Responsibility & Renewal
CHANCELLOR’S LETTER
Sustainability is a movement gaining momentum in many parts of this country and the world. Individuals, businesses, religions, builders, engineers, and scientists of all disciplines are part of it. Colleges and universities play a special role in the movement as indicated by the annual designation of the top “green” campuses by various rating agencies, and by the journal of record for higher education, The Chronicle.

The earning of a green campus designation is based on criteria such as recycling/composting, energy conservation, carbon footprint, food and agriculture, water usage, relevant educational programs, administrative support, and the existence of a mission or philosophy supporting sustained and coordinated efforts across various offices and campus constituencies. Although UMass Dartmouth is not likely to be in line to earn a green campus designation in the next few years, the breadth and pace of growth in its sustainability efforts over the past five years has been exemplary. The first visible result of the energy behind these efforts is the existence of the sustainability program, formally established in 2007.

This book, Responsibility & Renewal, is a summation of the rapid progress made on the campus over the past five years. A significant aspect of that progress is the scope of the sustainability effort, which involves offices and individuals from all areas of campus, in addition to the academic programs. Thus there is evidence of collaboration and cooperation involving: the Chancellor’s Office, academic departments and colleges, physical plant and facilities, student affairs, purchasing, and residential life. Topics covered include green purchasing, managing and transforming waste, greening the built environment, transportation, energy, land use, food, water, and the building a culture of sustainability.

This campus, the core of which was built between 1964 and 1975, according to a design by noted modernist architect, Paul Rudolph, is one of the few of the many campuses launched in the 1960s built according to a unified plan and concept. It was also built prior to modern wetlands legislation and with very little thought given to energy consumption and conservation. It can be, at the same time, both an inspirational architectural expression and a set of problems to be overcome. Perhaps most pertinent for the sustainability initiatives developed in this book, is the basic role of this campus as an agent of uplift for the region. Both Paul Rudolph and his main client, President Joseph Driscoll, viewed the bold architecture as a statement of possibilities and aspiration for an economically...
and educationally-depressed region in the 1960s (Gifun, UMass Dartmouth, 1960-2006: Trials and Triumph). They saw the campus as a work of art that could expand the vision of students and residents of the region.

The campus is still an architecturally-imaginative example of the optimism of the period in which it was conceived. Now, under the influence of the philosophy of sustainability, and a revised master plan, it is being re-conceived to serve once more as a model of a new phase of growth and innovation; a vision of sustainable growth with respect for the environment and the adoption of the most cutting-edge technologies to promote better use of resources. Underlying this transformation is the same bold assumption that produced the campus against all odds in the 1960s: the university can lead the way toward a different kind of future through its example and its educational efforts. It can then work more productively in cooperation with citizens and organizations in the community, including the newly-formed Regional Council on Sustainability.

Producing a future of sustainable practice for the university and the region involves changing assumptions and adopting new paradigms about stewardship and the “common wealth.” This book is a first step along the path to establishing a solid foundation for sustainability, in this university, in the students and faculty who study and apply its principles, and ultimately in the larger society.
Acknowledgments
Introduction
Purchasing
4,264 ft/1.3km

UMass Dartmouth '08
Paper Use

2,716 ft/828m

Buildings from left to right:
Burj Khalifa
Taipei 101
Empire State Building
Eiffel Tower
30 St, Mary Axe
Historically the University’s directive for purchasing has operated under one core principle: lowest cost. However, price tags do not always reflect all of the costs associated with a product or service when sustainability is taken into account.

Traditionally, lowest costs have been determined by adding up only the directly associated expenses for the product itself, delivery, installation and maintenance. With sustainability concerns in mind, lowest costs do not necessarily mean best values. Considering environmental and social ramifications of a product’s lifecycle, the lowest cost item may end up costing the University more in the end.

In our unsustainable lifestyles, one of the reasons why we have been able to purchase some goods so cheaply is because a large portion of the costs of producing a given product have been “externalized.” Manufacturing-process pollution, destruction of forests, degradation of the lives of indigenous peoples, and the exploitation of disadvantaged people for the sake of cheap labor are all examples of externalized and unaccounted-for costs.

In our globalized marketplace, American firms have been motivated to keep price tags low by moving production to developing countries where they don’t have to pay for pollution or pay workers living wages. Throughout the developed world, governments have enacted legislation that requires companies to be responsible for these costs.1

Where we are
Understanding Our Consumption Habits

Universities consume a steady stream of technology products, office supplies, vehicles, lighting, furniture, and other products. In order to address the environmental, social, and economic costs of these purchases, we must first understand our current purchasing habits. What and how much are we purchasing?

To this end, the UMass Dartmouth Purchasing Department conducted a print audit in 2009. We found that our campus consumes nearly 13 million sheets of paper on an annual basis. The cost of the paper, plus other printing supplies, is in the hundreds of thousands of dollars, not counting the acquisition and maintenance of the associated technology.

The environmental consequences of our paper consumption are high. We found that nearly none of the paper being purchased contained any recycled content. The chart below details the harms to the environment by category from one year of paper consumption on
campus, and compares the effects of reducing our consumption levels and/or purchasing paper with 30% post-consumer recycled content.²

The chart illustrates an important point: combining “greener” product choices (recycled content in the case of paper) with cutbacks in overall consumption leads to the greatest reduction in the environmental impact of our purchasing. We therefore are charged with a two-pronged goal: first, reduce the amount we are using, and second, choose the most sustainable product when we purchase.

### Campus Total Environmental impact of Paper Consumption

<table>
<thead>
<tr>
<th>Env Impact of Paper</th>
<th>Wood Use (tons)</th>
<th>Energy Use (MBTU)</th>
<th>GHG (tons CO₂e)</th>
<th>Water Use (gallons)</th>
<th>Solid Waste (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Use</td>
<td>225.07</td>
<td>2,493.13</td>
<td>184.87</td>
<td>1,237,029.01</td>
<td>147,921.81</td>
</tr>
<tr>
<td>50% Reduction and 30% RC</td>
<td>78.78</td>
<td>1,083.52</td>
<td>82.15</td>
<td>533,512.75</td>
<td>63,017.98</td>
</tr>
<tr>
<td>10% Reduction (No RC)</td>
<td>202.56</td>
<td>2,243.82</td>
<td>166.38</td>
<td>1,113,326.11</td>
<td>133,129.63</td>
</tr>
<tr>
<td>Current Quantity at 30% RC</td>
<td>157.55</td>
<td>2,167.03</td>
<td>164.29</td>
<td>1,067,025.49</td>
<td>126,035.96</td>
</tr>
<tr>
<td>10% Reduction and 30% RC</td>
<td>141.80</td>
<td>1,950.33</td>
<td>147.86</td>
<td>960,322.94</td>
<td>113,432.36</td>
</tr>
</tbody>
</table>

Key: RC is for Post Consumer Recycled Content

Several innovative approaches to reducing overall paper and printing use on campus are being initiated. For example, the University Book Store is encouraging professors to list their required course textbooks early enough that students can seek used textbooks. For every re-used textbook, a new textbook does not need to be ordered. In some cases, online textbooks can be substituted.

To further reduce printing costs, the University is looking at moving away from personal single-function office machines (printers, copiers, and faxes) and toward multi-function machines that would be shared by clusters of workers. Professors are encouraged to accept “papers” electronically and encourage wider margin settings when accepting hard copies. Everyone is asked to consider before printing or copying if an item is actually needed in hardcopy. Double-sided printing is becoming standard practice.
Green Purchasing

Although up-front economic cost is often the deciding factor in product choice, there are other costs to be considered when trying to “buy green.” Certainly the quality of the product, how it was manufactured, and what it is composed of are important. The life-cycle costs of the product should be considered: when initial cost, operation cost, maintenance costs, and disposal costs are factored in, the resulting value of a product may rise or decline. In addition, the environmental and social costs related to all stages of the lifecycle of the product must be considered. To assist the campus community in choosing more sustainable products our Purchasing Department researched, created and will be adopting a campus-wide Environmentally Preferable Purchasing or “green purchasing” policy. The policy covers nearly all purchases made by the University, and also serves as a tool to help end users identify “green” products.

In addition to the broad purchasing policy, recommendations have been added to the campus Technology Procurement Policy. One provision suggests that purchasers look for technology certified by the Electronic Product Environmental Assessment Tool (EPEAT). Additionally, replacing personal printers with multifunctional devices is expected to enhance efficiency while meeting the EU Restriction of Hazardous Substances (RoHS) environmental standards at the same time.

In order to effectively achieve the goals of reducing overall consumption and replacing remaining product purchases with Environmentally-Preferable Purchasing (EPP) we need to be able to continue to track and assess what is being purchased and make EPP products easy to identify and economically attractive.

Because the University is one of the largest purchasers of office supplies and technology products in its geographic area, we have both the strength to negotiate highly competitive contracts and also the ability to influence local markets. If UMass Dartmouth begins purchasing large volumes of EPP products, it encourages our vendors to stock greater quantities of these products and often find cheaper prices as well.

When UMass renegotiated its office supplies contract with WB Mason during FY09, that agreement included provisions whereby WB Mason will make environmentally preferable products more accessible and they will help the University track and benchmark our purchasing habits. This will allow University staff to easily identify the EPP products on the WB Mason site when ordering and allow the Purchasing Department to continue to assess the consumption patterns on the campus for further improvement.
Recent Accomplishments

Apparel Licensees Sign a Code of Conduct
UMass Dartmouth is committed to conducting its business affairs in a socially responsible manner, and to protecting and preserving the global environment. UMass Dartmouth is one of a select handful of collegiate institutions that require prospective licensees to sign and abide by a Code of Conduct that assures that the manufacturers (and their subcontractors) have produced licensed products for the University in a socially responsible way.

“Green Purchasing” Training Workshops for Staff
The Purchasing Department developed and led a series of workshops for staff providing information and tools for making Environmentally Preferable Purchasing (EPP) decisions, encouraging conservation both in energy and printing/paper, and encouraging recycling. Future workshops are also planned.

Printing and Paper Benchmarks and Goals Established
A print audit and quality performance test for recycled paper were conducted in 2009. As a result of the data collected through that research, benchmarks and goals were established for print reduction, paper conservation, and recycled content. A target goal was set for all campus paper
purchased to be a minimum 30% post consumer recycled content. Another target goal was set that remanufactured ink/toner cartridges will be chosen whenever the option is available.

**Green Cleaners**

The University has made a campus wide switch to utilizing Green Seal Certified cleaners for the majority of cleaning applications on campus.

**Environmentally Preferable Purchasing Policy Adopted**

The Purchasing Department researched, created and will be adopting a campus-wide EPP or “green purchasing” policy. EPP products are now available through our office supplies vendor. Recommendations were also made to purchase Electronic Product Environmental Assessment Tool (EPEAT) certified technology.

**Opportunities**

**Cleaner Vehicles**

We will work to encourage the use of smaller electric vehicles for the campus fleet whenever their abilities do not compromise the task that needs to be done. Using such vehicles would help reduce the more than $250,000 spent annually on vehicle fuel.

**Developing a Less-Paper Campus**

Our research and benchmarks serve as a great starting place for a robust paper and print conservation program. A committed effort could make a significant impact by encouraging paper-reducing practices such as electronic faxes, duplex printing, and collaborative digital editing of documents in offices, and by encouraging faculty to send and accept assignments digitally whenever appropriate.

**Expanding eBooks**

The campus store already makes used and electronic books available to students. But through increased direct collaboration with faculty and concerted planning, more of these books can be made available to students looking for alternatives to newly printed publications.

**Encouraging Availability of “Green” Products**

Recognizing our leadership role and the influence our purchasing power exerts, UMass has the opportunity to not only increase environmentally preferable purchasing on our campus, but use these purchasing choices to encourage our vendors to stock greener products.
Purchasing Best Practice

Duke University adopted an official Green Purchasing Policy in 2003 and developed a set of EPP guidelines in the summer of 2004. Their early adoption of EPP principles and practices has made Duke a leader in campus efforts to show sustainable values through how money is spent. Their guidelines cover all purchases made on their campus, and they do not impede the campus’ ability to provide adequate resources for regular operations.

The core structure of their efforts is outlined in their EPP guidelines: “Recognizing our impact as a major purchaser of goods and services, Duke University gives preference to environmentally friendly products whose quality, function, and cost are equal or superior to more traditional products.” Emphasized in their guidelines are life cycle cost analysis and practicability.

Duke’s efforts strongly demonstrate that green purchasing need not be simply a matter of paying a price premium for a “greener” product, but instead that smart and responsible purchasing can reduce the impact on the environment, and improve a university’s ability to meet its goals.

Purchasing Best Practice

Spotlight On Sustainability

Re-Manufactured Print Cartridges

A lot of printing gets done during the daily operations of an institution of higher learning: student papers, photocopies, forms, fliers, letters to constituents, bills, transcripts, and more. To better dissect our University’s printing habits and corresponding environmental impacts, the UMass Dartmouth Purchasing Department conducted a Print Audit in 2009. One unanticipated finding involved an easy and obvious opportunity to save money and protect the planet by changing how we handle used ink and toner cartridges.

Of the approximately $125,000 spent on ink and toner cartridges annually, UMass Dartmouth found that virtually all of these funds went to purchasing new original equipment manufacturer (OEM) products. Re-manufactured ink and toner cartridges (cartridges that have been used, recycled, and refilled) are available through our office products vendor, WB Mason. In addition to the environmental benefit remanufactured cartridges offer by keeping cartridges out of our landfills, the remanufactured cartridges were shown to be an average of 25% cheaper than their OEM counterparts. Switching to buying remanufactured ink and toner cartridges has the potential of saving the university over $25,000. If remanufactured product options become available for all the print cartridges purchased this number has the potential to be even higher.

By moving to remanufactured print cartridges, the University is able to simultaneously do several things: reduce the environmental impact of our current print habits, save money, and encourage our office supply vendor to increase availability of “green” products like remanufactured print cartridges. Long-term strategies for reducing the total volume of University printing and further reducing the environmental impacts of printing are being investigated. While these are developed, the simple move from new to remanufactured print cartridges provides immediate benefits.
Future Research Projects

There are significant opportunities for research into the life-cycle costs of products commonly purchased at the University and evaluating whether a “green” product is truly sustainable when the entire lifecycle, distance travelled, and other factors are considered. For example, are e-reading devices “greener” than paper books or computer-based ebooks?

As the University continues to collect data about the purchasing habits of our academic community, it will be important to continue to analyze both what the EPP product options are as well as innovative ways for reducing the need for the product in the first place.

For Discussion

Consider different types of products that may sport cheap price tags, but may be costly when sustainability values are factored in. How do we measure the price of degrading land or human quality of life when factoring those costs into the price that should be paid for a product?

Additional Resources

www.duke.edu/web/ESC/campus_initiatives/purchasing/index.html
www.responsiblepurchasing.org/
www.epa.gov/epp/
Waste
Waste is the second half of the resource cycle. Whereas purchasing is concerned with resource extraction, waste is about where things go when we are done with them.

Both purchasing and waste fall under the broader category of consumption, the cycle in which goods are produced, consumed and/or disposed of. When we talk about the model of consumption that our society generally follows, we talk about a “cradle-to-grave” cycle. But this “cradle-to-grave” process is antithetical to the natural world. The natural world follows a “cradle-to-cradle” or “closed loop” process, where all waste becomes a new raw material that again gets consumed. A dying tree becomes home to animals and insects and eventually decomposes to feed the soil and fuel the growth of new trees.

We take the example of the natural world as our model as we work to make our consumption process more sustainable. Some of the “cradle-to-cradle” research underway at UMass Dartmouth involves using shredded tires as substrate for gardening drainage, and grinding up used asphalt to mix in with new road paving materials. Ideally, all our waste should be repurposed or recycled.

Where We Are

The Waste Stream

The enormous amount of resources and products flowing into a university leads to a natural counterpoint: an enormous amount of waste flowing out. Every year thousands of pounds of packaging, used papers, empty print cartridges, uneaten food, outdated technology, unwanted clothing, dorm furnishings, and so on are generated. In FY08, $185,000 was spent on disposing of 2,375 tons of solid waste at UMass Dartmouth. This equates to 595 pounds of solid waste per full-time student.

It is important to remember that our trash does not simply disappear once it is removed from campus. Our solid waste is sent to Crapo Hill Landfill, where it is piled up and eventually buried. Crapo Hill captures methane, which greatly reduces the greenhouse gas emissions generally associated with landfills. As community landfills reach capacity, waste is trucked farther away and piled and buried (or occasionally burned) in other communities, sending the consequences of our misuse of resources into the land or air of other people. This is not a sustainable or responsible choice.

We must seek ways to reduce the amount of waste we generate, and develop strategies for moving closer to the closed-loop resource cycle exemplified in the natural world.
Recycling

Developing solutions for reducing our volume of waste requires a multifaceted approach because of the multifaceted nature of the problem. As a community we should consider the products we use:

- Are we choosing products with unnecessary packaging?
- Are we using paper or other goods we don’t really need?
- Are we disposing of products while they are still viable?

Many of the products currently in our waste stream can be donated, repurposed, or recycled. Simply making recycling bins available on campus has made a tremendous difference. In 2007 and 2008, both the Housing Facilities and Operations office (HFOS) and the Facilities and Physical Plant office (hereafter: Facilities), initiated recycling programs starting with select buildings as testing grounds. These efforts grew during the summer of 2008 as HFOS expanded its program in one residence hall to include all campus dorms. At the same time, Facilities negotiated a contract with the Town of Dartmouth to provide funding for recycling bins on campus in academic buildings. The University repaid the bill for bins with the money it saved by recycling.

Recently a contract for solid waste management was negotiated with a new waste disposal company. Historically the campus has worked with two and sometimes three different companies in the removal of waste from campus. This situation made it very difficult to track solid waste and recycling rates in order to identify areas of opportunity for improvements. With the new contract in place, one company will be servicing all solid waste and recycling on campus. This will include the residence hall recycling managed by HFOS, and the recycling on the main campus for co-mingled beverage containers and all types of paper.

Furthermore, our arrangement with this company has led them to stop shipping their recycling overseas. Instead they have identified and will be using a regional facility to process recycled goods. The switch from shipping recycling overseas to using a regional facility is a huge one: it underscores the capacity of the University to influence the sustainability of its vendors and the region.

When we consider the entire life cycle of our products we must include where our waste is sent for recycling, the fuel spent in shipping it there, and the environmental and social value of recycling responsibly in a state-of-the-art facility rather in dumps in other countries without regard to safety.
Composting

While recycling is an excellent option, it often includes a down-grading of a material as it is processed and reprocessed. Many items cannot be recycled over and over again, which means recycling is often not truly a “closed-loop” system. Food waste can be part of a true closed-loop cycle through composting. Composting involves turning food scraps back into a nutrient-enriched soil which can be used to help grow food.

At UMass Dartmouth, our food service provider, Sodexo, is taking steps to reduce the amount of food waste generated in our dining halls and going down the drain or into the trash. Key accomplishments include moving to a tray-less dining system (helping to reduce the total food wasted), partnering with a local farmer to send pre-consumer food scraps to feed chickens, and sending post-consumer food scraps to the same farm for garden composting.
Recent Accomplishments

Established Recycling Programs

A significant move toward reducing our total waste was achieved by establishing recycling programs for the campus. These programs are the beginning of a change in the unsustainable mindset of simply “trashing” all our unwanted goods. In FY08, 98 tons were recycled, a significant start. In addition to reducing our environmental impact, the University found recycling tonnage rates to be cheaper than landfill rates, making recycling in the University’s best interest economically.

Established Single Waste Disposal Company Contract

Consolidating our solid waste management contracts into one new contract with a new disposal company for all solid waste and recycling on campus is giving us an overall perspective and control of our waste. It has also influenced the disposal company to stop shipping their recycling overseas. Instead, they have identified and will be using a regional facility.

Participated in National “Recylemania” Program 2008 to 2009

In the spring of 2008, the University participated for the first time in the national “Recyclemania” competition, which focuses on increasing awareness among students of the values of recycling and boosting the volume of recycling in resident housing. A “Move-Out Day” program collected students’ unwanted dorm items at the end of the school year. Rather than throwing them away, all items in good condition were donated to a local charity. Over 3,900 pounds of items were donated at the end of the spring 2009 semester.

Less Food in the Waste Stream

The University has been rapidly expanding the amount of food waste diverted from landfills by working with a local farmer to have our pre-consumer food waste used as animal feed. Starting mid-semester in fall 2009, a post-consumer composting pilot program in the Resident Dining Cafeteria will use students’ food scraps for compost at Silverbrook Farm rather than sending them out to the landfill as trash.

Campus Clean-Up

Student-organized clean-ups of the campus have drawn participation from students, staff, and faculty alike. Participants fan out across the campus picking up litter and sorting recyclables from trash. The Campus Clean-Up days beautify the campus, identify possible problem zones, and raise awareness about putting trash and recycling in collection bins where they belong.
Opportunities

Increase Recycling

The greatest opportunity in regards to waste that the University has now is to recycle more. Recycling costs less than waste disposal. Currently, Facilities and the Sustainability Office are looking at ways to make recycling more available on campus. We discovered last year that the amount being recycled often exceeded available recycling bin capacities.

Making Recycling More Accessible for all Types of Waste

The University makes electronic-waste recycling available for all University-owned equipment. UMass Dartmouth also has access to recycling facilities for ink and toner cartridges. These are not well utilized however. They should be expanded and made more readily accessible.

Evaluate and Write Vendor Contracts to Reflect Our Waste Management Values

UMass Dartmouth is a big institution and can influence the best practices of the contractors with whom it chooses to do business. As such, we recommend negotiating contracts that require responsible recycling of materials whenever possible. This should include recycling of construction materials, as well as food waste and office supplies.

Developing an Internal System for Reuse

The University to a limited extent makes goods no longer needed by particular departments available for use by other departments. But this system is not very cohesive, and may well stand to benefit by following a “freecycle” model.

“As community landfills reach capacity, waste is trucked farther away and piled and buried (or occasionally burned) in other communities, sending the consequences of our misuse of resources into the land or air of other people. This is not a sustainable or responsible choice.”
Spotlight on Sustainability

Putting Food Scraps to Good Use

There is nothing wrong nutritionally with pre-consumer food waste except that it tends to be clippings and trimmings that humans don’t want to eat—the skins of potatoes, the peelings from carrots, the leafy tops of celery, the end cuts of cheeses. But, to chickens otherwise fed on a steady diet of cornmeal, this mix makes a healthy, inexpensive, and varied alternative.

Since 2007, UMass Dartmouth has been sending its pre-consumer food waste to feed Silverbrook Farm’s chickens. This particular farm, just around the corner from the UMass Dartmouth campus, has been devoted to sustainable and organic practices for over five years. Its chickens consume every week over 200 pounds of University kitchen scraps that would otherwise go straight into the waste bin.

Just started in December of 2009 is a composting effort that will save post-consumer food leftovers from rotting in the trash. Already, just one of four waste stations in the residential cafeteria is collecting approximately 400 pounds a week in uneaten food that can be fed to chickens or composted for enriching garden soil.

With an estimated 3,000 meals served every day on campus, the potential seems promising for many more hundreds of pounds of food waste to be redirected for farming once all trash stations in both residential and commuter cafeterias participate in the effort.

Future Research Projects

Research into developing sustainable “Closed-Loop Systems” to eliminate waste and establish best practice models are needed. Partnering with local businesses that can take back used products and repurpose them for continued use may be a possibility. Research and creativity are both required to move from our “cradle-to-grave” system to a “cradle-to-cradle” system.

Waste Best Practice

UMass Amherst has long set an admirable example of how best to manage solid waste on a university campus. The campus boasted a 56% solid waste diversion rate in 2006 and continues to look for ways to improve their program. Their efforts save their university over $250,000 in annual disposal costs.

Their program is based on a principle of Integrated Solid Waste Management (ISWM) “which holds that “garbage” is not a homogenous mass to be burned or buried and then forgotten.” Their system is based on a hierarchical priority structure that allows them to focus their efforts on achieving the best results.

That hierarchy is as follows:

1. Reduce
2. Reuse
3. Recycle or Compost
4. Incinerate with Energy Recovery
5. Landfill

The biggest lesson to learn from their example is that waste isn’t simply garbage to be sent for disposal, instead that there is great opportunity in how waste is managed, and that in an ideal system, a closed loop system, waste should become a resource for another purpose.

For Discussion

What are some examples of how modern waste items could be changed into “cradle-to-cradle” new beginnings for other products?

Do you believe that you recycle to your best ability and if not, what holds you back?

Additional Resources

www.epa.gov/waste/conserve/rrr/recycle.htm
www.mass.gov/dep/recycle/ 
storyofstuff.org/
Our built environment is a physical representation of both our cultural and our institutional histories. Buildings both shelter us and influence our expectations of what is possible in construction design. In the U.S., buildings account for most of our greenhouse gas emissions (38%), electricity consumption (72%) and energy use (39%). They also are responsible for 40% of raw materials use, 30% of waste output, and 14% of potable water consumption.¹

Over the past few years, governments that are intent on reducing emissions and energy costs have focused their efforts on retrofitting existing structures and building “green.” Efficient design, low-emission construction materials, and decreased energy use in buildings can greatly reduce the rising costs of lighting, heating and cooling.

But energy efficiency in buildings is only a starting point. A truly “green” building should help preserve natural resources. Water use should be minimized. Construction materials should be non-toxic and be transported from shorter distances. Appliances and furnishings should use less energy and fewer toxic chemical compounds. Most importantly, at UMass Dartmouth, we have the opportunity through sustainability commitments already made and Massachusetts State requirements to ensure that all buildings receive this treatment whether they are new or already built.

College campuses are the perfect places for green buildings. Not only do they reduce operating costs, but they also serve as important models for students and community members alike. Visionary buildings like the Adam Joseph Lewis Center at Oberlin College in Ohio² stand as testament that buildings ought to be teachers of our best rather than our worst practices.

Where We Are

Existing Buildings

The UMass Dartmouth campus was designed by brutalist architect Paul Rudolph in 1964; it was considered his finest achievement. The UMass Dartmouth campus was designed by brutalist architect Paul Rudolph in 1964; it was considered his finest achievement. While our multi-level glass and concrete infrastructure is unique, it was constructed at a time when most builders paid little heed to energy use or costs. The windows are enormous, single-paned plate glass with very little insulation properties. The concrete buildings have vast public spaces with high ceilings that are expensive to heat and cool.
But it is possible to look at the problems that we have with our buildings—their leaking roofs and stark concrete—as sustainability challenges with potential solutions like green roofs and green walls.

The Facilities, Design and Construction Department has made a commitment to sustainability. They’ve purchased materials that are green and chosen sustainable solutions like polishing rather than covering our concrete floors. They’ve also retrofitted several bathrooms on campus with water-saving taps and flush devices. And, while a recent green-roof pilot showed that our original buildings cannot handle the weight of substrate, soil and plants to create green roofs, there are opportunities on our newer buildings and in the planters designed into buildings.

During future re-roofing projects, we can plan for solar panels and green roofs as well as reflective or white roofing materials. Other significant opportunities may be available in our windows as thin-film solar technology continues to improve.

New Construction

Although the U.S. Green Building Council’s (USBC) Leadership in Environmental and Energy Design (LEED) green building certification program has been in existence since 1998, none of the recent University construction projects have been built to LEED standards. These projects include dormitories, a business building, a bio-lab research building and a few mid-sized renovation projects.

As a State agency, UMass Dartmouth must follow the laws and regulatory requirements of the larger UMass system of campuses administered by the UMass President’s Office. The Department of Capital Asset Management (DCAM) is the agency/manager of all state building in Massachusetts. On April 17, 2007, Governor of Massachusetts Deval Patrick signed Executive Order 484 requiring all State buildings to be at least LEED Plus Certified.

UMass Dartmouth is currently working on or planning a number of short-term and long-range major construction projects. Because of the size of these projects, most will be administered by DCAM. In spring 2009, DCAM and the University began a major library addition and rehabilitation of the existing five-story building. Other near-term projects include a major addition to the SAST Campus Building in New Bedford, a classroom addition to the Charlton College of Business Building, and a large scale bio-manufacturing facility, which is in the design phase.

The graph above from the USGBC shows the costs of buildings built on college and university campus, built to varying LEED levels, compared to buildings built to conventional standards.
Recent Accomplishments

**Bathroom Renovations**
Recent bathroom renovations allow some of our facilities to use less water thanks to the installation of waterless urinals and motion detection faucets. Electricity is conserved with motion detection lighting. Facilities have been redesigned with ease of cleaning in mind in order to reduce the use of both chemical cleaners and water.

**Building Product Purchasing with Sustainable Values in Mind**
UMass Dartmouth is updating its buildings by selecting materials that utilize rapidly renewable resources such as linoleum and other products with a high recyclable content. Further, the University has made a commitment to purchase products that are harvested and manufactured as close to campus as possible and from companies that have strong environmental policies.

**Spreading the Word About Sustainability Standards**
UMass Dartmouth’s Facilities, Planning, Design and Construction Office has made a commitment to research, promote and direct agencies, architects, engineers and contractors of the University’s and the State’s sustainability policies.

**Pursuing Green Roof Installations**
UMass Dartmouth is actively working to promote and expand its green spaces, even on roof tops. The green-roof pilot that began on the Liberal Arts building is currently being installed on the walkway between the Administration Building and the Campus Center.

Opportunities

**LEED Platinum Certification Pursued by Charlton College of Business**
The Charlton College of Business is seeking to build a LEEDs Platinum addition to their school. Achieving this goal would both bring short-term recognition as a leader in the field and long-term savings to the University. UMass Dartmouth would also gain a strategic advantage in its goal of attracting high-level graduate students with sustainability values for its MBA program.

**Sustainable Carpeting**
The University is choosing recyclable, low-VOC carpet as it looks to replace worn areas or lay new carpet.
**Roof Upgrades**

When replacing roofing surfaces throughout the campus, efforts should be made to ensure that the roof is strong enough to support future solar panels, green roofs, rooftop gardens, or other more sustainable surfaces. Sustainability means planning for, and building for, future needs instead of present needs.

**Self-Sustaining Housing**

As the University looks to increase our graduate student population, the need for building new graduate housing will come into focus. By using a combination of technologies such as small-scale wind, solar-thermal, photovoltaic, and geothermal energy, UMass Dartmouth could build a housing complex that generates as much or more power than it needs. This housing would serve as a model for green housing throughout the area.

**Window Remediation**

While the campus’ enormous expanses of windows provide for excellent views and daylighting opportunities, their single-pane nature is a heating nightmare. Replacing all windows on campus would be prohibitively expensive, but slowly reducing heating load by replacing broken windows with high-efficiency double-pane windows is possible. New windows would save the University money, improve employee comfort, and move us towards the ACUPCC goal of climate neutrality by reducing the amount of required heating.
Spotlight on Sustainability

Green Roof Project

Roofs are one of the most desolate areas in most building-scapes. Tradition has dictated that they work best when designed to shed water and shut out nature’s intrusions.

An entirely different, more sustainable approach is to incorporate Green Roof thinking. By putting engineered gardens on top of our man-made habitats, we can more efficiently preserve heat and cooling inside dwellings, while reducing water runoff, and boosting eco-systems for desirable birds and insects even in the middle of cities.

UMass Dartmouth, with its flat-roofed building designs, is an ideal place to experiment with green roof technologies. The University has been testing various substrates for plants that incorporate recycled materials such as crushed glass and porcelain and shredded tires.

Green roof layouts depend on building infrastructure and how much load they can bear. A basic green roof begins with a waterproofing membrane system laid over the rooftop surface to prevent leaks and root protrusions. Next, a drainage layer removes excess water not retained by the moisture blanket. The growing medium on top of the blanket is comprised of topsoil or alternative substrates. Sedums are commonly-used plants for green roofs because they are attractive, low-maintenance, and can survive droughts.

Using real topsoil means higher costs, more weight, and greater threat of erosion if washed or blown away. Sedimentary substrates (sand, clay, granule, etc.) or recycled materials such as crushed brick or seashells are common for green roofs because they filter water and hold roots in place. A popular and effective substrate is rock wool, a composite material made from mineral fibers, similar in texture to fiberglass. Rock wool is light, porous, provides stability, helps germinate seedlings, and aids in water and nutrient absorption.

The Office of Campus and Community Sustainability has been fostering UMass Dartmouth’s venture into adding green roofs to its buildings thanks to a grant from the Leading by Example Program, run by the Massachusetts Executive Office of Energy and Environmental Affairs. A green roof pilot that began on the Liberal Arts Building is now located on the walkway between the Administration Building and the Campus Center. In the near future, UMass Dartmouth’s brutalist-architecture of concrete and glass buildings clustered around a grassy central expanse may be softened with gardens on high. Green roofs not only create pocket eco-systems out of once barren areas, they help lower heating and cooling energy expenses to make our buildings more sustainable.
Future Research Projects

Green roofs and green walls could add color and sustainability to UMass Dartmouth’s concrete façades. Experimenting with lighter materials or building on newer roofs could expand our green roof research. Building a variety of green wall pilots would allow us to test which were most suitable and most effective.

For Discussion

How do buildings designed for different environments and social norms—like guest suites in the U.S. versus one-man sleeping chambers in Asian hotels—influence our expectations for what our built environments should be?

What are the most obvious opportunities for sustainable upgrades to your home or place of business?

Does sustainability in our building designs require a mindshift from working against the natural elements to working with them?

Additional Resources

www.usgbc.org/
www.nrdc.org/buildinggreen?gclid=CJze0MDwl58CFRh15Quo
www.mcdonoughpartners.com/
Transportation
Transportation is an integral component of everyday life—getting to work, class, home, and everywhere in between requires a mode of transport. In the United States the major form of transport since the 1950s has been the automobile. Land use and development patterns have been shaped by this preference, leading to communities filled with multi-lane roadways, wide-spread shopping centers bordered by expansive parking lots, and a separation of services, businesses, and homes that makes alternative modes of transport such as walking or biking both dangerous and unrealistic. Gone, for the most part, is the village lifestyle where homes and the businesses were clustered together.

The UMass Dartmouth campus is no exception when it comes to its design as a commuter campus for people primarily getting about in automobiles. It is located between the regional urban centers of Fall River and New Bedford, making it convenient by automobile but inconvenient to access by any other mode of transport. Understanding the need for access to campus and to shopping outlets helps define the challenge faced by UMass Dartmouth to reduce automobile travel.

As a university, our transportation challenges are not ours alone, but part of our region’s pattern of development. Strategies for improving the sustainability of transportation at UMass Dartmouth are yoked to the wider region and require our participation in regional transportation conversations.

Where We Are

Getting to Campus

Our campus was deliberately sited between urban centers with the goal of attracting commuter students from throughout the region. Our status as a commuter-based institution has begun to shift, but a large number of students still commute in. When faculty and staff are also considered, we find that the average person travels to campus a distance of just over 18 miles daily.

This distance is too great for walking or biking. A transportation survey conducted on campus in 2009 bears this out—only 8% of respondents ever walk to campus and only 4% of respondents report reaching campus by bicycle. The lack of biking paths and continuous sidewalks may also be a factor.
A slightly larger group use public transportation: nearly 12% report having taken a bus to reach campus. All other modes of transport are eclipsed by single-occupancy vehicles. While 29% of survey respondents claim to carpool to campus at least “some of the time,” 85% report traveling alone “most of the time.”

The prevalence of single-occupancy vehicle transport to campus is problematic for several reasons: it increases the need for parking, increases traffic, and has the greatest carbon footprint of all the modes of transit. More fuel is consumed per person and more carbon dioxide is emitted per person if a car carries only one passenger. Currently our students, faculty and staff use about 25,000 gallons of gas per typical school week getting to and from campus.

Once on campus, however, getting around is easy. Our campus is built in a circular design. A “ring road” runs along the exterior of the encircled buildings and campus green. The road is lined by parking lots that make getting to main classroom and office buildings a short walk. In addition, the University offers a “DART Van” service that drives a scheduled route around ring road to speed travel and assist those who have trouble walking.

Recent Accomplishments

*Increase Campus Residency*

Reducing the environmental impact of transportation to and from campus is challenging, but opportunities exist. Increasing the proportion of students who are residents rather than commuters helps reduce campus-bound travel circuits. Indeed, in the last ten years the amount of resident students on campus has increased significantly, and currently approximately half of the student population lives on campus.

*Revamped Carpooling Program*

The Campus Services and Sustainability Offices have partnered to re-imagine the carpooling program on campus. This partnership has lead to the development of a new carpooling policy, the development of a carpooler matching program, and an increase in the number of preferred parking spaces for carpoolers on campus. The matching program is in late development stage, and proposals are being sought for the installation of signs designating carpooling spaces.
Promote Bus Riding

The University offers a free bus service for students, known as “The LOOP,” that runs regularly between the main campus in Dartmouth and our satellite campus in downtown New Bedford. Public busses also stop on campus, allowing students and staff to travel to New Bedford, Fall River, or beyond. In FY09 a pilot project was run with the Southeastern Regional Transit Authority to offer free bus passes to all UMass Dartmouth students and staff for use on any of the regional bus routes. The program went largely unused. It is unclear if this was due to lack of interest, insufficient marketing, inconvenient bus routes and/or schedules, or other factors.

Improving Dart Van Service on Campus

DART Van ridership has increased significantly since the addition of covered waiting areas and the addition of a new route that runs by the residence halls. A snapshot of ridership in the months of September through February reveals 47,272 rides in the 2007-08 period compared to 79,016 in 2008-09.

Opportunities

Promote Walking and Biking

Walking and bicycling are naturally suited to the scale of travel around campus. Eighty-six percent of residential students surveyed reporting walking to class on a regular basis. The lack of safe bike ways on campus is likely to be a significant factor in the currently limited role bicycling has on campus. Only 10% of residents reporting ever biking around campus. The addition of a designated bike path on campus would allow the University to capitalize on the untapped potential of students bicycling to different parts of campus. Such a path would also provide a safe recreational space for staff. The University has been looking into establishing a bike path along Ring Road that could eventually connect to a larger regional bikeway. This would both increase the possibility of external funding for the project and provide a greater benefit by allowing students and staff the possibility of commuting by bicycle between the main campus and satellite campuses, homes or local businesses.

The University, in promoting biking should also make bike racks more available. The availability of bike racks has improved over the last few years, but more facilities will need to be made available in order to make biking a more regular component of how people get around on campus.
The University may also explore a bike-sharing program. Such a program might not only encourage biking on campus by making bikes more available, but also could serve as enterprise experience for students running the program.

**Developing Community/Residential Amenities On Campus**

The average UMass Dartmouth student leaves campus three times a day. Why are students leaving campus so often and can the University make changes to better suit their needs without trips off-campus?

These are questions that can guide us as we make our on-campus community more completely satisfying, reducing the need for frequent transportation off-campus.

**Group Transportation into the Town of Dartmouth**

With an understanding of why students are leaving campus, the University can work on developing services on campus that will help remove the need to go off campus. UMass Dartmouth can also put in place group transportation options into the town to make such services as groceries and other shopping more accessible without the use of single-occupancy vehicles.

**Creating a Long-Term Transportation Plan**

The University should convene a working group to develop a long-term transportation plan.

**Designate Preferred Parking Spaces For Hybrid and Alternative Fuel Vehicles**

Work is already underway to establish new preferred parking spaces for carpoolers on campus; but we can take this further. Adding preferred spaces for hybrid and alternative fuel vehicles is another step we can take. By giving preference to these vehicles the University can send a clear message that shows our commitment to alternative modes of transportation. Further, UMass Dartmouth can begin planning to deploy electric vehicle parking spaces, as use of these types of vehicles will likely surge in the near future.

**Establish a Continuous Direct Shuttle to Downtown New Bedford and Fall River**

The University has already made great strides by establishing the LOOP shuttle bus, which provides students, faculty, and staff a direct and free ride to one of our downtown New Bedford satellite location. But we can do more. We have an additional campus location in New Bedford, and two more in Fall River. Reliable and direct services to and from these
locations will help reduce the dependence on single-occupancy vehicles, and emphasizing direct routes to the city centers will also aid in integrating passengers with the larger regional public transportation network.

**Continue to Engage in Regional Transit Conversations**

As the region and the University both continue to grow and develop we have the opportunity to take part in (and to an extent we already have) regional transportation development conversations. These conversations should capitalize on such opportunities as the development of The South Coast Rail, as well as provide expertise in devising the most efficient and cost-effective public transportation routes.
Transportation Best Practices

For best practices, we look to the University of Pittsburgh, whose multiple green transportation approaches won them the 2009 Campus Commuter Challenge.

Their efforts begin with a campus fleet that includes hybrid, electric, and biodiesel vehicles. The Pittsburgh Port Authority, in partnership with the University, recently purchased six diesel-electric hybrid buses. All members of the school community can use bus and light rail transportation for free. The University offers discounts on parking passes for community members who carpool and helps carpoolers find rides or riders through a carpool and vanpool ride-matching service. Pitt also provides bicycles that can be rented hourly or daily and has significant infrastructure investment in free bicycle racks and nominal-fee bicycle lockers.

In addition, Pitt operates a free bus around campus and to some local destinations. During breaks, the University offers discounted bus trip service to 14 cities. The University of Pittsburgh has won the following awards:

- Fall Campus Challenge 2009, First Place
- Best Workplaces for Commuters
- Best Workplaces for Commuters Race to Excellence Bronze Level Award
- ACT Mid-Atlantic Chapter Moving Mobility into the Workforce Award

Spotlight on Sustainability

Matchmaking for Carpoolers

Though carpooling is a sensible and cost-saving alternative to single-occupancy vehicles that vie for space in traffic jams and parking lots, it tends not to be a driver’s first choice to share a ride. One enterprising UMass Dartmouth Charlton College of Business MBA student asked himself why carpooling was not more popular. What he unveiled may change attitudes for drivers and passengers in the future.

Alex Sierra is launching a new service called CarpoolFriend.com in early 2010. Thanks to his research into ride-sharing prejudices, a pilot project centered on getting commuters to group together when driving to and from campus may prove his theory that what turns potential carpoolers off has a lot to do with matchmaking personal travel choices.

Beyond matching the basics of pick up and drop off locations and travel times, CarpoolFriend.com asks car mates for personal preferences such as whether they smoke, allow pets in the car, want to be able to sing, have a musical preference, and want to ride in same-sex or mixed-gender groups.

Making a carpooling experience more pleasurable, and providing an easy online system for finding potential ride-share matches, could be the start of something big when it comes to turning the tide on our society’s prevailing preference for single-occupancy vehicles.
Future Research Projects
As a research endeavor, the University can make a concerted effort into advancing new and innovative modes of transportation that produce less greenhouse gasses. We can also investigate where students and staff are living to negotiate new bus routes and schedules with the regional transit authority, reducing the need to use single-occupancy vehicles as the only choice for getting to and from campus.

For Discussion
The one-car-per-person norm for suburban living is not how many people get around. In cities and old-fashioned villages, many people do not even own cars. What are your preferences and under what circumstances would you be willing to change how you get around?
What are the challenges and benefits of carpooling?
If a convenient bus route was available to bring you to and from campus, would you use it?
If you are a campus resident, what kinds of shops and services would you like to see included on campus?

Additional Resources
www.gdrc.org/uem/sustran/sustran-principles.html
www.smartcommunities.ncat.org/transprt/trintro.shtml
www.endofsuburbia.com/
Historically, UMass Dartmouth has shown little concern about its energy use. The low priority status given to our energy consumption is embodied by the fact that there is only one meter spinning up the kilowatts being used by the entire main campus. This makes evaluating the efficiency and consumption of individual buildings virtually impossible.

Energy, in one form or another, supports every aspect of University operations. The need to monitor and limit its consumption is not just a factor of economic cost, but a reality in regard to conserving energy supplies. Most of our energy comes from non-renewable sources such as fossil fuels, which experts believe to be “peaking.”

“Peak Oil” is a term that refers to the point at which half of the supply of oil—including the highest grade and most easily extractable part—has been produced. The Association for the Study of Peak Oil and Gas (ASPO) suggests that in some of the countries we rely on most for oil supply, Peak Oil was already reached in the 1980s and that we are at or near Global Peak Oil. Growing population and energy demands are likely to increase the cost of the remaining supplies.¹

Renewable energy sources are a promising alternative to our fossil fuel-based energy system, but we must recognize that all energy sources have associated costs. While investing in renewable energy is a visible statement of commitment to sustainability, pursuing energy conservation and efficiency may provide even more dramatic gains for sustainable living.²

As an institution of higher education, UMass Dartmouth can help model the importance of evaluating both energy consumption and energy sources as we seek a sustainable energy plan for the campus.

Where We Are

Infrastructure

The University’s campus was designed in 1964 with an eye toward industrial-flavored architecture but without regard to building energy performance. Our structures in essence consume as much energy as buildings can consume. We have aged heating, ventilating, and air conditioning, and lighting systems with minimal options for controlling the energy they draw.

Nonetheless, UMass Dartmouth is in the early stages of one of the largest energy performance contracts ever undertaken by the state of Massachusetts. The energy service company NORESCO, to which we have awarded the contract, is considering a wide range of energy conservation and generation measures on campus. These improvements will be paid for over a 20-year period through the cost savings generated by the improvements themselves.

¹ "Peak Oil" is a term that refers to the point at which half of the supply of oil—including the highest grade and most easily extractable part—has been produced. The Association for the Study of Peak Oil and Gas (ASPO) suggests that in some of the countries we rely on most for oil supply, Peak Oil was already reached in the 1980s and that we are at or near Global Peak Oil. Growing population and energy demands are likely to increase the cost of the remaining supplies.

² Renewable energy sources are a promising alternative to our fossil fuel-based energy system, but we must recognize that all energy sources have associated costs. While investing in renewable energy is a visible statement of commitment to sustainability, pursuing energy conservation and efficiency may provide even more dramatic gains for sustainable living.
company NORESCO, to which we have awarded the contract, is considering a wide range of energy conservation and generation measures on campus. These improvements will be paid for over a 20-year period through the cost savings generated by the improvements themselves.

The majority of our campus’ heating energy comes from our central steam plant. Until two years ago, that facility had received no significant updates since its construction in the late 1960s. Recently, modern computer controls have been added to the steam plant, which allow a greater level of system control. The steam plant was also updated to run on natural gas, which is cleaner than the previously utilized fuel oil.

Our heating and cooling system regularly leaves rooms on one end of a building too hot and rooms at the other end of the same building too cold due to a steam delivery system that has received few updates and is prone to leakage. To exacerbate the situation, large, single-pane windows with minimal insulation value cover much of all of our building walls.

All new buildings and major renovations on campus are required to be at least LEED Plus Certified, as mandated by the April 2007 Executive Order 484. LEED Plus is a green building definition specially developed by The State of Massachusetts as guidance for State buildings, with additional emphasis given to our New England climate. While this mandate will help minimize the energy impact of future UMass Dartmouth construction, it does not address the challenge of the existing campus infrastructure. Considering the high cost involved in any infrastructure updates, repair, or new energy production projects, improving energy efficiency is often challenging.

**Energy Mix**

The University receives energy through a mix of fuel sources, relying greatly on one of the dirtiest until recently. Our steam plant, until earlier this year, was powered by number six heavy fuel oil; a fuel high in carbon emissions. Now the plant has been converted to natural gas and burns more cleanly. We receive electricity from Direct Energy, which is generated from a mix of coal, oil, nuclear, wind, and solar powers.³ We would like to increase the amount of renewable energy our campus uses, ideally generating power on the campus itself. Possible renewable energy projects will be evaluated as part of the NORESCO contract.

**Behavior**

General attitudes of indifference to energy consumption have led to wasteful behaviors like students leaving windows open in the winter, and personnel leaving technology and
lighting on in classrooms and offices. An impressive display of the impact changes in attitudes and behaviors can have was highlighted by a campus-wide Energy Savings Campaign during the 2008-9 academic year (see results below).

Recent Accomplishments

Reduced Energy Consumption Through Behavior and System Control Changes
The campus recently achieved significant reductions in energy consumption by updating steam plant controls and manually manipulating machinery at individual buildings. In addition, students and staff worked to raise awareness and encourage others to do things such as shut off lights, and take shorter showers during last year’s campaign to reduce energy usage campus-wide. These behavioral changes combined with the diligent attention that the Facilities, Facilities and Physical Plant Office paid to managing the campus systems have paid off. They led to an 11% decrease in electricity consumption and 9% reduction of fuel for the steam plant between the fiscal year 2008 and 2009. These savings equated to a total dollar savings of over $647,000 for FY09.

Developing Comprehensive Energy Savings Performance Contract
The University has completed a review process necessary for working with energy savings company NORESCO to develop a comprehensive energy savings performance contract. The value of this contract will be upwards of $35 million. This program will save the University at least the value of the contract over a 20-year period and is expected to cut our carbon emissions and energy consumption by 20%.

Improved Steam Plant Controls and Fuel Source
The campus recently completed an update of our steam-plant controls systems, and switched to burning natural gas instead of heavy oil. These changes have not only reduced our total consumption, but also natural gas releases much less carbon, and offers greater market stability.

Initiated Wind Power Feasibility Studies
The campus has in the last year begun two different wind studies for developing wind energy projects. The first was the installation of a meteorological tower in spring 2009 to measure the viability of a commercial turbine on campus. The second was the installation of an anemometer on the roof of the Aspen residence hall. This device is measuring rooftop wind speeds to determine the feasibility of installing a series of 1-kilowatt structure-based turbines.
Energy Generation Studies
Our Advanced Technology and Manufacturing Center (ATMC) is researching methods of tidal energy generation. Renewable Energy research is also ongoing in the Engineering Department and in the Clean Energy Lab at the ATMC.

Solar Lights and Dart Van Stops
Solar-powered lights were recently installed in several parking lots, and the lights on DART van stops are also powered by solar photovoltaic panels.

Opportunities
On Campus Renewables
The University in February 2009 erected a meteorological tower in order to study the feasibility of a commercial scale wind turbine on campus. This project if completed will likely be compromised of a 660kW turbine similar to the one installed at the Massachusetts Maritime Academy. Assuming similar cost parameters, and generation yields, such a project could yield a net savings of over $20,000 per year. The University is under consideration by the Commonwealth for a 250kW solar photovoltaic installation. Such an installation, assuming that it is wholly funded by the State, could yield the University a net annual savings of over $36,000 per year. We also expect our swimming pool to be heated by a solar array through our ESCO project.

Updates to our Aging and Inefficient Infrastructure
The University’s energy performance project with NORESCO will run over a 20-year period, but is already bringing measurable results. Currently, researchers are studying the potential of upgrading the energy infrastructure on campus. They are also investigating the benefits of installing and integrating numerous renewable energy measures, including but not limited to: solar photovoltaic, wind energy, and geothermal.

Energy Reduction Campaigns
Much of the energy used on campus is wasted through lights and technology left on in classrooms or opened windows in offices and dorms. While our recent energy savings campaign netted the University significant savings, a more systemic approach to energy conservation could benefit us both financially and environmentally.
Spotlight on Sustainability

Energy Savings Company (ESCO) Contract

Saving money by spending it on changes that conserve energy for the long run is a strategy that was hatched during the energy crisis of the late 1970s, but it is being rediscovered now. The first Energy Savings Companies (ESCOs) proposed the idea decades ago that investing in energy saving measures would pay for itself in monthly utility bill reductions. Potential clients were unconvinced, so ESCOs came up with plans that allowed businesses to pay for work they had done by sharing a percentage of their energy savings over a period of time. Energy cost savings turned out to be so significant that ESCO contracts are again being sought out in today's conservation conscious marketplace.

UMass Dartmouth launched an ESCO program with NORESCO of Westborough, MA in 2009. The University and NORESCO have been working together to assess the campus and where its opportunities are for instituting energy-savings measures. Under the emerging plan, UMass Dartmouth will pay back over 20 years $35 million in improvements to its heating and air conditioning systems, lighting and environmental controls. The projection is for the University to save between 30 and 40 percent of its annual $9 million energy costs.

Among the exciting upgrades for UMass Dartmouth are a complete rebuild of the University's steam plant with a gas-turbine co-generation unit added to capture otherwise lost energy. Furthermore, each campus classroom will be fitted with thermostats and individual heating and cooling controls. While this may not seem particularly cutting-edge, the UMass Dartmouth campus currently has only one energy meter for the entire enterprise, making it impossible to budget or measure individual buildings, never mind subsections of buildings. While making energy cost savings possible on a room-to-room basis, ESCO measures in the works will also eliminate the University's problems with cold and hot spots.

The UMass Dartmouth plan is one of the biggest ever undertaken by a state agency. However, the concept is sound, the changes to be made are tried and true, and the results will benefit campus sustainability efforts far into the future.

Energy Best Practice

The Massachusetts Maritime Academy has shown a strong commitment to sustainability, and renewable energy in particular. In 2006 they erected a 660kW Vesta wind turbine, which has been generating over a million kWh per year. They have also acquired an 81kW solar array, and utilize solar-powered lighting for their walkways.

Mass Maritime’s model offers a number of beneficial examples: they show both the economic and environmental viability of renewable energy projects. Their wind turbine cost approximately $1.3 million installed; they received a grant valued at more than $500,000, and they are saving more than $200,000 per year, which implies a payback period of less than five years. And they have carried the lessons learned for their previous projects forward, continuing to develop renewable energy and energy efficiency on campus.
Future Research Projects

**Advanced Energy Technology Research**

Many renewable energy sources like structural wind and ocean tidal power are still in their infancy. As a research institution, UMass Dartmouth has the opportunity to help develop products and markets for advanced renewable energy sources.

**Feasibility Study of Cooperative Renewable Energy Approach**

It is unlikely that our campus will be suited for all of the current possible systems of generating renewable energy. Despite the availability of grant funding, UMass Dartmouth will be unable to access funds for systems not well matched for our campus. Joining a cooperative of schools that collectively fund and benefit from the carbon reduction of well-suited energy projects on each campus is one possible model for participating in sustainability efforts that reach beyond our own limitations.* Research into the feasibility of such collaborations is needed.

For Discussion

Should the possibility that Peak Oil has passed or is imminent change the way in which we think about pursuing alternative energy sources?

What simple behaviors could you change in your home or workplace to conserve energy?

If obvious actions like keeping windows closed in winter and turning off lights can save 9 to 11 percent on a utility bill, how much extra money could be saved in your home or workplace?

Additional Resources

www.maritime.edu/l2.cfm?page=169
www.masstech.org/renewableenergy/index.html
www1.eere.energy.gov/windandhydro/
www.peakoil.net

The following charts show our strategy for calculating and presenting the data:

**Fig.1  Averages for Energy Used in Specified Rooms (Group I)**

<table>
<thead>
<tr>
<th>Type of Room</th>
<th>Watts per Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Classroom</td>
<td>19131 watts/16 rooms = 1196</td>
</tr>
<tr>
<td>Computer Lab</td>
<td>2350 watts/3 rooms = 784</td>
</tr>
<tr>
<td>Office</td>
<td>10776 watts/3 rooms = 3592</td>
</tr>
</tbody>
</table>

**Fig.2  Averages for Energy Used in Specified Rooms (Group II)**

<table>
<thead>
<tr>
<th>Type of Room</th>
<th>Watts per Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Classroom</td>
<td>15240 watts/12 rooms = 1270</td>
</tr>
<tr>
<td>Computer Lab</td>
<td>10120 watts/5 rooms = 2024</td>
</tr>
<tr>
<td>Lecture Hall</td>
<td>4525 watts/3 rooms = 1508</td>
</tr>
<tr>
<td>Office</td>
<td>1565 watts/4 rooms = 392</td>
</tr>
</tbody>
</table>

**Fig.3  Averages for Energy Used for Group I and Group II (Combined)**

<table>
<thead>
<tr>
<th>Type of Room</th>
<th>Watts per Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular Classroom</td>
<td>(1270 watts/room + 1196 watts/room)/2 = 1233</td>
</tr>
<tr>
<td>Computer Lab</td>
<td>(2024 watts/room + 3592 watts/room)/2 = 2808</td>
</tr>
<tr>
<td>Lecture Hall</td>
<td>(1508 watts/room)/1 = 1508</td>
</tr>
<tr>
<td>Office</td>
<td>(392 watts/room + 784 watts/room)/2 = 588</td>
</tr>
</tbody>
</table>

**Fig.4  Energy Usage of Most Common Electronic Devices (in Watts)**

<table>
<thead>
<tr>
<th>Electronic Device</th>
<th>Off</th>
<th>Warming Up</th>
<th>Running</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Camera (Samsung 900DXR)</td>
<td>3</td>
<td>N/A</td>
<td>50</td>
</tr>
<tr>
<td>Projector (Sony VPL-Px35)</td>
<td>20</td>
<td>N/A</td>
<td>10</td>
</tr>
<tr>
<td>DVD Player (Sony SLV-D350P)</td>
<td>5</td>
<td>N/A</td>
<td>10</td>
</tr>
<tr>
<td>Computer (Gateway E2500D)</td>
<td>5</td>
<td>150</td>
<td>100</td>
</tr>
<tr>
<td>Printer (HP Printer 4100N)</td>
<td>0</td>
<td>600</td>
<td>40</td>
</tr>
</tbody>
</table>

**Fig.5  Total Energy Usage for Different Types of Light Bulbs**

<table>
<thead>
<tr>
<th>Type of Light Bulb</th>
<th>Total Wattage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluorescent Tubes</td>
<td>33903</td>
</tr>
<tr>
<td>Compact Fluorescent</td>
<td>1846</td>
</tr>
<tr>
<td>Incandescent</td>
<td>108</td>
</tr>
</tbody>
</table>
Land Use
Southeastern Massachusetts is one of the fastest-growing areas in the state. More land has been developed here between 1960 and 2000 than in any time span since the Pilgrims first landed. Land use consumption has slowed from a high of 40 acres/day from 1985-1999 to 22 acres a day from 1999 to 2005. While land use protection is up, threats to agricultural land use are particularly high in our region.

As a society, Americans tend to think of undeveloped land as empty. In fact, it is teeming with life—microbes, insects, plants, trees, small and large mammals, and birds. The world’s health depends on forested land for carbon sequestration, clean air, and beauty.

Campus-based universities have an opportunity to model sustainable land use by being thoughtful about development. As UMass Dartmouth grows, we must think sustainably about how we allocate the hundreds of acres that belong to us.

**Where We Are**

**Open Space**

UMass Dartmouth lies on over 700 acres of former forest and dairy farm. That land is already half covered with asphalt and concrete buildings. GIS maps of the area show our campus is not an isolated piece of property, but rather part of a larger landscape. UMass Dartmouth sits on one of the largest undeveloped tracts—and connected habitats—in North Dartmouth. Nearly 350 acres of our campus remain undisturbed. These acres are home to deer, muskrats, foxes, coyotes, wild turkeys, mushrooms, and rare plants, including the flowering Plymouth Gentian.

It is also home to several thousand students, many of whom suffer from Nature Deficit Disorder. According to *Last Child in the Woods*, direct exposure to nature is essential for healthy childhood development and for the physical and emotional health of children and adults. Although many faculty and staff—including grounds crews—have a love for our land, there is no organized effort for encouraging students and community members to explore the property beyond its use for athletics. Crossed with trails and stone walls, our campus forest represents an incredible opportunity for inspiring eco-stewardship and education.

In the Fall of 2009, UMass Dartmouth received a grant from the Mass Department of Forestry to develop a forest stewardship plan. Walden Forest Conservation, a local forestry service, is working on the plan which will help us to:
• Protect and promote biological diversity and the health of the forest.
• Develop the University’s educational infrastructure and resources in the fields of natural sciences (biology, botany, ecology, wildlife management etc.), land management, and land-use history.
• Use forest carbon sequestration to offset campus emissions of CO₂.
• Develop a regional educational resource that promotes sustainable multiple-use management practices, and supports local wood products producers.
• Use wood harvested, and any money generated, for the improvement of educational resources, and for campus projects.

Cedar Dell Vista
When 500 acres were originally designated for the construction of UMass Dartmouth, architect Paul Rudolph advocated for the addition of two smaller parcels, including the land fronting Cedar Dell Pond on its eastern half. Rudolph believed having the University’s land extend to the pond would “anchor” the campus. The Campus Master plan written in the 1960s called the Cedar Dell vista a “landmark element” of the campus. It reads: “The Cedar Dell Vista highlights the most visually memorable topographic feature, a cleared swath of land sloping down towards Cedar Dell Lake and offering an impressive view from the heart of campus.”

In the late 1990’s mowing of the swath was stopped. Now the view is obscured by undergrowth and a stand of White Pines. Recent conversations with the Dartmouth Conservation Commission and Mass Wildlife suggest that clearing the vista carefully and occasionally would not impinge on our wetlands. It would also, in fact, provide new types of habitats. These areas represent significant opportunities for biological studies. The pond itself has innumerable research and recreational possibilities and, if re-opened to view, could provide the campus with a much-needed reminder of the beautiful land we occupy.

Inner Campus
UMass Dartmouth’s land use combines strikingly unique modern buildings with surroundings that feature a pastoral landscape of old stone walls and open fields. Improvements to the landscape have integrated the campus’ bold architectural design with its agricultural history and the familiar New England landscape. This juxtaposition of formal architecture to natural settings has provided the guiding principle for landscaping.
Inside the campus’ circle of buildings is an expanse of manicured green grass with walls and seating areas nested along walkways that invite people to relax and take in their environs. A plaza between the administration building and the campus center is rimmed by broad steps that act like a mini amphitheater and invite people to linger when the weather is pleasant.

Although our inner campus green is a groomed space, it also offers us a chance to model sustainable practices for such places that have not been left entirely to nature. The University uses no fertilizer and does not water any grounds except athletic fields. We are also experimenting with native plantings and the sowing of wildflowers in previously-mowed areas. Natural habitats provide homes for wildlife, preserve water, and sequester carbon out of the atmosphere. In contrast, mowing a traditional American lawn creates huge amounts of CO₂ and air pollution. One hour of gasoline-powered mowing can emit as many pollutants as driving a car 20 miles.²

Recent Accomplishments

*The Construction of Wetlands*
New wetlands were built on the inside of Ring Road as a mitigation measure for recent construction. These wetlands are now home to a significant number of birds, insects, and other wildlife.

*Campus Bulb Planting*
In the fall of 2009, forty students, faculty, and staff participated in bulb planting on campus with the University grounds crew lending a hand. In all, 11 University gardens were given blue and gold treatment. Blue flowering bulbs planted were scilla, grape hyacinths, anemone, and crocus. Daffodils and tulips will provide the gold blooms. The high level of interest among planting helpers suggests that more gardening opportunities will be arranged next year.

*The Creation of a Forest Stewardship Plan*
Through a grant from the Massachusetts Department of Forestry, Walden Forest Conservation is conducting an inventory of our forest stands. Several students and faculty have been involved in the process which will provide us with a stewardship plan for our acreage.
Opportunities

*Develop the Campus as a Model of Sustainable Land Use*

Our campus is an opportunity to showcase best practices in sustainable gardening, land use, and forestry for students and community members. By increasing the amount of no-mow areas as well as gardens with native plantings, we can educate the community about low-carbon landscaping. We can also create signage and seating areas for visitors and the UMass Dartmouth community who want to visit our trails, forests, and open spaces.

*Develop the UMass Dartmouth Forest as a Model of Sustainable Forestry*

By harvesting our forest in a sustainable manner and developing a long-term stewardship plan, we can create a forest model that will educate local landowners and land trusts about the harvesting and care of their forests. Developing trails and educational kiosks will benefit students and community members alike.

*Revisit Paul Rudolph’s Original Campus Vision*

Paul Rudolph’s original campus design included an open Cedar Dell Vista to anchor the campus; it also included a boathouse on the pond and a bioreserve in the current forested area of the campus. Opening Cedar Dell Vista and making the pond accessible for recreation would help to restore this original vision and also to remind the campus community and visitors of the richness of our geographical heritage.
Land Use Best Practices

For best practices, we look to Eastern Connecticut State University. Eastern’s Institute for Sustainable Energy has led the charge to a greener campus. Despite its 182-acre size, the University has established an arboretum that could be better called a wild area preserve. The preserve’s one-mile walking trail contains six different ecosystems and is planted with native species. The arboretum is used as an extended classroom for biology, environmental Earth science, and sustainable energy majors and has been called “One of the hidden treasures of northeastern Connecticut.”

In addition, the University has an integrated water management system of bioswails, catchment and reuse systems, and irrigation reduction efforts. This water management system, combined with an integrated low-pesticide pest management system, leads to reduced runoff and watershed pollution. Furthermore, the campus features Connecticut’s largest geothermally-heated and cooled building—a seven-story dormitory. Learn more about Eastern’s Sustainable Energy program at http://nutmeg.easternct.edu/sustainenergy/

Spotlight on Sustainability

UMass Dartmouth’s Living Classroom

Lessons in sustainability at UMass Dartmouth take students outside the walls of their classrooms into some of the natural habitats on campus. The University’s 700 acres include meadows and wetlands, uncut forests and managed forests, ponds and ecosystems in various stages of natural reclamation from the groomed farmland that once dominated this property.

Long left unexplored, the grounds of UMass Dartmouth were inventoried in the fall of 2009. Species of flora and fauna were accounted for as the University made decisions about where to discontinue mowing lawns for energy conservation and natural landscape reconstruction efforts. Among the indigenous wildflowers identified on campus that are expected to proliferate if mowing is discontinued are clover, raspberry, Black-Eyed Susan, daisies, Queen Anne’s Lace, and asters. An endangered herbaceous plant called the Plymouth Gentian also makes its home here. A wider range of bird species will likely nest on campus as artificial landscapes are given over to naturalization. Future classes of students will be involved in watching this transition.

For students and the public, several miles of handicapped-accessible walking, biking, and cross country skiing trails are being planned for the campus forest areas. Signage will point out the features of the woodlands, including which ones are managed old-growth areas, which are re-forested, and which are red cedar groves versus stands of white pine. Students and faculty groups will maintain the trails and determine priorities for signage.

An education shelter built of campus-harvested timbers will welcome visitors at the edge of the woods, offering trail maps and informational materials about the forests, wetlands, and Cedar Dell pond. Wood cut on campus could also be used to build a dock for launching kayaks and canoes onto the pond, inviting people to rediscover this water feature long forgotten as the forests have grown up and hidden it from view on campus.

Dartmouth Conservation Commission and Massachusetts Department of Fisheries and Wildlife planning documents will guide us as we tend to the living classroom of our acreage at UMass Dartmouth, exposing students to the process of making sustainable decisions for outdoor habitats.

Our forests, like all others across the planet, will also sequester carbon from the atmosphere. By showing people our forested plots and sharing with them our estimates for how much work these trees and shrubs are doing to turn carbon dioxide back into oxygen through photosynthesis, we’ll teach a lesson in sustainability that’s easy to grasp on a small scale.
Future Research Opportunities

Connecting Campus to Other Protected Lands
Connecting the UMass Dartmouth forest with a proposed bikeway would increase opportunities for campus recreation and for regional residents to discover our undeveloped acreage. More research is needed to determine just how to make a bikepath connection a reality. Further, promoting the University lands as greenspace open for visitors would be an entirely new undertaking.

Making the Outdoors a Classroom Subject
A forestry and land management educational program facilitated by the Sustainability Department would benefit both current and continuing education students. The natural environment surrounding the campus offers a variety of research opportunities.

For Discussion
Are there obvious opportunities for land use improvements at your home, business, or community? Visit your town’s conservation commission and find out what projects are being considered and the crux of the issues involved. If a moratorium on building sprawl was proposed in order to preserve unused lands and require people to live in existing cities, would you support such a move? Why or why not?

Additional Resources
B-Sustainable Information Commons (Washington State Example) www.b-sustainable.org/built-environment/responsible-land-use
Environmental Law Institute’s Sustainable Use of Land Program www.eli.org/Program_Areas/sustainable_land_use.cfm
Smart Communities Network Land Use Planning Tools www.smartcommunities.ncat.org/landuse/tools.shtml
Along with satisfying basic hunger, food engages our senses, replenishes our bodies, and often shapes social events across cultures. However, most people in industrialized nations have become disconnected from the wider context of our food, including its origins, costs to the planet, and journey to our tables.

Our social consciousness is beginning to contend with how our individual food choices do or do not support a sustainable system that works in a healthy and natural cycle with the limited resources of our planet. The organic process of growing food and disposing of waste is no longer a new concept to most people. Just coming into focus is the need for increased understanding of what sustainability means in our relatively new global marketplace.

Most food production in the United States is heavily dependent on fossil fuel energy. Producing 1 calorie of food energy consumes between 7-10 calories of energy generated by other means.\(^1\) This equation highlights an unsustainable production model—one that is out of balance.

Agriculture is the leading U.S. contributor to the greenhouse gas nitrous oxide\(^2\). It is responsible for 48% of river and stream pollution\(^3\). Improper farm maintenance causes precious soil to erode and lose nutrients. Agriculture tends to draw on the poorest and least educated workers for its labor. Industrial farms that work like factories tend to focus on one crop, forsaking the kind of diversity that is good for rotating land use and the sustainability of local economies.

Understanding the influence personal and institutional choices have on the larger food system is critical. Our choices can determine whether the food production system becomes sustainable as our world population continues to grow while available farm land shrinks. Our daily call to the table to satiate our appetites can also be a daily call to conversations about sustainable choices.

**Where We Are**

What’s on the menu at UMass Dartmouth is determined by a Dining Services contract with Sodexo, Inc. As a corporation, Sodexo recognizes the responsibility to contribute to a greener campus environment through “well planned objectives that clearly advance a larger vision for sustainability\(^4\).” Guidance defining “what is sustainable” is provided in corporate headquarter literature and policy. These sources specify Sodexo’s preference for purchasing local, organic, and GMO-free food. Sodexo also gives preference to “Food Alliance” certified food.
The UMass Dartmouth campus has one Residential Dining Hall that provides all-inclusive meal services for resident students. A Commuter Cafe includes a la carte options. Several on-the-go food carts located throughout the campus make it convenient to find a snack, coffee, fruit or sandwiches. Sodexo also offers an on-campus catering service. Vegetarian and vegan meal options are available. On average about 3,000 meals are served daily on campus.

Despite the sustainability rhetoric of Sodexo’s corporate headquarters, the level of best practice achieved at any campus is left to the discretion and creativity of the Dining Services Director in charge, and strongly influenced by inclusion or exclusion of sustainability requirements in a particular dining services contract.

Recent Accomplishments

Reducing Waste
We’ve made great strides in reducing food waste through a combination of initiatives.
• In 2008, Dining Services moved to a tray-less system, reducing food waste as students no longer loaded trays with food they ended up being too full to eat, and reducing water use, as the washing of trays was eliminated from operations. On average 200 gallons of water are saved for every 1000 resident meals not served on trays per operational day. Over the course of the academic year, UMass Dartmouth is able to save 127,800 gallons of water by having trayless resident dining.
• In June 2008, Dining Services began sending pre-consumer food waste to local Silverbrook Farm for use as chicken feed. Over 200 lbs a week was diverted from the waste stream.
• The success of the partnership has led to a new initiative to begin composting post-consumer waste from the Resident’s Dining Hall at Silverbrook Farm. It is anticipated this will reduce the waste generated by an additional 400 lbs a week.

Recycling Vegetable Oil
Stepping into one of the promising waste-to-energy strategies of the future, UMass Dartmouth’s used vegetable oil is being donated for biodiesel production.

Education/Awareness
UMass Dartmouth has hosted a number of events to educate both the campus community and wider community about the connections and challenges of sustainable food. Events have included film showings, student presentations, and a regional conference focused...
on Sustainable Food. Held in collaboration with the Southeastern Regional Planning and Economic Development District (SRPEDD) the March 2009 conference focused on understanding and building Sustainable Food Systems. Presentations included information on The Industrial Food System, Agricultural Commissions, Land Preservation, Farmers Markets, and School Garden Programs.

**Fall Farmers Market**

UMass Dartmouth has a Farmer’s Market on the main campus in the fall (see Spotlight on Sustainability). It features a mix of locally-grown vegetables, fruit, prepared foods, seafood, and fair-trade products.

**Opportunities**

*Develop a Food Purchasing Policy that Reflects Our Values*

The current contract with our Dining Services provider does not specify expectations for sustainable food purchasing. UMass Dartmouth is developing a food purchasing policy that reflects our values. It will hold our food providers accountable to making increased sustainable food purchasing a reality at the University.

*Develop Coursework that Examines the Impacts of Different Food Systems*

Academic courses offer a unique opportunity for in-depth exploration of the conditions and implications of different food systems as they relate to sustainability. A course focused on the subject has the greatest potential for expanding student comprehension. A formal survey measuring student comprehension in this area would provide a useful baseline to track rising awareness against in the coming years.

*Grow Food on Campus*

The Cedar Dell Garden at UMass Dartmouth is one location where food can be grown on campus. Other garden spaces may also offer opportunities for food production. Numerous possibilities exist for education, recreation, and outreach related to food production.
What is Food Sustainability?

From Sodexo document “What Does it Mean to Be Green?”
December 2005

Food from the Farm
• Local sourcing
• Organic inputs in production
• No Genetically Modified Organisms (GMOs)
• Integrated pest management
• Genetic diversity in crops planted
• No non-therapeutic medications for poultry/animals
• rBST-free dairy
• Humane-certified animal products (includes free range)
• Appropriate manure management
• Strategies to minimize methane release (dairy, rice)
• Sustainable fish harvest
• Fair Trade certification for international products
• Soil conservation practices
• Sustainable irrigation practices
• Minimal pollution in water run-off
• Efficient on-farm energy budget (including farm-based energy production)
• Farmlands that do not impair old growth forest / ecologically sensitive lands.
• Preserving wildlife habitat (including smaller farm fields)
• Minimal food waste in transit

Food in Dining Facilities
• Minimal food waste in preparation
• Minimal food waste post-preparation (includes food gleaning projects)
• Foods that match the local growing seasons
• Decreasing meat consumption; increasing vegan food consumption
• Minimizing highly processed foods (especially ones with corn syrup, artificial flavorings, and preservatives)
• Purchasing a variety of fresh foods (including heirloom items)
• Ability to track food origins

Waste Management
• Elimination of excess packaging (including bulk purchasing options)
• Use of non-disposable serviceware
• Recycling options when disposable packages are necessary
• Non-plastic, compostable packaging when disposable packages are necessary
• Paper products made from 100% postconsumer waste recycled material (or highest possible %)
• Grease management (including proper filters, grease to biodiesel)
• Composting

Other Environmental Issues
• Efficient energy use by kitchen and retail equipment
• Efficient energy use for building space heating and cooling
• Low-energy lighting (including use of natural lighting)
• Energy drawn from renewable sources
• Conservative water use (including recycling dishwater & low-flow faucets)
• Eco-friendly cleaners
• Unbleached items (paper or flour)
• Education for diners
• Long range planning
Food Best Practice
A best-practice model for food is available in a neighboring New England state institution of higher education: The University of New Hampshire (UNH). UNH integrates an understanding of and commitment to sustainable food throughout academics, dining, student initiatives, and community outreach. Defining itself as a “Sustainable Food Community,” UNH has a university-wide Food & Society Initiative with the mission of integrating the ethics, science, technology, and policies of civic agriculture and community food security into the University’s identity and practices.
UNH pursues its Food & Society Initiative mission through a commitment to five interwoven components of a sustainable food system: local procurement, civic agriculture, food solutions, social justice, and health & wellness. UNH is a leader in education, research, and action for a healthy food system. Current projects include:
- Development of a Community Food Nutrition Profile (CFNP)
- A dual major in Eco-Gastronomy
- Local Harvest Initiative
- UNH Compost Program
- UNH-based New Hampshire Center for a Food Secure Future
- Housing the New Hampshire Farm-to-School Program
- Organic Dairy Research Farm
- Student Initiatives including an Organic Garden Club and Real Food Challenge
- Commitment to Slow Food Principles

In addition, UNH Dining is committed to procurement of local foods as well as USDA certified organic, Fair Trade certified, and certified Humane foods. Currently 22% of Dining’s budget is spent on foods grown, processed, or manufactured within a 250 mile radius of its campus.

For more information on University of New Hampshire’s Food & Society Initiative visit: http://www.sustainableunh.unh.edu/fas/index.html

Spotlight On Sustainability
On-Campus Farmer’s Market
Multi-colored carrots, leafy greens, squash, herbs, and flowers tempt browsers to become buyers at one vendor’s table. Next door are apples and peaches waiting for tasting. Walk a little further and discover that this farmer’s market also includes a few non-farmers selling local and fair-trade products popular with the college-aged customers: purses from recycled materials, brownies made from organic ingredients, even small-batch roasted coffees. Welcome to the UMass Dartmouth Farmer’s Market.

Launched in 2007, the UMass Dartmouth Farmer’s Market began through the enterprising work of one student—Ellie Early. Inspired by the work she was doing at local Silverbrook Farm and motivated by what she was learning about the food system Ellie decided to get more involved. She led a delegation of students from UMass Dartmouth to participate in the Real Food Challenge Regional Summit. This conference is for students passionate about moving their colleges toward a purchasing food produced locally, sustainably, and equitably. Ellie envisioned an opportunity to provide local farmers and small producers with a venue for selling their goods, supporting the local economy, and providing the campus community with a sampling of some of the freshest food available. The UMass Dartmouth Farmers Market was born.

The educational opportunity provided by the Farmer’s Market is an added harvest for the University. Our design students were engaged to help market the endeavor. Beautiful, eye-catching posters with tag lines like “have you been fresh lately?” adorned the campus inviting all to come join in fresh food experiences. Visitors to the market itself ask growers questions from the simple, “What’s this?” to the challenging, “What does organic mean?” Customers may find familiar faces selling them their food: the farmers are their neighbors, friends, and even a former student—UMass Dartmouth alum and farmer at Kettle Pond Farm, Steve Murray ('08). The exchange at the market is a vibrant one. Our dollars spent there will circulate in the local economy and help support the continuation of working farmland. Our conversations spark new understanding about the food system, local bounty, and seasonal cycles. Perhaps most simple and revolutionary of all: bags of fresh local produce leaving in the hands of happy customers bring homegrown goodness home with students, faculty, and local residents.
Future Research Projects

Community Food Shed Analysis
Information about the regional foodshed—what percentage of food consumed in the region is grown locally, what percentage of regional food consumption can be met by local production, where food is available, farmland availability, etc.—is not currently available in one source. Research is needed to help collect and analyze data on the regional food shed.

Biochar Research
Biochar—a form of activated carbon that has shown potential as both a soil enhancement, a carbon-sink, and a potential biofuel producer—offers exciting research potential.

For Discussion
How does globalization of food production and food markets make us vulnerable to unsustainable practices? Why did globalization seem to make sense in the first place?
Why is crop diversity and crop rotation seen as more sustainable than growing large tracts of mono-cultured crops (one crop type) year after year? What are the challenges or risks of either system?
Is it possible to re-establish local growing and small farms? What are some of the challenges and benefits?
How far did the ingredients in your breakfast travel to reach you? What would happen if the supply and transport chain those ingredients rely on was stopped?

Additional Resources
SouthEastern Massachusetts Agricultural Partnership (SEMAP): www.umassd.edu/semap/
Community Food Security Coalition: www.foodsecurity.org
Real Food Challenge: realfoodchallenge.org/
Sustainable Food Policy: www.sustainablefoodpolicy.org/
Water is a reminder that natural systems do not follow our designations of what is off-campus and what is on-campus. UMass Dartmouth is part of the Buzzard’s Bay watershed. We tap into the water resources of the town of Dartmouth and the city of New Bedford. We are a water-rich region, but the abundance of water that comes to us—and the water we discharge—is dependent on energy. In Dartmouth, the water treatment plant and water plant are the first and third largest users of town energy.¹

Clean, fresh water is a luxury many people can’t afford or obtain in certain parts of the world. Reliance on filtered tap water over bottled water is one means for sustainable usage. Reducing indoor usage, such as waterless urinals, removal of trays from cafeterias, and taking shorter showers, are easy steps. Recycling waste water, such as a grey-water system, reuses water for irrigation and landscaping. Storm water management captures water runoff from roofs and other surfaces and stores it in tanks for cleaning, plant growth, and all other non-consuming uses. Using water-efficient appliances and systems, like leak-proof plumbing fixtures, sink faucets, and shower heads, as well as garden hoses with trigger nozzles, will improve household water efficiency.

As climate change continues to impact water, more of our planet’s human and wildlife populations go thirsty. Conflict over water is likely to increase as it becomes more obvious that water taken from others—in the form of diverted waterways, and bottled water—is unsustainable from the perspectives of energy, finance, and humanitarian concerns.

The University is an ideal place to model sustainable water usage, to raise student awareness, and to research new water systems.

Where We Are

Water Use and Discharge

The water used on our campus comes from the town of Dartmouth which draws on fourteen groundwater wells. The water comes from storage tanks on Chase Road and Old Westport Road.

From June to October, the town often draws on the water supplies of New Bedford, which are treated with chloramine rather than chlorine. Because chloramine is toxic to aquatic life, our biology department must purchase distilled water for their fish tanks. Chloramine is also problematic for those with kidney or immune system disorders.

“Although we spend nearly a million dollars annually bringing in fresh water and sending out wastewater, there has not been a sustained focus on water conservation. UMass Dartmouth has only four meters for incoming water and no way of keeping track of what the water coming into campus is being used for, or where the substantial amount of wastewater is coming from.”
Dartmouth tests our water weekly for bacteria. The average ph of water from New Bedford is 9.5; Dartmouth’s is 7.5-8. The ideal ph of drinking water is 6-8.5.\(^2\)

Although we spend nearly a million dollars annually bringing in fresh water and sending out wastewater, there has not been a sustained focus on water conservation. UMass Dartmouth has only four meters for incoming water and no way of keeping track of what the water coming into campus is being used for, or where the substantial amount of wastewater is coming from. We send out more water in waste than we bring in, perhaps twice as much. A utility assessment conducted by Sebesta Blomberg for the University suggests this is “due to storm water infiltration into an aged on-site sewage piping system.” These high numbers could also be attributed to leaks that go unfixed. In addition, run-off from our paved surfaces flows into creeks that lead to the Atlantic.

We have switched to low-flow faucet aerators and have built pilot green bathrooms that conserve water. New construction that meets LEED standards will also benefit the campus: a 30% reduction in water use earns two LEED credits and helps to meet Massachusetts LEED Plus standards.

**Drinking Water**

Despite the fact that the water brought into campus is potable, little of it over the past few years has gone into drinking water. It has become the norm for campus offices and individual students and faculty to drink bottled water trucked in from Poland Springs or through our beverage contract. In the fiscal year 2008, the University spent $26,916.23 on bottled water, including containers, cups and coolers. Students likely spent many thousands more on water purchased in vending machines and from Sodexho.

In the summer of 2009, the University stopped purchasing bottled water for University offices and placed filters in all the drinking fountains on campus. Facilities also purchased a water filling station for the Fitness Center.

**Education and Awareness**

Preliminary surveys of students’ awareness of water issues indicate that water literacy is low. Nor have there been any sustained campaigns for water reduction. Such a campaign—perhaps in conjunction with a bottled water campaign—could be a significant opportunity for changing attitudes towards water usage on campus.

Two honors students recently conducted studies of water: one focused on campus water use and the other on the use of algae wheels in wastewater treatment. An early Topics in Sustainability course brought together five faculty members to teach their differing departmental perspectives on “water” as a sustainable concern in our time and in times past.
Recent Accomplishments

Four East Campus Residence Halls Switch to Water Conservation Aerators

Based on a standard showers lasting 8.1 minutes used a day per person, 400 users per building, the switch to water conservation aerators (from 2.2 gallons per minute to 1.75 gpm) will save over 13,000 gallons of water a day for all four residence halls, potentially saving UMass Dartmouth 2.9 million gallons of water a year.

Reduction in Bottled Water

The University stopped funding bottled water for campus offices in the summer of 2009. At the same time, campus bubblers were repaired and fitted out with filtration systems. A water filling station has been installed in the fitness center and reusable bottles are sold nearby. Sustainability events serve tap water in pitchers rather than bottled water. Many other offices are following Sustainability’s lead. Student Affairs provided refillable water bottles for incoming freshmen in 2008.

Facilities Met with a Purveyor of a Packaged Water Treatment Plant

This plant is designed to treat sewage water on campus, reducing the amount of water delivered to the sewage system.

Opportunities

Reducing Water Usage and Discharge

Our intake and discharge of water could both be reduced by multiple targeted measures. Mechanically, sewer and water piping could be fixed to repair groundwater leakage. Replacing and retrofitting older water-consuming equipment—such as toilets, faucets and showerheads—with modern and more efficient devices would cut down on unnecessary usage. Installing meters on pipes going in and out of each building would keep track of consumption in each building and could help the University determine how much water seepage there is in the pipes. Conducting periodic water audits of all water fixtures, flow rates and user frequencies could determine which water-flow devices offer the greatest potential water and monetary savings. These measures, coupled with a water-saving and awareness campaign, could greatly reduce our overall usage and discharge.
Reducing or Eliminating the Use of Bottled Water

Installing water filling stations throughout the campus and conducting an educational campaign about the damages of bottled water use could significantly reduce the amount of bottled water consumed on campus as well as the related trash. A student or other group could use the sale of UMD reusable water bottles as a fund-raising endeavor.
Spotlight on Sustainability

Forsaking Disposable Water Bottles

The drinking of bottled water has a fairly short history, but the practice has overtaken the United States and many other countries. Aside from being easy to use and widely available, bottled water is perceived to be healthier than tap water.

Yet, the sustainability-minded web site lighterfootstep.com lists five reasons not to drink bottled water, including the fact that research has shown bottled water is no better than tap water; that it is not a good value (averaging five cents per ounce versus one cent per gallon for tap water); that it takes away support for important public infrastructure; that it creates garbage; and that it corporatizes a resource that ought to be a public good.

Each of these issues plays out in some way on a college campus and it is for this reason that student groups nationwide have worked on ban-the-bottle campaigns. At UMass Dartmouth, trash barrels often overflow with plastic bottles. The availability of bottled water distracts staff, faculty and students away from options like the use of upgraded and filtered bubblers or water filling stations.

The recent decision of the UMass Dartmouth Purchasing Office not to pay for bottled water for office use has changed this landscape. The water from campus bubblers now repaired and outfitted with water filters tastes great. Sodexho also now offers pitchers of water for events as part of their green conferencing commitment.

The University spent $27,000 in 2008 to purchase bottled water for offices, not including the electricity used to keep the bottled water stations running. Student spent many thousands more on bottled water in vending machines.

As an alternative, refilling stations may encourage students to make the switch from buying disposable bottles to reusing durable bottles. Water fountains designed for people to take a sip while on the run simply do not make it easy to fill a bottle. The “hydration station” UMass Dartmouth is testing in its athletics facility automatically detects a refillable bottle without touching and delivers filtered water. The manufacturer, Hawes, says that “every bottle refilled saves the equivalent of a quarter bottle of crude oil that would have been used in the manufacture and shipping of bottled water.”

Water Best Practices

The University of California in Davis voted to remove all bottled water sold on campus, putting water conservation and waste reduction ahead of revenues. Other water-related initiatives include:

- Most of the domestic, drinking, and irrigation water on campus comes from underground aquifers. Forty campus buildings are metered for water usage.
- The campus wastewater treatment plant reclaims water to use for lawn landscaping.
- Water quality monitoring in the University’s arboretum occurs before the water is pumped into Putah Creek.
- Storm water detention ponds were constructed at the California National Primate Research Center.
- The UC Davis Tahoe Environmental Research Center has toilets that use rain and snowmelt. In addition, its air conditioning uses water cooled by night air that is circulated through radiant pipes.
- When there is insufficient irrigation water to meet the water demands of crops, gardens, and the arboretum, the available irrigation water is applied using drought management techniques.
- Student housing has installed hydration stations, provided ENERGY STAR-rated washing machines, and retrofitted all bathrooms with ultra-low flush toilets.

The University of California in Davis voted to remove all bottled water sold on campus, putting water conservation and waste reduction ahead of revenues. Other water-related initiatives include:

- Most of the domestic, drinking, and irrigation water on campus comes from underground aquifers. Forty campus buildings are metered for water usage.
- The campus wastewater treatment plant reclaims water to use for lawn landscaping.
- Water quality monitoring in the University’s arboretum occurs before the water is pumped into Putah Creek.
- Storm water detention ponds were constructed at the California National Primate Research Center.
- The UC Davis Tahoe Environmental Research Center has toilets that use rain and snowmelt. In addition, its air conditioning uses water cooled by night air that is circulated through radiant pipes.
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- Student housing has installed hydration stations, provided ENERGY STAR-rated washing machines, and retrofitted all bathrooms with ultra-low flush toilets.
Future Research Projects

*Designing and Installing an Onsite Biological Water Treatment System*

Such a system could purify enough water to meet all campus non-potable water needs. Onsite wastewater recycling would also help reduce demand on the City of Dartmouth’s wastewater treatment plant, and provide a direct learning opportunity for UMass Dartmouth students.

For Discussion

Despite studies that most bottled waters are no better than tap water, people have become attached to the concept of purchasing and drinking from individual-portion, disposable bottled water. Are you one of those people and why?

Already in this global marketplace the poor countries suffer from lack of access to safe water supplies. Can you imagine a world where water became an increasingly scarce and expensive commodity? How might that force changes in water use and rationing?

What uses would you feel comfortable adapting to for wastewater from sources like washing machines or rainwater runoff?

Additional Resources

- Alliance for Water Efficiency www.allianceforwaterefficiency.org
- American Water Works Association www.awwa.org
- An online publication for water conservation www.waterefficiency.net
- Water Efficient Solutions www.waterefficientsolutions.net
Culture encompasses our habits and histories, our beliefs, values, and ways of evaluating what we know about the world and ourselves. Most of us were brought up with behaviors that are unsustainable over the long term—the carbon footprint of the average U.S. citizen is between two and ten times that of the rest of the world’s inhabitants. We consume on average five times more resources than people from other nations.\(^1\)

But our ‘throwaway’ culture and profligate use of energy and other resources is actually a fairly recent phenomenon. Included in our nation’s past are many periods—from the Puritans, to war generations, and to the Depression—when an ethic of conservation and reuse was celebrated and widely propagated. In a sense, our turn to sustainable practices is a process of rediscovering traditional wisdom.

Changing culture requires all of us to examine every aspect of our individual and collective lives. Rather than a single step, it is a constantly evolving path of adapted knowledge and behaviors. A university is a perfect place to model this culture. Doing so can help us to build a community that can be resilient during a time of rapid financial, human, environmental, and institutional change.

Where We Are

Activities, Education, and Awareness

Sustainability has long been a passion for many faculty, staff, and students on campus. It became a more urgent and widespread topic of discussion in 2005-6 when popular media and former Vice President Al Gore’s film “An Inconvenient Truth” brought climate change threats into stark relief. The UMass Dartmouth Consortium for the Advancement of Teaching, Learning, and Scholarship (CATLS) chose sustainability as a priority area in 2006 and this effort led to the creation of the sustainability minor program as well as the Office of Campus and Community Sustainability in the summer of 2007.

On-going activities sponsored by the Office of Sustainability include lecture series, workshops, conferences, and faculty presentations on their teaching and research interests. Special events have included a Peak Oil Conference, a Short Sea Shipping Conference, several Regional Sustainability Conferences, and Focus the Nation, which brought over 200 students to a day-long conference on Climate Change. Nationally-known visiting authors have included Oil Experts Richard Heinberg (Peak Everything) and Michael Klare
Working groups associated with the Office of Sustainability have been important incubators for University projects including potential wind turbine placements on campus, pursuit of a bike path connecting UMass Dartmouth to other dedicated bike trails, the campus farmers’ market, the energy-savings campaign, student sustainability research projects, and the sustainability assessment process that resulted in this document.

Interest in sustainability activities has spread to other campus staff and offices. Working on common projects helps to bring the community together—typical sustainability conversations include faculty, staff, and students from several disciplines and offices. A multi-cultural panel on sustainability, a sustainability Seder, and civic engagement activities focused on sustainability had multiple campus sponsors. As sustainability values have become embedded in the campus, activities have deepened into structured educational endeavors, with the Facilities and Purchasing offices sponsoring workshops on paper and energy reduction.

The campus newspaper, The Torch, includes weekly sustainability articles. Sustainability-focused campus activities and events are regularly publicized on the sustainability website, through a weekly e-mailed Sustainability Almanac, and through a listserv that reaches a regional audience of several hundred.

**Student Activities and Groups**

Students are an essential part of all our sustainability activities and have played key roles in the development of several campus projects, including the campus garden, the campus clean up, the farmers’ market, and the green living guide. Student groups include Net Impact, composed primarily of MBA students, Students in Free Enterprise (SIFE), the Social Change Society, and the Massachusetts Public Interest Research Group (MassPIRG). Several student classes and groups have participated in global warming campaigns, green jobs trainings, the development of conferences, and educational campaigns. Student Affairs, the Housing Office, and Student Activities and Leadership (SAIL) have contributed guidance to student sustainability endeavors.

The Green Navigator program, begun in the spring of 2009, is a peer education and activities group whose members volunteer or earn work-study or Connections pay for their time in the program. Green Navigators were instrumental in the Recyclemania residence
hall competition and in the campus energy savings campaign. They have done door-to-
door “Dorm Storms” to collect recyclables, and have also informed students of simple
energy-saving measures, like keeping windows closed, turning off lights, powering down
computers, unplugging chargers and turning off vending machines.

Recent Accomplishments

The Sustainability Film Series
Hosted by a UMass Dartmouth computer science trainer, the film series shows evening films
four times a semester followed by a panel discussion featuring faculty, staff, and students.
It has become a popular fixture on campus and has contributed to the sustainability
literacy of the entire community. Eighteen films have been shown on campus since the
sustainability film series began in 2007. Titles have included: “The End of Suburbia,”
“King Corn,” and “Why We Fight.”

The Green Navigator Program
Since its beginnings in 2009, the Green Navigator program has doubled in size. Green
Navigators perform an important peer education function and also increase their own
sustainability literacy through workshops and presentations.

Green Campus Awards
Our first green campus awards—given to an outstanding office, staff member, faculty
member, and student—were presented in the spring of 2008 by Chancellor MacCormack.
Awardees received plaques. In addition, a bench designed from wood harvested from our
forest will be placed on campus in honor of their accomplishments.

Sustainability Media
Our new website was completed in the spring of 2008 and the sustainability-focused
alumni magazine Blue Gold and Green became one of the most popular alumni magazines
ever. Our Sustainability Almanac goes to several hundred regional e-mailboxes and our
activities are regularly reported in regional newspapers.

Sustainability Education
UMass Dartmouth offers sustainability studies that are cross listed with appropriate offerings
in other departments. It also offers special seminars called “Topics in Sustainability” that
draw on the expertise of five different professors to give perspectives on a sustainability
subject. What follows is the description of the cultural sustainability topic course entitled
Perception, Representation, and the World: “We humans live in this world according to our beliefs and assumptions about the planet and all that exists on and in it. But how do we acquire those beliefs and assumptions in the first place? Where do they come from, and how are they communicated to us? Are there alternative, equally valid beliefs and assumptions we might explore? Would different assumptions and beliefs lead to different behavior, a different relationship to the planet and all that exists on it and in it?”

Opportunities

Expand the Green Navigators Program

With the expansion of the University’s recycling programs and the development of campus forests and walks, there is an opportunity for an expanded Green Navigators program that consolidates student recycling workers and the current Green Navigators group. Funded by a green fee, the Green Navigators could make a significant contribution to the greening of the UMass Dartmouth campus.

Development of a Sustainability Alumni Network

UMass Dartmouth alumni represent an important resource for the campus. Several alumni have offered their professional services to the sustainability initiative. Building on this support through the alumni office and social networks could help to develop a broader community of support and also provide opportunities for students to intern with alumni companies.

Development of Sustainability Captains for Campus Offices

As we step up campus literacy on resource and energy conservation, a network of Sustainability Captains could help in the implementation of energy and paper savings campaigns. Captains could attend sustainability workshops and share information with their co-workers; they could also commit to office-wide conservation goals. A LEED program for offices could be put into place, allowing for friendly competitions between offices, departments, and buildings.
Culture Best Practices

For leadership in establishing a campus culture focused on sustainability, the University of North Carolina Chapel Hill stands out. UNC has established what it calls The Sustainability Living Learning Community encompassing nine areas of sustainable living through speaker events and field trips. There are sustainability representatives that help determine UNC’s actions and policies in both the University Administration and Student Affairs. UNC has a formal sustainability policy and also includes sustainability in its master plan. The Environmental Affairs Committee of Student Government works to increase recycling on campus and supports a community garden. There is a Green Games competition among residence halls. There are at least 15 sustainability-oriented student organizations including the Carolina Garden Co-op, Students Working in the Environment for Active Transformation (SWEAT), and Fair, Local, and Organic Food (FLO).

Spotlight On Sustainability

Green Navigators

What does someone who cares about sustainability look like? Can you pick them out in a crowd? If you have a mental image of a “type” of person who cares about the environment, recycling, and a healthy planet, it’s time to replace that image. Sustainability cannot be a specialty concern, championed only by the few. Achieving a sustainable future requires the commitment, enthusiasm, and participation of the entire community.

Building a culture of environmental awareness where sustainable practices are the norm requires educating ourselves and our peers. To effect change at the University level, it involves getting the word out about opportunities for making more sustainable choices at UMass Dartmouth. To assist in this process of peer outreach and education, a new program was launched in the Spring 2009 semester aptly named “Green Navigators.” Green Navigators are students who are peer educators for sustainability. Their goal is not to be “green” all by themselves, but to help their fellow students understand the environmental impacts of their choices, and the many ways they can act responsibly for a more sustainable world.

Among the many outreach projects spearheaded by UMass Dartmouth’s first batch of Green Navigators was a Campus Clean-Up Day that included participation by a wide range of students, faculty, and staff; a Bag Swap, that allowed community members to recycle plastic shopping bags in exchange for reusable cotton bags; and “Dorm Storms” in the residence halls that let residents know about a Recyclemania competition against 510 other colleges that led to regular recycling collections. This example of inspiring others is what the Green Navigators are all about—charting a path that we can all take together toward a more sustainable future.
Future Research Projects

*Longitudinal Studies on Changing Attitudes*

With a growing force of students, faculty and staff on campus engaged in sustainability campaigns, the University is an ideal leader for studies in whether such activities are having an impact on the mindsets and behaviors of students over the course of their years at UMass Dartmouth. Further, investigators might measure how messages about sustainable cultural values are filtering out into surrounding communities.

For Discussion

Individuals can be members of many cultures at once—a geographically-defined culture, a workplace culture, a family culture, and a culture based on ethnic traditions are a few of the possibilities. What cultures touch your life and do any of them embrace sustainable values?

For the U.S. culture in general, the values of trading-up, purchasing new, and throwing away old have ruled for several generations. What kind of messages might be effective in helping to turn these trends around?

Additional Resources

Global Development Research Center [www.gdrc.org/sustbiz/mgmt-sust.html](http://www.gdrc.org/sustbiz/mgmt-sust.html)

Health

Health is an integral component of a sustainable system. A community made up of individuals who are physically and psychologically well is better situated to be a productive and creative community of learners, thinkers, and doers.

Responsibility for health is both individual and collective. As a university, we are responsible for providing a safe environment for work and study. We also have the capacity to establish best practice policies and infrastructure development that support the wellness of the entire campus community.

Investing in wellness brings solid, measurable financial benefits. A review of scores of published studies on worksite wellness found that the return on investment is $3.48:1 due to reduced medical costs and $5.82:1 due to reduced absenteeism.

Where We Are

We define health and wellbeing in broad terms, including issues of safety and support services and infrastructure. The health of the campus community is reflected by a variety of indicators, including workplace injuries, illness, and recreational participation. Is walking a natural part of the workday? Is nutritious food available? Are facilities maintained? Health and wellbeing involves a wide scope of factors and many people actively working to support a healthy campus community.

Safety: Protection from Health Detractors

A healthy campus must be safe. This involves avoiding pollution and meeting safety standards in our buildings, equipment, and roadways. Safety also includes being free of violence and crime.

At UMass Dartmouth our commitment to the health of our environment and our people has led to our standard practice of using non-toxic “green” cleaning products. Approximately 95% of the cleaning products used at UMass Dartmouth are considered “green,” meeting third-party certification standards such as Green Seal Certification. We use zinc-free floor finishers, water-based polyurethane for floors, and HEPA filters on machines used to finish floors.
all academic endeavors. The Safety Officer also ensures laboratory fume hoods are tested and inspected, chemicals are registered, and our buildings and equipment are maintained to meet all safety codes.

Unfortunately, without a full-time Environmental Health & Safety Officer position or a comprehensive workplace safety policy, many important opportunities for improving campus safety and health are missed. Workplace safety trainings are often lacking, leading to unnecessary injuries and risk. Student concerns over indoor air quality due to mold in Residence Halls are not swiftly addressed.

UMass Dartmouth has a Public Safety Department staffed by 26 trained police officers and eight institutional security officers. The Department of Public Safety provides police services, community policing programs, crime prevention and safety services, as well as dispatch, security and parking services. Department staff provide safety escorts, offer informative presentations on safety and crime prevention, and conduct educational programs on alcohol and self-defense. A daily criminal activity log is posted on their webpage for the information of all community members.

Workplace injuries are monitored by the Human Resources Department and initial care is provided by Health Services in all non-emergency cases. In 2008, Health Services saw 86 employees for Workers Compensation injuries. This was a 20% increase from 2007, when there were 65 visits.

**Valuing Wellness: Promoting Health Builders**

UMass Dartmouth supports a healthier campus community by providing medical and mental health services, recreational opportunities, access to outdoor green space, and healthy behavior educational programming.

Medical services for students are available on campus through Health Services. The medical staff of registered nurses, nurse practitioners, and medical doctor provides wellness care that includes nutritional counseling, immunizations, physicals, and gynecological care as well as treatment for illnesses and minor injuries. During the 2008-2009 Academic Year there were a total of 5,868 visits to Health Services, an increase of over 500 visits from the previous year.

Health Services also provides important public health information and a campus-wide flu vaccine initiative. In 2004, the Peer Health Educators Program was launched. Trained student Peer Health Educators lead a range of health-behavior education programs of particular value for college students. Programs include: alcohol education (including info on “Good Samaritan” policy and “Good to Drive” initiative), prescription drug abuse, stress,
nutrition, consent, women’s health, and freshman concerns. The program was awarded “Outstanding Peer Education Group-Area 10” by the Bacchus Network in 2009.

Mental health services are provided by the Counseling Center. Other resources for wellness and coping on campus include: The Academic Advising Center, Frederick Douglass Unity House (support for students, faculty and staff of color), International Student Center, Pride Alliance (support for the gay, lesbian, bisexual and transgender community), The Religious Resource Center, and Women’s Resource Center.

The Athletics Department offers a variety of fitness opportunities, including 12 men’s varsity NCAA Division III sports teams and 13 women’s varsity sports teams, a growing Intramural program, and a Fitness Center. Community use of the Fitness Center is high: in 2008, 5,282 total patrons used the facility 102,004 times.

In addition to the Sports Medicine staff’s responsibility to the student athletes, they have also been a resource to faculty and staff members on health/wellness questions. CPR certification classes are offered (Head Coaches are required to be CPR/AED certified) and seven defibrillators are stationed throughout Tripp Athletic Center and the Fitness Center.

UMass Dartmouth also offers a selection of fully-accredited nursing degrees through the Nursing Department. With a mission of providing visionary leadership that advances the practice of nursing in a dynamic environment, UMass Dartmouth’s Nursing Department has a long history of excellence and community engagement. In addition to educating the health leaders and educators of tomorrow, the Nursing Department brings important health education information to the wider UMass Dartmouth community, supporting the development of a wellness culture on campus.

Recent Accomplishments

Green Custodial Cleaning Products are Standard Policy
In efforts to protect the health of our employees and students and keep toxic chemicals out of our environment, UMass Dartmouth has moved to a standard practice of using non-toxic Green Seal Certified cleaning products. Approximately 95% of cleaning products purchased are considered “green.”

Participated in National College Health Assessment
In 2007, Health Services coordinated UMass Dartmouth’s participation in the National American College Health Association/ National College Health Assessment (ACHA/ NCHA) which will allow UMass Dartmouth to track a series of health indicators and
compare our performance to colleges and universities across the nation. The results of the most recent survey are currently being analyzed and will be available soon.

**Upgraded Fitness Equipment and Increased Programming in Fitness Center**

The Fitness Center underwent a major equipment upgrade in the summer of 2008 and continues to increase the fitness programs offered. Athletics programming continues to increase with popular classes including yoga, tai chi, and aerobics. The pool has undergone renovation. Open swim hours are available for the campus community and SouthCoast Aquatics Masters classes are offered for advanced swimmers. The interest in the programs and demand for the new equipment is reflected by increasing usage numbers at the Fitness Center. There were over 102,000 visits during the 2008 calendar year, an increase of over 12,000 from 2007.

**Hired Full-time Nutritionist**

Dining Services hired a full-time nutritionist in 2008, a first for UMass Dartmouth. As part of her work, a nutrition newsletter “Food for Thought” was launched, cooking demonstrations have been held for both students and staff, and a revised nutrition website is available (www.umassdfood.com). Choosing nutritious options in the cafeteria has become easier through the development of “Danielle’s Daily Plate” (highlighting healthy meal options each day). Furthermore, vegan meal options have been increased in the dining halls. Nutritional counseling is available to individual students and student groups.

**Opportunities**

**Comprehensive Workplace Safety Policy**

We currently lack a Workplace Safety Training Policy and guidelines for organized procedures employees are expected to take once an injury occurs (including who to report to, where to go for services, paperwork and pay issues, and legal ramifications of all of these). A comprehensive policy is needed.

**Expand the Environmental Health & Safety Officer Position to Full-Time**

Every campus in the UMass system, except UMass Dartmouth, has a full-time Environmental Health & Safety Officer. By expanding the Safety Officer position at UMass Dartmouth from part-time to full-time, the University has the opportunity to pro-actively invest in the wellbeing of the campus community. A full-time Safety Officer could help coordinate a comprehensive workplace safety plan, worker safety trainings, and continued monitoring of the health and safety compliance for a growing university.
Increase Staff and Faculty Intramurals/Fitness Participation
Intramural and fitness options are available for staff and faculty. Increasing participation in these programs would support the goal of a healthy campus community, providing outlets for stress while improving physical fitness.

Expand the Audience of Peer Health Educators
Peer Health Educators currently present their programs almost exclusively to Resident Assistants. An expansion of the program to provide programming directly to the general student body would increase the number of students benefiting from this program.

Expansion of Fitness Center
Increasing demand at the Fitness Center puts a strain on the capacity of the existing infrastructure. An expansion of the Fitness Center is recommended to continue to accommodate the growing numbers of students, staff, and faculty who want to benefit from access to the Fitness Center and its programs.

“Responsibility for health is both individual and collective.”
Health and Wellness Best Practices

The Wellness Program at the University of Minnesota is packed with activities and educational outreach to motivate people to participate. The University has a Wellness Works magazine produced by the Department of Recreational Sports and a Discover Wellness website produced by the Health Sciences Libraries that includes tips for evaluating online health information. A Fitness Reward Program allows members to earn money and credit for taking the wellness assessment, going to the gym, or completing a health improvement program. Also offered by the University are:

- Self-paced online Healthy Living programs;
- The 10,000 Steps (R) walking program from HealthPartners;
- HealthCare Choices—an online program for health care consumers;
- In-person or over-the-phone health coaching;
- Free Wellness Assessment for students;
- 24-hour health and medical information from the Ask Mayo Clinic nurse line.

Spotlight On Sustainability

Health & Wellness Collaborative

What makes a healthy campus? Is wellness just the absence of disease, or is it something more robust? UMass Dartmouth is engaged in finding out. We’re working to maintain the safety of our infrastructure and purity of our environment. We’re providing medical services. We’re promoting recreational outlets. We’re devoted to building a University community that achieves sound health and seeks greater wellness.

As the Sustainability Office’s Health & Wellness Committee began to gather information for our assessment about promoting a culture of wellness at our University, members discovered that their goals fit into a larger vision of a sustainable campus. They found that complementary work was being done by others elsewhere on the campus who often had important insights for improving the University as a healthy community.

A roundtable discussion was initiated, drawing together members of the Facilities Department, Nursing Department, Sodexo Food Services, Athletics Department, Health Services, Office of Campus and Community Sustainability, and student Peer Health Educators—individuals who rarely if ever met, but all of whom were actively working on some component of developing a healthier community at UMass Dartmouth. While discussing what work was being done, the group also began to identify gaps needing to be addressed.

The value of such a forum for communication became clear, and a formal Health & Wellness Collaborative was proposed. This collaborative will play an important role in re-envisioning the nature of our work in a more inclusive fashion with a broader scope and reach throughout the campus.
Future Research Projects

**Best Practice Guidelines and Monitoring for Indoor Air Quality**

Information on Indoor Air Quality at UMass Dartmouth is currently lacking. Although an outside specialist is called in to measure air quality whenever an air quality complaint is registered, there are no internal monitoring procedures or metrics for measuring air quality. Further research into best practice methods for monitoring indoor air quality is recommended. Consideration of a smoke-free envelope around buildings is also recommended.

For Discussion

What are global examples of communities that embrace wellness as a way of life? How do they accomplish it?

Beyond crash dieting and exercise programs with quick, short goals, what can you do to introduce more health and wellness behaviors into your life? What do you think would make the difference between changes that last and changes that die off?

Is there a difference between the pursuit of health and the lack of illness? Is there a difference between eradicating violence and achieving safety? Is avoiding hazards the same as gaining wellness?

Additional Resources

U.S. Department of Health and Human Services www.healthfinder.gov/

Healthy.net—Healthy People Healthy Planet www.healthy.net/scr/Center.aspx?centerId=42

Web MD Green Living www.webmd.com/health-ehome-9/default.htm#nav
Community
As a twenty-first century university, UMass Dartmouth is not an “ivory tower” shut off from the ebb and flow of community life and commercial interests. We function as a catalyst for education at all levels in our regions, as a model for contemporary best practices, and as a convener of important cultural conversations. The challenges of climate change and peak oil have brought universities such as ours to the forefront of the sustainability dialogue, and many are accelerating research into new technologies and behaviors. They are also increasingly at the center of their surrounding community’s transition to sustainability.

UMass Dartmouth has a history as a regional leader and has often been lauded for its important contributions to the South Coast region. Our strategic plan calls for us to be “Engaged” with and “Embedded’ in our community. Sustainability is no exception. Our endeavors not only build on our current relationships—including the neighboring K-12 and business communities—but also have sparked new partnerships with surrounding municipalities, workforce investment boards, community colleges, and planning agencies.

UMass Dartmouth’s Office of Campus and Community Sustainability sits at the nexus between academics, campus operations, and community—one of the few sustainability endeavors in the country that does so. It is thus able to leverage University resources in pursuit of community goals, and bring regional perspectives to bear on University issues. Our regional focus was one of the prime reasons UMass Dartmouth was chosen for a Leading by Example Award in 2008 and as a case study by the non-profit Clean Air-Cool Planet sustainability research group. Much of the grant funding received by our office is dedicated to our community outreach.

Where we are

Community Networks

UMass Dartmouth took the lead in the creation of the South Coast Community Gardens Coalition, a regional collaborative that is working to build resources and communication in support of the development of a thriving community gardens network in the South Coast region. In October 2008, the Coalition held a visioning session to explore what resources are needed to help community gardens flourish and what people hoped to see develop in relation to community garden projects and food production in general. Several community and schoolyard gardens have been fostered through the Coalition.
In May of 2008, the Office of Campus and Community Sustainability convened a regional weatherization task force. Representatives from business, community organizations, foundations, the Greater New Bedford Workforce Investment Board, Bristol Community College, and the City of New Bedford were part of the discussions that lead to the first Green Jobs Training in the area as well as the development of the SEA GREEN Green Jobs Network. SEA-GREEN was formed in the belief that Massachusetts, and specifically the South Coast, has the potential to lead the nation in the transition to green jobs, alternative energy sources, sustainable production, transportation, food production and resource management.

Several other regional discussions were convened by UMass Dartmouth in partnership with the Southeastern Regional Planning and Development District (SRPEDD). These led to the creation of the Southeastern Massachusetts Council on Sustainability (see Spotlight), which has emerged as the principal force in the region for education and action on sustainability. Working groups on food, energy, transportation, economic development and natural resources have developed comprehensive visions and regional action plans.

**Outreach and Education**

In 2008, the Office of Campus and Community Sustainability was awarded a 3-year grant to run a sustainability camp for area middle-school students. Funded by the Southeast Regional Pre-K-16 STEM Network (a branch of the Department of Higher Education’s STEM Pipeline Fund) the camps have hosted 6-8th graders on campus where they’ve learned about food systems, renewable energies, and carbon. The youngsters have built solar cars and sustainable cities. In the summer of 2009, 35 K-12 teachers from across the region came to campus to learn how to weave sustainability into Science, Math, English and Arts curricula. Funded by the Southeastern Environmental Education Alliance (SEEAL) the teacher training also fostered a network of teachers and a resource website, sustainableteacher.org.

Other outreach and education has focused on the business community (energy education and conferences); the regional transportation network (a short sea shipping conference); and area municipalities. UMass Dartmouth faculty and staff have also been active in the building of a green Habitat for Humanity home, the US Department of Energy’s Solar Decathlon, and New Bedford’s Earth Eve. They play important roles in local sustainability boards, including the New Bedford Mayor’s Sustainability Task Force, the South Coast Rail Task Force, the Advisory Board of Greater New Bedford Voc Tech School and the SEEAL board.

“The Southeastern Massachusetts Council on Sustainability has emerged as the principal force in the region for education and action on sustainability.”
Many of these initiatives have called on us to expand our outreach into non-credit education, including the development of green jobs training. Our first grants related to green jobs training were awarded through the New Bedford Workforce Investment Board which funded classes in Energy Efficiency Principles, and Green Entrepreneurship. A UMass Dartmouth-administered Certificate in Energy and Carbon Management is also under development for those seeking training in green jobs careers.

Our community partnerships in the development of green jobs have led to the establishment of a Center for Sustainability at 11 Cove Street in New Bedford. Beginning in the spring of 2011, UMass Dartmouth will host energy-related classes in the Center. Homeowner and contractor education in energy efficiency and renewable energy technologies are also planned for the Center. The Cove Street Center will be a mecca for community sustainability endeavors, including incubation of small businesses and a year-round marketplace for green products and foods from this region.

Another educational center is envisioned in a renewable energy park proposed for Plymouth, Massachusetts. In collaboration with Solaya Energy and developer J.K. Scanlon, the Office of Campus and Community Sustainability recently presented a plan to Plymouth County to build a combination educational center/theme park with a “Back to the Future” focus. “Re-New World,” will suggest that the path to the future is built not only on revolutionary new technologies but also a return to the values of conservation espoused by both the Pilgrims and the Wampanoag Native Americans.

Recent Accomplishments

The Sustainability Summer Camp for Middle School Students

Our summer camp has been an important opportunity to expand sustainability literacy throughout the region. Students, their teachers, and their parents have been enthusiastic about the camp and eager for follow-up activities. UMass Dartmouth’s Office of Civic Engagement recently filed a grant to increase the number and size of the camps, as well as to partner in greening the region’s schools.

The Development of the Southeastern Massachusetts Council on Sustainability

SEMCOS is being held up as a model of regional collaboration by state and federal agencies. Dozens of UMass Dartmouth faculty and students have been involved in council activities, including several MBA classes who have worked on indicator projects.
The Opening of a Center for Sustainability on Cove Street

The Cove Street Sustainability Center places the University at the core of regional green jobs conversation and training. The offices, classrooms and workshop at the Center will house both energy efficiency training and sustainability classes. The renovation of an old mill building will demonstrate sustainability in action while providing a hub for fostering green entrepreneurship, including a sustainable food and goods marketplace.

Opportunities

Continuing Development of the Atlas Center for Sustainability

The Cove Street Center represents an opportunity to grow not only our green jobs programming but also our outreach to businesses, homeowners, municipalities and other community members who will take advantage of the training space and demonstration areas.

The Development of the “Re-New World” Education Center in Plymouth, MA

The installation of significant renewable energy systems on 104 acres off of Route 3 in Plymouth represents a unique educational opportunity for the general public and for Massachusetts schoolchildren. While wind turbines have been erected at Mass Maritime, at Hull, and at the Electrical Union Headquarters on Route 93, none of these installations has included a comprehensive public educational component. Our vision is to use the wind turbines and solar array as the backbone of a sustainability educational center that is a nationwide model. Beginning with the development of an “Energy Trail,” we envision the creation of a state-of-the-art center and the eventual development of an entire campus. Using neighboring Plimoth Plantation as a guide, we envision a “Re-New World” educational experience that reflects the idea that we are now Pilgrims stepping into a new world.

This educational center could be an important opportunity for the University’s History and Sustainability Departments to partner on educational displays and exhibits, and will put UMass Dartmouth on the national map for sustainability endeavors.
Spotlight on Sustainability

Regional Council on Sustainability

Sustainability is a hot topic not only on campus, but in our surrounding communities. From Fall River to Wareham and Taunton to Westport, community gardens, energy groups, sustainability plans, and citizen action groups are springing up. Spawned by an awareness of climate change and peak oil as well as by financial necessity, these groups are beginning to collaborate in increasingly structured ways.

Achieving sustainability must be a wide-spread effort. Though individual commitments are important too, saving our planet will require that groups and entire regions work in concert in order for us to accomplish meaningful and far-reaching effects.

Officials, citizens and organizations dedicated to eco-focused lifestyle changes in Southeastern Massachusetts have come together to form the Southeastern Massachusetts Council on Sustainability. The Council's first meeting was held in June of 2009 at UMass Dartmouth's Advanced Technology Manufacturing Center in Fall River.

Sparked by the Office of Campus and Community Sustainability at UMass Dartmouth and by the Southeastern Regional Planning and Economic Development Department (SRPEDD), the Council came into being in order to coordinate efforts among different entities in the region. The Council is an opportunity to stretch limited resources as these entities share knowledge, adopt best practices and form partnerships to address issues at larger geographic and functional levels.

Mor

Community Best Practice

Oberlin College is a leader in connecting campus and community efforts for sustainability. The college benefits from a dedicated Office of Community and Government Relations, as well as the leadership and expertise of Oberlin “Paul Sears Distinguished Professor of Environmental Studies and Politics” David Orr, a renowned sustainability author and leader. Using these strengths, Oberlin has extensive partnerships with their neighboring municipalities helping to introduce and expand sustainable initiatives throughout the community and government.

Recent endeavors include a $140 million venture focused on building a post-fossil fuel based economy. The project is off to an auspicious start, with Oberlin, Ohio, invited to become the 18th city in the world to join the Clinton Climate Initiative. The project joins the many strands of sustainability (including urban revitalization, green development, advanced energy technology, sustainable agriculture and forestry, green jobs, and education), into an integrated response. Other recent projects include a two-year $2.2 million collaborative project to define a 100 days Climate Action Plan for the Obama Administration, and a gift from the college to the city of Oberlin toward a LEED-rated fire station expansion.

In addition to calling on the expertise of faculty and staff the college has also engaged its students to provide assistance to surrounding communities. A series of “community enhancement research projects” focused on sustainable initiatives, including: investigation of potential connectivity of the campus to a regional bikeway, opportunities for local businesses to move to renewable energy systems, and the potential of fueling local school buses with biodiesel.

More than 80 people attended the kickoff meeting, and involvement has continued to grow. The Council’s working groups and citizen activists represent education, business, agriculture, environmental groups, foundations and local governments.

Five working groups have taken up the tasks of the Council. They focus on: (1) Food and Agriculture, (2) Economic Development, (3) Energy, (4) Natural Resources, and (5) Transportation. These committees meet quarterly. Members of UMass Dartmouth’s faculty serve as leadership on four out of five of the committees.

Some of the issues the Sustainability Council is working on include making sure all people have access to healthy foods in their own neighborhoods, encouraging development projects that promote walking rather than driving, bringing training opportunities for green jobs to Southeastern Massachusetts, protecting our aquifers as population growth places more demands on water supplies, and exploring local energy alternatives such as coastal wind power. For more information, visit http://www.councilonsustainability.org/.
Future Research Projects

Research and Teaching Opportunities through SEMCOS
The action plans developed by Southeastern Massachusetts Council on Sustainability represent significant opportunities for UMass Dartmouth. As we grow our undergraduate and graduate offerings, our regional partnerships can serve as important sources of research, teaching, and funding opportunities. In addition, internships and projects for students will help to give them real world experience in the transition to sustainability.

Additional Resources
Sustainable Communities Network www.sustainable.org/
Institute for Sustainable Communities www.iscvt.org/

For Discussion
What kinds of actions and attitudes make up a community that is sustainability-minded?
What topics of interest or concern would draw you out to a meeting about sustainability in your community?
Do you have expertise or leadership skills that you’d be willing to contribute to a sustainability effort?
Not long ago the definition of the word “sustainability” was not widely known beyond the
desks of business analysts or grant makers, nor was it tied to the health of the environment.
Popular awareness of sustainability as a concept and the worldwide push for sustainability
education heated up toward the turn of the 21st century as concerns about the future of global
warming, pollution, clean air and water, food supplies and fuel became impossible to ignore.

The United Nations declared the years 2005-2014 “The Decade for Education for
Sustainable Development.”1 Universities for the most part are starting from scratch to
develop sustainability as a field of study. While the United States lags behind some other
countries in sustainability academics—notably the commonwealth countries of Canada
and Australia—the creation of scholarly courses are underway nationwide. The American
Association of Sustainability in Higher Education (AASHE) lists 17 minors across the U. S.—
including UMass Dartmouth’s offerings.2

Sustainability coursework blends 21st century skill sets like carbon accounting, green
chemistry, and triple-bottom-line reporting with lessons that renew traditional avocations such as farming. Peak
Oil expert Richard Heinberg suggests that the U.S. will need 50 million farmers in the coming years to bring food production back to locales that lost their farms to globalization trends.

Studies in sustainability also expand existing courses to incorporate new knowledge. For
example, when the business-minded are trained to grow healthy enterprises, sustainability
pushes their academic lessons beyond number crunching to look at how management
decisions must take into account our increasingly energy-constrained world.

Sustainability draws into its purview academic training from many disciplines that
in the past may have seemed unrelated. Developing and revising curriculum that joins
departments from across the campus in the pursuit of teaching sustainability requires
commitments and creative thinking from faculty and administration, as well as the
willingness to recognize the critical importance of success.

Where We Are

Academic Programs

Sustainability is a discipline in its own right, yet it requires networking between new and existing
programs and departments. Engineers need to learn about building sustainably; chemists must
concern themselves with non-toxic principles; nurses need to consider environmental health,
business students have to pursue understandings of life-cycle analysis; and all students require knowledge about climate change, species extinction, and fossil-fuel depletion.

At UMass Dartmouth, each of our seven colleges has faculty, staff, and students involved in research and coursework in areas such as sustainable fisheries, environmental nursing, triple-bottom-line reporting, and green design. Creating formal academic programs of study for degrees in sustainability is interweaving these researchers and professors in new forward-thinking endeavors.

**Sustainability Research**

Environmental or sustainability research is not new to the UMass Dartmouth campus. Prominent programs include wetlands and ocean research; biomimicry investigations; sustainable transportation networks; sustainable fisheries partnerships; and research into biofuels, energy efficiency, renewable energies; and sustainable business and policy matters.

Although much of UMass Dartmouth’s research is not coordinated internally with a ‘sustainability’ tag as of yet, the University is a seedbed of sustainability projects, with a significant opportunity to coordinate and establish itself as a leading sustainability research center. Through the Office of Sustainability, sustainability research projects can be connected across colleges and pursued in an advantageous multi-disciplinary fashion.

**Student Research and Internships**

UMass Dartmouth has found that sustainability research is appealing to students because it is cutting edge, hands-on, relevant, and provides an opportunity to impact the campus and the world. Student researchers span the academic spectrum, and their projects have real world applications. Sustainability initiatives put students to work in communities doing recycling projects. They also involve students in national competitions such as the Department of Energy’s Solar Decathlon where they work in teams to design, build, and operate attractive, effective, and energy-efficient solar-powered houses. Our business students are rising to the challenge of envisioning green futures that also make economic sense. One recent business plan proposed a web site that would match up potential carpoolers by pairing people going the same directions at the same time, and also allow riders to choose to travel with smokers or nonsmokers, those who prefer to listen to music versus news, and so on.

**Academic Collaborations**

Because sustainability is a new discipline, collaborations across campuses within the UMass system and beyond can spur the development of programs.
Our collaborations already include the CONNECT network, which allows work to span the Southeastern Massachusetts public school campuses of Bridgewater State College, Cape Cod Community College, Bristol Community College, Massachusetts Maritime Academy, and Massasoit Community College. Past pursuits though CONNECT have drawn these partners together for projects related to the American College and University President’s Climate Commitment.

Conversations between UMass campuses in Boston, Lowell, Worcester, Amherst and Dartmouth on developing the UMass System as a leader in the Green Economy have been funded through the UMass President’s Creative Economy Award and other funders.

The Office of Sustainability at UMass Dartmouth has sponsored research on a wetlands restoration study at the Atlas Tack Superfund site in Fairhaven and is currently working with UMass Amherst on the development of biochar research (in which biomass waste is reduced to a charcoal solid to prevent carbon from entering the atmosphere).

Recent Accomplishments

**Multi-disciplinary Sustainability Minor**

Our Multi-disciplinary Sustainability Minor was approved in the Spring of 2007 and graduated its first students in the spring of 2009. The 18-credit program “looks to discover and examine humanity’s philosophies and practices, past and present, as they relate to the natural and social world, and consider what new or alternative philosophies and practices might be capable of providing a sustainable, balanced, and ethical future for the planet and its inhabitants.” The minor was conceived of and planned by a group of faculty over the course of several years. Currently over 30 faculty members from as many disciplines are involved in teaching sustainability courses.

**Topics in Sustainability**

A UMass Dartmouth staple sustainability course called “Topics in Sustainability” examines a single area of sustainability through the lens of five disciplines. Taught by five professors, the popular course is routinely filled with students. Topics courses have included focuses on Food; Consumption; Water; Coastal Zones; Perception, Representation and the World; and Urban Environments. Other sustainability courses at UMass Dartmouth mix old and new courses; *The Politics of Everyday Things* looks at resource chains.
Sustainability Team Projects
Many sustainability courses involve campus issues which give students concrete examples of sustainability challenges and solutions in the real world. A capstone course for the sustainability minor engages students in team projects. One such project pursued biodiesel fuel production on campus for University.

Online Programs
A 12-credit online Sustainability Certificate program started in the summer of 2009. It drew students from several states and countries. Our first graduate was a Sustainability Specialist for Universal Companies, an international distributor for skin, beauty, and body products. A 12-credit online Masters Certificate in Environmental Policy opened in January of 2009.

Student Research
Student sustainability research projects have led to a plan to heat the swimming pool with solar thermal panels; a paper reduction campaign; and logos and marketing materials for the Sustainability Office and the Regional Council on Sustainability.

Opportunities
New Academic Programs in Sustainability
With the creation of the Sustainability Programs Academic Unit by the Chancellor in the winter of 2010, the structure to create new undergraduate and graduate programs is in place. Programs in the works include:

• Potential undergraduate and graduate sustainability tracks in the Colleges of Engineering and Business. Student interest in renewables and strategic sustainability management suggest that such tracks would be well populated.
• Post-baccalaureate online certificate programs in Energy and Carbon Management.
• A multi-disciplinary Masters in Sustainability.

Sustainability Literacy as a General Requirement
Our Climate Action Plan includes a commitment to make sustainability literacy part of every UMass Dartmouth student’s experience. This could be accomplished through a General Education requirement or through a campus-wide effort to infuse sustainability in every department.
Spotlight on Sustainability

Lessons in Sustainability

UMass Dartmouth kicked off its sustainability studies offerings in the spring semester of 2007 with the now popular Topics in Sustainability course focused on food, how we grow it, distribute it, and what that means in terms of current costs to our planet and its population. This experimental course was taught by professors from five different departments since a complete understanding of the global marketplace and food production didn’t fit under any one area of expertise.

The same turned out to be true for subsequent Topics in Sustainability which educated students about sustainability issues related to consumption, water, coastal zones, and urban environments. Involved in the carbon cycle study for spring 2010 are professors and researchers from the areas of political science, business management, anthropology, marketing, and marine science.

This single course each semester has helped to coalesce a disparate group of faculty from across the campus who are interested in forwarding sustainability studies, but had no previous path for coming together to take action. New foci for Topics in Sustainability are recommended and voted on by sustainability faculty. The course is required for the Sustainability Minor but is popular with students throughout the campus, with each offering filling up quickly.

The first Chairman of Sustainability Studies at UMass Dartmouth, English Professor Jerry Blitefield, said the inter-departmental approach to teaching the Topics course “demonstrates to students that sustainability studies is under no single province. It’s not exclusively science-based. It’s not exclusively philosophically-based.”

He explained that a student majoring in economics does not have to become an expert in earth system science in order to develop their interest in working in their own field with an understanding of a sustainability framework.

Those who choose to take one or more Topics in Sustainability should be prepared, Blitefield said, “To have the doors blown open on their own thinking.”

Academics Best Practices

For best practices in sustainability academics, we look to Arizona State University’s (www.asu.edu) doctoral program in Environmental Planning and Design which offers concentrations in:

*Design*: a concentration focused on the study of factors affecting various aspects of built environments. ASU’s design lessons consider large scale concerns as found in landscape architecture, architecture and interior design, as well as reduced scale concerns in industrial design and visual communication design.

*History, Theory, and Criticism*: a concentration focused on the theoretical dimensions of sustainable design in areas of architectural and design history including critical discourse in the design disciplines.

*Healthcare and Healing Environments*: a specialized concentration with a focus on the integration of evidence-based design, sustainable science and best practices in the design and planning of healthcare facilities.

ASU’s multidisciplinary program “provides research experience for students wishing to pursue careers in industry as members of interdisciplinary design and planning teams on environmental and energy issues, as well as for those wishing to teach in the architecture, design, or planning fields.”

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*History, Theory, and Criticism*: a concentration focused on the theoretical dimensions of sustainable design in areas of architectural and design history including critical discourse in the design disciplines.

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ASU’s multidisciplinary program “provides research experience for students wishing to pursue careers in industry as members of interdisciplinary design and planning teams on environmental and energy issues, as well as for those wishing to teach in the architecture, design, or planning fields.”
Future Research Projects

*Joint Work Across Departments, Campuses, and Colleges*
There are significant opportunities in developing multi-disciplinary research or grant collaborations.

*Growing a Sustainability Doctoral Program*
The depth of campus strengths in sustainability offerings and research in Policy Studies, Engineering, Business, SMAST and other colleges suggests that a Doctoral Program in Sustainability would be a natural fit for the University.

*Development of a Sustainability Cooperative Extension Service*
With students, researchers, certificate-holders, and professors all connected to the Sustainability Office at UMass Dartmouth, we’d make a logical hub of outreach help for people in the community looking to bring their own sustainability practices forward.

Additional Resources
UMass Dartmouth Sustainability Web Site www.umassd.edu/sustainability
Teach Sustainability www.teachsustainability.com.au
Association for the Advancement of Sustainability in Higher Education www.aashe.org
Second Nature www.secondnature.org

For Discussion
How do you envision that training in sustainability would enhance your chosen course of study?
If you pursued credentials in sustainability itself, how would you apply them to make yourself more valuable as a working professional after graduation?
Blending the expertise of more than one department at UMass Dartmouth, what kind of sustainability research project would you be interested in investigating and how do you imagine answers to your questions would benefit the global sustainability thought process?
Endnotes

Chapter 1, Purchasing


2. Environmental impact estimates were made using the Environmental Defense Fund Paper Calculator. For more information visit http://www.papercalculator.org.

3. To view the UMass Dartmouth Environmentally Preferable Purchasing (EPP) Policy visit: http://www.umassd.edu/sustainability/purchasing_guide.cfm

Chapter 2, Waste


2. To learn more about landfill methane capture visit the State of California's website on Landfill Methane Capture Strategy http://www.calrecycle.ca.gov/climate/Landfills/default.htm

3. For more information on the role of academia in advancing sustainability see: Creighton, Sarah H. Greening the Ivory Tower: Improving the Environmental Track Record of Universities, Colleges, and Other Institutions (Urban and Industrial Environments). The MIT Press, April 1998.

Chapter 3, Built Environment


2. The highly consumptive building common today need not be a fixed destiny. Oberlin College's Adam Joseph Lewis Center offers an example of an innovative resource-conscious building design: http://www.oberlin.edu/ajlc/systems_home_1.html

3. For more information on LEED Certification Standards visit: http://www.usgbc.org/LEED

Chapter 4, Transportation

1. For more information see the documentary “The End of Suburbia: Oil Depletion and the Collapse of the American Dream” (2004), http://www.endofsuburbia.com

2. To learn more about Southeastern Massachusetts regional transportation efforts visit the Southeastern Massachusetts Regional Planning and Economic Development District (SRPEDD) website: http://www.srpedd.org/

Chapter 5, Energy

1. For more information visit the Association for the Study of Peak Oil and Gas at: http://www.peakoil.net/

2. For more information on the value of conservation and simple ways to implement energy conservation in your home or office visit the U.S. Department of Energy and U.S. Environmental Protection Agency website on the Energy Star program: www.energystar.gov

3. For further information on electricity generation in the United States visit the Energy Information Agency of the Department of Energy Database on energy electricity generation in the US: http://www.eia.doc.gov/cneaf/electricity/page/at_a_glance/gen_tabs.html

Graph of Cost of Academic Buildings


Chapter 6, Land Use:

Chapter 7, Food


Chapter 8, Water:

Chapter 9, Culture:

Chapter 10, Health

Graph of Savings per Dollar Investment:

Source for graph: The American Institute for Preventive Medicine, 2005.

Sources for the studies referenced on the graph:

1. Source: Aldana, SG, Financial impact of health promotion programs:
Chapter 11, Community

Graph of Savings per Dollar Investment:
Source for graph: The American Institute for Preventive Medicine, 2005.
Sources for the studies referenced on the graph:
Climate Action Plan
Text of the American College & University Presidents’ Climate Commitment

We, the undersigned presidents and chancellors of colleges and universities, are deeply concerned about the unprecedented scale and speed of global warming and its potential for large-scale, adverse health, social, economic and ecological effects. We recognize the scientific consensus that global warming is real and is largely being caused by humans. We further recognize the need to reduce the global emission of greenhouse gases by 80% by mid-century at the latest, in order to avert the worst impacts of global warming and to reestablish the more stable climatic conditions that have made human progress over the last 10,000 years possible.

While we understand that there might be short-term challenges associated with this effort, we believe that there will be great short-, medium-, and long-term economic, health, social and environmental benefits, including achieving energy independence for the U.S. as quickly as possible.

We believe colleges and universities must exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality. Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society. These colleges and universities will be providing students with the knowledge and skills needed to address the critical, systemic challenges faced by the world in this new century and enable them to benefit from the economic opportunities that will arise as a result of solutions they develop.

We further believe that colleges and universities that exert leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities. Accordingly, we commit our institutions to taking the following steps in pursuit of climate neutrality.
1. Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.
   a. Within two months of signing this document, create institutional structures to guide the development and implementation of the plan.
   b. Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update the inventory every other year thereafter.
   c. Within two years of signing this document, develop an institutional action plan for becoming climate neutral.

2. Initiate two or more tangible actions to reduce greenhouse gases while the more comprehensive plan is being developed.

3. Make the action plan, inventory, and periodic progress reports publicly available by providing them to the Association for the Advancement of Sustainability in Higher Education (AASHE) for posting and dissemination.

In recognition of the need to build support for this effort among college and university administrations across America, we will encourage other presidents to join this effort and become signatories to this commitment.

Signed,

The Signatories of the American College & University Presidents Climate Commitment
## Emissions Reduction Strategies

<table>
<thead>
<tr>
<th>NAME</th>
<th>EXPECTED REDUCTION (Tons eCO₂)</th>
<th>EXPECTED COST/SAVINGS (costs reflected as negative values)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCO</td>
<td>(8,667.76)</td>
<td>$-</td>
<td>Our energy performance contract will bring substantial efficiency upgrades as well as a natural gas steam cogeneration plant to our campus.</td>
</tr>
<tr>
<td>Energy conservation (10%)</td>
<td>(2,889.25)</td>
<td>$523,800.37</td>
<td>In the 08/09 academic year we achieved an approximately 12% savings in energy through conservation alone. These savings were primarily achieved through manual control of HVAC systems, and through mild temperature reductions through the winter. We hope to replicate and expand this program by encouraging behavior-based conservation measures, such as shutting down equipment when not in use, and switching off lights when not needed. The savings goal here is in addition to the already achieved 12% reduction.</td>
</tr>
<tr>
<td>Wind</td>
<td>(467.58)</td>
<td>$-</td>
<td>The campus currently has a MET tower in place to measure our wind potential. We hope to be applying for a 660kW installation at the termination of the wind study in Summer 2010.</td>
</tr>
<tr>
<td>EV and Alt Fuel Fleet</td>
<td>(433.35)</td>
<td>$-</td>
<td>We plan to increase the average efficiency of our fleet 50% by 2020 by replacing current vehicles with high efficiency and hybrid vehicles, and electric vehicles where practicable; as their useful life expires. So far this process has begun with the addition of 2 hybrid vehicles to the public safety fleet.</td>
</tr>
<tr>
<td>Attrition and replacement</td>
<td>(433.35)</td>
<td>$-</td>
<td></td>
</tr>
<tr>
<td>Carpooling (20% participation)</td>
<td>(1,253.51)</td>
<td>$(2,884.62)</td>
<td>We hope to meet state target goals for carpool participation by both students and faculty/staff. We are currently implementing a new car sharing program as well as expanding the availability of preferred parking spaces for carpoolers around campus.</td>
</tr>
<tr>
<td>Proposed Solar PV</td>
<td>(-128.9366374)</td>
<td>0</td>
<td>We are currently awaiting approval for a grant funded 250kW PV array.</td>
</tr>
<tr>
<td>Bike Path</td>
<td>(501.40)</td>
<td>$(3,846.15)</td>
<td>We are currently developing plans to construct a bike path through and around our campus that also connects to the local community.</td>
</tr>
</tbody>
</table>
## Emissions Reductions Strategies continued

<table>
<thead>
<tr>
<th>NAME</th>
<th>EXPECTED REDUCTION (Tons eCO₂)</th>
<th>EXPECTED COST/SAVINGS (costs reflected as negative values)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discouraging Air Travel</td>
<td>(225.50)</td>
<td>$-</td>
<td>We hope that through the continuously advancing technologies regarding communication—specifically video conferencing—that we will be able to reduce the amount of air travel by our staff and faculty 25% from current levels.</td>
</tr>
<tr>
<td>30% RC Paper Purchasing</td>
<td>(67.03)</td>
<td>$-</td>
<td>We plan to establish as a standard a minimum of 30% recycled content in all paper purchases. This is intended to occur in conjunction with a long-term objective of a 50% print reduction, and also widespread purchasing of remanufactured ink and toner cartridges; these together should exceed the cost premium of the recycled paper.</td>
</tr>
<tr>
<td>Wind</td>
<td>(467.58)</td>
<td>$-</td>
<td>The campus currently has a MET tower in place to measure our wind potential. We hope to be applying for a 660kW installation at the termination of the wind study in Summer 2010.</td>
</tr>
<tr>
<td>50% Print Reduction</td>
<td>(83.79)</td>
<td>$102,126.89</td>
<td>We aim to reduce on-campus paper consumption 50% by 2020. Given the increased availability of digital collaboration tools, as well as the proliferation of online courses, and the increased prevalence of paperless business services, we feel we can make significant and progressive strides to achieve this goal.</td>
</tr>
<tr>
<td>35% MSW diversion</td>
<td>(133.53)</td>
<td>$-</td>
<td>We plan to bring our solid waste diversion rates in line with current state averages. We are embedded in planning on this issue now, and have tripled our recycling rates over the last three years. We hope to exceed this target.</td>
</tr>
<tr>
<td>15% Renewable energy by 2012</td>
<td>(1,788.98)</td>
<td>$(43,286.16)</td>
<td>The benchmarks for renewable energy purchasing are established through MA Executive Order 484. We expect that these will be the most difficult goals to achieve given the clear and present cost premium. We plan to leverage savings achieved through conservation, as well as revenues achieved through a potential “green fee” in order to reach these goals.</td>
</tr>
<tr>
<td>30% Renewable energy by 2020</td>
<td>(3,577.95)</td>
<td>$(21,643.08)</td>
<td></td>
</tr>
<tr>
<td>Total Reduction</td>
<td>(20,218.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of total emissions reduced from 2008 levels by 2020</td>
<td>46%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Date Adopted: 1/15/2010*
Summarize the institution’s plans for mitigating its greenhouse gas emissions.

In our quest for sustainability, UMass Dartmouth has identified areas of opportunity, past success and struggle by undergoing a thorough campus-wide Sustainability Assessment. The insights gathered by this process are the guiding force behind our Climate Action Plan. The Assessment examines UMass Dartmouth sustainability performance from 12 perspectives: Purchasing, Waste, Built Environment, Transportation, Energy, Water, Food, Land Use, Health, Culture, Community, and Academics. Each chapter of the assessment encompasses one of these perspectives and discusses the current state of affairs, recent successes, and further opportunities. Undergoing the assessment has brought out many meaningful and useful ideas—several resulting in immediate actions to reduce emissions or conserve resources. Though each opportunity may not directly shrink the University’s footprint, they nonetheless contribute to our vision of building a sustainable university.

In addition to the Assessment, the University is also undergoing a deep energy retrofit/energy performance contract. This program is the largest single item in our Climate Action Plan, and alone it will reduce our total emissions in excess of 20%.

Our Climate Action Plan targets a 40% reduction in greenhouse gas emissions by 2020. We plan on reaching climate neutrality by 2050. However, detailed planning beyond 2020 could prove fruitless given the rapid rate of change in technologies and energy costs. Instead, we are committed to maintaining our Climate Action Plan and Sustainability Assessment as living documents to be revisited and revised as we progress toward the future.

Summarize the institution’s plans to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students (up to 300 words).

UMass Dartmouth is pursing graduate and undergraduate studies in Sustainability as an area of specific academic
study, and as a multi-disciplinary specialty that grows from relevant perspectives in courses already offered by other departments. Currently, over 30 faculty members from as many disciplines are involved. Though courses in Sustainability have been offered for several years, our Chancellor on February 19, 2010 officially added to the University roster its own distinct Sustainability department.

Also in February 2010, the UMass Dartmouth Office of Campus and Community Sustainability received a grant from the U.S. Department of Labor underwriting the creation of at least a dozen Master’s level Sustainability courses. We expect a full degree program to be in place by the fall semester of 2011.

Our multi-disciplinary 18-credit Sustainability Minor was approved in the spring of 2007 and graduated its first students in spring 2009. A UMass Dartmouth staple Sustainability course called “Topics in Sustainability” examines a single Sustainability issue through the lens of five disciplines. Taught by five professors, the popular course is routinely filled. Topics courses have included focuses on Food; Consumption; Water; Coastal Zones; Perception, Representation and the World; the Carbon Cycle, and Urban Environments. Other Sustainability courses at UMass Dartmouth mix old and new courses; The Politics of Everyday Things, for example, looks at resource chains.

At UMass Dartmouth, each of our seven colleges has faculty, staff, and students involved in Sustainability research and coursework. Creating formal academic programs of study for degrees in Sustainability is interweaving these researchers and professors in new forward-thinking endeavors. But we are also working to incorporate Sustainability into the education of every student. One strategy is to bring discussions of Sustainability into pre-existing required classes, and another under consideration is to add as a requisite for all students a topics course in Sustainability.
Summarize the institution’s plans to expand research related to the achievement of climate neutrality.

Environmental and Sustainability-related research has long been underway on our campus across numerous subjects and within many academic fields. In addition to the studies housed in our primary Dartmouth facilities with emerging Sustainability concerns such as ecology, chemistry, biology, physics, engineering, political science, and business, UMass Dartmouth also has several satellite sites where extraordinarily important research is taking place.

• Our School of Marine Science and Technology (SMAST) has several scientists working on climate issues—from modeling to ocean chemistry—as well as sustainable fishing practices and harvests.
• Our Advanced Technology and Manufacturing Center (ATMC) has developed a Marine Renewable Energy Center (MREC) and a Clean Energy Lab.
• A historic mill building currently being renovated in the heart of the New Bedford community is becoming the Atlas Center for Sustainability where UMass Dartmouth researchers and training practitioners will make green technologies readily accessible to the public and to students who want to learn how to adopt them as future professionals.
• An historic mill building in the heart of the New Bedford community is envisioned as a future Center for Sustainability where UMass Dartmouth researchers and training practitioners will make green technologies readily accessible to the public and to students who want to learn how to adopt them as future professionals.

Some of the more prominent of already-studied or ongoing topics of study in Sustainability at our University include:

• Wetlands
• Biomimicry
• Sustainable Transportation
• Biofuels
• Energy efficiency
• Food and agriculture

• Health and nutrition
• Solar power and water resources
• Use of recycled materials in pavement
• Green manufacturing
• Triple-bottom-line reporting
Although much of UMass Dartmouth’s research is not coordinated internally with a Sustainability “tag” as of yet, the University is a seedbed of Sustainability projects, with a significant opportunity to coordinate and establish itself as a leading Sustainability research center. Through the Office of Sustainability, research projects can be connected across colleges—and even, perhaps, across the five UMass campuses—while maintaining its advantageous multi-disciplinary nature.

Summarize the institution’s plans to expand community outreach related to the achievement of climate neutrality.

From its outset, the UMass Dartmouth Office of Campus and Community Sustainability has resisted the Ivory Tower syndrome and worked to become imbedded and involved in the surrounding community.

Beyond academics, we are evolving our Sustainability Initiative as an outreach and extension program, spreading knowledge out into the community and inviting people in to access our resources. Starting with hosting Sustainability seminars and workshops, guest speakers and films, and weekly email news-letters, UMass Dartmouth has been building a network of like-minded stakeholders from decision-makers to average citizens.

The Sustainability Office has been instrumental in developing the Southeastern Massachusetts Council on Sustainability (SEMCOS). SEMCOS is being held up as a model of regional collaboration by state and federal agencies. It brings together citizens and decision-makers pioneer sustainable paths forward for (1) Food and Agriculture, (2) Economic Development, (3) Energy, (4) Natural Resources, and (5) Transportation. Members of our faculty serve as leaders on four of these committees.

Reaching out to younger generations, in the summer of 2008 we hosted our first Sustainability summer camp for middle school students. The camp expanded Sustainability literacy throughout the region, and participation for 2010 has more than doubled. Students, their teachers, and their parents have been eager for follow-up activities. UMass Dartmouth’s Office of Civic Engagement is seeking funds to increase the camps, as well as to partner in greening local schools.

As a tangible and high profile hub for Sustainability in the community, the Sustainability Office is planning a Center for Sustainability in New Bedford. This will be a place where visitors can explore and buy small-enterprise eco-friendly products, consult Sustainability practitioners, and receive green jobs training. The Center will place the University at the core of regional green jobs action, and positions us in easy reach of businesses, homeowners and municipalities.
Recommended Reading and Viewing

Books
Believing Cassandra
Alan Atkission
Cradle to Cradle: Remaking the Way We Make Things
William McDonough, Michael Braungart
Deep Economy
Bill McKibben
Depletion and Abundance
Sharon Astyk
Dream of the Earth
Thomas Berry
Earth in Mind
David Orr
Limits to Growth
Donella Meadows
Natural Capitalism
Paul Hawken, Amory Lovins, L. Hunter Lovins
Omnivore's Dilemma
Michael Pollan
Peak Everything
Richard Heinberg

Web Sites
350.org
aashe.org
foodroots.org
greenreportcard.org
grist.org
newdream.org
peakoil.net
secondnature.org
transitiontowns.org
usgbc.org

Films
An Inconvenient Truth
Flow
Food, Inc.
I.O.U.S.A.
King Corn
No Impact Man
The Corporation
The End of Suburbia
Who Killed the Electric Car
Why We Fight
OGJ, 9 Feb 2004 (Jan-Nov 2003)
Glossary

ACUPCC
The American College & University Presidents’ Climate Commitment (initiated in 2007)

April 2007 Executive Order 484
“Leading By Example: Clean Energy and Efficient Buildings.” The goals of this executive order include that all Commonwealth agencies meet the following by 2012:
- 25% reduction in greenhouse gas emission from 2002 levels
- 20% reduction in energy per square foot from 2004 levels
- 10% reduction in water use from 2006 levels

Arboretum
A facility where trees and shrubs are grown for display

Bike Sharing
Systems where numerous bicycles are made available for shared use amongst individuals who do not own any of the bikes

Biochar
Charcoal created by the chemical decomposition of condensed substances by heating that occurs spontaneously at high enough temperatures (pyrolysis) of biomass.

Biomass
A renewable energy source. Biological material derived from living, or recently living organisms, such as wood, waste, and alcohol fuels. Biomass is commonly plant matter grown to generate electricity or produce heat.

Bioreserve
An area containing a wildlife preserve bordered by a buffer zone in where frequent use is permitted to the public.

Brutalist
A style of modern architectural style that developed in the 1950s to mid 1970s. Stylistic features range from block-like geometric forms to organic and sculptural looking forms

Carbon Footprint
Measures the total amount of greenhouse gas emissions released into the environment either directly or indirectly by an individual, organization, event, or product.

Carbon Sequestration
Designed for the lessening of global warming, it is a geoengineering technique for the long-term storage of carbon.

Carpooling
The shared use of a car by a driver and one or more individuals that are going to the same destination, therefore reducing the number of vehicles on the road and reducing CO₂ emissions.

Climate Neutrality
Having net zero Green House Gas emissions (also referred to as Carbon Neutrality).

Closed Loop
A system where materials are continually recycled into the same product. For example, a glass bottle can be recycled and made into another glass bottle.

Consortium for the Advancement of Teaching, Learning, and Scholarship (CATLS)
A group though UMass Dartmouth that seeks to provide a communications nexus within which larger conversations can take place; to help the faculty fulfill their multiple roles; and to connect the activities and programs that the faculty already engages in.

Craddle to Cradle
An assessment where the end-of-life disposal step for a product is a recycling process where a new identical or completely different product is created.

Daylighting
The use of natural light through windows, skylights, light shelves, and other techniques that minimize glare and heat.

DCAM
Division of Capital Asset Management—the state agency responsible for real estate and public building construction for the Commonwealth of Massachusetts.

Electronic Product Environmental Assessment Tool (EPEAT)
A system that helps purchasers evaluate, compare and select electronic products based on their environmental attributes.

Energy Performance Contract (EPC)
A financing technique that uses cost savings from reduced energy consumption to repay the cost of installing the energy conservation measures.

Energy Service Company (ESCO)
A business that provides energy management services to an energy user.

Environmentally-Preferable Purchasing (EPP)
The federal government requires the purchase of products or services that have the least negative effect on the environment and human health in consideration of the attainment of raw materials, manufacturing methods, packaging, distribution, and recyclability.

Externalized Costs
Negative effects associated with economic transactions which affect people outside of those dealings, which means that neither the buyer nor the seller is influenced by the impact.
**Food Waste**
Is any food substance which is discarded, or intended or required to be discarded.

**Geothermal**
Of or relating to the heat in the interior of the earth.

**Green Roof**
A literally green roof that’s covered with plants to reduce the heat that the roof absorbs. The roof system uses a specialized undercarriage for the waterproof membrane and excess water removal.

**Green Seal Certification**
means that a product or service has been tested according to science-based environmental leadership standards, that it works as well or better than others in its class, and that it as been evaluated without bias or conflict of interests.

**Grey-Water**
Non-industrial wastewater generated from domestic processes such as dish washing, laundry and bathing.

**Life Cycle Cost**
The total of all costs concerning a system, product, structure or service during its life time.

**LEED**
Leadership in Energy and Environmental Design. A system to categorize the level of environmentally sustainable construction in buildings.

**Meteorological Tower**
A device that measures wind speed and determines whether a site qualifies for a wind turbine.

**Methane Capture**
A method of gathering methane by using wells, pipes, and other technology from either landfills or dairy farms, stopping it from entering the atmosphere and harnessing it for energy.

**Municipal Solid Waste**
A waste type that includes predominantly household waste collected by a municipality within a given area.

**Nature Deficit Disorders**
Refers to the trend that children are spending less time outdoors, resulting in a wide range of behavioral problems.

**Peak Oil**
The term used to describe the point when worldwide production of conventional crude oil peaks in volume, which is expected to result in an increase in oil prices from a decline in the availability of cheap and easily accessible oil sources.

**Potable Water**
Water which is free from impurities that may cause disease or harmful physiological effects, such that the water is safe for human consumption.

**Preferred Parking**
Parking that is preferred for environmentally-friendly vehicles including hybrid cars. However no punitive action is taken when a non-preferred vehicle parks in a preferred spot.

**Public Transportation**
Various forms of shared ride vehicles which are intended for use by the public.

**Recycled Content**
Refers to the percentage or weight of recycled materials in a product.

**Renewable Energy**
Energy from sources that cannot be used up: sunshine, water flow, wind and vegetation.

**Restriction of Hazardous Substances (RoHS) environmental standards**
Restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive which sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste. Helps reduce sellers’ environmental footprint, including energy consumption, releases of toxic chemicals, and potential risks to human health and the environment.

**Single Occupancy Vehicle**
(SOV) is a privately operated vehicle whose only occupant is the driver.

**Slow Food**
Movement that was founded by Carlo Petrini in Italy to combat fast food. It claims to preserve the cultural cuisine and the associated food plants and seeds, domestic animals, and farming within an ecoregion.

**Sprawl**
Development patterns where rural land is converted to urban/suburban uses more quickly than needed to house new residents and support new businesses, encouraging people’s dependence on automobiles.

**Sustainability**
Is all about preserving the world’s natural resources for future generations. A fully sustainable industry would be one that has zero impact, or a positive impact on the environment.

**Sustainable Living**
Lifestyle that attempts to reduce an individual’s or society’s use of the earth’s natural resource and his/her own resources.

**Thin-Film Solar**
Also called a thin-film photovoltaic cell, is a solar cell that is made by depositing one or more thin layers of photovoltaic material on a substrate. Thin film solar cells employ materials such as amorphous silicon cadmium telluride and copper indium diselenide. These materials have high light absorbency and a much thinner layer of material is
required. Cells fabricated from these materials are currently less efficient
than Crystalline cells, but promise attractive cost and flexibility benefits.

**Triple-Bottom-Line**
Is for companies aiming for sustainability, who have to perform to
not just a single financial bottom line, but the simultaneous pursuit of
economic prosperity, environmental quality and social equity—Profit,
Planet & People.

**U.S. Green Building Council’s (USGBC) Leadership in Environmental and Energy Design (LEED) green building certification program**
Provides independent, third-party verification that a building project meets the highest green building and performance measures. LEED-certified buildings are designed to:
- Lower operating costs and increase asset value;
- Reduce waste sent to landfills;
- Conserve energy and water;
- Be healthier and safer for occupants;
- Reduce harmful greenhouse gas emissions;
- Qualify for tax rebates, zoning allowances and other environmental incentives in hundreds of cities;
- Demonstrate an owner’s commitment to environment stewardship and social responsibility.

**Waste Stream**
The total flow of solid waste from homes, businesses, institutions,
and manufacturing plants that are recycled, burned, or disposed of in
landfills, or segments thereof such as the “residential waste stream”
or the “recyclable waste stream.”
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