

Sangren Hall Solar Array

Sangren Hall hosts a 232 kW solar array, which helps limit the university's greenhouse gas emissions and offset energy costs. This most recent solar installation offers nearly five times the output of the 50 kW Miller array. It consists of 975 panels, and is a substantial boost to the solar harvesting capabilities on campus. The array was completed June 1st, 2013, and produced over 65,000 kWh of power within the first month! This amount of energy could meet the power demands of about six homes for a full year.

Miller Solar Array

The Miller Solar Array consists of 216 solar panels organized in 18 separate units, which cumulatively add up to 50 kW of power production. The use of micro-inverters for each panel is a feature unique to this array, maximizing power output and allowing real time data monitoring either from individual panels or the whole array. Since its installation in February 2012, the array has produced nearly 100 GWh of power. This project was made possible due to a \$700,000 grant from the Department of Energy and the expertise provided by the Office for Sustainability.

Wood Hall Solar Array

The Wood Hall Solar Array is a 12 kW array, which consists of three different types of solar panels: mono-crystalline, poly-crystalline, and thin film amorphous silicon. Throughout its lifetime WMU has researched differences in power output, operating costs, upkeep and maintenance costs, and many other factors critical in choosing the most cost effective system for campus. Since it went online the system has yielded 14-15,000 kWh per year.

Lawson Arena (ice rink & swimming pool)

In 2000, WMU installed an innovative heat recovery system that would recover waste heat from the Lawson Arena ice rink chillers and transfer it to the swimming pool in the campus natatorium. The Lawson Arena and the natatorium share a common mechanical room enabling the two systems to be linked in a closed loop. The heat recovery unit replaces the steam heat previously sourced from the campus central plant.

Recycling Stations

In 2009, stainless steel outdoor recycling receptacles for paper/cardboard and bottles/cans were installed in 20 locations. In 2012, the Office for Sustainability joined forces with Building Custodial & Support Services to pilot a new waste handling system in Schneider Hall. The recycling initiative had such great success it was later expanded into a campus-wide program. Recycling stations are now located in all buildings on campus offering receptacles for paper/cardboard, bottles/cans, and landfill waste. Inspired by the success of the indoor recycling and landfill trash system, newer outdoor receptacles have been redesigned to model the look, feel and function of the indoor system.

LEED Buildings

WMU has committed to a policy to meet USGBC Silver LEED (Leadership in Energy and Environmental Design) certification for all new major construction projects and modifications of existing structures (LEED Silver or better). Each building is designed and built to last, reduce energy consumption, recycle waste where possible, manage stormwater runoff, and provide for a healthy indoor working environment. LEED certified buildings on campus include the Chemistry Building, College of Health and Human Services, Brown Hall, Sangren Hall, the Lee Honors College, and the latest phase of construction at the Western View Apartments.

Natural Areas

The WMU Natural Areas and Preserves Program consists of more than 400 acres of natural landscape overseen and managed by Landscape Services and Facilities Management. Maintaining the health of these ecosystems includes: Removing invasive species, planting native species, improving wildlife habitat, managing stormwater, and providing ongoing education. The WMU Natural Areas and Preserves Program includes: The Asylum Lake Preserve, The Kleinstuck Preserve, The Valley Pass, The Business College Woods, The Lawson Ice Arena Woods, and the Western View Apartments Woods.



Campus Sustainable Features Map

This Western Michigan University Campus Sustainability Features Map identifies buildings, initiatives, and certifications that demonstrate WMU's effort to build a campus culture of sustainability and model our university's sustainability commitments. Some of these "features" are visible and standout, others are seamlessly integrated into everyday operations. In every case, however, these efforts represent bold and inspiring attempts of members throughout our campus community to link vision to action. Sustainability efforts and initiatives are popping up in departments, programs, offices, centers, and institutes all over campus - from Dietetics to Environmental and Sustainability Studies and the Office of Diversity and Inclusion to the Center for Sustainable Business Practices. We are fortunate to have a tremendous abundance of sustainability activities on this campus and can't do the depth and breadth of these efforts justice by singling out a few - please talk to your friends, colleagues, and professors and ask: "What does sustainability mean to you?" - to learn more

wmich.edu/sustainability



Tree Campus USA

WMU is one of 29 campuses across the United States, and one of only two in Michigan that have received the designation "Tree Campus USA" by the Arbor Day Foundation. Tree Campus USA certification acknowledges schools that have shown a major commitment to protecting, caring for, and adding to the campus forest. WMU has a tree advisory committee that deals exclusively with the health and protection of the 110 acres of tree canopy on campus. WMU has a dedicated tree care and management plan, annually dedicates one tree on Arbor Day, and has a policy to plant two trees for every tree taken down. Education is facilitated by guided and self-guided walking tours that are managed by Landscape Services.

Water Bottle Filling Stations

Recently, WMU has implemented a new style of water fountain that also functions as a filtered water bottle filling station. These stations actively measure how much water is distributed through the system, allowing us to calculate the number of plastic bottles that have been kept out of the landfill as a result. Located in nearly every major building, this program is promoted in conjunction with the EcoMug program.

Energy Conservation Initiatives

Facilities Management routinely conducts energy audits across campus. The goal of auditing is to produce the data necessary to prioritize energy conservation measures, which are strategies employed to reduce energy use and waste. Examples include insulation upgrades, installing LED lighting retrofits, and upgrading temperature & lighting controls. The campus energy audits reveal that while building space has expanded, total energy use has decreased.

Non-toxic Cleaning

Custodial Services routinely tests and implements innovative, green cleaning strategies. They have recently replaced 80-85% of regularly used chemicals with aqueous ozone. Their goal is to reduce exposure to harmful chemicals to all building occupants and custodians. Efforts to date have effectively reduced the purchase and use of disposable cleaning products and maximized the use of recycled materials whenever possible.

Dining Services

Various dining policies are in place in order to reduce, reuse, recycle waste, and source food from local farms and ranches. Signage assists the separation of recyclables from the landfill waste stream, tray-free dining reduces waste and consumption, pre-consumer food wastes are diverted to local pig farms for feed (19 tons during one six month period!), and WMU buys sausage back from these same farms. For carryout, students are encouraged to bring their own reusable bag, and only EcoMugs are accepted as a drink container.

Climate Action Plan

2012 commemorated the five-year anniversary of the American College & University Presidents' Climate Commitment. The commitment recognizes that colleges and universities must take initiative and serve as models for society by exemplifying behavior that works to eliminate greenhouse gas emissions and to educate students with the skills and stamina to address climate change. A WMU Climate Action Plan was completed in 2012, which maps a path to achieving carbon neutrality by 2065. There are many opportunities to leverage the Climate Action Plan and use it to further sustainability research, teaching, and other implementation interests.

Student Sustainability Grants

Part of WMU's effort to actively support the building of a culture of sustainability and greening of campus is through the Student Sustainability Grant Program (SSG). The SSG Program is a competitive grant program that is open to all students who pay the sustainability fee. Student Sustainability Grants have supported prototypes for new green vehicle concepts, piloted a vermicomposting program, created a bicycle repair cooperative, fostered the creation of a community garden, funded a hybrid solar updraft tower, aided the completion of an aquaponics system, been used to green areas on campus, and enabled the construction of several beehives on university grounds.

1

The mission of the **Office for Sustainability** is to guide and assist the WMU community in fulfilling and growing its sustainability commitments. Through building a diverse and flourishing learning community around sustainability, WMU will continually explore and develop new opportunities to create a culture of sustainability and improve quality of life for all. In the fall of 2012, the Office for Sustainability took up residence in a newly renovated building at the southeast corner of Howard Street and West Michigan Avenue. The space contains a mix of re-purposed furnishings and equipment and new sustainability technologies. You have to tour it to take it all in. Look for the **Wesustain** sign.

2

The new **Zhang Legacy Collections Center** hosts a range of historic documents and photographs including nearly 200-year-old news articles. The building was built to LEED Silver specifications. In addition, the building has an integrated geothermal heating and cooling system, which uses local temperature differences to heat or cool based on needs.

3

Sangren Hall is one of the newest buildings on campus and is a testament to WMU's dedication to green buildings. An astonishing 32% of materials used to construct the building were recycled. During the tear down of the previous Sangren Hall, 93% of its materials were diverted from the landfill, totaling more than 29,000 tons. Sangren Hall hosts a green roof with plants that absorb rainfall and help insulate the building. A small portion of the parking lot was constructed of porous asphalt so that heavy precipitation flows directly into the storm water basin beneath. The building is also the home of campus' largest rooftop solar array.

4

In 2007, a **wind turbine** was erected at The College of Engineering and Applied Sciences. The turbine features three six-foot blades, and can be seen off of the US-131 highway. Producing two kilowatts (kW) of peak power, the turbine can power ¼ of the electricity for an average home. Current plans include increasing the output of the turbine to five kW in the near future. Dr. John Patten spearheaded the effort to bring this source of renewable energy to campus.

5

Oil to Mowers, located in the Bernhard Center, is a pilot project exploring the use of spent cooking oil as an alternative fuel source to support Western Michigan University's commitment to carbon neutrality. After use in Dining Services campus fryers, spent oil from soybeans grown and processed near Zeeland, Michigan is super-filtered into a holding tank at the Bernhard Center loading dock for use in a diesel lawnmower. If successful, Oil to Mowers could be extended to larger, higher mileage vehicles in WMU's fleet. At full implementation, the project could substantially reduce carbon dioxide emissions from consuming petro-diesel and save the University money.

6

The Gibbs House is a program of the WMU Office for Sustainability that provides experiential opportunities for students to live and learn in a dynamic residential setting. Year-long fellowships are offered for students who engage with and lead projects to enhance campus sustainability across a range of academic disciplines. The future development plan at the Gibbs House property features an extensive perennial food forest, annual vegetable garden, food preservation facilities, community education center, solar panels, and many other exciting resources to facilitate sustainability education at Western Michigan University. Stay tuned for information regarding future programming at the Gibbs House!

8

WMU has gone above and beyond existing regulations with its **stormwater management programs**. Across campus, WMU has incorporated both retention and detention basins into the landscape. These basins collect water during periods of heavy precipitation and release it over time thereby reducing erratic flows, flooding, and erosion. Some of these basins are above ground and easily located, such as the one by the chemistry building, while others are below ground such as the massive basin beneath the Sangren parking lot. WMU showcases its dedication to proper management by also collaborating on stormwater programs in the local community.

9

WMU is a national leader for developing an **electric vehicle (EV) charging station infrastructure**. We have more than 20 charging stations, with 15 in front of the Miller Solar Array alone. Other locations include the Physical Plant, Sangren Hall, The Office for Sustainability, The Engineering Campus, and Welborn Hall. The use of the EV charging stations offset an impressive 142,720 pounds of carbon emissions per year by utilizing vehicle battery packs as storage for excess power produced at the WMU Power Plant during the night. This offset reduces operation costs and green house gas emissions. The EV charging stations are used by five, all-electric work vans and a broad array of personal vehicles that are charged while on campus.

10

Western Michigan University students have free access to **municipal and University bus lines**. Partnered with Metro Transit, the bus programs cover all areas of Main Campus, Parkview Campus, and Downtown Kalamazoo, allowing students to travel virtually anywhere in Kalamazoo County. Buses depart every half hour, lessening inconveniences associated with long wait times and facilitating the system's use. All buses are equipped with a bike rack up front, so cyclists are welcome too! Students and riders can track their bus' arrival via Bronco Mobile.

11

The Physical Plant Control Center is housed in the Facilities Management offices at the confluence of Stadium Drive, Oakland Drive, and Lovell Street. Facilities Management is responsible for managing all 8 million square feet of university space, more than 65 miles of sidewalk and roadway, and 1,200 acres of university grounds. The Center is technologically advanced and integrated allowing Facilities Management to control and monitor many building functions to minimize energy consumption and waste.

12

Most electricity used on campus is produced at our power plant. As a greener and cleaner alternative to burning coal, the **WMU power plant** has two generators that use natural gas. The cogeneration plant produces heated steam as a byproduct of the combustion process, which is used to heat and cool facilities around campus. The facility generates approximately 75 million kWh and 600 million pounds of steam annually and, combined with our renewable energy and conservation practices, satisfies the majority of our campus energy demand.

LEED Certified Buildings

EV Charging Stations

