



University of Missouri Kansas City



Campus Sustainability Plan Update 2008 -2016

**R. Kaye Johnston
PhD Candidate**

**UMKC Arts and Sciences Geosciences
/Bloch School of Public Administration
Sustainability Coordinator**

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I. Executive Summary

The story of sustainability efforts at the University of Missouri-Kansas City (UMKC) campus is a pragmatic step by step process with major milestones and accomplishments along the way. The UMKC Campus Sustainability Plan summarizes those steps and accomplishments while charting a course for the future.

In a monumental first step, the UMKC Campus Facilities Management (CFM) Department created a Recycling and Waste Reduction Team which began efforts to further reduce waste and expand the white paper recycling program in 2002. Building upon those initial recycling efforts, in December 2007 CFM, along with the College of Arts & Sciences Geosciences Department, combined dollars to pay for a membership in the Association for Achieving Sustainability in Higher Education (AASHE). In a milestone event in the fall of 2008, the University of Missouri System President Gary D. Forsee signed the American College and University Presidents' Climate Commitment (ACUPCC). Simultaneously, UMKC signed on to The Greater Kansas City Chamber of Commerce Climate Protection Partnership. With each of these important commitments it was important for UMKC to formalize its sustainability initiatives into one reporting process and provide a framework by which sustainability programs, actions and the results of those efforts are unified, consolidated and made available.

Over the past years from November 2007 to June 2010 CFM has provided the budgeted resources for a half-time staff to monitor and gather data for Recycling and Waste reduction activities on campus. In July 2010, the same staff member was hired full time as the Sustainability Coordinator and continued the work of compiling data on campus sustainability efforts and to lead the UMKC Sustainability Team: an adhoc team

of individuals representing staff, faculty and students. This team has made significant strides forward in achieving sustainability goals since its inception in November of 2007. This report is a reflection of ten years' of sustained and collaborative efforts towards greening the campus which began with recycling and waste reduction and energy management and has since resulted in a comprehensive list of sustainability efforts. This plan also identifies a framework for the future in continuing sustainability initiatives and goals in support of the University mission and the ACUPCC.

II. Introduction

As scientists started to uncover more evidence that global climate change and a general warming trend may be accelerated by people's consumption of fossil fuels, there has been an ever increasing stress from local and federal governments to conserve energy and be more aware of our overall impact on the environment. (Solomon, S, et all 2007) UMKC soon realized that they are part of the problem and that it is the duty of institutions of higher education to be a part of the solution since they are educating future generations of leaders.

The history of activity to reduce natural resource consumption on campus began with the UMKC Campus Facilities Management¹ (CFM) department when the Recycling and Waste Reduction Team was created to further reduce waste and expand the white paper recycling program in 2002. The team implemented the new expanded recycling program on the UMKC Volker campus in 2005. Additionally, UMKC Hospital Hill campus recycling was implemented in spring 2008 in both the Health Sciences Building

¹ <http://www.umkc.edu/adminservices/cfm/> retrieved 6/20/2011 by Kaye Johnston

and the School of Dentistry. By fall 2011 the program has been fully expanded to include all of the Health Sciences Campus with the addition of School of Medicine into the program and on Volker Campus only a few low occupancy building are not included in the total three million square feet of space now with recycling and waste reduction fully implemented. UMKC now recycles mixed paper, cardboard, paperboard, aluminum cans, plastics 1-7, beverage containers, and scrap metal all in a single stream recycling program in all buildings on campus. This is a huge accomplishment because there are over 100 buildings on two separate campuses. Additionally, UMKC recycles toner cartridges, lead/acid batteries, organic waste, Styrofoam, scrap metal, computers, florescent bulbs, computers and other electronics, etc. As part of the reuse program to reduce waste the campus engages in an office supply swap internally at both campuses plus has a surplus furniture and electronics warehouse where it sells items for reuse at auctions and on-line. In fall 2011 UMKC became an official United States Environmental Protection Agency (USEPA) WasteWise Partner² to take full advantage of the online tracking system offered through the voluntary program offered by USEPA. UMKC received a series of Environmental Excellence awards in 1994 and 2005 for expanding its white paper recycling program on campus. In 2010 the program won the Mid-America Regional Council Solid Waste District, “Outstanding Program” Award³. Furthermore, the Sierra Club Magazine⁴ in October 2010 – 2016 listed UMKC as one of the 100 Top Cool Schools in the nation for their environmental record. Additionally,

² <http://www.epa.gov/epawaste/partnerships/wastewise/about.htm> retrieved 12/ 09/2011by Kaye Johnston

³ <http://marc.org/archives/swmd2010mtg.htm> retrieved 1/10/2011 by Kaye Johnston

⁴ <http://www.sierraclub.org/sierra/201009/coolschools/top100.aspx> retrieved 10/11/2010 by Kaye Johnston

UMKC was awarded the American Schools and University Magazine Green Cleaning Award Honorable Mention plus the Regional TOP Sustainable Success Stories from the Mid-America Regional Council's Academy for Sustainable Communities 2011, 2012 and 2013 and in 2014 is listed in the Princeton Review's Top Green Universities publication. UMKC is really moving forward as a leader in for it's on the ground sustainability programs, and it is continuing to press forward.

In 2005, UMKC had started to expand efforts of sustainability in other areas and began to uncover ways that they could conserve energy. Since that time, an energy performance contract with Burns & McDonnell has been implemented and will make the campus more efficient and will significantly reduce the carbon footprint of UMKC. In the fall of 2007, UMKC hired a part-time solid waste coordinator that has not only saved the campus money by managing their solid waste more efficiently, but has implemented sustainability in many aspects of Campus Facilities Management. In November 2007 the new UMKC Sustainability Team convened and was reinvented from the recycling and waste reduction team from earlier years. The new UMKC Sustainability Team has accomplished annual goals in 2008 through 2015 and has formulated its goals for 2016. In 2011 the team was divided up into sub-committee according to each area of sustainable focus. Each sub-committee has a chair and co-chair so that meaningful progress can be made on annual goals with a group of folks who will forward action steps to the team and implement the programing to proceed forward in making the goal happen. This team is an adhoc group that functions directly reporting to the Associate Vice Chancellor of Administration and boasts 140 members across campus.

New sustainable initiatives in 2007 and 2008 led to the signing of the ACUPCC⁵ which sets a number of visible environmental goals the university must comply with in a certain number of years. These new initiatives also lead to the Carbon Print Baseline, The UMKC Sustainability Plan Framework, the RideShare program, the Clean Commute program, the Transportation and Parking Taskforce Report and Recommendations 2009⁶, Campus Dining Services Composting Program, Student lead Garden Collective, the campus rain gardens, grant funding for expanding the current environmental programs, the use of alternative fuel vehicles, implementation of green purchasing practices and contracts through the procurement process, addition of green building elements and LEED certification⁷ of construction planning and practices, energy conservation and performance contracting, the use of green cleaning products campus wide, and a slew of other sustainable practices being implemented from education to grounds maintenance. In 2011, the provost created a committee of faculty and administration under the direction of Dr. Peter Eaton, Economic Department Chair. That committee is supporting the efforts of the team in regards to setting goals for carbon reductions on campus.

Even though there is a long road ahead towards greening the campus and making UMKC the go to place in the community for sustainability, a lot has been accomplished over the past few years. As you will see throughout this report, more can and will be done in coming years to set the UMKC campus apart as a leader in sustainability initiatives both locally and regionally.

⁵ <http://www.presidentsclimatecommitment.org/reporting> retrieved 6/22/2011 by Kaye Johnston

⁶ <http://www.umkc.edu/adminfinance/parking/images/pdfs/task%20force/Parking-and-Transportation-Task-Force-Report-August-2009.pdf> retrieved 8/22/2011 by Kaye Johnston

⁷ <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1988> retrieved 6/22/2011 by Kaye Johnston

III. Sustainability Framework and Organization

Campus Facilities Management Sustainability Office has taken a leadership role in organizing, tracking and setting goals for sustainability initiatives on campus. The department has funded a full-time position for coordinating the campus sustainability efforts and has a formal process in place to make recommendations regarding sustainability and to forward those recommendations to campus leadership for their approval. The UMKC Sustainability Team sends their recommendations to the CFM Facilities Advisory Committee who then takes those recommendations, after review, to the Chancellor's Direct Reports. With Administration approval from the Chancellor's Direct Reports, implementation of the recommendations can begin across campus. In 2011 as an outgrowth of the UMKC Strategic Plan and the Taskforce 2020, an Environmental Sustainability Committee with faculty leadership has been created. This new committee also includes the leadership group from past CFM and Sustainability Team efforts. Through this organization, CFM and academic units, including the UMKC Geosciences Department, have partnered to bring sustainability education to staff, students and faculty on campus and to the broader community off campus.

The Sustainability Team is comprised of 140 members including faculty, staff, and students' cross-campus created to collectively work on environmental issues and natural resource reduction. The UMKC Sustainability Team meets monthly on the third Wednesday of each month to organize efforts, complete goals, discuss campus sustainability efforts, offer support and resources to the campus and plan events. The tables of goals below were created by the UMKC Sustainability Team at its annual planning meeting in November of each year.

	Use of “green” ice melt Composting all organic waste Resources Building reuse of deconstruction materials	√ √
2010	Administrative Resources Hired a full-time Sustainability Coordinator Recycling Implemented Glass Recycling Continued to expand recycling program, adding signage and bins Implemented Recycling On The Go outdoor recycling education Expanded number of Materials Recycled	√ √ √ √
2011	<ul style="list-style-type: none"> • Institutionalized the UMKC Sustainability Team into a ratified campus group, utilizing sub-committees. • Hosted more eco-educational events, workshops and conferences. • Continued to expand recycling to all buildings on campus. • Continued efforts towards zero waste to include composting and fewer trash cans. • Reduced cardboard and other packaging from vendors. 	√ √ √ √
2012	<ul style="list-style-type: none"> • Continue to expand recycling and waste reduction throughout campus culture including all events. • Continue to host more eco-educational events, workshops and conferences. • Create more educational opportunities of alternative transportation options on campus. • Create a green purchasing policy campus wide. • Launch Interactive Voluntary Energy Management Campaign 	
2013	<p>1. Waste/Recycling Reduction</p> <ul style="list-style-type: none"> -Campus Wide Recycling -Expand Velda’s new desktop bins to all departments. -Expand composting to all departments. -Refillable water fountains in buildings. -Place in the top 5 with Recycle Mania 2013 -Have recycling at every event and be zero-waste. -Chipper to shred yard waste and reuse as mulch. <p>2. Communication & Education</p> <ul style="list-style-type: none"> -Host sustainability educational Events on Campus. -School/unit education program to push recycling down to individual level. -More integrated sustainability in courses with campus laboratory. -Information giveaways, such as bookmarks on why not to use plastic straws. Magnets with website information 	

	<ul style="list-style-type: none"> -Increase flow of recycling savings into faculty/staff – Use U-Matters direct email. -Sustainability more widely recognized as university goal /w resources. -Regular/timed process for press releases related to sustainability team. -Student, Faculty, Staff individuals profiles in a “What can you do?” theme. <p>3. Energy Resources</p> <ul style="list-style-type: none"> -Achieve Energy Star rating for buildings. -Solar installation on campus. In addition to KCP&L installation. -Implement energy savings or energy harvesting projects and grants. -Achieve Energy Star rating for buildings. -Biofuel test generator. -Calculate our campus carbon footprint. <p>4. Funding</p> <ul style="list-style-type: none"> -Find a dedicated line of funding for sustainability projects. -Sustainability team looks for funding opportunities. <p>5. Water Resource Conservation –</p> <ul style="list-style-type: none"> -Rain harvest tanks all new buildings to get a top LEED rating -Harvest waster for lawns. -Low flow toilet fixtures to reduce water. -Native plants. -Expand use of permeable concrete. -More sustainable features within landscaping methods. -More roof gardens on existing and future buildings. <p>6. Green Purchasing</p> <p>Purchasing eco-friendly better and safer products for the environment.</p> <p>7. Transportation</p> <p>Continue to expand and maintain Clean Commute.</p> <ul style="list-style-type: none"> -Improve & finish ‘The Hub’ Clean Commutes Bike Shop. -Have bus pass include Johnson County Transit. -100% of campus vehicles/buses go to electric. -Plug-in stations for electric cars. -Promote Walkable Campus. -Continue to expand and maintain Clean Commute. -Improve & finish ‘The Hub’ Clean Commutes Bike Shop. 	
<p>2014</p>	<p>1. Waste/Recycling Reduction</p> <ul style="list-style-type: none"> -Capture ALL Campus Buildings in Recycling Program -Recycling Bins in Every Department/Expand Recycling/Big and Small Bins/Additional Recycling Containers in All Buildings -Compost Heaps and Glass Recycling Everywhere Increase Composting Across Campus -Increase Styrofoam Recycling -Glass Recycling -Increase Electronics Recycling (2x’s) -Organics Composting in All Buildings -Get Campus Area Restaurants to Go Green i.e.(Chipotle, Pickelman’s) 	

<p>-Increase Recycling in All Buildings and Be Better Prepared for Larger Events</p> <p>-Increase Electronics Recycling</p> <p>-Single Stream Recycling</p> <p>2. Energy</p> <p>-Energy Star Ranking for Buildings 2014</p> <p>-Address Areas in each building for energy improvements (variable speed motors, HVAC, etc.)</p> <p>-Get to 500+ sign-ups for the Voluntary Energy Management Program</p> <p>-Achieve Energy Star Rating in at Least One Building</p> <p>-Work towards more Solar Installations on Campus</p> <p>-Energy Savings Incorporated into all Remodel and Construction Projects</p> <p>-Get a 25Kw Solar Installation Completed by end of June 2014</p> <p>-University System-Wide Divestment from Coal</p> <p>-Energy Savings-Energy Wars and Contests</p> <p>-Exterior Parking Lot and Walkway Lights Converted to LED</p> <p>3. Events</p> <p>-Zero Waste Events 100% of the Time</p> <p>-Community Engagement both internally and externally-Encourage, Educate and Engage</p> <ul style="list-style-type: none"> • Educate Young Community through a Fair-Sustainability similar to the Sally Ride Festival • Christmas Tree composting and Leaves • TV and Electronics Recycling • Shredding Paper Event • Scrap Metal Event • Books, Tapes, CD's, VCR Tapes, Batteries • Jean Donation- Team with Companies that Reuse • Donate a Car Charity <p>4. Funding</p> <p>-Dedicated Sustainability Funding in 2014</p> <p>-Student Led Funding</p> <p>-Seek Funding Opportunities</p> <p>5. Education</p> <p>-Campaign to Keep Campus Free of Smoke and Litter</p> <p>-Helping Make the Tobacco/ Smoke Free Campus on campus is successful through Public Awareness and tie it to the Environmental Impact of Smoking</p> <p>-Make Public Awareness Campaign about Recycling and Composting</p> <p>-Education Piece on what is recyclable and what is not before Recyclemania 2014</p> <p>-Waste Audit and Reporting Across Campus to Help Us Understand and Increase Recycling</p>

	<p>-To Support More Educational Trainings/Modules for Students and Student Organizations</p> <p>5. Reuse</p> <ul style="list-style-type: none"> -Reuse 900 Cardboard Boxes from the Spring Computer Buy -Create a Reuse Room -Discounts for Refillable Mugs at the Food Businesses on Campus <p>5. Transportation</p> <ul style="list-style-type: none"> -Provide More Bicycle Parking at Heavily Used Buildings -Street Car Promotion -Additional Parking Garage to Reduce Driving Around Looking for a Spot <p>6. Green Purchasing</p> <ul style="list-style-type: none"> -Partner with Campus Dining Services to Provide a Catalog Order for Sustainable Wares, i.e. plates, utensils. -Buy-Recycled Paper Policy -Procurement Packaging Policy to Reduce Packaging both Policy and Text for RFP's -Work with Vendors to Reduce Packing Waste <p>7. Grounds</p> <ul style="list-style-type: none"> -Create an Adopt a Landscape Program -Grounds Maintenance Alternatives-No More Leaf Blowers or Mowing Leaves—Manual Labor as Raking -More Pervious Concrete -Continue Looking for Green Products for Daily Use- Ice Melt-Fertilizer, etc. <p>8. Water</p> <ul style="list-style-type: none"> -Time controlled Water Main Fixes -Increase Water Management: Rain Gardens, Flush Management <p style="text-align: center;">•</p>	
<p>2015</p>	<ul style="list-style-type: none"> • Increase Funding for Sustainability Efforts on Campus • Waste Reduction, Recycling, and Reused- Continue to minimize waste and explore waste to energy opportunities in the region • Policy and Planning-Develop Sustainability Policies within all Departments • Reduce Energy Consumption • Expand Transportation Use and Options — • Support Local Food Efforts and Expand Awareness and Education 	
<p>2016</p>	<ol style="list-style-type: none"> 1. Community <ol style="list-style-type: none"> 1. Support the expansion of the Kansas City street car 2. Better educate the Faculty, Staff, and Students on sustainability projects by using posters, social media, and orientation 	

	<ul style="list-style-type: none"> 3. Partner with academia for the greater Kansas City sustainability to attract students and bring the community into campus 2. Energy <ul style="list-style-type: none"> 1. LED Lighting 2. Solar Panels 3. Recycling and Waste Reduction <ul style="list-style-type: none"> 1. Increase Composting 2. Enhance electronic recycling 3. One step active recycling database 4. Local Food Sourcing <ul style="list-style-type: none"> 1. Reintegrate UMKC Community Garden 2. Local and sustainable food sourcing (tracked and reported) 	
	Other Goals:	
	Institute toner recycling program for the dorms. There is currently a toner recycling program in all the office and classrooms on campus including the Miller Nichol Library.	√
	Create a campus roadmap for sustainable purchasing policy. Reduce cardboard generated on campus through use of reusable plastic totes for supplies both internal and from vendors	√
	Air compressor on campus for bike tire fill-ups.	√
	Campus-wide survey of what students want to make the campus more sustainable.	√
	Continue to work with students who live on campus to meet their goals and encourage their involvement in sustainability issues on campus.	√

IV. Operations

A. Electrical Energy Management and Conservation

The second largest source of carbon emissions (and perhaps the most controllable) at UMKC is the energy required to operate the campus's buildings and fleet vehicles. From the most recent data, these two sources alone produce 1,758 tons of CO₂ annually. Second only to the carbon emissions from students and staff commuting to and from campus, this aspect of the university's carbon footprint is directly controlled by the university and is a reflection of its energy practices. All things considered, it is easily the area where the largest reduction of carbon emissions can potentially happen because the department has control over building operations. The signing of the ACUPCC was a huge step forward and the implementation of building policies that include sustainability goals have made a tremendous impact on the campus. To continue to cut carbon emissions, UMKC needs to continue to build on current initiatives to find more ways to reduce our energy needs while reducing those costs to the university and its students.

B. Performance Contracting

Various projects around campus have contributed to a significant reduction in carbon emissions over the last several years. The most prominent project in recent years was an energy performance contract with Burns & McDonnell. At a cost of \$19.4 million, the contract is projected to save an estimated \$1.6 million per year in energy costs and will be a responsible for a substantial reduction in carbon emissions. Most buildings on the Volker and Hospital Hill campus were upgraded under the contract with at least more efficient lighting retrofits. Other projects under the contract included

upgrades to the heating systems, cooling systems, and ventilation systems around the campus. The boilers, part of the current heating systems, were modified so at times of lower load; the campus can use fewer boilers at a time. Air handlers were modified to shut down when they aren't needed to improve efficiency and a steam line repair project was undertaken to identify leaks and deliver heat to campus buildings more effectively. Also under the contract, a new automated chiller plant was installed on the Volker Campus to cool the buildings more efficiently. This new system is automatically adjustable at many levels to ensure that there is less stress put on the system and more energy is saved.

Repairs of the existing underground steam lines were completed in 2010 and will greatly contribute to energy efficiency since the old lines were leaking significantly.

C. Energy Management Savings

Prior to the implementation of the energy performance contract, UMKC had established an Energy Management Group in 2004. In that time, they have implemented energy savings projects with approximately \$532,000 of savings annually by implementing night setback programs, steam trap maintenance programs, steam pit insulations projects and limited roof top unit/controls replacements.

Building on this initial effort the energy performance contract is project to have significant cost and emissions impacts. The project has been completed from a construction standpoint since January 2010 and first year savings and impacts are currently being calculated by Burns & McDonnell. The estimated annual savings guarantee and emissions reductions break down as follows:

Annual Savings Guarantee	% Reductions	Emissions Reductions Projected
Energy Cost Savings		11,706 Tons of CO ₂
\$1.6 Million		26 Tons of NO _x
Energy Savings		52 Tons of SO ₂
11.8 Million kWh	22.8 % electricity consumption	224,465 milligrams of Hg
51,348 kW	45.6% electricity demand	Net 30% reduction of emissions
613,559 Therms	30.8% natural gas	
21,024,908 gallons	29.4% water	

D. Heating Ventilation Air Conditioning Systems

Other improvements have been made that were not in the energy contract as well. Most recently, controls were switched from pneumatic systems to electronic computer DDC systems in several buildings. These controls automatically calibrate themselves to ensure optimum performance and less maintenance. Oxygen sensors (O₂ trim) were installed on the boilers a few years ago that analyze combustion gases to ensure combustion efficiency to save energy. Current climate control systems on campus were retrofitted with optimum start times that will bring the building to the target temperature more efficiently based on past performance and over 250 variable frequency drives have been installed on motors to reduce energy consumption. In addition, through the energy performance contract, secondary chilled water pumps have been eliminated in all buildings on the Chilled Water Plant loop. UMKC is also pursuing a number of energy efficient upgrades and renewable energy projects around campus for little to no cost to the university. UMKC is currently working with the Electric Power Research Institute (EPRI) on a demonstration project to replace 10 parking lot lights with light emitting

diodes (LEDs). CFM has also worked with a local manufacturer to retrofit 5 university pedestrian lights with LEDs. LED bulbs are an excellent technology because they not only save money; they last for a very long time. A photovoltaic demonstration project is in discussions with Kansas City Power & Light and the local electricians union. It would be limited or no cost to the university and would be in a highly visible area of the campus.

E. Energy Saving Retrofits

Aside from improvements to the education buildings, the detached houses used as offices on campus are undergoing improvements to increase their energy efficiency. This year a study was done to assess the ceiling insulation and found that it was sufficient. The carpentry department is currently working on improving weather stripping and winterizing the houses. A project was done with KCP&L to install programmable thermostats that decrease the energy used during the day at no cost to the university. As lamps fail in those houses, they will be replaced by compact fluorescent bulbs to further reduce energy needs.

F. Energy Contracts and Suppliers

Over the last few years, UMKC has been aggressive about lowering the campus's energy consumption and has been successful. The energy contract with Burn and McDonnell was a huge step forward in reducing the university's energy consumption; however there are projects that were originally in the contract that were not financed due to long payback timeframes or concerns about technology. These projects had significant

potential for energy reduction. UMKC should continue to reevaluate why these projects were not practical and look at funding or technology alternatives overcome those obstacles.

G. Potential New Technologies and Voluntary Energy Management

Research has been done into new wireless motion detecting lighting systems that would greatly reduce the installation costs of traditional wired systems and have potential to reduce energy consumption. Some motion detection systems have been installed in larger auditoriums on campus. These devices have high energy saving potential and the application of this technology should be expanded to other areas on campus such as new building projects and renovations. To install these systems in areas under construction greatly reduces the installation cost and shortens the payback period. There have been many additions and renovations on campus recently and it is very important that the university implements as much energy saving technology as possible in these projects. If UMKC takes carbon reduction seriously, these extra expenses should be calculated into every new building project or renovation. Even with all of the campus' recent carbon reduction measures, our data shows that at current rates of expansion, UMKC will still have slight increases in carbon emissions by 2013 without the addition of the new student union and other building expansions factored in.

As UMKC continues to improve its sustainability, it is important that we gauge our progress. In addition to the energy performance contract and ACUPCC reporting, other progress measures are also available. For example, by participating in the EPA's Energy Star rating system, we can assess how UMKC's facilities compare to other

campuses. The university should consider use of this tool to track its energy efficiency improvements over time so we can get a better idea of where it really stands.

In 2011 UMKC Sustainability Team designated a Voluntary Energy Management Sub-Committee to work to find solutions to engage folks on campus to help in reducing energy consumption through individual actions steps. The sub-committee, comprised of eleven members includes faculty staff and student representative and in addition a representative from the local electric utility Kansas City Power and Light, Smart Grid⁸. The sub-committee developed a survey instrument in conjunction with Dr. Larry Bunce in campus Institutional Research which was sent out fall 2011. The sub-committee reviewed the survey results and has put together a three pronged voluntary energy management campaign that will roll out in February 2012 and is completing an updated survey in spring 2017. The program will be multi-media, interactive and educational.

H. Grounds Maintenance Landscaping Sustainability

While UMKC's Ground Maintenance's practices do not contribute a large percentage to the campuses' carbon footprint, it does have a very large impact on the campuses' overall ecological footprint. Through the use of chemical fertilizers, pesticides, and its landscaping water consumption, UMKC is significantly contributing to an impact on the local community's natural wildlife and water systems.

The Landscape Services efforts under Campus Facilities Management Department have taken additional measures every year to help lessen its impact on the environment. Landscape Services has implemented numerous lawn care practices that help to minimize

⁸ <http://www.kcplsmartgrid.com/> retrieved 09/10/2011 by Kaye Johnston

the need for chemical fertilizers such as installing mulch kits on lawn mowers and reduced picking up lawn clippings to help nourish the soil. Mulching discourages weed growth, and thus the use of herbicides, by cutting the grass at 3.5-4 inches (the top of the recommended range). Grounds recently changed grass seed with a higher quality drought resistant variety called [SMART SEED™ with MYCO Advantage™](#) which produces a healthier, thicker lawn that grows deeper and denser root systems. This new grass requires up to 30% less water and maximizes fertilizer performance. They feed the newly planted grass and pre-existing lawn at times of the year that will minimize the effect of chemical run off and reduce the need for herbicide and insecticides. Grounds Maintenance is making a large effort to save and reuse plants by transplanting and recycling plants from areas that are under current construction and future construction areas. Constant attention is also given to the irrigation system in the dry months to ensure that water is utilized as effectively as possible. All these progressive measures have collectively reduced the environmental impact of grounds services.

When the irrigation system is being used, precipitation and vegetation requirements are taken into account to prevent overwatering. Measures are also taken to encourage deep root growth so less water is required during the summer months. UMKC recently installed rain gardens and continue to plant trees and even have used seedlings of existing trees. This approach to planting trees saves the university money and improves the campus' aesthetics also using drought tolerant trees will help decrease water runoff that would normally enter the city's overflowing storm water system. There are also parts of the irrigation system that are fitted with deduct meters that help identify where

water use is going, such as on lawns and not down the storm drains which saves money from going down the drain.

As part of the City of Kansas City's "10,000 rain gardens" program to reduce storm water runoff UMKC has created rain gardens on campus that divert water from the storm system to landscaping on campus. These areas also reduce the square footage of lawn and thus reduce the amount of chemicals, and reduce some carbon because the reduction of maintenance. Landscape Services thinks there is room for one to three more rain gardens around campus and their installation could start as soon as next spring depending on funding.

Landscape Services has made an effort to explore more environmentally friendly fertilizers, herbicides, pesticides, and ice melts to lessen the adverse effects on surrounding ecosystems. At this time, there are two main obstacles to implementing these products: their cost is often significantly higher than other products at a time when budgets for landscape maintenance is being reduced and the effectiveness of the new products is either untested or is not as effective. In spite of these obstacles, Landscape Services has continued to pursue options. The department has experimented with chicken manure and turkey litter as an organic alternative to chemical fertilizers, but proved too impractical. In fall 2009 an organic fertilizer containing poultry was implemented because of recent product improvements to reduce odor. Also, insecticides have been switched from chemical based to organic Spinosad and Horticulture Oil which are environmentally friendly and less harmful to people. In the past urea-based ice melt has been used, but because of its impact on campus landscaping, CFM has now switched to a more organic, potassium based ice melt that can help nourish the grass. The higher

grade organic options are very expensive, however in winter 2009-10 Landscape Services will be using a new organic granular ice melt called Greenscapes that has recently been made much more affordable. This product does not contain hazardous components as per the Material Safety Data Sheets (MSDS). Grounds will also try another newly developed ice melt called Green Fire which contains no hazardous components as per its MSDS, but is much more expensive.

The steps being taken by Landscape Services demonstrate the correct mindset regarding the university and the environment, but some current practices that have the largest environmental impact have not been significantly changed. Some current practices and unsuccessful efforts require continued research and investigation. A few examples are described more fully herein.

Corn gluten has been tried as a pre-emergent herbicide, which is much more natural and is harmless to people and animals, but is very expensive and hasn't shown to be as effective as chemical based herbicides. However, extensive research has been done by the Horticulture Department at Iowa State University and has shown that if used in a specific manner, corn gluten can be very effective as a natural alternative.⁹ This option should be reconsidered as a chemical substitute. The department uses synthetic fertilizers every year to maintain a full, green lawn. While the department currently takes steps to minimize the use of these chemicals and the runoff from them, the effect on the environment is unstoppable. Brush Creek is contaminated with an extensive list of synthetic molecules including 2-4 D (and chemical in many herbicides), nitrates, and anthracene, a chemical commonly found in pesticides that the EPA considers toxic to

⁹ <http://www.hort.iastate.edu/gluten/>

animals and harmful to humans.¹⁰ Landscape Services has noted that there potentially will be more product cost of a different form of fertilizer/herbicide and that finding an alternative with comparable performance would be difficult, however other universities around the country have demonstrated that an organic approach to landscaping and fertilizers is both attainable and practical. This portion of the department's maintenance activities may be the most pertinent to damage of the environment and needs to be reassessed. More natural alternatives to current fertilizers and herbicides need to be investigated more aggressively.

UMKC currently has arrangements with Deffenbaugh and Missouri Organics that will allow all of organic waste generated by the campus to be taken to Missouri Organics composting site instead of the landfill using existing dumpsters. Deffenbaugh will waive part of the fees they charge by taking the waste to an alternative location making it less expensive for the university. Secondly, as UMKC contributes to Missouri Organics' feedstock, the university will receive a discount on mulch and compost which the department buys significant amounts of every year further reducing the university's cost. Buying this recycled mulch would build on existing efforts to use recycled mulch made from tree stumps here on campus. The main obstacle for this project is to educate CFM and other Departments on what is eligible for the organics dumpster. Posting a sign with what qualifies for the organics dumpster and the purchase of biodegradable bags for the Landscape Services crew would make this program more attainable. This is a very important first step toward a more aggressive action plan that will significantly improve

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http://kcwaters.org/datadisplay.aspx?Stream=Brush%20Creek&Station_Number=1&acmed_name=Water

the sustainability of the campus. Because this project requires very little investment of time, money or labor, there is no reason why it cannot be implemented immediately.

On January 30, 2009 Kansas City, Missouri submitted an Overflow Control Plan with an estimated cost of \$2.4 billion.¹¹ Under this plan Kansas City will make massive changes to their storm water and sewage systems to improve water quality, minimize damage due to flooding, and maximize social, economic and environmental benefits. This new plan will be the “greenest” plan ever developed by the city and will meet regulatory requirements put forth by the Environmental Protection Agency (EPA) and the Missouri Department of Natural Resources (MDNR). Under this plan, Kansas City has developed the Blue River Watershed Management Plan which will control the overflow of the city’s sewer system and improve the water quality in the Blue River and many other projects to control this and other environmental concerns.ⁱ As a representative of Kansas City’s academic community, it is important that UMKC not only participate in the city’s environmental initiatives, but to set an example for other institutions in the area. The grounds maintenance supervisor has done some preliminary research into a water collection system that would utilize water collected from the roofs of building, store it under landscaping, and use it to irrigate the campus’s lawn and landscaping. There would be considerable cost in a system like this, but would make a massive contribution to the sustainability of the grounds maintenance department. Until funding can be attained for such a project, the university and the city will continue to benefit from existing landscaping water reduction. More measures should be taken to reduce the department’s water consumption such as even further reduction of irrigation and continue to practice

¹¹ http://www.kcmo.org/idc/groups/water/documents/ckcmowebassets/plan_overview.pdf

current water conservation measures. This approach has been taken with recent new construction, including the use of drought tolerant native landscaping and temporary, rather than permanent, irrigation systems for lawn areas. This aspect of the grounds maintenance should be a priority as it has an impact not only on the environment, but the local economy and the future availability of a vital resource to others in the city.

The three main environmental concerns that need to be address and improved on are composting, water management and conservation, and organic landscaping treatments. The current measures implemented show potential, but there is always a room for improvement. While there may be more initial investment and ongoing operating costs to accomplish some of the needed changes, they should be considered a high priority as resources allow and are a crucial component to steering UMKC to a more sustainable future.

I. Facilities Planning, Renovations and Construction

The construction, renovation and maintenance of campus buildings occurs within the context of the overall UMKC Mission and Strategic Plan. The Campus Master Plan is a reflection and an outgrowth from the Strategic Plan. As the 2002 Campus Master Plan evolved from visioning through development of land use concepts, themes emerged that were tested and refined and ultimately distilled into the following set of overarching principles. These principles – which apply to both the Volker and Hospital Hill campuses – remain relevant to the most recent 2008 Campus Master Plan update and today. They establish the physical framework for realizing the University’s strategic goals and address both the internal organization of the campus and its relationship to the surroundings.

The planning principles, tied to specific UMKC Strategic Plan goals, include:

Create a vibrant learning and campus-life experience:

- Develop future academic functions within the academic core
- Develop student apartments and student support services on Hospital Hill
- Enhance and develop open spaces and greenways within the campus

Deepen and expand strength in the arts

- Develop a signature Cultural Arts District along the Volker campus northern edge at Cherry Street, Volker Boulevard, and Rockhill Road

Lead in the life sciences

- Create a campus identity on Hospital Hill for the health sciences
- Identify expansion sites for academic use or related functions that support the city's Life Sciences Initiative

Engage in urban issues

- Encourage and enhance retail activity at the Volker campus Troost Avenue edge, and as part of the Oak Street West Development.
- Pursue partnership opportunities, both physically and programmatically, outside the campus boundary, within Kansas City.

Building Design for Energy Efficiency

All new buildings, additions and major renovation are designed to meet ASHRAE Standard 90.1, Energy Standard for Buildings.

- ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.) developed Standard 90.1 to establish minimum requirements for the energy-efficient design of buildings.
- This standard is also used by the State of Missouri.
- These features have positive lifecycle costs and are used to achieve ASHRAE 90 compliant designs.
- Use insulation in Building Envelope walls and roofs and thermally efficient glazing.
- Use heat recovery systems and variable volume distribution systems on air circulation and comfort systems.
- Use occupancy sensors and building controls to allow energy setbacks and load management.
- Use high efficiency electric motors with building equipment.
- Use high efficiency lighting fixtures and ballast

LEED and Green Building projects

In the past four years, UMKC has placed a significant emphasize on the sustainable features of new buildings, addressing ‘green’ features beyond energy efficiency such as the use of renewable and recycled materials, recycling of construction waste, and the introduction of natural daylight into the environment. These possibilities are considered in every new project and major renovation, and the pursuit of LEED certification by the USGBC is evaluated. The following projects are examples of this emphasis:

- The Henry W. Bloch Executive Hall for Entrepreneurship and Innovation was completed in the fall of 2013. The design of the new 68,000 square foot building is intentionally simple and elegant. It includes a 200-seat auditorium, multiple flexible and active learning classrooms, seminar rooms, finance lab, and faculty offices. The upper three floors of the building are connected by an open, light-filled lobby that includes an amphitheater that will serve as an important student gathering area for the entire school. The project incorporates many energy efficiency and daylighting strategies and has earned LEED Gold certification in 2014.
- Health Sciences Building on Hospital Hill was built with many ‘green’ features when it opened in 2007, including a green roof, zero-carbon impact carpet tiles and interior daylighting/light controls.
- Herman and Dorothy Johnson Residence Hall on the Volker campus was recognized as a LEED Certified building in 2010. This building was the first LEED building in the University of Missouri System.
- The Miller Nichols Library Automated Storage and Retrieval System (ASRS or ‘Robot’) Addition on the Volker Campus is sustainable in its overall principal of compactly and securely storing volumes of books and materials that were previously in an inefficient open shelving environment. The facility opened in 2010 and includes a green roof.
- The Student Union on the Volker campus opened in 2010 and was design and is registered as a LEED building. The final commissioning and construction

submissions are in progress and it is hoped to be recognized as a LEED Silver or LEED Gold building in 2011.

Construction Services (In-House Design and Construction)

Construction Services is located in CFM and is part of its operations. All building renovations are subject to design criteria of the UM System. Energy saving retrofits such as new roofing, upgrading building insulation, window glazing and caulking or replacement is done on a case by case basis. Plumbing, lighting, addition of recycling infrastructure are most always done. There has been a focus on low flow plumbing fixtures and high efficiency lighting upgrades throughout campus as a part of routine maintenance when a fixture is broken or stops working.

Construction Services staff evaluates each project during the planning process for sustainable features. Lifecycle costing is a part of that process. A lot of the upgrades made are part of the design guidelines the UM System uses for new building design and renovations.

Recycling is a part of the waste handling strategies and according to the project manager on in-house renovations there is a lot of recycling going on with scrap metal, cardboard, and paper involved in renovations. There is not any recycling of wood or sheet rock at this time.

The Construction Services designer does source recycled content materials for hard and soft finishes for all projects. The UMKC Campus Procurement Manager also adds language to bid calls that include recycled and refurbished materials. Additionally,

where appropriate, the bid requests for the vendor to take back their goods at the end of life and recycle them as part of the contract.

Resources and Operations:

Construction Services is dependent upon the funding that is brought by other sources.

They are the service unit that bids out and manages construction, both new buildings and renovations. It would be good to have a research base within UMKC that has a data base of available monies for green building and purchases. This would be a great educational opportunity for campus when departments are considering building or renovating and help with funding projects. Construction Services has initiated the MY Smart Plan program through assistance with the UMKC IT Department to recycle the need for printing so many copies of building blueprints throughout the construction process. This has saved the department over \$500,000 since the implementation began.

There is room for improvement in the efficiency of the campus's building and renovation processes. The department could implement more recycling on job sites, create an inventory list of building supplies in store rooms across campus so that we know what we have, where it is located and use it in upcoming renovations.

Overall, Planning, Design and Construction is doing a great job of being good stewards of the monies they spend doing renovations and new construction.

J. Transportation- Fleet Vehicles and Parking and Transportation

Fleet Vehicles

UMKC currently owns 82 fleet vehicles including light and medium duty trucks, utility vans, and police cars. Most of these vehicles are being used every day for general service works, police duties, mail delivery, etc. UMKC fleet vehicles travel about 25 miles per day, averaging 5000 – 7000 miles per year, at 10 – 13 mpg. Typical ages of UMKC’s fleet vehicles are about 8 years old, and approximately 4 – 5 vehicles are replaced every year. UMKC currently does not perform emission testing, but regular fleet vehicle maintenance is performed every 120 – 180 days on average. More frequent maintenance is required on police vehicles and mail delivery vehicles due to more frequent usage. Recently, UMKC has started outsourcing vehicle maintenance service for UMKC owned vehicles. UMKC fleet vehicles use synthetic transmission fluids and ethanol 85 fluids to increase shuttle fleet service intervals and decrease hazardous waste. Ethanol 85 offers significant environmental benefits (85% of Ethanol 85 is made with renewable resources), and also reduce fleet vehicle’s use of petroleum. Overall, UMKC’s fleet vehicles are in fair condition.

UMKC replaced five fleet vehicles in 2010, one of which is an electric truck. That vehicle has become a significant symbol of the progress in UMKC for sustainable efforts. UMKC joined a group of 17 partners that received a \$15 million Clean Cities grant from the Recovery Act. The grant will support the installation of a variety of refueling stations and aid in the deployment of more than 300 alternative fuel and advanced technology vehicles.

Through the grant, UMKC procured an electric truck that will be used on campus for the pick-up and delivery of recycling. The truck is wrapped with a design that promotes sustainability on campus using the UMKC Sustainability logo. The

combination of the zero-emissions fuel source and the recycling task are key to the symbolic role of this new vehicle.

The Smith Electric Vehicles (SEV) electric truck is powered by the latest Lithium-Ion batteries and a 120kw electric motor, has a top speed of 50mph (80km) and a range in excess of 100 miles (160km) on a full charge. It can be recharged in six hours. Newton was launched in the UK by Smith Electric Vehicles in 2006. It is produced in North America by Smith Electric Vehicles US Corporation, based in Kansas City, Missouri.”¹²

The electric truck traveling the same 30 mile per day, will have a total annual electric cost of about \$200 at \$0.1107 per KWh (Kilowatt Hour). Considering all of these factors, UMKC will save a significant amount of money on fleet operation costs. The electric truck will reduce emissions and costs at low speeds while preventing noise pollution around campus.

UMKC has also purchased electric carts for general service usage around campus. These electric carts are not street legal vehicles; however these carts have been able to travel on campus by using sidewalks. A benefits of using electric carts is that they can travel almost anywhere on the campus where fleet vehicles cannot reach and they produce far less carbon emission. By using electric carts, general services on campus are now easier, faster and cleaner.

Using alternative fuel and green vehicle fluids are great way for sustainable fleet, but the best way to reduce carbon emission and reducing fleet cost is limiting the fleet. A major cause of inefficiency in the fleet is from poor work on planning and scheduling.

¹² <http://www.umkc.edu/sustainability/>

Over the past years, fuel consumption has gone down on fleet vehicle operation from managing the fleet schedule. This is a reason why UMKC keeps track of our fleet on campus and create more efficient fleet schedule to reduce the number of fleet vehicles operating and increase the number of services during a schedule period.

Sustainability is enormous part of UMKC fleet vehicle operation. UMKC is willing to accept new technology for a sustainable fleet such as using ethanol 85, alternatively fueled vehicles, and practicing more efficient tracking, maintaining and regulation of the fleet operations. UMKC does not have projected budget for fleet vehicle operation yet, but their goal is to maintain and control operation cost and make sure no money is being wasted. As carbon emissions continue to rise, UMKC fleet operation's vision is to create sustainable and greener fleet operations, and moreover change society's perception of transportations.

Parking and Transportation

Presently, UMKC is providing a total of 4,602 parking spaces. There are for 2,677 spaces for students, 1,252 spaces for faculties and staff, 442 spaces for visitors and 231 handicapped parking spaces are available on UMKC Volker Campus and about 1,897 parking spaces available for the Health Science at Hospital Hill campus. With the increase of enrollment in fall 2010 and the anticipated continued growth in enrollment parking spaces are not enough to serve everyone on campus therefore UMKC Parking and Transportation does require increasing parking spaces. In 2011 the Oak Street Parking Structure is undergoing demolition and a design build parking structure replacement is underway. Various alternatives have been proposed such as changes in

bus and shuttle stops, a multi-modal transfer station, available covered parking for bicycles, a charging station for electric vehicles, carpooling parking spaces as well as housing other amenities such as showers, lockers, and bicycle mechanics to support the urban commuter. These amenities will consider the environment impacts and sustainability elements in the design and build. The new parking structure should accommodate parking for between 1,400 to 1,600 vehicles. The replacement structure will include sustainable features like a multi-modal transit stop, covered bike parking and available showers and electric vehicle charging stations. This new structure will increase the number of spaces available for the rise in student enrollment, number of students residing on campus, use during games at the new Stanley H. Durwood Soccer Stadium and Recreational Field and the Student Union. UMKC Master Plan Update does include the eventual removal of most of the surface parking lots so that all parking will be located in parking structures/garages on the outskirts of campus.

Overall, the UMKC parking lots are in good shape because the Parking and Transportation Department performs annual maintenance. The department endeavors to repair about 3 to 4 lots every year. These are very common issues in urban parking lots from lack of green spaces and bad parking lot design. The green spaces around the parking lots such as grassy areas, trees, and shrubs act as a buffer to cool down the parking lots, therefore decreasing the heat generated by the asphalt surfaces of the parking lots. Currently, most of the asphalt is a light grey color due to age and does not absorb heat like the newer darker asphalt.

UMKC is also planning on implementing an Inter-Campus Shuttle system that will require the rental operation of a shuttle vehicle with a cost of around \$97,000. This

will be the next logical step forward with the potential passing of the Student All Access Bus Pass referendum to be voted on by the student body in spring 2011. The Inter-Campus Shuttle Bus will offer transportation to students, faculty and staff for use on Volker Campus. Students will, upon passing the referendum, have unrestricted use the KCATA bus system including the Main Street and Troost Avenue Bus Rapid Transit to go between the Volker and Hospital Hill campuses. UMKC Parking and Transportation Taskforce's recommendations include for UMKC to continue to make improvements in creating a walkable campus. The Shuttle Bus project will encourage students to reduce their use of personal vehicles to travel to and while on campus. UMKC Master Plan also includes a plan to close an interior street traffic on 51st Street between Troost and Cherry Street, and create a walking boulevard on campus. This project will create safer walking environment and easier connectivity between major destinations on campus. "Closed hours" streets are also being planned, where only pedestrian, delivery vehicles, and fleet vehicles to access to this interior street. This project will decrease number of vehicles on campus and create a more pedestrian friendly campus.

An increase in the Ride Share program is also a recommendation from the taskforce report encouraging commuters to reduce their number of trips to campus and reduce driving while on campus by using incentives such as reduced parking permit costs, preferential parking space locations. It is hoped these measures will decrease the number of cars on campus. Ride Share program is an excellent way to reduce number of cars on campus resulting in less carbon emissions and an overall better parking coordination. Parking and Transportation Department is willing to explore expanding these programs in future, however, regulating and managing the program may be

challenging. This would be a good place for the UMKC Sustainability Team to act as a resource which could ease any challenges.

There are plans for installing an electric car charging station on campus. Currently electric cars are not commonplace. However, as availability of this automotive technology increases, charging stations may be expanded on campus. Other sustainable design elements such as solar powered lighting, controlled water run-off, pervious parking surfaces are being considered by UMKC Parking and Transportation Department. Expense is always the leading factor when making actual upgrade decisions and currently, there are not specifically designated funds to implement these sustainable elements. Nevertheless, they are being considered.

Currently, parking availability for those commuting to campus is not ample. There are not enough parking spaces on campus and the majority of commuters are not able to find spaces to park with ease because UMKC is growing and expanding in enrollment.

UMKC Parking and Transportation Task force's recommendations to improve walkability and reduce the number of cars on campus includes; creating multi-modal transportation structures on the outskirts of campus, rerouting the street, and creating an Inter-Campus Shuttle Bus system within next few years. These projects will produce a better overall parking system, ease traffic flow, and create a more pedestrian friendly campus.

UMKC is on the leading edge of incorporating sustainable elements in parking and transportation to create a healthier environment, flexible parking and safe experiences for commuters coming to campus.

K. Purchasing

The University of Missouri-Kansas City (UMKC) is one of four campuses of the University of Missouri System. Each of the campuses as well as the University Hospital and Clinics has a procurement department that handles much of the procurement of goods and services for its location. Although the policies of the Curators of the University of Missouri are those that govern University purchases, certain individual, specific policies, guidelines, or procedures may be established and followed on the individual campuses. These are not inconsistent with the Curators' policies. The University of Missouri-Kansas City is comprised of 12 professional schools which include over 130 departments. There are over 500 purchasing card holders who can make regular small dollar purchases up to \$5,000 per transaction. For purchases over \$5,000, the campus users use the on-line purchasing system and for purchases over \$10,000, the Procurement Operation takes secure competitive bids. For purchasing card purchases under \$5,000, the cardholders determine where they make their purchases and hence, have the most control over what type of products they buy. While the University has several contracts and agreements in place for commodities and services, these are not exclusive contracts and agreements; therefore, the users have the freedom to buy what they want from whom they want.

There are many benefits that may be realized through implementation of green purchasing. These benefits can provide significant incentive for organizations (public or private) to adopt green procurement practices. The UMKC Office of Procurement has worked with Campus Facilities Management to make 'green' purchases such as recycled content paper products, environmentally friendly cleaning products, Energy Star

equipment, toner cartridges, lead acid and alkaline batteries and added language to both the Recycling Contract RFP and the Waste Hauling Contract RFP. Additionally, the manager of procurement is part of the UMKC Sustainability Team and chairs the subcommittee for Green Purchasing. The Procurement Manager works with student interns on class projects regarding Green Purchasing and is currently working on a UMKC Green Purchasing Guideline.

Through the e-Procurement system at UMKC, system users will have the ability to make green purchasing decisions. Items that are green-friendly will be identified in the purchasing system and should be the first choice, once a user searches for a particular item. Green procurement purchases will be maintained and tracked through this system and can be tracked as part of the overall campus sustainability efforts.

L. Recycling and Waste Reduction

Campus Facilities Management and the Recycling and Waste Reduction Team began efforts to further reduce waste and expand their white paper recycling program in 2002 and implemented the new expanded recycling program on the UMKC Volker campus in 2005. In 1994 UMKC received an Environmental Excellence Award for its white paper recycling program on campus. Again, in 2005 the Recycling Team won the prestigious Environmental Excellence Award for their efforts in expanding recycling on campus. Additionally, UMKC Hospital Hill campus recycling was implemented in spring 2008 in both the Health Sciences Building and the School of Dentistry. The initial waste assessment and characterization along with full recommendations from the team were completed and implemented in partnership with Bridging the Gap. Funding in the

form of grants came from the Missouri Department of Natural Resources and Mid-America Regional Council.

UMKC has recycled a total of 6139.75 tons of materials from 2004 to December 2016.

Breakdown by year:

Year	Tonnage Recycled
2004	55
2005	97
2006	109
2007	127
2008	234
2009	881
2010	300
2011	415
2012	537
2013	575
2014	971
2015	881.75
2016	957
Totals	6139.75

UMKC has increased recycling by 54% since we began which is a huge step forward. Our average recycling rate combining all the years together is 42% however if you look at fiscal year 2016 our recycling rate is 77% with some months during the spring and fall semesters as high as 85% recycling. Based upon industry models, The UMKC recycling program has saved 104,376 trees (17 trees per ton of recycling) 7000 tons of air pollution (using the ICLEI carbon calculator) and 42,978,000 gallons of water (7,000 gallons per tons) to date.

CFM Building Services is currently working on a plan to extend recycling infrastructure to all buildings on campus. In fall 2015 CFM began a waste audit update for campus. Working along with UMKC Geosciences Department faculty and students,

one third of all the buildings on campus were accessed. The study was completed by July 2016. This helps the in determining the current recycling/to waste ration on campus.

Overall, UMKC is making great progress in recycling and waste reduction.

M. Food Services

Sodexo in June 2008 rolled out their cage free eggs that are also raised responsibly without hormones and antibiotics. They are also working with a network of local farmers to provide dairy products, fresh fruits and vegetables. Sodexo has also implemented a composting program for all food waste in November 2008. Combining these efforts with utilization of durable plates and utensils, the use of napkin dispensers that save the amount of paper use and elimination of trays Sodexo's UMKC Dining Services has made great strides forward in reducing its carbon print.

V. Teaching, Education and Community Outreach

A. Curriculum

Environmental responsibility and sustainability may be one of the most important issues facing the world today. Students getting a college education today must be able to address issues of limited energy supplies, pollution, limited water supply and shrinking biodiversity from anthropogenic causes and as a part of student's education at UMKC, they should be competent to make decisions that address these issues in their careers. As a University, It is UMKC's responsibility to educate its students and faculty about current social and economic issues such as sustainability to better prepare them for their careers and produce more rounded individuals that can advance the knowledge of current and future generations.

Scientific research and government policies have pushed forward the concerns of environmental sustainability and responsibility and as it grows, the demand for educated individuals in that field grows. UMKC has realized this need for an addition area of study for students and over the last couple of years has started to implement environmental sustainability into many different fields of study.

The most significant addition to the sustainability education at UMKC is the new Sustainability minor that was added fall of 2009. This new minor combines existing classes and new classes into a comprehensive course of study that will span several disciplines including geosciences, engineering, ethics, urban planning and design, economics, history, philosophy, political science and public administration. Some of the new classes developed under the new minor are Environmental Sustainability, Managing Sustainability, Water and Sustainability under the geosciences department. Additionally,

students will have to complete an internship or sustainable project on campus to complete the minor. The formation of this new minor will better prepare students for the millions of “green” jobs being made in the U.S. over the next few years.

Aside from the sustainability minor, UMKC’s departments implement elements of sustainability education ranging from entire courses to the addition of sections in existing courses that focus on sustainability. In 2003 Dr. Syed Hasan designed a new Graduate Certificate Program in Waste Management that is offered on a regular basis. The biology, geosciences, environmental studies, environmental sciences and urban planning and design departments all integrate essential concepts that students can take with them upon graduation to apply to new jobs in sustainability.

B Internships and Service Learning

Internships in any discipline are very important in a student’s education. It allows them to incorporate knowledge they have gained and use it in a practical way that will make skills visible to future employers. While other departments at UMKC have very developed internship programs and research opportunities, internships and service learning opportunities in sustainability are in the beginning stages. UMKC has agreed to help reduce the regional greenhouse gas emissions by being a part of the Kansas City Climate Protection Partnership. Under this partnership, UMKC can provide opportunities for students in various majors to gain real world application by assisting other businesses in Kansas City fulfill their commitments under the partnership. These internships may be obtained by collaborating with academic advisors within the Geosciences and Environmental Studies department or through professors of relevant courses.

These internships can be very useful to students from different majors, but the current methods of distributing information consists of posting bulletins in few places on campus and individual emails thus limiting them to a small group of students. Students outside of these departments are not offered direction concerning these opportunities and could benefit from what the affiliations across the city if they had more information about who they needed to consult about sustainable internships and the range of different internships that were applicable to their career paths. There should of course be individual consultation with the appropriate staff concerning the individual service learning opportunity, but simply making a larger percentage of the student population aware of such opportunities would both increase the participation in these internships and create closer community ties between institutions in the Climate Protection Partnership resulting in a larger effort to reduce greenhouse gasses across Kansas City.

Additionally, the federal work study program also provides students with paid jobs to shadow staff throughout each semester. The Campus Facilities Management Department hosts five work study positions, one of which works with campus sustainability efforts.

C. Research

Sustainability research takes place across several departments around campus. In the Geosciences department Dr. Syed Hasan's research emphasis is on waste management, a topic that is very pertinent to UMKC's goals of recycling and waste reduction. Dr. Jimmy Adegoke's current work involves modeling cross-scale linkages and feedbacks between processes that impact heat stress and air quality in changing urban

areas. His research may be directly applied to the greater Kansas City area and help our region reach its environmental goals. Jejung Lee's research is focused on developing numerical and theoretical approaches that merge various hydrologic and geologic data such as geophysical data, GIS information, and known geologic data into a stochastic modeling framework to characterize uncertain hydrologic structure and contaminant transport. He studies how contaminants in water travel through various geologic matrixes. His work is very applicable to the Kansas City area considering that local bodies of water are becoming increasingly more polluted. Dr. Caroline Davies brings a geological aspect to the study of sustainability through focus areas such as water and air quality; community projects engaging students in real life environmental education opportunities and Paleoclimatology, human and environmental interactions, air particulate and asthma which enhances geosciences education both inside the department and engaging students from other fields of study.

Outside of the Geosciences department, sustainable research is being conducted in Urban Planning and design by Sungyop Kim. His emphasis is on transportation systems in urban area. His insight of public transportation systems can be of huge benefit to the university by seeking out and organizing alternative ways for students and faculty to get to and around campus. He also teaches sustainable land use and development that can be implemented into future campus planning.

It is not only important to have paid staff to conduct sustainable research, but to provide research opportunities for students. Research helps students gain valuable insight to how formal research is conducted and what would be expected of them in a research-based career. There are a few opportunities for students to assist in such research on

campus. Graduate students may assist on various sustainable research projects being conducted by professors on campus, however because of the complexity of these projects, there are limited positions for undergraduates. However, any undergraduate may participate in a research project with a mentor professor under the SEARCH (Students Engaged in Artistic and Academic Research) program where they may explore any topic that they are interested in including the environment or sustainability. There are a number of projects every year that investigate an aspect of earth science and may be very applicable to our goals on campus.

D. Efforts to Raise Sustainability at UMKC and Around Kansas City

Dr. Syed Hasan has presented his research results at national and international conferences, including those held in France (1987) and the Netherlands (1990) and has also appeared on the National Public Radio's highly acclaimed Science Friday Show (September, 2007). He serves as the director of the Center for Applied Environmental Research (CAER) which he helped establish in 1996.

Dr. Caroline Davies is representing UMKC at a panel discussing being held in Kansas City in December and will discuss the importance of preserving the natural resources in our region and how it ties into ecological urbanism. This event is very important to bringing awareness of our local environmental condition to Kansas City and how we need to go forward develop the city more sustainably.

“Jim Sheppard helps students address 21st-century questions. In the September/October 2010 issue of Sierra Magazine – near environmental luminaries, such as Michael Pollan, Jared Diamond, Elinor Ostrom, Al Gore and James Hansen –

UMKC's Environmental Ethics and Policy course, taught by Professor Jim Sheppard, ranks among the nation's top five environmental courses.

"I can't think of a more prestigious honor for Jim as a teacher, frankly," said Clancy Martin, chair of the UMKC College of Arts and Sciences' Department of Philosophy. "Sheppard is the finest teacher I've ever worked with, and if we support him and his ideas properly, he could create a UMKC Environmental Ethics and Policy program that would be the envy of the best schools in the country." Offered by the Department of Philosophy, the three-credit undergraduate course is open to all majors and academic levels. Professor Sheppard said that all students can benefit from the course.

"I think of it as a class that every student should take," Sheppard said. "The questions of the 21st century are environmental questions. Social, political and economic issues all relate to the environment and this class helps students understand all the interconnections that exist in the world."¹³

"The Kansas City Business Journal's 28th Annual Book of Lists ranked UMKC number three in top area colleges and universities, based on its 2009 fall enrollment of 14,818. More than 15,000 undergraduate, graduate and professional students attended UMKC in the fall of 2010. The KC Business Journal ranked the Bloch School number two in top area MBA programs, based on its 2009 fall enrollment of 412. Led by Dean Teng-Kee Tan, the Bloch School is the only fully accredited school of both business and public administration in the greater Kansas City area. The School's excellence in key areas has been recognized through recent rankings. The Institute for Entrepreneurship and

¹³ <http://www.umkc.edu/news/feature.asp?id=196>

Innovation was ranked among the top 25 graduate entrepreneurship programs in the nation by the Princeton Review; The Master of Public Affairs' Nonprofit Management concentration is ranked among top 25 in the country by U.S. News & World Report; and the Bloch Executive MBA was ranked No. 1 for career impact among U.S. public universities by Financial Times.¹⁴

Perhaps the most important thing UMKC can do raise awareness and encourage sustainable change is to act as an example for other institutions in the area and for the city. When other organizations and city leaders witness how much practical, sustainable progress UMKC has made, they will be encouraged to follow. UMKC needs to continue to move towards more sustainable practices and make those efforts public through panel discussions, collaboration, and various forms of media so that Kansas City and the surrounding region can feed off of that momentum and be compelled to change their environmentally irresponsible practices.

“The Urban Planning + Design students present plan for repurposing empty KCMO schools as part of their sustainable communities’ curriculum. In an effort to repurpose the Kansas City, Missouri School District's (KCMSD) 41 empty buildings, the College of Arts and Sciences' Department of Architecture, Urban Planning and Design (AUP+D) fourth-year Urban Planning + Design Studio presented a strategic plan to an audience of civic and community leaders on Thursday, Dec. 16, 2010. Among those in attendance were Airick Leonard West, KCMSD Board president and Shannon Jaax, KCMSD building repurposer and one of the studio's advisors.

¹⁴ <http://www.umkc.edu/news/announcements/KCBusinessJournalrankings.asp>

"I thought the students did a wonderful job – they presented an amazing volume of work, a lot of fact-based analysis that will be very useful to the Kansas City, Missouri School District," said Daniel Musser, one of the studio's advisors and Senior Vice President – Principal of Zimmer Real Estate Services. "This research] represents a quarter million dollars' worth of consulting work for the Kansas City, Missouri School District."

In March of 2010, in response to a \$50 million budget shortfall, the KCMSD voted to close 29 of its 61 schools. Almost a year later, those buildings – and about 15 other former school buildings – sit vacant, some in serious disrepair.

"We chose this project because it's very complex, topical and important to the community," said Vicki Noteis, AIA and fourth-year studio instructor. "We hope the community will see the big picture instead of focusing on just one building. People need to have the sense that they're all in this together, instead of feeling like they're isolated. They need ideas and information."

From their spacious, new sunlit studio in Katz Hall, Urban Planning + Design students have covered every surface with statistics, maps and sketches. For about 20 to 30 hours each week, students have focused on the following projects:

* Review of History, Context and Existing Conditions: Students became familiar with the broad historic and contextual issues that formed the KCMSD and led to its current condition. Using information from speakers, site visits and reading material, students presented a KCMSD facility overview to faculty and the Studio Advisory Group, made up of the following professionals:

- A city council member
- A city planner

- A KCMSD advisory board member
- A real estate developer and executive
- The American Institute of Architects president
- The Urban League of Greater Kansas City president

* **Data Review and Analysis:** For a month, students collected, reviewed and analyzed KCMSD data. They developed a summary of building conditions, a list of facilities on the National Register of Historic Places, a demographics map and an understanding of existing city plans.

* **Development of Strategic Alternatives for District Decision-Making:** Next, students conducted a planning charette – a final, intensive effort to finish an architectural design project – and presented pertinent data to the Studio Advisory Group.

* **Design a Community Engagement Process:** Then, students investigated best practices for engaging the community, attended planning project meetings and met with local experts, neighborhood leaders and activists.

* **Refine KCMSD Guidebook for Repurposing Strategy:** With input from the Studio Advisory Group, students selected the most promising strategic concept from the planning charette. For six weeks, students created a guidebook to assist the KCMSD in decision-making and implementation of a five-year building repurposing strategy.

While half of their classmates developed geographic information system (GIS) reports from a wall of computers, Andy Clarke and Jesse Lange, senior urban planning and design students, interpreted district maps from their design tables. Clarke and Lange developed a plan that would encourage community support in repurposing the empty buildings.

"We're dealing with the challenge of organizing decades of disorganization," Clarke said. "A student who lives in Hyde Park, for example, would need to walk five miles and past a highway to arrive at a school. We're also developing a plan for community anchors, such as a community center, so the site can serve the community."

As one of the studio's advisors, Troy Nash – vice president and director of Public Sector Consulting at Zimmer Real Estate Services, LC and past KCMO city council member – strived to provide students with a "real world" experience and advice.

"This studio allows students to take what they learn in class beyond the theoretical framework," Nash said. "AUP+D is really helping Kansas City by providing solutions that are grounded in sound urban development principles. Coupled with the urban focus of the Henry W. Bloch School of Business and Public Administration, School of Law and the College of Arts and Sciences' Department of Economics, AUP+D enhance UMKC's standing as a useful community partner."¹⁵

Along with raising awareness across the city, UMKC needs to be aggressive about raising awareness around campus. To coordinate all of the sustainability initiatives around campus is a very time consuming task and it requires expertise from many different backgrounds. It is important that staff and students are aware of the environmental issues that society faces today and also of where the university stands sustainably and what current project are underway. The university can then tap into all of the intellectual resources present to accelerate these initiatives.

It is also important that the students, faculty and staff are aware of the sustainable initiatives that are taking place on campus. Without the participation of the individuals

¹⁵ <http://www.umkc.edu/news/feature.asp?id=192>

on campus, the sustainable programs we have developed such as recycling, Ride and Share, and energy conservation practices would be useless. Research has shown that active programming makes the most impact. Active programming requires input and action steps cross campus to include staff, faculty and students. The methods we have in place now to inform the campus the aforementioned programs are limited at best. UMKC should take advantage of school's web page and expand the current portion dedicated to sustainability initiatives making more inclusive, detailed, and easier to navigate to from the main page.

E. Development of Sustainable Infrastructure

As UMKC implements more sustainable initiatives and as more students and faculty become involved, the amount of dedication and time required to organize and maintain these programs will also increase. Currently as the additional responsibilities regarding sustainability programming and reporting are added, they are spread out among staff members in various departments that do not have the time to address these extra concerns in addition to their current duties. If we are to continue to advance UMKC's sustainability, we need more specialized staff with more time to dedicate to this growing component of this institution's education.

If the university were to undertake this initial investment, the result would be increased time dedicated to primary job responsibilities of sustainably involved staff, increased productivity of current staff dedicated to organizing sustainable programs, increased campus savings to the and cost effectiveness of these programs. The cost savings already accrued from more efficient waste management is capable of paying for

the pay increase of a full time sustainability coordinator. Other benefits include a stronger presence on campus for sustainability initiatives, resources and a go to place to support further growth in this area. This will also support the goal of the university to increase enrollment as more and more students are searching for campuses with a more sustainable and environmental conscious operation. This new and more encompassing full-time position would also be able to act as a resource for environmental stewardship to other departments around campus and advise them on sustainable purchasing, waste management and recycling, and act as a medium through which other institutions and organizations around Kansas City collaborate with UMKC for sustainable organization and lead sustainability initiative through a dedicated UMKC Sustainability Team.

Additionally, this position would work with Student Life and Residential Life to heighten awareness of the university's commitment towards a sustainable future. This new sustainability center would serve as a resource for students. Staff in this office would be able to introduce students to sustainable internships and volunteer opportunities around the city to help them build their résumés and prepare them for various environmental careers. If UMKC is to improve and expand on its existing sustainable education and practices, it is imperative that a more structured and centralized sustainability office with more faculty resources is produced.

The sustainable and environmental education opportunities offered at UMKC seems to be pretty comprehensive. Students can be educated and trained in an environmentally oriented career in a number of fields including environmental science, Biology, and Urban Planning and Design or they may choose to explore other careers and simply take courses that stress sustainability. One area of improvement is the

coordination and information distribution of environmental internships and volunteer opportunities. If UMKC could make these opportunities more available to students, the number of participants would increase. There seems to be research opportunities available to students who are interested and the environmental research being done by the faculty is robust.

UMKC should continue to lead Kansas City in sustainable efforts should try and make its environmental programs and policies visible to the surrounding community to encourage them to follow. However, the university could reap many benefits from conducting more sustainable awareness events around campus. Most importantly, UMKC needs to take advantage of the benefits of having a full time sustainability coordinator. From the best projections available, the cost of a full-time sustainability position would remain well under the total savings to the university in better solid waste management alone. This investment should be the next move for the university considering that the current programs and initiatives have almost exhausted current faculty resources and to spread additional responsibilities over more existing staff is not only inefficient, but causes disruption and frustration among staff members.

VII. Partnerships and Memberships

Kansas City Chamber Climate Commitment Signatory

“The Greater Kansas City Climate Protection Partnership, coordinated by the Greater Kansas City Chamber of Commerce, offers businesses and organizations the opportunity to lead the community toward the complementary goals of reduced regional greenhouse gas emissions and increased economic competitiveness. UMKC joined the commitment as a signatory in 2008.”¹⁶

The American College and University Presidents Climate Commitment Signatory

“The American College & University Presidents’ Climate Commitment is a high-visibility effort to address global warming by garnering institutional commitments to neutralize greenhouse gas emissions, and to accelerate the research and educational efforts of higher education to equip society to re-stabilize the earth’s climate.

Building on the growing momentum for leadership and action on climate change, the Presidents Climate Commitment provides a framework and support for America’s colleges and universities to go climate neutral. The Commitment recognizes the unique responsibility that institutions of higher education have as role models for their communities and in training the people who will develop the social, economic and technological solutions to reverse global warming.

¹⁶ <http://www.kcchamber.com/ClimateProtection/About/Index.asp?IdS=0004CD-8896A60&x=020|010&~=>

Presidents signing the Commitment are pledging to eliminate their campuses' greenhouse gas emissions over time. This involves:

- Completing an emissions inventory
- Within two years, setting a target date and interim milestones for becoming climate neutral.
- Taking immediate steps to reduce greenhouse gas emissions by choosing from a list of short-term actions.
- Integrating sustainability into the curriculum and making it part of the educational experience.
- Making the action plan, inventory and progress reports publicly available.

The college and university presidents and chancellors who are joining and leading the Commitment believe that exerting leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities.”¹⁷

AASHE Membership

UMKC is a member of the Association for Advancement in Sustainability for Higher Education. Campus Facilities Management and the Geosciences Department partner 2007 to pay the AASHE membership fees of \$1500. As of December 2010 UMKC is a current member in good standing.

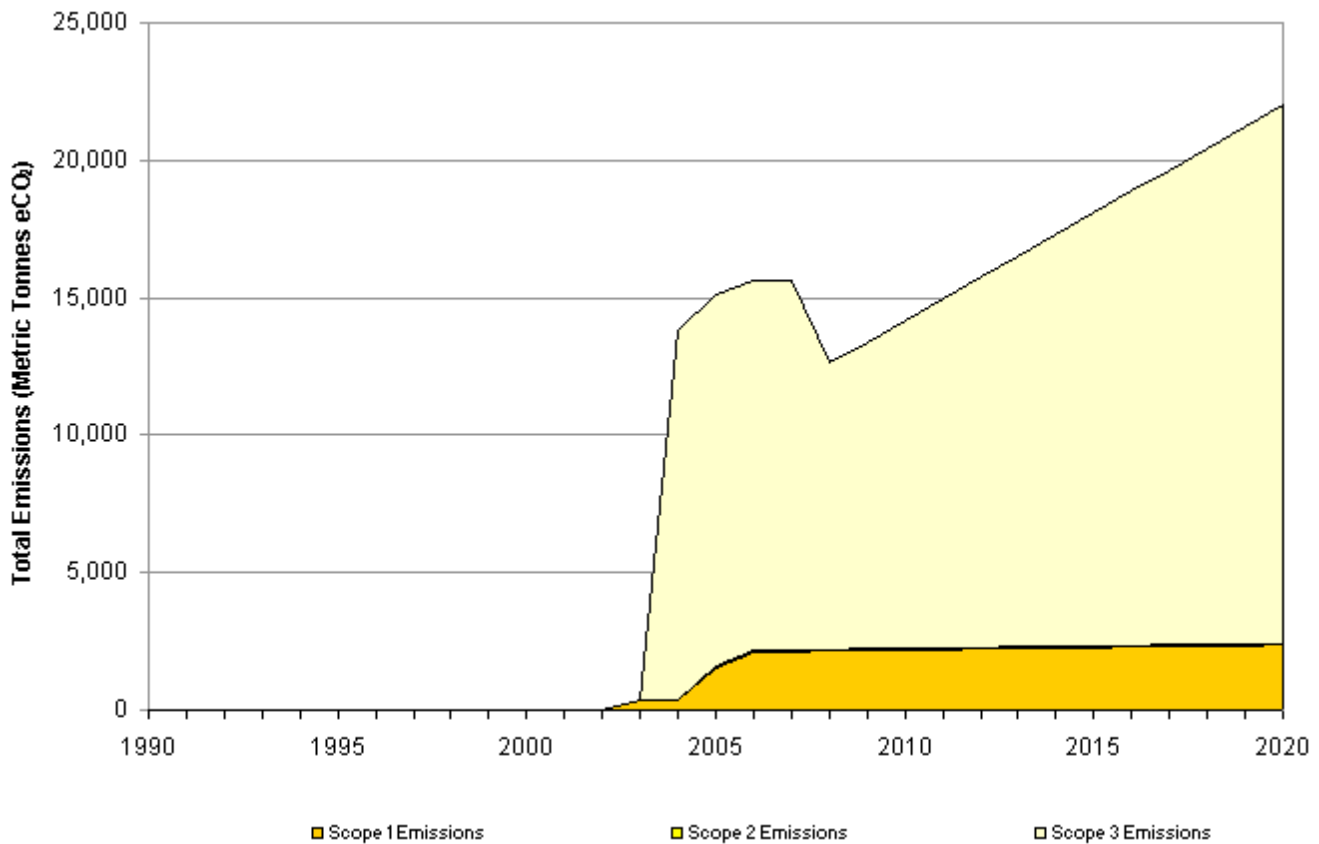
¹⁷ <http://www.presidentsclimatecommitment.org/about>

VIII. Carbon Print Analysis and Assessment

University of Missouri-Kansas City GHG Report

The total CO₂ Emissions for the University of Missouri-Kansas City in 2008 are 10,401.5 metric tons of CO₂e. The data was collected from various departments on campus including Registration, Campus Facilities Management, Procurement, Human Resources and Parking and Transportation. Once the data was collected it was input into the fields on the Clean-Air Cool Planet Calculator v 6. The campus Sustainability Coordinator worked with three student interns through the process of data collection and input. Once the calculations were complete the study was peer reviewed by five tenured faculty members from the Geo-sciences Department and the Assistant-Vice Chancellor of Campus Facilities. This report is a baseline study and will be updated every two years ongoing.

Clean-Air Cool Planet Calculator v 6.0 Graph for CO₂ Emissions for UMKC 2008



IX. Conclusions and Top Priorities

The following conclusions and top priorities have been segmented into the categories discussed earlier in this report. It is important to keep the same methodology for further discussion on what the possibilities are in each area.

Operations

Energy Management

UMKC has done an excellent job in the last several years implementing more efficient energy systems, improving efficiency of current systems, and dropping the overall energy requirements of the campus. However, there is always room for improvement. Perhaps the largest and easiest chunk of energy savings has been accomplished in part by UMKC energy contract with Burns and McDonnell and the subsequent energy saving measure will become more expensive and solutions will have to become integrated into the students, faculty, and staff.

UMKC can reduce its energy requirement noticeably through education of the students, faculty and staff for virtually no cost. A more comprehensive voluntary energy conservation campaign should be implemented to encourage all occupants of the university to reduce their energy consumption. Professors and aids should be encouraged to turn lights off when the classroom is not in use. Students should be made aware of the amount of electricity that is consumed when electronics such as laptops are left on. Maintenance and janitors should also follow suit.

Students living on campus should have the information available on how to conserve energy in the dorms every day such as turning refrigerators and thermostats up a

few degrees in the summer and turning electronic not in use. Other universities hold competitions during the year in the dorms such as Battle of the Bulbs what floor can reduce the energy consumption the most in a month for a prize. This event will not only save the university money, but will encourage students to be proactive environmental and political issues.

Required energy consumption on campus should be identified and more unnecessary energy use should be reduced such as lighting and electronics when the university is closed. After cleaning and maintenance personnel have gone through the building day to day, everything that can be shut off at night should be. If more energy saving measures like these are not implemented, UMKC will have lost all of the energy savings accrued over the last several years just due to expansion of the university by 2014. This next step is the easiest and least expensive way to improve energy efficiency on campus and should be made a priority.

Energy Supplies

KCP&L is currently the only provider for UMKC's electrical energy. By using mostly coal to power the power plants near Kansas City, UMKC is contributing a great deal to the worsening problem of green house gases and global climate change. In addition to improving the energy efficiency of the university, UMKC should seek out electricity from renewable sources such as wind or solar power. Since it is unlikely that UMKC will become an energy produce, the efforts can best be supported through encouragement of and legislative support to KCP&L in their renewable energy efforts. In

the near future, these renewable energy sources will be a reality for Kansas City and UMKC should act aggressively to incorporate them into the power supply.

Along with purchasing renewable energy, UMKC would benefit from research into the technologies and feasibility of small scale on site electrical generation. These technologies could not account for much of the overall energy consumption of the campus, but if they would serve as a symbol of UMKC's commitment to the environment, would lead other institutions in Kansas City to implement clean energy into their energy into their operations, and would attract students to the campus that prioritize sustainability which is increasing every year.

Landscape Services

Steps continue to be made to make UMKC Landscape Services more sustainable. Ice melt that is being used has less of an environmental impact than that used in the past. Steps have been taken to reduce water consumption for irrigation, and only native plants are being planted for landscaping among other things. However, there are specific areas of concern that have a large, direct impact on the local and global environments that need to be addressed. These changes must be decided upon by all parties involved in the decision making of grounds maintenance in order for consistent, effective implementation.

While the grounds maintenance department has reduced the amount of synthetic fertilizers and pesticides by reducing areas applied and finding some alternative solutions, a zero tolerance policy would be a huge step forward in sustainability. No matter what precautions are taken, there will always be harmful effects from these chemicals on the

environment and people and as a leader in academia it is the university's responsibility to make informed, ethical decisions that will improve the quality of life for students and wildlife.

The grounds maintenance department has also made strides in water conservation by planting only native species of plants, regulating the irrigation system my tightly, planting drought tolerant grass, and encouraging deep root growth in the vegetation. However, as of right now, 100% of water used for irrigation is treated and 0% is reclaimed or captured water. With all of the roof space that UMKC has established, large portion water required for irrigation could be provided from rain water capture. The department should pursue the feasibility of this project as it would have a great impact on the campus's sustainability.

Perhaps the most crucial next step and also the easiest and most cost effective is the composting of the landscaping wastes. There is a dumpster available currently to put the waste and Missouri Organic will dispose of it. The investments necessary to complete this project are education of the staff involved and purchase of compostable bags. This project would yield the greatest increase in sustainability for the financial investment required. The next available resources in the Landscape Services department should be focused on this project.

Facilities Planning, Renovations and Construction

The most important recommendation for the Facilities Planning Department is to continue to require contractors to reduce waste generated from projects through recycling, reuse of materials and supplies, and decreased generation of waste through best

management practices. In addition, the department is in the process of using [MySmartPlans®](#) at the renovation at Cherry Hall and adapting this program for all the construction and renovation projects in the future. This could save the university more than \$10,000 per project in blueprint printing and printing costs and in addition saves delivering sets of plans to all parties. Reducing the amount of paper generated (36 cases estimated per project) would save approximately 1080 tons of CO2 per project.

There are several other ways to reduce waste such as inventorying left over supplies, furniture and equipment from a project and using it for future renovation projects. Right now the department is looking at the cost efficiency of such an inventory/cataloging operation on campus.

Installing green technologies and green features as they become available and tested into projects both new construction and renovation would be another way to reduce the use of natural resources and increase the economy of structures on campus.

Overall the department is doing a good job of being forward thinking in regards to reducing resource consumption.

Transportation- Fleet Vehicles and Parking and Transportation

The UMKC Parking and Transportation Report from 2009 gave a lot of good recommendations for campus to increase use of alternative transportation including bicycle riders, ride share, pedestrian traffic, and public transportation. With the advent of the Max line currently being installed on Troost Avenue that will create rapid transit between Volker Campus and Health Sciences Campus a student and staff all access pass would be a logical next step. The Student Government Association set forth a vote to the general student population in March 2010 for a green fee to pay for such an all access bus passes for all

students. The vote was defeated at a near 50/50 margin. The student in February 2011 voted for the All Access Bus Pass and it was passed. The UMKC Bus Pass is available to all students. The fee is \$14 a semester instead of the \$50 Kansas City Area Transportation Authority charges for the all access Metro Bus Pass. Ridership for the program has steadily increased by more than half each year of operation and is wildly successful. More than 38% of the student population uses the pass as of 2016. Two other area universities has joined giving access to the Metro by their students as a result of the success at UMKC.

Additionally, continued expansion of the Clean Commute Program that make bikes available to students would go a long way to increasing ridership on campus by 15-20% over the next five year. Continuing to build a bike friendly infrastructure on campus and on the streets surrounding campus would insure increased ridership.

There are plans to have an electric charging station for electric vehicles and increasing those stations so they are strategically located around campus would support use.

Another great idea is to use the Smart Car concept that has been adapted at a number of large campuses where cars are available for short commutes on campus and around the local community.

Ideas for air travel and ground travel is for the university to purchase carbon offsets and make that part of the overall travel contract through procurement.

Overall, there is much to be done to reduce the use of single occupancy vehicles on campus.

Transportation on our urban campus and also national and international travel are the largest carbon generators and managing transportation sustainably could reduce the campus carbon print by half.

Purchasing

The UMKC Procurement Department has been very active in adding sustainability language to new contracts as they come up for bid and for new contracts. The UMKC Sustainability Team has asked the UMKC Procurement Department to draft a “Green Purchasing Guideline” for use by all purchasing agents in the department around campus. A guiding policy combined with vendors and products identified as “green” through the US Environmental Protection Agency’s Environmentally Preferable Purchasing (EPP) program would give staff the opportunity to make green purchases on a daily basis. The electronic E-Procurement system could also be used to identify green products and vendors (via their contracts) could track green purchases compared to purchases made that are not considered green. This way education could be developed to encourage more purchases. One example of a green purchase would be 30% post-consumer recycled paper. The university still has not set forth a guideline asking departments to purchase only recycle paper for everyday use. Recycled content paper is now competitive to virgin paper and this could go a long way to closing the loop for the campus paper recycling program. Other purchases such as white-out that have volatile organic compounds (VOCs) should be switched with water soluble white-out products. Not only is the water soluble products safer for use in the office they are also safer when they are produced.

Overall, the UMKC Procurement Department should take the lead in forwarding sustainability by providing guidance to all the departments on campus.

Recycling

Building Services, a department within Campus Facilities Management, manages the staff pick up of recycling on campus. While recycling has expanded its infrastructure to 35 buildings on campus another 30-buildings are still without the bins and signage needed to increase the amount of recycling coming from those buildings. Funding for purchasing the additional container and signage need to be budgeted using dollars from reducing the amount of waste being taken to the landfill and the dollars collected for recycling the materials.

Education is a key component for increasing recycling. An interactive online orientation for all new employees making them aware of the recycling program, how to reduce waste and how to reuse office supplies and other materials on campus would go a long way to increasing participation in the recycling and waste reduction program. It is also important to encourage participation in campus events such as Recyclemania, American Recycles Day and Earth Day. Such events can be a way to invigorate the recycling program

Expanding the number of materials accepted in the program can also help increase the number of tons recycled. Right now the UMKC campus recycles 53% of all its waste. A goal of recycling 90-95% of all its waste would be a great next step for the program.

Food Services

Sodexo Dining Services on campus has implemented a food composting program, purchases all cage-free eggs and is partnering with the UMKC Garden Collective, a student community garden initiative to use some of the local grown produce in its offerings. Additionally, Sodexo has eliminated the use of trays to cut down on food waste and uses durable wares instead of disposable. The next step for dining services is to focus on local grown food for more than 50% of its offerings. This would cut the foot print on the transportation of food miles and thus reduce the overall carbon print for food purchases. In addition to supporting the local food infrastructure, Sodexo could also offer more bulk foods and drink and less single serving packages. The reduced packaging would also reduce the waste. For the To-Go orders Sodexo should steer away from using Styrofoam and use a compostable, biodegradable packaging for the meals.

XI. Glossary of Terms

Sustainability --Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Green Procurement/Purchasing --Green procurement involves the purchasing of products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.¹⁸

Greening/Going Green – the activity of adding sustainability principles and considerations into the planning process of an event or organizational or personal lifestyle.

Biodegradable – Substances which, when left alone, break down and are absorbed into the eco-system.

¹⁸ Definition is taken from Executive Order 13101. Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition. September 14, 1998.

Recycling -- taking a product of material at the end of its useful life and turning it into a usable raw material in order to make another product, thus diverting it from the waste stream or from ending up in a landfill.

Recycled-content Papers – defined as papers containing a minimum of 30 percent post consumer fiber by weight.

Light emitting diode (LED)-LEDs produce light at low temperatures. This reduces wasted heat energy and makes them very efficient.

XII. Appendices

A: The UMKC Parking and Transportation Report and Recommendations 2009

<http://studo.umkc.edu/sga/election-issues/Parking-and-Transportation-Final-Report-Aug-2009.PDF>

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This is a book written by the panel on advancing science of climate change from the National Research Council who includes top experts from a wide array of disciplines over a variety of sectors. The panel gives the history, present and potential future causes and impacts of global climate change in a thought provoking methodology including current and new understandings on research, next generation modeling and the human assets and resources needed to support ongoing activities to reduce human impacts on climate change in relationship to current climate trends.

2. BRT (2011) [Business Round Table Report 2011](#) Businesses learning about new technologies and how they impact sustainability in their leading U. S. Companies.

The Business Round Table Report 2011 is an association of chief executive officers from leading US Companies with nearly \$6 trillion dollars in annual revenues globally. Each CEO from the 115 companies ranging from AO Smith Corporation to Dow Chemical to Xerox, give summaries of their activities in innovations towards sustainability in terms of resource use and conservation, social capital and environmental stewardship. The commitment in terms of economics is critical to drive these activities on a global scale and reduce emissions while keeping the businesses viable in the context of an emerging global scale economy.

3. CCSP (2008b). [Abrupt Climate Change. A report by the US Climate Change Science Program \(CCSP\) and the Subcommittee on Global Change Research \(Clark, PU, AJ Weaver \(coordinating lead authors\), E Brook, ER Cook, TL Delworth, and K Steffen \(chapter lead authors\)\).](#) Reston, VA: US Geological Survey.

This publication is a result of a report by the USGS on abrupt climate change research. The lead team of researchers include John P. McGeehin, and John Barron from the USGS and David M. Anderson from NOAA and David Verado with NSF. The report was compiled to be used to inform policy and decision making regarding key climate issues. The three goals addressed in the report are: “ (1) summarizes the current knowledge of key climate parameters that could change abruptly in the near future, potentially within years to decades and (2) provides scientific information on these topics for decision support.(3) As such, the SAP is aimed at both the decision-making audience and the expert scientific and stakeholder community.”

The scientific research discusses rapid changes in glaciers and ice sheets, hydrological variability and abrupt change in the Atlantic Meridional Overturning Circulation and abrupt changes in atmospheric methane. The first four chapters focus on the scientific findings and the rest of the report discusses implications for policy discussions.

4. Costanza, Robert., Daly Herman E., Bartholomew, Joy A. GOALS, AGENDA, AND POLICY RECOMMENDATIONS FOR ECOLOGICAL ECONOMICS . , Gundiee Publications US (1991)

This publication is one of the first to discuss the importance of ecological economics and how it will frame policy. It also puts forth ideas on this emerging transdisciplinary field of study specifically in regards to sustainability. In summary, this book is relevant to present day discussion to reach a meeting of the minds on how best to move forward in a global economy using consensus. This book offers a variety of ideas and perspectives from leading economic and environmental thinkers around the world.

5. Fischlin, A., *et al.*, in IPCC AR4 WG2 2007. "Executive summary" (PDF). Chapter 4: Ecosystems, their properties, goods and services. pp. 213–214.

This is a scientific report on the value of ecosystems and how they provide goods and services generally not considered as having economic value. This report shows how value can be assigned to benefit.

6. Granger Morgan, M. (Lead Author), H. Dowlatabadi, M. Henrion, D. Keith, R. Lempert, S. McBride, M. Small and T. Wilbanks (Contributing Authors) (2009). *Synthesis and Assessment Product 5.2: Best practice approaches for characterizing, communicating, and incorporating scientific uncertainty in decisionmaking. A Report by the U.S. Climate Change Science Program*
Developing best practices within the sustainability field is a challenging and difficult feat when there are conflicting reports in the science of climate research. This book deals with what approaches can be used to communicate these conflicting reports and characterizing the science in the context of the real world.

7. Subcommittee on Global Change Research. Washington D.C., USA.: National Oceanic and Atmospheric Administration. pp. 19-20; 27-28. <http://www.globalchange.gov/publications/reports/scientific-assessments/saps/311>. Tables 2.1 and 2.2 on pages 27-28 show two quantitative scales of uncertainty which are used in the TAR and AR4.
This report was written by a group of leading scientist and shows the scale of uncertainty by which relevant and non-relevant claims are being made by sciences in the area of global climate change. It is important to understand these scales to make decisions that are both pertinent for now and for the future.

8. Magretta, Joan. [“Growth Through Global Sustainability: An Interview with Monsanto’s Robert B. Shipiro”](#) The Harvard Business Review pp. 79-88. January –February 1997

This journal article brings forth tenants that in a global economic sustainability are the only worthwhile long-term plan for continued economic growth. Sustainability is the platform by which 21st Century companies can compete in a global market and continue to expand growth during economic uncertainty.

9. Rosenzweig, C. (December 2008). ["Science Briefs: Warming Climate is Changing Life on Global Scale"](#). Website of the US National Aeronautics and Space Administration, Goddard Institute for Space Studies. Retrieved 2011-07-08

This journal article is hard science evidence that our planet is warming and changing life in a global scale ecosystem by ecosystem.

10. Smith, B.; Schneider, H.; Oppenheimer, M.; Yohe, W.; Hare, W.; Mastrandrea, D.; Patwardhan, A.; Burton, I. et al. (Mar 2009). ["Assessing dangerous climate change through an update of the Intergovernmental Panel on Climate Change \(IPCC\) "reasons for concern" "](#). *Proceedings of the National Academy of Sciences of the United States of America* **106** (11): 4133–4137. [Bibcode 2009PNAS..106.4133S](#)

This is the updated IPCC of 2009. This report shows definitely that climate change is progressing and there are reasons to move forward with climate policy to reduce the impacts of human activities on climate change.

11. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.) Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007 [Cambridge University Press](#), Cambridge, United Kingdom and New York, NY, USA. Solomon’s fourth assessment of the International IPCC is not only compelling on the science and research surrounding climate change but set a precedence showing there is no turning back. Mounting evidence forecast continuing decline in ecosystems across the world.
12. [WDR 2010. "Managing social risks: Empower communities to protect themselves"](#) (PDF). Part One: Chapter 2: Reducing Human Vulnerability: Helping People Help Themselves

This report discusses the impact local communities can make in managing specific local risks and how these practices can influence a culture of sustainability on a global scale.

From low impact farming techniques to water filtration, these communities are using their local ecosystems to reduce direct impacts.

13. WHO (2009). ["2.6 Environmental risks"](#). Global health risks: mortality and burden of disease attributable to selected major risks. Produced by the Department of Health Statistics and Informatics in the Information, Evidence and Research Cluster of the World Health Organization (WHO). World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland: WHO Press. [ISBN 978 92 4 156387 1](#).

This is a manual of human risks produced by global climate change based on global health organization data. It shows the trends and changes of mortality and disease as the impacts of global climate change are felt across the world. The most at risk are the poor and currently millions are affected by the effects of climate change on their daily lives. Additionally, the financial burden of the effects are overwhelming and contribute to a decline in the quality of life for many individuals across the globe.

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This report is only the beginning baby step in helping forward sustainability on the UMKC campus. Much more will be needed as the campus begins to transform itself and embrace sustainability as it moves forward in serving countless individuals in the future and being an academic leader in sustainability for the local community and beyond.

R. Kaye Johnston
Campus Facilities Management
Sustainability Coordinator and the UMKC Sustainability Team Chair
