

## MIT Office of Sustainability

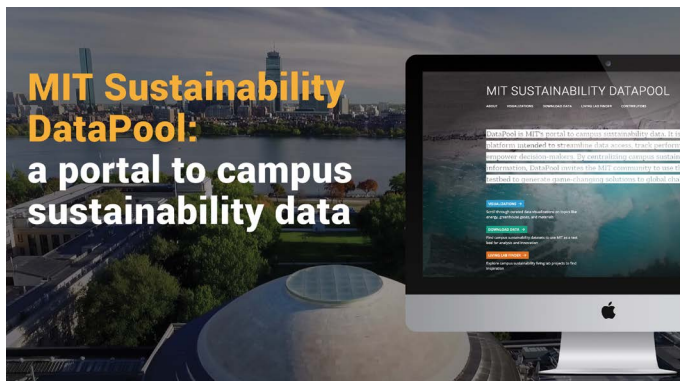
The [MIT Office of Sustainability \(MITOS\)](#) was launched on an organizational framework that seeks solutions across scales that extend from the individual to the campus, to the city, and to the globe. The MITOS team applies this framework to assess the implications of each priority, leading to new and unprecedented ways to solve for sustainability. The office is of the opinion that the foundation for institutionalizing sustainability at MIT must be considered across these scales—all problems cannot be solved at one scale. Although the office’s work is based on campus, that work is connected to the larger mission of MIT, which is to serve the nation and the world. In the office’s efforts to transform MIT’s campuses, the staff seeks to bridge operational staff and academics to co-develop implementable solutions. MITOS is accountable for advancing MIT’s commitment to sustainability. Staff continuously revisit the question of how MIT can be a game-changing force for campus sustainability in the 21st century—how to have an effect beyond the boundaries of the Institute.

In this vein, MITOS has built a model that uses the MIT campus as a test bed for climate and sustainability research and application. The process for institutional change calls for catalyzing research with operational and academic partners that leads to sustained data collection and analysis, solution development, and measurable outcomes. The office seeks to innovate, improve, and accelerate societal progress toward sustainability.

MITOS’s work in academic year 2019 was shaped by accessing and analyzing data, developing greenhouse gas mitigation strategies, modeling climate resiliency, reassessing MIT’s waste development and disposal strategies, grappling with food systems and food insecurity, and re-evaluating how to commute. MIT’s commitment to sustainability led to its receiving a Gold certification from the national Sustainability Tracking and Rating System (STARS).

## Data: Implementing and Measuring Sustainability of our Campus

### Sustainability DataPool



MITOS launched the [Sustainability DataPool](#) website—which serves as MIT’s central portal to campus sustainability data—in 2018. The Sustainability DataPool provides the MIT community with data downloads for research and education, as well as access to sustainability performance dashboards. In fiscal year 2019,

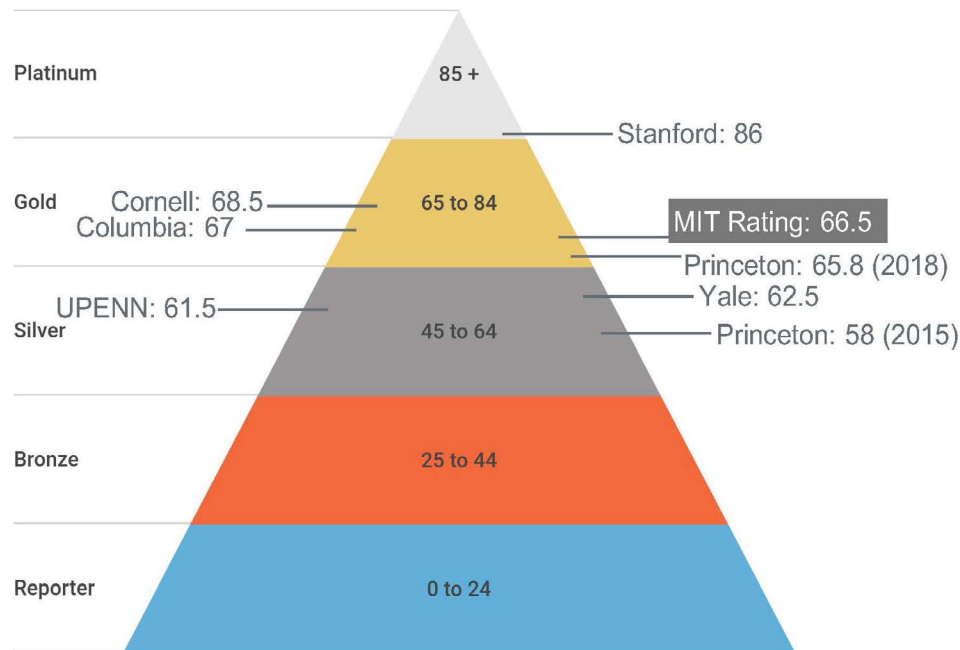
five more dashboards were developed and added to the site, which now provides information on a diverse range of topics, including bike share usage, the campus tree inventory, and greenhouse gas emissions. In fall 2018, MITOS and the Department of Facilities contributed a challenge to the annual Energy Hackathon, organized by the MIT Energy Club. The Sustainability DataPool was a key resource in this effort.

## Sustainability Tracking and Rating System

STARS is the transparent self-reporting standard developed by the Association for the Advancement of Sustainability in Higher Education. The standard was developed by and for the higher education sustainability industry in 2007. More than 800 institutions and peer groups are reporting. The standard is widely used by many of the Ivy Plus members. In fall 2018, MITOS completed the 1,500 data point evaluation form and MIT emerged as a Gold-rated institution. This places MIT in the upper echelon of the colleges and universities that are leading the way to a sustainable future. In early FY2021, MITOS will begin work on a new STARS report to assess the Institute's performance in comparison with the baseline established by the 2019 report.



## Ivy Plus Ratings



*Comparison of STARS ratings*

## Energize MIT Goes Global

MITOS launched the Energize MIT project in 2017 to provide the MIT community with an open energy data platform that would support research, education, and operational decision making. In the winter of 2019, the Tel Aviv Museum of Art invited MIT to showcase its professional video, "Energize MIT: Climate Action at MIT," in an exhibition, *Solar Guerrilla: Constructive Responses to Climate Change*. The exhibition featured a range of city-scale responses to climate change from across the globe. MITOS coordinated with the Department of Facilities, *MIT News*, and the MIT Technology Licensing Office to develop the video. More than 2,000 business executives, faculty members, artists, and members of the public arrived for the opening of the art collection, which featured MIT's work throughout the summer.

## **Climate: Mitigation to Resiliency**

### **Climate Action: Greenhouse Gas Mitigation**

MITOS continued in FY2019 to take the lead in facilitating the campus greenhouse gas mitigation and campus-as-a-test-bed components of the Institute's Plan for Action on Climate Change. MITOS annually measures and reports the greenhouse gas emissions associated with the operation of the campus to better understand MIT's direct contribution to heat-trapping gases in the atmosphere—the gases contributing to global climate change. This basis informs the office's carbon reduction strategies and allows for tracking progress over time.

In FY2019, MIT continued to advance toward its goal of achieving a 32% reduction in campus emissions by 2030. Since 2014, MIT has reduced its emissions by approximately 20% toward this 32% goal, taking into account the purchase of solar power from the Summit Farms facility, which is fully operational and operating at full capacity.

This past year, in collaboration with the Department of Facilities, a comprehensive governance structure was put in place to enhance management and reporting to MITOS's institutional sponsors, the Office of the Provost and the Office of the Executive Vice President and Treasurer. Advancing the office's test-bed approach for new ideas, MITOS has jointly developed and initiated a pilot project to use artificial intelligence in conjunction with conventional building control systems to reduce energy use. If successful, this approach is expected to have a meaningful impact on campus greenhouse house gas emissions and advance the office's collaborations with faculty and students.

### **Climate Action: Campus and Community Resiliency**

The MIT Climate Resiliency Committee, managed by the Office of Sustainability, is modeling and planning a climate resilient MIT. The committee comprises faculty members; engineering and facility operations staff; experts in risk, insurance, and climate science; experts from the Massachusetts Institute of Technology Investment Management Company (MITIMCo); and students. A climate resilient MIT is a community that will continue to fulfill its mission in the face of current and future climate risks and disruptions caused by flooding from more frequent and extreme rains, flooding from storm surges and rising sea levels, and extreme heat events.

The collaboration has collected new data and generated new models that evaluate the probability and extent of different campus flooding risks in both current and future climates. A web-based flood risk visualization platform is being developed to empower campus planners, engineers, emergency managers, and operational decision makers with the information needed to prioritize campus systems and locations in greatest need of adaptation. Preliminary project results have reduced the uncertainty of risks facing MIT and have been communicated to the MIT Corporation Risk and Audit Committee. MITOS has also been working with the City of Cambridge Climate Resilient Zoning Task Force to promote alignment of climate risk modeling tools and potential city-wide adaptation strategies.

## **Mobility: Flexible Commutes and Parking Demand Reduction**

### **Access MIT**

Access MIT is a benefit offered to all full-time employees that provides free access to public transit, coupled with paid daily parking. It is in the third year of implementation. MITOS took the lead in collecting, analyzing, and designing a reporting mechanism to track progress of this initiative from 2016–2018. The daily average number of unique individuals entering gated lots declined 11.6%—from 2,185 to 1,931—on weekdays that were not holidays. The data demonstrate that transportation trends are successfully reducing parking demand and giving MIT staff and faculty incentives to choose alternative routes to campus. The challenge is how to grow as an institution while continuing to reduce parking demand. In analyzing the raw data, machine learning modeling techniques were applied to improve the quality and to increase the reliability of the results. These techniques are novel contributions to administrative analysis at MIT, and can be applied to other topics and efforts. In the next phase, MITOS, in collaboration with members of the Transportation and Policy Committee, will review the data and begin to work on the next phase of Access MIT.

### **Materials**

#### ***Managing Materials Sustainably: The Media Lab***

Globally, humans are consuming and wasting more materials than environmental, economic, and social systems can process. MIT's campus purchasing and waste practices contribute directly to these global trends. MITOS has partnered with the Department of Facilities and the Media Lab to use the campus as a test bed for understanding these consumption challenges and experimenting with best practices for designing out waste in campus systems. The project has included a pilot project, using the Media Lab, looking at whether waste collection systems, educational messages, and waste audit evaluations can help to generate cleaner recycling and food waste streams. Outcomes confirm that these approaches do lead to more sustainable waste sorting and collection practices. A second phase seeks to drive waste out of the more than 300 catered events that the Media Lab hosts each year. The project team is currently developing a zero waste events planning document promoting reusable service ware and dishes. The framework could be adopted by the Media Lab as well as by other event venues, hosts, planners, and caterers serving MIT.

### **Food Systems**

#### ***Sustainability and the MIT Food System***

In 2017, the MIT Food and Sustainability Working Group set out to have a conversation about the MIT food system—one that bridged the areas of food insecurity, student and retail dining, campus construction, education, culture, and technology. Over the course of the year, the group examined the cultural, administrative, and environmental dimensions of the MIT food system, resulting in a set of recommendations for operationalizing sustainability across campus life and operations. In October 2018, the group delivered their recommendations to the vice president and dean for student life and the deputy executive vice president and treasurer. There were five key topic areas:

- Access and Empowerment
- Shared Standards for Vendors
- Comprehensive Waste Reduction Strategies
- Vibrant Indoor and Outdoor Spaces
- Innovation and education

With feedback from senior leadership, the Office of Sustainability prioritized a number of initiatives to advance the recommendations. The office:

- Engaged with Bon Appetit on a sustainability plan
- Engaged with departments and student groups to promote reusable service ware and dishes in the food system
- Engaged with the Office of the Vice President for Finance to integrate sustainability into preferred catering contracts
- Collaborated with MIT Dining to expand its food recovery efforts and develop a food waste reduction campaign
- Developed an on-campus community garden space that promotes education around pollinator-friendly plants and their connection to the food system

## **Building the Leadership and Capacity of the MIT Community**

### **Pathways to Sustainability at MIT**

The [Pathway to Sustainability Leadership](#) document provided a framework for the MIT campus that connects operational and campus system goals with the academic pursuit of sustainability in coursework and research. The document outlines five elements of a pathway by which MIT will formalize and build on current efforts to address the challenges posed by sustainability and become a leader in this crucial arena. The five elements call upon MIT to be:

- An exemplar that incorporates sustainability considerations into campus infrastructure, operations, student life, and daily decisions
- A model of organizational transformation for sustainability
- A generator of meaningful new sustainability ideas and research, building on MIT's history and current capacity for helping to meet vital global needs and priorities
- An innovator of deep educational experiences for the diverse communities on campus and beyond
- A thoughtful partner to the local and global communities in which MIT operates, a clearinghouse of good ideas, and a mobilizer of actors who can implement sustainability solutions

In June 2018, the Office of Sustainability hosted an [implementation design forum](#), inviting all community members to contribute to the process. How best to develop an implementation plan for the pathways document was debated during the forum, and from that debate there emerged a call for a set of conditions for success to ensure accountability to and by MIT. The components of these conditions included institutional oversight and accountability, a governance structure, access to data, and improved communication and visibility of MIT's sustainability commitment.

In response, a new Sustainability Leadership Steering Committee was formed to oversee the implementation and review process, with work to begin in early 2019. MITOS will work with this committee to propose and establish a variety of sustainability benchmarks, review documents and ideas, convene stakeholders and roll out action items, and hold stakeholders accountable for setting and achieving goals.

### **Coming Together: The Fifth Annual MIT Sustainability Connect**

MITOS hosts Sustainability Connect, an annual event designed to bring together the ecosystem of actors working to create a sustainable campus and world. The 2018 publication of the Pathways to Sustainability Leadership report set the stage for this year's event. Held on May 3, 2019, Sustainability Connect drew more than 100 people from across the Institute. Interactive panels and workshops featuring students, faculty, and staff explored themes such as

- Designing the future of sustainability education at MIT
- A retrospective of sustainability successes at MIT
- Community input into campus priorities: water, materials and recycling, and communicating sustainability

### **Sustainability Lunch and Learns**

Over the course of AY2019, MITOS designed and hosted seven Sustainability Lunch and Learns as a means for building community and sharing new knowledge and ideas among our key campus and city partners, from the Department of Facilities to the Kendall Square Association. Audiences at each event ranged from 50 to 75 people. Topics included:

- Leveraging the campus as a test bed: research partnerships with the Central Utilities Plant (CUP)
- Access MIT: measuring impact and next steps
- MIT Materials Management: driving positive impacts through consumption, reuse, and disposal
- Advancing MIT's climate action commitments
- Sustainable food in the campus landscape
- Sustainability data dashboards, visualizations, and problem solving
- Student research on creating a digital MIT food map

MITOS is working on topics for the series for 2020.

## Working Green Committee

The Working Green Committee (WGC) strives to engage support staff in sustainability topics on campus and in their personal lives. In 2019 the WGC launched a newly designed [website](#) to act as a portal for MIT staff seeking information on working, living, and commuting “green.” The WGC’s main focus is on educating the MIT community about recycling and reusing and enabling them on campus. The signature event is Choose to Reuse, which takes place the third Thursday of the month from September through May in the Stata Center. In the past year, the event averaged 219 people attending or picking up items per month and 76 people dropping items off each month. This is an opportunity for MIT community members to engage in the circular economy by giving new life to items donated by their peers. In March, the WGC co-chairs were invited to make a presentation at the MIT event planners annual luncheon. The co-chairs presented to 105 MIT event planners on ways to approach event planning through a sustainability lens and created a one-page Sustainable Event Planning Guide as a handout.

## Sustainability Fellowship Program for Students

MITOS runs a student fellowship program that engages undergraduate and graduate students in meaningful work to advance a sustainable campus at MIT and to build their professional experience in institutional transformation. The office hired five part-time student fellows during the academic year and six full-time student fellows during the summer. The AY2019 student fellows grappled with a range of topics and proposed sustainable solutions, including

- Campus climate risk assessment, analysis, and visualization
- Sustainable purchasing guidelines and designing waste out of campus events
- Food waste reduction campaign in the dining halls and sustainable food procurement standards
- Geospatial data analysis of campus commutes
- Design and construction of campus community garden
- Analysis of greenhouse gas emissions of campus purchased goods, travel, waste, and so on

## Transforming the Campus into a Living Laboratory and Test Bed

Using the MIT campus as a test bed refers to conducting rigorous campus-based research with operational and academic partners, research that is supported by sustained data collection and analysis and leads to measurable and communicable outcomes. By using the campus as a test bed, MITOS seeks to catalyze innovations in sustainability that will in turn improve and accelerate the office’s own efforts.

## Solving for Carbon Neutrality at MIT

Two special subjects (11.S938 Special Subject: Urban Studies and Planning and 2.S999 Graduate Special Subject in Mechanical Engineering) engage a team of multi-disciplinary faculty from the five schools at MIT, who bring their knowledge and

expertise to bear on the problem of solving for carbon neutrality at MIT. The subjects are managed by two co-instructors—Professor Tim Gutowski of the Department of Mechanical Engineering and Julie Newman, lecturer in the Department of Urban Studies and Planning and director of the Office of Sustainability at MIT. The content is provided by invited MIT faculty via lectures, readings, and discourse, as well as staff experts who are responsible for the operational management of MIT and relevant state and local officials. Solving for carbon neutrality at MIT requires a deep understanding of technology and human behavior, as well as regional, state, and municipal energy production and distribution systems, economic frameworks, and policy. The subjects are designed for students to consider the local, state, regional, and national context of solving for carbon neutrality to inform the development of the pathways they design. They use the MIT campus as a test bed for understanding climate adaptation and mitigation in this context.

### **Sustainability Incubator Fund**

The Campus Sustainability Incubator Fund makes it possible for MIT community members to use the MIT campus as a test bed for research in sustainable operations, management, and design. MITOS works to inspire and enable the continuous generation of breakthrough sustainability solutions to transform MIT's campus, the City of Cambridge, and the world. The seed funds enable students, faculty, and researchers to explore the physical facility and social context in which they are working, living, and learning. In AY2019, two new projects were launched with awards from the fund. One award went to Associate Professor Jessika Trancik, in the Institute for Data, Systems, and Society, and the other to Professor Douglas Hart, in the Department of Mechanical Engineering. Associate Professor Trancik's team seeks to study on-site renewable energy storage systems. The team has been working closely with the Department of Facilities to determine a location for such storage and how to plan the integration of energy storage on-site. Professor Hart's team designed a two-semester class to prototype carbon-neutral cooling systems. The research of both faculty members has been closely managed in collaboration with operational staff within the Department of Facilities and the Central Utilities Plant.

## **Forging Collaborative Partnerships Across the Campus, the City, and the Globe**

### **City Partnerships**

MITOS continued to expand and strengthen its constructive collaborations with the City of Cambridge through mutual interests in leadership on sustainability. Throughout FY2019, the office's collaborations focused on helping shape the implementation of the city's Net Zero Action Plan, adopted in 2015. The action plan identified a path for moving the city toward net zero greenhouse gas emissions. MITOS, along with the Department of Facilities, the Environment, Health, and Safety Office, MITIMCo, and others participated in numerous working groups organized by the city to provide stakeholder input on various components of the plan. Components under discussion included new construction requirements, existing buildings' energy efficiency, renewable energy procurement and generation, laboratories' energy use, and the local low-carbon energy supply. Through being an active partner with the city and others, MITOS believes we are contributing to the making of more effective city programs and regulations.



The Cambridge Compact for a Sustainable Future continues to provide a platform and forum for collaboration with both leading private and public institutions to explore sustainability solutions applicable to Cambridge. Sharing expertise and experience in the areas of climate resiliency and adaptation, laboratory energy efficiency, and renewable energy systems has contributed to cross-sector pollination of ideas and strategies intended to accelerate adoption of best practices. Similarly, MITOS continues to support the participation of MIT's executive vice president and treasurer in the Boston Green Ribbon Commission, which seeks to accelerate implementation of Boston's climate action plan. The office's participation in the commission's Higher Education Working Group has contributed to improved cross-institution energy use and greenhouse gas data collection and benchmarking, sharing best practices for laboratory design, and long-term renewable energy purchasing. Other areas of MITOS's collaboration with the City of Cambridge included participation on the city's recycling, climate vulnerability, master planning, and climate action advisory committees.

### **Global Networks**

MIT remained engaged at the global leadership level for campus sustainability via the International Sustainable Campus Network. The network is a global forum supporting leading colleges, universities, and corporate campuses in exchanging information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability in research and teaching. This year MIT supported the launch of a Latin American branch that seeks to support the broader engagement of universities committed to sustainability on their campuses throughout Central and South America.

### **Conclusion**

MIT is well positioned to solve for sustainability at the levels of the individual, the campus, the city, and the globe. That said, this will require the Institute to engage its own faculty, students, and researchers to inform its analysis and solutions. MITOS has consistently found excitement about, and uptake of, its unique framing to solve for sustainability both within MIT and, more recently, across the globe.

In FY2020, MITOS will be committed to ensuring the success of the work that was begun in FY2019 while laying the foundation for the next era of sustainability at MIT. MITOS will continue to seek collective engagement and action on priority areas that include:

- Climate change—forging ahead with more aggressive strategies to mitigate campus emissions
- Water—seeking a comprehensive understanding of MIT's water use patterns in an effort to reduce overall demand and consumption across campus
- Sustainable transportation—broadening and deepening MIT's commitment to and participation in Access MIT
- Data collection and analysis—augmenting access to sustainability data across campus
- Food and culture—exploring ways to connect food choices to community health, food insecurity, sustainable agriculture, and climate change

- Sustainable design and construction—continuing to ensure that MIT has access to the knowledge and processes needed to enable growth of the campus while minimizing that growth’s environmental effects
- A living laboratory—leveraging the campus as a test bed for research, innovation, and teaching that will improve understanding of natural systems and deeply inform decision making
- Modeling and planning for climate adaptation and investments for a resilient campus
- Managing the impact of the Institute’s purchasing and waste management systems in a manner that takes the full life cycle costs and effects of materials and products into consideration

### **Sustainability in the News**

Sustainability efforts received a fair amount of recognition this past year, including coverage of

- [MIT’s STARS Gold rating](#), received in recognition of its sustainability achievements
- [Solving for Carbon Neutrality at MIT](#) subject (offered again in spring 2019)
- The [EnergyHack event](#) on solutions to challenges in the energy industry
- Office of Sustainability’s [2018 grant winners](#)
- [3Q: Julie Newman](#) on MIT’s pioneering solar power purchase

**Julie Newman**  
Director