the committee, this implementation section supports that visionary future thinking while establishing a framework for moving forward. It is important to provide a perspective for next steps—recognizing implementation will be addressed with more thoroughness by the University Sustainability Steering Committee and campus standing sustainability committees.

Communication Counts

A key implementation step is communicating this work broadly. During feedback sessions, one concern was for highly visible administrative support to align this effort with the University's community fully—and in the way needed to successfully implement the Board of Regents *Policy on Sustainability and Energy Efficiency*.

Goals Forward

The breadth of the 8 high-level and 27 work team goals, existing ability to measure outcomes, and complexity of implementation will result in some goals moving forward quickly while others may warrant additional designation of resources and even institutional changes before real progress can begin. The committee recognized the University will face barriers and challenges on this journey toward sustainability. That said, we must take on this challenge and embrace significant transformations in our personal choices, our institutional commitments, and the needed breakthroughs that will come from our research. This process for sustainability is vital for our University to thrive and inspire.

Institutionwide goals are presented here. Recognizing their unique circumstances, resources, strengths, and challenges, each campus must be empowered to achieve these institutional goals. It is hoped that campuses will use the high-level goals as guideposts as they select from the work team goals, objectives, and measures those on which to focus first. We have seen the passion and enthusiasm at all levels for becoming a premier sustainable university; we have every confidence that campuses will strive to reach for the stars, to pursue not just low-hanging fruit, but fat fruit—things that really make a difference for their campus, the University, and the entire planet.

Students and instructors at the University of Minnesota find ways to integrate sustainability into education and curriculum in both undergraduate and graduate programs. Crookston's environmental landscaping students present as part of a seminar class.

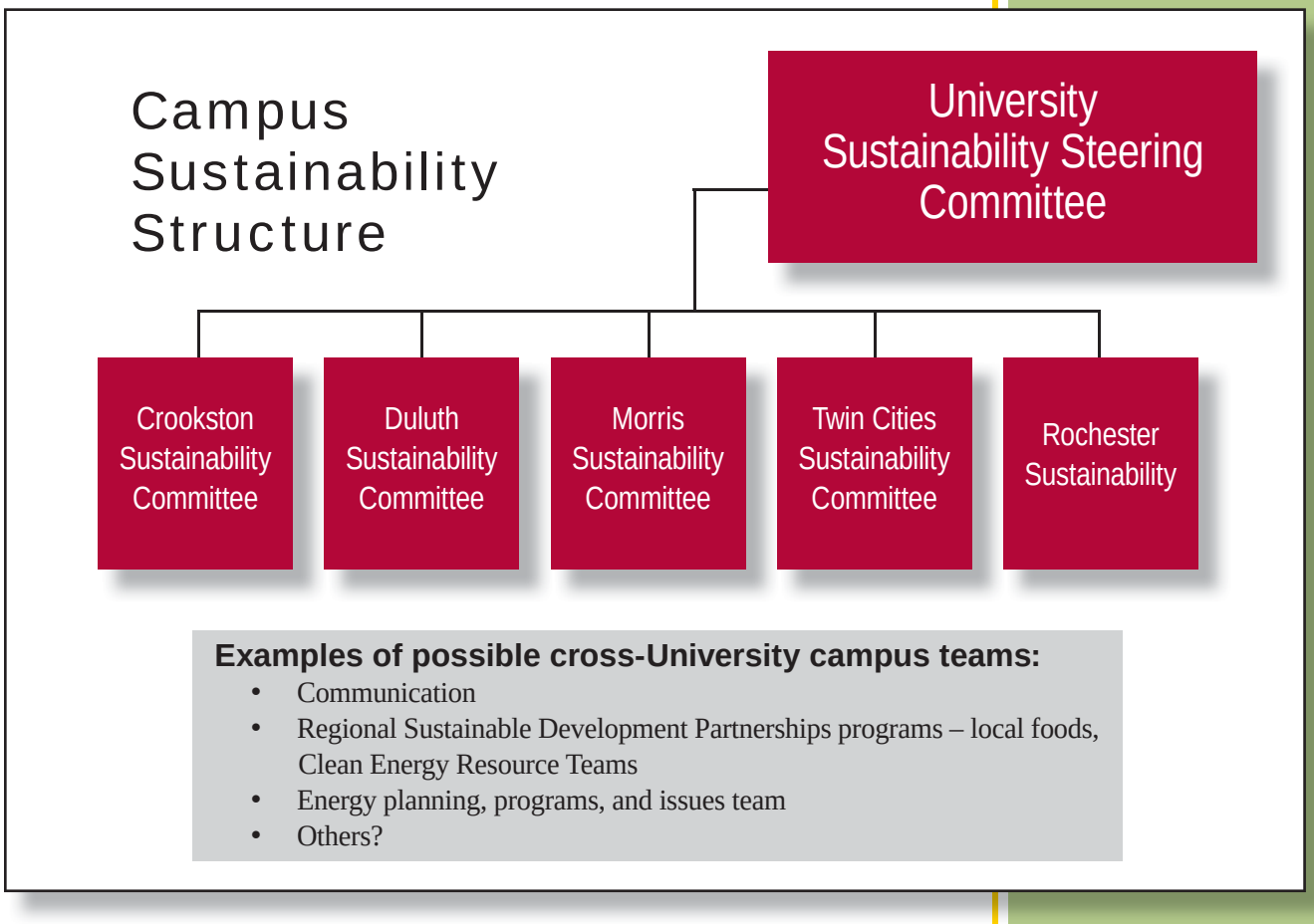
Structure

Sustainability committees at each campus will work in an ongoing way to implement the committee goals. Using the proposed outcomes and measures, a set of objectives and targets that are tailored to the campus will be developed through the campus sustainability committees and reported on to the University Sustainability Steering Committee. Each campus committee will also satisfy the institutional structure of the ACUPCC commitments. The structure will include cross-campus work groups to address topics that impact all campuses and to share best practices. This will also help leverage resources efficiently and determine where enterprise solutions are necessary.

Sustainability-supporting work groups and initiatives may have a short-term focus or be of a strategic, long-term nature (e.g., the Regional Sustainable Development Partnerships). There are also topics where focus is needed to meet the requirements of more than one commitment and may require a fast track—for example, meeting the milestones of the ACUPCC. Complexity of ideas and lack of current measurement systems may create the need for us to take a slower course.

Below is a proposed structure that represents the strategy, assessment, and reporting organization for our University sustainability program. Accountability for the outcomes is at each campus. The University Sustainability Steering Committee will have representation from each campus and include representation from students, faculty, and staff in the key areas integral to sustainability efforts. This committee will be charged by President Bruininks.

Campus sustainability committees will be formed and charged by the chancellors of the campus and will develop work plans with defined initiatives and targets and assess and report what metrics are currently tracked and reported. The University Sustainability Steering Committee will oversee systemwide priorities and progress. The systemwide committee will ensure a reporting system is in place. Campus committees will provide a contact to help facilitate communications with the University Sustainability Steering Committee. It is important for the committees to represent key areas/programs/initiatives for each campus and to include student, faculty, and staff representation.



The work of the campus and University committees will be completed through various work teams and task groups—which may be campus specific or, in some cases, may span campuses to provide opportunities to share and create systemwide solutions.

Reporting

Reporting will be carried out on an annual basis for key representative metrics. Each campus sustainability committee will share its progress toward sustainability goals with the University Sustainability Steering Committee, which will summarize and synthesize the reports in the context of these goals and present the results to the Board of Regents. Additional metrics may be added as a more comprehensive measurement system is developed.

Acknowledgments

Leadership and Modeling

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Deborah Swackhamer, Charles M. Denny Chair of Science, Technology, and Public Policy, Humphrey Institute of Public Affairs; Professor, Division of Environmental Health Sciences, School of Public Health; Co-director, Water Resources Center, UMTC

Members:

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Arne Kildegaard, Associate Professor, Economics/Management, UMM
Kevin Linderman, Associate Professor, Carlson School of Management, UMTC
Matt Norris, Undergraduate Student, Carlson School of Management, UMTC
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Timothy M. Smith, Associate Professor, Department of Bioproducts and Biosystems Engineering, UMTC

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Co-chairs:

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Members:

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Mindy Granley, Sustainability Coordinator, UMD
Holly Lahd, Undergraduate Student, Department of Applied Economics, UMTC
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Energy Efficiency

Co-chairs:

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Members:

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John King, Director of Facilities Management, UMD
Tim Norton, Director, Facilities and Operations, UMC
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Sangwon Suh, Assistant Professor, Department of Bioproducts and Biosystems, UMTC

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Bethanie Kloecker, Undergraduate Student, Landscape Architecture, UMTC
Karen Mumford, Assistant Professor, Biology/Environmental Studies, UMM
Jesse Schomberg, Coastal Communities and Land Use Planning Extension Educator, UMD

Staff:

Brea Lambert, Program Associate, Auxiliary Services Administration, UMTC

Campus Consultations

The committee would like to thank all who attended the campus forums or commented on the University of Minnesota Sustainability Goals and Outcomes Committee Initial Summary Report online. We are grateful as well to the sustainability coordinators and to the individuals on each campus who helped organize the forums.

We appreciate the thoughtful input gained through meetings and forums held during the year to review the progress of the University Sustainability Goals and Outcomes Committee and gather information or input:

11/25/2008 Review of endowments, foundation, and process for proxy review, Associate VP and Chief Investment Officer S. Mason

01/16/2009 Community Advisors sustainability training – Housing and Residential Life

01/22/2009 University Services Leadership Team

02/24/2009 Campus Sustainability Forum and Energy Panel, cosponsored event, University Services, Sustainability Studies Minor, and student groups (AEC, MESC, MPIRG, EcoWatch)

02/26/2009 Vice President for Research, T. Mulcahy

04/07/2009 President Bruininks' senior vice presidents meeting

04/21/2009 Senate Committee on Finance and Planning

05/12/2009 Office of Student Affairs, Vice Provost for Student Affairs G. Rinehart, Chief of Staff A. Whyte, Assistant Director of Student Activities M. Sweet

05/26/2009 University of Minnesota Foundation President and CEO S. Goldstein

06/17/2009 University of Minnesota Extension Dean and Director B. Durgan and Associate Dean G. Cuomo

07/22/2009 Institute on the Environment Director J. Foley

08/05/2009 Regional Sustainable Development Partnerships Statewide Coordinating Committee annual meeting

08/30/2009 Orientation and First-Year Program training for Welcome Week leader training

Campus Consultations on Proposed Goals
04/20/2009 Morris
04/24/2009 Crookston
04/27/2009 Twin Cities
04/28/2009 Twin Cities
04/28/2009 Duluth

Finally, thank you to every member of the University of Minnesota community who takes this policy, these principles, and these goals to heart, and helps make them an integral part of what we as an institution are and strive to become.

Appendices

Note: In the spirit of sustainability, a list of appendices and electronic links to materials is included here. Information is available at http://www.uservices.umn.edu/sustainableU/index.html - or by clicking on the links if you are viewing this report electronically. If you don't have Internet access, you may request more information by calling University of Minnesota, University Services at 612-624-3557.

Appendix A.

Board of Regents *Policy on Sustainability and Energy Efficiency*
http://www1.umn.edu/regents/policies/administrative/Sustain_Energy_Efficiency.pdf
(See also on page 63)

Appendix B.

Sustainability Goals and Outcomes Committee Resources
http://www.uservices.umn.edu/sustainableU/index.html

Appendix C.

University Sustainability Goals and Outcomes Committee Work Team Reports
http://www.uservices.umn.edu/sustainableU/index.html

Appendix D.

Final Report of the Univeristy of Minnestoa Commission on Environmental Science and Policy: Building on our Strengths: Our Opportunity in Environmental Science and Policy
http://www.uservices.umn.edu/sustainableU/index.html

Appendix E.

American College & University Presidents' Climate Commitment Text
http://www.presidentsclimatecommitment.org/about/commitment

Appendix F.

AASHE Sustainability Tracking, Assessment & Rating System (STARS)
http://www.aashe.org/stars/index.php

Appendix G.

Links to Additional University of Minnesota Sustainability-Related Resources
(continued on p.62)

Sustainability and U
http://www.uservices.umn.edu/sustainableU/index.html

University of Minnesota, Crookston Sustainability
http://www3.crk.umn.edu/committees/sustainability/

University of Minnesota Duluth Sustainability
http://www.d.umn.edu/sustain/

UMM: A Green Campus
http://www.morris.umn.edu/greencampus/

University of Minnesota Sustainability
http://www.uservices.umn.edu/sustainableU/index.html

Institute on the Environment
http://environment.umn.edu

Regional Sustainable Development Partnerships
http://www.regionalpartnerships.umn.edu/

It All Adds Up
http://www1.umn.edu/italladdsup/index.php

University of Minnesota Purchasing Services Sustainability Policy
http://purchasing.umn.edu/policy/sustain.html

Appendix A

Administrative
SUSTAINABILITY AND ENERGY EFFICIENCY
Adopted: July 9, 2004
Supersedes: (See end of policy)

University Of Minnesota
Board Of Regents Policy

SUSTAINABILITY AND ENERGY EFFICIENCY

SECTION I. COMMITMENT.

Sustainability is a continuous effort integrating environmental, social, and economic goals through design, planning, and operational organization to meet current needs without compromising the ability of future generations to meet their own needs. Sustainability requires the collective actions of the University of Minnesota (University) community and shall be guided by the balanced use of all resources, within budgetary constraints. The University is committed to incorporating sustainability into its teaching, research, and outreach and the operations that support them.

SECTION II. GUIDING PRINCIPLES.

Subd. 1. Leadership. Through excellence in environmental education, research, outreach, and stewardship, the University shall strive to be a world leader by promoting and demonstrating sustainability and energy efficiency and by producing leaders and informed citizens.

Subd. 2. Modeling. The University shall strive to be a model in the application of sustainability principles to guide campus operations by:
(a) meeting and aspiring to exceed all applicable regulatory requirements;
(b) preventing pollution at its source;
(c) reducing emissions to the environment; and
(d) encouraging the use of a life-cycle cost framework.

Subd. 3. Operational Improvements. The University shall undertake a continuous improvement process that seeks to meet the operational performance targets, goals, and objectives designed to achieve sustainability.

Subd. 4. Energy Efficiency. The University shall undertake a process to increase energy efficiency, reduce dependence on non-renewable energy, and encourage the development of energy alternatives through research and innovation.

Administrative
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Supersedes: (See end of policy)

University Of Minnesota
Board Of Regents Policy

Subd. 5. Research. The University shall (a) promote innovative, high visibility research projects focused on sustainability and energy efficiency to inform campus operations as a whole as well as the broader community; and (b) promote collaborative projects that include faculty research undertaken in partnership with operations staff, students, public entities, community organizations, and industry.

Subd. 6. Education and Outreach. The University shall promote educational and outreach activities that are linked to operational improvements and innovation principles.

SECTION III. IMPLEMENTATION.

Subd. 1. Administration. The University shall have sustainability goals that inform administrative policies and procedures in the areas of planning, decision-making, execution, assessment, reporting, and alignment. These policies and procedures shall rely on scientific analysis and support the efforts described in subds. 2-4 of this section.

Subd. 2. Operations. Each University campus shall develop specific sustainability objectives and targets in the areas of:
(a) physical planning and development, including buildings and infrastructure;
(b) operations;
(c) transportation;
(d) purchasing; and
(e) waste management and abatement.

Subd. 3. Accountability. The president or delegate shall develop indicators and measures of success in the implementation of the principles outlined in this policy in consultation with appropriate faculty, staff, students, and experts in the broader community.

Subd. 4. Reporting. The president or delegate shall report to the Board annually on progress toward established targets and standards, using this information to identify opportunities for subsequent improvement.

SUPERSEDES: POLLUTION PREVENTION AND WASTE ABATEMENT DATED JUNE 12, 1992.

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The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status or sexual orientation.

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