



## 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 space is managed 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. The campus includes some 600 buildings with more than 2,000 classrooms and instructional laboratories. The U-M is responsible for nearly 30 miles of roads and 5 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. About 200 miles of fiber optic cable weaves through the campus, supporting 6 enterprise-level data centers, some 2,300 servers, and thousands of individual computers.

Space utilization guidelines have been established for classrooms, food service, research activities, and offices. In particular, effective course and classroom scheduling is critical to the academic mission of the University. It enables students to take the courses they need to make progress toward graduation, and contributes to on-going cost containment efforts through efficient use of space.

The condition of buildings requires regular monitoring to ensure that renovations and/or new construction occur in a cost-efficient manner while meeting the needs of the academic and research community.

The campus sustainability initiative brings together education, research, and operations under the campus-wide sustainability brand, known as Planet Blue. Recently, 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.”<sup>1</sup> In summer 2016, the U-M was one of eight institutions to receive the Sustainability Award in Facilities Management<sup>2</sup> by a national organization of physical plant administrators.

### For More Information

Space Planning and Utilization ([provost.umich.edu/space/](http://provost.umich.edu/space/))

Planet Blue ([sustainability.umich.edu/](http://sustainability.umich.edu/))

U-M sustainability education, research, and campus operations

✦ *Chart updated since the September 2017 edition.*

### Charts in Chapter 11

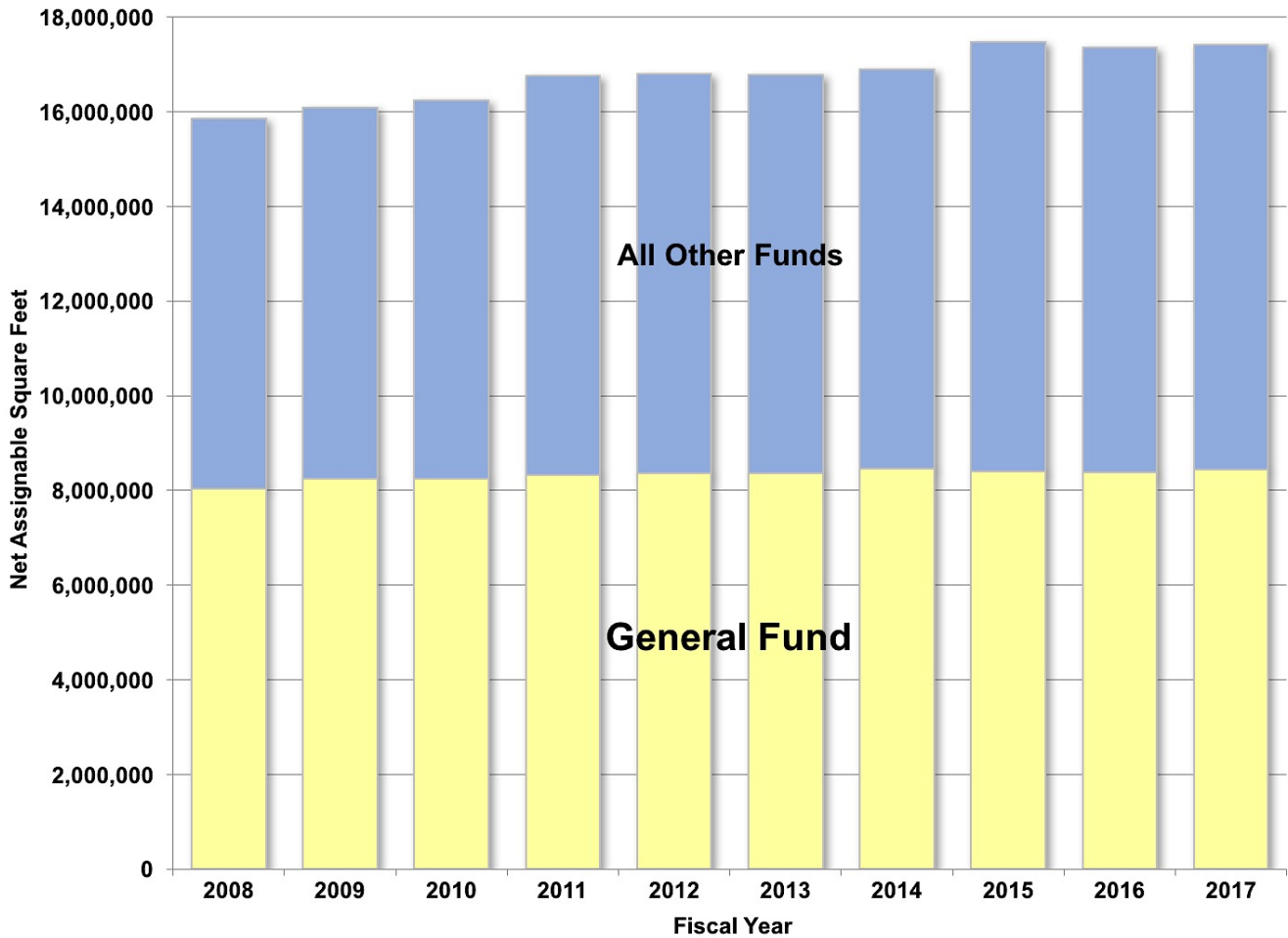
- 11.1 Total Facilities Space on the Ann Arbor Campus, by General Fund and All Other Funds, FY 2008-17.
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<sup>1</sup> “University takes the American Campuses Act on Climate Pledge,” *University Record*, Nov. 20, 2015.

<sup>2</sup> “U-M wins national award for campus sustainability excellence,” *University Record*, July 25, 2016.

Ann Arbor campus space<sup>1</sup> is about equally divided in being supported by the General Fund and by other funds. Compared to 2006, the General Fund now supports an additional 392,000 net assignable square feet, a 4.9% increase.

**11.1 Total Facilities Space on the Ann Arbor Campus<sup>3</sup>, by General Fund and All Other Funds, FY 2008-17.**



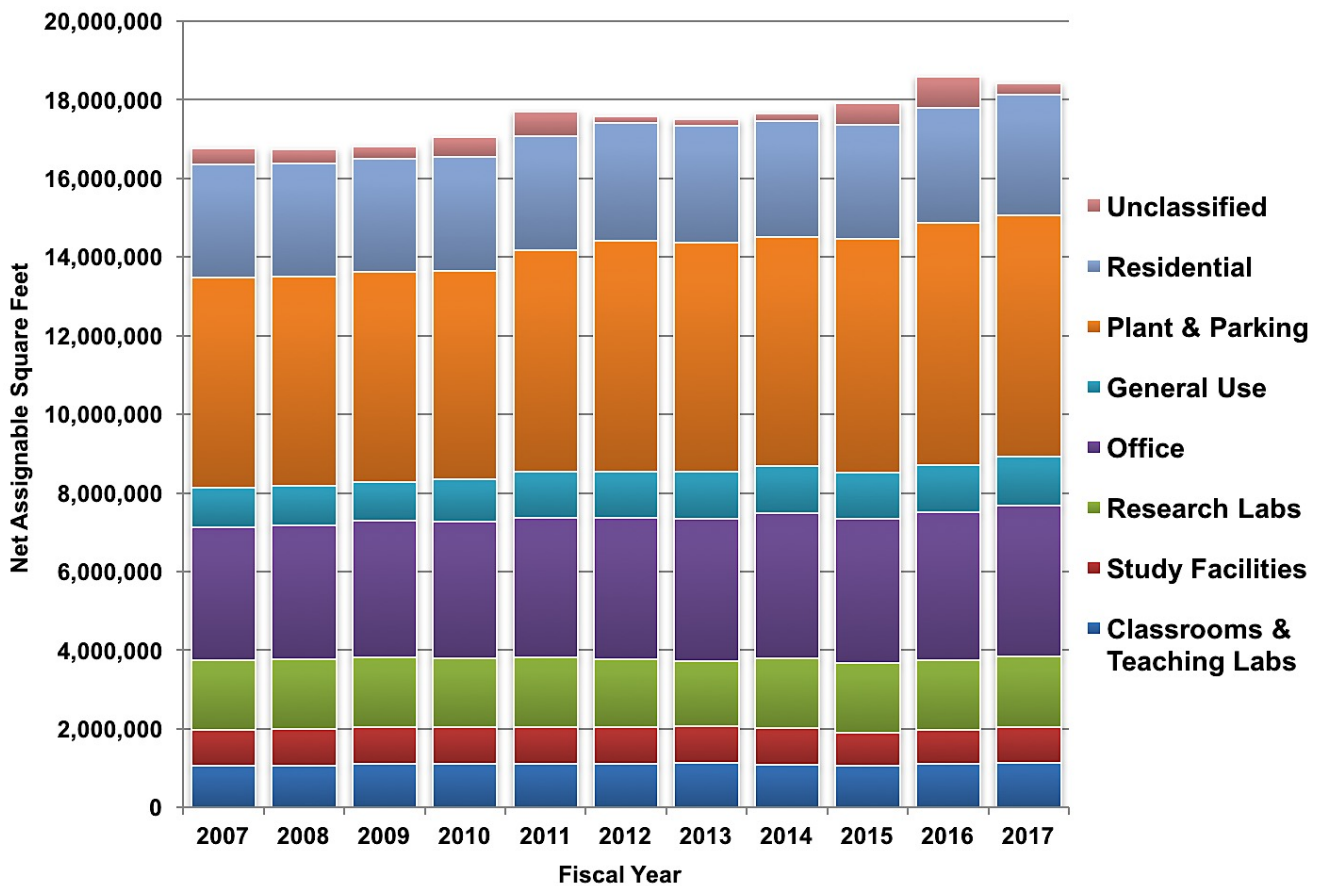
SOURCE: U-M Annual Space Management Survey Reports

Ann Arbor campus space<sup>3</sup> 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. Both categories exclude common areas, such as hallways, staircases and lobbies.

<sup>3</sup> In this chart, Ann Arbor campus excludes the non-Medical-School portion of the Health System and North Campus Research Complex.

Ann Arbor campus space<sup>4</sup> has increased by just under 1.7 million net assignable square feet (~4%) over the last decade.

★ 11.2.1 Ann Arbor Campus Space<sup>4</sup>, by Room Type, FY2007-17.



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 &

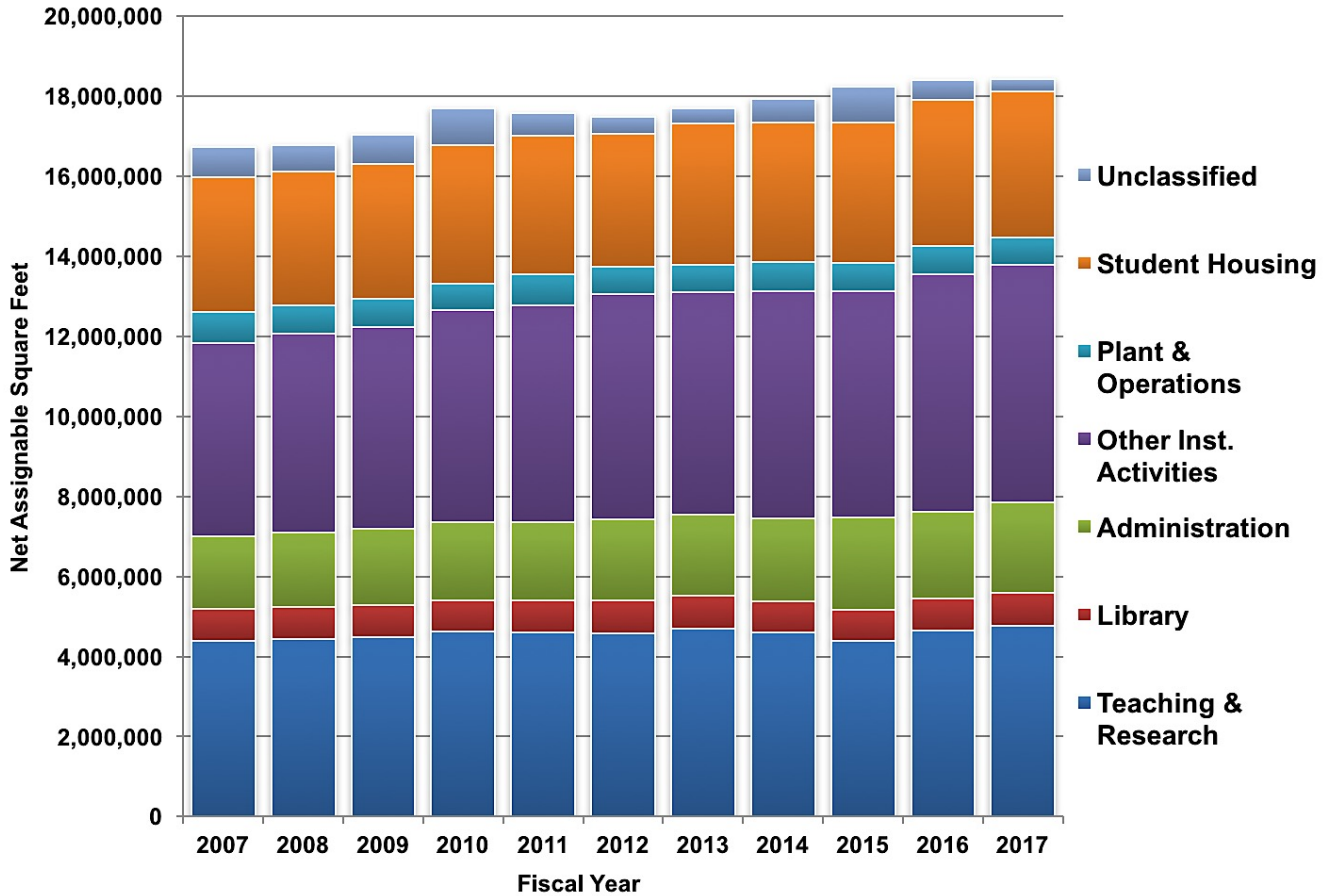
Parking encompasses central computing and telecommunications rooms, parking structures and garages (but not surface lots), health care space that is not part of the U-M Health System, housing for research animals, media production facilities, and storage.

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

<sup>4</sup> For the purposes of this chart, Ann Arbor campus excludes the Health System and North Campus Research Complex.

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

11.2.2 Ann Arbor Campus Space<sup>5</sup>, by Function, FY2007-17.



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. Space assigned to the

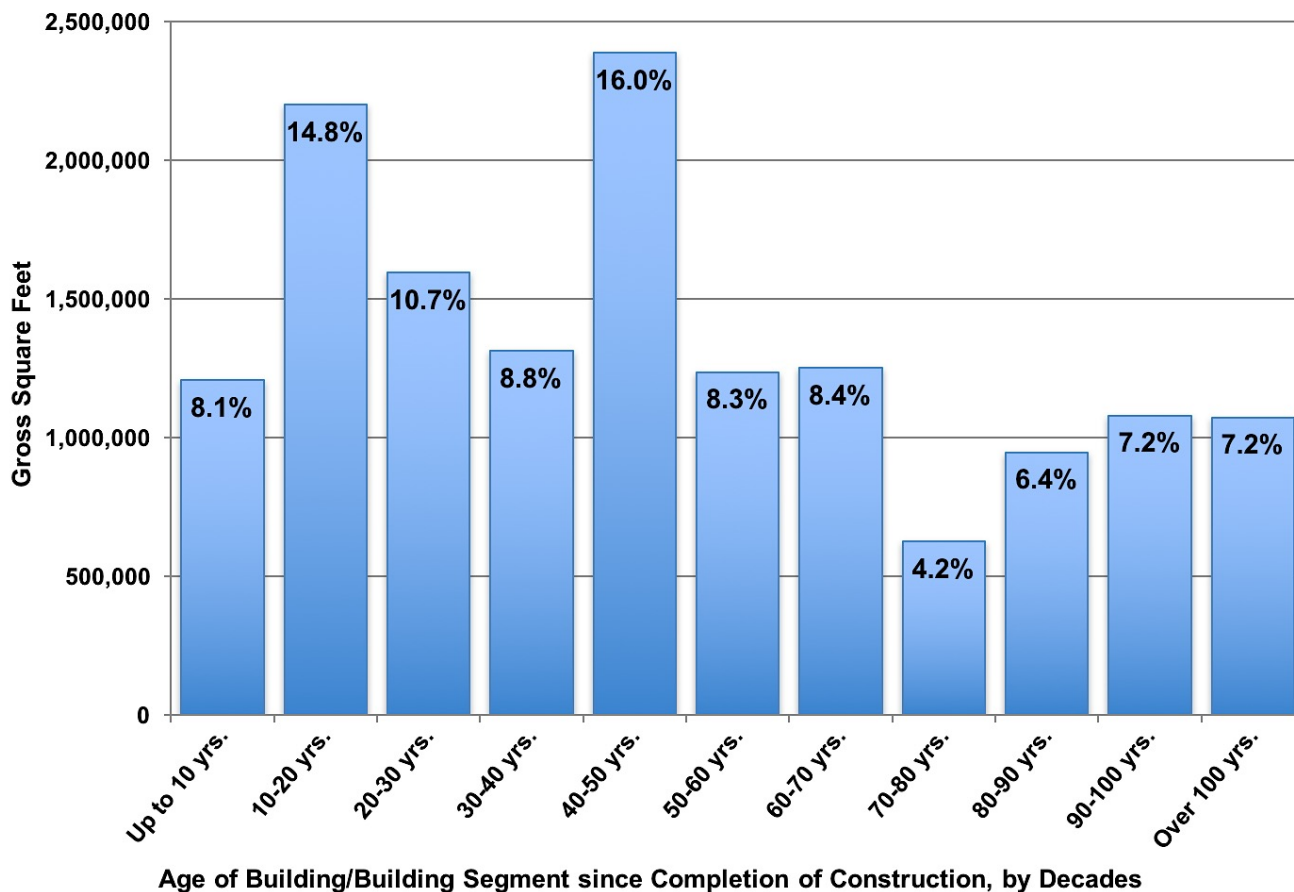
Other Institutional Activities category includes a long list of functions, such as development, government and community relations, student clubs and organizations, as well as University space leased to private entities or operated under a management agreement with an outside entity (i.e. food service in the student unions).

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

<sup>5</sup> For the purposes of this chart, Ann Arbor campus excludes the Health System and North Campus Research Complex.

**About 58 percent of the General Fund building space on the Ann Arbor campus<sup>4</sup> was first put into service within the last 50 years.**

**11.3 Age of Ann Arbor Campus<sup>6</sup> General Fund Space, by 10-year Increments through FY2017.**



SOURCE: U-M Data Warehouse.

The General Fund building space for the Ann Arbor campus<sup>6</sup> and nearby areas totals 14.5 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.

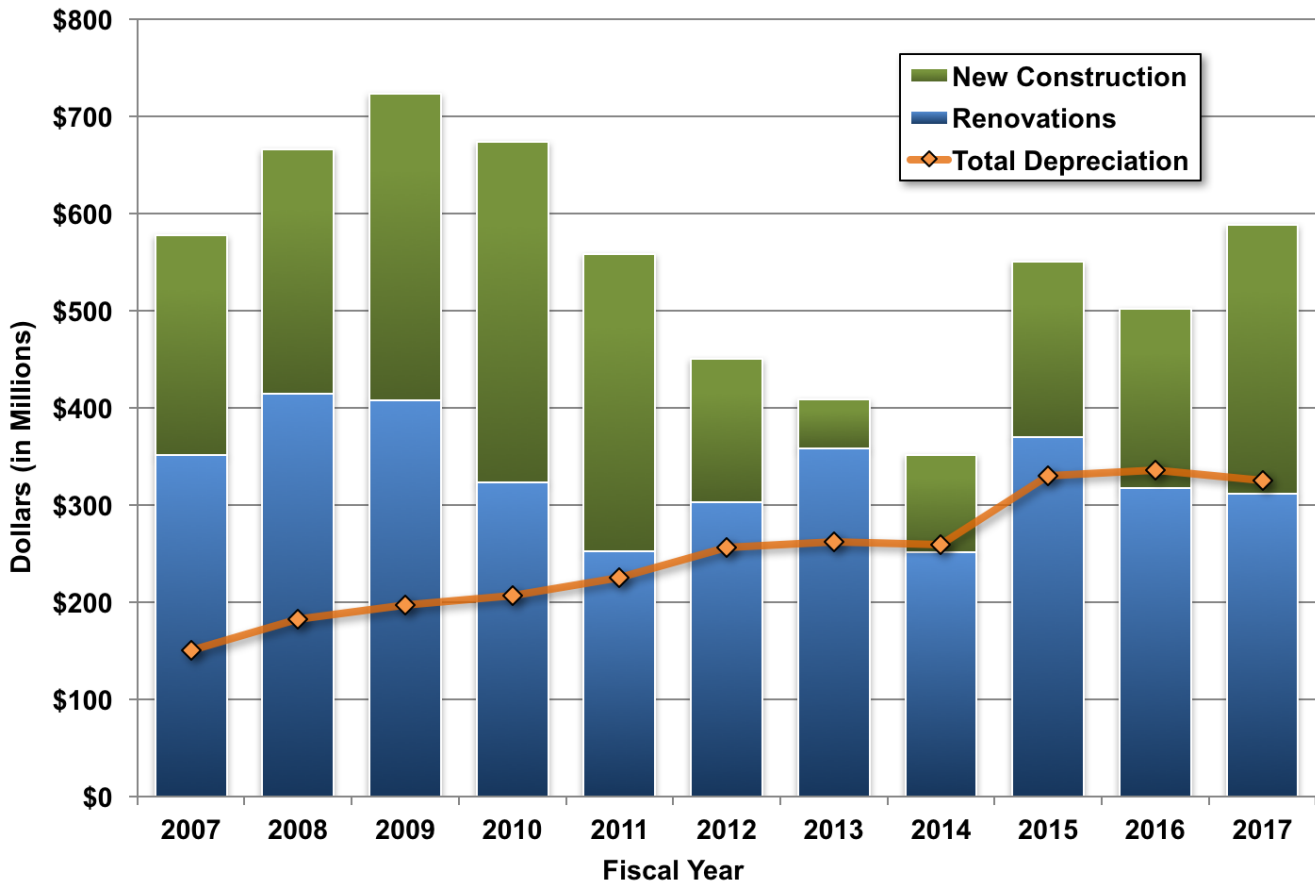
The last 20 years saw a large increase in new construction on campus. During this period, the U-M built the Biomedical Sciences Research Building, Undergraduate Science Building, Palmer Commons, Computer Science Building, and the Ross School of Business building.

Buildings associated with auxiliary activities (e.g., U-M Health System, 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 buildings in the North Campus Research Complex, which was acquired by the University in 2009.

<sup>6</sup> For the purposes of this chart, Ann Arbor campus excludes the Health System and 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 General Fund Renovation and New Construction Expenditures, Adjusted for Inflation<sup>7</sup>, and Depreciation of the U-M Physical Plant, FY2007-17.



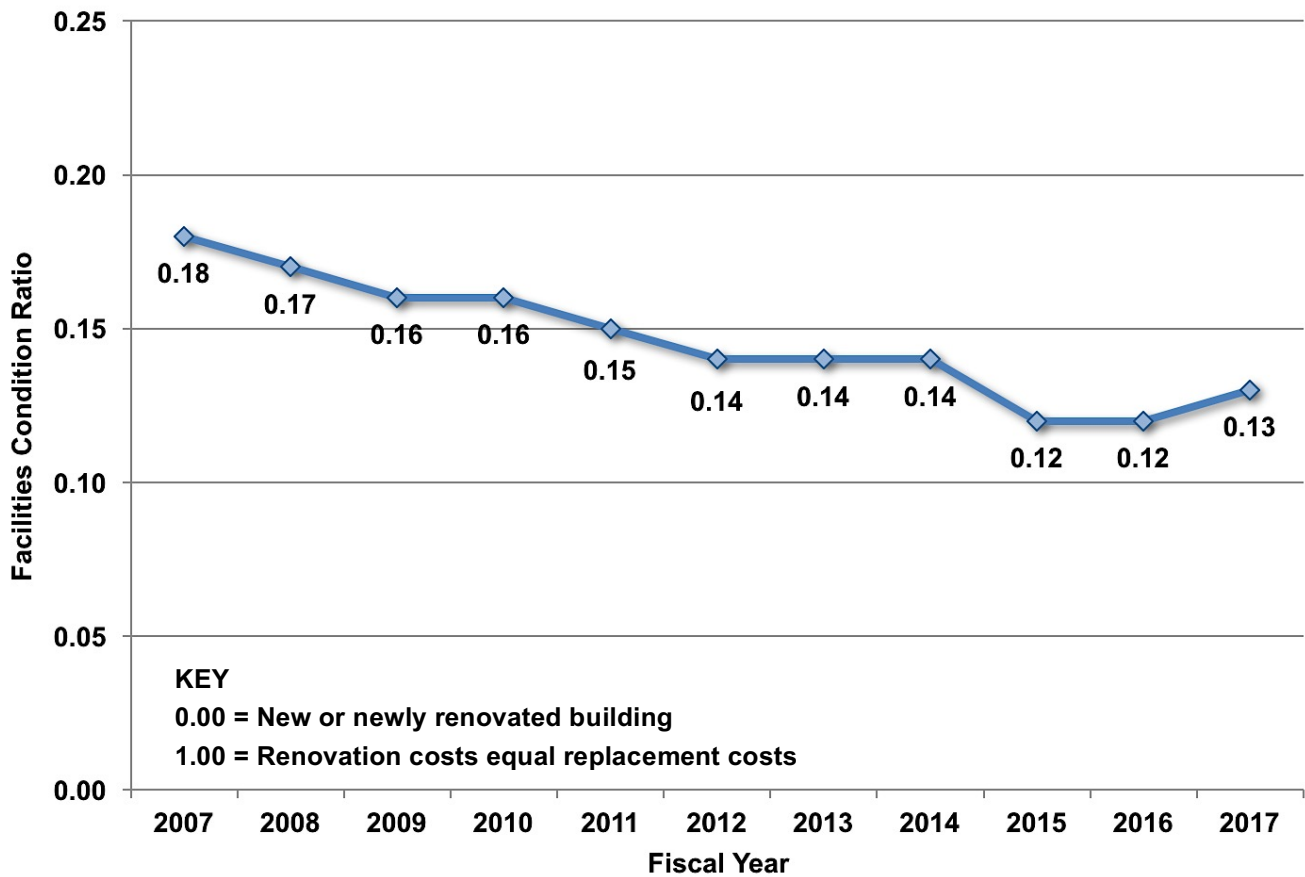
SOURCE: U-M Office of Financial Analysis.

The FY2009 new construction/renovation expenditure total does not include the purchase of North Campus Research Complex (NCRC) for \$108M. However, expenditures for subsequent renovation to NCRC space is included.

<sup>7</sup> Based on 2017 Building Cost Index, *Engineering News-Record*.

The overall condition of General Fund buildings on campus has improved over the last decade as measured by the ratio of infrastructure renovation costs to total replacement costs.

★ 11.5 Ratio of General Fund Infrastructure Renovation Costs to Total Replacement Costs, FY2007-17.



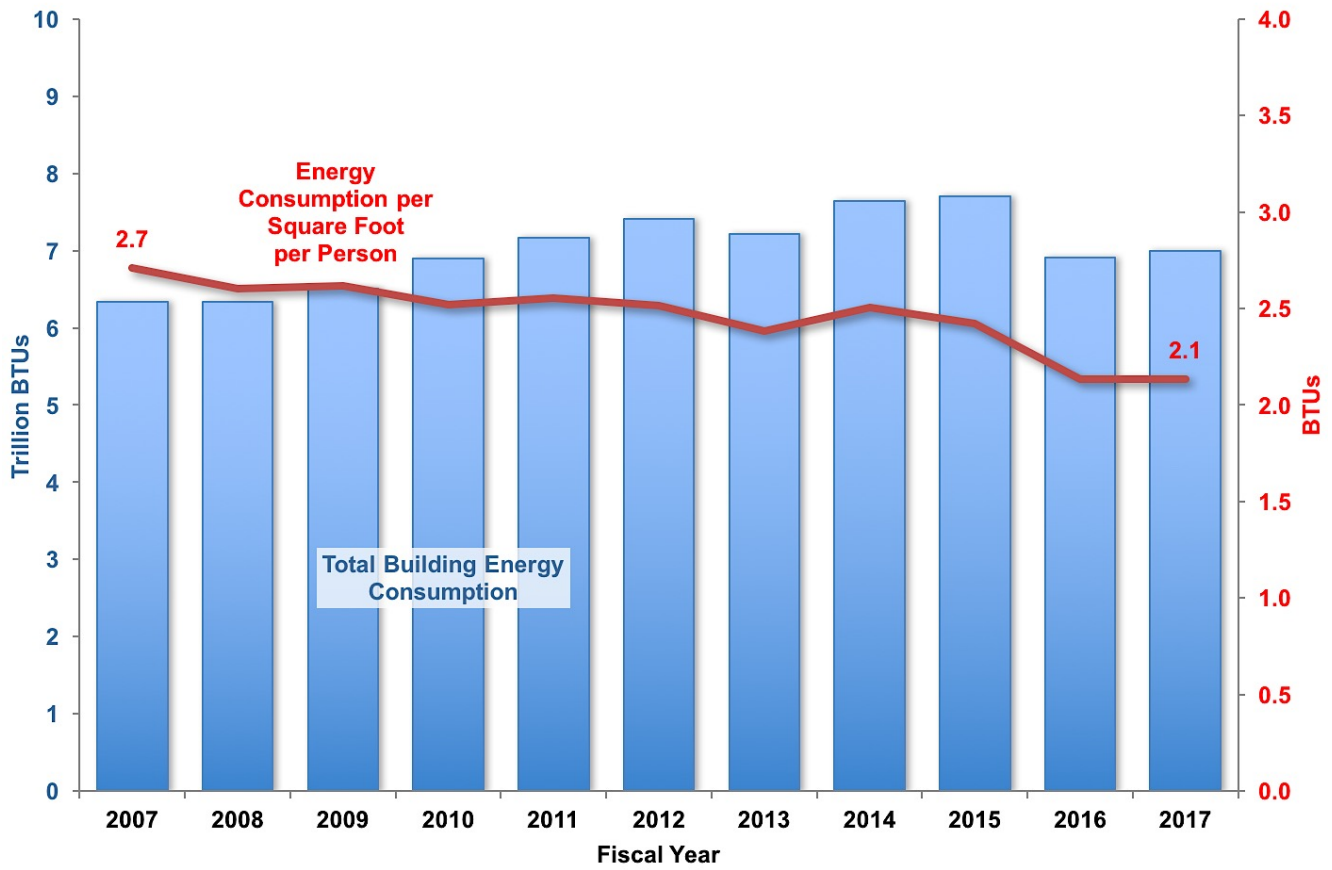
SOURCE: U-M Office of Financial Analysis.

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.



The growth in total energy use by buildings on campus is larger today compared to a decade ago. At the same time, energy use per square foot per person has declined over the last several years.

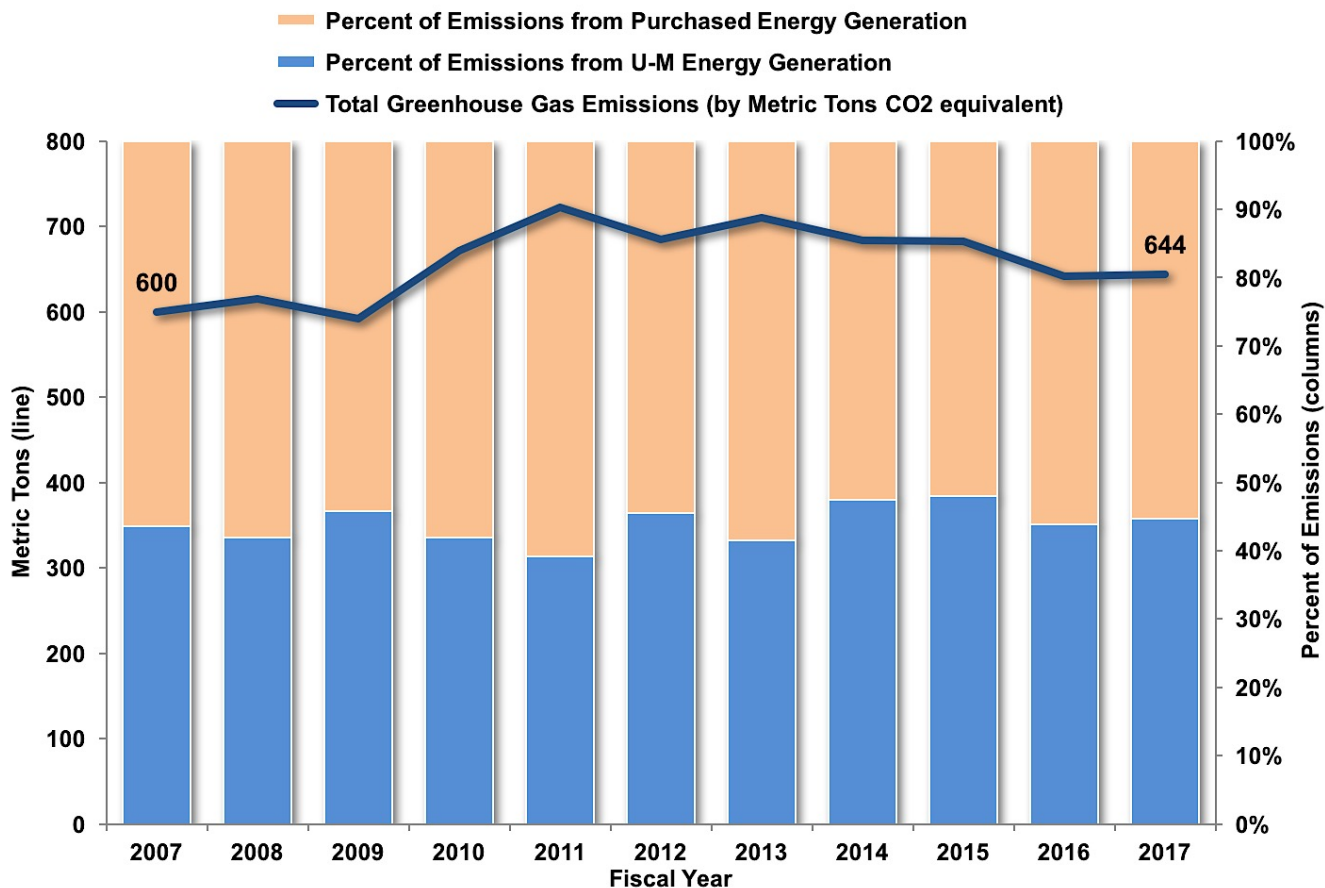
✦ 11.6.1 Building Energy Use, Total and Per Square Foot Per Person, FY2007-17.



SOURCE: U-M Utilities and Plant Engineering.

**Total greenhouse gas emissions from campus buildings and vehicles have declined in the past several years.**

**11.6.2 Greenhouse Gas Emissions, Total and Percent of Emissions by Energy Generation Source, FY2007-17.**

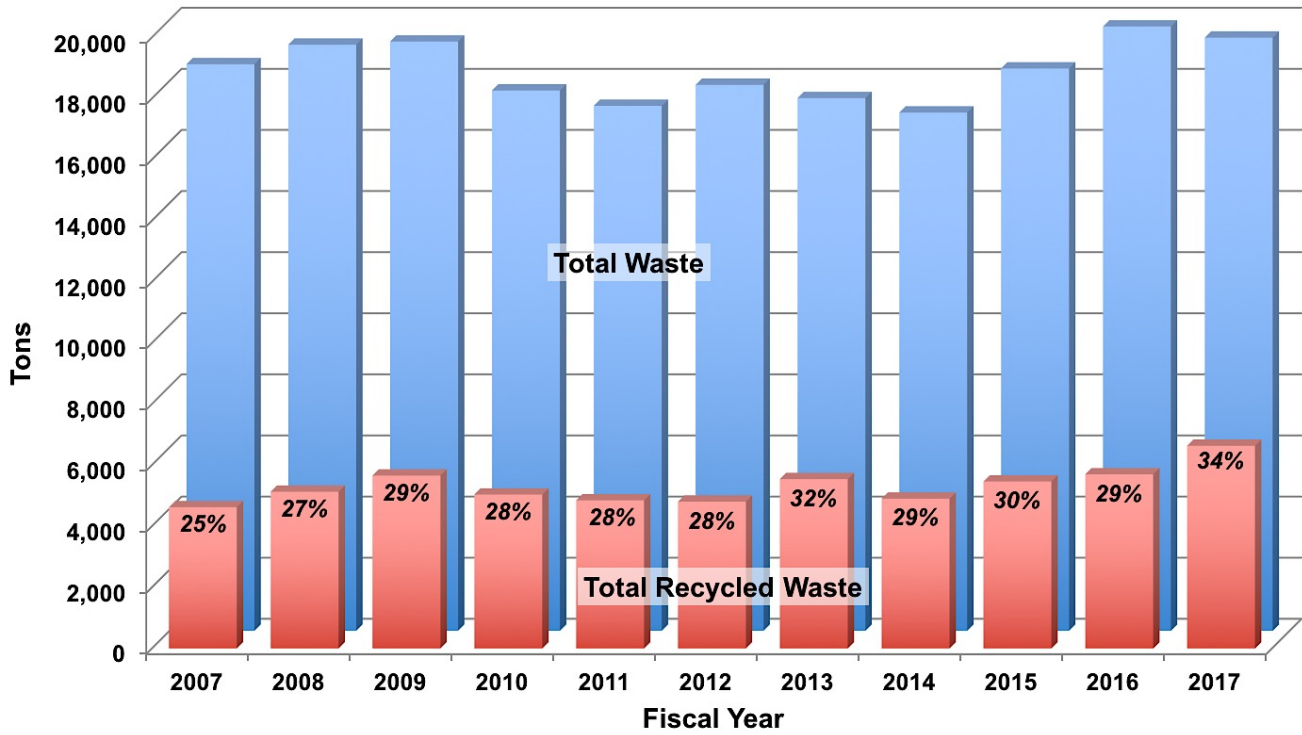


SOURCE: U-M Utilities and Plant Engineering.

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 weight and percentage of waste being recycled is highest in the most recent fiscal year.

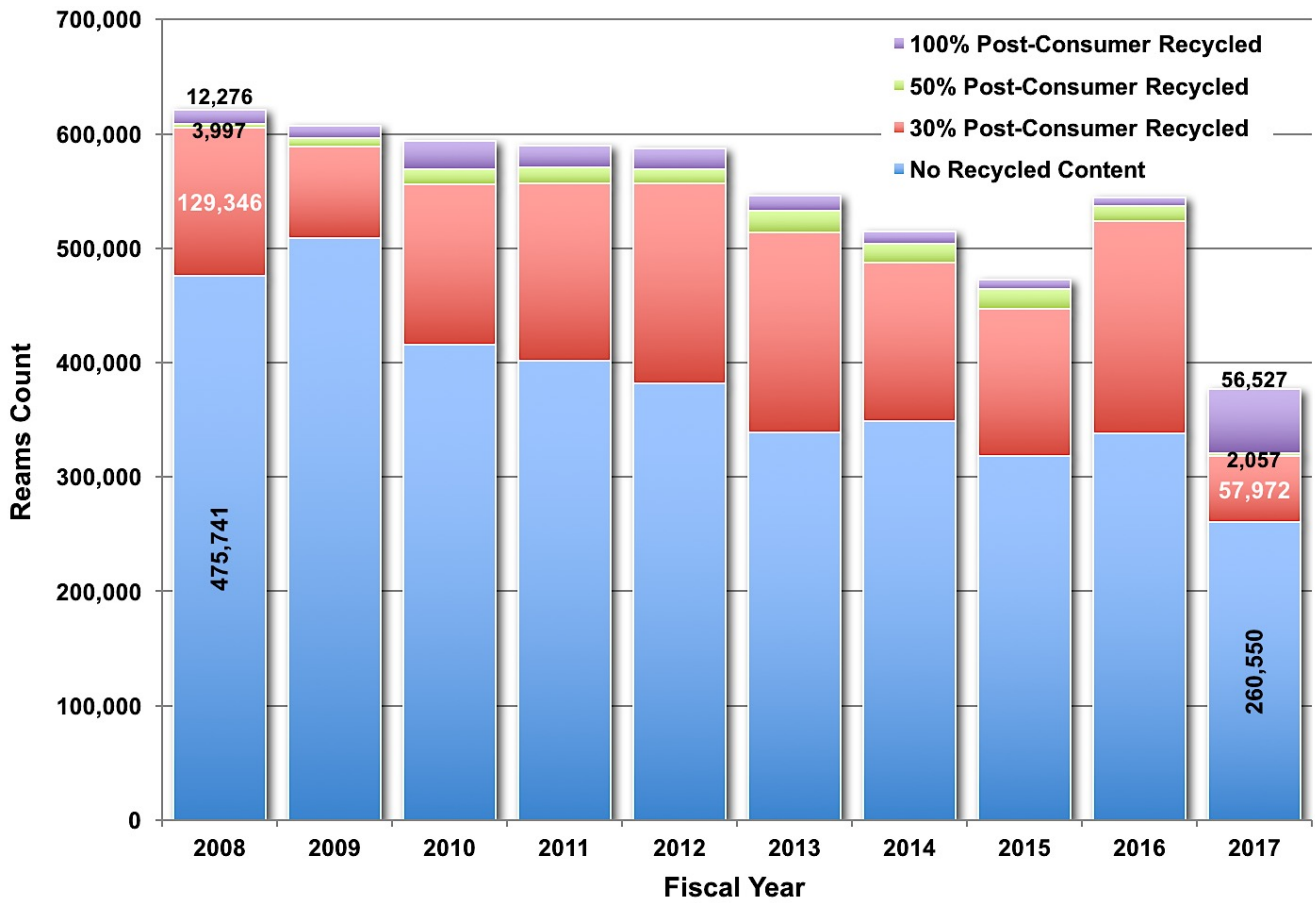
★ 11.6.3 Waste, Total and Percent Recycled, FY2007-17.



SOURCE: U-M Waste Management.

Even as the total amount of paper purchased by the University is declining, the fraction of the total with recycled content has, in general, increased.

★ 11.6.4 Paper Purchased by Percent Recycled Content, FY2008-17.



SOURCE: U-M Office of Campus Sustainability.