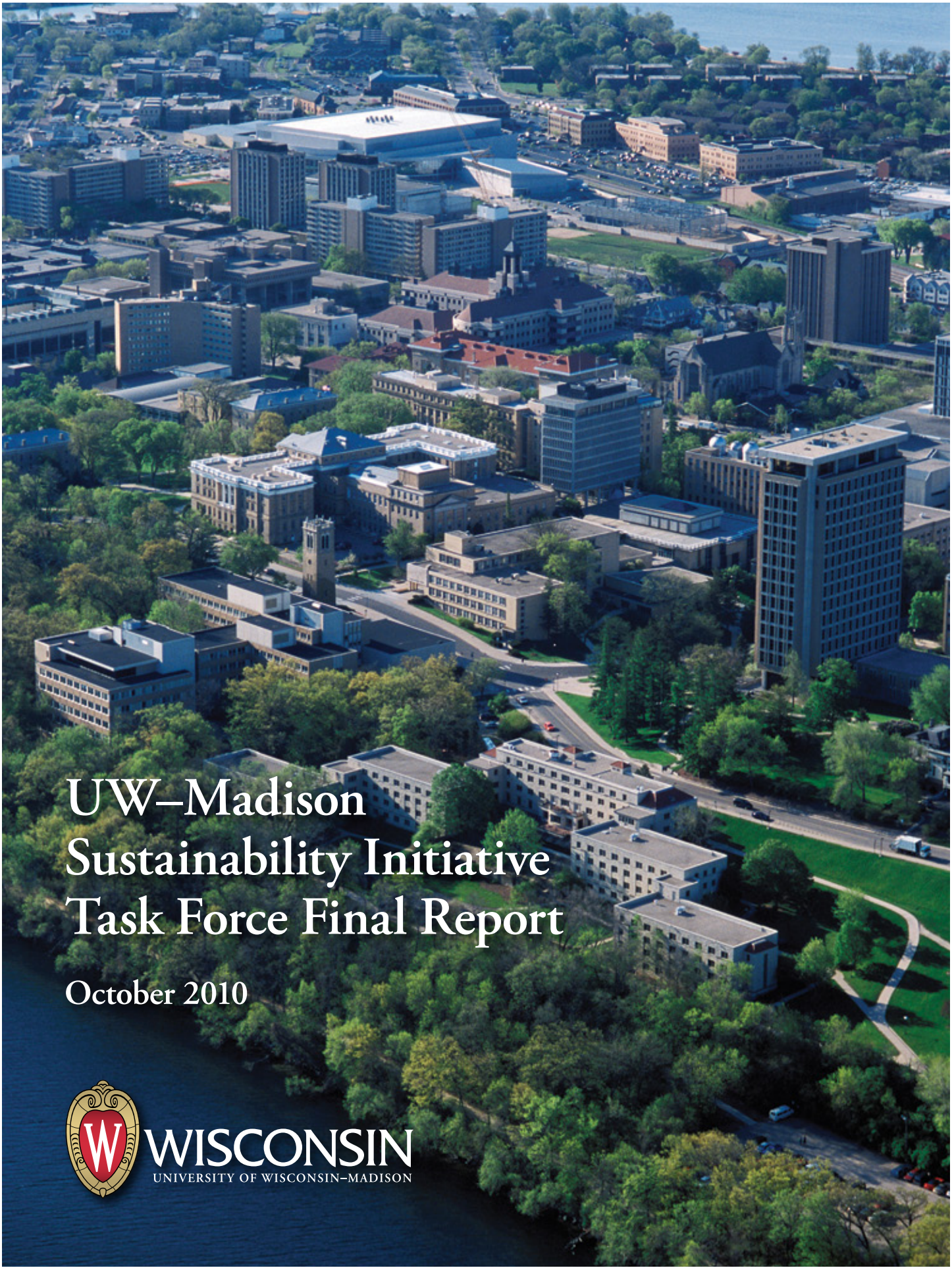

UW–Madison Sustainability Initiative Task Force Final Report

October 2010

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We are pleased to present the final report of the campus Sustainability Task Force. This report fulfills the charge we gave to the task force to recommend goals, policies, governance structure, and pilot projects related to sustainability for consideration by UW–Madison's leadership and campus community.

There are many reasons why sustainability was chosen as the focus of one of two cross-campus strategic initiatives (the other being global health). As the task force notes, no other university has its roots as deeply embedded in sustainability, including the legacies of Wisconsin—and UW–Madison—environmental pioneers such as John Muir, Aldo Leopold, and Gaylord Nelson. More importantly, sustainability is, and must be, at the heart of today's UW–Madison—its education, research, operations, and public service.

We endorse wholeheartedly the task force vision for UW–Madison to be a "living model for sustainability, exemplifying values and actions that demonstrate our commitment to stewardship of resources, respect for place, and the health and well-being of the broader community, now and for the future."

The faculty, staff, and students on the task force represented research, education, and operations. The group was aided by eight working groups in the areas of energy, food, health, transportation, campus environment, materials/consumption, governance, and communication. We thank everyone who served on the task force or supported its exemplary work.

Now it is up to the campus community to build on the recommendations put forth in this report, enrich our culture of sustainability, and demonstrate our unwavering commitment to a sustainable future.

Paul DeLuca
Provost

Darrell Bazzell
Vice Chancellor for Administration

UW–Madison Sustainability Initiative Task Force Final Report

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Executive Summary

Around the country, and the globe, the importance of sustainability is escalating. A 2010 *Princeton Review* survey of 16,000 college applicants found that 66 percent of prospective freshmen want to know about the sustainability efforts of the colleges they are considering attending.[1] Students aren't the only ones concerned about a university's commitment to economic, environmental, and social responsibility—the pillars of sustainability. So are faculty and staff, alumni and donors, and government, business, and industry. Increasingly, the environmental and social costs of the goods we produce and consume, the buildings we inhabit, the energy we use, the food we eat, and the transportation choices we make are shaping the decisions of business leaders, policymakers, and citizens.

Today, Wisconsin companies such as S. C. Johnson have earned worldwide recognition for their dedicated commitment and leadership in environment and social responsibility. State legislation, such as the recently enacted Wisconsin Green to Gold Fund, intended to help manufacturers reduce their energy costs, improve their bottom line, and create jobs, has placed Wisconsin ninth among states ranked using a set of sustainability criteria.[2] During the last 10 years, the state of Wisconsin has invested over $70 million to improve the energy efficiency of UW–Madison buildings, and across campus we have made important education and research contributions in areas from green business to building design, from renewable energy to sustainable agriculture, from life-cycle analysis to energy and transportation policy. Yet, we have not been similarly acknowledged in sustainability rankings as the state of Wisconsin or some of its business partners. But perceptions can be deceiving, particularly in the area of sustainability, where metrics or standards may bear little relation to substantive action.

No other university can match UW–Madison's long tradition in responsible environmental leadership and thought. The ethos of conservation and stewardship advanced by Wisconsin pioneers such as John Muir, Charles Van Hise, Aldo Leopold, and Gaylord Nelson inspire us as we address one of the greatest challenges of the 21st century: how to meet the needs of the present without compromising the ability of future generations to meet their own needs. This report reflects our university's heritage, and serves as a starting point for an integrated approach for addressing sustainability in our education, research, and university operations.

With more than 60,000 students, faculty, and staff, UW–Madison has a population comparable to that of Wisconsin cities such as Eau Claire or Janesville. But UW–Madison as a city has a unique purpose: to provide a learning environment where innovative ideas sparked in the classroom, in research laboratories, and in the field can be developed, tested, and applied to improve the quality of life for all. Aligning the university's purpose with its practices—from the design of buildings to the consumption of water, energy, and other materials, from transportation and purchasing to the food choices available on campus—is critical in ensuring the integrity of our institutional values. Such alignment could also bring greater recognition and attention to the accomplishments UW–Madison has already achieved as a sustainability leader, including the notable efforts of the WE CONSERVE campaign.

In early 2010, the provost and vice chancellor for administration charged a 17-member task force to develop a comprehensive vision for UW–Madison's sustainability efforts. Many of our peer institutions have advanced their own sustainability initiatives, and our work—and this report—has benefited from their approaches. This report highlights those institutions, policies, and programs that we believe should be considered at UW–Madison

1 http://www.princetonreview.com/green/press-release.aspx

2 http://wistechnology.com/articles/7552/

as we develop our own strategies and best practice recommendations.

In reviewing the work already done at a number of other institutions, we found several areas where UW–Madison is poised to step forward as a national leader in campus sustainability. In particular, very few institutions discuss the need for integrating their operational and academic components. We believe this approach is both critical and integral to the success of "walking the talk" as we train our students, faculty, staff, and administrators to implement sustainable practices throughout their lives and careers. In addition, recent discussions regarding the metrics many institutions use to measure the results of sustainability efforts suggest that campuses sometimes cater to emerging national sustainability ranking organizations such as *Princeton Review*'s Green Ratings, Sustainable Endowment Institute's Green Report Card, and the Sierra Club's Cool Schools ranking systems. We believe such strategies miss the opportunity to critically evaluate what "sustainability" could really mean given the unique features of a particular campus. For this reason, literacy in sustainability is one of the guiding principles to grow out of this report. With a thorough understanding of the risks, benefits, and trade-offs involved in the choices we make, and the complex environmental, economic, and social consequences of our action or inaction, our collective ability to set informed policy and proceed responsibly is enhanced.

We already have a strong foundation upon which to build. As Table 1 suggests, UW–Madison has made significant strides in addressing our environmental footprint in ways that have great potential for bridging the education and research mission of the university with its operational practices. The table summarizes a preliminary inventory done at an early stage in the task force's work to make visible current cross-campus projects related to sustainability. Some of the projects showcased in the table occupy research; others are focused on education or operations. A number of projects reach across all three areas. WE CONSERVE can be found throughout this matrix. The WE CONSERVE initiative began in 2006 to increase the community's awareness about the importance of environmental stewardship and to minimize waste in UW–Madison's daily operations. Since 2006, WE CONSERVE has realized an annual energy savings of $9 million and 1 trillion BTUs. WE CONSERVE has also reduced annual water usage by 178,000,000 gallons, and prevented an additional 70,000 tons of annual carbon dioxide emissions being released into the atmosphere. Through cooperation with the university's dining halls, UW–Madison now composts all pre-consumed food waste. The addition of hybrid and energy-efficient vehicles to the campus fleet has reduced annual diesel fuel consumption by 10,000 gallons.

WE CONSERVE is just one example among many highlighting UW–Madison's commitment to the idea and practice of sustainability. The potential to establish sustainability as an integral part of UW–Madison's brand, increase awareness and understanding, and build a campuswide community of sustainability is great. The time for action is now.

We should embrace sustainability as a community and an institution fully cognizant of the challenges that lie ahead. The projected capacity for growth of the UW–Madison campus over the next decade includes an additional 4 million square feet of building space with a concomitant increase in energy demand. This illustrates the scope of the challenges we as an institution face in acknowledging, taking responsibility for, and addressing the future consequences of our past and present decisions. It also suggests the sense of urgency now upon us to drive significant change. Significant change in our individual behavior, collective action, institutional commitment, and political will is required if sustainability is to be more than a buzzword. Our challenge is to integrate sustainability into everything the campus is and does — in education, in research, in operations, and in public service.

Our *vision* is for UW–Madison to become a living model for sustainability, exemplifying values and

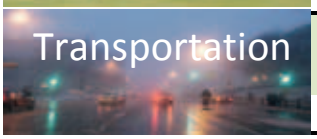
	Research	Teaching/ Education	Operations
 Campus Environment	**8 cross-cutting campus environment projects:** WIMR Cistern; Stormwater Management; Water and Climate Change; We Conserve Initiative; CEE/CEM/LA Capstone; WID/CEE/WARF Behavioral Research; Native and Adaptive Plantings; Biodiversity		
	4 projects research only	5 projects education only	6 projects could add academic
 Energy	**3 cross-cutting energy projects:** Building Energy Savers Program; Energy Institute; We Conserve Initiative		
		2 energy projects span education and operations: GreenHouse; REthink Wisconsin	
	8 projects research only	6 projects education only	5 projects operations only
 Materials and Consumption	**3 cross-cutting materials and consumption projects:** Move-out Recycling; ReTHINK Wisconsin; We Conserve Compost Program		
	4 projects research only	5 projects education only	3 projects operations only
 Food	**5 cross-cutting food projects:** REthink Wisconsin; Wisconsin Institute for Sustainable Agriculture; We Conserve Initiative; Allen Gardens; Healthy Grown Potato		
	1 food project spans research and teaching: Green House Learning Community		
	1 food project spans research and operations: School of Business		
	11 projects research only	13 projects teaching only	12 projects operations only
 Health	**1 cross-cutting health project:** Greening University of Wisconsin Health		
	9 projects research only	3 projects teaching only	12 projects operations only
 Transportation	1 transportation project spans research and operations: We Conserve Initiative		
	4 projects research only	3 projects teaching only	5 projects operations only

Table 1. Current projects that link Teaching/Education, Research, and Operations across campus (for a complete listing or to submit projects for inclusion in the inventory,[3] see http://sustainability.wisc.edu/report/projects.htm).

actions that demonstrate its commitment to stewardship of resources, respect for place, and the health and well-being of the broader community, now and for the future. We offer the following principles as a guide in setting a direction for UW–Madison's sustainability efforts:

- More fully integrate research, education, and campus operations
- Incorporate systems analysis, life-cycle analysis, and cradle-to-grave thinking
- Advance literacy in sustainability to effect cultural change
- Eliminate waste[4] with urgency, in ways that are environmentally, economically, and socially responsible
- Be transparent in our metrics, practices, and decision-making
- Honor and engage the ideas, enthusiasm, and commitment of students

3 In the limited time and scope available to task force working groups, we were able to begin the development of an inventory of current efforts that link academic and operational function across campus within our six focus areas, as represented by Table 1. It is very likely that we have missed some projects that should be included in this ongoing inventory.

4 Waste is meant to be inclusive of materials, energy, water, food, fuel, and space.

Proposed Recommendations

To realize this vision, we propose several concrete actions that should be implemented as soon as possible. To confirm the campus commitment to sustainability, increase its visibility, and improve our ability to integrate our purpose as an institution of higher learning with our operational practices, we recommend the following:

- **Create an *Office of Sustainability*.** Infusing sustainability as a fundamental, constitutive principle of all university endeavors will require significant leadership. That leadership will have to catalyze a broad range of material changes in how research, education, and operations are conceptualized, planned, and performed. It is essential to have a stable platform from which to operate, energize, and coordinate change.

  While many colleges and universities have already established offices of sustainability, few have adequately addressed the disconnect between the different responsibilities and functions of the academic and operational units of the institution. We propose to overcome this problematic binary by embedding cooperation in the organizational structure of the Office of Sustainability itself. The office will be led by two co-directors, one for operations and another coordinating the academic (education and research) side of the campus. It is essential that the office have a dedicated staff and access to resources proportional to the magnitude of the challenges it faces. In addition, we recommend formally chartering a Sustainability Advisory Committee composed of faculty, staff, and students representing a cross-section of the operational and academic sides of campus. The role of this body is to set an overall direction for campus, recommend broad policies to the provost and vice chancellor for administration in the area of sustainability, and ensure the Office of Sustainability is accountable for its work.

- **Support the Office of Sustainability communications by establishing a web portal at http://sustainability.wisc.edu.** A web portal is a central place for people to discover, align, and connect to sustainability activity on campus by using news, databases, maps, and social media features. Although each peer institution to UW–Madison has a sustainability website, those sites do not confront our same challenges of scale and scope. Such challenges are met with a two-part plan: 1) to create a single point of *discovery* with rhetorical and visual impact that encourages users of many backgrounds and expectations to explore and develop their own role in sustainability, and 2) to provide an intuitive and transparent *online inventory* of campus sustainability information so that users can readily comprehend the mass of sustainability information, close any information gaps, and improve alignment of our educational, research, and operations activities.

  The UW–Madison web portal model can be compared to a small community journalism effort, with its chief goal to be timely and useful. The sustainability web portal will require an initial moderate technology investment to establish databases, map cores, news feeds, and presence. The web portal will require a managing editor who can stay ahead of campus information needs and support the Office of Sustainability communications. Metrics in traffic, outreach, and conversion should be established to ensure that the portal adapts to the changing information needs of campus and the Office of Sustainability.

- **Amplify the formal and informal educational programs in the domain of sustainability to enhance awareness, knowledge, and personal and professional capabilities of our students and staff.** The newly proposed undergraduate majors in Environmental Studies and Environmental Sciences, when implemented, offer an important opportunity to infuse literacy in sustainability throughout the university curriculum. Opportunities for student internships through the Office of Sustainability, and residential learning communities such as the newly established GreenHouse, help to advance the integration of research, education, and operations through experiential learning. The web portal will enhance informal education efforts by serving as a clearinghouse of information related to sustain-

ability, including courses, resources, guidelines, best practices, metrics, and progress to date.

- **Encourage and expand UW–Madison as a living laboratory in sustainability through seed grants that would fund projects to bring education and research to bear on our operational practices**. Such projects should aim to advance greater links across education, research, and operations, and have the potential to impact sustainability awareness and action beyond the UW–Madison campus. While the full report of the Sustainability Task Force offers many potential projects in the areas of the campus environment, energy, materials and consumption, food, transportation, and health, we highlight two in this executive summary that demonstrate the guiding principles that inform our vision: space utilization and metrics development.

Space Utilization: As part of a broader long-term initiative to sustainably optimize space utilization on campus, a pilot project addressing classrooms represents a logical staring point. The utilization of classroom space is a small, but symbolic, example of the cultural change needed to be responsible stewards of our resources. Currently, space utilization rates for classroom and instructional laboratory space at UW–Madison are significantly lower than our Big Ten peers, and departmental classroom utilization rates are approximately 50 percent less than general assignment classroom rates. What are the ecological, economic, and social implications of wasted classroom space? Can we redefine "need" in light of these impacts to better utilize capacity that is currently hidden, under-utilized, or stranded? Addressing this issue directly impacts outcomes in other areas—such as energy, climate, and more. A joint research, education, and operations project to develop and apply systems and life-cycle analysis tools and methods that integrate sustainability considerations into assessing and optimizing classroom space needs could provide a test case and proof of concept in developing a rigorous sustainability metric for space optimization that could address our environmental footprint and be used by other institutions. Such a metric, based on the guiding principle of incorporating life-cycle and systems analysis into our thinking, would also help advance the principles of literacy and transparency. Once faculty, staff, and students become aware of the environmental and economic consequences of behaviors and policies that favor departmental autonomy, faculty flexibility, and student choice over eliminating waste, the possibility to effect cultural change in the assignment of classroom space is enhanced.

Metrics in Food Sustainability: Developing sustainability metrics that will inform food value systems and evaluate the intertwined impacts of our eating decisions is another example of a project that has the potential to transform understanding and behavior related to sustainability, while advancing integration of education, research, and operations. The sustainability of food is a highly debated and controversial topic with a changing definition that varies among individuals depending on their viewpoints and value systems. Currently, efforts are under way nationally to develop standards and metrics that can guide the development of sustainable food products and methodology for quantification and verification of accomplishments toward improved environmental, economic, and social conditions surrounding food production, processing, and distribution. But what are the values embedded in particular metrics? Consider, for example, campus food-purchasing policies. Implementing a university policy to purchase 20 percent local food by 2015—where local is defined as products grown, raised, or produced within a 250-mile radius of campus—might be considered. This metric is used in a number of surveys to annually rank the sustainability commitment of colleges, and has been adopted by many universities. Yet, if the pillar of a university's sustainability commitment is mitigating climate change, then a food policy aimed at reducing the amount of red meat consumption may be more effective than buying locally sourced food, taking into account the life-cycle greenhouse gas emissions associ-

ated with food production and transportation.[5] While a campus food policy promoting local purchasing may not be a particularly effective way to minimize climate change, it may advance other institutional values linked to sustainability, including the support of diversified agriculture and regional economies. Transparency in how those values are articulated, adopted as policies, and supported by particular metrics is essential to the success of any sustainability initiative. It is an area where UW–Madison has an opportunity to lead by facilitating open discussion on components of a sustainable food system, how to quantify them, and developing a robust sustainability metric for food, grounded in life-cycle analysis, that informs that university food policies, decision-making, and action.

5 Christopher L. Weber and H. Scott Matthews, "Food Miles and the Relative Climate Impacts of Food Choices in the United States," *Environ. Sci. Technol.* 42 (2008): 3508–3513.

Reclaiming Our Tradition

We have the legacy, we own the tradition, and, thanks to WE CONSERVE and other efforts, we already are making our day-to-day operations more efficient. Now is the time to reclaim the *proud tradition* and rightful heritage of UW–Madison, not as a follower, but as a leader in environmental sustainability in its broadest sense. It will require concerted effort and collective will at all levels and across all areas of campus. How we envision a sustainable future for campus, and the values we choose to advance, can only be achieved through the sifting and winnowing of ideas, and a process of shared governance and democratic decision-making, that are at the heart of UW–Madison. We look forward to your participation.

Introduction

"When we tug at a single thing in nature, we find it attached to the rest of the world."
— John Muir

"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."
— Aldo Leopold

"Reaching a general understanding that sustainability is the ultimate issue will finally bring us face-to-face with the political challenge of forging a sustainable society during the next few decades. It is a challenge we can meet if we have the leadership and the political will to do so."
— Gaylord Nelson

What do these statements from three of the nation's most influential environmental leaders have to do with current sustainability efforts at the University of Wisconsin–Madison? Everything.

No other university has its roots more deeply embedded in an ethos of conservation and stewardship. The ideas and actions of Wisconsin pioneers such as John Muir, Charles Van Hise, Aldo Leopold, and Gaylord Nelson are an inspiration in addressing one of the greatest challenges of the 21st century: how to meet the needs of the present without compromising the ability of future generations to meet their own needs.

In addition to this rich legacy, we have a strong current set of efforts under way. As Table 1 in the executive summary suggests, UW–Madison has made significant strides in addressing our environmental footprint in ways that have great potential for bridging the education and research mission of the university with its operational practices. The table includes an inventory of current projects related to sustainability under way across campus, including the pioneering efforts of the WE CONSERVE campaign.

WE CONSERVE is just one example among many highlighting UW–Madison's commitment to the idea and practice of sustainability. From the classroom to the residence hall to the boardroom, sustainability is increasingly a part of the fabric of UW–Madison research, education, and practice. It extends from the WE CONSERVE initiative to the new GreenHouse residential learning community, from developing majors in environmental studies and environmental sciences to certificates in engineering sustainability and business, environment, and social responsibility. The potential to establish sustainability as an integral part of UW–Madison's brand, increase awareness and understanding, and build a campus-wide community of sustainability is great. The time for action is now.

We should not, however, oversimplify the challenges ahead. Sustainability is not an end result: it is a process. It involves hard questions at every turn: about priorities, values, and short-term versus long-term economic benefits. Any sustainability metric is embedded in a set of values. Consider, for example, campus food-purchasing policies. Implementing a university policy to purchase 20 percent local food by 2015—where local is defined as products grown, raised, or produced within a 250-mile radius of campus—might be considered. This metric is used in a number of surveys to annually rank the sustainability commitment of colleges, and has been adopted by many universities. But what are the values being advanced in such a metric? If the pillar of a university's sustainability commitment is mitigating climate change, then a food policy aimed at reducing the amount of red meat consumption may be more effective than buying locally sourced

food, taking into account the life-cycle greenhouse gas emissions associated with food production and transportation.[6] While a campus food policy promoting local purchasing may not be a particularly effective way to minimize climate change, it may advance other institutional values linked to sustainability, including the support of diversified agriculture and regional economies. Transparency in how those values are articulated, adopted as policies, and supported by particular metrics is essential to the success of any sustainability initiative.

Over the next decade, the UW–Madison campus has the capacity to add 4 million square feet of building space with a concomitant increase in energy demand. This projected growth points to the challenges we as an institution face in acknowledging and taking responsibility for the future consequences of our decisions. It also suggests the sense of urgency needed to drive significant change. If sustainability is to be more than just a buzzword, it will also require significant change in our individual behavior, collective action, institutional commitment, and political will.

The utilization of classroom space is a small, but symbolic, example of the cultural change needed to be responsible stewards of our resources. Currently, space utilization rates for classroom and instructional laboratory space are significantly lower than our peers in the Big Ten, and departmental classroom utilization rates are approximately 50 percent less than general assignment classroom rates. The low utilization rate is, in part, the result of behaviors and policies that favor departmental autonomy, faculty flexibility, and student choice. That is why literacy in sustainability is one of the guiding principles of this report. With a thorough understanding of the trade-offs involved in the choices we make, and the complex environmental and social consequences of our action or inaction, our collective ability to set informed policy and act responsibly is enhanced.

We have the legacy, we own the tradition, and, thanks to WE CONSERVE and other efforts, we already are making our day-to-day operations more efficient. Now is the time to live up to our proud tradition and heritage, not as a follower, but as a leader in environmental sustainability. It will require concerted effort and collective will at all levels and across all areas of campus. *The challenge is to integrate sustainability into everything the campus is, and does, in education, research, operations, and public service*. Our vision is for UW–Madison to be a living model for sustainability, exemplifying values and actions that demonstrate its commitment to stewardship of resources, respect for place, and the health and well-being of the broader community, now and for the future.

It won't all happen at once. A process unfolds over time. But time is of the essence, and so we must engage in the process with all the strength and commitment UW–Madison can bring to bear.

We see this report as the beginning of a campuswide effort to clarify and set a direction for an integrated approach to sustainability at UW–Madison. In it, we offer a vision, mission, and set of guiding principles that we hope provide a useful map in charting a future course. We also offer a proposed governance structure for broad engagement by faculty, staff, and students across academics and operations. Our recommendations also include a communications strategy to establish sustainability as an integral part of the UW–Madison brand, increase awareness, build a campuswide community, and evaluate and convey progress toward a more sustainable campus. In addition, six working groups in the areas of the campus environment, energy, materials and consumption, food, transportation, and health, with participation from more than 80 faculty, staff, and students, have developed a set of goals and projects, some already under way, which have the capacity for cross-cutting integration across research, education, and operations. How we envision a sustainable future for campus, and the values we choose to advance, can only be achieved through the sifting and winnowing of ideas, and a process of shared governance and democratic decision-making, that are at the heart of UW–Madison. We look forward to your participation.

6 Christopher L. Weber and H. Scott Matthews, "Food Miles and the Relative Climate Impacts of Food Choices in the United States," *Environ. Sci. Technol.* 42 (2008): 3508–3513.

Vision, Mission, and Guiding Principles

We propose that UW–Madison be guided by the following ideas:

Vision

The University of Wisconsin–Madison will be a living model for sustainability, exemplifying values and actions that demonstrate our commitment to stewardship of resources, respect for place, and the health and well-being of the broader community, now and for the future.

Mission

The University of Wisconsin–Madison aligns research and education on sustainability (our purpose) with campus operations (our practices) in the service of environmental, economic, and social responsibility to people and the planet.

As we work together to make our vision a reality, we will strive to follow these guiding principles:

- More fully integrate research, education, and campus operations
- Incorporate systems analysis, life-cycle analysis, and cradle-to-grave thinking
- Advance literacy to effect cultural change
- Eliminate waste[7] with urgency, in ways that are environmentally, economically, and socially responsible
- Be transparent in our metrics, practices, and decision-making
- Honor and engage the ideas, enthusiasm, and commitment of students

These principles directly connect to one of the strategic priorities outlined by our chancellor in 2009: "Be responsible stewards of our resources"[8] which includes:

- Align resources with priorities
- Make our administration and governance more effective, efficient, and flexible
- Identify and pursue new revenue sources
- Promote environmental sustainability on and off campus
- Improve our technology infrastructure
- Assess our progress and make our assessments available to the campus

Guiding Principles

More fully integrate research, education, and campus operations

Education is usually thought of at the scale of the individual classroom and in the context of a relationship between an instructor and students. But education is also important in the relationship between an academic institution and its external constituents. If we take as our goal "contributing to our society's capacity to meet future challenges," then the example we set in our community through our institutional behavior is no less important than the interactions that take place between a professor and his or her students in the classroom.

Academic institutions do three things: (1) we disseminate knowledge through education/teaching; (2) we discover and create new knowledge through research; and (3) we operate (often large) institutions. In working to advance sustainability, we need to think not only about these elements on their own, but also about their relationships with one another.

7 Waste is meant to be inclusive of materials, energy, water, food, fuel, and space.

8 See http://www.chancellor.wisc.edu/strategicplan/ and http://www.chancellor.wisc.edu/strategicplan/priorities-initiatives.html

Education includes everything that we do to disseminate knowledge. Everything means not just what goes on in the classroom, but everything about how UW–Madison operates. It is vital to recognize that our institutional behavior is an immutable part of our pedagogy. Just as children recognize inconsistencies between what a parent says and does, our stakeholders—whether they are students or members of our broader communities—will be more inclined to follow our lead if our institutional actions are consistent with our words.

Research is the set of activities associated with knowledge production. To the extent that we recognize and draw on the knowledge of other groups, such as NGOs, governmental labs, private sector firms, and cultures beyond our own, we are engaged in research.

Too often, the greening of campus operations is the extent of university sustainability programs (i.e., recycling, energy conservation, building, and food and purchasing decisions). But sustainability outcomes can be further enhanced by strong, two-way connections with a university's educational and research components.

Each vertex of Figure 1 represents one of the university's core activities: education, research, and campus operations. Our challenge is to populate the center of the diagram with activities that reflect the values of the university community. Our decisions should be transparent and should represent our best understanding of the Earth system. We should engage all of our intellectual and institutional resources to ensure that the impacts of our actions are consistent with our stated vision for a better future.

Incorporate systems analysis, life-cycle analysis, and cradle-to-grave thinking

Our examination of sustainability efforts currently under way at other institutions revealed a tendency to either establish broad sweeping polices (e.g., absolute levels of carbon-emission reductions by particular

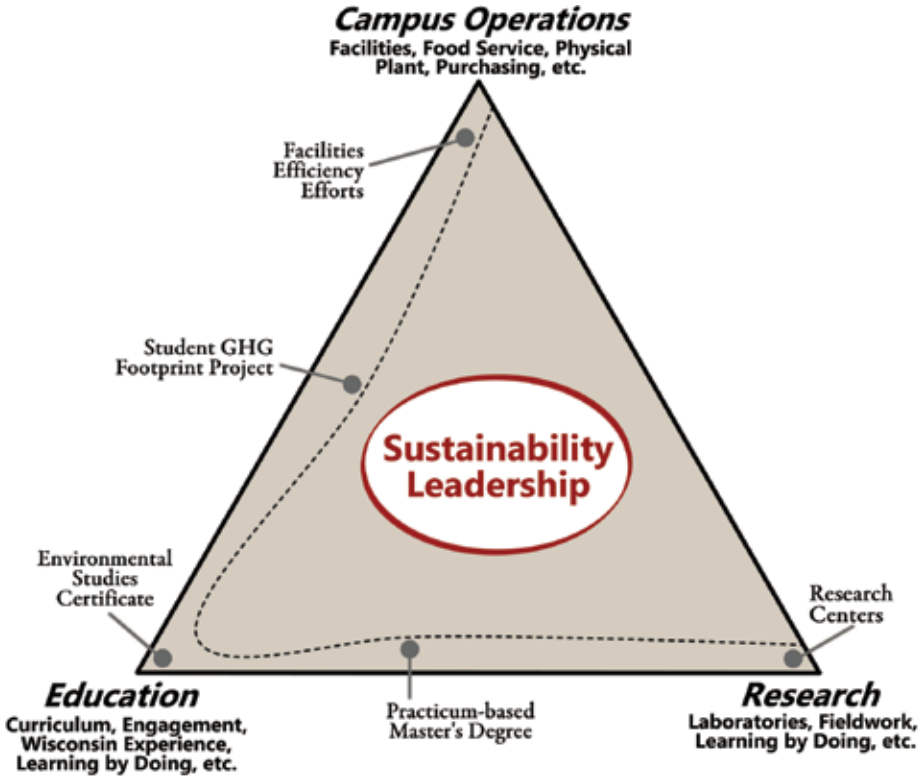


Figure 1. Integrating research, education, and operations to become a leader in campus sustainability. More details available at http://sustainability.wisc.edu/report/

dates or zero-space growth), or to promote specific tactics (e.g., LEED for all new buildings or local-food emphasis in purchasing decisions). Almost without exception, we found no defensible basis for establishing and implementing these policies and strategies. Furthermore, many of these policies and goals have been shown to fall short of providing the intended outcome. It seems clear that life-cycle analyses of the entire system for which a more sustainable outcome is sought should be a first priority.

Life-cycle assessment (LCA) is a compilation and evaluation of the inputs, outputs, and potential environmental impacts of a product system throughout its life cycle. LCA considers the entire life cycle of a product, from raw material extraction and acquisition, through energy and material production and manufacturing, to use and end-of-life treatment and final disposal. LCA typically does not address the economic or social aspects of a product, but the life cycle approach and methodologies described in the International Standards can be applied to these other aspects.

Advance literacy to effect cultural change

"In the end, we conserve only what we love. We will love only what we understand. We will understand only what we are taught." These words, from Senegalese poet Baba Dioum, eloquently express why literacy is fundamental to any significant change effort.

Advancing literacy in sustainability is a multi-dimensional task. Clearly, one dimension is to achieve an understanding of the concept of sustainability itself. Other dimensions relate to being able to "think sustainably" in specific contexts, e.g., energy, food, water, and transportation. At its heart, sustainability involves understanding system dynamics and envisioning solutions to complex problems that are difficult both to describe and to remedy. Trial and error may be necessary as we enter uncharted territory. The answers are not in the back of the book. In fact, the questions may not yet be written.

For our students, sustainability literacy is an excellent match with the Essential Learning Outcomes at UW–Madison.[9] For example, sustainability connects to the outcome of "knowledge about the physical and natural world, as focused by engagement with big questions, both contemporary and enduring." It also connects to the outcome of integrative learning, as demonstrated through the "application of knowledge, skills, and responsibilities to new settings and complex problems."[10] Infusing sustainability into our teaching, through new undergraduate majors such as environmental studies and environmental sciences, and research, through collaborative efforts across campus, gives us the opportunity to achieve these and other high-level learning outcomes.

In advancing literacy in sustainability, we also seek to couple knowledge with action. As we seek to understand sustainability, we need to also understand what motivations and preparations are needed to help solve the problems that we face as individuals, as a university, and as part of a larger society. With a thorough understanding of the trade-offs involved in the choices we make, and the complex environmental and social consequences of our action or inaction, our collective ability to set informed policy and act responsibly is enhanced.

Our students are poised to become leaders and conveyors of sustainability in their future work and lives. We owe them a robust literacy in sustainability to become informed decision-makers and change agents.

Eliminate waste with urgency, in ways that are environmentally, economically, and socially responsible

Waste is the inefficient, thoughtless, inappropriate, and unnecessary use of natural and human resources. Waste accounts for a large percentage of our consumption of natural resources. It is also a large contributor to environmental and social inequities throughout the world.

9 The Wisconsin Experience and the Essential Learning Outcomes, Office of the Dean of Students and Office of the Provost, www.learning.wisc.edu, 2009

10 Liberal Education and America's Promise (LEAP), Association of American Colleges & Universities, http://www.aacu.org/leap/documents/EssentialOutcomes_Chart.pdf.

When we leave the lights on in an unoccupied room, allow a computer to remain on even though it is not being used, throw plastic dishware and bottled water containers "away" in the cafeteria, we ignore the fact that these simple actions represent a large waste of both the natural and human resources required to provide the modern conveniences we have come to rely upon. To eliminate such waste, we must act urgently; each and every resource we fail to conserve represents a loss of natural and human inputs that cannot be regained.

We have the great opportunity to educate our campus community in resource-saving practices while also enhancing our campus operations in ways that make the "sustainable" choice the easiest and most logical choice. For real and lasting changes in behavior that align with our sustainability goals, people need to be informed about the environmental, economic, and social impacts of waste. Understanding the consequences of one's actions is the first step toward changes in one's behavior. But knowledge alone is often not enough. Incentives can help nudge individuals and institutions to accept inconvenience and embrace change for the greater good.

Be transparent in our metrics, practices, and decision-making

An unwavering commitment to transparency is critically important to the success of UW–Madison's sustainability initiative. In our highly decentralized campus environment, honest transparency will help engage the community and build a sense of empowerment. It will help leverage the best ideas from a variety of perspectives and from all corners of the campus. It also will help our sustainability efforts carry on UW–Madison's proud tradition of sifting and winnowing.

In addition to creating public visibility and building cross-campus support, a commitment to transparency will ensure accountability in all aspects of our sustainability program. As the campus moves ahead with this initiative, we must constantly ask and answer a simple question: How are we doing? Measurement and evaluation on issues ranging from campus energy use to the sustainability literacy of students, faculty, and staff must be ongoing and accurate. Transparency will enable the entire campus community to celebrate our successes and work together in areas that need improvement.

Finally, consider the alternative. The absence of transparency runs the risk of alienating the very stakeholders we want to engage and has the potential to undercut the entire sustainability initiative. Support for and participation in this effort cannot happen without open and honest communication. The evaluation of how we are doing cannot take place without clear, reliable, and accessible data. Only through an honest assessment of our efforts can we hope to achieve our sustainability goals.

Honor and engage the ideas, enthusiasm, and commitment of students

Students are at the center of campus life. They are also future alumni, citizens, and leaders who will raise, nurture, and inspire generations to come. They are the inheritors of this place and this Earth. Their ideas, passion, concerns, and efforts should be respected, honored, and encouraged to advance sustainability on campus, in the community, and throughout their lives.

This will require a commitment to create and promote accessible and meaningful opportunities for student engagement in sustainability—from volunteer opportunities to paid internships, from directed studies to sustainability courses—regardless of a student's major or background. These learning experiences, inside and outside the classroom, are vital if the campus is to become a living model of sustainability, whereby students can learn and build upon our successes and failures in creating positive change.

Honoring and respecting students as future generations also means ensuring their involvement in the governance, decision-making, and day-to-day management of campus sustainability efforts. Students are an important bridge in integrating the research, educational, and operational functions of campus.

The knowledge and values that students acquire and contribute to in advancing sustainability at the UW–Madison is a key metric of institutional commitment and measure of future success.

Realizing the Vision

Proposed Governance Structure

This section provides an explanation of how decisions will be made within the UW–Madison Sustainability Initiative, and serves as a blueprint of the governance structure and process for successful project selection and implementation at UW–Madison. This blueprint is by no means inclusive of the many detailed roles and relationships that will, over time, compose this system.

Structure

The governance structure recommended by the task force is made up of five basic elements: An Office of Sustainability, an Advisory Committee, an "Ideas Bank," ad hoc working groups, and sponsorship from the provost and vice chancellor for administration (Figure 2). These elements will help the campus to embody the sustainability principles articulated by the task force.

Office of Sustainability

The task force recommends the creation of an Office of Sustainability. This office will serve as the central clearinghouse for sustainability-related information and activities by 1) developing networks across campus in operations, research, and education, 2) providing concrete examples of best practices across campus in content or subject areas, 3) maintaining inventories of existing and needed projects as well as efforts, metrics and resources deployed to meet campus sustainability principles, 4) assembling ad hoc working groups, and 5) fostering, promoting, coordinating, and communicating sustainability principles, commitments, efforts, ideas, and involvement opportunities (including a highly interactive website), and 6) designing and implementing projects necessary to achieve the sustainability vision and principles set forth to move UW–Madison forward. In order to meet the vision of a more integrated sustainability effort, we recommend that the office have co-directors, one for operations and another coordinating the academic (education and research) side of the campus. The office will help to catalyze interactions across disciplines and foster connections between the many activities taking place in the area of sustainability. It is imperative, therefore, that this office have a small, sufficient number of staff, who will act as catalysts in concert with others. Student interns and staff will be used to support these efforts.

Advisory Committee

The task force recommends formally chartering a Sustainability Advisory Committee. The role of this body is to set an overall direction for the campus and to recommend broad policies to the provost and vice chancellor for administration in the area of sustainability. Its work could include 1) prioritizing annual focus areas (an annual theme or themes to work on a specific topical area, such as campus food initiatives), 2) providing consensus recommendations on far-reaching policies that represent the values and will of UW–Madison and its constituents, and 3) ensuring the Office of Sustainability is accountable for its work. The make-up of the committee will include student seats and a cross section of operational and academic faculty and staff.

"Ideas Bank"

Inspiring and engaging the campus in sustainability is vitally important. On a campus with the size and complexity of UW–Madison, a huge potential exists for outstanding ideas and actions to go unnoticed. Borrowing from MIT's highly successful program (http://ideabank.mit.edu/), the Ideas Bank will help harness the collective wisdom of campus and tap into its spirit of innovation. The Ideas Bank is an online resource tool that invites campus members to provide and rank ideas they think have merit, usually within a certain requested subject area. The Office of Sustain-

ability will be charged with processing and managing this program.

Ad Hoc Working Groups

The task force found great value in using working groups in each content area (campus environment, energy, materials and consumption, food, transportation, and health) as well as two subject areas (governance and communications) to engage with a large cross section of campus stakeholders. We therefore recommend utilizing ad hoc working groups when appropriate to help explore complex issues and projects. Students, faculty, and staff should make up these groups, along with interns to help ensure efficient operation.

Provost and Vice Chancellor for Administration

The task force recommends that the Office of Sustainability report directly in the chain of command to the provost and vice chancellor for administration. They will also act as the initiative's sponsors.

Process and Function

In order to illustrate the potential for this governance structure, here is an example of how it may function in practice.

At the beginning of the academic year, the advisory board meets to prioritize and recommend thematic directions or projects. Let us imagine that this year the theme is "what are the best approaches for a sustainable food system at UW–Madison?" The theme is introduced to the campus and ideas pertaining to this thematic area come into the Ideas Bank from campus or community members. The Office of Sustainability maintains an inventory to determine how to match project suggestions from the Ideas Bank and other sources with current efforts in this thematic area. The office decides whether to launch an ad hoc working group to explore potential solutions to the theme of "what are the best approaches for a sustainable food system at UW–Madison?" If it decides to charter a working group, the office packages ideas to help support the group's efforts (with the help of a database to help

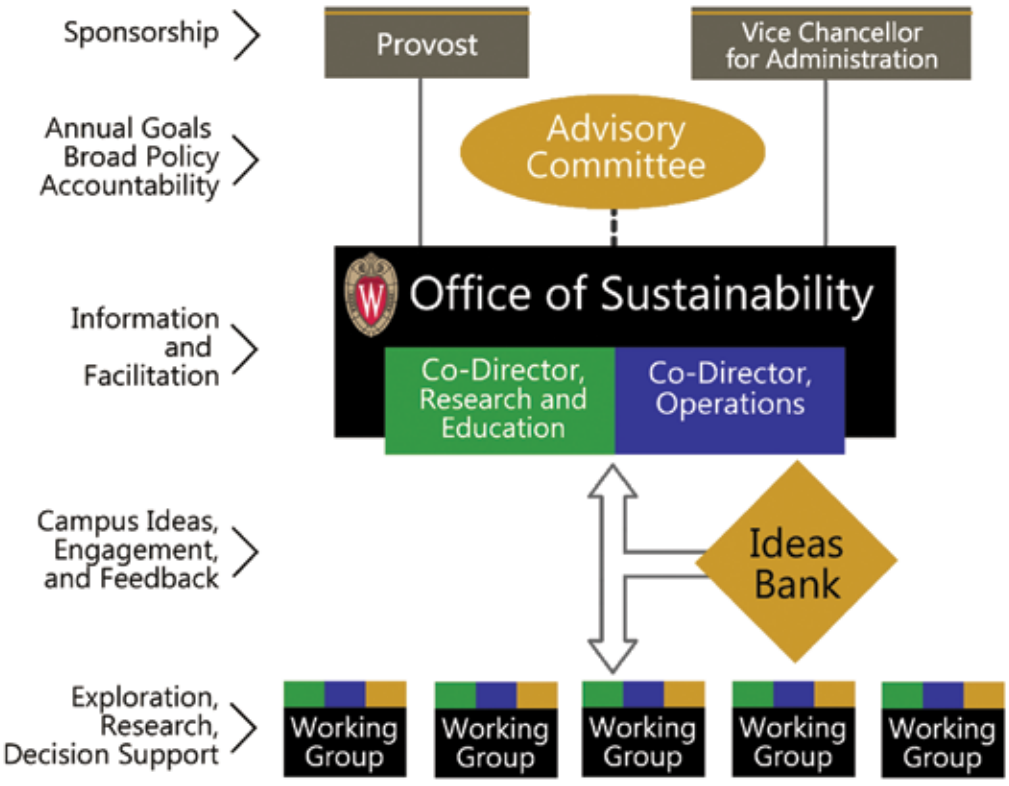


Figure 2. Recommended Office of Sustainability governance structure.

determine current practices and how the project would change them). Now the ad hoc working group investigates best practices and recommends solutions to the office. The office decides whether solutions need further support from the provost and vice chancellor in order to implement. If requested, the vice chancellor/provost/directors give approval or support for the recommended project(s). The office then utilizes cross-campus networks of operational and academic members or other partners to put into place the project(s) or ideas.

Proposed Communication Plan

UW–Madison's Campus Sustainability Initiative will require strong, consistent, articulate communications in order to realize the principles put forth in this report. From strengthening the university's brand to fostering a culture of sustainability on campus, clear and comprehensive goals and messages are crucial to the success of the initiative. This communications strategy is intended as an initial framework to outline what we consider to be the foremost goals of sustainability communications on campus and possible channels to reach our intended audiences. Continued success will require ongoing evaluation and flexibility as our goals and strategies evolve.

Communication Goals

1. Establish sustainability as an integral part of the UW–Madison brand.
2. Increase awareness and understanding of what sustainability is and how it relates to working, studying, playing, and living at UW–Madison.
3. Build a campuswide community of sustainability.
4. Identify areas of change and evaluate and convey progress toward a more sustainable campus.

1. Branding

To position UW–Madison as a role model and leader in sustainability, it is imperative that sustainability becomes a part of the fabric of the university, an integral part of what it means to be a Badger. UW–Madison sustainability communication efforts should build on the unparalleled environmental legacy that sets us apart from our peer institutions and shows our natural grounding in sustainable thoughts and actions. To capitalize on the strength of the UW–Madison brand, we recommend aligning sustainability communications with existing branding practices wherever possible, including website design, fonts, colors, and use of the UW–Madison crest.

2. Awareness

We must engage members of the campus community in a dialogue about what sustainability is and what it means to them in their daily lives. One important issue is showing that sustainability is not just an environmental movement. Developing a common literacy in sustainability will allow us to engage in a unified conversation to identify where we are now, where we would like to be, and how we can get there. This communication should include examples of effective and ineffective actions to empower individuals and groups to take ownership of the initiative, make educated decisions, and change their behaviors.

3. Community

The Sustainability Initiative will be successful only with the buy-in, support, and active participation by the entire UW–Madison campus, including prospective and current students, faculty, classified and academic staff, and administration. Communications should encourage both top-down (leadership-driven) and bottom-up (individual- or small-group driven) approaches. Campus leaders, including staff committees, faculty governance, and student government, can be enlisted to solicit input from diverse audiences and identify areas of coordination and cooperation with the goal of linking the many corners of campus.

4. Progress

Benchmarks and metrics should be developed to quantify changes and progress toward achievable goals. Both the processes and the outcomes should

be well publicized to promote transparency, reward accomplishment, inspire further work, and raise the sustainability profile of UW–Madison. Additional benchmarks and metrics should evaluate the effectiveness of our communications efforts, including branding and awareness.

Communication Channels

It is imperative that communication approaches be strategic in order to more effectively meet several of the principles proposed in this report, including culture change; transparency in metrics, practices and decision-making; and engaging students. We believe the four communication goals can best be accomplished through the following channels:

Direct communication from leadership. Visible and clear statements of support from campus leadership will be essential for sustainability to succeed on campus. This includes communication with campus groups through messages from the chancellor, deans, directors, and chairs, as well as conversations with influencers—city and state government, thought leaders, prominent members of the business community, media, and donors.

Student engagement. Students are the largest and typically most active population on campus and arguably have the greatest stake in the future of our planet. Student-led activities and organizations will provide a critical cornerstone of sustainability on campus. Student voices are more likely to resonate with other students, making student leaders and organizations (Associated Students of Madison, *Daily Cardinal*, *Badger Herald*, and others) key channels for reaching the student body.

Prominence in admissions materials. Prospective students and their parents are a primary audience for our commitment to sustainability and, for many, the admissions process is their first contact with the university. UW–Madison should emphasize sustainability at all phases of student recruitment, including admissions materials, the Office of Admissions website, school fairs, campus tours, acceptance letters, and contacts with alumni and other university representatives.

Participation in surveys and rankings. Sustainability rankings and lists of "green" colleges are a quick way for prospective students to identify schools that share their values. UW–Madison is underrepresented among these ranks, despite credentials that merit inclusion. Identification of appropriate surveys and timely responses should be assigned to a designated person, preferably one with extensive experience in dealing with sustainability ranking organizations.

Sustainability.wisc.edu. The UW–Madison sustainability website will support the campus sustainability mission by serving as a central place to discover, align, and connect to activity on campus. It will be a portal for all information on sustainability, including resources, guidelines, best practices, metrics, and progress. The website must be updated frequently to reflect our active engagement and to provide a place for regular feedback on the university's performance.

Sustainability e-newsletter. The task force recommends creating an e-newsletter that can be distributed quarterly to the campus community and made available on the sustainability website. Content can include news items related to sustainability efforts in research, education, operations, and campus life, as well as a mix of other content: profiles of individuals who are making a difference, "news you can use" items, campuswide progress updates, best practices from UW–Madison or peer institutions, and features on classes that incorporate elements of sustainability.

Integration with existing campus communication channels. Sustainability communications should coordinate with existing networks on campus and develop a cohesive approach to campuswide communications about sustainability to avoid confusion and duplication of efforts.

- **Web presence:** The sustainability website should link to relevant information on existing campus web pages, such as those from departments, research centers, and the WE CONSERVE program, and be linked from the UW–Madison home page and all departmental and unit

websites. A sustainability keyword tag should be added for university news searches.

- **Publicity:** Sustainability-related events, research, and achievements can be publicized through University Communications and other communication offices across campus (College of Agricultural and Life Sciences, College of Engineering, Nelson Institute, UW Health, etc.) via news releases, *Wisconsin Week*, *On Wisconsin* alumni magazine, school and college magazines, departmental newsletters, media placements, and social media.
- **Social media:** Sustainability efforts should be featured on UW–Madison's Facebook page. A sustainability-specific Twitter feed should be created to raise awareness of UW–Madison efforts, align campus communications and, contribute to the broader conversation about sustainability and higher education.

Incentives and awards. Incentives and awards for students, staff, and faculty may increase participation, reward improvement, and help create a positive buzz around behavioral changes that might otherwise be perceived negatively. Student competitions such as the Climate Leadership Challenge, Innovation Days, and the 100-Hour Challenge can incorporate sustainability or serve as a model for a sustainability-themed competition. Such efforts offer opportunities to forge new corporate partnerships and attract publicity for sustainability activities.

Engagement of associated entities. Campus units and partners including UW Housing, the Wisconsin Union, UW Athletics, UW Health, the Wisconsin Alumni Association, and the UW Foundation can become major players in promoting sustainability at UW–Madison through connections to the external community, including parents, alumni, donors, and the general public.

Coordination of academic opportunities. A comprehensive list of courses related to sustainability, accessible through the sustainability website, will help students pursue areas of interest in schools or departments they might not otherwise be exposed to, and will facilitate connections among students in different academic programs and identify gaps in the existing curriculum. As with the Go Big Read program, faculty should be challenged to integrate issues and discussions related to sustainability into classes in all disciplines.

Roll-out. Chancellor Martin; other senior campus leaders; key faculty, staff, and students; community leaders—and even Bucky Badger—should be part of a major public event announcing the sustainability initiative and UW–Madison's vision for sustainability. This roll-out should be planned in consultation with communication experts following confirmation of support from campus leadership and governance.

Content Areas

The following section contains recommendations and ideas to help achieve the vision set forth for campus sustainability by concentrating on topically based content areas including the campus environment, energy, materials and consumption, food, transportation, and health. It can serve as a guide and resource as we seek to integrate operations, education, and research functions across campus. Full reports from working groups provide more detailed explanations of projects, metrics, and context, and can be reviewed at http://sustainability.wisc.edu/wiki.

CAMPUS ENVIRONMENT

Vision Statement

To use the campus buildings and outdoor environments as living laboratories of stewardship in which we discover, teach, and apply knowledge that safeguards the environment, preserves quality of life, and maintains fiscal responsibility.

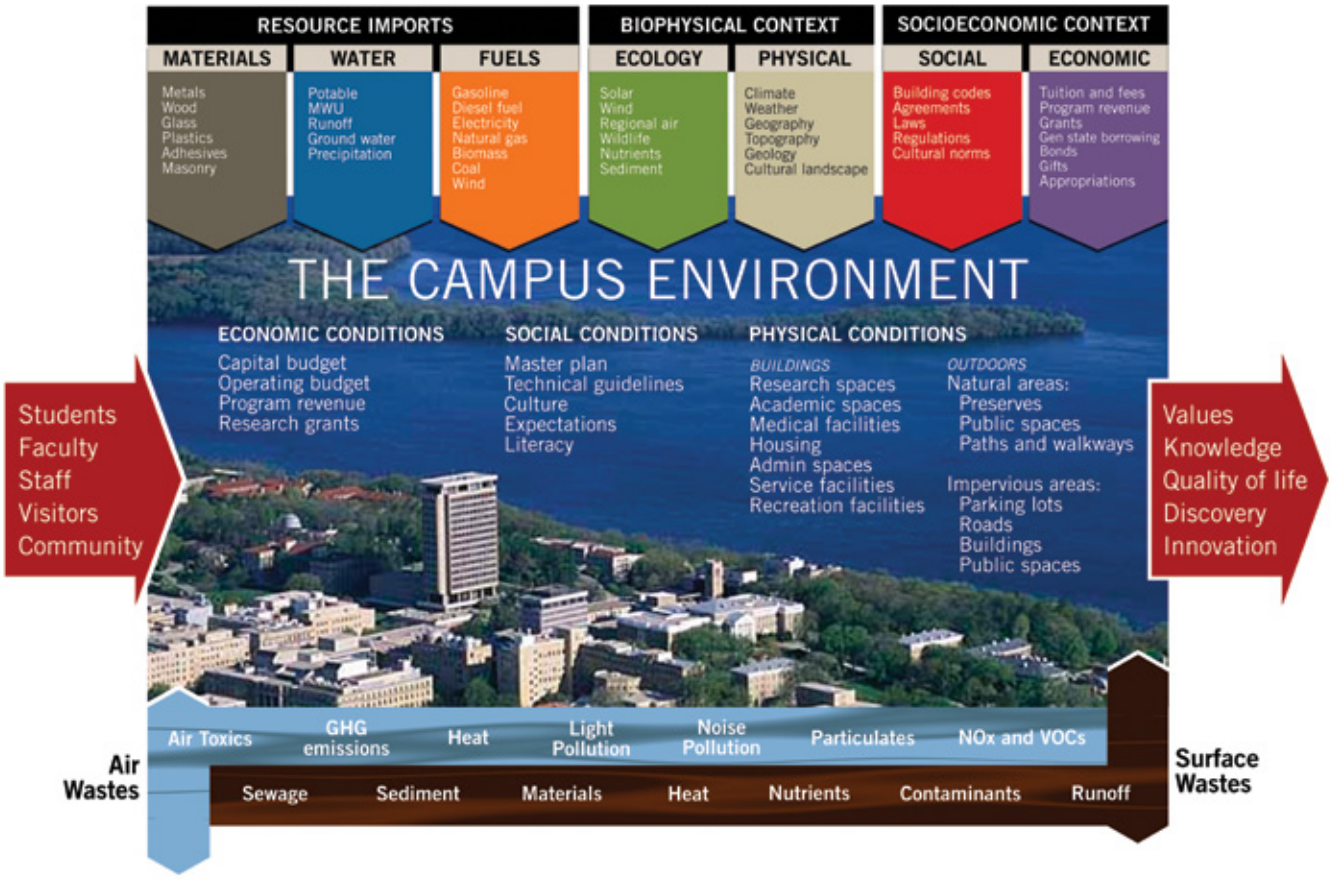


Figure 3. Campus environment system at UW–Madison.

Recommendations and Goals

To achieve the goals and directions set forth by the task force, we developed a system diagram (Figure 3) to describe the current state of the UW–Madison campus environment. This diagram shows flows into and constraints on the campus environment, the current states of systems within the campus environment, and the flows out of the campus environment. Natural imports enter the system along with natural constraints and socioeconomic external drivers. Some wastes can be recaptured and reused while others may only be reduced in quantity.

Sustainably manage natural imports

Construction Materials: Minimize material use and use materials with low environmental impact. Construction generally involves significant amount of demolition and rework which, when properly planned and managed, can be minimized. Further, construction materials have significant levels of embodied energy involved in manufacturing and delivering the materials to the job site.[11] In addition, some materials have harmful environmental impacts when harvested, or may give off harmful toxics when used in interior environments. The university should study all of these impacts of construction materials and ways to mitigate those negative impacts.

Water: Sustainably manage imported water on campus. This includes three imports: the surface water that comes into campus from urban runoff, the groundwater that is pumped for campus uses, and bottled water being purchased and consumed on campus. The Yahara Lakes (including Lake Mendota) were historically recharged by groundwater in the watershed. Now, as a consequence of increased water use by the city of Madison (including the university), the flow has reversed—Lake Mendota is now charging the groundwater system.[12] In addition, Madison routes about 40 million gallons of water per day out of the watershed through consumption and wastewater treatment. The university contributes to this and could reduce its consumption of potable water and consider means to return this diverted water back into the watershed. In addition, substantial surface water is imported to campus. Regarding bottled water imports, water fill stations could be established to use locally harvested water instead of water being trucked in from points unknown, and have a much smaller carbon footprint.

Fuels: Achieve and maintain sustainable levels of fuel use on campus, particularly by dramatically reducing existing building energy use. Buildings are responsible for almost half of the energy use in the United States and over three quarters of the electricity use in the United States.[13] These trends hold true for the university as well. In order to lower operating costs and the environmental impact of the university, significant efforts should be put towards researching and applying energy saving practices in buildings. WE CONSERVE has demonstrated how existing building energy use can be reduced and its program should be expanded and accelerated.

Reduce and minimize waste

Air: **Achieve and maintain clean and healthy air on campus and limit emissions of greenhouse gases.** Dane County occasionally exceeds the American Lung Association's metrics for ozone and particulate pollution, placing residents of Madison and Dane County at risk for the health issues associated with those pollutants.[14] Several other pollutants and air toxics exist in the outdoor air of the campus environment. In addition, the air quality of the work spaces, research labs, and academic spaces in the buildings on campus impacts the health and well-being of building occupants. Finally, greenhouse gases and ozone depleting chemicals have shown to compromise

11 Hammand, G., & Jones, C. (2008). Embodied energy and carbon in construction materials. *Proceedings of the Institution of Civil Engineers, May 2008*(EN2), 87–98.

12 Lathrop, R., Bradbury, K., Halverson, B., Potter, K., & Taylor, D. (2005). Responses to urbanization: Groundwater, stream flow, and lake level responses to urbanization in the Yahara lakes basin. *Lakeline, Winter 2005*, 39–46.

13 Architecture 2030. (2009). *The building sector: A hidden culprit.* http://www.architecture2030.org/

14 American Lung Association. (2010). *State of the air 2010*. New York, NY: Hard Copy Printing.

Figure 4. The Campus Environment boundary (from the 2005 Master Plan).

the global climate, and the campus environment is responsible for many of those emissions.

Surface: **Sustainably manage soils and stormwater runoff, enhance biodiversity on campus and reduce material waste**. Urban stormwater runoff coming into and leaving the campus compromises water quality in surface waters on campus and contributes to water-quality degradation in the Yahara Lakes system. Poor soil conditions lead to many of the surface wastes outlined in the system diagram. Poor soil cannot sustain wildlife and vegetation, eroded soil can transport harmful chemicals to surface waters, and compacted soils can decrease groundwater recharge, increasing urban runoff and flooding. Impervious surfaces are also significant contributors to stormwater runoff and can be substituted with systems that reduce runoff and enhance biodiversity. In addition, material waste is produced by construction projects and buildings act as a conduit for material waste from inhabitants.

Buildings: **Sustainably manage our building inventory to assure existing facilities are utilized efficiently and that existing buildings are remodeled, reused, and reprogrammed to extend their useful life into the next century prior to building additional new space.** UW–Madison has approximately 22 million gross square feet of existing building space. Included in that inventory are many older and historic buildings that can and have been reprogrammed to extend their life. The old adage of "reduce, reuse, recycle" can easily be used when evaluating building capacity, and has been in many cases across the campus. Examples include total building renovations for: Red Gym/Armory, Lathrop Hall, Chamberlin Hall, Sterling Hall, Biochemistry, Hiram Smith, Material Sciences, Mechanical Engineering, Horticulture, Babcock Hall, Mifflin Street Warehouse (now the Art Lofts), Washburn Observatory, the University Club, Education Building, the School of Human Ecology, and many of our residence halls. Others are planned for similar

renovation in the future including the Memorial Union, Science Hall, and Music Hall. Many of our buildings, however, are also at the end of their useful life. The structural systems are failing, their HVAC system are failing, and they are woefully energy inefficient—they do not meet necessary program needs and would not be economically feasible to reprogram or renovate. In several cases, it is actually more sustainable physically and fiscally to remove them and build new.

Points of Discussion

UW–Madison occupies 935 contiguous acres of land that it manages along with the UW Arboretum and various research stations off-campus. While the Arboretum and other facilities outside the main campus may offer valuable lessons in implementing sustainable practices, the "campus environment" as defined by this group includes 935 contiguous acres of land bordered by property lines to the west, east, and south, and by Lake Mendota to the north. This land contains preserves, public spaces, paths and walkways, parking lots, roads, housing, academic spaces, research spaces, medical facilities, recreational facilities, service facilities, and administrative spaces. The development and management of these outdoor environments and buildings on campus are governed by complex natural systems (such as hydrologic and nutrient cycles), social constructs (such as codes and laws), and financial constraints (such as revenue and state funds).

Comparison to Peers

Due to the unique nature of the university's physical setting and socio-economic conditions, we determined that providing detailed benchmarking of other universities' campus environments would be of marginal benefit. We did, however, discover that our peer universities have relevant policies and programs that can be emulated to improve the sustainability of the campus environment and involve learning and research in doing so. Common themes included life-cycle analysis for all building projects, use of native plantings, collecting and displaying energy and water usage for each building, and more. The task force may choose to recommend the university adopt similar policies based on this report.

Institutional capacity for linking education, operational, and research functions

A number of academic and operational departments can act as hubs of activity in sustainability of the campus environment and are vital contacts for enacting sustainable projects. These include:

Academic

1. Atmospheric and Oceanic Sciences
2. Biological Systems Engineering
3. Botany
4. Civil and Environmental Engineering
5. College of Engineering – Energy Institute
6. Horticulture
7. Landscape Architecture
8. Nelson Institute for Environmental Studies
9. School of Human Ecology
10. Soils Science
11. Urban and Regional Planning

Operational

1. Campus Planning Committee (and other review bodies)
2. Campus Planning and Landscape Architecture
3. Capital Planning and Development
4. Environment, Health and Safety
5. Lakeshore Nature Preserve
6. Physical Plant – Grounds
7. Physical Plant – Maintenance
8. Physical Plant – WE CONSERVE
9. Space Management Office

In addition, a number of current efforts are already under way on campus that effectively link educational, research, and operational functions at UW–Madison. For a complete listing and description of these projects visit http://sustainability.wisc.edu/report/projects.htm.

Defining Defensible Metrics and Standards

Currently, the data available for many of the natural imports and wastes is insufficient to set useful metrics. Recommendations to study current operational consumption and waste, develop meaningful limits, develop projects to reach those limits, and establish transparency and availability of historical data are included herein (see Table 2 for a summary of recommended projects). State, campus, and other standards and guidelines are in place for buildings and the outdoor environment that provide means for indirectly achieving sustainability goals, but measurable, quantifiable, and absolute metrics are necessary to ensure accountability. Baseline data and metrics are difficult to pinpoint and set, and will evolve over time. Refer to the full working-group report for a listing of goals and standards that require greater research (http://www.sustainability.wisc.edu/environments/).

Project Recommendations

Project 1: Measure/Model/Focus

Currently, specific data and metering is not always available to determine exactly what buildings or areas on campus have the biggest room for reduction in consumption of energy, water, other resources, and production of wastes. To install an extensive metering system to give us this information for each building and power plant on campus may take decades and millions of dollars. Energy metering is being done on some existing buildings as they are renovated and remodeled. Instead, the campus should evaluate what information is available now, develop models to pinpoint the biggest areas for improvement, and utilize strategies for consumption reduction in these focused areas. These strategies could entail metering at focused locations, rather than a campuswide network. Students and researchers could contribute to developing these models and strategies, as well as monitoring the success of projects that would come from this process.

	Imports				Wastes	
	Water	Fuels	Materials		Air	Surface
Recommended Projects						
Measure/Model/Focus	X	X				
Visibility of Data and Performance	X	X	X		X	X
Campus Landscape Master Plan	X	X	X		X	X
Nine Springs Waste Replenishment	X					X
Space Utilization Study	X	X	X		X	X
Willow Creek Restoration & Stormwater Mitigation	X					X
Recycling Clarity/Consistency			X			X
Window Glazing			X			
Thermal Performance		X	X			

Table 2. Recommended Campus Environment Projects.

As an example of this process, the Space Management Office will be developing an improved process to associate research grants and PIs to research space on a systematic and comprehensive basis. The intent is to strengthen the institution's F&A cost proposal in addition to capturing information that can be utilized by various campus units with research management and federal compliance responsibilities. These data will serve as a basis for resource-allocation analysis and decision-making by deans, department chairs, and campus administration.

Another project could be the installation of an air-quality monitor on campus to measure the air pollutants mentioned in Section Five: Metrics. This would be a relatively low-cost project in the Measure/Model/Focus group of projects and would allow the university to have a better understanding of how its operations impact the local-air quality of the campus. Students could be involved in studying the data from the monitor and studying where certain pollutants come from on campus.

Project 2: Visibility of Data and Performance

In many cases, data exist or will exist because of the sustainability measures taken by the university. This data should be made more visible and accessible to the campus as a whole to increase literacy, understanding, and clarity of the current situation. Some data, which may be helpful to display in central locations, include:

- Inventory and map of fertilizers and pesticides used on campus
- Air-quality monitoring data
- Maps of mowed spaces
- Water quality leaving campus (specifically from Willow Creek and other stormwater outfalls into the Yahara Lakes system)
- Utility consumption data for each building (or at least each new building)
- Mapped locations of LEED-certified buildings
- Stormwater metrics across campus

Project 3: Campus Landscape Master Plan

While there are provisions in the Campus Master Plan for increasing open space and street tree plantings on campus, there is no overall detailed Landscape Master Plan. Creating a Landscape Master Plan would ensure the development of sustainable, enjoyable, and useful open spaces, and would ensure the preservation of natural spaces on campus. This plan would also provide a more holistic vision for natural/outdoor spaces and achieving sustainability goals, especially those concerning stormwater management and biodiversity. The development, implementation, and monitoring of this plan could be supported by undergraduate classes, student projects, capstone courses, and graduate-level studies. A Master Plan for the Lakeshore Nature Preserve was developed and released in 2006 (UW–Madison Lakeshore Preserve 2006; http://lakeshorepreserve.wisc.edu/stewardship/master_plan.htm). The Preserve Master Plan, particularly its guiding principles, could be used as a benchmark or resource in the development of the Campus Landscape Master Plan. Initial recommendations for the plan from this group include:

- Increasing street tree coverage and other heat-island-effect mitigation practices, involve faculty and students in planning, studying, planting.
- Increasing infiltration on the asphalt flume at Tripp Hall and in general on campus.
- Use Linden Drive (or other) as a study site for water infiltration and sediment-load reduction practices.
- Integrate the Sustainable Sites Initiative ideals and recommendations into campus site planning.
- "Daylighting" drainage waste.
- Find and transform areas where conventional lawns could be replaced by native grasses or other species that do not need to be mowed.
- Study and recommend a policy on the feasibility of incorporating food production into open spaces.

- Set and enforce soil standards for new and existing development.
- Study and comment on the sustainability and tradeoffs of installing in-ground irrigation, especially for high traffic areas.

Project 4: Nine Springs Waste Replenishment

As mentioned above, Madison diverts about 40 million gallons of water out of its watershed through consumption and then wastewater treatment disposal out of the watershed. While it is not on campus, the university could study ways to pipe some of the wastewater from the Nine Springs Treatment Plant back into the watershed, possibly on campus. This project would involve a number of professors, students, and other members of the university, along with stakeholders from the city and county.

Project 5: Space Utilization Study

While other projects and programs address how an individual building's economic and environmental footprints can be improved—both new and existing—*this proposed project addresses how sustainability impacts traditional methods of establishing space requirements and need.* How do we measure ecological, economic, and social impacts of space? Can we redefine "need" in light of these impacts to better utilize capacity that is currently hidden, under-utilized, or stranded? How do we add sustainability considerations and still maintain and enhance university function? Addressing this issue directly impacts outcomes in other areas—such as energy, climate, and more. A joint research, education, and operations project is proposed to develop and apply systems and life-cycle analysis tools and methods to apply the principles of sustainability in assessing and optimizing a university's space needs. Given the critical need to improve the utilization of classroom space at UW–Madison, we recommend this as a test case and proof of concept in developing a rigorous sustainability metric for space optimization.

Project 6: Willow Creek Restoration & Stormwater Mitigation

Willow Creek, which flows into Lake Mendota just to the west of the Natatorium, contains urban runoff from a significant portion of the near west side of Madison and from the campus, and is an exhibit of urban-stream degradation. During and after storm events, the creek flashes and fills with sediment, causing water quality and erosion issues in the creek and in Lake Mendota. This project would, over time, restore the banks of the creek, improve the handling of stormwater before it enters the creek, increase public awareness of the creek and how stormwater management can improve the creek, and make the creek into an enjoyable public space. This would potentially be a long-term project (over 10 years) with room for involvement of operations, academic staff, and city and county staff, along with faculty and students to guide, plan, design, implement, and research this project.

Project 7: Recycling Clarity/Consistency

A lack of clarity and consistency of practices and policies on campus may be impeding campus recycling efforts. Developing and enforcing a clear set of guidelines for recycling and waste receptacles in conjunction with an education and outreach program could decrease the amount of mismanaged waste and improve the recycling system on campus. Student groups and classes could help in the development, implementation, and advertisement of these guidelines and policies.

Project 8: Window Glazing Optimization – Visual (Daylighting and Aesthetics vs. Building Thermal Performance)

An often important goal of new building projects is to improve or provide for a high level of thermal performance while providing building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight

and views into the regularly occupied areas of the building. Key visual features of curtain walls are glazing appearance and sightlines. The Division of State Facilities has current restrictions on the amount of glazing penetrations that may or may not optimize daylight penetration deep into our buildings, nor allow for good sight lines out. This also affects the aesthetics of the university. We recommend studying the effects of the DSF restrictions on new and existing campus buildings.

Project 9: Thermal Performance (Conduction, Solar Radiation, Thermal Break, Comfort)

The basic function of the envelope or enclosure of a building or structure is to protect the covered or otherwise conditioned interior spaces from the surrounding environment. This fundamental need for shelter is a concept that is as old as the recorded history of mankind. However, as our needs have evolved and technologies have advanced, the demand placed on designers to both understand, and integrate, a wide range of increasingly complex materials, components, and systems into the building enclosure has grown in equal proportion. We suggest that major university construction projects may benefit from additional resources to facilitate a better understanding of the basic principles behind heat, air, and moisture transfer (including bulk rainwater penetration and precipitation management) through the exterior walls of a building or structure. Specifically, a study focused on specified exterior wall systems in the Midwest, illustrating proper selection, use, and integration of the various materials, components, and systems that comprise those wall systems is critical to the long-term durability and performance of the building enclosure.

ENERGY

Vision Statement

To develop and promote a culture of energy literacy to facilitate sustainable energy use and reductions in byproducts and emissions on campus and beyond.

Recommendations and Goals

To achieve this vision, our activities include, but are not limited, to:

- Minimizing unnecessary or inefficient use of energy in the campus
- Focusing research on more energy-efficient products and solutions
- Emphasizing the importance of the environment in instruction and campus life
- Maximizing purchase and generation of sustainable alternative power

Points of Discussion

The U.S. has one of the highest energy uses per capita of any nation in the world, accounting for over 20 percent of all energy used worldwide. The average U.S. citizen uses roughly 15 times more energy than an average person in a developing country. UW–Madison energy use may be more intensive, given the education and research activities by faculty, staff, and students. Because of this activity and our goal to be a living model to others in the state and the nation, a focus on sustainability is a logical step that needs to be part of our mission and goals.

Energy Achievements to Date

UW–Madison is currently one of the nation's leading campuses in energy conservation. Energy sustainability in our operations began in earnest in 2000 with the investment of over $29 million in the Wisconsin Energy Initiative that focused on increasing building-system efficiency. This investment resulted in a reduction of the university's annual energy costs by over $3.5 million.

In 2006, the university launched a comprehensive environmental stewardship initiative entitled 'WE CONSERVE' (http://www.conserve.wisc.edu/), which has focused on energy sustainability, waste prevention, and public awareness in operations throughout the Madison campus. Under this program, we have reduced our energy and water consumption by over 20 percent, saving the university about $10 million annually. This has been accomplished mostly through the retro-commissioning of buildings on campus in which targeted mechanical systems and building infrastructure (insulation, fans, meters, sensors, etc.) were replaced or updated.

UW also has plans to replace its current coal-burning heating plant with a cleaner and more efficient mixed-fuel heating plant that uses fuels including biomass. The $250 million project scheduled to be completed in 2013 will be one of the largest biomass energy projects in the U.S., and is estimated to improve efficiency by 5 to 10 percent (http://www.news.wisc.edu/16755).

Peer Comparison

Campuses around the U.S. are beginning to evaluate their energy use, along with educating their students, faculty, and staff on the topic of sustainable energy use. Many peer institutions have taken steps to get their faculty, staff, and students involved through several pathways, including courses, internships, and campus energy-saving programs. UW–Madison will need to look closely into integrating faculty, staff, and student involvement in all of its energy use/conservation projects to truly become sustainable.

Institutional capacity for linking education, operational, and research functions

UW–Madison is uniquely positioned to integrate its education, research, and operational activities toward the goal of energy efficiency. Some of the key resources include:

Academic

1. Nelson Institute for Environmental Studies
2. UW Energy Institute
3. Wisconsin Bioenergy Initiative

Operational

1. Administrative Information Management Services (AIMS)
2. Athletics Facilities
3. Business Services
4. Campus Planning & Landscape Architecture
5. Capital Planning & Development
6. Division of Housing
7. Division of Information Technology (DoIT)
8. Environmental Health & Safety
9. Facilities Managers representing the various UW–Madison schools and colleges
10. Facilities Planning and Management (FP&M)
11. Physical Plant Department
12. Purchasing Services
13. Surplus With a Purpose (SWAP)
14. Space Management Office
15. Student groups, including ReTHINK
16. Transportation Services
17. University Residence Halls
18. University Apartments
19. WE CONSERVE Initiative
20. Wisconsin Union

Defining Defensible Metrics and Standards

We recommend developing defensible knowledge-based metrics for energy literacy, current energy use, and energy consumption trends across campus as these areas can help guide future actions in moving toward greater energy conservation and further energy sustainability on campus. Details on current efforts and recommended actions for these metrics are detailed below in the project recommendations section.

Project Recommendations

Project 1. Determine energy literacy on campus

Determine awareness, understanding, and commitment about this issue by conducting surveys (both initial and ongoing) on the UW–Madison campus. The UW–Madison Survey Center (http://www.uwsc.wisc.edu/) is nationally known for its ability to design, conduct, and analyze a wide range of surveys. We envision this being a way to benchmark our campus climate on this important issue, as well as monitor its progress.

Project 2. Determine current campus energy usage and byproducts and emissions

Monitoring the production and purchase of thermal energy and electrical energy is an ongoing activity for the WE CONSERVE initiative (www.conserve.wisc.edu). In addition, this initiative is developing better tools to monitor and measure the amount of byproducts and emissions from on-site power sources, as well as purchased power.

- Consumption and use of materials with embodied energy use is also under way as a pilot program in certain areas of the campus (www.conserve.wisc.edu): Such a project can be expanded and cover a range of materials; e.g., amount of paper used for printing, and amount of disposable containers used on campus.
- Amount of indirect byproducts and emissions from activity on campus: Such a project can involve staff and students with the FP&M operations staff and other departments to develop a system life-cycle analysis for both on-campus and off-campus activities that could involve purchasing activities, waste disposal and recycling, to name a few. Doctoral students at the Nelson Institute (e.g., K. White, P. Meier, P. Denholm) have done pioneering work on this in the past for stationary electric power plants as the applications.

- Identification of wasteful behaviors by staff and students (inefficient energy usage): Again this project can involve staff and students collaboratively, with examples being office computers, energy consumption, and water/energy consumption in residence halls.
- Design and construction of buildings (inefficient usage): This is a larger issue related to campus planning and building initiatives and should be worked on collaboratively with the campus environment working group. The project would be to formally improve the consideration of sustainability components in the actual design process, including maintainability, sustainable materials of construction, and human factors in building design.

Project 3. Determine energy trends and changes in consumption on campus

Comparison of trends in energy use within UW–Madison is a long-term goal of the current WE CONSERVE initiative and will require additional equipment to add granularity to the current energy trending and monitoring on campus. We recommend the development and implementation of a visible energy dashboard that displays energy use and provides spatial and historical trends that would not only add to our understanding, but would also promote awareness and involvement of the faculty, staff, and students in energy conservation.

In conjunction with this campus initiative, we recommend the development of tools to monitor personal trending of energy use and its environmental impact (byproducts and emissions) as an important component to aid in awareness and involvement. The UW Energy Institute has already developed such a "personal calculator" (http://www.energy.wisc.edu/eic/) and this can be advertised, used, and improved to compare individuals and groups of individuals.

Finally, we recommend implementing long-term comparisons to other UW System campuses and to peer institutions. Such cross-cutting comparison needs to be done carefully to minimize any negative connotations, yet better motivate the UW–Madison community and develop better recognition of our efforts nationally and internationally. UW–Madison is part of key national and international academic associations (e.g., APLU, WUN) where sustainable energy comparisons are appropriate.

Project 4. Develop tools and metrics to assess sustainability in campus research

This project involves two components: 1) exploring and comparing the sustainability of various energy components (e.g., fuels, devices, processes) through life-cycle assessment and other tools, and 2) examining the feasibility and effectiveness of requiring Sustainability Plans as part of research proposals. Both of these components would provide a community service by developing new ways to assess and monitor the sustainability of energy research itself. The first component would lead to an easily transferable metric with an associated protocol (testing or analysis) for assessing energy devices, components, or processes. Such information would prove useful in the classroom as well as through campus operations such as the selection of appropriate fuel mixes for emerging technologies (e.g., the Charter Street plant biofuel conversion). Moreover, it can become a metric that is usable within the energy community nationally or internationally. The second component would lead to the inclusion of a "sustainability assessment" for all research grants that would require investigators to consider the environmental, social, and economic impacts of their research protocols. (In effect, the required assessment would be similar to an IRB protocol used in human subjects research.) To accomplish this protocol development, the UW–Madison would have to work with federal agencies such as the NSF, DoD, or DoE and develop criteria that can be used to assess the broader impact of research on sustainability.

Project 5. Determine curricular and extracurricular elements of sustainability for students

Promotion of energy awareness outside of the classroom: This is probably the most undervalued approach to make the UW–Madison community more energy literate, and more aware of energy uses and byproducts. Some specific group activities for structured student and staff involvement include:

- Engage in student competitions in student majors or colleges or in residence halls (e.g., see current activities, but with a sustainability focus)
- Develop new hands-on opportunities for student involvement with sustainability (e.g., Engineers without Borders, Habitat for Humanity, EPICS)
- Energy or consumption fact of the day for broadcast to the campus community (e.g., use UW–Madison's main website to promote interesting factoids or news items)
- Develop projects that educate the non-technical parts of campus
- Develop sustainability awareness during SOAR and other major university events
- Promotion of energy awareness in instruction: This is another educational venue for student involvement that has been developed within the science and engineering student population, but not generally on the UW–Madison campus.
- Nelson Institute Energy Analysis and Policy certificate (http://www.nelson.wisc.edu/education/programs/graduate-certificates/eap/overview.html)
- Masters of Engineering in Energy Systems (http://www.engr.wisc.edu/me/current/grad/mees.html)
- Undergraduate Certificate in Energy Systems (http://www.energy.wisc.edu/?page_id=1077)
- Develop courses for technical and non-technical UW–Madison students (e.g., Why WE CONSERVE, taught by Prof. T. Holloway)
- Bio-energy certificate planned for the bio-energy initiative (see Professor T. Runge)

MATERIALS & CONSUMPTION

Vision Statement

To have all members of the university community collaborate to minimize adverse environmental and social impacts resulting from our purchasing, consumption, and disposal decisions, and to set the standard for other institutions in how principles of sustainability are incorporated into these decisions.

Recommendations and Goals

We recommend developing a procurement policy that elevates our consideration of sustainable products by requiring "standards teams" to integrate operational need, sustainability research, and student involvement. We also recommend selecting initial "focus areas" in which we can make a practical impact in the near future, including (in alphabetical order):

- Computers and IT equipment
- Cleaning products
- Office paper
- Disposable items
- Carpet and flooring
- Lawn and landscape chemicals

Points of Discussion

Social responsibility

One element of sustainable procurement that crosses all of our identified focus areas is the concept of socially responsible purchasing. This includes the use of diverse small businesses, including historically under-utilized and under-represented minority-, women-, and veteran-owned businesses. It also includes requiring our supply sources to be socially responsible by paying a living wage to an adult work force. It is important that the university communicate its diverse supplier preference goals and have each college, school, or other division report back on their progress. It is also the responsibility of the university to establish guidelines for wage and working conditions for areas of historically abusive industries.

Behavioral Change

In addressing performance of the UW–Madison campus on sustainability issues, care must be taken to understand why things are the way they are. If behavior of UW–Madison staff, faculty, or students is to be changed, appropriate behavior-change models must be used. One way to bring about change is to provide incentives that reward behavior that is sought. It is better to reward desired behavior than to punish undesirable behavior. For example, develop contests that offer prizes or awards that help to shape desired use and disposal behaviors. In addition, everything that is done for sustainability reasons should be communicated to the campus community. Sharing information should be a cornerstone of behavior change.

Cross-campus Integration through Champions

Many of the changes that we recommend will succeed or fail based upon the participation of individual colleges, schools, or other divisions of campus. Therefore, we recommend that each college, school, or other division identify a "sustainability champion" who will be responsible for communicating evolving sustainability practices throughout their units, and to report information back on progress towards campus goals. These sustainability champions will be the change agents for their respective units. Specific duties will be included in their job descriptions and performance expectations included in their annual reviews.

Procurement and Consumption Standards Teams

The sustainability charge for these teams will be to continually: 1) provide direction as to what products represent the most sustainable possible

solutions to the campus, 2) debunk competing product claims, 3) establish practical standards for use considering life-cycle costs, and 4) establish tangible metrics for sustainable progress in terms of selection, consumption, and disposal.

Focus Areas

Computers & IT Equipment

Technology is part of campus life, and as it continues to evolve, it will be used more and more. Annually, we spend tens of millions of dollars on computers and IT equipment, and the purchase of this equipment comes at an environmental cost. The energy use of computers and data centers makes up roughly 10 percent of the energy used on campus. Supporting many different software applications that essentially support the same tasks is an inefficient use of resources. Supporting multiple server-infrastructure programs inefficiently uses space, energy, and technical support staff. Disposal of computers and IT equipment is a significant issue due to the harm that is caused through improper disposal and recycling processes. Tube monitors contain hazardous material that can leach into the soil and also cause physical harm to recyclers if not captured and disposed of safely. Metal extraction, likewise, is harmful to the environment if not done properly.

Cleaning Products

Every day, workers at UW–Madison must clean over 22 million square feet of space in academic, residential, administrative, athletic, and health care buildings. This cleaning is important for the health, safety, and well-being of those who use the buildings, for campus aesthetics, and for proper upkeep and maintenance.

Depending on the chemical composition, cleaning agents vary in usage risks. Some cleaners are relatively harmless, such as water, baking soda, mild abrasives, vinegar, steam, and dye-free organic salt. In contrast, others can be harmful, such as strong acids and bases, chlorinated compounds, volatile solvents, and bleaching agents. Such cleaning agents can damage the surfaces they clean, compromise ambient air quality, harm skin and clothing, cause illness or even death, and damage local and wider ecosystems. These cleaning agents are also often harmful to manufacture and dangerous to transport.

Depending on the amount of cleaning agents used, the risks also vary. ("The poison is in the dose.") For example, soaps and detergents are relatively harmless in small quantities, but can cause changes in nearby lakes and streams when used widely.

Even though we seek to increase the use of more sustainable products, our mission requires that we use products that disinfect that by definition are not green. They are necessary to maintain the safety and health of the campus. Understanding the spirit of sustainability, these products will be used conscientiously and only in the quantities necessary to maintain the health and safety of the campus.

Office Paper

UW–Madison purchases $1.3 million of office and printing paper annually. Letterhead, copy paper, and printing paper when purchased, used, and disposed of improperly use scarce natural resources. The manufacture of paper also can be detrimental to the environment, especially when the process uses a chlorine-based bleaching process. Finally, disposal methods that do not funnel the paper back into the paper manufacturing process (i.e. disposal through landfill, mixed paper, or other outlets) fails to maximize the life-cycle value of the paper.

Disposable Items

Many different products are purchased with the intent to be used once and disposed.

Plastic bottles are of a particular concern because of their volume in our waste stream. Disposable foodservice items as a group make up a large percentage of the solid waste that is currently generated on campus. While we need to consider our customers' needs for convenience, we also have an obligation to help shape responsible thinking and behavior on campus.

Carpeting and Flooring

The university currently has over 2.3 million square feet of carpet on campus that it maintains and periodically replaces. Carpet offers many advantages such as noise reduction, warmth, and aesthetic appeal. Generally, however, carpet is replaced before it is worn out, either because decorative tastes have changed or because only a small section of it is worn out. If carpet cannot be reused, it inevitably ends up in our landfills, making up 2 percent of the U.S. waste stream. The goal of a standards team would be to seek more environmentally healthy alternatives to non-recyclable broadloom carpeting.

Lawn and Landscape Chemicals

Pesticides and fertilizers are an important part of maintaining our lawns and landscape. However, the majority of actively managed areas are virtually on the shore of Lake Mendota, and the use of any lawn or landscape chemicals must consider the impact upon the lake. A standards committee should be developed to provide recommendations on sustainability criteria that could be developed for lawn and landscape chemicals. In addition, a determination should be made as to what areas of campus can be "native," and initiate steps to return them to a less-managed condition.

Institutional capacity for linking education, operational, and research functions

Academic

1. Computer Science
2. Communications
3. Forest and Wildlife Ecology
4. Industrial Ecology
5. School of Business
6. School of Human Ecology
7. Sociology (consumption research)
8. Other academic links as focus areas are expanded beyond the initial group listed.

Operational

1. Athletics
2. Division of Information Technology (DoIT)
3. Facilities Planning and Management
4. Faculty Governance
5. Memorial Union
6. Housing
7. Procurement
8. WE CONSERVE

Defining Defensible Metrics and Standards

We recommend that standards teams develop defensible knowledge-based metrics when determining the best sustainable products and practices for purchasing, consuming, and disposing of materials. In particular, education, research, and operations can integrate to help set metrics, baselines, and monitoring programs.

Project Recommendations

Project 1: Green Purchasing Policy

We recommend the creation of a green purchasing policy to help provide a defensible, accountable, and transparent guide for purchasing across campus. Such a guide would build upon our best current research on best practices and environmentally friendly, socially responsible product availability, as well as operational feasibility for implementing changes to support these products and practices.

Project 2: Materials and Consumption Standards Teams

For each of the focus areas, we recommend developing a "standards team" to ensure contracting processes address sustainability goals. While it is already a practice to have end-users on contract committees, these need to be expanded to include not only operational and procurement staff, but also research and student representation. The sustainability charge for these teams will be to continually:

1) provide direction as to what products represent the most sustainable possible solutions to the campus, 2) debunk competing product claims, 3) establish practical standards for use considering life-cycle costs, and 4) establish tangible metrics for sustainable progress in terms of selection, consumption, and disposal.

For example, a paper standards team could promote the use of alternative papers (made from cotton, hemp, flax, kenaf, etc.) by researching the most environmentally friendly paper products available and developing purchasing specifications that would diversify our sourcing of paper. Likewise, a carpeting and flooring standards team could help put the research of Professor Majid Sarmadi into practice to help minimize the environmental impacts of UW–Madison's carpeting practices. Professor Sarmadi has previously worked with California in developing an award-winning carpet-purchasing policy and contributed significantly to those recommendations.

FOOD

Vision Statement

To develop a greater sophistication in regard to understanding food (where it comes from, how it is produced, and where the waste goes) among our students, faculty, staff, and partners.

Recommendations and Goals

Our goal is to promote food literacy among the university community by creating an intellectual environment that inspires all members of our communities to well-considered opinions and actions regarding the tradeoffs inherent in feeding ourselves. These food-value systems will be informed by the integration of: research, conducted at UW–Madison when possible and appropriate; courses designed with non-agricultural students in mind; and food operations that are consistent with our best understanding of Earth's environment, of our institutional, local, and regional economies, and of our norms and values regarding a just society.

Points of Discussion

"Sustainability" relative to food and agriculture is a common but nebulous goal, often based on values associated with individual parameters such as food miles, pesticide use, or habitat preservation. We recognize that food and agricultural production systems consist of an inextricably complex web of management decisions overlaid with equally—if not more complex—biological and climatic conditions. With this in mind, we submit that the creation of such a complex food-value system would greatly benefit from being informed by science-based information and food literacy in the UW–Madison community. In the future, commonality in food-value systems and resulting market demand among the food-literate campus community may shape related campus policy and procurement. Additionally, UW–Madison is in a position to be an active global leader in developing sustainability metrics that will inform food-value systems and evaluate the intertwined impacts of our eating decisions. These metrics will be developed by existing expertise and validated with place-based learning opportunities among the diversity of Wisconsin food and agricultural production and in the tone of the Wisconsin Idea.

Peer Comparison

The food working group has looked extensively into a variety of other institutions' food sustainability practices from their structure for local foods purchasing, to their outreach and training programs on food sustainability, to their composting programs. Although it is very important for this group to observe other schools with similar demographics, we have not ignored small, private schools whose practices may provide models we could expand upon.

A large part of our established mission is to create food literacy throughout the UW–Madison community. Harvard University created the Food Literacy Project (FLP). Its mission is: "to cultivate an understanding of food from the ground up. Education focuses on four integrated areas of food and society: sustainability, nutrition, food preparation, and community. Ultimately, the project's goal is to promote enduring knowledge, enabling consumers to make informed food choices. In addition to promoting community in our daily operations, the FLP also draws together the Harvard Community at its on-campus farmers' market, cooking classes, film screenings, etc. Students, faculty, and staff find opportunities to take pleasure in and learn from the food they share."

It is very important that the conversation on food be spread throughout the campus community, engaging all members in an initiative.

The University of Minnesota, a comparable institution to UW–Madison, has undertaken impressive efforts, working from within its University Dining Services and going outward. It has partnered with Heartland Food Network, which works to increase the availability and variety of local and organic foods for the university. It has also partnered with Urban Ventures and created a café that

provides a learning lab for high school youth from Urban Ventures and UM students by providing hands-on work experience and mentoring opportunities. UDS has even employed part-time "green team" students interested in the support and education of social and environmental programming on campus.

Arizona State University provides an example of how the operations side and academic side of food sustainability can merge. ASU uses the food distributor ARAMARK to source its food. ARAMARK hired a food sustainability manager/coordinator who works with the dining services staff, students, and student groups, as well as the director of sustainability from the university. These lines of communication are very important and have proved to be very beneficial to ASU for promoting and improving food sustainability on campus.

Iowa State University has written a "Farm to ISU five-year plan" detailing a dining services goal to purchase 35 percent local, organic, and sustainable food by the 2010–2011 academic year. It has agreed on operational labels, defining sustainable, local, and organic. ("Sustainable" is food-alliance certified; "local" is within a 200-mile radius.) It has also created an "approved vendor" application for potential food vendors to fill out in order to become clients of ISU.

Finally, the University of California–Davis has demonstrated how to complete a full loop of sustainability, much like the cradle-to-grave idea the task force has emphasized. Postconsumer food waste (meat, dairy, eggs, and leftover food) is collected by University Dining services at three dining locations. With the collaboration of Jepson Prairie organics, it is turned into nutrient-rich matter for local growers and vineyards, many of which supply Davis with fruits or vegetables. Pre-consumer food scraps are also collected by a student group and taken to the student farm, where they are turned into compost, rather than going to the campus landfill.

Institutional capacity for linking education, operational, and research functions

Food sustainability interacts with the university in many ways and in many different areas. As a state agricultural school, the production of food is a central theme for the institution. There are nodes of institutional cross-cutting capacity throughout the university in education, research, and operations. Some of the key spaces of opportunity for academic and operational integration with food sustainability include:

Academic

1. Agroecology Program
2. Babcock Institute for International Dairy Research and Development
3. Center for Culture, History, and Environment
4. Center for Dairy Research
5. Center for Global Health
6. Center for the Humanities
7. Center for Integrated Agricultural Systems
8. Center for Sustainability and the Global Environment
9. College of Agricultural and Life Sciences – several departments
10. Department of Landscape Architecture
11. Department of Urban and Regional Planning
12. Food Research Center
13. Institute for Sustainable Agriculture
14. Integrated Pest and Crop Management Program
15. Land Tenure Center
16. Nelson Institute for Environmental Studies
17. Program on Agricultural Technology Studies
18. School of Human Ecology
19. Student groups, including FH King Students for Sustainable Agriculture, Slow Food UW–Madison, ReThink Wisconsin, WisPIRG Fair Trade, the Student Labor Action Coalition, Madison Infoshop, MeCHA, Dietetics and Nutrition Club, Association of Women in Agriculture (AWA), Badger Dairy Club, the Food Science Club, and Minorities in Agricul-

ture, Natural Resources, and Related Sciences (MANRRS).
20. UW–Extension: Environmental Resources Center Farm*A*Syst Program, Center for Meat Process Validation, Farm and Industry Short Courses, UW Center for Cooperatives, and programs within the Center for Integrated Agricultural Systems, such as the Driftless-Area Food Initiative.

Operational

1. Agricultural Research Stations
2. Allen Centennial Gardens
3. Athletics
4. Babcock Dairy plant
5. Campus Greenhouses
6. Campus Natural Areas
7. Eagle Heights
8. Food Science Department teaching kitchens
9. Housing (including both the dining halls and the common area-kitchens in student dormitories)
10. Memorial Union
11. UW Hospital & Clinics
12. UW Meat Processing facility
13. WE CONSERVE's composting and waste-management programs

Many departments and programs have community programs involving food or agricultural sustainability. The Memorial Union, in collaboration with FH King and Slow Food UW, hosted a lecture series with a local dinner called Come to the Table. The Agroecology Program hosts a graduate seminar with a similar focus. Tracks within the Nelson Institute's Tales from Planet Earth Film Festival, the Wisconsin Book Festival, and several other independent events have focused on food-sustainability issues in the past year as well, many in conjunction with UW–Madison's Go Big Read program.

In addition to the academic and operational units listed above, we recognize the wealth of professional associations and community organizations in Madison that may serve as important resources and partners for food and agricultural sustainability initiatives. Examples of professional associations that are poised for supporting our efforts include: the Wisconsin Farm Bureau; Growers' Associations such as the Wisconsin Potato and Vegetable Association responsible for the Healthy Grown Potato; agricultural consultants; and the Wisconsin Crop Protection Association (WCPA). Some notable community associations include: the Research, Education, Action, and Policy on Food Group (REAP); the Madison Area Community Supported Agriculture Coalition; Slow Food Madison; Family Farm Defenders; Porchlight; the Dane County Farmers' Market; the South Madison Farmers' Market; the Community Action Coalition's Community Garden Program; Community Groundworks at Troy Gardens; the Dane County Food Council; the Culinary History Enthusiasts of Madison; Michael Fields Institute; Fitchburg Fields; and the proposed Badger School.

Defining Defensible Metrics and Standards

The sustainability of food is a highly debated and controversial topic with a changing definition that varies with individuals, depending on his or her view points and value systems. Current efforts are under way nationally to develop standards and metrics that can guide the development of sustainable food products and methodology for quantification and verification of accomplishments toward improved environmental, economic, and social conditions surrounding food production, processing, and distribution. This is necessary due to the establishment of marketing schemes and certification requirements by food distributors, end users, and retailers that threaten to erode the core meaning of sustainability. UW–Madison has an opportunity to participate in the development of these standards and metrics. In fact, UW–Madison could provide leadership for the standards and metrics-setting process through the unique expertise of its students, staff, and faculty. UW–Madison also provides a unique environment for facilitating open discussion on components of a sustainable food system and how to quantify them.

Project Recommendations

In order to develop defensible metrics and standards for food sustainability on campus that integrate education, research, and operations, we recommend taking the following steps, which will enable us to take into account the many values that our community members bring to the table. Following these steps will enhance the transparency of our process of defining metrics, gathering data, and setting goals regarding food sustainability and best practices.

Project 1

Campus community customer survey: What do customers desire in a campus dining experience, what will they pay for, and how do they prioritize food choices?

Project 2

Campus Food Summit: Relay survey results to campus, describe inventory of current campus food-centric projects, and invite in-depth discussion of campus food priorities.

Project 3

Food Literacy Seminar Series: Invite internal and external speakers on food production, logistics, nutrition, implications of food choices, and challenges and opportunities.

Project 4

Create a forum for discussing sustainable agriculture standards, and science of metrics and quantification, and debate how to proceed with methodologies for quantifying the sustainability of food.

Project 5

Faces of Food on campus: Market campus food choices by featuring the personnel who prepare the food, an item-specific campus life cycle for the meal choice, and nutritional information in dining hall handouts.

Project 6

Food Frenzy at SOAR: Feature campus food choices, an introduction to the importance of food literacy in the university experience, and early discussion of a food-value system.

Project 7

Food curriculum: Develop courses focused on (but not limited to) non-agricultural majors that provide a science-based education that allows for development of a food-value system.

Project 8

Outreach: Deliver curriculum devised for food literacy among UW–Madison students to the state and beyond, including Wisconsin citizens, agricultural producers, food processors, and international communities.

TRANSPORTATION

Vision Statement

To promote environmental sustainability on and off campus. We specifically seek to protect and enhance the campus environment, conserve natural resources, and reduce greenhouse gas emissions by modifying how university citizens transport themselves to, from, and around the UW–Madison campus and perform their work functions.

Recommendations and Goals

1. To increase the efficiency* of our transportation systems used to transport students, staff, and visitors to, from, and around campus
2. To reduce all forms of pollution (air, water, noise, etc.) associated with our transportation systems
3. To encourage and support a comprehensive and compatible mixture of modes of transportation conducive to the health, safety, and well-being of all those living and working in and around the university
4. To encourage university and city policies and practices that advance the above goals, including educating its citizenry on these issues

* We define efficiency generally here to include the energy, materials, resources, space, and time consumed for transportation activities.

Points of Discussion

Transportation issues affect every member of the university community. Transporting students, staff, visitors, and materials to, from, and around UW–Madison represents a major use of private and public resources, including energy, space, and time. These people use a wide mix of modes of transportation both through their commute to work, as well as in the performance of their work duties. They include walking; bicycling; bussing; using mopeds or electric bicycles; driving fossil-fueled single-occupancy vehicles, hybrid vehicles, or electric vehicles; taking a taxi; carpooling; vanpooling; flying; and taking a train. Each mode of transportation brings a mix of impacts on our local and global environment and economy. These include consumption of renewable and non-renewable energy, changes in air and water quality, the release of greenhouse gases, and the effect of transportation choice on personal and community health, safety, and employment. The goals and activities described here are intended to assist the university and its citizens in reducing the negative impacts of transportation while supporting the positive ones, and maintaining a safe, practical, and efficient mix of transportation modes.

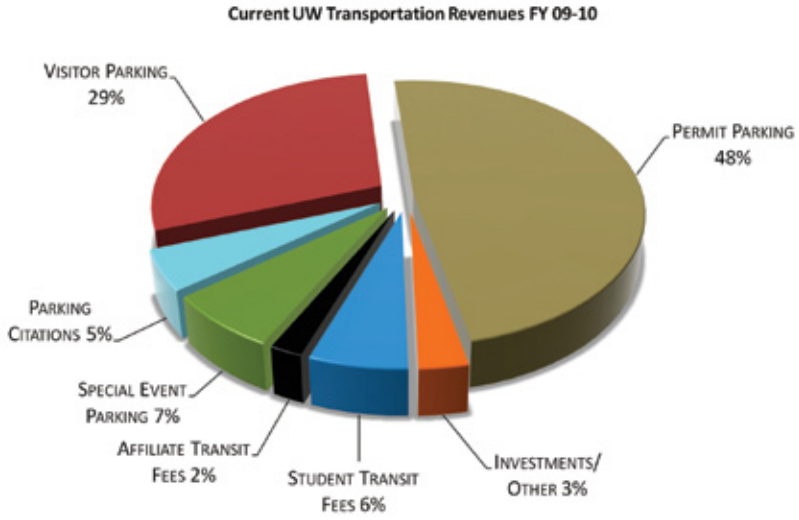
Several current activities across campus maintain strong commitments to transportation innovation and conservation. For example, Transportation Services has developed "Commuter Solutions" (following principles of Transportation Demand Management) and bus pass programs while the Physical Plant Car Fleet has pursued adopting electric, hybrid, and dual-fuel vehicles. Most notably, UW–Madison has established itself as a leader in transportation conservation by fully subsidizing on-campus bus service and providing city-wide Metro bus passes for all faculty and staff. (Universal student bus passes are funded by segregated fees.) UW–Madison has also decided to cap the total number of parking places on campus at about 13,000 (the least of any Big Ten universities or our comparison peer group). The cap is possible, in part, because the campus greatly restricts student parking, a unique policy among peer universities.

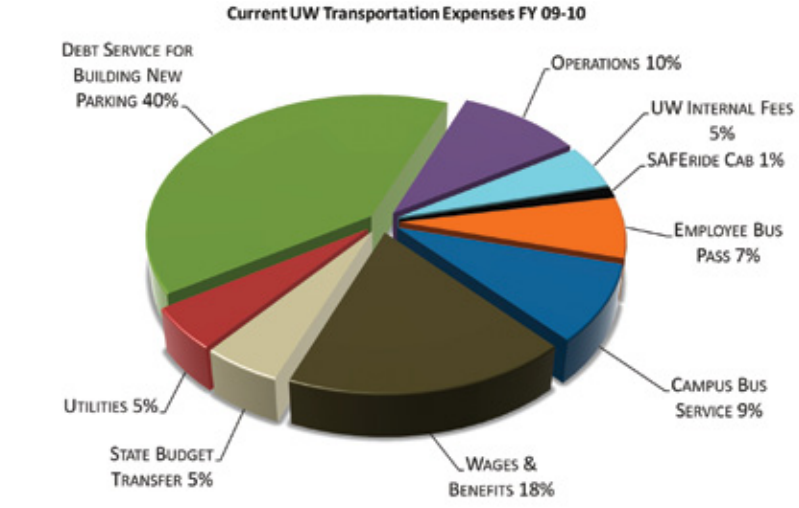
In all, Transportation Services manages access to the university for 18,000 faculty and staff, 42,000 students, 3,500 UW hospital employees, and about 4.6 million annual visitors. It sells 13,000 permits (with 1,000 wait-list requests) and 100,000+ special event parking permits each year, distributes 15,000 bus passes, and maintains 6,900 bike parking spaces. More than three-fourths of its revenues come from the sale of lot permits and visitor parking (Figure 5). Its greatest expense, and one that has grown rapidly, is debt service for building new parking stalls.

Another example of UW–Madison's commitment to conservation and its capacity to partner effectively with the city of Madison is the new "Park and Bike" facility launched in Summer 2010 at the

old Irish Waters restaurant on University Avenue at Whitney Way, which connects to the Westside bicycle corridor near Shorewood.

Car- and van-pooling are encouraged and institutionally supported through the Rideshare Etc. carpool/vanpool matching program and vans provided by the state Department of Administration. However, the resources devoted to both programs are limited by the state. Rideshare Etc. also advertises in print, on radio, and on TV, and provides incentives such as the Guaranteed Ride Home program, transit passes, and reduced cost-parking passes for limited-use drivers.





UW–Madison's Physical Plant Car Fleet is also pursuing a many-pronged approach to conserve resources. For instance, when new vehicles are purchased, they are equipped to fulfill multiple distinct business life-cycles, thereby reducing the number of new vehicles required over time. A new minivan will support group travel in the daily rental fleet for a number of years, usually three to four, accumulating many miles in a short time. It is then usually re-assigned to a campus department, where it usually will be used for far fewer annual miles. The campus department thus gains use of a younger vehicle than would be possible if a new vehicle had been purchased and driven the same overall number of miles. This way, the fleet is kept as current as possible, with the latest pollution-control equipment, and the demand for new vehicles is reduced.

This pattern of vehicle re-use also makes costly technology available to campus departments that may not be able to afford it otherwise. Based on available state-fleet bid prices, a hybrid-electric passenger car is about 60 percent to 80 percent more costly to acquire new than a traditional fuel-only vehicle. Daily-rental users find an attractive option, despite the relative per-day charge increase, so the first few years of rental use pay for the technology upgrade. When a hybrid-electric passenger car is then re-assigned to a campus department, that car realizes additional potential for increased fuel economy (relative to a non-hybrid car) by operating in an urban environment.

UW–Madison's Fleet uses biodiesel fuel for campus construction and landscaping equipment as well as fleet trucks. Currently UW–Madison uses about 50,000 gallons per year of B20 blend fuel on campus. This means about 10,000 gallons of biofuel and 40,000 gallons of petro fuel are combusted. Federal regulations on diesel fuel have

been tightened in the past five years to dramatically reduce sulfur content, allowing for some very successful exhaust-treatment strategies on new model trucks. Diesel-powered trucks are far cleaner now than they ever have been. This fact, combined with the availability and use of renewable biofuels, has resulted in a strategy to replace light duty trucks with diesel power when possible. The light-duty (up to one ton) diesel-power trucks can achieve up to ~18 percent better fuel economy than the gasoline powered models they replace. This, combined with 20 percent renewable fuel, results in considerable per-truck decreases in the use of fossil fuels.

In Wisconsin, the governor has statutory power to approve or deny all state-agency purchases of automobiles, trucks, and aircraft. Because of this, the UW–Madison fleet is far smaller than most of our peer institutions and far smaller than it was in 2003. In 2010, UW–Madison has approximately 650 automobiles or trucks, down from close to 760 in 2003. As part of the strategy to reduce the size of the fleet, Physical Plant Car Fleet has purchased neighborhood electric vehicles (also known as low-speed vehicles). These vehicles have replaced the functions of some gasoline-powered vehicles, allowing those that remain to be assigned to their highest and best use. Currently there are 21 NEVs in use and five on order to add to our fleet.

The university and city of Madison also pride themselves on providing a high quality of life that includes several alternative-transportation options. The city's compact core on an isthmus and plentiful student housing near the university encourage walking and other modes of transportation including buses, bicycles, mopeds, and car- and van-pools.

Madison's Metro Transit system (see: http://www.cityofmadison.com/metro/) is extensive and provides regular service to the city and several surrounding communities, as well running the frequent (every 6 to 45 minutes depending on route, time of day, and time of year) buses that serve the campus. Madison Metro also supports sustainable transit choices via online tools such as its real-time "Transit Tracker" and "Route Planner."

Starting in 1996, students have collectively bought bus passes via their segregated fees. Transportation Services began subsidizing bus passes for all employees in 2002 and has covered total costs since 2003. This program has had the effect of greatly increasing staff bus (and total city) ridership (Figure 6). However, the costs for this program have also increased by more than 57 percent in the last five years as a result of both this increased ridership and increased costs per ride, now amounting to 7 percent of Transportation Services' total expenses. Madison Metro is now asking for a 21 percent increase in these payments for fiscal year 2011.

Madison and the UW campus also support enthusiastic and growing communities of bicycle riders that often throng the streets during warmer weather (as well as a small but growing group of winter bicyclists). Walking and cycling provide significant health benefits. For example, research in the Netherlands suggests that shifting short daily trips to bicycles would bring health benefits more than 9 times greater than the detrimental effects of accidents and pollution. They also minimize air and water pollution, energy use, and the infrastructure necessary to support vehicles (roads, parking, etc.).

In recognition of the advantages and efficiency of alternative modes of transportation, the city and campus have worked together to expand the infrastructure available to support bus riders and bicyclists. These include coordinated bus routes, bus shelters, bike lanes, dedicated bicycle paths (including the Campus Drive Path, funded entirely by UW Transportation Services at a cost of over $1.5 million), bicycle parking, bicycle law enforcement, bicycle education, bicycle encouragement (such as the Ride the Drive event in recent years and the annual Bike to Work Week celebration), and the recently added bicycle boulevards and painted bike advance stop boxes at intersections. These efforts have earned the city a Gold rating from the League of American Bicyclists. Many in Madison are eager to upgrade this rating to Platinum, including the mayor who has convened a committee to make recommendations for advancing the city to Platinum status. For more information, see: http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities/bfc_madison.php and the city of Madison's Platinum Bicycling Plan at

http://www.cityofmadison.com/trafficEngineering/documents/PlatinumAdopted040808sm.pdf.

In addition to providing extensive bus, bicycle, and pedestrian facilities and providing the transit services already mentioned, Transportation Services runs several other support programs to reduce regular car commuting to campus. These include the Flex Parking program that charges drivers only $6 per day in proportion to the days (or partial days) they park on campus, rewarding them for avoided trips. Other programs include allowing carpool members to share the cost of a single permit, the Emergency Ride Home program (free taxi rides), car-sharing through the several Community Cars parked across campus, the SAFE nighttime walking escorts and free taxi rides, and individualized marketing, including personalized bike and transit-route planning services.

Together, these efforts at managing transportation demand at UW–Madison are estimated to save:*

- 4,150 tons CO2/year
- 18 tons VOCs
- 18 tons NOx
- ½ ton fine particulate (PM2.5)

*relative to the situation if all these individuals were driving alone (R. Kennedy, Transportation Services).

Moped use has also expanded rapidly on and near the UW–Madison campus in recent years, prompting the university to institute formal moped parking places with an associated parking fee. Mopeds (a majority of which run on two-stroke engines) contribute to air pollution and traffic congestion on campus, as well as presenting conflicts with pedestrians and bicyclists on and near campus.

One reason that alternative modes of transportation thrive in Madison is the scarcity and cost of available parking. Regular automobile commuters to campus must pay $485 to $1,075 per year for an annual permit (2009–2010 rates). The cost of parking a car in a city lot is $95-$180/month for residents ($1,140–$2,160/year) and $114–$210/month for non-residents or businesses ($1,368–$2,520/year). (See: http://www.cityofmadison.com/parkingutility/permits/monthly.cfm). These figures make clear that UW–Madison campus parking rates are at or below current city rates, and sometimes far below.

Despite these substantial accomplishments in regulating transportation impacts to the campus, UW–Madison currently faces key decisions on how to adjust to the increasing cost of providing parking places on campus. As mentioned above, the total number of parking places is now capped at about 13,000, but with in-fill and new construction, the campus is replacing surface lots with new ramps and basement parking in new buildings. New construction will result in the loss of 1,300 parking stalls between 2007 and 2013 (projected to result in a $1.2 million reduction in annual revenue by 2012–2013). New parking stalls now cost $24,000 to $70,000 each, forcing Transportation Services to incur considerable debt with their construction. This has caused parking structure debt expenses to increase by 50 percent over the past five years with less than 40 percent of Transportation Services' annual budget (about $18 million total) now dedicated to parking debt service and depreciation (Figure 5). Transportation Services plans to build 3,700 parking spaces to offset the spaces lost, but this is projected to cost $100 million and to incur an additional $7 million cost per year in debt-service payments. Permit prices would need to increase by more than $500 to fund this new garage construction (ignoring inflation). Permit prices would need to increase an additional $200 to cover projected increases in other program costs if other sources of revenue are not found.

Because these costs and the costs of providing employee / staff bus passes (Figure 6) have risen, Transportation Services is facing a rising shortfall of funds (now about $1 million per year of a total budget of $18 million). This financial pinch has led Transportation Services to investigate a number of solutions, including charging employees for bus passes. This would, on the one hand, generate revenue to at least partially fill the budget gap, provide price signals to commuters on the environmental costs of bus use, and possibly encourage walking and bicycle commuting. On the other hand, charging for bus passes would

likely reduce UW–Madison bus use (now almost half of Madison Metro passengers) and delay or prevent some commuters from switching from private vehicles to public transportation. It would also prove unpopular with existing employee bus commuters and might encourage some to use their cars more often (or switch back to cars).

The transportation working group further recognizes that UW–Madison citizens engage in transportation beyond commuting, including travel to meetings, professional exchanges, field work, etc. This often involves travel via fleet or rental car, train, or airplane. Air travel is particularly energy intensive and thus contributes substantially to UW–Madison's overall energy and carbon "footprints." We do not know the extent to which teleconferencing could substitute for some of these trips. Data on such trips is also difficult to obtain. (Data on the use of Fleet vehicles is available, but state constraints on the number of these vehicles means that many trips involve personal or rental cars that are far harder to track.) For these reasons, we did not attempt to gather and analyze data on these additional trips. Nevertheless, we do recommend actions be taken to improve their efficiency.

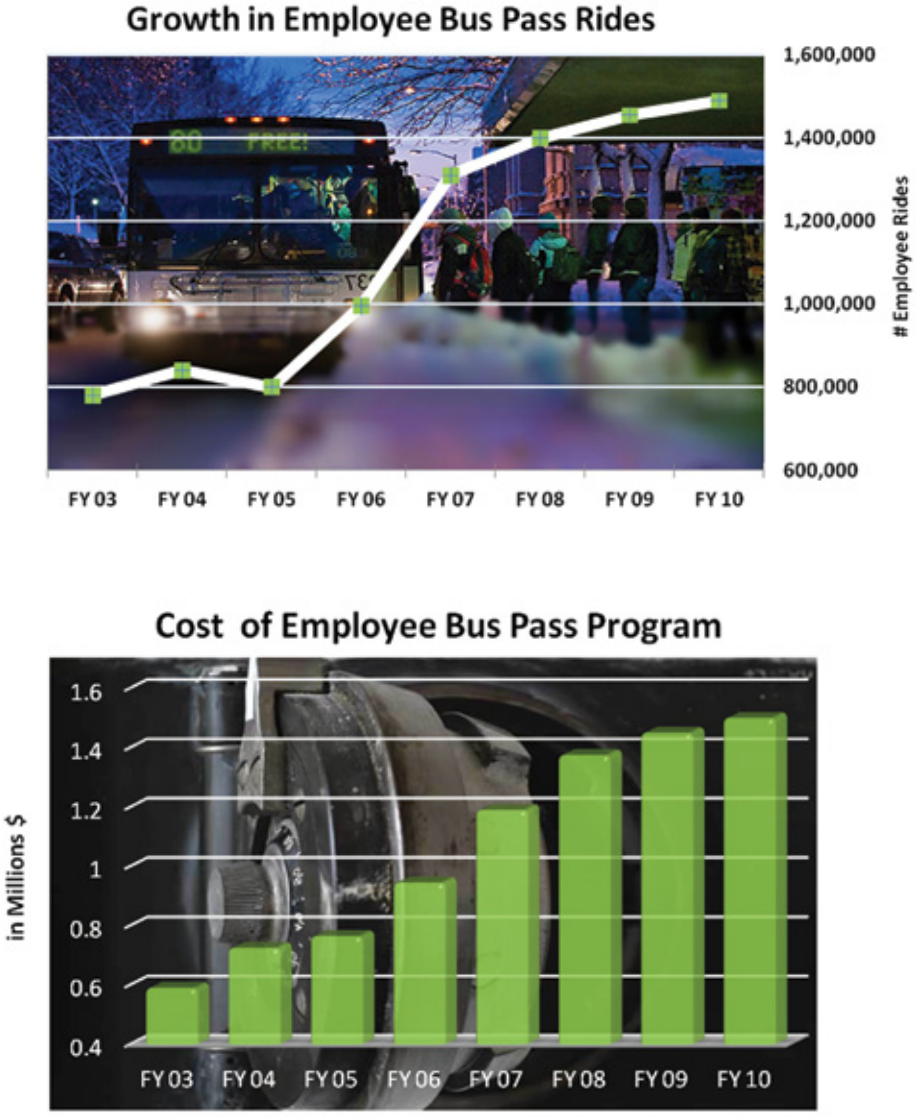


Figure 6. Recent increases in ridership (a) and costs (b) associated with UW–Madison's subsidized employee bus pass program.

Institutional capacity for linking education, operational and research functions

Several existing programs and departments have the capacity for establishing links between academic and operational components of transportation on campus, including:

Academic

1. Engineering Graduate Program in Transportation Engineering and City Planning (see http://www.engr.wisc.edu/cee/research/transengr_geo.html), which focuses on transportation planning; highway, safety, and traffic engineering; and transportation management and policy.
2. Nelson Institute's graduate program in Transportation Management and Policy (see: http://www.nelson.wisc.edu/education/programs/graduate-certificates/tmp/overview.html), which takes an integrated approach to mobility

management and planning with an emphasis on environmental analysis and comprehensive planning.
3. Wisconsin Traffic Operations and Safety Laboratory (http://www.topslab.wisc.edu/)

Operational

1. Associated Students of Madison (ASM) provides bus passes to students and subsidizes nighttime travel and the campus bus.
2. Physical Plant Car Fleet (Fleet) (https://www2.fpm.wisc.edu/ppnew/fleet/), which leases and maintains state vehicles for campus use and university departments.
3. Transportation Services (http://www2.fpm.wisc.edu/trans/), which handles parking, lot maintenance, coordinates alternative transportation options, and sponsors Safe Nighttime Services.

We recommend closer and more formal relationships among the Engineering Graduate Program in Transportation Engineering and City Planning, Nelson Institute's graduate program in Transportation Management and Policy, Wisconsin Traffic Operations and Safety Laboratory (TOPS), Campus Planning, Transportation Services, and Fleet to develop a better mix of academic and operational solutions to transportation issues.

Defining Defensible Metrics and Standards

The transportation working group is fortunate to have access to the unusually complete data collected and shared by Transportation Services, Fleet, and the city of Madison. Transportation Services, in particular, keeps close track of parking usage, bus transit use, and the costs of constructing and maintaining transit infrastructure. They also conduct regular (every two years) surveys of students, faculty, and staff to understand their transportation situation and choices (at a cost of under $50,000). We recommend building metrics based upon the following data that are already available:

- Campus bus service hours and ridership
- Transportation mode split of students, faculty/staff, and hospital employees
- Parking stalls and user groups (student, employee, visitor)
- Bicycle parking stalls and locations relative to demand
- Cost of transportation programs
- Traffic counts
- Fleet – number of vehicles, fuel use, miles per year

In addition, we recommend developing the following metrics to help set goals for transportation on campus:

1. Increase transportation efficiency

- Track fuel use per passenger-vehicle mile (PVM, the inverse of mpg, divided by the number of passengers within the vehicle)
- The number of PVM traveled per student or employee per working day
- Set baselines and metrics based upon the total fuel use per university citizen per day (the product of metrics a and b, and thus a means of comparing the impacts of individuals making different decisions about how far away to live and how to travel to and from the university). The following metrics are currently tracked across campus and can be used for such purposes: bus use; number of single-occupancy vehicles (SOV) on campus; parking places and use (absolute and number per employee); number of bikes, cars, and mopeds; land area and concrete per dollar used for parking; traffic (Park Street and University Avenue, data maintained by the city of Madison); and Fleet (number of vehicles, fuel use, and miles driven per year).

2. Reduce pollution

- Monitor, set baselines, and establish goals for pollution reduction based upon metrics for campus bus use, transportation mode splits, and fleet, which provide information on how different mixes of transportation modes can help decrease fossil fuel use and its related pollutants.
- Monitor, set baselines, and establish goals for the number of registered mopeds used on campus; in particular, monitor the number of mopeds using two-stroke engines, which have higher rates of emissions.

3. Favor transportation modes that enhance health, safety, and well-being

- Work with the health working group to establish metrics and goals for transportation modes that increase health and well-being through physical activity. For information on the benefits of exercise, see: http://www.walkinginfo.org/why/benefits_health.cfm and http://www.bicyclinginfo.org/why/benefits_health.cfm.

4. Advance appropriate university and city policies to achieve the above goals, including an educated citizenry

- Monitor, set baselines, and establish goals for transportation literacy across campus.

5. Commuter inconvenience tolerance

- Monitor, establish baselines, and set transportation goals based upon preferred modes of transportation as related to weather, traffic congestion, and parking availability.

Projects for Consideration

Project 1: Encourage reductions in the use of Single-Occupancy Vehicles (SOVs) for commuting

To reduce the use of SOVs for commuting and the amount of motorized traffic on and near campus:

- Highest priority: Use some university funds to maintain the full subsidy for bus passes for employees now entirely paid for by increasingly tight Transportation Services revenues. Keeping these free or low-cost for users encourages busing over SOV trips and reduces demand for expensive parking structures.
- Invest in a systems analysis to evaluate the impact of increasing costs of SOV and moped parking, particularly in central campus locations, to reduce motorized trips and traffic on campus, and to encourage alternatives. Income from this source is needed to pay for expensive new parking places and could help cover costs of the employee bus program. Experiment with scenario pricing and assignment schemes to better evaluate their success in addressing, and modifying, demand for parking and SOV trips.
- Promote the FLEX parking program and on- and near-campus Community Car options to reduce the number of SOV trips to campus.
- Increase the number and convenience of park-and-ride and park-and-bike facilities to promote bus and bicycle use close to campus.
- Increase the number of available vanpools to accommodate current and future demand.
- Encourage further collaborations among Transportation Services, Physical Plant Car Fleet, and our graduate programs in Transportation Engineering and City Planning and Transportation Management and Policy to develop further innovations in devising academic and operational solutions to transportation issues.

Project 2: Enhance the convenience and safety of walking and bicycling on and near campus

To provide a safe and pleasant environment for pedestrians, bicyclists, and those using the bus, and to complement Project 1:

- Highest Priority: Construct one or more bike station facilities (e.g., at the new Union South) to provide quality, high-volume, secure indoor bike parking; bicycle repair; essential bicycle products for sale; and possibly showers. Engage students in these programs, e.g., via student mechanics.
- Expand infrastructure including the construction of pedestrian and bicycle friendly sidewalks, lanes, avenues, and road over- and under-passes, to and beyond the levels outlined in the Campus Master Plan. These serve to separate competing modes of traffic, enhance safety, and make walking and bicycling more pleasant and attractive.
- Increase bike parking to better meet demand. Replace damaged or obsolete equipment.
- Expand and enhance bicycle parking options with covered parking, secure bicycle storage (lockers and cages), and other innovations.
- Corporate partnership: In exchange for advertising, market advantage, etc., a large bike company (e.g., Trek) could help subsidize biking with any of the following programs.
- Encourage expansion of local bike rental programs, as at the University of Colorado-Boulder (see: http://ecenter.colorado.edu/transportation/bike/semester-rentals), and provide helmets, U-locks, and bike lights at a discount for students and faculty/staff, as at Arizona State University (see: http://cfo.asu.edu/pts-commuter-biking).
- Implement commuter benefits for bicyclists, such as a financial incentive (as proposed in the Bicycle Commuter Act).
- Collaborate with the health working group to promote the health benefits of biking. Include comprehensive information on the advantages of biking and the availability of lanes, etc. in local campus resources, e.g., "Green Guide to Living."
- Collaborate with the built environment working group to identify needs for additional bike parking and opportunities to better integrate diverse modes of transportation.
- Investigate options for expanding shared-use bicycle programs.

HEALTH

Vision Statement

To become the healthiest campus in the nation while creating a sustainable campus environment that focuses both on human health and environmental quality.

Recommendations and Goals

To enhance the physical and mental health, and the well-being of students, faculty, staff, and visitors at UW–Madison and our surrounding community, we recommend that health-based sustainability goals at UW–Madison focus on *prevention of illness and enhancement of human flourishing* rather than curing or reacting to human illness.

This will lead us to develop an awareness of the interconnectedness of life and an integration of human relationships into the way we work, live, and recreate at UW–Madison.

To reach this goal, we recommend focusing on two areas:

1. Enhancing healthy behaviors across campus (e.g., physical activity, nutrition, stress reduction).
2. Minimizing exposures to chemical, biological, and physical hazards across campus.

Points of Discussion

Awareness of the connections between human health and the environment has been the backbone of major environmentally focused initiatives throughout U.S. history, from the development of pesticide regulations following the publication of Rachel Carson's *Silent Spring* and the adoption of the Superfund Act in response to the Love Canal and Times Beach incidents, to "Agenda 21" of the United Nations promoting health and sustainable development at the international level. In reviewing the sustainability initiatives and recommendations of our peer institutions, we have found that none put a direct emphasis on human health.

Perhaps the fact that health is a derivative of all other sustainability goals helps explain this common omission. However, we believe that connections between health and sustainability can be a leading driver in promoting sustainable actions across campus—both within other specific topic areas (food, energy, transportation, materials and consumption, natural and built environment), and as a key topic area itself.

Therefore, the goals and recommendations outlined here sometimes overlap with other topic areas (e.g., promoting alternative transportation methods to both increase physical activity and decrease emissions), while at other times focus specifically on health-enhancing practices related to sustainability (e.g., promoting stress reduction activities through access to nature).

How Healthy is UW–Madison?

Currently, there is not sufficient up-to-date data regarding the health of the campus. The Spring 2006 National College Health Assessment Institutional Data Report (NCHA) for the American College Health Association (ACHA), an instrument that is nationally benchmarked for the college population, is the most recent compilation of health survey results. This assessment was limited in its scope (students only) and content pertaining to connections between health and sustainability (physical activity levels and certain determinants of stress are two of the most pertinent to this report—see below), but does provide a starting point both for determining some baseline health data of the UW–Madison community and provides a model for developing future campuswide health surveys. Overall, this resource exemplifies the need for a full campus health assessment (including faculty, staff, and students) of a wide range of health aspects, including detailed stress and well-being measurements, nutrition, physical activity, and exposures to hazardous materials.

Physical Activity

Data from the American College Health Association (National College Health Assessment Institu-

tional Data Report, Spring 2006) shows (Figure 7) that only 3.6 percent of UW–Madison students participated in vigorous activity for 20 minutes or moderate exercise for 30 minutes every day; 30.4 percent exercised 1–2 days per week; 29.4 percent exercised 3–4 days per week; 16.1 percent exercised 5–6 days per week; and 20.5 percent did not exercise at all. Current recommendations suggest getting 30 to 60 minutes of moderate activity every day.

Stress

Data from the American College Health Association (National College Health Assessment Institutional Data Report, Spring 2006) show (Figures 8 and 9) that during the school year UW–Madison students felt hopeless never (39.9 percent), 1–2 times (26.5 percent), 3–6 times (16.6 percent), 7–10 times (6.2 percent), and 11 or more times (10.9 percent). Students felt overwhelmed by everything they had to do never (3.7 percent), 1–2 times (12.9 percent), 3–6 times (33 percent), 7–10 times (21.2 percent), 11 or more times (33 percent) throughout the school year. Students got enough sleep each week to wake feeling rested 0 days (5.7 percent), 1–2 days (24.5 percent), 3–4 days (35 percent), 5–6 days (27.3 percent), or 7 days (7.4 percent).

Institutional capacity for linking education, operational, and research functions

UW–Madison has the unique opportunity to build a strong health-focused sustainability initiative by working with several existing departments and programs across campus that together have the potential to link education, research, and operational functions. Key resources for such integration include:

Academic

1. Center for Investigating Healthy Minds (http://www.investigatinghealthyminds.org/)
2. Molecular and Environmental Toxicology Center (http://metc.med.wisc.edu/metc/)
3. Nelson Institute for Environmental Studies (http://www.nelson.wisc.edu/)
   a. Center for Culture, History, and Environment (http://envhist.wisc.edu/)
   b. Center for Sustainability and the Global Environment (http://www.sage.wisc.edu/)
4. School of Medicine & Public Health (http://www.med.wisc.edu/)
   a. Department of Medical History and Bioethics (http://medhist.wisc.edu/)
   b. Department of Population Health
   c. Department of Integrative Medicine

Operational

1. Memorial Union Food Services
2. UW Health Green STEPS Committee
3. UW Health Wellness Campaign
4. UW Hospital Health and Healing Committee
5. Wisconsin Wellness Campaign (http://www.recsports.wisc.edu/wwc.html)

Defining Defensible Metrics and Standards

We recommend assessing health-related goals by measuring increases in healthy behaviors of the campus community *(e.g., physical activity, nutrition, stress reduction)* and decreases in exposures to hazardous materials across campus *(e.g., chemical, biological, and physical hazards in air, water, food, and other materials)*. The key caveat, however, is to minimize demand on natural resources by practicing "sustainable health"—health for today without compromising the capacity of our ecosystems to support the health of future generations. Health-related data at UW–Madison is currently insufficient to set defensible metrics, therefore we recommend establishing metrics and baselines in the following areas:

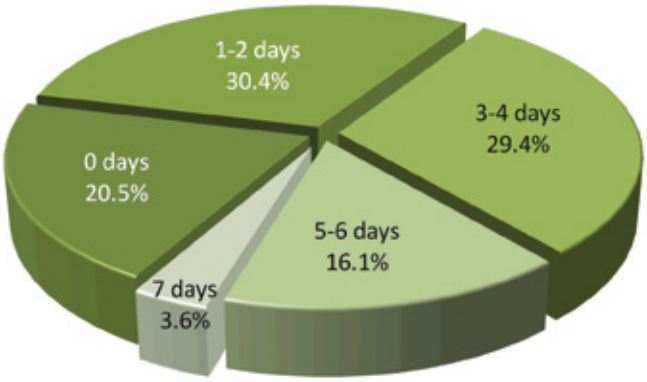


Figure 7. Percent of UW–Madison students who attained recommended physical activity levels during the school year (2006).

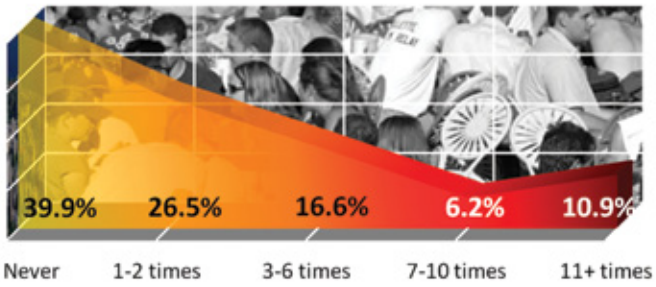


Figure 8. Percent of UW–Madison students who experienced a sense of hopelessness during the school year (2006).

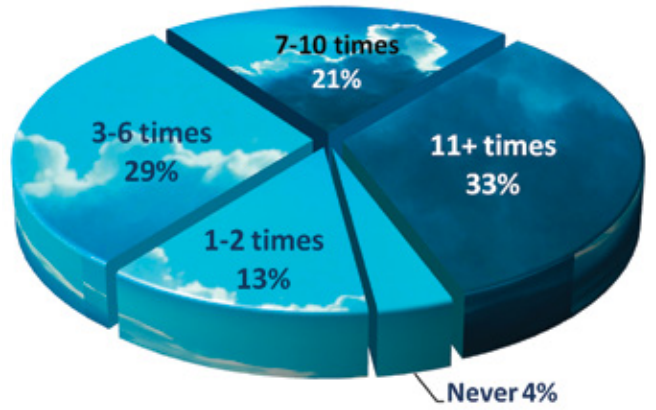


Figure 9. Percent of UW–Madison students who felt overwhelmed during the school year (2006).

1. Enhancing healthy behaviors

Nutrition and healthy diet – Increase the number of students, faculty, and staff who consume the recommended five to nine fruits and vegetables per day by first establishing the baseline (current national rate is 14 percent).

Physical Fitness – Increase the number of people who attain recommended physical activity levels each day (30 to 60 minutes of moderate activity every day) by first determining the current baseline level of physical activity across campus.

Healthy perspectives – Increase healthy psychological outlooks and decrease stress as measured by (i) reductions in anxiety, depression, and other indices of mental distress, including specific measures of stress; and (ii) increases in psychological well-being, by first establishing baseline levels.

2. Minimizing exposures to chemical, biological, and physical hazards across campus

Proper protection from and disposal of hazardous substances (chemical, biological, physical) – Work with Campus Environmental Health & Safety department (http://www2.fpm.wisc.edu/safety/) and UW Health Environmental Services Department (Tom Peck, Peg Adamowicz) to establish a baseline of exposures and set reduction goals.

Healthy, environmentally favorable materials – Set baselines and increase the use of environmentally preferred products (i.e., office supplies, medical supplies, cleaning supplies, building materials, etc.) across campus, including UW Health whenever available.

Outdoor air quality – Set baselines and goals to reduce outdoor particulate matter exposures (PM 2.5) of the campus air shed based upon National Ambient Air Quality Standards (http://www.epa.gov/air/criteria.html).

Indoor air quality – Determine current total square meters of indoor space contaminated with asbestos

and set goals to minimize exposure (current research suggests that maintaining asbestos in place may be safer than removing the material); work with University Health Services Environmental Health Program to set a target date for ensuring indoor mold levels in all building areas are less than outside mold levels; and determine baselines and set goals to reduce the total annual amount of pesticides used indoors.

Measures for both goals (enhancing behaviors and minimizing exposures) gain power when viewed in relation to one another. Health at the cost of the environment and/or future generations is no longer acceptable or sustainable. Environmental progress with a focus on aspects of human health is more powerful than a focus on environmental progress alone. Therefore, we recommend using an index of sustainable well-being (SWB; inspired by the New Economic Foundation's survey-based measure, which has been used worldwide) that places human health and well-being metrics in the numerator and metrics of exposures (along with measures of ecological footprint) in the denominator, such as:

Sustainable Well-Being index = (mental + physical health metrics) / (harmful chemicals, etc.) yields a measure of the amount of well-being we achieve per resource or hazardous substance used.

Project Recommendations

The following projects have been prioritized based upon their ability to achieve the goals and metrics outlined above, and their ability to integrate research, education, and operations across campus.

Project 1: Survey of the health of UW–Madison

Develop a campuswide survey to determine and inform baseline metrics for nutrition, physical activity, stress reduction, and exposures to hazardous materials, and establish an understanding of the barriers to and opportunities for enhancing healthy/sustainable practices. In addition, validated self-report measures are available for determining stress baseline information, along with immune function, inflammation, and cortisol levels in response to a standardized stressor (i.e., the Trier Social Stress Test) or in a pre- and post-intervention design to detect changes in reactivity (see also Project 4 below).

The survey and baseline data collection protocols could be developed and administered as part of a Nelson Institute/School of Medicine and Public Health course or through sustainability internships. The results would help determine the success of all subsequent projects and initiatives on enhancing healthy behaviors and reducing exposures to hazards across campus. Resources to help in this endeavor are available through the "Survey of the Health of Wisconsin" research program (http://www.show.wisc.edu/).

Project 2: Partnership with Wisconsin Wellness Campaign and UW Health Wellness Campaign

This project will integrate work being done by two of the university's wellness campaigns (Wisconsin Wellness Campaign—Don Schutt, Sarah Van Orman, and UW Health Wellness Campaign—Lisa Riehl) and expand upon their efforts to include aspects of sustainability through the integration of education, research, and operations. In this manner, researchers and facilitators will have the ability to communicate and develop the best possible solutions to health-related sustainability issues across campus. Projects will also have the ability to impact students through education and demonstrate how

to create a healthy sustainable lifestyle. Environmentally conscious choices emphasize and demonstrate how increasing your personal health can protect the environment and support sustainable practices.

Project 3: Greening the practice of medicine

This project builds upon the national and international work of Health Care Without Harm (www.noharm.org) and Practice Greenhealth (www.practicegreenhealth.org), the dissertation research of Christine Vatovec on the environmental and public health impacts of medical practice, and the operational work of the UW Health Green STEPS Committee to implement best "green" practices throughout UW Hospital and Clinics and the UW Medical Foundation. The project should include a research component to identify and evaluate best practices opportunities, barriers, and implementation outcomes.

Project 4: Study to enhance and measure sustainable well-being

This interdisciplinary project will use existing health and sustainability classes to create a sustainable well-being intervention in the context of a longitudinal randomized controlled pre-post study. Measures specified in Goals 1 and 2 will be collected but with the enhanced rigor possible when laboratory resources are included. The model for this study is an ongoing NIH-funded study investigating the neural, immunological, and behavioral changes resulting from Mindfulness-Based Stress Reduction (MBSR), the Health Enhancement Program (HEP), or a wait-list control condition being carried out by the Waisman Laboratory for Brain Imaging and Behavior under the supervision of Professor Richard Davidson and others. Both MBSR and HEP have already been empirically validated by a previous NIH-funded study conducted by the same lab and are taught by UW Health personnel from the Integrative Medicine Program (see Academic resources). The logistical, methodological, and clinical expertise from this ongoing study will be applied to this proposed study.

Project 5: Implementing integrated pest management across campus

This project stems from concerns about the health-impacts on workers and the community from the use of potentially hazardous pesticides. A growing research base supports this concern, and several alternatives are available through the use of integrated pest-management techniques for both indoor and outdoor pest-management. In general, this project should be completed by partnering with the Sustainability Task Force materials and consumption working group. Projects could follow examples from Seattle University (http://www.seattleu.edu/sustainability/pestmanagement.aspx) and Tufts University (http://sustainability.tufts.edu/?pid=14&c=22). Project activities should include surveying current practices to develop a baseline understanding of the types, amounts, exposures, and potential health effects of pesticide use across campus to provide transparency in current practices, and implementation of integrated pest management whenever possible.

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