

Chapter 11 Space & Sustainability

Goals

Campus space must support the academic and research missions of the University. To accomplish this requires comprehensive usage policies, monitoring and capital planning to ensure that units manage space strategically, thoughtfully, and with institutional needs in mind.

The U-M has also established sustainability goals, such as for greenhouse gas emissions, carbon output of university vehicles, and production of waste.

Overview

The physical plant of the University of Michigan Ann Arbor campus is extensive, covering 3,188 acres locally. The campus includes 600 buildings with more than 2,000 classrooms and instructional laboratories. The U-M is responsible for 30 miles of roads and five million square feet of sidewalks, steps, and plazas. More than 16,000 trees and countless gardens populate the campus, as well as 13 million square feet of turf. Fiber optic cable weaves for more than 200 miles throughout the campus, supporting many enterprise-level data centers, and thousands of servers, computers, and tablets.

Space utilization guidelines exist for classrooms, food service, research activities, and offices. Effective space management contributes to efficiency and cost containment, while also prioritizes efforts to offer smaller class sizes.

Planet Blue is the campus sustainability initiative, which includes educational, research, operational and community engagement programs. In 2015, the University became a signatory to the American Campuses Act on Climate Pledge,

joining more than 200 universities and colleges committing to take "significant action to reduce greenhouse gas emissions, increase campus sustainability and incorporate environmental sustainability in academic curricula." ¹. In summer 2016, the U-M was one of eight institutions to receive the Sustainability Award in Facilities Management² by a national organization of physical plant administrators.

In early 2019, the U-M launched the President's Commission on Carbon Neutrality³. This 17-member body released recommendations in March 2021 for reducing the U-M's carbon emissions to levels that will help the institution reach its 2025 and 2040 sustainability goals.⁴ Recommendations included converting heating/cooling systems from natural gas-based to rely on electricity and geothermal energy exchange. In February 2023, the Ann Arbor campus announced that it had reached two of these goals; greenhouse gas emissions dropped by 25% compared to the 2006 benchmark, and the applications of chemicals to campus grounds declined by 40% (compared to 2006).

For More Information

Space Planning and Utilization (provost.umich.edu/resources-policies/space-planning/)

Planet Blue (<u>planetblue.umich.edu/</u>) U-M sustainability education, research, and campus operations

U-M Sustainability Goals (ocs.umich.edu/sustainability-goals/)

Charts in Chapter 11

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¹ "University takes the American Campuses Act on Climate Pledge," *University Record*, Nov. 20, 2015.

² "U-M wins national award for campus sustainability excellence," *University Record*, July 25, 2016.

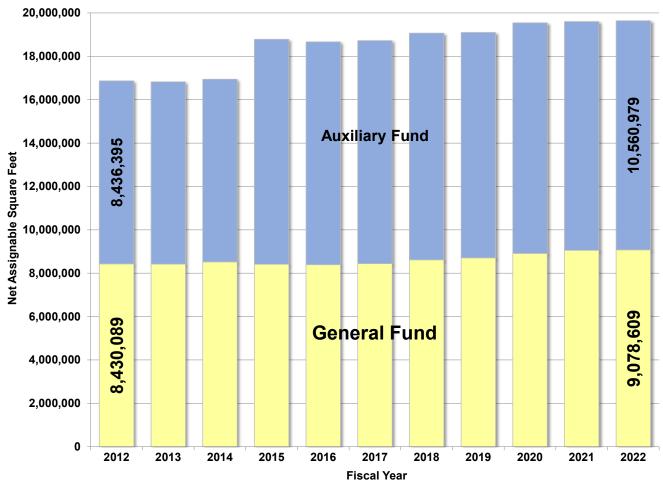
³ "University launches Commission on Carbon Neutrality," *University Record*, February 4, 2019.

⁴ " Carbon neutrality commission submits final report and recommendations," *University Record*, March 18, 2021.

⁵ "U-M joins Better Climate Challenge in effort to cut emissions," *University Record*, May 24, 2022.

Ann Arbor campus space is about equally divided in being supported by the General Fund and by other funds. Compared to 2012, the General Fund now supports an additional 549,000 square feet, a 7.7% increase in the U-M's total space⁶.

11.1 Total Facilities Space on the Ann Arbor Campus (excluding U-M Health System), by General Fund and All Other Funds, FY2012-FY2022.

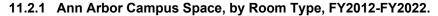


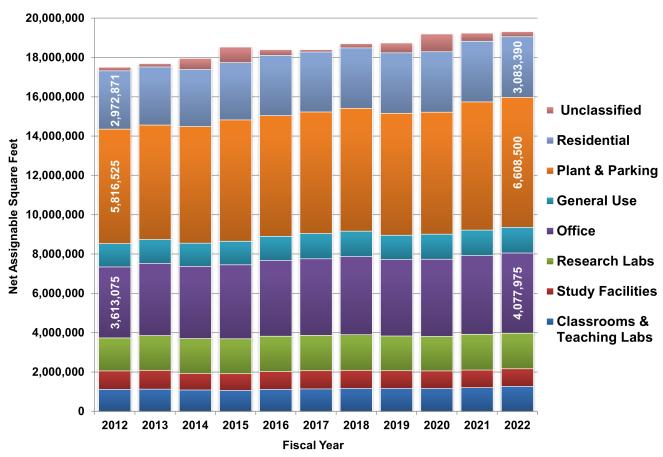
SOURCE: U-M Annual Space Management Survey Reports

Ann Arbor campus space⁵ supported by the General Fund is mainly used for teaching, research, student services, support of the campus physical plant, and administration. All Other Funds space is primarily comprised of the hospitals and health system, residence halls, parking structures and varsity athletic facilities. These space categories are labeled "net assignable," which means they exclude common areas, such as hallways, staircases and lobbies.

⁶ In this chart, Ann Arbor campus excludes the North Campus Research Complex and the non-Medical-School portion of the Health System.

Ann Arbor campus space has increased by 1.82 million net assignable square feet over the last decade at an annual growth rate of about 1.0 percent.





SOURCE: U-M Office of Space Analysis

Neither this chart nor 11.2.2 includes the space assigned to the U-M Health System or the North Campus Research Complex.

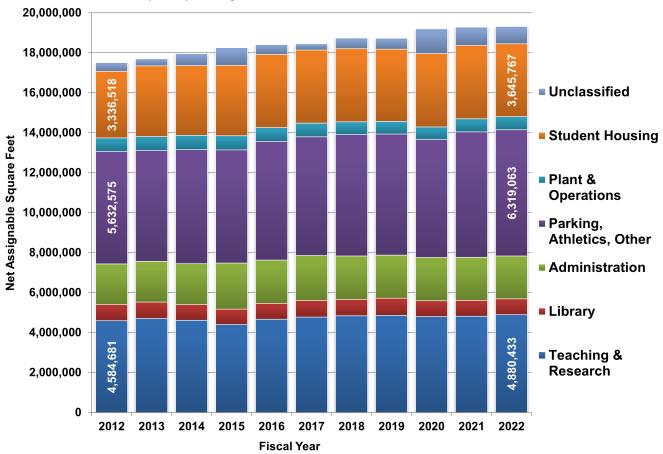
Space that is either not in use or being remodeled is in the unclassified category; campus facilities and buildings move into and out of this category from year-to-year. General use space covers rooms used for performances, exhibitions, food service, recreation, lounges, and meeting rooms. Plant &

Parking encompasses central computing and telecommunications rooms, parking structures and garages (but not surface lots), health care space that is not part of the U-M Health System, housing for research animals, media production facilities, and storage.

Net assignable space excludes hallways, restrooms, elevators, and custodial areas.

All types of space are needed to support the University's mission.

11.2.2 Ann Arbor Campus Space, by Function, FY2012-FY2022.



SOURCE: U-M Office of Space Analysis

Neither this chart nor 11.2.1 includes the space assigned to the U-M Health System or the North Campus Research Complex.

Space in the unclassified category is either not in use or being remodeled. Plant and Operations includes space used in the operation and maintenance of the University's physical plant, its heating/cooling and other utilities services, central information technology services, and some special service operations, such as printing services.

About 5/6 of the space in the Parking, Athletics, Other category is used by parking and athletics. The remainder supports activities such as development, government and

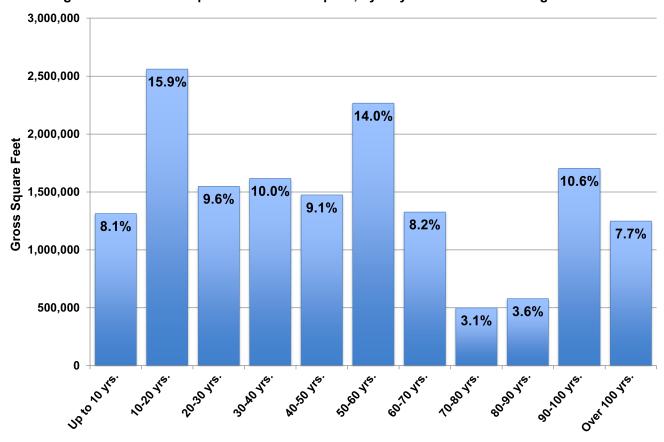
community relations, student clubs and organizations, as well as University space leased to private entities or operated under a management agreement with an outside entity (i.e. food service in the student unions). The need for parking and the growth in athletic facilities have driven this category to grow the most over the decade displayed.

Administration combines space used by central functions, departmental functions, and student administration and student services.

Net assignable space excludes hallways, restrooms, elevators, and custodial areas.

About 53 percent of the General Fund building space on the Ann Arbor campus was first put into service within the last 50 years.

11.3 Age of Ann Arbor Campus General Fund Space, by 10-year Increments through FY2022.



Age of Building/Building Segment since Completion of Construction, by Decade

SOURCE: U-M Space Dataset

The General Fund building space for the Ann Arbor campus⁷ and nearby areas totals 15.5 million gross square feet. Buildings on campus that are more than 100 years old include the President's House, Newberry Hall, Tappan Hall, the Detroit Observatory, Burnham House, and two barns at Matthaei Botanical Gardens; the 100-year-old structures contribute about 850,000 gross square feet to the campus total.

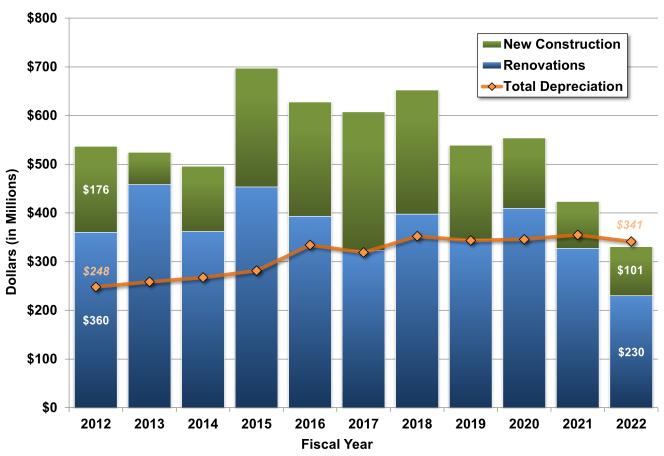
The last 20 years saw a large increase in new construction on campus tied to several U-M initiatives. During this period, the U-M campus added the Biomedical Sciences Research Building, Undergraduate Science Building, Palmer Commons, Computer Science Building, and the Ross School of Business building.

Buildings associated with auxiliary activities (e.g., U-M hospitals and clinics, student residence halls and athletic facilities) are not included in this chart because these facilities are not supported by the General Fund. Also, this chart does not include the North Campus Research Complex, a group of buildings acquired by the University in 2009.

⁷ This chart excludes the non-Medical School parts of Michigan Medicine and the North Campus Research Complex.

The University tries to maintain a balance between adding new space and renovating existing space on campus.

11.4 U-M All Campuses Renovation and New Construction Expenditures, Adjusted for Inflation⁹, and Depreciation of the U-M Physical Plant, FY2012-FY2022.



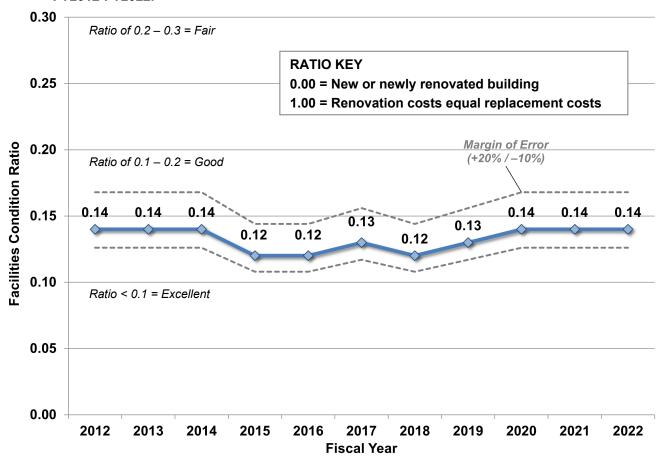
SOURCE: U-M Office of Financial Analysis

This chart displays new construction, renovation, and depreciation expenses in the plant funds for buildings on all three U-M campuses, including Michigan Medicine. These expenses may be funded from a variety of sources including gifts, general funds, or other revenues.

 $^{^{8}}$ Based on December 2021 Building Cost Index, $\it Engineering \, \it News-Record.$

The overall condition of General Fund buildings on the Ann Arbor campus has remained consistent. The U-M continues to monitor building condition by identifying and prioritizing infrastructure needs.

11.5 Ratio of General Fund Infrastructure Renovation Costs to Total Replacement Costs, FY2012-FY2022.

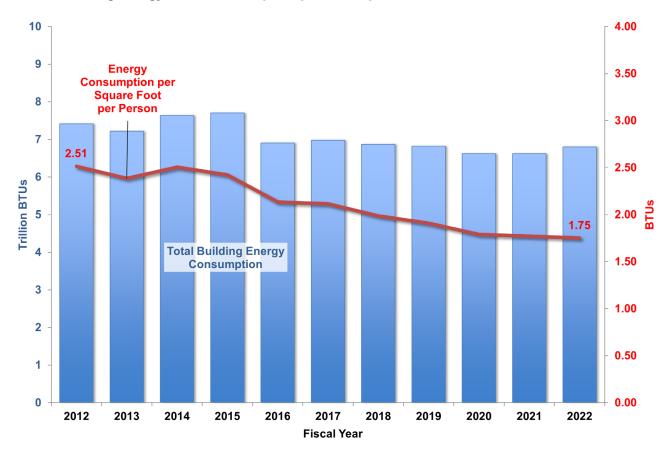


SOURCE: U-M Office of Financial Analysis

The facilities condition ratio is an indicator of building condition that divides the cost of needed building renovations by the cost to replace those structures. The ratio maximum of 1.0 indicates that the cost of renovating the existing facilities equals their total replacement. A ratio of 0 would mean no renovations are necessary; that is, the facilities are all new or newly renovated. A ratio of 0.2-0.3 is generally considered Fair, 0.1-0.2 is considered Good, and below 0.1 is considered Excellent.

Total energy use in campus buildings and energy use per square foot per person has declined compared to a decade ago even as new buildings have been added.

11.6.1 Building Energy Use, Total and per Square Foot per Person, FY2012-FY2022.



SOURCE: U-M Utilities and Plant Engineering

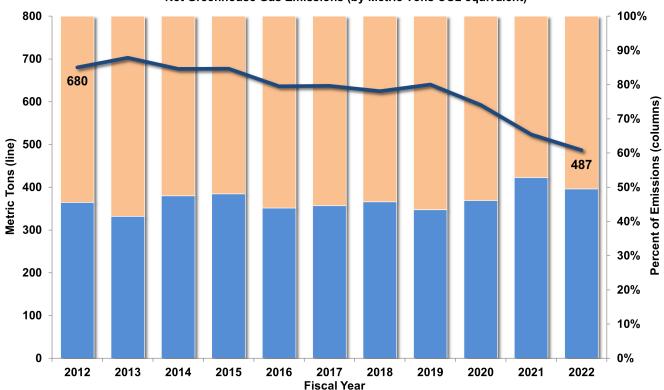
Net greenhouse gas emissions from campus buildings and vehicles have declined over the past several years as the fuel source for generating electricity has shifted to natural gas over coal.

11.6.2 Greenhouse Gas Emissions, Total and Percent of Emissions by Energy Generation Source, FY2012-FY2022.



GHG Emissions from U-M Energy Generation



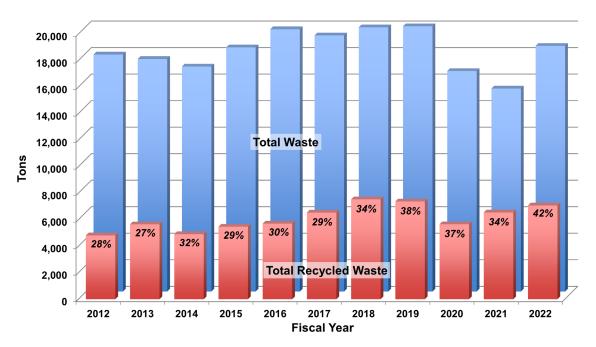


SOURCE: U-M Utilities and Plant Engineering

The level of greenhouse gas emissions is influenced by two factors: total energy usage and the energy provider. University-generated energy is highly optimized for efficient production and to limit greenhouse gas production. However, much of the purchased electricity consumed on campus is generated by coal-fired plants, which produces relatively high levels of greenhouse gases. Even so, natural gas is becoming more competitive with coal as a fuel source, and as the U-M's external energy providers shift toward natural gas, greenhouse gas emissions have leveled off.

The total waste generated at the University of Michigan increased in FY22 as on-campus work and educational activities returned following a lift in pandemic-related restrictions.

11.6.3 Waste, Total and Percent Recycled/Diverted from Landfill, FY2012-FY2022.



SOURCE: U-M Waste Management

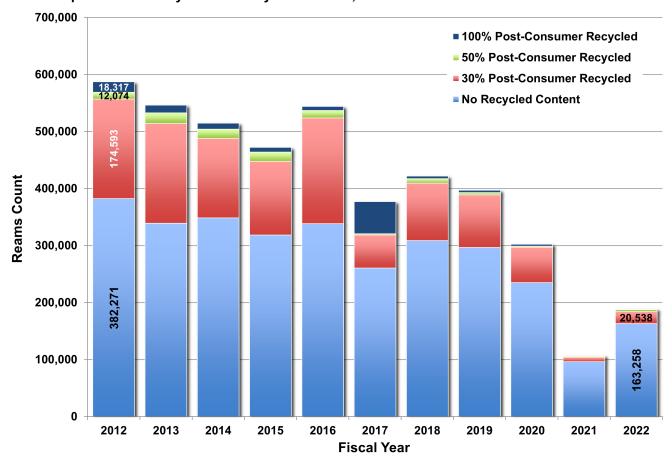
The percentages in the red columns indicate the percentage of total waste that was recycled. Total waste tends to track the overall space in use, which is increasing. However, the amount of waste that is recycled is also growing.

In fall of 2020, the U-M Office of Campus Sustainability⁹ introduced "Where to Throw," a web application that allows the user to enter an item's description and find out the best method of reuse, recycle, composting, or, if necessary, disposal. See ocs.umich.edu/resources/where-to-throw/.

⁹ 'Where to Throw' search tool eases campus waste disposal decisions, *The University Record*, Oct. 15, 2020.

The total amount of paper purchased by the University increased in FY 22 compared to the previous year, largely due to the return of many in-person campus activities.

11.6.4 Paper Purchased by Percent Recycled Content, FY2012-FY2022.



SOURCE: U-M Office of Campus Sustainability