

FY2019

Annual Sustainability Report



University of Massachusetts

Amherst • Boston • Dartmouth • Lowell • Medical • Law • Online

The University of Massachusetts (UMass), which includes five campuses in Amherst, Boston, Dartmouth, Lowell and the Medical School in Worcester, has made a collective commitment to be “good stewards of resources” including not only fiscal resources but also a commitment to be environmentally responsible. Each of the University’s campuses conducts a wide variety of sustainable programs and services, many of which are unique to its campus population but all of which serve to make UMass, as a whole, a more sustainable entity. The efforts and achievements of each of the campuses demonstrates the strong responsibility felt by members of the University community.

The report that follows represents the programs and achievements of our campuses during fiscal year 2019. For prior year reports on campus sustainability efforts, links to each campus’ sustainability websites, and for additional details please refer to our website: www.umass.edu/budget-office/sustainability

This year’s sustainability report is an assessment of progress under the University’s Sustainability Policy adopted by the Board of Trustees in December 2016. The process undergone by the Sustainability Council to further refine reporting on metrics represents the extensive work underway at all campuses and this year’s report reflects the highlights in an Executive Summary and a metric dashboard across the policy areas.

This year’s report is the third annual report under the University’s Sustainability Policy and reflects the continuing efforts of the UMass Sustainability Council to report data on a consistent basis. After identifying metrics that are utilized across other reporting platforms, the campuses have worked collaboratively to improve their data collection efforts and clearly establish the methodology utilized. The effort to standardize the data methodology across the campuses and within each campus for these metrics require substantial staff time. However, as a University we are already realizing efficiencies by undertaking this effort. Since the metrics reported for this annual report are required early in the fiscal year and are aligned with data requirements for the Commonwealth’s Leading By Example program, the campuses have been able to complete those state reporting requirements with greater ease and higher confidence in the validity of the data.

As we continue to refine the methodology, the Sustainability Council expects that this work will have a greater impact on our reputation in the sustainability rankings of other publications and groups. The Sierra Club, Princeton Review, and the Association for the Advancement of Sustainability in Higher Education (AASHE) STARS reporting system require reporting on metrics which align with our internal annual reporting. These efforts will further bolster our data reported to these groups and support the University’s rankings by these groups.

This report includes two sections: An Executive Summary below which includes a campus section covering key achievements and highlights for FY2019; and an Appendix which features the Board of Trustees presentation with metrics information displayed in a dashboard format and the Board approved Sustainability Policy for reference.

University of Massachusetts Amherst

Sustainability at UMass Amherst continues to be a point of pride for the flagship public research university of the Commonwealth. UMass Amherst students are learning, living, and leading in sustainability by doing! They are learning about innovative solutions to the global problems of the 21st century and applying their knowledge and skills locally and throughout communities across the Commonwealth and beyond. FY19 was a year of impressive accomplishments in sustainability operations, academics, engagement, planning and administration, and innovation. The campus has again been named to the Princeton Review's list of Top 50 Green Colleges and jumped to #7 in the Sierra Magazine's Cool Schools list. Highlighted below, are a few of the exemplary practices where UMass Amherst made strides in FY19.

Sustainability Strategic Planning

UMass Amherst initiated three high level sustainability plans in FY19 in the areas of Waste Assessment, Campus Resiliency, and Carbon Mitigation. Two taskforces were created by the administration and the Chancellor's Sustainability Advisory Committee (CSAC), the committee that developed six high level strategic priorities to advance sustainability on campus. See Climate Resiliency and Preparedness, Waste and Recycling, and Clean Energy sections of this report for more information.

Clean Energy

Carbon Mitigation Plan

In April 2019 the Chancellor tasked the newly formed Carbon Mitigation Taskforce to develop a comprehensive, high level feasibility study that seeks to achieve 100% renewable energy for all heating, cooling, and electricity systems of the main campus by 2025-2030. The Taskforce developed an RFP and released it after the culmination of FY19. The taskforce consists of faculty, staff, and students.

On-Campus Solar

In FY19, the eight solar projects on the Amherst campus generated over 5.7 million kWh of clean, renewable electricity, all behind the meter. This amount of generation is equivalent to almost 10,000 Massachusetts homes annual electricity consumption.

Solar Net Metering

UMA is participating in three solar net metering contracts. These projects include a 2.4 MW array in Whately, MA, and two projects in Hadley, MA totaling 4 MW. The net metering contracts achieve significant cumulative cost savings. While the environmental attributes of this power was not retained by the Amherst campus, these projects serve as an example of investment in renewable energy by the University.

Climate Resiliency and Preparedness

Campus Resiliency Plan

In April 2019, the Campus Resiliency Taskforce released an RFP to develop a campus resiliency plan that expands upon the campus' current Federal Emergency Management Agency (FEMA) and Massachusetts Emergency Management Agency (MEMA) approved UMass Hazard Mitigation Plan. The plan will include a set of recommendations to appropriate committees and councils on campus and will incorporate climate projections, components of statewide plans and components of the Executive Order 569. The vendor selected towards the end of the fiscal year was Boston, MA based Linnean Solutions. The taskforce consists of faculty, staff, and students.

Green Building and Sustainable Building Operations

Energy Conservation

In FY19, UMass Amherst completed over 20 projects that reduced energy consumption in 18 different facilities, resulting in over 2 million kilowatt hours of electrical savings and almost \$500,000 in utility incentives with MOU collaborator, Eversource.

Green Buildings & Infrastructure

As of the end of FY19, UMass Amherst has 1,337,319 SF of LEED certified space, over 10% of the total campus GSF, including 11 LEED Gold buildings and 2 LEED Silver buildings. Among those buildings is the new Physical Sciences Building (PSB), which opened in April 2019. The LEED Gold lab fosters and expands cutting-edge collaborative learning and research.



PSB exterior including the WES facade. Photo courtesy of UMass News Office

Green Building Awards

In early July, 2018 the Old Chapel and the John W. Olver Design Building were honored by the national planners group, Society for College and University Planning (SCUP). The John W. Olver Design Building, which opened in 2017, earned a SCUP Merit Award for Excellence in Landscape Architecture – General Design. Old Chapel, at the center of campus since 1885, earned a SCUP/AIA-CAE Merit Award for Excellence in Architecture for Rehabilitation, Restoration or Preservation. In

December 2018, the Design Building earned LEED Gold Certification.

Sustainable Landscapes

In November 2018, the campus launched the campus's first student-run vineyard. The project, led by viticulture expert Elsa Petit and students from the Stockbridge School of Agriculture, is located at the Agricultural Learning Center in Amherst and initially received a \$3,000 grant from the campus's Sustainability Innovation & Engagement Fund (SIEF).

In October 2018, the campus established its first Songbird garden located on Governor's Drive. Designed and planned by Stockbridge School of Agriculture student interns with landscape management

staff and with consultation help from birder Dan Ziomek from the local Hadley Garden Center, the garden integrates a list of plants that provide one or more of the essential needs of nesting and migratory songbirds – food, water, and shelter.



Photo courtesy of Monte Belmonte, Valley Advocate

In April 2019 the Mass Aggie Seed Library opened in the Lederle Lowrise section of campus. The seed library, now open for seed borrowing and donation, houses a collection focusing on organic, open-pollinated and heirloom vegetable and flower seeds as well as a collection of books to educate the community about seed saving. The Seed Library is made possible through a generous grant from the UMass Amherst Sustainability, Innovation & Engagement Fund (SIEF).

Sustainable Transportation

ValleyBike Share Program

August 2018 marked the launch of the ValleyBike bike share system at UMass Amherst. ValleyBike Share, the new automated bike-sharing program serving six municipalities in the Pioneer Valley, began service at UMass with approximately 50 pedal-assisted bikes across five stations. The system has 540 bikes and 54 stations in the Pioneer Valley. FY19 saw huge ridership numbers at UMass Amherst with over 4,600 bike checkouts across the five campus stations before the end of the calendar year in 2018. The UMass Southwest station is the most popular station in the entire system.



Photo courtesy of UMass News Office

Electric Vehicles

As part of the 2019 Earth Day events held on campus, UMass Amherst sponsored an electric vehicle Ride & Drive event for the community. The public was invited to test-drive or ride in electric vehicles (EVs) and plug-in hybrids, including such brands as BMW, Chevy, Honda, Hyundai, Mercedes, Nissan, Tesla and VW. Workshops were offered by UMass Transportation Services staff at which attendees learned about the newest EVs and could talk with EV owners and manufacturers about costs, mileage, range and benefits.

Waste and Recycling

Waste Assessment Study

In FY19, UMass Amherst initiated an on-going Campus Waste System Assessment Study that will help the campus work toward becoming a Zero Waste Campus. Led by the Office of Waste Management and a team of outside consultants led by Kessler Consulting, the process will evaluate campus waste system

infrastructure and education and engagement programs, explore compost program expansion options, and will produce high-level recommendations from the consultant to help the campus achieve 70-90% waste diversion rates over the next 5-10 years.

Student Projects

In October 2018 student Leif Lindholm, a sophomore majoring in industrial engineering, in partnership with UMass Dining, designed and built a sculpture made primarily of plywood, plumbing straps, compostable to-go containers, and trash, called the Trash Monster which went on display at the UMass Campus Center Blue Wall café. The sculpture is a 6 foot tall creation that raises awareness of problems created by improper recycling and composting habits, or the neglect of them.



Photo courtesy of UMass News Office

Waste Sort

In April 2019 student and staff volunteers held an Earth Day Waste Sort hosted by Residential Life and the Office of Waste Management in the Southwest Residential Area Concourse. Volunteers sifted through more than 1,000 pounds of trash that had recently been produced in the surrounding student residences and dumped on a blue tarp. The event was designed to raise awareness about the importance of properly disposing of trash; that is, putting recyclable and composting items in separate containers from trash that is headed for the dump. The Southwest Residential Area was chosen because it has a lower recycling rate than other campus areas.

Sustainable Food Services

In partnership with Auxiliary Services and the MS Sustainability Science Program, the Amherst campus is researching the potential to coordinate a regional food recovery system. This project is a collaborative effort to design systems of communication between

stakeholders in the region to develop a response to produce grown in the Pioneer Valley that is not entering the supply chain for a variety of reasons. Contributors are seeking to understand farm food loss in the Pioneer Valley, and mechanisms through which institutions can provide a market for secondary produce as well as play a role in partnership development, education, workforce development and capacity building in the regional food system.

Sustainable Water Systems

In FY19 the Amherst campus used over 71 million gallons of reclaimed water, effluent water from the Amherst Wastewater Treatment Plant that is treated so that it is suitable for beneficial reuse in accordance with state permitting requirements and used in the cooling towers and process make-up water at the Central Heating Plant. The campus is nearing the 1 billion gallon mark of reclaimed water, which is the equivalent of filling up the Atkins Reservoir, the Town’s primary water supply, five times.

Academic Programing, Research and Community Engagement

School of Earth & Sustainability

Established in 2016, our new School of Earth & Sustainability (SES) serves as the central hub for research, education and outreach focused on sustainability in both the natural and built environments. In FY19, SES co-hosted several campus conferences that engaged with campus and regional leaders on important concerns such as climate resiliency and energy transition; organized professional development workshops for sustainability students; co-sponsored an interdisciplinary seed grant program to support faculty developing interdisciplinary proposals in social science and sustainability. Additionally, SES played an instrumental role in coordinating and convening initiatives such as the Sustainability Curriculum Fellowship Program, Energy Corps, Paperbark, BRIDGE Scholars Program, Envirothon, Eureka! Girls Inc., and the Eco-Rep student leadership program.

Master of Science in Sustainability Science

Sustainability Science is a one-year professional master's degree program that trains students for sustainability-focused careers in industry, academia, government, and the nonprofit sector. With an emphasis on leadership training and career development, students in the program complete a 150-hour professional-level internship at an organization of their choice; as of FY19, the program contributed 16,500 hours of service to the regional green workforce through its internship requirement. With the graduating class in FY19, the Sustainability Science Program has 95 graduates with an 86% employment rate for graduates in the sustainability field.

Sustainability Curriculum Fellowship

Established in 2013, the UMass Sustainability Curriculum Fellowship (SCF) is a yearlong interdisciplinary faculty training program designed to bring together faculty who are teaching undergraduate or graduate courses with a focus on sustainability. In FY19, the program hosted its sixth cohort. The university now has over sixty faculty fellows from every college from across 31 departments.

Earth Day 2019

The School of Earth & Sustainability partnered with the UMass Libraries to host the annual Earth Day Celebration on Wednesday, April 17 in the John W. Olver Design Building. The theme for the celebration was Hope and Resilience and it featured a showcase of undergraduate and graduate student projects that covered such topics as climate change, environmental solutions, green design and sustainability. The keynote speaker, Susanne Moser, discussed climate adaptation, science-policy interactions and effective climate change communication. Paperbark literary magazine hosted a Resilience World Café. On Thursday, April 18, the annual UMass Amherst Earth Day Festival celebrated sustainability on the Goodell Lawn with over 30 student and local community groups.

Energy Research

A multidisciplinary team of scientists including Alison Bates, environmental conservation and School of Earth & Sustainability, and Sanjay Arwade, civil and environmental engineering were awarded an NSF Engineering Research Center (ERC) Planning Grant to identify with industry partners the key priorities for offshore wind. UMass will play a key role in setting national priorities for wind energy based on a data-driven, multi-disciplinary system-level framework to identify where advances are needed in science and engineering.

A team of international researchers led by Amherst faculty was awarded funding from the Worldwide Universities Network (WUN) to initiate global projects designed to impact millions of people in the developing world including a project designed to bring sustainability and electricity access to developing countries. Erin Baker, professor and associate dean of the College of Engineering, director of the IGERT Offshore Wind Energy Program, will work with other faculty and partner with Universities of Ghana, Nairobi and Cape Town.

In July 2018 Krish Thiagarajan, an expert on marine renewable energy and energy-producing offshore structures, was appointed to the Endowed Chair in Renewable Energy. The chair was established in 2014 with \$2.5 million in funding from the state Department of Energy Resources (DOER). Thiagarajan will collaborate with DOER staff on renewable energy research and projects. Thiagarajan's studies focus on harvesting energy from waves in marine environments.

Climate Research

Several environmental conservation and SES faculty, who are also agency scientists with the Northeast Climate (Adaptation) Science Center (NE CASC) were chapter authors in the Fourth National Climate Assessment that was released in November 2018. Rob DeConto, geosciences, serves as a leading scientist and member of the Intergovernmental Panel on Climate Change (IPCC), which is preparing their Special Report on the Ocean and Cryosphere in a Changing Climate. DeConto serves as lead author of the Special Report's Chapter 4, "Sea Level Rise and Implications for Low Lying Islands, Coasts and Communities," and a contributing author to Chapter 3, "Polar Regions."

Elizabeth Brabec, landscape architecture and regional planning and SES professor, is the Director of Center for Heritage and Society. She and an international team of authors were appointed members of the Climate Change and Heritage Working Group of ICOMOS (International Council on Monuments and Sites), the official advisory body to UNESCO World Heritage on issues of cultural heritage.

This report includes language from news stories published throughout the fiscal year from the UMass Amherst Office of News & Media Relations.

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The University of Massachusetts Boston is Boston’s only public university and a doctoral degree granting research institution serving nearly 17,000 undergraduate and graduate students. UMass Boston was the only public university in Massachusetts to sign the historic 1990s Talloires Declaration on sustainability and formed part of the leadership circle in 2007 ACUPCC Climate Commitment. It was the first campus in the UMass system to establish a comprehensive sustainability program in 2002. It was recognized as a recipient of Second Nature organization’s Marks of Distinction for its continued efforts as signatories to the 2016 Climate Commitment (carbon neutrality and resilience) thereby continuing to set high-performance goals, demonstrating and reporting measurable progress towards its goals. UMass Boston was once again recognized as Princeton Review’s Green Colleges of 2019. Some of UMass Boston’s key sustainability achievements for FY19 are highlighted below.



GREEN BUILDING DESIGN & SUSTAINABLE STRATEGIC PLANNING

UMass Boston Residence Halls LEED Gold: In 2019, UMB’s first ever Dining and Residence Hall project achieved LEED Gold Certification from the U.S. Green Building Council (USGBC). The UMB Res Halls construction is in an area of high density and connectivity to the community on a site that is considered a brownfield redevelopment making it a sustainable site. Additionally, 56% of the open space on the site is vegetated, comprising of plant species that are either native or adapted to the particular coastal conditions of the site. Water conserving

showers, faucets, toilets achieve about 34% water conservation savings with about 27 % energy savings over the baseline achieved by energy conservation features including cool roofing, hardscapes to reduce the heat island effect, high performance envelopes, energy recovery units, hot water efficiency and 100% LED lighting. A variety of green construction and operations features include a 500-seat Dining Commons featuring zero-waste dining with non-disposable dinnerware and numerous sustainable dining features, single stream recycling and composting along with outdoors access for walkability, outdoors recycling, bike racks, access to the harbor and marine recreational and student focused Living Learning Communities and Academic in Residence programs.

The 1,077-bed, 260,000-square-foot complex was built through a public-private partnership, (P3) the first of its kind for the UMass system and its first ever LEED Gold Residence Halls was featured in the March 2019 edition of the AASHE bulletin. Previously, two other campus buildings - Integrated Sciences Complex, opened in 2015 and University Hall, opened in 2016 have also achieved LEED Gold certification.

The Utility Corridor and Roadway Relocation (UCRR) Project:

In FY19, UMass Boston neared the completion on one of the largest campus transformational projects, the UCRR project. The \$164 million UCRR project included a new utility corridor to support future buildings and provide reliable and efficient utility services to the campus. The UCRR includes a new two-way roadway network to provide various amenities including 3 miles of bike lanes, tree lawns of about 600 trees, and 6 miles of walkways sidewalks throughout the campus. By upgrading key infrastructural improvements, the UCRR enhanced campus aesthetics, walkability, and green space at the harbor campus.

CLEAN ENERGY & SUSTAINABLE TRANSPORTATION

Net Metering (Solar PV PPA)

UMass Boston entered into three net metering contracts with third party solar farms. Eversource provides 100% of the credit on the UMB bill related to the generation from the solar arrays, which is around \$1.3 million per year. UMB pays the project owners 75% of the credits received and UMB retains the remainder, which has been roughly \$325,000 in energy savings per annum over the last 2 years. FY18 was the first year that all 3 projects were fully operational. The Meadow project in Dedham, MA, expected to generate 5.1 million kWh in its first full year of operations, but generated slightly more at around 5.2 million kWh in its first full year of operations. UMass Boston will continue to evaluate additional offsite projects under the new SMART program.

Solar + Storage Project; EV Charging Stations



Following the announcement of a competitive grant program for energy storage demonstration projects in 2016, the UMass System conducted a competitive solicitation process for innovative storage solutions and use cases at the five University campuses. UMass Boston selected Enel Green Power North America as its demonstration project partner to deploy multiple solar systems on campus along with a co-located lithium ion battery that can store solar power generated during the day and then discharge the electricity in the late afternoon and early evening when the campus' electric demand peaks. In late 2017, UMass Boston was

one of twenty electric end users across the Commonwealth to be awarded a demonstration grant by the Massachusetts Clean Energy Center. The \$850,000 grant will help offset the upfront cost of the solar plus storage system, which will generate clean energy on campus and help reduce local grid congestion and related peak costs. Under the 20-year shared savings arrangement with Enel, UMass Boston expects to save \$100,000 in energy costs annually. UMass Boston students will be able to leverage a range of educational opportunities with Enel including paid internships, professional development, and educational curriculum development.

The UMass Boston campus is working on installation of EV chargers to enhance commuter options. UMB hosted numerous alternative transportation events including its first ever Clean Commute Challenge, Bike to Work event, Ride-Matching events alternating with Massrides related green transit alternative education events.

CLIMATE RESILIENCE AND PREPAREDNESS



Climate Resilience Grant : UMass Boston's Sustainable Solutions Lab

The Barr Foundation awarded \$1 Million to the UMass Foundation for UMass Boston's Sustainable Solutions Lab (SSL) to support research, convening, and pilot projects that tackle challenges at the intersection of climate change and social equity.

The UMass Boston Sustainable Solutions Lab (SSL) mission is to understand the disproportionate impacts of climate change on marginalized populations and work with them to develop sustainable and equitable solutions. It has expanded to an interdisciplinary partnership among five schools and four institutes within UMass Boston: the College of Liberal Arts, the College of Management, the College of Nursing and Health Sciences, the McCormack Graduate School of Policy and Global Studies, the School for the Environment, the Institute for Asian American Studies, the Institute for New England Native American Studies, the Mauricio Gaston Institute for Latino Community Development and Public Policy, and the William Monroe Trotter Institute for the Study of Black History and Culture.

The SSL conducts a quarterly Climate Adaptation Forum in partnership with the Environmental Business Council of New England and has released three major reports, many featured in the *Boston Globe*, around financing climate resilience, the feasibility of a harbor barrier in coming decades as part of larger resilience efforts, and the need for upgraded governance structures.

By the fall of 2020, the SSL plans to release a report on how Greater Boston residents view and experience climate change.

Project GBRAG and the MAPC Climate Change Analysis: The Metropolitan Area Planning Council (MAPC) is the regional planning agency serving the people who live and work in the 101 cities and towns of Metropolitan Boston. The MAPC is working with UMass Boston's School for the Environment and the Urban Harbors Institute on a project called the Greater Boston Research Advisory Group (GBRAG) which will build upon the 2016 Boston Research Advisory Group report, a high level group led by the then UMass Boston Dean for School for the Environment Robyn Hannigan, which presented the first scientific consensus on climate change specifically related to the City of Boston.. Funded by the Barr Foundation, the GBRAG project will update and expand the analysis to investigate climate changes and threats to the entire MAPC region within the greater Boston area and produce special reports relevant to the region over the period of October 2018 through December 2021.

ACADEMICS, STUDENTS & COMMUNITY ENGAGEMENT

In summer 2019, UMass Boston graduate students in the **School for the Environment (SFE)** and the **McCormack School of Policy Studies** partnered with **The Trust for Public Land Massachusetts** and the **West of Washington Coalition** to design and build a Butterfly Garden in a vacant lot on Norwell Street, near Codman Square in Dorchester while the popular **Green Planet Living Learning Community** initiative developed primarily for residential student engagement - set upon **turning a Boston beach cleanup into art** at the UMass Boston Harbor walk joined in by other Boston area groups.



Photo: UMass Boston, 2019



Photo: UMB Student Maria Rodriguez

Student Maria Vasco's switched from a political science major to environmental studies and sustainability at UMass Boston becoming the **first-ever recipient of UMass Boston's mentored Entrepreneur Scholarship** by the UMass Boston Venture Development Center. She looks forward to launching her own **zero-waste business** and inspire people to become more conscious as consumers – working title – “Eco-Vida”. SFE faculty member Juanita Urban-Rich team of researchers was the first to show that some corals are eating tiny bits of plastic debris found in the ocean. The team found high concentration of **plastics in corals living in Narragansett Bay** and that **corals often prefer microplastics** over natural food, even as the plastic potentially carries harmful bacteria that can kill them. SFE

faculty member Ellen Douglas' students' Estanislau Ribeiro, Laxmi Spearing, and Molly Brady created a capstone class video on **harmful effects of microplastics in the ecosystem due to plastic straws** and alternatives, which was then presented to Boston restaurant and catering company clients.

College of Management faculty Vesela Veleva and David Levy co-founders of the Center for Sustainable Enterprise and Regional Competitiveness - organized workshops on **Business Opportunities in Sustainable Lifestyles in Greater Boston**; case studies on the role of business in advancing the circular economy; **“Entrepreneurs in Sustainable Consumption: The Furniture Trust Case”** and **“AEC Computer: Adopting a Circular Business Model for Used Electronics”** and a first ever benchmarking study of **Green Chemistry adoption in an International Pharmaceutical Supply Chain** published in Green Chemistry Letters and Reviews.

The 2019, the **Biology Sustainability Symposium** organized by the Biology Dept. faculty Kamal Bawa and Robert Stevenson featured speakers such as Brandeis Univ Collen Hitchcock's **City Nature Challenge (CNC)** - an annual, international 4-day biodiversity observation competition (see the iNaturalist app and website); USDA Forest Service' Susannah Lerman's talk **“Mow Less for More Bees: Urban Sustainability Begins at Home.”** – highlighted how yard management decisions have profound implications on the fate of wildlife and urban sustainability, yet less than 5% of all yards are managed for wildlife. Harvard Univ Erica Walker's talk on **“Community Noise and Citizen Science”** where her research studies suggest that exposure to urban environmental noise has been shown to be associated with a wide range of stress and cardiovascular related responses (see Noise Score app; Noise and the City org.)

The **7th Annual Environmental Research Colloquium**, organized by the **UMB School for the Environment** and the **Alumni Office**, featured environmental research from graduate and undergraduate students and meetings with alumni and potential employers and speakers from Massachusetts. The 2019 Keynote speaker

Mark Huang, Co-Founder & Managing Director of SeaAhead discussed the potential for Boston and Massachusetts to become the innovation capital on the US Atlantic coast. Posters and oral presentations included key aquatic ecosystem management and research as well as current interest topics from Strategies to Manage Sea Level Rise in Boston Area, Environmental Journalism, Grey Seals and microplastics, Making Food Deserts a Thing of the Past and more. **Robert Chen**, interim dean of the **UMB School for the Environment** was awarded four-year, \$3 million grant from the **National Science Foundation (NSF)**. Dean Chen and his collaborators at **UMass Lowell** and the **University of Kansas** will create a climate change education model that can be replicated all over the country, and also internationally. As part of this grant, six artists will have their work featured on buses in the **Merrimack Valley, Worcester, Kansas City, and Topeka** over the course of a month.

UMass Boston Faculty Member Jack Wiggin was awarded the American Planning Association Massachusetts Chapter's 2018 Distinguished Service Award. He is professor of practice in coastal urban planning in the School for the Environment (SFE), a former director and currently a senior research fellow in the school's **Urban Harbors Institute**. He helped launch the SFE's Urban Planning and Community Development program and was recognized for his long-term efforts and leadership in advancing coastal planning and management in the state through teaching, research and technical assistance.



Sustainable Strategic Planning

This year the Dartmouth campus took its first step toward realizing components of the new Campus Master Plan by replacing the first-year residence halls. They were over 45 years old, beyond their useful life mechanically and from an energy perspective were very inefficient. The campus pursued a Public Private Partnership and selected Gray Star as the vendor to build a new, 2 wing building for first year students,



closer to the inner core of the campus. This will help to stitch together the campus community into a more-dense configuration so that as students move between residential buildings, they feel like they are still within a tight-knit community and not walking forever through open fields or parking lots. This new building will also include a larger and modern dining facility.

The Dartmouth campus also worked with Competitive Energy Systems to create a request for proposals for an energy master plan. This is an outgrowth of the master planning process and a recognition that the NORESKO project and steam

line improvements were the first steps in modernizing our energy infrastructure. As the campus moves to decarbonize and reduce both its consumption of energy and specifically its fossil fuel use, it needs a roadmap on how to get there. This plan will help identify new technologies, bring some fuel redundancies and ensure reliability within the heat, electrical and water distribution throughout campus.

Clean Energy

The Dartmouth campus participates with two solar Net Metering Agreements. This includes the 2.4 MW project by ConEdison in Dartmouth and the 6 MW project by TransAlta in Freetown. These projects save the Dartmouth campus approximately \$600,000 annually and represents 44% of our purchased electricity.

The Dartmouth campus also generates its own electricity through our 269 KW solar PV system and the 1.6MW natural gas fired combined heat and power plant. These represent 42% of our overall electric usage on campus.

Climate Resilience and Preparedness

An honors class in Sustainability conducted a semester long project to analyze the campus’ readiness for the effects of climate change. In this activity they looked at what would happen if a Category 4 hurricane were

to hit the campus. The students met with a variety of campus personnel to evaluate how prepared their functional area was in light of a Cat 4 storm. Both students and professionals were surprised to learn some of the vulnerabilities of the University, our town and region as a result of this.

The Dartmouth campus also worked with Eversource to install a 540 KW battery storage system on campus. It was installed in June for testing with a go live date of July 5th (bridging both fiscal years). The main focus of the battery is to help avoid peak demand charges for the University and to take advantage of utility rebates for helping to balance the electrical loads on the grid. This was the largest battery system installed at a public institution at the time. The battery also has the ability to assist with enhanced resiliency.

Green Building Design and Sustainable Campus Operations

The Dartmouth campus officially opened the doors on its new School for Marine Science and Technology East building in the fall of 2018. This LEED Silver project is 66,000 square feet, features new wet labs for researchers, and uses innovative HVAC techniques like chilled beams, which keep the energy use low. The building also houses the Massachusetts Division of Marine Fisheries, which allows for collaboration between researchers and policy experts, in making data-driven decisions regarding our fisheries.

The Dartmouth campus was also recognized by the Environmental Protection Agency as the College and University who showed exemplary operations regarding our recycling and waste reduction programs, notably our food waste recovery. 30 tons of pre-production food scraps are redirected to a chicken farm, 30 tons of post-production scraps are sent to a pig farm in keeping with the EPA Food Recovery Hierarchy. We also redirect another 75 tons of food for donation to area homeless shelters and the campus food bank.

Sustainable Transportation and Vehicles

The Dartmouth campus started discussions with Eversource to install an additional 10 electric vehicle charging stations. The campus currently has two chargers on the main campus and 3 at its SMAST location. The new chargers will be networked to make it easier for users to see if they are available for use.

The Dartmouth campus also ran a pilot project using a dockless bike share system. In the 11-month trial period, more than 1,400 riders used the bikes over 17,000 times. The bikes were available through the winter and were used during all seasons. While most rides took place on campus, many people also took them to local shops as well as in the 360 acres of forest located on campus. The campus is looking to partner with other towns and cities in the area to bring a larger, electric-assist bike program by the spring of 2020.



Waste Reduction & Recycling

The Dartmouth campus added 2 textile recycling bins for students and other community members to donate clothing, towels, bed linens and shoes. More than 2 tons of textiles were collected through this program that started late in the fall semester.

The Dartmouth campus had another stellar year with the New2U collection in the spring and sale in the fall. All bedding that was collected in the spring was donated to a local charity, My Brother's Keeper, who in turn donates furniture to families in need, especially women escaping domestic violence. All food collected stocked the campus food pantry. All remaining items were sold during the fall yard sale at 80% off list prices. This year we held one sale on the 1st Saturday of the year, which was received very well by the students.

Dining

The Dartmouth campus had an amazing year in sustainable dining. It included the receipt of two Kendall Foundation Grants. These are designed to study, along with several other partners, the use of new types of fish that are either abundantly caught but not well known, or are brought in as by-catch when fishing for other species; this includes dogfish, redfish and Monkfish. The other grant is to explore the use of sea kelp into our recipes and diets. As ocean farming becomes more popular, there needs to be a larger market for their product. This grant will help increase that demand by testing new recipes with a willing audience.

Another highlighted project was that of our Freight Farms, indoor, hydroponic growing trailer. The campus historically has grown lettuce, the equivalent of 1.25 acres of land within a shipping container the size of two parking spaces. It grows lettuce in 8 weeks, uses 85% less water, and is completely organic as there are no need for pesticides within the controlled environment. We have been growing ¼ of the lettuce needs of the campus for about 5 years. This year, the chef/farmer was asked to expand the growing possibilities for a special event in New York City for the Timberland Board of Directors. This included several varieties of lettuce, swiss chard and edible flowers.

The food waste diversion programs have really exploded this year with the creating of three programs. First, the Grounds to Ground programs includes collecting coffee grounds and filters and sending them along with shredded paper to one of suppliers, who uses them in their composting operations. This program alone diverted more than 7.9 tons of product away from the landfill and into reuse. We also included the donation of prepared, but not served foods into the Meals with Dignity program on campus. This helps serve 20 full meals every week to the campus food bank. It also includes the donation of food to local homeless shelters. Together, these programs represent the diversion of 75 tons of food from going to the landfill.

The chefs have going through a 2-day training on serving vegan options throughout our dining operations. In the main cafeteria, that means supporting a daily Rooted offering for vegans at every meal and at two of our lunch locations, there are always vegan options as well.

We have also increased the amount of local sourcing of ingredients. This includes easy thing like bagels from a local shop, served daily in the main cafeteria. It also includes an average of 100 pounds of seafood a week, the 3rd most popular source of protein on our menu. We have been working with our local food distribution company, Sid Wainer and Sons, to source as many items, like fresh eggs, fruits and vegetables,

from within 100 miles of campus. The Dartmouth campus is fortunate to be surrounded by farms and orchards, the closest of which is less than one mile from our front door.

We have also increased the amount of paper products that have 100% recyclable content. This includes our napkins for guests as well as the paper towels used by the kitchen staff. 75% of our paper purchases now include 100% recycled content! We also direct guests within the main cafeteria to compost their napkins as well, making sure that they are again being recirculated and avoiding the landfill.

Lastly, the campus has invested in new, reusable clamshell containers for our students, faculty and staff. Instead of using the ones that are thrown away, guests put down a \$5 deposit on a reusable container. They are able to use it, rinse it out and return it during their next visit. The dining staff then runs it through the dish room and the guest can either get a token for another use or immediately take another clamshell for a take away dining experience.

Water

The Dartmouth campus continues to use the 27 water bottle filling stations, as overall usage topped 2 million bottles filled. This is a significant number of plastic bottles that did not need to be manufactured, and we know that only 20% get recycled, so we are saving space in our landfill as a result.

Academics and Research

The Dartmouth campus presented the first-year findings in a three-year study of 5, low-mow (annual rather than 27x/year) areas on campus. The spaces are being studied by Biology students in several different classes for soil moisture, plant species diversity and insect diversity. The initial results prompted the Facilities team to allow the spaces to increase in size for the next growing season.



UMass Lowell continues to make remarkable strides in sustainability. FY 19 was a year of impressive accomplishments for UMass Lowell with system leading initiatives in operations, teaching and research. Across all three areas, UMass Lowell prioritizes community and industry partnerships resulting in a distinctive and authentic approach to sustainability based on our unique urban setting.

The campus submitted its third AASHE STARS report this year resulting in a STARS Gold rating with a score of 77.56, placing UMass Lowell as the number one ranked campus in the State of Massachusetts.

UMass Lowell’s reputation for excellence in sustainability has resulted in increased alumni engagement and philanthropic support. This past year, alumnus Brian Rist pledged \$1 million to establish the Rist Institute for Sustainability and Energy (RISE) which will enhance UMass Lowell’s reputation for excellence in sustainability on the local, national, and international stage.

UMass Lowell is currently engaged in significant efforts in sustainability, which fall under multiple centers and offices, including the Energy Institute, the Climate Change Initiative, the National Science Foundation Industry-University Cooperative Research Center in Wind Energy, and the Office of Sustainability. The Rist Institute for Sustainability and Energy allows us to bring these entities under one umbrella to foster integrated knowledge and action and serve as the catalyst to increase prominence and expand the impact of our total efforts in sustainability.



UML: Alumnus Brian Rist with Senior Vice-Chancellor Joanne Yestramski at the announcement of the Rist Institute for Sustainability and Energy at UMass Lowell.

In addition, Chancellor Moloney led an effort with Lowell philanthropist Nancy Donahue to fund two sustainability fellowships in the Donahue Center for Business Ethics and Social Responsibility. The fellows will work with the Office of Sustainability, and within the wider Lowell community, to identify areas of strategic importance for sustainability in Lowell. Opportunities exist to have UMass Lowell work directly with partner organizations to successfully apply for, and execute, research, teaching, and operational grants.

Outlined below are a few of the exemplary practices that UMass Lowell prioritized in FY19 in order to continue to evaluate, engage, and enhance our reputation for excellence in sustainability.

Clean Energy

UMass Lowell completed its \$23.1 million Accelerated Energy Program (AEP) in April of this year. Through the AEP - the largest such program completed in the Commonwealth to date - UMass Lowell has implemented more than 100 energy-saving measures in 30 buildings across campus resulting in significant financial, operational, and environmental savings for the campus. More than 6,000 pieces of mechanical equipment and lighting were updated or replaced, including the installation of a new solar hot water system at the UMass Lowell Inn & Conference Center, new LED lighting at the Tsongas Center and Costello Athletic Center, and low-flow plumbing fixtures in residence halls.

As a result of these improvements, the university expects to see \$1.2 million in annual energy savings. The upgrades will save 1.7 million gallons of water and reduce carbon dioxide emissions by 9 million pounds each year. The AEP also eliminates \$10 million in deferred maintenance across campus.



DCAMM Commissioner Carol Gladstone, left, Chancellor Jacquie Moloney, center, and Senior Vice Chancellor Joanne Yestramski unveil the university's new AEP and STARS Gold plaques at the Earth Day ceremony.

In April of this year, UMass Lowell announced a three-year partnership with Greentown Labs in Somerville, the largest cleantech startup incubator in the United States. The partnership uncovers and creates opportunities for collaboration among the Greentown Labs startup community and UMass Lowell’s community of students, faculty and researchers. With a focus on academic and research projects, entrepreneurial ventures, and economic development activities, this partnership will allow the university to define a new green and clean tech incubator model for the Commonwealth of Massachusetts.

Green Building Design and Sustainable Operations

UMass Lowell continues to take an entrepreneurial approach to the stewardship of its human, physical and financial resources in support of the sustainability goals outlined in the university’s 2020 Strategic Plan.

This past year, UMass Lowell’s Office of Sustainability has received continued grant funding to further the development of sustainable initiatives campus-wide including \$100,000 to enhance our electric vehicle infrastructure, \$45,000 to continue to grow the university’s Urban Agriculture Program, and \$20,000 to enhance recycling efforts. Since its inception in 2015, the Office of Sustainability has successfully pursued external grant funding in order to further UMass Lowell’s sustainability efforts.

Sustainable Grounds Management

The physical greening of UMass Lowell’s campus has been an important focus this past fiscal year. The Facilities Grounds Department in partnership with the Office of Sustainability has worked on multiple fronts to make campus grounds keeping more sustainable and efficient. Sustainable techniques including increasing the use of organic fertilizers on lawns, installation of low maintenance pollinator habitats, and a strategic approach to the electrification of grounds equipment were all adopted this year. These efforts have helped to make UMass Lowell one of the highest rated campuses for sustainability in the country. With a focus on cost efficiencies and high visibility initiatives, UMass Lowell is leading innovative and engaging approaches to enhancing sustainability on our campus.



South Campus Pollinator Habitat & Goat “Mowing”

One particular highlight this year, was the herd of 120 sheep utilized to “mow” hard-to-manage areas on campus. This herd of sheep feasted round-the-clock (inside temporary fencing) to do the job in less time than

traditional grounds contractors – and at half the cost. The university received significant local and national media coverage for this initiative as well as a huge peak in interest on the campus and on social media.

Green Sports Alliance

UMass Lowell is the first institution within the America East Conference to join the Green Sports Alliance. As a premier member of the Green Sports Alliance, UMass Lowell has access to a network of professional and collegiate teams, leagues, and corporate members, to further enhance athletic sustainability initiatives. This innovative partnership will allow the university to build upon already significant achievements on the athletic front. Tsongas Center has received a number of notable sustainability upgrades including the first Grind2Energy food waste system in the Northeast.

Innovative approaches to waste management on campus, resulted in UMass Lowell being ranked fifth among the more than 650 higher education institutions around the world highlighted in AASHE’s 2019 Sustainable Campus Index.

Sustainable Dining

The University has developed an innovative and high-impact Urban Agriculture Program in partnership with Mill City Grows (MCG), a Lowell based food justice organization. This community partnership is unique in that it provides a hands-on learning environment for the university and the community to come together to address food production and nutritional issues prevalent in Lowell and many similar gateway cities across the Commonwealth, New England, and the country.

Development of this program has been supported by over \$400,000 in grant funding from state and foundational partners. Currently consisting of three sites on campus, the program contributes to the physical greening of our urban campus, while offering opportunities for teaching and cross disciplinary research.



UMass Lowell students and Mill City Grows staff install the Green Roof at University Crossing.

This past year, the partnership installed a 500-square-foot Green Roof focused on demonstrating the challenges and opportunities that are intrinsic to urban agriculture. Located on the second floor landing of University Crossing, one of the busiest places on campus, the space meets stringent structural and energy efficiency requirements, while maintaining impressive organic production which is utilized in UMass Lowell's Farm Share Program and Farmers' Markets. Our Urban Agriculture program donates 20% of all produce grown back to the local community in Lowell, additionally fresh food donations are provided to the UMass Lowell student food pantry.

Research Teaching and Engagement

UMass Lowell's AASHE STARS Gold rating was made possible due in large part to the university's extensive integration of sustainability and climate change literacy in curriculum and research. UMass Lowell offers over 200 courses featuring sustainable initiatives. Approximately 27% of faculty are engaged in sustainability research and 55% of research-producing departments are engaged in sustainability research. The university also embodies using the campus as a living laboratory by supporting student projects that assesses building energy efficiency and campus greenhouse gas emission reduction efforts.



The University of Massachusetts Medical School (UMMS) prioritizes energy efficiency and sustainability in its mission to advance the health and well-being of people through pioneering education, research and health care delivery with its partner UMass Memorial Healthcare (UMMHC). This effort is broad-based, with participation from students, faculty and staff. UMMS continues to partner with UMMHC on campus, sharing its committees, coordinating events and education of its staff.

Sustainability Strategic Planning

In FY19 UMass Medical School undertook significant master planning exercises including an update to the Campus Master Plan as well as completing a Power Plant & Utility Distribution Master Plan. Both plans incorporate significant elements of sustainability and resiliency, including potential for district scale water reclamation and battery storage.

Additionally, to complement the Campus and Power Plant master plans, UMass Medical school has contracted with GreenerU to complete a comprehensive Sustainability & Climate Action Plan to drive strategic direction in sustainability and carbon mitigation planning. This Action Plan is expected to be released in FY20.

Clean Energy

Solar Net Metering

UMMS is participating in three solar net metering contracts. These projects include a 2.5M-DC array in Palmer, MA, a 6MW-DC array in Warren, MA and a 2.1MW-DC project in Williamsburg, MA. The net metering contracts achieve significant cumulative cost savings of \$3.9M. While the environmental attributes of this power were not retained by the Medical School, these projects serve as an example of investment in renewable energy by the University.

Central Plant Efficiency

UMASS Medical School operates a 17.5 MW natural gas fired combined heat and power plant which supplies the campus with all of the steam and chilled water needs and roughly 80% of the electricity needs. The Central Plant includes state of the art burners and combined with the HRSG, the high-pressure steam generation system is among the most fuel efficient, cleanest and lowest GHG/unit of energy in the Commonwealth when burning natural gas. UMass Medical School continues to optimization of the central plant through the use of sophisticated modeling software Ictec and is currently working to include GHG emissions in the thermal and economic modeling on the Central Plant.

Climate Resilience and Preparedness

Battery storage feasibility study

In FY19 UMass Medical School received a DOER feasibility study grant to look the potential for energy storage at the central plant. The feasibility study included a comprehensive economic analysis of the energy storage system in conjunction with the CHP to calculate the cost reduction and simple payback from peak demand decrease, energy arbitrage and other operation efficiency optimization. A key component of this study was the evaluation of enhanced resiliency through operational improvements associated with energy storage.

Green Building Design and Sustainable Campus Operations

Completion of DCAMM AEP

Following several years of effort, UMass Medical School completed several energy conservation measures identified through DCAMM’s accelerated energy program ASRHAE level II energy audits of campus buildings. These initiatives, primarily focused on the Lazare Research Building include extensive retro-commissioning activities and valve repairs. Also included in this project are the installation of VFDs and ventilation controls for the library and loading dock of the main school building. Energy savings from this project are expected to reduce operations cost by over \$600,000 annually.

Clinical Wing HVAC Upgrade

Additionally, UMMS started an extensive HVAC infrastructure project in the Main School Building clinical wing. This project would include retrofitting floors 2-7 of the clinical wing with a hybrid chilled beam and VAV system. This project would save annually over 2,000,000 kWh of electricity and roughly 200,000 therms for an annual operational savings of \$500,000.

Sustainable Transportation

Increase EV charging infrastructure

UMMS continues to expand EV infrastructure on campus. In FY19, UMass Medical School installed 4 dual head chargers in the Plantation Street Garage, a project which was fully funded through utility incentives. These additional chargers complemented the existing 5 level II chargers and six level I “trickle” charge outlets available in the West Garage.

Waste Reduction and Recycling

Partners for World Health

In FY19 the Sustainability Office in collaboration with UMass Memorial Medical Center, the University’s affiliated Hospital, partnered up with a non-profit organization called Partners for World Health, based in Portland, Maine, to reclaim unused medical supplies and distribute them to people in need both domestically and around the world. To date over 6 tons of medical supplies have been donated by the medical center to Partners for World Health for use on medical mission trips.

Sustainable Food Services

Student Garden

In July of 2019, UMass Medical School students planted the first student/community garden on campus. The garden was developed in partnership with the Worcester Regional Environmental Council and spearheaded by three School of Medicine students as their capstone project enabling them to continue expanding the garden and developing related educational initiatives throughout their time at UMMS. While this year’s crops went to the student community, the long term vision for the garden is to integrate with the Medical School and UMass Memorial food services on campus. [Learn More](#)



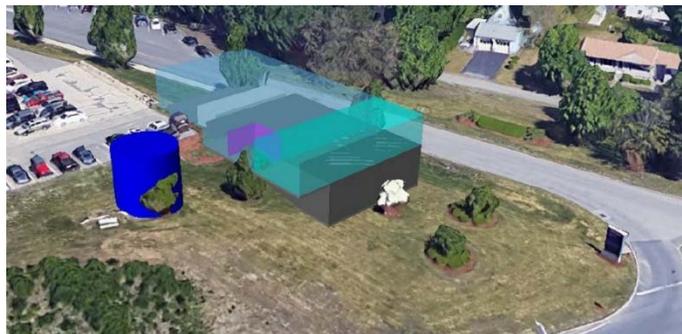
back

Sustainable Dining - NexDine

UMass Medical School selected a food service partner, NexDine, after an extensive RFP process which including significant sustainable dining elements. NexDine has formed a partnership with the Worcester Regional FoodHUB, which helps develop and grow food local businesses and connects farmers to markets in Central Massachusetts. Through this partnership NexDine features certain local items provided by the FoodHUB and include information on the local farmer through the “Meet the Farmer” program. Additionally, NexDine is working with UMMS to achieve Green Restaurant Association certification for the Albert Sherman Center Café in FY20.

Sustainable Water Systems

UMass Medical School continues to explore opportunities for water reclamation and reuse on campus. In FY19 UMMS completed a feasibility study to determine the overall practicality and economic viability of district-scale water reclamation and reuse on campus as well as assess alternative water supply options, inclusive of rainwater / storm water capture and reuse, groundwater (well) supply, building sump reclamation, and surface water use among others. This study will additionally evaluate existing water management practices and develop strategies to: minimize water supply risk for critical heating, cooling, fire suppression and other campus operations; improve the University’s environmental footprint through reuse and reduced wastewater discharge; and, Reduce long-term water



Proposed siting of water reclamation facility

and sewer utility costs. Proposed facility could treat up to 500,000 gallons of water per day, could drop campus potable water consumption by 50%.

Academic and Research Programming and Community Engagement

Best Practices Highlights

Through the Diversity & Inclusion Office the Sustainability Office was able to get two interns this summer to help with sustainability programs on campus. One student was through the Emerging Professionals Summer Internship Program (EPSIP), which is a ten-week paid internship experience for talented underrepresented minority college students, and the other student was through the Building Brighter Futures with Youth (BBFWY) program, which is broad-based strategic initiative to help youth in the Worcester Public Schools transition successfully to adulthood, earn extra spending money and gain real-world exposure to career options. Both EPSIP and BBFWY internships in the Sustainability Office exposed underrepresented students to sustainability, which is critically important as the Association for the Advancement of Sustainability in Higher Education staffing survey still shows 88% percent of those in sustainability positions identified as identified as “White/Caucasian”.

APPENDIX:
BOARD OF TRUSTEES REPORT PRESENTATION
UNIVERSITY SUSTAINABILITY POLICY

FY19 Sustainability Report

Administration & Finance Committee

April 1, 2020



University of Massachusetts

Amherst • Boston • Dartmouth • Lowell • Medical School • UMassOnline

Sustainability Policy Reporting

- ❑ Third year of reporting under the Board adopted Sustainability Policy
- ❑ Established key metrics for annual reporting and continuing to refine the methodologies utilized and appropriate data sources
- ❑ Efficiencies in reporting requirements- consistent metrics with Commonwealth reporting requirements has streamlined and eased the campuses reporting through the Leading By Example program
- ❑ Improvements to our metric reporting and time spent refining these methodology has a direct effect on our reputation as a University. Numerous organizations such as the Sierra Club, Princeton Review, and AASHE's STARS reporting rely on these metrics to determine their annual rankings on sustainability.

Sustainability Metrics

Sustainability Strategic Planning

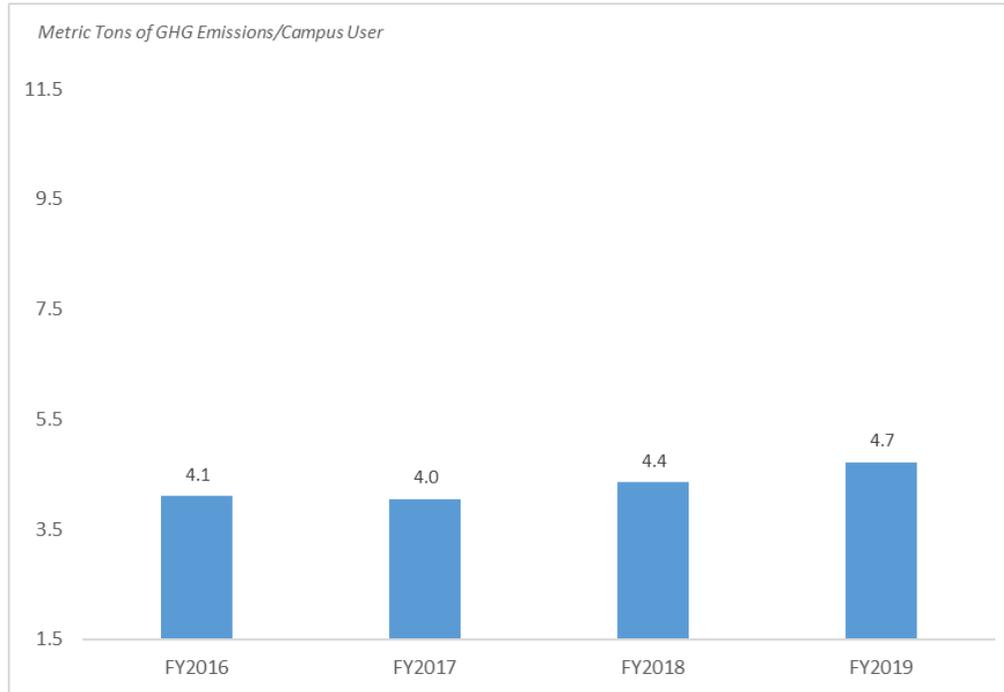
Best Practices Achieved

- ❑ Sustainability elements integrated across the campuses into the Strategic and Capital Planning processes
- ❑ Climate Action Plans are current and up to date at Lowell, and the Medical School
- ❑ Medical School completed an Energy/Utility Master Planning effort; campuses in stages of analysis

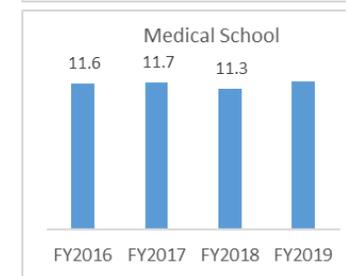
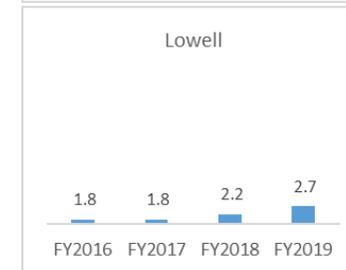
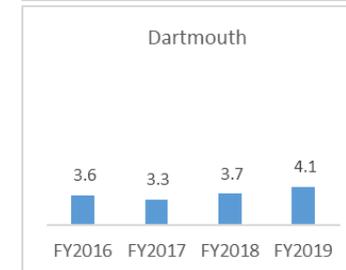
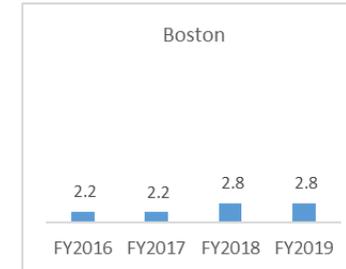
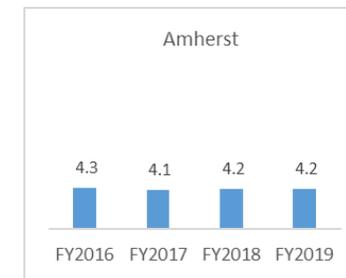
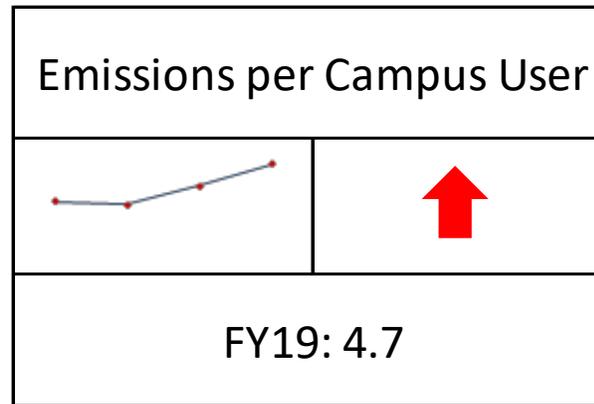
Planning Ahead

- ❑ Amherst, Boston, and Dartmouth Climate Action Plans are in need of updating
 - ❑ Amherst is developing a Carbon Mitigation Plan
- ❑ Sustainability Master Planning efforts are an identified best practice with campuses in various stages of development
- ❑ Coordinating campuses around aligning regular reporting through the STARS program on sustainability metrics

Greenhouse Gas Emissions – Emissions Per Campus User



Metric Tons of GHG Emissions/Campus User	FY2016	FY2017	FY2018	FY2019
Amherst	4.3	4.1	4.2	4.2
Boston	2.2	2.2	2.8	2.8
Dartmouth	3.6	3.3	3.7	4.1
Lowell	1.8	1.8	2.2	2.7
Medical School	11.6	11.7	11.3	13.4
University	4.1	4.0	4.4	4.7



Climate Resilience and Preparedness

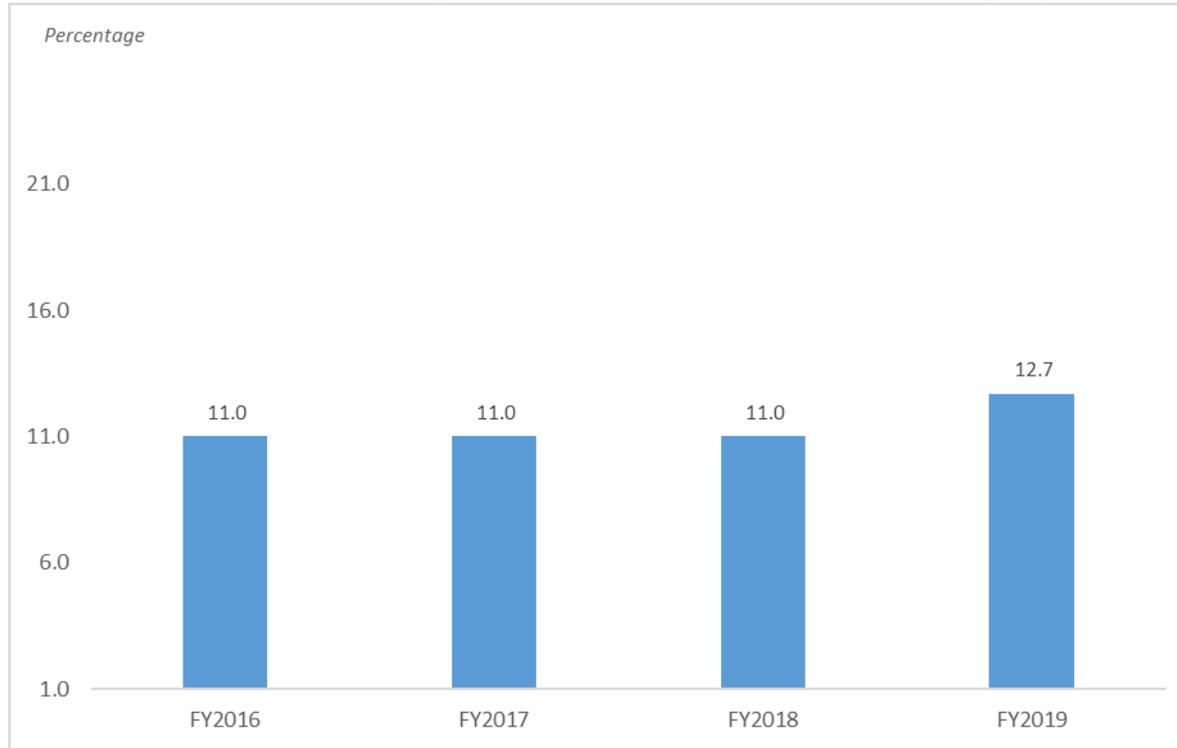
Best Practices Achieved

- ❑ All campuses have aspects of climate resilience and preparedness included in key campus planning documents.
- ❑ Through the Hazard Mitigation Planning efforts, climate resiliency for our campuses has been addressed on a consistent basis

Planning Ahead

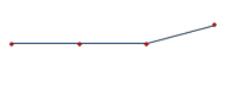
- ❑ Developing climate resilience and preparedness in the future after guidance from Executive Order 569 is issued
 - ❑ EO 569 establishes an Integrated Climate Change Strategy for the Commonwealth
 - ❑ Specifically maps out climate resilience planning as a key element

Building Operations – Percentage of LEED Certified Building Space Square Footage

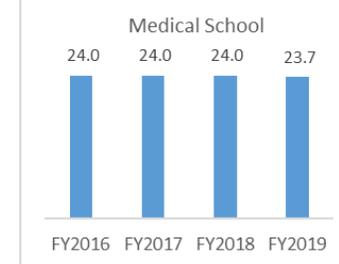
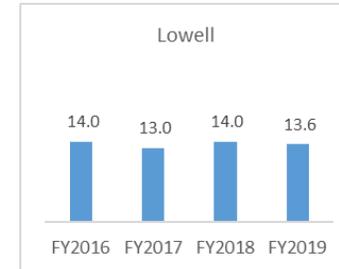
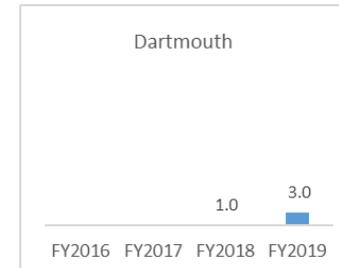
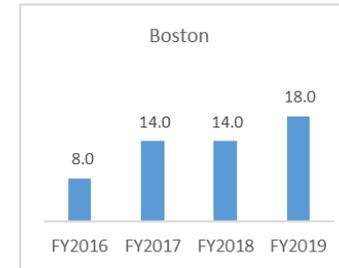
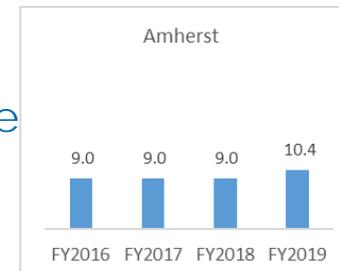


%	FY2016	FY2017	FY2018	FY2019
Amherst	9.0	9.0	9.0	10.4
Boston	8.0	14.0	14.0	18.0
Dartmouth	0.0	0.0	1.0	3.0
Lowell	14.0	13.0	14.0	13.6
Medical School	24.0	24.0	24.0	23.7
University	11.0	11.0	11.0	12.7

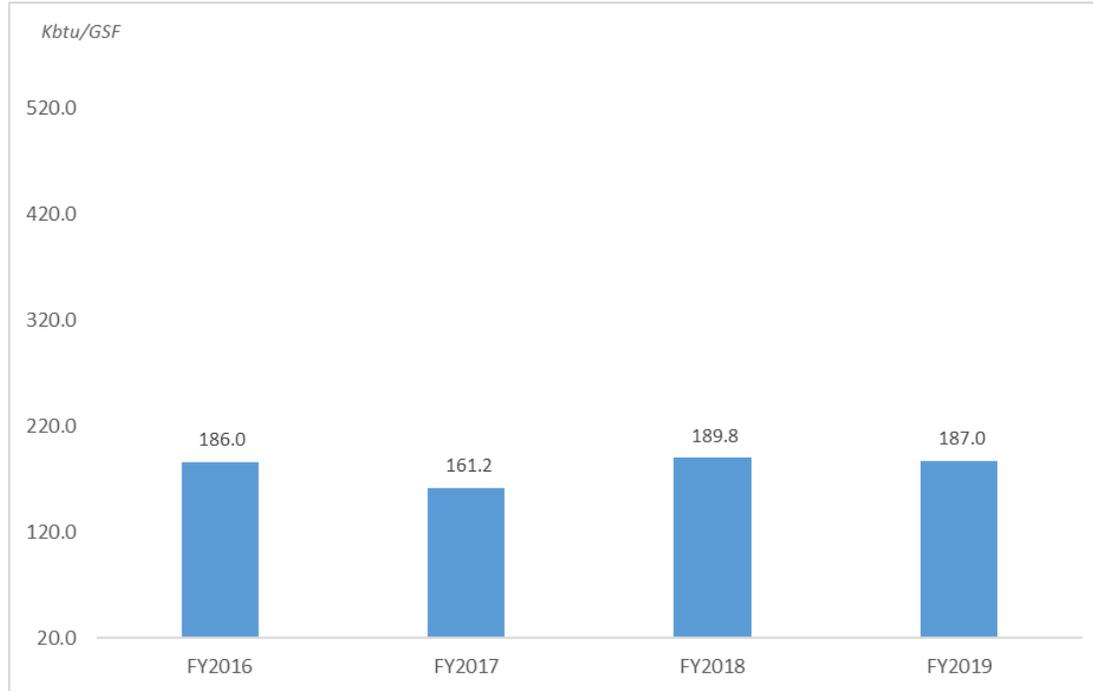
LEED Certified Building Space



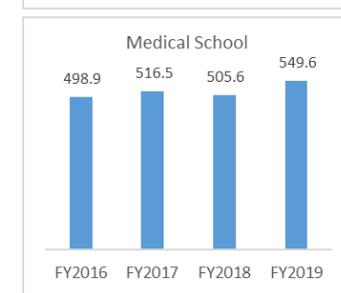
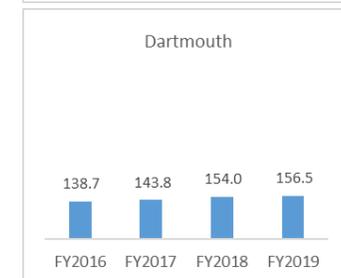
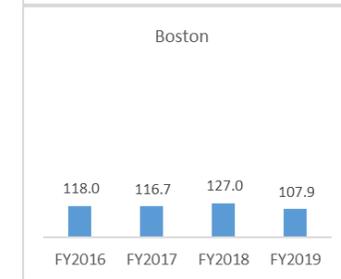
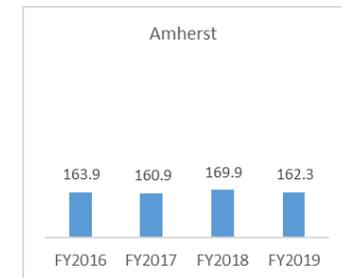
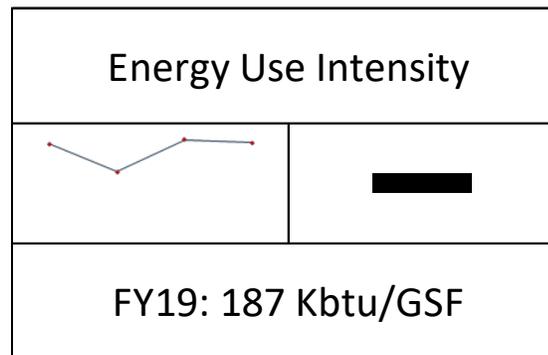

FY19: 12.7%



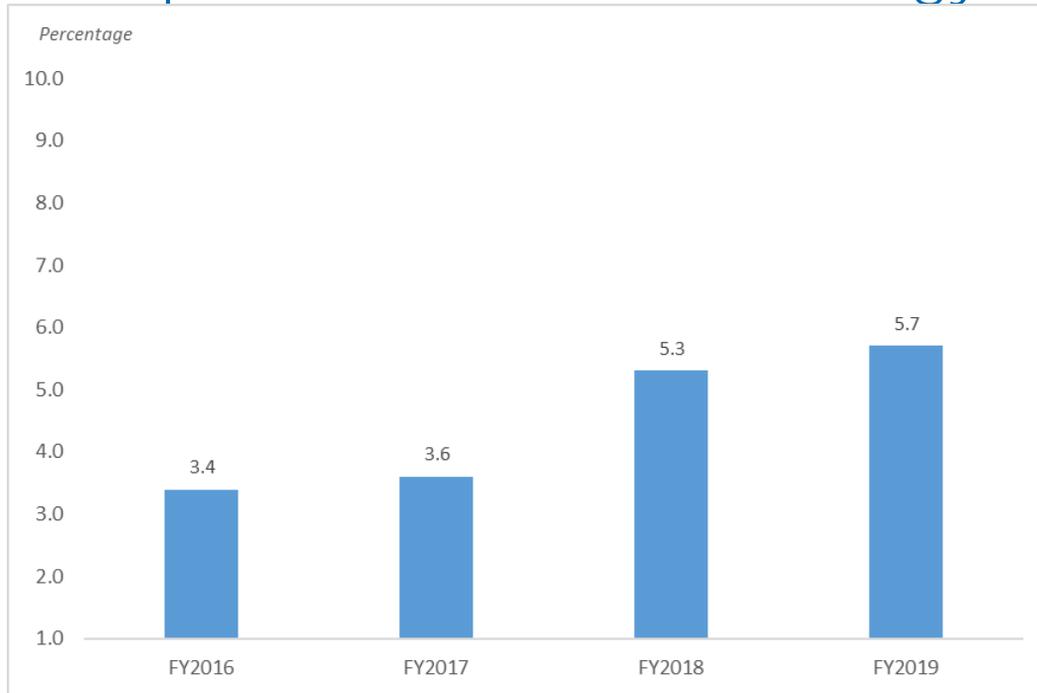
Energy Consumption - Energy Use Intensity



Kbtu/GSF	FY2016	FY2017	FY2018	FY2019
Amherst	163.9	160.9	169.9	162.3
Boston	118.0	116.7	127.0	107.9
Dartmouth	138.7	143.8	154.0	156.5
Lowell	93.8	95.4	93.2	92.9
Medical School	498.9	516.5	505.6	549.6
University	186.0	161.2	189.8	187.0



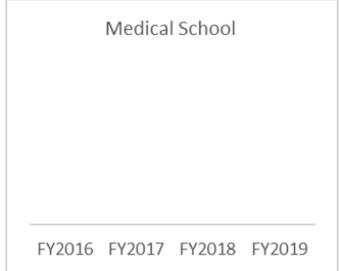
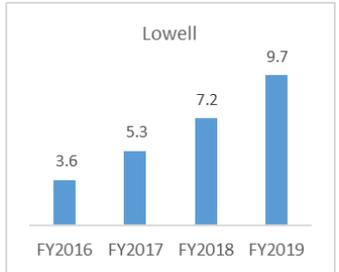
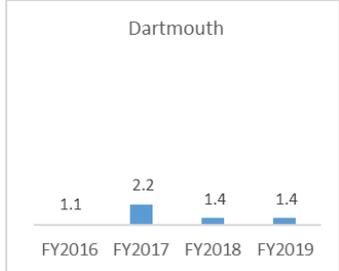
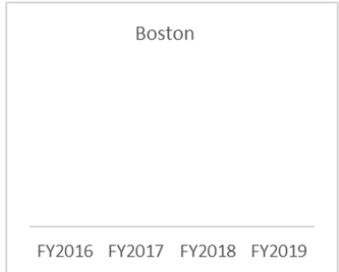
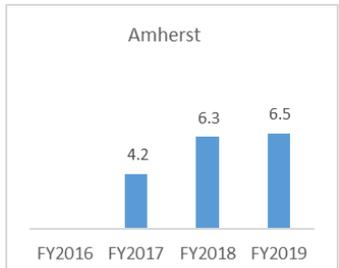
Sustainable Transportation – Alternative Energy Fleet Vehicles



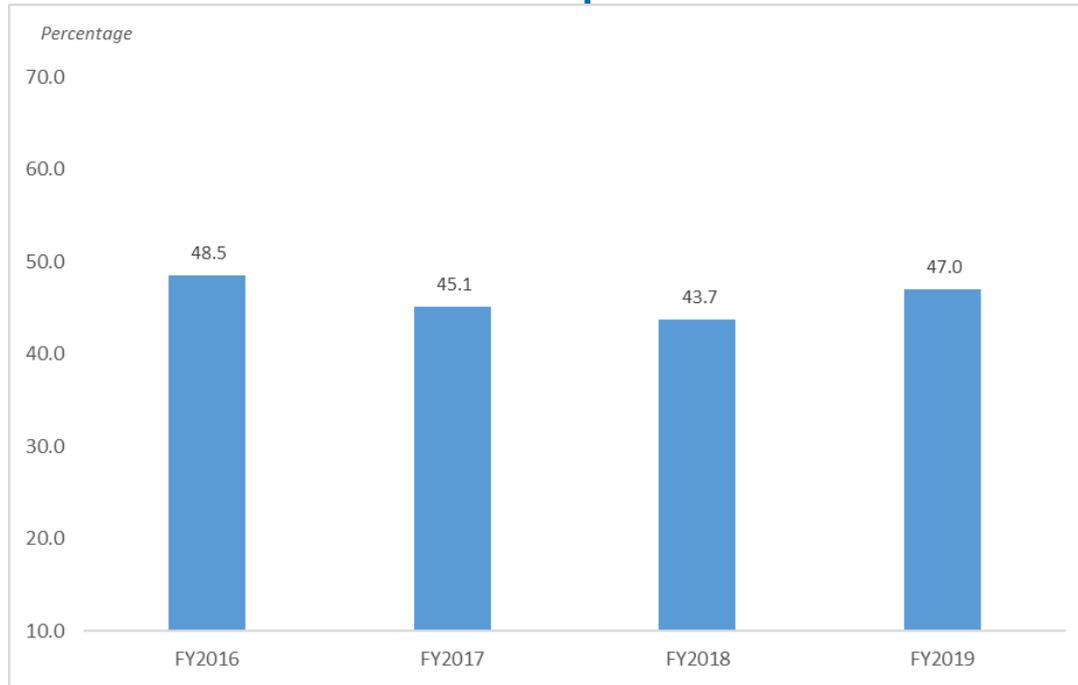
%	FY2016	FY2017	FY2018	FY2019
Amherst	NA	4.2	6.3	6.5
Boston (1)	0.0	0.0	0.0	0.0
Dartmouth	1.1	2.2	1.4	1.4
Lowell	3.6	5.3	7.2	9.7
Medical School	0.0	0.0	0.0	0.0
University	3.4	3.6	5.3	5.7

Alternative Fleet Vehicles

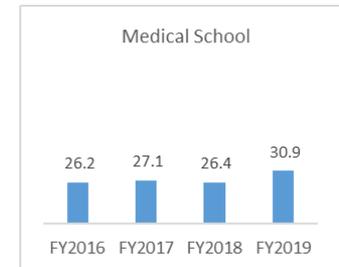
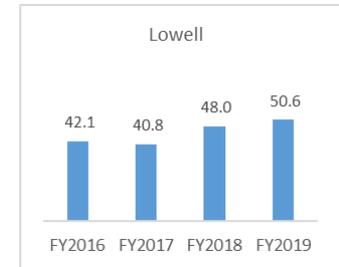
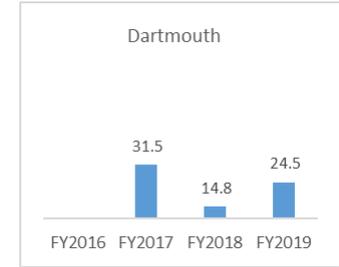
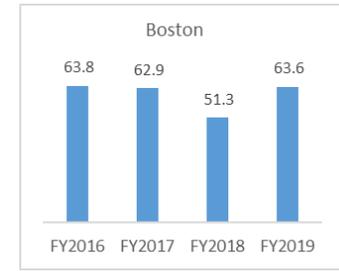
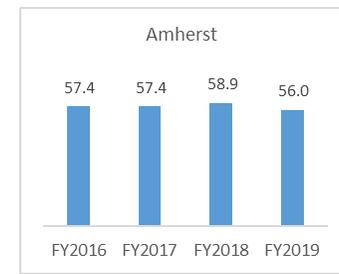
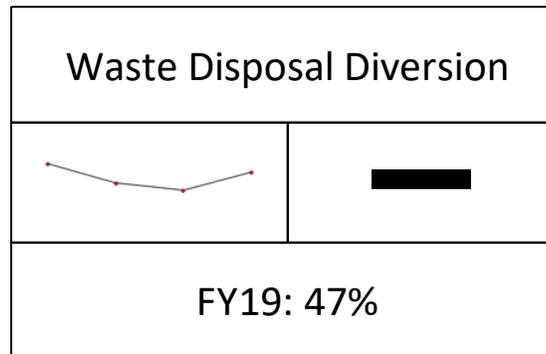
FY19: 5.7%



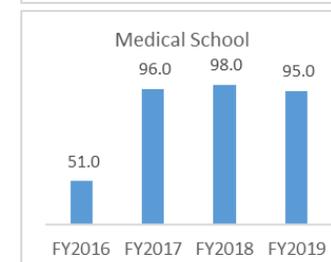
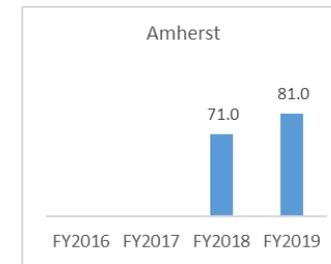
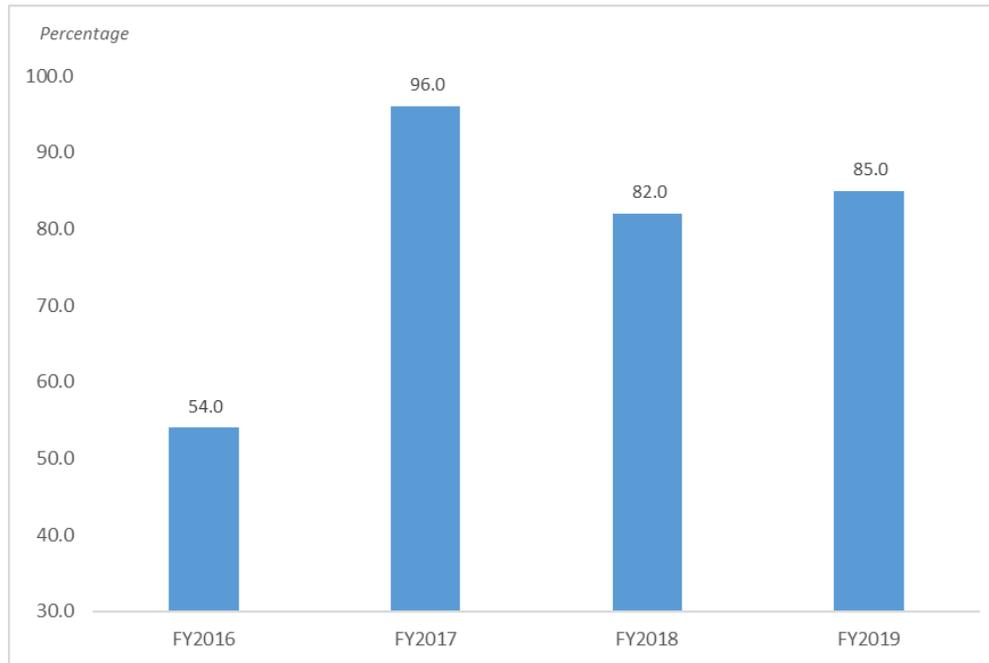
Waste Reduction – Disposal Diversion



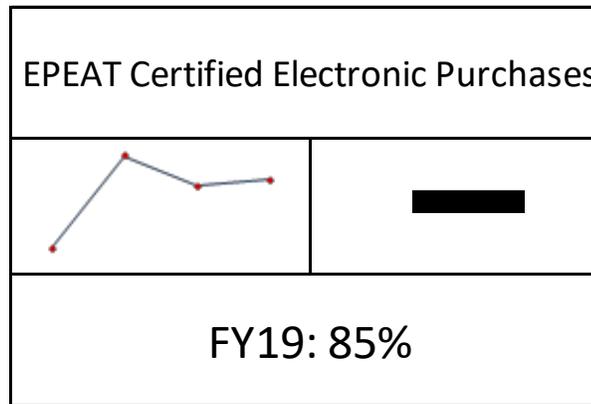
%	FY2016	FY2017	FY2018	FY2019
Amherst	57.4	57.4	58.9	56.0
Boston	63.8	62.9	51.3	63.6
Dartmouth	NA	31.5	14.8	24.5
Lowell	42.1	40.8	48.0	50.6
Medical School	26.2	27.1	26.4	30.9
University	48.5	45.1	43.7	47.0



Environmental Procurement - EPEAT Electronics Procured

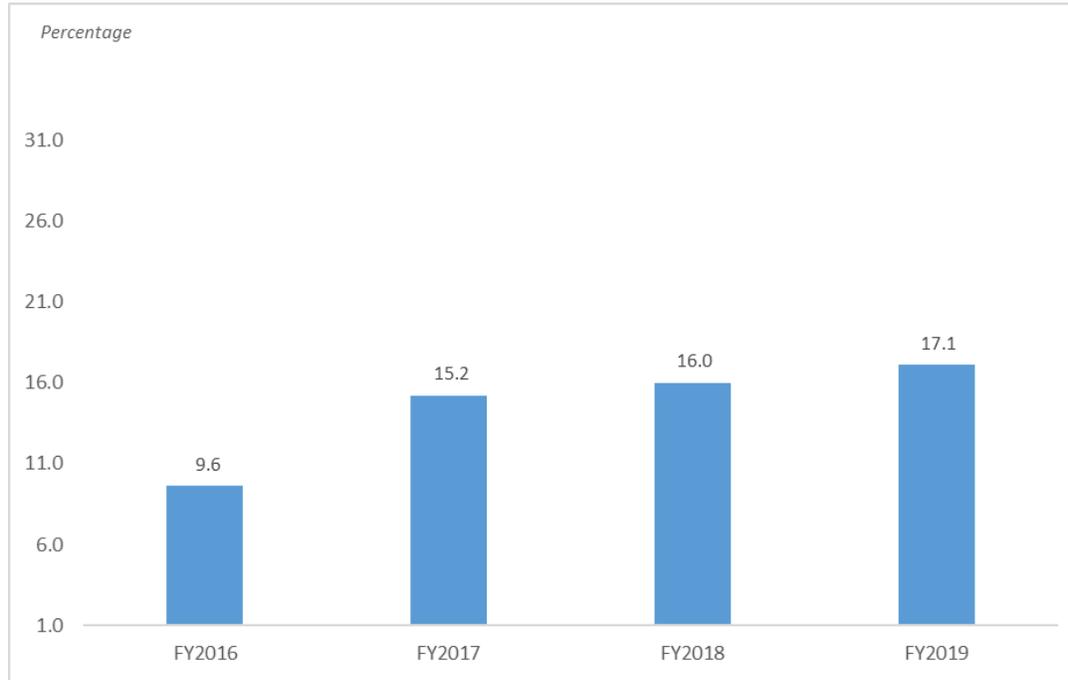


%	FY2016	FY2017	FY2018	FY2019
Amherst	NA	NA	71.0	81.0
Boston (1)	NA	NA	100.0	100.0
Dartmouth	NA	NA	NA	NA
Lowell	37.0	94.0	84.0	85.0
Medical School	51.0	96.0	98.0	95.0
University	54.0	96.0	82.0	85.0



(1) UMB figure for FY18/FY19 reflect a portion of electronic procurements through a Replace program, which is a majority of campus computer purchases; campus is refining available data to show complete procurement data

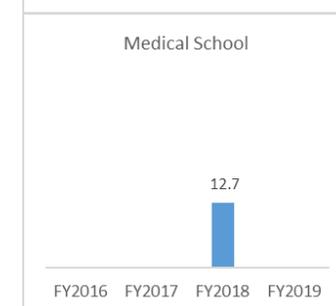
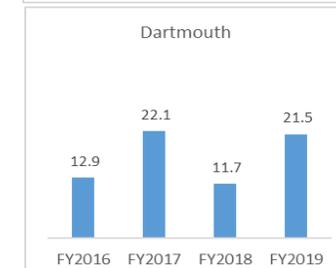
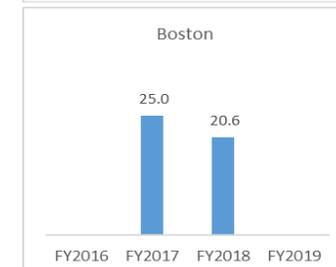
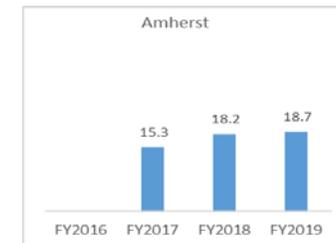
Sustainable Food Services – Locally Sourced Food



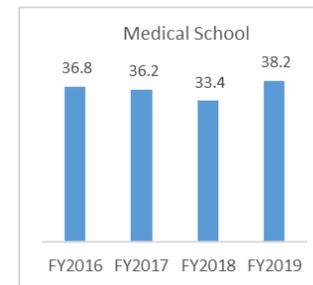
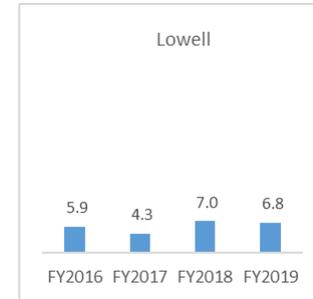
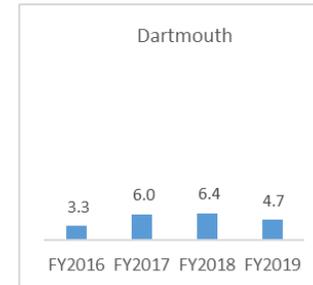
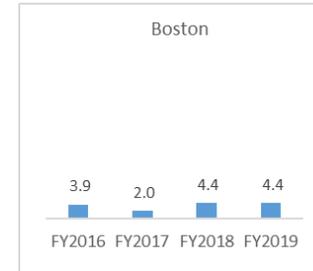
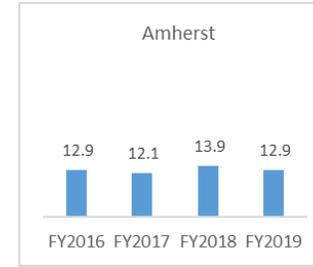
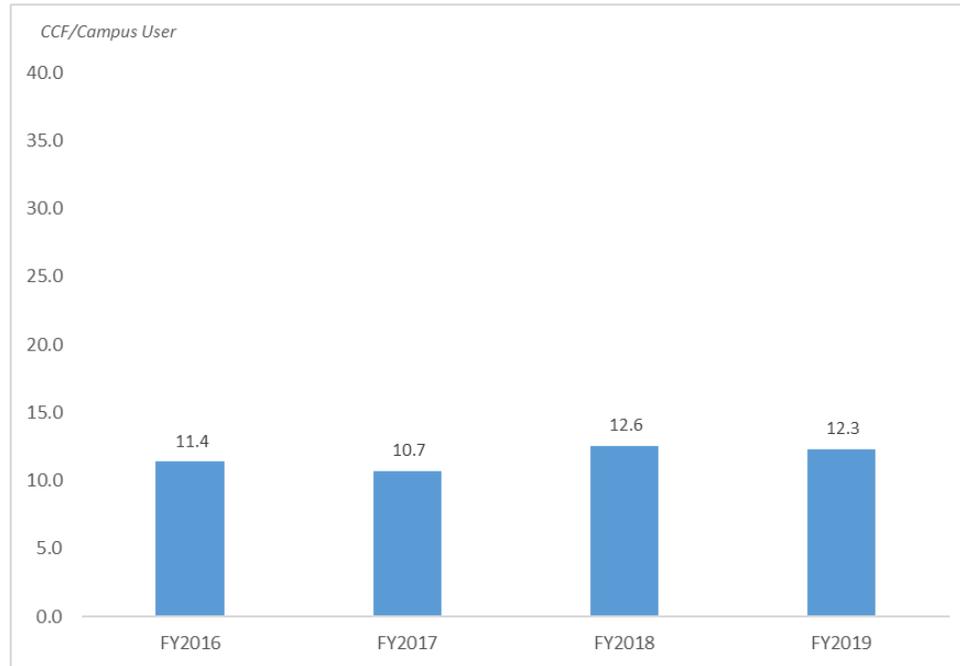
%	FY2016	FY2017	FY2018	FY2019
Amherst	NA	15.3	18.2	18.7
Boston	NA	25.0	20.6	NA
Dartmouth	12.9	22.1	11.7	21.5
Lowell	NA	NA	6.3	6.7
Medical School	NA	NA	12.7	NA
University	9.6	15.2	16.0	17.1

Certified Local Food Supply

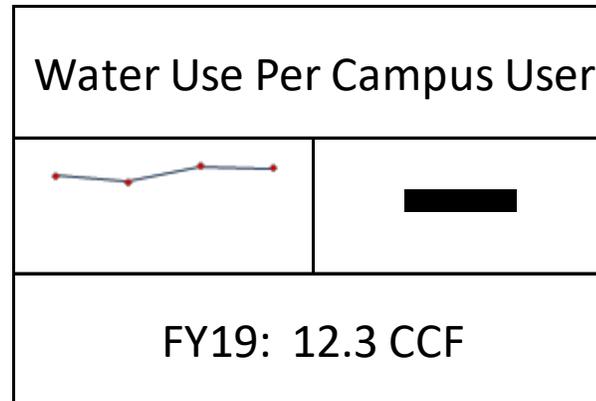
FY19: 17.1%



Water Systems – Water Consumption Per Campus User



Hundreds of Cubic Feet (CCF)/Campus User	FY2016	FY2017	FY2018	FY2019
Amherst	12.9	12.1	13.9	12.9
Boston	3.9	2.0	4.4	4.4
Dartmouth	3.3	6.0	6.4	4.7
Lowell	5.9	4.3	7.0	6.8
Medical School	36.8	36.2	33.4	38.2
University	11.4	10.7	12.6	12.3



Sustainability Community Engagement

Best Practices Achieved

- ❑ UMass campuses actively partner with other state agencies through the Leading by Example program to advance sustainability efforts and partner on best practices.
- ❑ UMass partners with national organizations such as Second Nature, Association for the Advancement of Sustainability in Higher Education (AASHE), and the U.S. Green Building Council, among numerous others

Planning Ahead

- ❑ Annually coordinates and programs around Earth Day celebration to spread awareness about sustainability efforts
- ❑ Partner with local advocacy organizations to collaborate on issues that range from transportation needs to costal environment protection.

UNIVERSITY OF MASSACHUSETTS
SUSTAINABILITY POLICY

PURPOSE

The Sustainability Policy exemplifies the long-term commitment of the five campuses of UMass to be good stewards of fiscal and environmental resources. Our environmental responsibility is rooted in the University's founding as a land-grant institution, designed to bolster good stewardship of land and industry as well as to serve the greater public good. With stewardship in mind, the efforts and achievements of each campus are celebrated while striving to be sustainability leaders, fulfilling our mission of advancing knowledge, and improving the lives of the people of the Commonwealth, nation, and world.

I. INTRODUCTION

The University of Massachusetts which includes five campuses in Amherst, Boston, Dartmouth, Lowell and the Medical School in Worcester has made a collective commitment to be "good stewards of resources". This includes responsibly managing our fiscal resources, investing in our capital assets, continuing our commitment to being environmentally responsible, and, in direct alignment with UMass' core mission, providing transformative education and research in the area of sustainability. Each of the University's campuses conducts a wide variety of sustainable programs and services many of which are unique to its campus population but all of which serve to make UMass as a whole better stewards of our environmental resources.

In 2007, the University President and all five campus Chancellors signed the American College & University Presidents' Climate Commitment (ACUPCC). In so doing, the University committed to developing a plan for achieving carbon neutrality, taking concrete initial steps to achieve that, and publishing required progress reports. During that same year, the Commonwealth of Massachusetts Executive Order 484 called "Leading by Example" (LBE) established aggressive targets for state agencies including reducing greenhouse gas emissions and energy consumption. In 2009, the Commonwealth of Massachusetts Executive Order 515, known as the Environmental Purchasing Policy, was signed to promote the use of clean technologies, recycled materials, and less toxic products. That Environmental Purchasing Policy is committed to reducing impact on the environment and enhancing public health by procuring Environmentally Preferable Products (EPP) and services whenever such products and services are readily available. Currently, the

University performs required compliance activities in accordance with Massachusetts Department of Environmental Protection regulations relating to solid waste, hazardous waste management, air pollution, underground storage tanks, wastewater, and other applicable regulations.

Since taking office in January of 2015, Governor Charlie Baker has indicated his commitment to energy and sustainability efforts with a focus on diversification of the Commonwealth's energy sources. The Governor's administration has been actively developing policy proposals and advocating for alternative sources of energy. In July 2016, the Legislature approved and the Governor signed an energy diversification law implementing requirements for utilities to enter into long-term commitments for off-shore wind and hydroelectric power. The new law also creates opportunities to finance energy improvements for commercial properties, addresses improvements to renewable power storage; and prioritizes gas leak identification and remediation. While the law does not directly impact the University energy portfolio, the legislation aligns with the University's goal of reducing carbon emissions and increasing renewable energy consumption.

Addressing climate change and carbon pollution have recently become more prevalent topics in the national discourse. On August 3, 2015, President Barack Obama announced a historic commitment to clean energy and reducing carbon emissions through the "Clean Power Plan." The Plan creates the first-ever carbon pollution standards for power plants and is designed to reduce carbon emissions by 32 percent by 2030 from 2005 levels. It further sets goals for each state based on its energy production and allows states to tailor their own state-specific plans to meet the Clean Power Plan goals. The Clean Power Plan bolsters efforts to expand renewable energy generation, build clean energy infrastructure, and promote energy conservation practices.

Over the course of this same period, the University has made historic investments in capital infrastructure to meet the need of increasing student demand but also to address the deferred maintenance needs of many of our campus buildings. Continued infrastructure investment will be needed to address outstanding needs and position our campus infrastructure for the future. As part of these efforts, strategic investments in energy efficiency, renewable energy, emissions reductions, recycling and waste reduction, water conservation, sustainable transportation, and other building/campus improvements have to be incorporated into all efforts of infrastructure and operational planning.

This Sustainability Policy has been developed using the principles currently employed by the campuses for planning and investments, and strategic initiatives such as the ACUPCC and Leading by Example. The University System has a responsibility to the people of the Commonwealth to take a leadership role in preserving resources for future generations by making sustainable decisions today.

II. POLICY STATEMENT

OVERARCHING PRINCIPLES

The University of Massachusetts is committed to responsible stewardship of resources and to demonstrating leadership in sustainable business practices. The University's five campuses should be continuously improving our practices for sustainability consistent with available funding.

The guiding principles for the University of Massachusetts Sustainability Policy include: Sustainability Strategic Planning, Clean Energy, Climate Resilience and Preparedness, Green Building Design and Sustainable Campus Operations, Sustainable Transportation, Waste Reduction and Recycling, Environmentally Preferable Purchasing, Sustainable Food Services, Sustainable Water Systems, and Academic and Research Programming and Community Engagement.

The goals below have been developed to address key elements of these guiding principles.

PRINCIPLES WITH GOALS

1. Sustainability Strategic Planning – Integration of sustainability planning, practices, and strategies into the University's strategic planning processes

- 1. Goal** - Complete a sustainability plan with a focus on energy projects at each campus, or update any existing plans, to align with the principles and goals outlined in this policy in order to adequately and efficiently understand the energy needs and potential sustainability projects on each campus.

2. Clean Energy – Supports the development and use of clean and renewable energy sources

- 1. Goal** - Achieve UMass' commitment to carbon neutrality by 2050 or as specified through the sustainability planning process occurring through the development of campus-specific action plans, as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives, and UMass system's guiding principles towards this goal.
- 2. Goal** - Procure a defined amount of annual electricity consumption through renewable and clean energy sources as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives.

- 3. Climate Resilience and Preparedness – Implementation of strategies to mitigate or reduce environmental impact**
 - 1. Goal** - Build climate resilience and preparedness standards into the University’s capital planning process, emergency management and business continuity planning.

- 4. Green Building Design and Sustainable Campus Operations – Strategies to address emissions associated with designing, building, maintaining, and operating campus buildings and grounds**
 - 1. Goal** - Any new construction must meet the MA Leadership in Energy and Environmental Design (LEED) Plus green building standards, (LEED most current version) or other standards as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives, and continue to research and employ improved sustainable building practices.

 - 2. Goal** - Reduce energy consumption, increase efficiency, and determine goals consistent with capital investments and annual programs implemented in support of energy consumption reduction as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives.

- 5. Sustainable Transportation – Integrating sustainable best practices for the use and maintenance of campus fleets, student/employee commuters, and public transportation options**
 - 1. Goal** - Reduce vehicle fuel consumption of the University vehicle fleet through promoting the use of public transportation, reducing the number of single occupancy vehicles and increasing the use of other alternative fuel transportation for faculty, staff, and students.

- 6. Waste Reduction and Recycling – Promote strategies to encourage waste reduction and re-use and acknowledge the importance of preventative measures**
 - 1. Goal 1** Employ strategies around preventative measures in waste diversion to promote source reduction, re-use and recycling of used materials.

- 7. Environmentally Preferable Purchasing – Implement a procurement approach to access environmentally-conscious products whenever applicable and available**
 - 1. Goal** - Establish Environmentally-Preferable Products Procurement Program (EPP) and continue to implement annual procurement goals to move toward alignment with the standards of the Environmental Purchasing Advisory Council wherever appropriate and consistent with available funding.

8. Sustainable Food Services – Supporting sustainable food systems through food and beverage purchases

1. **Goal** - Strive for each campus food service operation to procure sustainable food products while maintaining accessibility and affordability for all students and campus patrons.

9. Sustainable Water Systems – Reducing campus water withdrawals can reduce pressures on local aquifers, streams, rivers, lakes, and aquatic wildlife

1. **Goal** - Reduce potable water usage and determine goals consistent with capital investments and annual programs implemented in support of reducing potable water.

10. Academic and Research Programming and Community Engagement – Ensuring Sustainability is part of Academic and Research programming and part of community engagement efforts

1. **Goal** - The UMass Sustainability Council will work with their respective campus curriculum governance units to identify where Academic and Research Programming and Community Engagement involving Sustainability already exists, and to explore more formal incorporation into core curriculum and identified learning outcomes.

III. REPORTING

The University will measure and track progress on achieving defined goals through the current reporting requirements of the ACUPCC and Leading by Example. With accountability and transparency in mind, the University commits to provide an annual report regarding each campus' sustainability activities to University Board of Trustees.

The University is committed to transparent and consistent reporting standards on sustainability metrics to critical external organizations. It is valuable to the University and the organizations to measure the achievements towards goals on a defined scale and to refine strategies to achieve continuous improvement. The University participates in numerous organizations advancing sustainability and the Commonwealth's Leading By Example initiative which all require reporting as described below.

- **Annual Board of Trustees Report:** provide an annual update on sustainability efforts across the University and detail areas of progress towards defined sustainability goals as well as on-going needs in order to achieve established benchmarks.
- **STARS Reporting:** provide necessary updates to the Sustainability Tracking, Assessment & Rating System (STARS), a program of the Association for the Advancement of Sustainability in Higher Education (AASHE) which measures

performance in sustainability, and encourages accountability and transparency in all reporting institutions. The reporting system collects data across various metrics organized into four categories: Academics, Engagement, Operations, and Planning & Administration. Each campus shall continue any STARS reporting in progress and work towards appropriate STARS ranking most applicable to the individual campus moving forward while striving for excellence in sustainability.

- **ACUPCC Reporting:** As a member of ACUPCC, institutions are required to report metrics to the organization in order to track progress towards the Presidents' Climate Commitment. ACUPCC incorporates the STARS reporting system for its interim reports, which will stream-line the reporting requirements to this organization.
- **Leading by Example or its Successor Executive Order:** The Commonwealth of Massachusetts program to reduce greenhouse gas emissions requires annual reporting on energy consumption and related costs.

IV. DELEGATION

The President and Chancellors may delegate all or any part of their authority set forth in this Policy in accordance with the University's delegation policy.

V. STANDARDS

The President, in consultation with the Vice President(s) and Chancellors, will issue administrative standards to implement this policy.

**ADMINISTRATIVE STANDARDS FOR THE
SUSTAINABILITY POLICY
(Doc. T16-055)**

I. INTRODUCTION

Sustainability Standards are intended to assist in the implementation of the University’s Sustainability Policy. The policy provides a framework within which the University reviews its progress toward meeting its sustainability goals. The University’s commitment to sustainability practices are not strictly limited to the topics outlined. The University endeavors to demonstrate leadership in sustainable practices in any topic area where it is applicable and appropriate in a manner that is compatible with these overarching UMass System sustainability principles.

II. STANDARDS STATEMENT

Principles – Goals – For each of the Principles, goals were established to determine how the principle would be evaluated over time. For background, each of the goals was evaluated to address the following questions:

- Define the goal issue and provide background information to understand the goal in layperson terms.
- Why is this goal important to highlight?
- Where do the University/campuses currently stand in meeting this goal?
- Are there other groups/departments who will be critical stakeholders in meeting this goal?
- What has been done in the past to advance towards this goal?
- What does the University/campus need to do in order to reach this goal?

III. RELATED PROCEDURES, FORMS, AND OTHER RESOURCES

<i>Principle</i>	<i>1</i>	<i>Sustainability Strategic Planning – Integration of sustainability planning and strategies into the University’s strategic planning processes.</i>
<i>Goal</i>	<i>1.1</i>	<i>Complete a sustainability plan with a focus on energy projects at each campus, or update any existing plans, to align with the principles and goals outlined in this policy in order to adequately and efficiently understand the energy needs and potential sustainability projects on each campus.</i>
<i>Metric</i>		<i>Biennially report on the development progress of an Energy Master Plan/Sustainability Plan consistent with the Capital Plan reporting.</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - The purpose of an energy master plan and/or sustainability plan centers on the need to evaluate where each campus stands as it relates to energy projects and show how university commitments for carbon emissions reduction, green building designs, and other sustainability objectives will be met, with approximate timelines and costs for meeting those commitments and objectives. To date, each campus has undertaken a variety of projects addressing renewable energy or energy consumption. However, some campuses have completed more or less projects than others resulting in the need for evaluating where each campus has the ability to pursue future projects and their impacts. A comprehensive understanding of the impact of recent energy projects and the feasibility of future energy projects will allow each campus to tailor strategies to meet its energy needs and goals.

- **Why is this goal important to highlight?**
 - When undertaking substantial initiatives or new policies it is important to evaluate the current situation to assist in determining the proper course moving forward. Sustainability planning/energy master planning allows each campus to map out options and prioritize projects dependent on funding sources and their general impact on University operations.

- **Where do the University/campuses currently stand in meeting this goal?**
 - Currently, the Amherst campus has completed an Energy Master Plan and is in the process of implementing the plan. However, the other four campuses have not undergone a formal evaluation and planning session.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - While sustainability/energy master plans transcend all areas of the campuses and potentially spark priority conversations, the crucial departments involved in this process are sustainability and facilities/operations.

- **What has been done in the past to advance towards this goal?**
 - As previously stated, the Amherst campus has recently completed an Energy Master Plan and are utilizing it to determine projects and priorities. The other campuses have not undergone this type of comprehensive planning.

- **What does the University/campus need to do in order to reach this goal?**
 - The University must support these planning processes across all of the campuses for a consistent picture of where campuses currently stand and what can be done in the future to meet their energy needs in a sustainable and affordable manner. Each campus must engage their constituencies to engage in this planning as a way to accomplish many of the goals contained in this policy.

<i>Principle</i>	2	<i>Clean Energy – Supports the development and use of clean and renewable energy sources.</i>
<i>Goal</i>	2.1	<i>Achieve UMass commitment to carbon neutrality by 2050 or as specified through the sustainability planning process occurring through the development of campus-specific action plans, as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives, and UMass system’s guiding principles towards this goal.</i>
<i>Metric</i>		<i>Annually publish latest available greenhouse gas (GHG) emissions inventory</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - In 2007, the President of the University of Massachusetts signed the American College & University Presidents’ Climate commitment (ACUPCC). In doing so the University committed to developing plans to achieve climate neutrality. In the context of this commitment climate neutral is the elimination of net greenhouse gas emissions from campus operations. The University under the commitment is required to reduce greenhouse gas emissions and report on the following: stationary sources (fossil fuels burned in boilers, central heating plants and power plants), mobile sources (fossil fuels used in vehicle fleet), purchased electricity, financed air travel, and commuting of faculty, staff and students. There are also additional reporting categories including refrigerants and chemicals, agricultural sources, other financed travel, study abroad, solid waste, and waste water which when included give a more comprehensive assessment of greenhouse gas emissions. Under this commitment each UMass campus developed baseline greenhouse gas inventories and created climate action plans which set interim goals and outlines mechanisms to achieve climate neutrality.

- **Why is this goal important to highlight?**
 - The ACUPCC outlines the importance of this goal as it relates to climate change. Climate change is defined as a change in the global or regional climate patterns. The scientific consensus is that climate change is real and attributed to increases in greenhouse gas emissions largely caused by humans. The speed and scale of climate change has the potential for large scale adverse health, social, economic and ecological effects. The Commitment states that to avoid the worst impacts of climate change greenhouse gas emissions need to be reduced 80% by midcentury.

- **Where does the University/campuses currently stand in meeting this goal?**
 - All five campuses have completed climate action plans and report on greenhouse gas emissions and progress to the ACUPCC. It is important to note that the interim goals and climate neutrality are not consistently normalized. Even if they were being normalized they are still not being met because the goals do not compensate for growing energy use intensities (Ex. Labs). Therefore, with the campuses growing, there is a struggle to meet the interim reduction goals and stay on track to become climate neutral by the target date.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - Several departments are integral in moving forward to meet this goal, including Facilities, Engineering and Construction, Planning, Transportation, Purchasing, Sustainability & Energy Management, Power Plant Operations, Administration & Finance, and faculty, staff, and students.
- **What has been done in the past to advance towards this goal?**
 - The campuses have made significant gains in reducing greenhouse gas emissions despite aggressive growth and the addition of new buildings. These reductions come principally from energy efficiency measures, retrofits, fuel switching, and in part from LEED building design.
- **What does the University/campus need to do in order to reach this goal?**
 - High level support and funding is required to develop more extensive carbon reduction plans and to make investments to reduce greenhouse gas emissions.

<i>Principle</i>	2	<i>Clean Energy – Supports the development and use of clean and renewable energy sources.</i>
<i>Goal</i>	2.2	<i>Procure a defined amount of annual electricity consumption through renewable and clean energy sources as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives.</i>
<i>Metric</i>		<i>Total GHG Emissions Reduced Since LBE Baseline (FY04)</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - When the Leading By Example Executive Order was written and signed into law in 2007, the Governor and the Commonwealth of Massachusetts acknowledged their buildings consumed over 1 billion kwh of electricity, 22 million gallons of heating oil, and 46 million therms of natural gas, resulting in over a million tons of GHG emissions a year contributing to “environmental and health issues...such as global climate change, regional mercury contamination, and urban asthma rates.”

Energy procurement plays a leading role in how the University addresses our long-term commitment to reducing greenhouse gas emissions. The campuses should seek to identify achievable levels of their electricity consumption that comes from renewable energy sources such as wind, solar, hydropower, etc. The University’s energy goals should be consistent with or exceed as feasible the Commonwealth’s energy priorities and funding.

- **Why is this goal important to highlight?**
 - As campuses expand and our energy consumption grows, the University must be seeking electricity from renewable energy sources to alleviate the greenhouse gas emissions impacts. The University is the largest energy consumer in the state and therefore can have a tremendous impact on the overall GHG emissions of Massachusetts. The environmental and human health impacts would be positively affected when the University prioritizes energy conservation, fuel switching, and renewable energy production to reduce GHG emissions.

- **Where does the University/campuses currently stand in meeting this goal?**
 - The campuses have experienced progress in expanding renewable energy sources particularly around solar photovoltaic (PV) projects. The campuses are a part of solar net-metering projects across the state and exploring other renewable energy options. Additionally, there has been an overall reduction of GHG emissions by 14.7% based on the FY 2004 baseline. Some of the campuses have developed interim emission reduction goals prior to the ACUPCC 2050 carbon neutrality commitment, some have not. Each campus must begin to conduct short term and long term emission reduction planning in order to move toward carbon neutrality and begin implementing wide-scale low-carbon energy strategies. Each campus will need to establish prioritized strategies to reflect local and regional needs, opportunities, and challenges. Some strategies may include, but should not be limited to, On-site renewable energy planning and procurement, energy conservation measures in campus buildings such as continuous commissioning, individual energy reduction strategy implementation and behavior change, along with consideration of net-zero energy growth policies.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - The University will have to engage with our energy planners and facility staff in determining the most cost-effective and consistent renewable energy sources. The campus may have an opportunity to engage in conversations with their local electricity utility companies to discuss available resources in the region and ways to work together. The System Office will need to continue to play an important role of convener of Sustainability, Facility, and Administration from each campus in order to advance climate action planning, goal setting, and progress reporting. Each respective campus must have an active Sustainability Committee including decision makers and active community members from Facilities, Procurement, EH&S, Academics and Research, student leaders, and all major energy consuming units on campus including but not limited to: Residential Life, Dining and Auxiliary Services, Athletics, etc.

- **What has been done in the past to advance towards this goal?**
 - The University is currently a part of solar net-metering projects which allows for the credits to offset their electricity costs through large-scale solar PV projects which are not required to be in close geographical location. Despite rapid physical growth of most campuses within the UMass System and new development of very high energy

intensive facilities that help serve the academic mission of the University, the campuses have been effective in reducing energy and emissions through a variety of efforts dating back to the early 2000's. The UMass Building Authority has established the minimum standard for new constructions at all campuses must meet LEED Silver certification.

- **What does the University/campus need to do in order to reach this goal?**
 - The campuses must work to identify the renewable energy sources available to them and how much electricity consumption should be sourced by renewable energy. Carbon emission reduction efforts must be ramped up and prioritized through energy master planning, updates to carbon plan goals and GHG inventories, etc. as well as utilize innovative funding mechanisms such as green revolving funds which have very effective returns on investment throughout higher education and state government.

<i>Principle</i>	<i>3</i>	<i>Climate Resilience and Preparedness - Implementation of strategies to mitigate or reduce environmental impact.</i>
<i>Goal</i>	<i>3.1</i>	<i>Build climate resilience and preparedness standards into the University's capital planning process and emergency management and business continuity planning.</i>
<i>Metric</i>		<i>Published plans including measurable objective with corresponding strategies.</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - Climate resilience is the ability for a system, institution, or operation to withstand the impacts of climate change and related events and to modify assets and adjust operations based on changing circumstances. Climate resilience planning is a critical process for all major institutions to be mindful of when considering other types of planning.
- **Why is this goal important to highlight?**
 - Climate resilience planning for the campuses will assist the long-term planning at the campus level in order to be proactive about potential weather/climate related events impacting University assets and operations. Including but not limited to specific topic areas, such as tropical storms/hurricanes, snow storms, extreme heat, or sea level rise.
- **Where does the University/campuses currently stand in meeting this goal?**
 - The University has included aspects of climate resilience planning into the University Hazard Mitigation Plan.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - The stakeholders involved in this goal are: facilities, administration & finance, design & construction, operations heads, academic heads, student affairs personnel, student government, IT, emergency management staff and campus communications.

- **What has been done in the past to advance towards this goal?**
 - The University has included aspects of climate resilience planning into the University Hazard Mitigation Plan.

- **What does the University/campus need to do in order to reach this goal?**
 - Continued participation and discussion at a local level; funding that can help both resilience and sustainability efforts.

<i>Principle</i>	<i>4</i>	<i>Green Building Design and Sustainable Campus Operations – Strategies to address emissions associated with designing, building, maintaining, and operating campus buildings and grounds.</i>
<i>Goal</i>	<i>4.1</i>	<i>Any new construction must meet the MA LEED Plus green building standards (LEED most current version) or other standards as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives and continue to research and employ improved sustainable building practices.</i>
<i>Metric</i>		<i>Annual report of building construction and LEED Certifications</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - In 2006, the Massachusetts Sustainable Design Roundtable was assembled consisting of a public-private collaboration of 54 state agencies, private firms and non-profit organizations to create An Action Plan for Green Building in Massachusetts State Construction Project.
 - The Roundtable has recommended adoption of a new “Massachusetts LEED Plus” standard that specifically mandates certain LEED points for energy performance, building commissioning (i.e. 3rd party verification that a building’s systems work as designed), achievement of smart growth objectives, and water conservation.
 - This criterion evolved into LEED Silver for new buildings and the basic LEED Plus for construction projects less than 20,000 SF.

- **Why is this goal important to highlight?**
 - The Roundtable’s report found that in studying 33 green buildings that were already built, by spending an additional \$3-5 per SF in building costs, a savings of \$15 per SF in operational costs from lower energy, water and maintenance was observed.

- **Where do the University/campuses currently stand in meeting this goal?**
 - The University of Massachusetts Building Authority has established the Massachusetts LEED Plus and LEED Silver minimum standard for all new

construction. Where applicable the campuses have been designing to the LEED Gold standard or higher.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - There are numerous stakeholders associated with the success of this goal: DCAMM and UMBA, Campus Leadership, University’s Facility Management (Planning, Project Management, Operations & Maintenance), Sustainability and Energy Management, and EH&S.
- **What has been done in the past to advance towards this goal?**
 - The establishment of an energy and sustainability standard of LEED Plus & LEED Silver for the Facilities departments to use when considering the renovations and designs for new buildings.
- **What does the University/campus need to do in order to reach this goal?**
 - The design of new construction and renovations provides the opportunity to evaluate the impact of energy infrastructure from a financial and energy efficiency perspective. The diligent application of these standards on all projects, no matter how large or small, will continue to demonstrate progress towards our goal.
 - The University must also examine opportunities to design beyond LEED standards depending on the project. Other building standards might be more suitable depending on the project details such as Zero Net Energy Buildings (ZNEB), Passive House, Lab 21 Green Lab Standards, Greening IT practices, Living Building Challenge, and Architecture 2030.

<i>Principle</i>	<i>4</i>	<i>Green Building Design and Sustainable Campus Operations – Strategies to address emissions associated with designing, building, maintaining, and operating campus buildings and grounds.</i>
<i>Goal</i>	<i>4.2</i>	<i>Reduce energy consumption and determine goals consistent with capital investments and annual programs implemented in support of energy consumption reduction, as identified in Goal 1.1 as being necessary to achieve carbon reduction commitments and meet sustainability objectives.</i>
<i>Metric</i>		<i>Total Energy Use Intensity Per Square Foot</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - Energy reduction goals need to be met in a variety to ways that include green procurement, enhanced recycling, IT, enhanced tree planting, increasing recycled paper, transit and clean energy options, residential dorms, building complete streets or smart/livable/walkable cities, food sourcing, green construction etc. and thus involves system-level planning over and above physical plant improvements.
- **Why is this goal important to highlight?**
 - The importance of this goal stems from the need to identify strategies that reduce the energy consumption of existing campus infrastructure and align the planned capital

investments with the goal of minimizing future energy usage. Progress in this goal area has the starkest impact on overall reduction in greenhouse gas emissions.

- **Where does the University/campuses currently stand in meeting this goal?**
 - Most campuses provide annual tracking data to Department of Energy Resources and also to ACUPCC & STARS - and should continue to do so.
- **Are there other groups/departments who will be critical in meeting this goal?**
 - Students are the most critical group on each campus when considering sustainability issues. Outreach to students through more effective, campus-wide education such as on campus social media. University communications should be engaged to reflect these sustainability priorities for the campus and use their expertise in emerging media techniques.
- **What has been done in the past to advance towards this goal?**
 - Since 2013, The System has created the annual sustainability report which has become an annual feature for the Board and the public to learn about the efforts taking place at each campus.
- **What does the University/campus need to do in order to reach this goal?**
 - Most campuses are moving in this direction, however, a greater transparency, and integration with A&F goals and budgeting is needed. Accomplishing significant savings associated with energy consumption is achievable through undergoing master planning exercises. Management of energy systems with a focus on conservation is a crucial part of reaching this benchmark.

<i>Principle</i>	5	<i>Sustainable Transportation - Integrating sustainable best practice for the use and maintenance of campus fleets, student/employee commuters, and public transportation options.</i>
<i>Goal</i>	5.1	<i>Reduce vehicle fuel consumption of the University vehicle fleet through promoting the use of public transportation, reducing the number of single occupancy vehicles, and increasing the use of other alternative fuel transportation for faculty, staff, and students.</i>
<i>Metric</i>		<i>Annually report on the vehicle fleet composition and growing commuting options for faculty, staff, and students</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - Transportation is a topic which impacts every individual at the University and there are various opportunities to be more environmentally friendly. This goal recognizes the move towards purchasing and utilizing fuel efficient vehicles and alternative fuel vehicles will assist in the need to reduce overall vehicle fuel consumption. It also encourages the implementation of strategies to encourage and assist students and staff to easily utilize alternative modes of transportation to commute to campus, and

encourage the use and accessibility of alternative modes of transportation to the broader community in addition to campus stakeholders.

- **Why is this goal important to highlight?**
 - This goal is crucial due to the fact that everyone has transportation needs on a college campus and the strategies used to get people to where they need to go should be considering the environmental impacts. Adjusting transit habits within the campus community can have significant environmental impacts as well as addressing other regional transportation priorities.
- **Where do the University/campuses currently stand in meeting this goal?**
 - The campuses are undertaking projects that align to the outlined goal. Many of the initiatives are highlighted in the annual Sustainability Report. For example, Lowell has instituted a “Park Once Policy”, a carpool program, bike share program, and offers Zipcars. The campus has drawn attention to local public transit options and organized educational campaigns on transit issues. The highlighted programs are also found at the other UMass campuses.
- **Are there other groups/departments who will be critical in meeting this goal?**
 - The campuses will have to continue to engage their campus communities in this process. The involvement of regional transit authorities and local government could provide an arena to align goals with regional planning efforts around transportation.
- **What has been done in the past to advance towards this goal?**
 - The University has demonstrated a commitment to providing alternative methods of transportation, such as shuttle services, to students, faculty, and staff at each campus.
- **What does the University/campus need to do in order to reach this goal?**
 - Each of the campuses will have to evaluate what programs and initiatives are on-going that seek to move forward in this goal area and develop plans for the areas where programs do not exist. The planning process should include transportation alternatives as a priority and consider guidance from complete streets, climate resilience strategies, clean fuels, EV charging stations, and green parking garages. It is also important to note that each campus has its own set of circumstances related to their geographic location and demographic make-up and that these considerations must be taken into account.

<i>Principle</i>	6	<i>Waste Reduction and Recycling – Promote strategies to encourage waste reduction and re-use and acknowledges the importance of preventative measures.</i>
<i>Goal</i>	6.1	<i>Employ strategies around preventative measures in waste diversion to promote source reduction, re-use and recycling of used materials.</i>
<i>Metric</i>		<i>Annually report on materials recycled, reused, composted, and disposed</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - This STARS reporting standards recognizes institutions that are diverting materials from landfills and incinerators and conserving resources by recycling and composting. Further, the University must be focused on minimizing the production of waste. While the benefits of recycling and composting cannot be overstated, the importance of preventative measures to avoid the waste should be a primary focus. Decreasing the total amount of materials that are used and discarded offers significant environmental benefits.

- **Why is this goal important to highlight?**
 - The reduction of waste disposed and enhanced recycling efforts can dramatically impact the carbon footprint of the University. These efforts are highly visible and require some educational context. In order to be successful, people must adjust their habits to help produce the desired results.

- **Where does the University/campuses currently stand in meeting this goal?**
 - Each campus has been consistently involved in notable recycling and waste reduction efforts helping to involve students, faculty, and staff while educating the entire campus community about the benefits to recycling and reducing waste. The campuses track their progress and achievements in this area in their own ways.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - The University will need to be actively engaging students, faculty, staff, administrators, and the general public in this goal. Additionally, the University should evaluate if there are current vendors or other parties that could assist with programs or other infrastructure to assist in accomplishing this goal.

- **What has been done in the past to advance towards this goal?**
 - The campuses can point to marked progress in this area through the substantial programing taking place around this issue. The University's annual Sustainability Report highlights many of the initiatives underway across UMass.

- **What does the University/campus need to do in order to reach this goal?**
 - UMass must sustain the progress achieved by the campuses and capitalize on the enthusiasm for this issue, thereby generating more programs and strategies such as: the University's total annual waste generation (materials diverted and disposed).

<i>Principle</i>	7	<i>Environmentally Preferable Purchasing – Implement a procurement approach to access environmentally-conscious products whenever applicable and available.</i>
<i>Goal</i>	7.1	<i>Establish Environmentally-Preferable Products Procurement Program (EPP) and continue to implement annual procurement goals to move toward alignment with the standards of the Environmental Purchasing Advisory Council where ever appropriate and consistent with available funding.</i>
<i>Metric</i>		<i>Annually report on purchasing of electronics, office paper, cleaning products, etc. and progress towards meeting established goals</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - As part of the Commonwealth's overall goals of conserving natural resources, reducing waste, protecting public health and the environment, and promoting the use of clean technologies, recycled materials, and less toxic products, this policy committed to reducing State Agency impact on the environment and enhancing public health by procuring Environmentally Preferable Products (EPP) and services whenever such products and services are readily available.
 - Environmentally preferable products are products and services that have a lesser or reduced effect on human health and the environment when compared to competing products or services that serve the same purpose. They may include, but not be limited to, items that:
 - Contain recycled materials
 - Minimize waste
 - Conserve energy and/or water
 - Consist of fewer toxic substances
 - Reduce the amount of toxic substances disposed or consumed
 - Protect open-space
 - Lessen the impact to public health
 - Ensure that at least one person from the University is designated to stay in contact with the state regarding the EPP program and EO 515 to ensure that if updates and changes occur they can be communicated to the Sustainability Group and Procurement Director for implementation.
- **Why is this goal important to highlight?**
 - This goal is important since it complements the other goals surrounding sustainability and will help support those goals through the use of environmentally preferable products wherever possible.
- **Where does the University/campuses currently stand in meeting this goal?**
 - The Director for Enterprise Wide Procurement currently meets regularly with State procurement leaders and will follow-up on the implementation of this program and any changes that the University should be made aware of.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - Working closely with the Procurement Council to ensure that EPP products are available on BuyWays and are competitively priced would be an important step to continue.

- **What has been done in the past to advance towards this goal?**
 - To date, specific products have been researched and launched but not a full scale EPP program. (i.e. Paper, ink cartridges)
 - The Director of Enterprise Wide Procurement has been meeting regularly as the University’s designee with the State’s Procurement Directors.

- **What does the University/campus need to do in order to reach this goal?**
 - The University must continue to work together to develop the best and most cost effective EPP program for the University and ensure that all information is effectively communicated to the necessary stakeholders using the products. The UMass Sustainability Council will provide recommendations to the Procurement office and collaborate on a regular basis.
 - Goals developed should continue to be met through regular communication with the State.
 - The EPP should also strive to meet or exceed existing campus practices keeping up with STARS criteria or other green purchasing best practices wherever appropriate and consistent with available funding.

<i>Principle</i>	<i>8</i>	<i>Sustainable Food Services – Supporting sustainable food systems through food and beverage purchases.</i>
<i>Goal</i>	<i>8.1</i>	<i>Strive for each campus food service operation to procure sustainable food products while maintaining accessibility and affordability for all students and campus patrons.</i>
<i>Metric</i>		<i>Annually report on the percentage of dining service food products that are third-party verified and/or local and community based sustainable food products</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - The STARS standards recognizes institutions that are supporting sustainable food through the purchase of their food and beverages. Institutions can do this by prioritizing the purchase of sustainably produced food and beverage items. These actions reduce the social and environmental impacts of food production and help foster robust local economies and food security; improved conditions for farm workers; healthier animals, soils and streams; and secure livelihoods for farmers.

- **Why is this goal important to highlight?**
 - This goal is important since food and beverages are a part of everyday life on a college campus and impacting the manner in which food is produced, transported, and consumed can have a systemic impact.

- **Where does the University/campuses currently stand in meeting this goal?**
 - Each of the campus have employed individual strategies or programs to address the theme of this goal. One example has been the commitment to local food options in various ways, including the sponsorship of a weekly farmer’s market at the Medical School.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - To achieve progress in meeting this goal the campuses will have to continue to partner with their food service providers to identify products and other available options to accomplish this goal.

- **What has been done in the past to advance towards this goal?**
 - Each campus has been promoting sustainability-minded programs to encourage locally sourced food products and reduce food waste. The Amherst campus has committed to the Real Food Challenge, which requires that 20% of the University food and beverage purchases be local / community-based, fair, ecologically sound and humane by 2020. The Medical School hosts a weekly Farmers Market from June to October bringing local produce and food options to campus. Boston, Dartmouth and Lowell integrate local food options on campus depending on the type of products available and the time of year. Some of the campuses have adopted trayless dining, an effort to encourage students to be more mindful of their food selection thus reducing waste.

- **What does the University/campus need to do in order to reach this goal?**
 - The University’s dining services purchase food and beverages that meet at least one of the following criteria: a local or community-based producer and/or third party verified to be ecologically sound, fair and or humane. The University must also work to ensure that all vending operations, convenience stores, or concessions abide by the same standards as the campus food service if different.

<i>Principle</i>	<i>9</i>	<i>Sustainable Water Systems – Reducing campus water withdrawals can reduce pressures on local aquifers, streams, rivers, lakes, and aquatic wildlife.</i>
<i>Goal</i>	<i>9.1</i>	<i>Reduce potable water usage and determine goals consistent with capital investments and annual programs implemented in support of reducing potable water.</i>
<i>Metric</i>		<i>Annually report the potable water use per weighted campus user compared to baseline</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - In 2007, the Leading By Example Executive Order 484 which required state agencies to address resource use at state facilities and established the Leading by Example (LBE) Program to oversee the coordinated efforts state agencies, including UMass campuses and state and community colleges, to reduce their environmental impact.

- **Why is this goal important to highlight?**
 - Water efficiency is important as fresh water supplies are limited and the current systems of treating, pumping, and disposing of water is energy intensive, wasteful, and can be disruptive to downstream ecosystems. As Executive Order 484 states, buildings account for 13% of potable water use. Potable water is defined as water that meets drinking water standards and is safe for human consumption. Potable water is often used in buildings not only for drinking water but for toilets, urinals, hand washing facilities, showers, kitchens sinks, irrigation and cooling towers. Non-potable water include rainwater which is captured and stored, reclaimed water which is waste water that is treated and purified for reuse, and grey water which is waste water that has not come in contact with toilet or kitchen waste, and can be used as an alternative to potable water in some applications.

- **Where does the University/campuses currently stand in meeting this goal?**
 - While the LBE program faced challenges in tracking water usage at state facilities, the University of Massachusetts campuses are achieving LEED certification for new building projects, which helps to meet reduction goals for potable water usage. LEED establishes prerequisite and credit options for the adoption of water use reduction strategies. Currently, all LEED certified buildings are required to reduce outdoor water use so that either no irrigation is required or irrigation is reduced by 30%. This can be achieved through more efficient irrigation, careful selection of plant species, and the use of non-potable water sources. Indoor water use is required to be at least 20% below code to receive LEED certification. Adoption of low flow fixture and the use of non-potable water in certain applications can reduce the consumption of potable water. Additionally, increasing the efficiency of power plant cooling towers by increasing the number of time the water cycles before being replaced and integrating non-potable water, can also reduce overall potable water use.

- **Are there other groups/departments who will be critical in meeting this goal?**
 - Grounds, Facilities, Engineering and Construction, Planning, and Power Plant Operations will all be critical department to include in the discussion of potable water usage at the university.

- **What has been done in the past to advance towards this goal?**
 - Water use is to be considered early in the construction process for new buildings and renovations, irrigation requirements for landscaping and the use of non-potable

water, and opportunities to improve efficiency and the use of non-potable water for cooling towers.

- **What does the University/campus need to do in order to reach this goal?**
 - A challenge in meeting this goal will be that UMass campuses continue to grow and that the reduction goals for potable water established by Executive Order 484 are not normalized. Sources of water need to be metered so that tracking of water use can be effective. Continuing to achieve LEED requirements and credits for installation of low flow fixtures, efficient irrigation, and cooling processes can reduce water usage. Additionally, by using non-potable water where potable water is currently used will decrease overall water use.

<i>Principle</i>	<i>10</i>	<i>Academic and Research Programming and Community Engagement – Ensuring Sustainability is part of Academic and Research programming and part of community engagement efforts.</i>
<i>Goal</i>	<i>10.1</i>	<i>Comprehensively integrate sustainability and climate neutrality into the core academic curriculum and research programs to create a means to enable students to use their campus as a living, learning laboratory.</i>
<i>Metric</i>		<i>Annually report on sustainability curriculum available to undergraduate students and on-going curricular developments</i>

- **Define the goal issue and provide background info to understand the goal in lay terms.**
 - This is in concert with the mission of the University “to provide an affordable and accessible education of high quality and to conduct programs of research and public service that advance knowledge and improve the lives of the people of the Commonwealth, the nation and the world.”
 - Currently, the University offers a range of academic offering and research opportunities that provide students with an opportunity to learn about sustainability issues exclusively and as part of other content areas.
 - Campuses should seek to develop academic and research programming that enables students to use their campus as a living, learning laboratory.
 - Climate change and sustainability challenges are one of the foremost issues affecting our collective future and impacting the lives of the world’s citizens. University graduates should all be prepared to meet those challenges in their work beyond the University.
- **Why is this goal important to highlight?**
 - This directly aligns with a major part of the University’s mission to “advance knowledge and improve the lives of the people of the Commonwealth, the nation and the world.”
 - As an institution of higher education the University is positioned to train and educate future leaders, scholars, workers, and professionals to understand and address climate change and sustainability challenges. Moreover, the University can

prepare students to respond to the growing challenges our planet faces no matter their field or discipline.

- Growing our academic offerings and learning outcomes in the areas of climate change and sustainability is a core focus of the ACUPCC and STARS, to which the University has publicly committed itself.
 - The Princeton Review's 2015 Hopes & Worries Survey stated that 60% of students said it would contribute "Very Much/Strongly/Somewhat" to have information about a school's commitment to the environment (ie. from academic offerings to practices concerning energy use, recycling, etc.) in their assessments of whether to apply to or attend the school.
- **Where does the University/campuses currently stand in meeting this goal?**
 - This goal has been addressed on a campus-by-campus level and the robustness of the integration of sustainability into academic programs on each campus varies widely across the University.
 - **Are there other groups/departments who will be critical in meeting this goal?**
 - There is a wide range of stakeholders involved in achieving this goal such as Chancellors and Vice Chancellors; Provosts; Deans and Associate Deans; Department Chairs; Faculty Senates on each campus; centers or faculty organizations focused on climate change and sustainability challenges, like the Climate Change Initiative at UMass Lowell; and students.
 - **What has been done in the past to advance towards this goal?**
 - At this time, each campus has been undertaking the work of evaluating where general education requirements are to the identified goal and exploring the feasibility of integrating sustainability topics on a department-by-department basis.
 - **What does the University/campus need to do in order to reach this goal?**
 - Evaluate where general education requirements currently align to sustainability topics and determine the best practices to integrate key topics related to sustainability into student learning outcomes.