



Washington
University in St. Louis

SCHOOL OF MEDICINE

2018-2025
Sustainable Operations Strategic Plan

To: Operations & Facilities Management Department (OFMD) staff
From: Melissa Hopkins, Assistant Vice Chancellor, Assistant Dean of Operations & Facilities Management, Washington University School of Medicine (WUSM)
Date: September 17, 2018
Subject: WUSM 2018-2025 Sustainable Operations Strategic Plan

This plan is an expression of our commitment to sustainability and offers our department's interpretation of the word "sustainable" as it applies to the work we do and the direction we are heading. It captures the moment, reporting on ongoing efforts and recent accomplishments to advance those sustainability activities for which we have delegated responsibility and those which we accomplish within the larger setting of the university, the campus and the city. It also details our expectations of next steps and next phases of realizing sustainable practices to employ in planning, designing, constructing and maintaining our physical environment.

The utility of this document is practical: to plan for capital and operating resources, staffing needs, and human resource development and as a vehicle for accountability. The core planning team, comprised of OFMD staff, representatives of the University Office of Sustainability, University Purchasing Services, and WUSTL Environmental Health and Safety contributed ideas and text to this report and we hope you will experience it as we do: a celebration of our commitment to sustainable operations.

Special thanks to all of our partners in support of and development of this program plan, as well as the School of Medicine Senior Leadership for their continued support of our planning and sustainability efforts.

With appreciation,

Melissa Rockwell-Hopkins

Assistant Vice Chancellor and Assistant Dean of Operations and Facilities

Washington University School of Medicine

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EXECUTIVE SUMMARY

The Washington University Medical Campus hosts the Washington University School of Medicine (WUSM), Barnes-Jewish Hospital, St. Louis Children's Hospital, BJC HealthCare, St. Louis College of Pharmacy, Shriner's Hospital for Children and the Alvin Siteman Cancer Center at Barnes-Jewish Hospital. The campus is 177 acres and supports more than 1,700 patient beds, nearly 23,000 employees, a daytime population of 30,000, 2.3 million gross square feet of research activity and an annual economic impact on the St. Louis region of nearly \$6.3 billion.

On the Washington University Medical Campus, WUSM building space has increased 65% in the last decade¹ and this scale of growth will continue in the near term with construction of a new ambulatory center and a new research building.² Today, the school's Operations & Facilities Management Department (OFMD) plans, maintains and manages 60 School of Medicine buildings and 8.2 million gross square feet of building space. Department staff is dedicated to stewardship of the WUSM's physical assets and promotion of the campus environment for the benefit of students, faculty, staff and visitors.

OFMD benefits from and contributes to the university's pursuit of sustainability; perhaps the most fundamental of these activities are investments that reduce the university's greenhouse gas emissions through design and operation of its energy and utility infrastructure and buildings. Specifically, the university made a commitment in 2010 to reduce its Scope 1 and Scope 2 greenhouse gas emissions to 1990 levels by 2020³ and to build highly efficient buildings.

OFMD's perspective on sustainability motivates creation of this plan, which focuses on the following seven areas:

1. **Culture:** Empower OFMD staff through education, assignment of tasks, resource support and enable them with opportunities for personal growth as we strive to support sustainability in our design, management, stewardship and operation of the physical resources of the Washington University Medical Campus for which the OFMD has responsibility.
2. **Energy and Emissions:** Design and operate WUSM energy systems and buildings to support reducing university Scope 1 and Scope 2 GHG emissions to 1990 levels by 2020.
3. **Sustainable Buildings and Landscapes:** Become a model among peers in the sustainable design and management of WUSM buildings and landscapes.
4. **Healthy Food:** Provide the campus community with a variety of on-campus options to procure healthy, locally grown food.
5. **Waste Management:** Reduce toxics use and increase the diversion of solid waste from landfills.
6. **Transportation:** Maintain or exceed the current WUSM profile of 47% of students, faculty and staff using modes of transportation other than single occupancy vehicles when commuting to or traveling through the Washington University Medical Campus.
7. **Community Engagement:** Encourage OFMD staff to contribute to and engage in the campus community, the neighborhoods that surrounds the campus, as well as their own communities.

¹ Measured by net assignable square feet

² Collectively, these buildings will add approximately 680,000 BGSF.

³ Without carbon offsets and excluding growth from 2010 to 2020

OFMD is committed to sustainability in all areas of their operations and to proactive and transparent communication. This is achieved through regular communication, including departmental meetings, regular operational interactions, service surveys, monthly newsletters, and targeted signage and sustainability communication. Evidence of concern for sustainability through staff resource development is found in standard practices, including: succession planning, a comprehensive program of training and professional development, and a suite of annual employee awards.

This plan works to memorializes OFMD’s sustainability accomplishments, activities, direction and objectives. The plan was developed to serve as a practical tool to align services areas, establish clear goals and deliverables and serve as a guide for budgeting and resource allocation to achieve the ambitions it expresses and to further the WUSM’s culture of sustainability.

This plan also strives to build on the university’s “2015-2020 Strategic Plan for Sustainable Operations”, which speaks to both campus and our support of university-wide goals, objectives and accomplishments. This plan reinforces the university-wide sustainability plan while setting forth goals and strategies that reflect the unique characteristics, culture, assets, and needs of the Washington University Medical Campus. Perhaps the most important difference between the two is this plan’s launch of a comprehensive approach to sustainable design and physical resource management within WUSM labs, as well as the appointment of a full time sustainability coordinator within the department to support these efforts.

INTRODUCTION: WUSM CULTURE OF SUSTAINABILITY

OFMD's mission is to provide stewardship for the long-term preservation and growth of Washington University School of Medicine's physical assets while working to ensure a safe, welcoming and high-quality environment for students, faculty, staff and visitors in support of the school's mission of clinical care, research and education. The department's commitment to execute this in ways that advance campus sustainability, the subject of this document, is to be celebrated. The commitment builds from fundamentals:

- OFMD strives for **excellence in the design, management and operation** of the physical attributes of the WUSM campus for which it is responsible. Sustainability – undertaking these steps to limit environmental impact and promote community cohesion – is a key means of the department's vision of excellence.⁴
- Diversity and inclusivity are elements of sustainability. As a matter of human resources within OFMD, this translates into **initiatives that promote a team based, collaborative and empowered work force which includes proactive programs focusing on staff learning, mentorship, health, safety and diversity.**
- Deliberate **communication by OFMD about sustainability** to WUSM students, faculty and staff is critical to developing this culture. The credibility of this communication rests on measuring activities and outcomes. Thus, this report commits to improving current data management systems, to robust internal reporting on activities, and to creating strategies for improved communication within the campus community.
- Finally, WUSM recognizes the **power of university and community partnerships** and extends its commitment to these. This document recognizes established and proposed new points of collaboration for the greater benefit of all parties.

OFMD's Culture of Sustainability Illustrated

Lactation Room Program: Mothers are the fastest-growing segment of the U.S. labor force. National studies establish that safe, convenient and appealing space for nursing improves the morale of nursing mothers in the workplace. This program is an essential element of supporting WUSM faculty, staff, postdocs, clinical fellows, residents, visitors, trainees and students who breastfeed and also benefits employers in reducing health claims, increasing productivity, and reducing absences to attend to family illnesses.

Access to lactation rooms helps smooth the transition back to work after childbirth. OFMD launched a lactation room program in 2014 to support the work-hour needs of those on the medical campus. The program started with no dedicated spaces, moved to 15 spaces in year one and has tripled to 53 lactation spaces in year four. The program's manager contributes to the design standards for these rooms, establishes needed housecleaning standards, and inspects the spaces weekly. In 2018, the

⁴ As with all its investment decisions, sustainability at WUSM is pursued according to a calculus of cost effectiveness or return (capital and/or social) on investment. The university employs the WUSM Life-Cycle Cost Calculator and university guidelines on financial modeling.

number of lactation rooms will be increase and the program will expand its outreach to inform people and attract them to use these facilities.

Annual Employee Health Fair: WUSM supports this university forum, which typically attracts about 600 staff members. This serves as an ideal opportunity to educate employees about campus sustainability initiatives and programs, campus emergency management practices, campus safety strategies and the WUSM lactation room program.

Training Program: The OFMD training program was launched in 2014. In FY18, the program included advanced computer training, meeting facilitation skills, Mini Medical School⁵, Society for Human Resources Management⁶, safety training and emergency management training. The program has standard training (for example, OSHA safety training) and skill-specific leadership training each year.

Recognition Program: This program recognizes staff members who have shown meritorious service, dedication and contributions to OFMD and the School of Medicine beyond the requirements and expectations of the job. Since the program began in 2014, the number of awards has increased each year. In 2017, 376 awards were granted in the categories of team, core values, leadership, community service, collaboration, innovation, and kudos.

People and Place Program: This mission-driven program acknowledges the value of OFMD employees to the department, the university, and the larger community with which they engage. Its forum of monthly meetings brings speakers to OFMD with the goals of individual empowerment and career-related education. Recent topics included information about educational opportunities, health and wellness, community engagement and safety, overcoming adversity, and opportunities/encouragement to participate in university community outreach programs. In FY19, the committee plans to center a topic on sustainability in order to educate and empower the department to be more thoughtful regarding sustainable actions.

The Sustainability Action Team: This university-wide group was established in 2007 to motivate reduced energy use by faculty, staff and students. Today, the team broadly considers sustainability and maintains a 900-person mailing list. Quarterly meetings are held to share information about university activity that promotes sustainability. Guests are invited from the city and region to share their sustainability related expertise. This forum is also a source of volunteerism for education and outreach events, including the annual employee picnic that serves over 9,000 people and where, for the 2017 event, 95% of the waste was composted or recycled.

⁵ Mini Medical School is a program where WUSM physicians educate the community by sharing the expertise of the medical faculty. It includes Mini Medical School I and Mini Medical School II. For more information, visit <https://minimed.wustl.edu/>.

⁶ The Society for Human Resource Management is the world's largest HR professional society and is the leading provider of resources serving the needs of HR professionals and advancing the practice of human resource management. For more information, visit <https://www.shrm.org/>.



Employee Sustainability Education: WUSM offers targeted sustainability training and education for OFMD staff as relates to their scopes of responsibility. In part, this effort serves the department’s objective of achieving diverse leadership in implementing sustainability. Twenty-seven OFMD staff has been credentialed through the Sustainability Facility Professional® program⁷. In 2019, the Office of Sustainability will provide a refresher course for OFMD’s six LEED AP staff.

The department is committed to establishing staff awareness and skills to execute their work in ways that promote university sustainability. Sustainability is featured in WUSM department/unit level orientations and is a component of standard staff training. With the release of the WUSM updated design guidelines, specific training will be organized to inform staff of its changes and to highlight the green design attributes it contains. An aim of the training is to encourage staff to apply the education in innovative ways.

In FY19, OFMD will offer training on topics such as proper recycling guidelines, buying an electric vehicle, green office program promotion, etc.

Motivating WUSM Building Occupants: OFMD organizes or contributes to many initiatives that engage the university community in their capacity as building occupants. These efforts aim to influence behavior in support of university sustainability goals and objectives. This includes planning and managing the campus recycling program and participating in the Green Office and Green Lab programs, and the Green Cup Challenge.

Mentor Program: The OFMD mentoring program serves to improve the evaluation process and promote the professional development of custodial services supervisors. Ken Zimmerman Jr., then Protective Services Assistant Director, was paired with Tina Jameson, a supervisor in the custodial services unit. While this formal relationship was temporary, the two have maintained open communication and meet monthly to discuss Tina’s professional experiences.

Ken’s view of the experience:

I was paired with Tina Jameson. My only concern going into this was whether Tina would accept me as a mentor. Tina embraced the new direction for the department. It has been an honor to watch her grow professionally and “be the change”.

⁷ Offered by the International Facility Management Association.

Tina's view of the experience:

I had many questions about the new employee evaluation process. Ken's advice was to account for as much positive information as possible along with areas that need improvement. There shouldn't be surprises: goals should be written and should be discussed in conversations leading up to and at the evaluation. I started a journal for each person from my team so that nothing could be missed in generating the written evaluations. I scheduled individual meetings with my team members on a two-week basis which kept the conversations about performance active.

I drafted the formal evaluations and shared them with Ken for his input in advance of the reviews. Ken made the helpful suggestion that I schedule the evaluation sessions to start with team members with whom I thought the meetings would be easiest. The review meetings were a success. I enjoy that this process opens conversation and I now coach team members on areas they need to focus on.

I have grown confident in my leadership abilities. Listening to Ken's advice has helped me to be more empathetic and compassionate. Ken told me his door is forever open to me; the comfort of this, for me, is priceless.

ENERGY AND GREENHOUSE GAS EMISSIONS

Direction

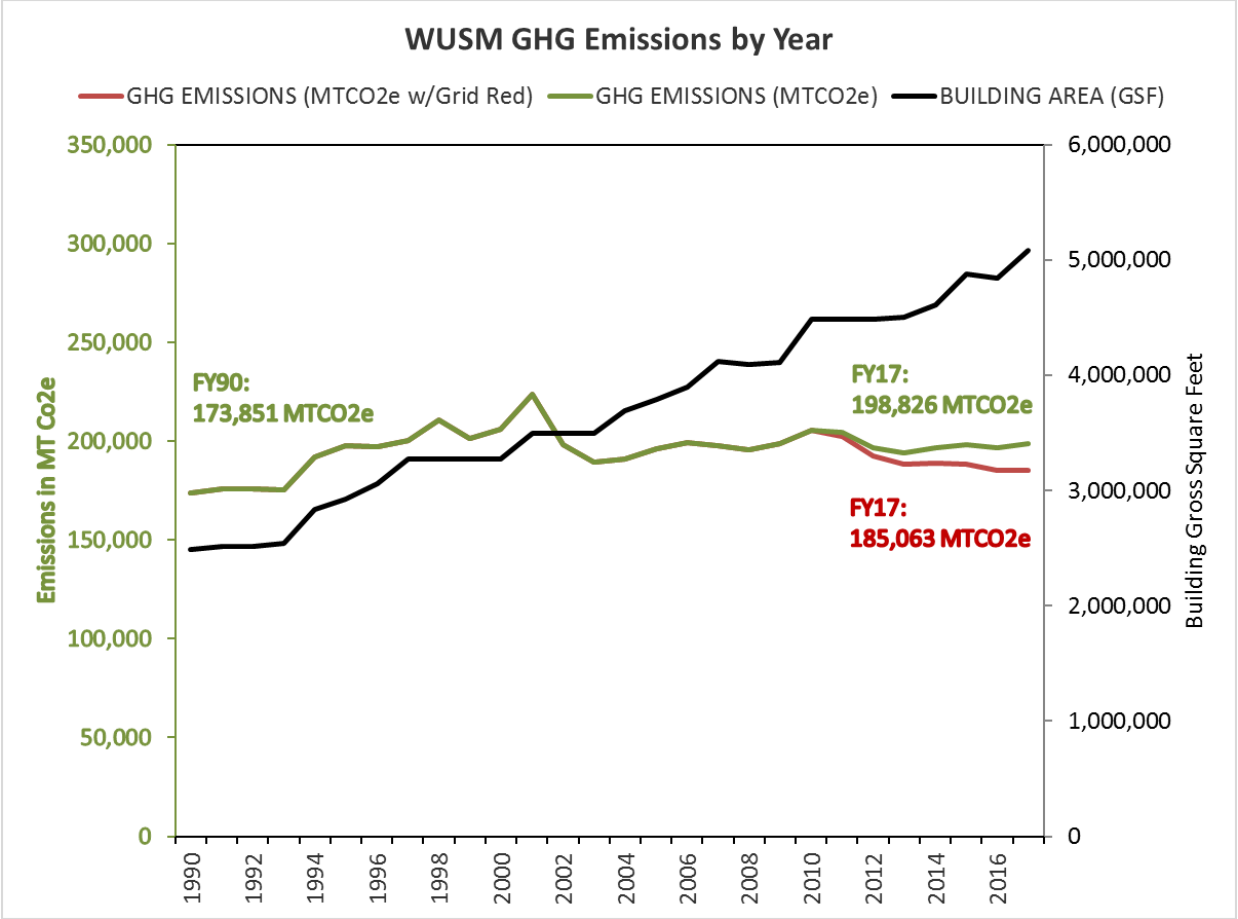
WUSM supports the university's commitment to chart a path toward carbon neutrality without purchasing unbundled renewable energy credits. In the near-term, it will:

1. Design and operate WUSM energy systems to support reducing university Scope 1 and 2 greenhouse gas emissions to 1990 levels by 2020, and:
2. Design, operate and maintain WUSM buildings to support reducing university Scope 1 and 2 greenhouse gas emissions to 1990 levels by 2020.
3. Actively support planning efforts to establish the university's carbon reduction target beyond 2020.

Progress

In 2014, WUSM committed \$30 million to energy conservation to be expended by 2020. Key investments of this fund include: HVAC retro-commissioning and retrofit in the Biotechnology Center, the Central Institute for the Deaf, 4444 Forest Park, East Building, East Imaging, North Building, South Building, McDonnell Sciences, BJC Institute of Health and Cancer Research; HVAC retro-commissioning in multiple buildings; lighting retrofits in multiple locations; air handling unit upgrades in Renard Hospital and West Building, and; campus-wide chilled water optimization.

In 2015, the university completed a review of its progress related to energy conservation. The conservation commitment was made more specific such that projects with the greatest impact on greenhouse gas emissions reduction would be preferential to those that did not. Through this term, WUSM greenhouse gas emissions have not increased, even with substantial growth in building square footage. Since 2015, with substantial building growth, and excluding grid fuel mix improvements, the WUSM greenhouse gas emissions have remained nearly flat.



While building area (gross square footage) has steadily increased from 1990 to 2017, greenhouse gas emissions have remained nearly constant throughout the same time period. The reduced emissions line for 2017 (red) includes the local grid improvements resulting in emission reductions from 2010 – 2017.

While the university has a single goal for greenhouse gas emissions reduction, WUSM also maintains a strategy to ensure the full extent of its potential contribution is realized⁸.

Heat recovery chiller projects and its impacts on energy use: Challenged with space constraints coupled with the commitment to reduce building energy demand, WUSM first installed a heat recovery chiller in 2007 in the Clinical Sciences Research Building. Ultimately, OFMD installed 4 chillers (1,400 tons) and these have dramatically improved campus energy use. Both heat recovery chillers and traditional HVAC systems remove heat from buildings, but heat recovery chillers reuse that heat in the re-heat of supply air in the buildings. This eliminates nearly all need for a heating source to re-heat supply for the building.

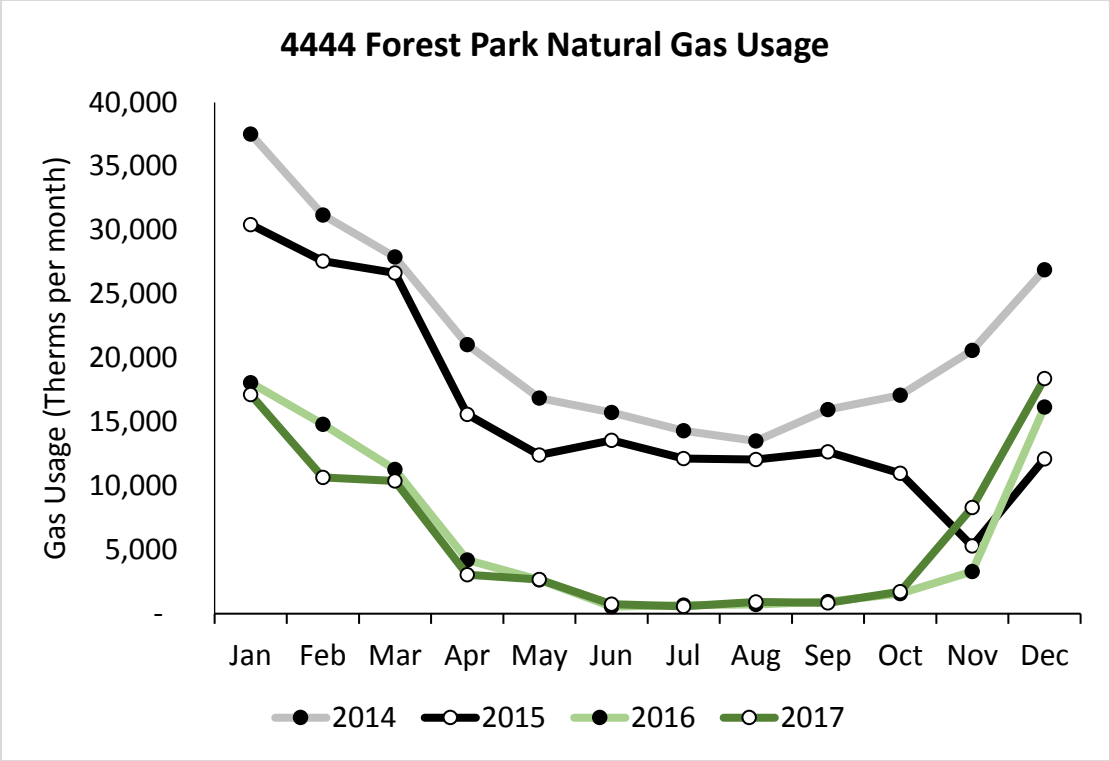
⁸ GHG emissions reductions based on Ameren generation assets/renewable portfolio standard are part of projected reductions to get to 1990 levels. Ameren’s reductions are not included in the data shown below.

Renewal – role of deferred maintenance: At WUSM, capital renewal plays a major role in energy conservation. Age and use related diminished performance, obsolete design methodology and outdated technology can cause significant increases in energy use. Reduced performance of utility distribution systems, building systems and building envelopes is a function of material decay, deferred maintenance and repairs, and/or obsolete controls and equipment. Obsolete design and technologies not only limit energy efficiency opportunities, but the ability to modify and renovate space.

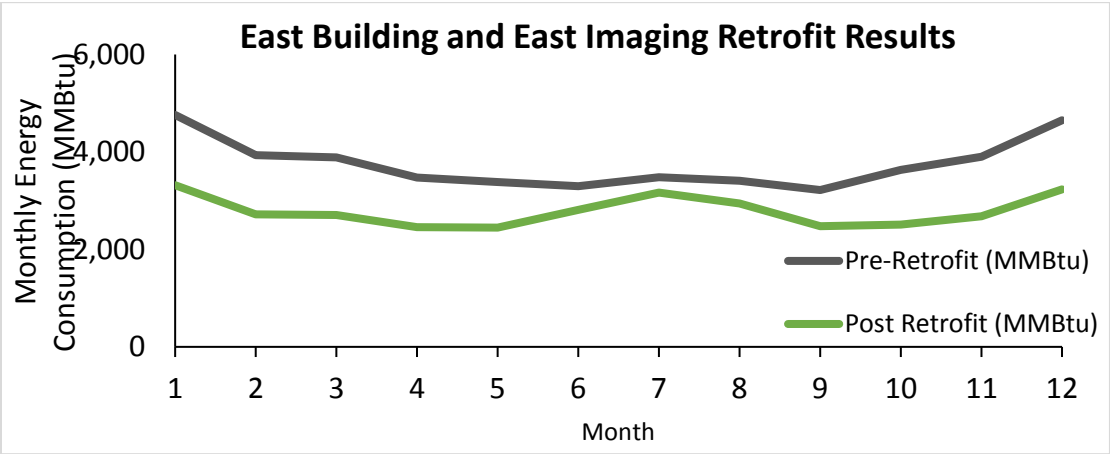
Proactively managing renewal is a systematic way to update and replace assets nearing the end of their useful life and to improve overall campus energy efficiency. Renewal projects provide the opportunity to install new technologies (such as converting a florescent lighting system to LED) and to implement innovative system design (such as moving from a constant volume HVAC system to a variable volume system). At the same time, cutting edge design approaches are used with the latest technology to ensure optimum performance and energy use.

Energy retrofits: A 2015 energy retrofit project at 4444 Forest Park updated boiler controls and temperature schedules for HVAC systems, added a variable speed drive to a chiller and installed a new heat recovery chiller. The result was a 64% reduction in natural gas usage and 4% reduction in electricity consumption⁹ (while accounting for lab space that was vacated during the post retrofit period). 2016 energy retrofits at East Building and East Imaging included rebalancing to reduce airflows, scheduling the air handling units to include night and weekend setback, and converting terminal boxes from pneumatic to digital for precise temperature control. The result was a 21% reduction in electricity consumption and 34% reduction in natural gas input energy related to steam use reduction.

⁹ Energy retrofit reductions account for change in heating degree days.



After a 2015 energy retrofit project at 4444 Forest Park, there was a 64% reduction in natural gas usage.



The retrofit projects at East Building and East Imaging resulted in a 21% reduction in energy consumption.

Emergency Power Management: WUSM’s electrical system’s reliability is achieved through its layers of redundancy and by managing critical loads within buildings to maintain life safety and preserve the viability of university assets and research. WUSM is supported by 100% redundant substations that it owns and operates. Every research building is supported by three power sources, two power lines from a WUSM substation and an emergency power source supplied through an emergency generator. The emergency generator use guideline dictates protection of life safety and provides emergency power to as many critical loads as can be supported through that system based on a watt per net area of square feet calculation. WUSM departments are responsible for prioritizing equipment loads.

Commitments

1. OFMD’s diverse activities to **manage** its energy use have proven to be valuable. OFMD will continue its activities and innovate to enhance effectiveness.
 - a. **Infrastructure equipment replacement** investments will satisfy immediate needs and anticipate the campus transition to next generation technologies (see “transition plan”, below).
Expected end date for infrastructure equipment replacement: with acceptance of transition plan. Annual reports on implementation.
 - b. Complete the **3-year building and lab re-commissioning program**. Expand the program to better incorporate concerns for sustainability, such as instituting set points for unoccupied mode where applicable, measurement and verification and occupant education of energy and water use.
Expected end date for program: June 2020. Expected start of second 3-year building and lab re-commissioning program is July 2020. Annual progress reports will be completed to report on and measure progress.
 - c. Continue **room-commissioning of plug load**.
Expected end date of plug load commissioning: ongoing activity. Annual progress reports will be completed to report on and measure progress.
 - d. Continue initiative to **reduce outside air** during unoccupied mode, nights and weekends.
Expected end date of reducing outside air during unoccupied mode, nights and weekends: ongoing activity. Annual progress reports will be completed to report on and measure progress.
 - e. Identify new construction and major renovation projects in the WUSM capital plan that can include linking **thermostat set point** to occupancy schedule. Incorporate this into those projects’ designs where applicable.
Expected end date: project identification by December 2018. The team will review the capital plan and identify projects that can be targeted for sustainability objectives. Annual reports on implementation and goal progress will be published annually.
 - f. **Data generation/data management**. Continue comprehensive real-time metering (electricity, steam, chilled water and water). Use this data in assessing the ROI of anticipated energy and water conservation measures and for establishing their value once installed. Contribute to university-wide uniform and transparent presentation of GHG emissions data. Use this to establish compliance with the St. Louis energy benchmarking (reporting) ordinance.
Expected end date: ongoing activity. Annual reports on upkeep and development of new reports and expanded data gathering, as relevant will be provided by OFMD
 - g. Develop plan and purchase **replacement fleet** vehicles that are more fuel-efficient models.
Expected end date of replacing fleet vehicles: to be determined (during term of this plan). Annual progress reports.

- h. Reduce **energy use of IT infrastructure**. Contribute to university plans for facility investments aimed at reducing energy use related to IT infrastructure.
Expected end date: ongoing support to WUSTL IT as directed by the Central Fiscal Unit. Annual report on activity and outcomes will be provided by the Office of Sustainability.
 - i. Complete commissioning of WUSM **data center energy savings** and implement study recommendations.
Expected end date: commissioning study completed by December 2019, with drafting of related implementation plan based on ROI completed by December 2020. Annual reports on implementation and outcomes will be provided by OFMD.
 - j. **Transition to use-based billing** and capture appealing opportunities for a utility-based incentive program.
Expected end date for proposing a use-based billing scheme and analyzing opportunities for a utility-based incentive program: December 2018.
2. Looking to the **next generation** of commitment to reducing greenhouse gas emissions, OFMD will take critical steps to support university needs.
- a. The long-range Washington University Medical Campus **energy system transition plan** will consider how a range of technologies and approaches can best operate, alone or in combination, to supply needed energy with minimal emissions and maximum functionality as a platform for future technologies. For example, the plan might consider the conversion from steam to a low temperature hot water network that can be generated by multiple means of reusing waste heat including combined heat and power, heat recovery, solar thermal, etc. The plan will be constructed on a foundation analysis and understanding of increased energy efficiency in campus buildings. It will incorporate modeling results predicting extreme events and gradual changes in temperature and precipitation patterns in St. Louis.
Expected date for issuance of transition plan: May 2021. Annual reports on implementation will be reported on by OFMD.
 - b. The university has a 2020 **goal for GHG emissions reduction** that has inspired campus activity since its establishment in 2010. WUSM will actively support the university's development of its next GHG emission reduction goal.
Expected date for establishing a new GHG emission reduction goal: June 2019.
 - c. The university will develop a **Scope 3 emissions inventory** as a first step to establishing a goal for its reduction. WUSM will be an active participant in the university's initiative to develop the university's Scope 3 inventory.
Expected date for establishing the goal and structure of the Scope 3 emissions inventory: June 2019. Annual progress reports will be prepared and provided by OFMD in coordination with the Office of Sustainability.

SUSTAINABILITY IN BUILDINGS AND LANDSCAPES

Direction

WUSM aims to be a model among its peers in the sustainable design and management of its buildings and landscape. WUSM implements the university's policy that capital projects which exceed \$5 million must minimally qualify for USGBC LEED Silver status¹⁰. This is done in combination with employing elements of other third-party certification programs and ASHRAE 90.1 2010 energy conservation standards as its regular practice.

WUSM has nearly one million square feet of wet lab space. Through this plan, OFMD commits to bringing specific focus to the design of labs and management of that physical asset to aggressively promote air quality, reduce energy demand and water use, reduce use of toxics and increase safe practices of recycling and disposing of lab wastes.

A transformation of the landscape and outdoor physical environment has begun. By evaluating and defining the outdoor spaces and then selecting the right plant for the right location based on site conditions (sun/shade, dry/wet, wind exposure, street lighting, security concerns, etc.), WUSM is creating a safe, clean, comfortable and aesthetically pleasing outdoor environment. WUSM advances this through annual plantings to increase the campus tree canopy, continually identifying candidate locations for enhancement, and using native and adaptive plant material to improve the WUSM landscape.

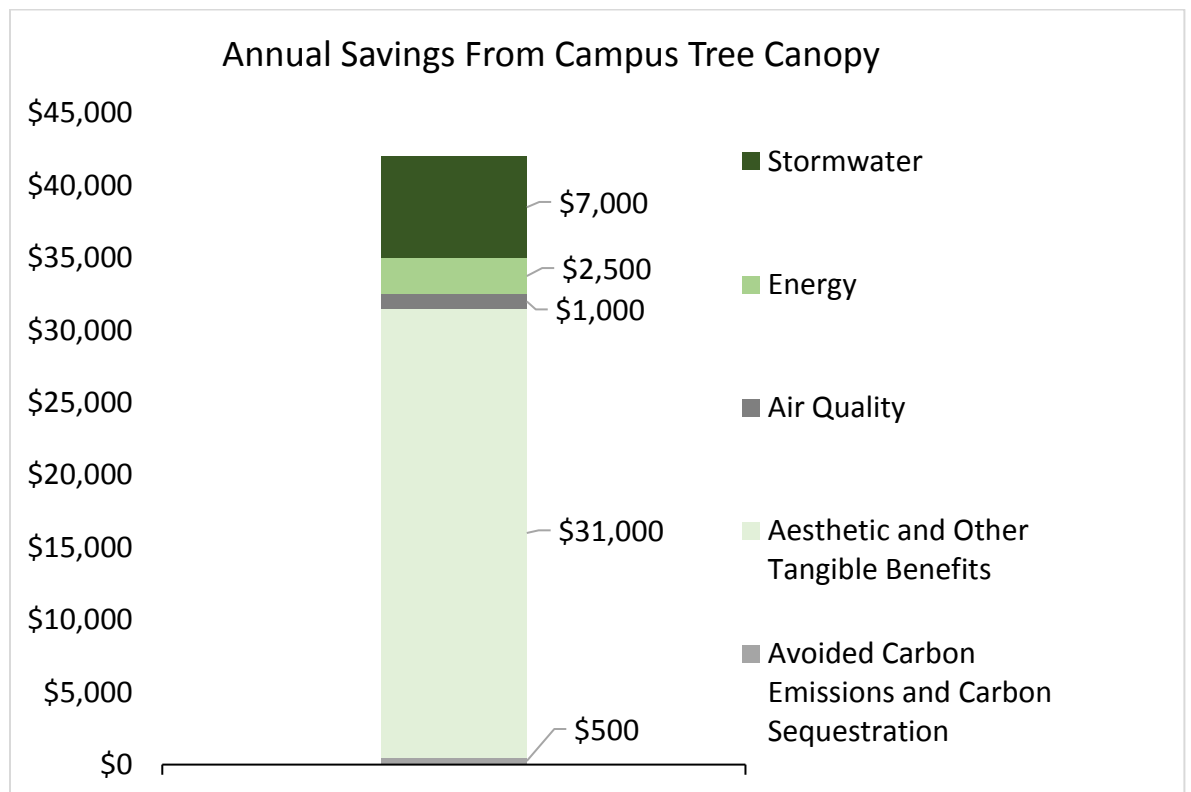
Progress

- WUSM has six LEED buildings. The Genome Sequencing Data Center, the BJC Institute of Health, and the Debra and George W. Couch III Biomedical Research Building are LEED Gold. The Data Center is LEED Silver and the McDonnell Medical Science Building (8th floor), BJC Institute of Health (5th floor) are LEED certified. The Mid Campus Center and 4480 Clayton are both designed to achieve LEED Gold (certification is pending).
- WUSM planners and project managers use the WUSM "Green Building Guideline Checklist" for every design project, regardless of size. This addresses installing bicycle storage and locker rooms, incorporating means to limit rooftop heat island effect, building systems commissioning, optimizing energy performance, construction waste management, sustainably sourced materials, indoor air quality management during construction, low emitting materials (paints and coatings, flooring, composite wood and agrifiber products), and controlling lighting and thermal systems. The checklist reinforces what WUSM's green building design values are and challenges staff to creatively bring them to design projects.
- Campus landscape management - WUSM landscape management continues to reduce the amount of turf on campus while creating landscapes that utilize Missouri and North American native plants, native cultivars and regionally adaptive species that require less input such as water, fertilizer, herbicide and mechanical maintenance efforts. Landscape design standards are being developed that will provide guidance to new building projects and future landscape enhancements. These landscape design standards, while helping to reinforce the need to use

¹⁰ Policy was established in 2015. Ongoing analysis is considering its viability relative to LEED version 4.0.

sustainable methods and materials, will help guide a campus continuity that is intended to improve the visitor experience for anyone arriving to the WUSM campus.

- WUSM’s campus tree inventory promotes and preserves the urban forest and improves the management of the trees on campus. This vision will ensure canopy continuity, which will reduce storm water runoff and improve air quality and aesthetic value to the campus. The inventory data will be used to understand species composition and tree condition and to generate maintenance recommendations. Tree values and benefits are able to be quantified using the I-Tree Streets benefits model¹¹. Key findings show the WUSM campus trees provide approximately \$42,000 the following annual environmental benefits:
 - *Air Quality* = valued at \$1,000 per year
 - *Aesthetic and Other Tangible Benefits* = valued at \$31,000 per year
 - *Avoided Carbon Emissions and Carbon Sequestration* = 74.48 tons valued at \$500 per year
 - *Energy* = 28,886.58 kilowatt-hours (kWh) and 592.43 British thermal units (therms) valued at \$2,500 per year
 - *Storm water* = 1,143,550.12 gallons valued at \$7,000 per year.



The campus tree canopy inventory results showed an annual savings of \$42,000 based on a variety of environmental factors.

¹¹ Developed by the USDA Forest Service in partnership with The Davey Tree Expert Company.

- Sustainable practices in labs – WUSM involves staff from administrative and academic units to consider, test and document sustainable practices in labs. To date, this has included projects such as changing from static to individual cages in vivariums, using HEPA-filtration at the rack level in combination with reduced air changes in the room, improving building automation systems, and shifting to automatic water systems. Ongoing consideration of potential next steps include reusing rinse water for cage wash, procuring racks that will increase energy savings, recycling feed bags, and transitioning from the current use of auger feed disposals for animal bed waste.

WUSM Building Design

With an energy use intensity of 128 kBtu/sq.ft./year, the Debra and George W. Couch III Biomedical Research Building is 36% more efficient than comparable buildings. A heat-recovery chiller captures waste heat to reduce energy usage throughout the building and occupancy sensors manage airflow. More than 95% of the waste generated from the demolition and construction process was recycled. Materials with recycled content account for more than 30% of the building materials used. Low-flow faucets and other strategies reduce the building's indoor water use by 35%. The landscape design incorporates native plants that contribute to a 50% reduction in irrigation water use. An appealing rain garden doubles as a storm water facility to capture rainfall and area runoff.

Green Offices at WUSM

The Access Control Office joined the Green Office program in 2015 and has advanced from silver to gold level certification. Today, the office score is nearing the platinum level. Office members set their computers to print double-sided with minimal margins, reduce their use of mechanical lighting when natural light is available, keep thermostats set within recommended ranges for energy conservation, and use re-usable water bottles and coffee mugs. To guide best waste materials practices, the office has individual recycling bins and a central trash container. Half of the office members are dedicated to using public transportation for commuting and when traveling to meetings on and off the campus.

Rack Washer Equipment Replacement Projects. In 2014 and 2015, the Division of Comparative Medicine and OFMD replaced four rack washers that had been installed in the 1990s in East McDonnell and the Clinical Sciences Research Building. In 2018, additional rack washer replacement equipment will be installed; this time in the Central Institute for the Deaf Clinic/Research Building.

The new equipment dramatically reduces equipment energy and water use, including:

- Cold water fill with heat exchanger – cold water is used during filling of the tanks in lieu of hot water. This water is brought to washing temperatures by an in-line steam heat exchanger, which extracts the heat from the previous rinse cycles. This eliminates the need for steam to heat the incoming hot water.
- Chilled water drain cool-down - the energy transfer of the heat exchanger, along with a re-circulated chilled water system eliminates the need for cold water injection to cool drain water effluent.
- Rinse storage tanks – the washers were installed with a steam heated rinse storage tank, which allows the washer to lower energy consumption by re-using rinse water from each load for the subsequent cycle.

- Alkaline and acid storage tanks – allow the washers to reduce chemical usage and hot water consumption by saving chemical solutions from each load for subsequent cycles.

Rodent Capacity and Infrastructure Renewal. In 2017, the Division of Comparative Medicine and OFMD began installation of individually ventilated caging with an automatic watering system as replacement for standard static mouse caging and water bottles in East McDonnell and the Clinical Sciences Research Building. To date, East McDonnell Suite 640 air flow rates have been reduced by ~12% and still maintain the proper temperature set points. The entire 5th floor of the Clinical Sciences Research Building is scheduled for air change rate reduction in the summer of 2018. The Clinical Sciences Research Building is tracking building level energy usage to validate the energy savings from these projects. The caging change and transition to automatic watering will allow for cage changing and washing frequency to be reduced from weekly to bi-weekly, resulting in energy and water consumption savings. Water bottles will no longer require autoclaving for sanitation and will be replaced by an ultra-filtration system that is distributed to the cage level.

Along with the change in caging system, OFMD is upgrading the building automation system and controls in these facilities.

Tree Canopy at WUSM. The opportunity for landscaping and tree planting at WUSM is more about streetscape opportunities than expansive turf and gardens. This suggests specific selections for trees on campus as many areas cannot support larger canopy trees because of limits such as narrow dimension of space, height restrictions, and sun/shade issues relating to the campus urban design, and water requirement considerations. Still, a Tree Canopy Improvement Plan at WUSM has generated significant improvements in the last three years. 257 new shade and ornamental trees were planted, 90% of which are Missouri and North American native or native cultivar. This has been accomplished through an annual WUSM planting that added 62 trees in 2016 and 2017. 30 – 35 trees will be added each of the next five years.

The Ellen S. Clark Hope Plaza. Recognized as a place of calm, rejuvenation and hope, the Ellen S. Clark Hope Plaza achieves its distinction in part because of the sustainable attributes of its design. This LEED certified plaza’s habitat is that of native Missouri woodland. Healthy native plant communities thrive with minimal maintenance.

Green Infrastructure at WUSM. The storm water detention basin at the corner of Scott and Taylor Avenues is an example of a storm water management technique being utilized on campus. This basin, installed in 2015, has consistently performed at Missouri Sewer District standards. Detention basins provide relief to storm sewer systems during periods of heavy rain by temporarily storing a predetermined amount of water while slowly draining to a creek, channel or storm water system. In addition to the basin design, its plant materials contribute to the basin’s effectiveness. Uses of native grasses and perennials that have evolved and adapted to the Midwest environment provide deep root systems that help promote pore space in the soil and aid in the infiltration process during and after a rain event. These root systems also help to sustain the plants during periods of drought and assist in anchoring the soil to reduce erosion. A final advantage to native plants is they are a valuable food and habitat source for birds and butterflies. WUSM is also utilizing permeable pavers, where applicable, in new construction projects such as the Mid Campus Center and the parking lot at the renovated 4480 Clayton Building.

Commitments

1. Design and construct **sustainable buildings and landscapes.**
 - a. WUSM will continue to practice **integrated design process** as developed by the university. Integrated design orchestrates engagement of members of the design team towards setting the project's design goals and working effectively to realize them. Often, integrated design is considered to be specific to design of high performance buildings and sustainable (green) buildings. WUSM will endeavor to assess its design practice with the aim of improving it.
Expected end date of implementation: ongoing. Annual progress reports.
 - b. Accomplish **sustainable building design** with transparency through involvement of third party certifications such as USGBC LEED, Better Buildings, and EnergyStar. Implement the university LEED Silver policy and, as feasible, exceed its LEED Silver standard. This will be done by accomplishing higher levels of LEED standards, by incorporating appealing elements of other third-party design certification programs and incorporating additional WUSM sustainable design values to each project. For example, of specific importance to WUSM, it will formalize its post-occupancy engagement to coordinate commissioning, measurement and verification and comply with LEED requirements for the same.
Expected end date of implementation: ongoing. Annual progress reports.
 - c. **Update the WUSM design guidelines.** WUSM will collaborate across the university to develop sustainable aspects of university building design guidelines. These will strive to outperform ASHRAE 90.1 2010 energy efficiency (new construction to perform 30% better and major renovations to perform 20% better than 90.1-2010 energy efficiency). This update will emphasize best practice environmental performance in lab design. It will introduce new elements such as including appealing and convenient campus shower/storage areas as part of all new projects and major renovations, providing unisex bathrooms, providing lactation rooms and stipulating that designs for new construction will include testing the viability of incorporating renewables.
Expected date for issuance: December 2018.
 - d. **Revisit elements of the design guidelines** which impact campus water use, energy demand and GHG emissions reduction on a biennial basis. As identified through this process, revisions will be made to related policies and standard operating practices to best harmonize with the guidelines, campus sustainability goals and objectives.
Expected date for completion: December 2019 and every two-years after with biennial reports.
 - e. Work with consultant engineers of new construction and major renovations to establish a benchmark analysis to be used to establish projects' **energy use intensity**. This will first be employed with designs of the new ambulatory and new research building.
Expected date of implementation: spring 2021 for the new ambulatory building and spring 2022 for new research building, then ongoing. Annual reports.
 - f. **"Green" the Newstead Garage** project. Assess opportunities to install solar on roof, LED lighting in garage and charging stations in new garage. Incorporate into design based on outcome of review. This project will also include rain gardens and bio retention.
Expected date to complete assessment: December 2019 with garage opening in spring 2022.
 - h. **Increase electric vehicle charging capacity in existing garages.**
Expected end date: Install 20 EV charging stations in the Clayton/Taylor garage by December 2018. Ongoing with annual reporting as demand increases.

- i. Charter **LEED O&M as a program pilot**. Pursue LEED Building O&M for the Taylor Avenue Building (620 S. Taylor). Use this experience to inform the decision to and means of pursuing this LEED program for future WUSM buildings.
Expected date of completed pilot is December 2019.
- j. WUSM design guidelines will address some capital investments in existing facilities, such as favoring high Solar Reflectance Index (SRI) material (.78) and **white roofs** when roof replacement is done.
Expected date to issue guidelines is December 2018.
- k. Establish **landscape design and maintenance** standards. These will work to increase tree canopy on campus¹², promote biodiversity, ensure desired quality of storm water management, eliminate invasive species, use environmentally preferable materials, and employ environmentally responsible operations and grounds maintenance. The guidelines will cause naturalized landscape area on campus to be of a size that meets or exceeds the university's storm water permit. WUSM will use the SITES checklist as a reference in developing university design guidelines. This checklist will be tested on the ambulatory care building and the animal/research building and use this experience as basis for deciding whether to make this checklist a standard practice.
Expected date to issue guidelines is December 2018. Expected date for landscape installation at the ambulatory care building project is spring 2021 and the animal/research building project is spring of 2022. Recommendation on future use of SITES checklist to follow within six months after that installation is complete.
- l. Participate in the creation of **outdoor spaces that foster community and improve safety**. The plaza area near the Mid Campus Center will be extended with infrastructure safety improvements including stairs, elevator, pedestrian crosswalks and landscape improvements, as well as the addition of a campus welcome center by 2020. The 4480 Clayton Avenue renovation/addition project and the new residential housing project each include a courtyard and green space. OFMD project managers and planners will guide design teams to provide for social goals in combination with naturalized landscape, storm water features, and maintenance needs that meet WUSM's reasonable capacity.
Expected date for safety enhancements in the plaza area near the Mid Campus Center is 2020 and the 4480 Clayton Avenue renovation/addition project and the new housing will be completed by September 2018.
- m. Continue to require general contractors to submit a **soil management plan** for each project expected to cause soil disturbance.
Expected end date to establish requirement: Ongoing with annual progress reports by project (on applicable projects) which will be identified as part of the capital plan process. Annual reports.
- n. Develop standards and require landscape contractors to submit regular reports on compliance with university guidelines for **chemical use** in WUSM landscape projects.
Expected end date to establish requirement: December 2019 with annual progress reports.
- o. Require landscape contractors to submit a **training** plan to educate their employees about WUSM landscape guidelines and to validate their support and completing of its implementation.
Expected end date to establish requirement: December 2019 with annual progress reports.

2. Decrease potable water use.

¹² University goal is to increase tree canopy by 35% in 3035 compared to baseline.

- a. Establish a goal and strategies for WUSM **water use reduction** by 2025 relative to 2014 base year.
Expected end date: June 2019.
 - b. Implement **strategies to realize WUSM’s water use reduction** goal. This will include specific steps relating to campus infrastructure systems, building maintenance, large medical and scientific equipment, and landscape and food service operations.
Expected end date: focus on landscape and food service through December 2019, development of guidelines and practices relative to campus infrastructure to be established through the energy transition plan, focus on building maintenance and large equipment by December 2020. Annual report on achievements will be provided by OFMD.
 - c. Reduce **cooling tower water use**.
Expected end date: ongoing activity with annual reports on achievements.
3. Ensure **management of WUSM’s physical assets** addresses sustainability with emphasis on excellence in the setting of WUSM’s nearly one million SF of wet **lab space**.
- a. Re-energize the WUSM **Green Lab Program**. This program works with researchers, staff, faculty and students to introduce and institutionalize sustainable practices and to inform the purchase of energy and water efficient equipment. With consultation from the Office of Sustainability, WUSM will establish the program baseline, goals for participation rates, and launch this program. The program will bring to its participants all the tools and opportunities outlined in this plan which can benefit the greening of labs. WUSM will issue annual reports on the progress and impact of this program.
Expected program chartering and launch of a pilot: July 2019. This pilot will include completing 10 lab consultations (individual meetings with lab managers to identify best practices for their labs). Annual reports.
 - b. **Implement post occupancy survey** for all new buildings and major renovations. Leverage this opportunity to also use the survey to test the opinions and solicit suggestions from building occupants about the greening of their work environment. With this, study utilization efficiencies in wet labs using the metric of dollar value of research revenue-to-provision of space. Survey analysis will be developed and used to inform future project designs, as relevant.
Expected end date for first two projects’ (Debra and George W. Couch III Biomedical Research Building and Mid Campus Center) survey and survey analysis in December 2018. Annual reports on implementation and project survey results.
 - c. Support university steps to **improve purchasing options** for highly efficient large equipment (water and energy). Survey WUSM’s large equipment that is near to end of manufacturer’s suggested life to strategically target three types of lab equipment to be piloted in this initiative. It is expected the three lab equipment choices will include high efficiency ultra-low temperature freezers, an item for which the cost, ROI, specifications and greenhouse gas emissions savings has already been calculated. Support development of university procurement guidance and practices to optimize making local purchases.
Expected end date: In support of University Resource Management, support the communication of the roll out of ULT freezer policy by the end of December 2018. Update standards and purchasing practices for other large equipment on an ongoing basis with annual progress reports.
 - d. Develop **lab re-commissioning protocol** and re-commissioning schedule recommendations.
Expected end date: June 2019 with annual progress reports.

- e. Manage size and assignment of space with objective of **optimizing space use**. Employ existing guidance for offices and shared spaces. Review FTEs per NASF based on space type as a metric for space use efficiency.
Expected end date: ongoing activity with guidance for lab space to be developed by December 2019. Annual progress reports will be provided by OFMD.
 - f. Increase the scale and impact of the university's **Green Office Program** at the WUSM. This is a voluntary program to help offices evaluate and improve the sustainability of their practices. Currently, 13 WUSM offices participate in the program. 4 of these have Bronze rating, 6 have silver rating, 2 have gold rating and 1 has a platinum rating. A university-wide program, WUSM will coordinate its activities to enhance the program at WUSM with support from the Office of Sustainability. WUSM's short-term goal is to increase participation to 30 offices in this program by July 2019.
Expected end date to develop metrics for growth in participation and expansion of activities: December 2018, with annual progress reports on participation and successes.
 - g. Create a program of **sustainable practices for WUSM dining facility management**. Identify means of improving the energy use, water use, and waste generation associated with campus food preparation. Require the food concessionaire to regularly report on activities employing metrics established by the university and maintained in the university's database. Coordinate development and management of database and reporting with the Office of Sustainability to establish a university-wide structure.
Expected end date to generate structure: June 2019 with annual reports after that.
 - h. Review operational areas to **identify green practices**, relating them to goals and, as needed, revising them to best support sustainable operation goals and strategies. Identify practices which aren't but should be documented as guidance and/or described in WUSM training (and training materials). This will include updating the **campus no idling guidelines** to ensure they meet best practices standard.
Expected end date: annual review with annual progress reports.
 - i. Implement department-specific resilience/safety planning.
Expected end date: annual activity with annual progress reports.
4. Accelerate WUSM's initiative to improve its **landscape management** practices.
- a. **Reduce the impacts** of campus storm water runoff. Satisfy regulatory requirements and implement best management practices.
Expected end date: ongoing with annual progress reports.
 - b. Design **all storm water facilities** to be functionally successful, low maintenance and aesthetically appealing.
Expected end date: ongoing with annual progress reports.
 - c. Establish a **database to track and report** on implementation of landscape guidelines. Report on experiences annually.
Expected end date to create database: December 2019, with annual progress reports to follow.
 - d. Use **recycled landscape materials** representing 20+% of total materials cost.
Expected end date: ongoing. Annual reports.

HEALTHY FOOD

Direction

WUSM strives to motivate and support students, faculty and staff to have healthy eating habits. Its food service practice aims to be sustainable in its management practices, procurement patterns and the quality and choice of its food. The concessionaire will improve its record keeping that tracks purchasing regarding the geographic source and environmental attributes of food and the food service's management practices that best limit environmental impact. During the term of this plan, it will ensure that:

- At least 22% of its total purchases will be of food that is grown and/or processed food within 200 miles of WUSM.
- At least 25% of its total purchases will be of food that is environmentally preferable, humane and fair and half of that will be grown and/or processed within 200 miles of WUSM.

Progress

WUSM's food service vendor sources approximately 20%¹³ of its ingredients per year from local farms and vendors. This includes purchases from the farmers who sell at the WUSM's farmers market. Every September, an "Eat Local Day" promotes this practice.

Food on the WUSM campus is prepared with fresh ingredients and healthy cooking techniques. Waste food is minimized by preparing food in small batches. On Earth Day, a "Low Carbon Day" is sponsored to teach about the carbon virtues of a diet that limits beef and focuses on sustainably grown food.

Each of the WUSM cafes offers vegetarian options for each meal.

Bringing farm to campus. WUSM brings healthy eating options to campus through its year-round weekly farmers' market. Established in 2010, local farmers sell fruits, vegetables, eggs, meat, dairy, nuts, whole grain breads, jams, and a variety of other healthy food options. The market occurs in conjunction with a pick-up location for the Local Farmer Community Supported Agriculture crop box, currently serving the families of 71 members of the WUSM community. Some farmers' market vendors sell their goods to the WUSM concessionaire.

Kaldi's Progressive Commitment to Local Purchasing: Kaldi's is committed to purchasing coffees from farms that use sustainable farming practices such as preserving the soil, protecting local wildlife, and conserving their local ecosystems. Beyond the certified organic and bird-friendly coffee, Kaldi's Café in the Farrell Learning and Teaching Center offers a 100% vegetarian menu with gluten-free and vegan options. Kaldi's in the Mid Campus Center offers a menu with 50% vegetarian options.

¹³Measured by cost.

Commitment

- a. The WUSM food concessionaire will continue to offer **good quality vegetarian and vegan options** at each WUSM food facility for every meal. WUSM to generate metrics to evaluate this practice.
Expected end date for metrics is July 2019 with annual progress reports.
 - b. The WUSM food concessionaire will continue to **purchase certified** seafood¹⁴, grass-fed beef, organic milk, non-GMO produce, certified coffee, products from hormone-free animals, and meat that is certified humane¹⁵. These purchases equate to at least 25% of total food purchases that are environmentally preferable, humane and fair.
Expected end date: ongoing activity with evaluation to be completed December 2019. Annual progress reports.
 - c. Annually, WUSM will survey students, faculty and staff to **test receptivity to healthy eating** and to identify means of improving the WUSM food service offerings.
Expected end date: annual survey with annual report on responses.
 - d. WUSM to supplement the university's **Food Day** with a corresponding WUSM campus event.
Expected end date: December 2019 and annually after that with annual report on activities.
1. Ensure food purchasing for the WUSM community **supports the region's food economy**.
 - a. In collaboration with WUSTL Human Resources, continue to host a **farmers' market and community supported agriculture program**. WUSM will evaluate its effectiveness and identify means of enhancing the program and program participation.
Expected end date: ongoing activity with annual progress reports.
 - b. The WUSM food concessionaire will purchase 22% of the value of its **food purchases locally** (grown and/or process within 200 miles of campus). At least 12% of locally sourced food will also be environmentally preferable, humane and fair.
Expected end date: ongoing activity with evaluation to be completed December 2019. Annual progress reports.

¹⁴ WUSTL follows the recommendations and standards of the Monterey Bay Aquarium's Seafood Watch program.

¹⁵ Humane Farm Animal Care administers this certification program.

WASTE AND TOXICS USE REDUCTION

Direction

Washington University in St. Louis has a three-decade history of diverting the university's solid waste from landfills. At present, the WUSM diverts 42% of its waste, excluding construction and demolition waste. Comfortable with its achievements and ability to continue to improve, OFMD turns its focus to toxics use reduction. Green products used for all every day cleaning at WUSM motivated interest in a rigorous expansion, involving the University's Environmental Health and Safety Office with the Office of Purchasing Services as partners in this endeavor.

During the term of this plan, the WUSM intends to support the university goals of:

- Achieve or surpass a 45% solid waste diversion rate by 2020, excluding construction and demolition waste.
- Expand construction and demolition waste recycling to applicable campus projects.
- Reduce waste stream contamination.
- Expand safe recycling and disposal of hazardous and toxic materials.
- Launch a toxic use reduction program for labs.

Progress

WUSM's solid waste diversion rates rests on the success of the convenient nature of campus recycling and composting and the excellence of communication to inform students, faculty and staff about which materials are recyclable or compostable. WUSM has installed four recycling compactors. In addition, special programs such as holiday light recycling, shoe recycling and electronic waste recycling are special elements that have become institutionalized.

Since 2015, WUSM performs annual audits to establish the extent to which waste it is being properly separated between that which should go to a landfill and that which should be diverted.

WUSM and Green Cleaning Products: OFMD started purchasing environmentally preferable custodial products in 2009. Today, WUSM employs industry standards¹⁶ to guide procurement of its cleaning products.

Food Waste Composting: Food waste from the Farmstead and Shell Cafes (nearly 9,000 pounds in 2017) is composted by a St. Louis-based company and sold locally as a soil amendment. Waste cooking oil is collected for recycling and reuse as biodiesel fuel (approximately 630 gallons in 2016 and 440 gallons in 2017).

Environmental Health and Safety at WUSTL: Serving as a Role Model. The Environmental Health and Safety (EHS) office offers information and services to support waste diversion interests. For example, the office provides written guidance on proper recycling and disposal of batteries and collects those batteries that should not be landfilled. The office provides similar instruction for empty containers, hazardous and regulated materials including chemicals, electronics and equipment, glass containers in labs, printer cartridges, and other materials in labs. The EHS program for laboratory cleanout functions

¹⁶ Such as those issued by the USGBC, the Green Clean institute, and the Carpet & Rug Institute

so that certain chemicals and materials that are no longer needed in one lab can be made available to another instead of immediate disposal of usable goods.

Commitment

1. Reduce the use of **toxics**.
 - a. Coordinate across the university to target opportunities to **purchase substitutes for regularly used materials** in university labs that are comparable in performance and reduced in toxicity and/or comparable in performance and are recyclable. Bring outcome of this effort to the Green Lab Program.
Expected end date: December 2019 for launch of offerings. Annual progress reports
 - b. Support EHS in its efforts to **expand recycling** in the lab environment. Bring outcome of this effort to the Green Lab Program.
Expected end date: June 2019 for launch of offerings. Annual progress reports
 - c. Increase today's use of Green Seal®, biodegradable and **non-toxic cleaners** in daily operations for general cleaning from 81% and introduce these as preferred cleaners for floors.
Expected end date: reach goal of 10% by volume for floor cleaning and 90% by volume for general cleaning by June 2020. Annual reports on use and effectiveness.
 - d. Reduce chemical and nonorganic **products in landscapes**. Establish what the practical opportunities are to reduce chemical treatment of paved areas and implement these on test sites within the campus.
Expected end date: ongoing for landscape. Spring 2020 for end of tests of paved areas. Annual reports on analysis and progress.
2. Improve the WUSM solid waste diversion rate.
 - a. Improve provision of information, signage and materials management practices to **guide faculty, students and staff to increase** their waste diversion. Continue the shift in offices to centrally located trash in combination with more convenient, local locations for recycling containers.
Expected end date: ongoing with annual reports.
 - b. Regularly **train custodial staff about the WUSM recycling program** and monitor the contents of building trash and recycling receptacles to establish the extent to which the program is being properly implemented. Continually use that data as a foundation for maintaining or innovating to improve campus waste diversion efforts.
Expected end date for next staff training: December 2018. Ongoing monitoring of receptacles and use of the data generated by this to assess and improve WUSM recycling. Annual reporting on findings and progress will be provided annually by OFMD.
 - c. Focus on opportunities to **divert kitchen waste**: see “Sustainability in Buildings and Landscapes”, above.
 - d. Expand the current practice to staff all events with more than 500 attendees with staff to **separate food waste** (compost, recycle and disposal) for the guests. Composting as a service will also be offered at all events, and education provided to allow schedulers to choose this service as an add on for management and planning by ECSS.
Expected date for expansion of the existing program: July 2019 with annual reports.
 - e. **Improve record keeping** and database for WUSM waste management and diversion. Collaborate with the Office of Sustainability to establish desired harmony of structure and data collection.
Expected date for improving the existing system: December 2018. Annual reports.

- f. Continue special material recycling collections (shoes, holiday lights, and e-waste).
End date: ongoing with annual reports.
- g. Identify opportunities to improve existing single materials diversion such as waste bulk mail (intra-university and coming to the university from outside sources).
End date: ongoing with annual reports
- h. Assess the viability of expanding WUSM recycling to include materials such as Styrofoam.
End date for assessment: December 2019
- i. Participate in the university's program to **convert waste oil to biodiesel**.
Expected end date: ongoing with annual progress reports.
- j. Expand current **construction and demolition diversion practices** when the university's anticipated new requirements are issued. Establish as standard contract language. Track compliance.
- k. *Expected end date: ongoing with annual progress reports.* Promote use of **refillable water stations**. Continue to increase the number of stations with each new construction project. Promote awareness of this option through signage and communication. Perform an initial inventory so there is a baseline measurement in 2018 then measure annually thereafter.
- l. *Expected end date: ongoing with annual progress reports.* Achieve or surpass a 45% solid waste diversion rate by 2020, excluding construction and demolition waste.
Expected end date is 2020 with annual progress reports not.

TRANSPORTATION

Direction

WUSM offers its community multiple transportation options to/from and on campus. Forty-seven percent of the WUSM community use transportation other than single occupancy vehicles. OFMD has a suite of activities to maintain or expand that rate and ensure the WUSM community is satisfied with the quality and safety of campus transportation options.

There are city and county-wide security challenges that inhibit the alternative transportation goals of the campus. The university is working closely with local and regional partners to overcome these security challenges by creating a paid ridership system where only paid riders can board the train which will allow other riders to feel safe and will over time increase ridership. While the system remains an “honor” system, WUSM will work with its campus community to educate users on personal safety and resources available.

Progress

In 2015, the WUMC Roundtable commissioned a comprehensive traffic and mobility study (Mobility Study) to assess short, mid-and long-term growth projections across the district. Recommendations include a plan for a comprehensive street network, transportation and demand management policies to increase alternative mode use, and a schedule for revisiting progress in the future.

In 2017, the Transportation and Parking (T&P) Committee was established to study parking functionality and capacity, vehicular circulation and impact to adjacent streets, pedestrian and bicycle circulation, safety measures, landscaping features, storm water requirements, planning-level utility needs, and cost impact. The committee calculated the excess street/traffic capacity that could be accommodated for future development build-out of the campus.

Transit Pass Program. This free transit pass program for all WUSM employees and students began in 2007 and serves 8,238 users.

Transportation Demand Management Planning. Field observation of campus bicycle and pedestrian routes generated recommendations for physical investment, to promote the use and safety of non-motorized transit on the Washington University Medical Campus. WUSM and its campus partners continue to partner with Metro Transit and other local transit authorities to educate community members about their alternative transportation options.

Due to university having prime responsibility for safety at the Washington University Medical Campus, progress toward the university’s transportation demand management goals will be enhanced by an aggressive safety communication campaign by OFMD. The aim is to be transparent in providing the university community with data about the safety of the campus. WUSM Protective Services and Barnes-Jewish Hospital Public Safety share a security center which provides the member institutions with an integrated dispatch system to improve incident responses and outcomes.

Bicycle Facilities. In the last three years, the number of campus bicycle parking spaces was increased by nearly two thirds. Ninety percent of the 477 spaces are well-used during the work week. Six campus buildings have shower and locker facilities for cyclists to use and OFMD will strive to ensure every future building will have this as a standard to its program.

Central West End MetroLink Station. WUSM with Barnes-Jewish Corporate and its partners collaborate in the funding and design of improvements to the Central West End Station, which has the highest ridership in the Metrolink system. Visibility from the station, a design for safety, and inclusion of a welcome center is expected to promote the sense of campus safety of this station, working to improve ridership.

Cortex/Boyle MetroLink New Station. In July 2018, a public/private partnership created the Cortex/Boyle Metrolink Station. In addition to the university's financial commitment to this project, the OFMD and other WUSM units were actively involved in the design of this project. Their participation brings the most reliably accurate and complete perspective on user needs and concerns to the design. Given that nearly one third of WUSM students, faculty and staff use public transportation and that the university provides its full-time staff with passes for free ridership, the interest of WUSM in the success of the design and construction is paramount. This station opened in July of 2018.

Commitment

1. Improve options and increase appeal to students, faculty and staff of **human-powered transport, regional transit and shared driving** as means of commuting to/from campus. A recent survey^[1] showed 53% of WUSM students, faculty and staff arrive on campus in a single occupant vehicle, 29% use public transportation, 9% walk, 7% carpool, and 2% use bicycles. WUSM's goal is to maintain or reduce the proportion of single occupant vehicle commuters. This will be accomplished through several means:
 - a. Update **transportation demand management strategies**, including enhanced communication efforts. The committee developed a methodology to cull cross organizational parking and transportation data from Cardinal, Lenel and other systems of record in an effort to align use data and create a joint understanding of the current state of parking. While this was progress, a software technology is necessary in order to reduce the extensive labor that is required to analyze the pulled data and the committee is currently completing demos of Smarking which is a potential software solution. WUIT is supporting this effort.
Expected end date for update: December 2018. Implementation is ongoing. Annual reports will include a progress report on all goals.
 - b. Continue to participate in the committee selected to guide development of the **Chouteau Greenway and advocate for strong connectivity to and through the WUSM campus.**
Expected end date: December 2023. Annual reports will include a progress report on all goals.
 - c. Continue to offer regular **bicycle skill and safety** classes and bicycle safety information to students, faculty and staff.
Expected end date: ongoing. Annual reports will include a progress report on all goals.
 - d. Continue to provide **free public transit commuting passes** for WUSM employees.
Expected end date: ongoing. Annual reports will include a progress report on all goals.

^[1] "Comprehensive Traffic & Mobility Study" (Urban Planning Roundtable, 2015)

- e. Contribute to design and construct the **Central West End Station expansion**. WUSM is project manager and partner in financing station expansion.
Expected end date: December 2021. Annual reports will be provided by OFMD.
- f. Continue to expand campus **bicycle parking**. Locate them in convenient and appealing locations. Bike racks are added as demand requires such as the addition of 80 bike rack spaces added to the 718 CORE building. Bike showers are also part of most new building projects.
Expected end date: ongoing. Annual reports will be provided by OFMD.
- g. Encourage **car sharing**, van and carpool use. The university offers Enterprise CarShare and supports Ridefinders van pools and expects to soon offer a third ridesharing program. In addition to program offerings, WUSM will make affirmative efforts to communicate to its community about the availability and advantages of these programs.
Expected end date: ongoing. Annual reports will be provided by OFMD.
- h. Continue to operate and finance an **after-hours shuttle service** for the neighborhoods adjacent to campus. Regularly assess the use, appeal and cost of this program to optimize it.
Expected end date: ongoing. Annual reports will be provided by OFMD.
- i. Issue a comprehensive **pedestrian and vehicular safety program**. This program is being crafted using data from recent studies that observed traffic flow and bicycle and pedestrian movements. A key objective of the program is to increase pedestrian use and safety of campus crosswalks as well as communicating and educating the campus on being safe while walking, biking and driving.
Expected end date: December 2019 with annual reports to track program impact.
- j. Complete the **Newstead street improvements** to ease congestion and improve pedestrian safety in the Tier II district area.
Expected end date: Spring 2020
- k. Begin planning **remote parking**. This will allow the campus to optimize its land use and reduce the number of cars on campus. It will lower cost options for staff.
Expected end date for planning: December 2018. Construction expected to start January 2019.
- i. Develop a comprehensive **bicycle and public realm enhancement program**. This program is being crafted using data from recent studies that observed commuter flow and bicycle resources and pathways. In addition, WUSM will continue to commit to adding green space and trees on all applicable projects and work closely A key objective of the program is to increase the tree canopy, improve cross walks and add bike racks while partnering with GRG. To date, WUSM has added 182 bike spaces (over 3 years) with a total resource available of 477 bike rack spaces. After CORE housing opens, WUSM will have achieved a total of 557 spaces. This is a 68% increase in 3 years.
Expected end date: December 2019 with annual reports to track program impact.

COMMUNITY OUTREACH

Direction

WUSM supports staff as contributors and as leaders of city and regional sustainability initiatives and programs, particularly as it relates to promoting public health and community redevelopment.

Objectives:

- Foster a diverse and inclusive sustainability movement.
- Collaborate with a range of partners to advance sustainability in the St. Louis region and state.

Progress

OFMD staff is encouraged to contribute to community outreach efforts that benefit the WUSM community, that which surrounds the campus and/or the neighborhoods in which they live. Through this, staff can experience the satisfaction of impacting community. These activities create bonds and increases social awareness. Some of the opportunities offered to staff are the school supply drive for the Adams Elementary School, raffles to benefit the United Way, financing a holiday adopt-a-family initiative, making furniture donations to local shelters and domestic programs and donating supplies to holiday food drives.

The Chouteau Greenway. The Chouteau Greenway will create a new means of connecting the Washington University Medical Campus to the Danforth Campus, Forest Park, the Cortex Innovation Community, the City Foundry STL and Armory projects, the Grand Center Arts District, Saint Louis University, Harris-Stowe State University, midtown, downtown and the Gateway Arch and Mississippi riverfront. The university is a proud contributor to this initiative. As described by Henry S. Webber, Executive Vice Chancellor for Administration, “Successful cities around the world not only have great assets, they have great ways to connect those assets. This project celebrates St. Louis’ many vibrant neighborhoods and great cultural and recreational assets while also doing the hard work of strengthening needed connections.”

Commitment

1. **OFMD staff is involved** in many Washington University Medical Center Redevelopment Corporation (WUMCRC) activities. WUMCRC is a partnership of BJC HealthCare and WUSM. Its mission is to improve the quality of life for the neighborhoods surrounding the medical campus. Activities address improving security, promoting a diversity of housing options, enhancing human and social services, improving infrastructure and cultivating economic development.
2. In support of university community engagement activities, OFMD organizes **departmental activities** with which staff contributes. These include a school supply drive, the annual United Way collection, the holiday food drive and an annual staff community outreach event where staff volunteer to improve the surrounding community.

3. While not an explicit directive of this plan, WUSM recognizes that its buying power **impacts the local and regional economy**. This is a point of pride that this plan will help to advance. Noted in this document are plans to collaborate with the purchasing office to improve the ease with which departments can purchase large lab equipment that is water-and-energy efficient, materials of reduced toxicity, and food that is grown and/or processed within the region. OFMD is also dedicated to procuring goods and services from local vendors where quality and price are competitive. Its guidelines discuss making all reasonable efforts to procure sustainably sourced materials defined as those that are at least one of the following in whole or in part: made of recycled material, regionally extracted/harvested/recovered and processed/manufactured (within 500 miles), rapidly renewable (e.g. bamboo, wheatboard), made of FSC certified wood.

ACKNOWLEDGEMENTS

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