

The background of the cover is a photograph of the MIT dome building, a large circular structure with a prominent dome, partially obscured by trees with autumn foliage in shades of orange, yellow, and brown. The building is situated behind a body of water, likely the Charles River, which reflects the scene. A stone wall and a green fence separate the building from the water.

MIT Office of Sustainability Annual Report to the President **FY2017**



Office of Sustainability

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The MIT Office of Sustainability [MITOS] entered into its fourth year of operation in the summer of 2016. We have set the foundation to create a campus sustainability model that both advances the mission of academic excellence at MIT and transforms the campus itself into an active demonstration of MIT's ability to address the world's great challenges. MIT strengthened its commitment to sustainability leadership via a number of public commitments and new programs that advance sustainable transportation, greenhouse gas mitigation, climate resiliency, innovation for sustainability and open access to data to advance the campus as a test bed for learning and innovation.

Highlights of FY2017 include: the roll out of ACCESS MIT; the announcement of MIT's first major renewable energy power purchase agreement (PPA); the launch of a new comprehensive MITOS [website](#); and the coordination of the World Summit on Sustainable Development for Higher Education forum, which brought representatives from more than 33 countries to MIT. MITOS representatives continued to serve in a leadership capacity at the city, regional and international level together with peer institutions also striving to innovate for and implement sustainability practices on their campuses and in their organizations.

In the summer of 2016, MITOS on-boarded two new and unique staff positions: Sustainability Project Manager for Living Lab and Project Manager for Sustainable Design and Construction. The second position is a pipeline position shared with the Offices of Sustainability, Campus Planning and Capital Construction. This position will work with MITOS for 15 months and then transition to the Offices of Planning and Capital Construction working toward the robust implementation of sustainable design and performance standards. MITOS seeks to build upon the success of this pipeline position and host future positions from other departments as a strategy to build capacity across the institute.

This report is organized around the four focus areas of MITOS and details its major accomplishments over the year.

- Planning for and managing **sustainable campus systems**
- **Building the leadership and capacity** of the MIT community
- **Transforming the campus** into an urban living laboratory
- **Forging collaborative partnerships** on campus and throughout our communities

Sustainable Campus Systems

In 2016-2017, MITOS continued to work collaboratively across operational and academic departments to actualize MIT's commitment to develop and manage a sustainable campus. Notably, we are on the cusp of being able to measure our impacts in more depth and at more frequent intervals. The combined force of the MIT Plan for Action on Climate Change and the Sustainability Working Group Recommendations, both released in the fall of 2015, continue to provide guidance and a charted course toward goal-setting, measurement and verification, and implementation of key strategies.

Sustainability Data Management

Underlying the success of our work is the need for accessible, reliable and replicable data streams to inform our understanding of the state of the campus today and solutions of tomorrow. MITOS worked to operationalize a Sustainability Data Hub and advanced the collection of strategic metrics that will enable us to benchmark MIT's progress and communicate our efforts to both internal and external partners. The ultimate goal of this project is to build a significant web-based resource accessible to the MIT campus community that enhances the ability to access sustainability data to inform decision-making and enable campus as test bed projects.

Energize MIT

MIT has launched a new website in beta form, making available a broad swath of detailed information about energy use and greenhouse gas emissions on campus. This rich resource is available to the Institute's students, faculty, and staff, for education, research, and decision-making purposes.

The rollout of this central data "dashboard," called Energize_MIT, is the latest in a series of steps implementing the goals and commitments set out in MIT's 2015 [Plan for Action on Climate Change](#). The site offers a single web-based entry point to a centralized pool of data, which seeks to improve collaboration across operational and departmental groups regarding sustainability related decision making and measured impacts.

The site provides two kinds of information. First, a set of interactive graphic visualizations depicts information such as campus-wide and building-by-building details about use of electricity, natural gas, fuel oil, steam, and chilled water, as well as the greenhouse gas emissions associated with energy use. And second, datasets can be downloaded and used to drill down into details of energy use, including some as fine-grained as energy-use measurements in 15-minute increments.

Plan for Action on Climate

In an effort to advance the MIT campus as a “test bed for change” as outlined in the MIT Plan for Action on Climate Change, MITOS continued to facilitate two internal working groups: Greenhouse gas working group and the Climate resiliency committee. Additionally, MIT signed our first power purchase agreement in an effort to explore the role of large scale solar and renewable energy financing strategies.

Greenhouse Gas Mitigation Plan for 32% below 2014 by 2030

The Greenhouse Gas (GHG) Working Group set out to produce a road map for MIT to achieve its initial 32% greenhouse gas emissions reduction goal by 2030 and is already looking beyond this goal. The Working Group, co-chaired by MITOS, developed the Institute’s first [campus GHG mitigation strategy and implementation plan](#) that informs strategies to scale up investments in energy efficiency, design to high performance building standards, renew our Central Utility Plant and invest in on- and off-site renewable energy. Progress-to-date includes a 7% reduction in GHG emissions from our 2014 baseline through 2016. We are in the process of calculating our 2017 emissions.

MIT Climate Resiliency

The Climate Resiliency Committee (CRC) continued to identify the risks faced by MIT from climate impacts: chronic heat stress, inland flooding and storm surge/sea level rise. Building upon the work of Cambridge and Boston, the CRC initiated a collaborative evaluation and planning process to understand how the campus ought to prepare for uncertain impacts. A primary area of focus continues to keep priority academic and research operations online in the event of climate-related impacts, while accelerating solutions for regional livability and long-term resilience.

Phase 1 of our Climate Vulnerability analysis in the form of a Flood Vulnerability study is now complete. This is a partnership between the Office of Sustainability, Departments of Facilities, Utilities, and Planning, Office of Emergency Management and Business Continuity, Office of Insurance and researchers in the Joint Program on the Science of Global Change and Earth Atmosphere and Planetary Sciences.

Power Purchase Agreement

MIT formed an alliance with two other Boston-based partners (Boston Medical Center and Post Office Square) via A Better City (ABC) initiative for the development of a 60-megawatt solar photovoltaic farm in North Carolina that has led to a long-term power purchase agreement (PPA). MIT is purchasing solar energy equivalent to 40 percent of its current electricity use, which will neutralize our emissions by 17% from our base. This agreement not only demonstrates the value of aggregation but will provide our research-

ers with first-hand access to data from the 60 mega-watt solar farm that has 255,000 solar panels on approximately 650 acres of land.

The PPA agreement also includes an educational component, and as a result, the Office of Sustainability has convened the Solar Test Bed Steering Committee, a diverse group of 20 faculty, post-docs, Phd candidates, administrators and operational staff, who are collaborating to determine strategies for linking the Summit Farms solar plant in North Carolina with research and other educational activities on MIT's main campus in Cambridge, MA.

Mobility: ACCESS MIT

Eighty-four percent of the MIT community commutes to campus in ways other than driving alone in a car, such as by using public transportation, or by bicycling, walking, and ride-sharing to work. The ACCESS MIT initiative, announced to MIT employees at the close of FY2016 and rolled out in FY2017, was designed to increase flexible and affordable transportation options, particularly targeting MIT employees that currently drive and further supporting those that regularly commute to work via alternative modes. Program highlights include a universal subway/bus pass embedded in MIT employee IDS, daily parking prices, and additional benefits for public transit. MITOS played a significant role in shaping the launch of the new program and will continue to act as a driving force in the expansion of Access MIT.

Access MIT seeks to reduce parking demand on campus by 10 percent over two years, which is equivalent to ~ 350 parking spaces. It is anticipated that 800 spaces will be lost over the next several years due to campus construction, highlighting the importance of this program as one key strategy in MIT's plan to offset this loss and provide robust access to affordable, convenient commuting options today and into the future. Meeting this goal is a high-level priority, shared by departments across the Institute, including but not limited to Campus Planning, Sustainability, and Facilities.

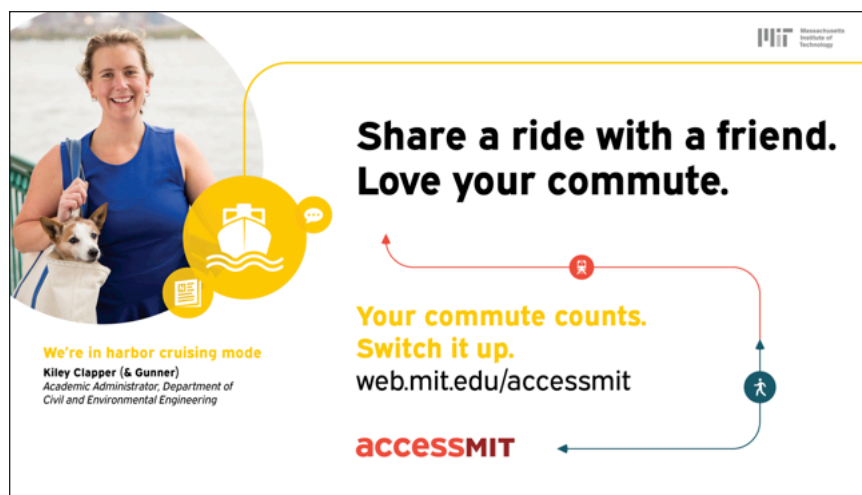


Figure 1: Image from ACCESS MIT campaign

Procurement: Materials Flow Analysis

The Offices of Sustainability and Procurement and Sourcing formalized a partnership to quantify and analyze a material flow analysis of the campus. When complete the collaboration will enable a deeper understanding of where there are opportunities for leveraging our buying power, considering our sourcing, and strategically reducing our waste streams. A “terms of use agreement” for data sharing between MITOS and Procurement and Sourcing was drafted and signed to pave the way for a new form of data exchange between internal entities at MIT. This will lead to a first of its kind materials flow analysis of the goods we procure, use, and dispose of. Moreover, this analysis will also provide grounds for a doctoral dissertation in the Institute for Data, Systems, and Society.

Building Leadership And Capacity

The MITOS strategy seeks to build leadership and internal capacity of the campus community to solve complex problems and meet the Institute's sustainability objectives. MITOS facilitates collaborative leadership models, such as the Campus Sustainability Task Force, to shape a vision and plan of action for sustainability at MIT that reflects faculty, staff, and student perspectives. The Office also works to build the capacity of the individual at MIT to understand critical issues and develop skills for integrating sustainability into their day-to-day campus lives. In 2016-2017, MITOS had the following accomplishments in this area.

The Campus Sustainability Task Force, whose members were appointed by the Provost and the Executive Vice President and Treasurer, which is chaired by Julie Newman, Director of Sustainability, and Professor Andrea Campbell, Dept. Head of Political Science, completed the draft of a blueprint for campus sustainability entitled "Pathways to Sustainability Leadership: Innovation, Transformation and Mobilization." This will be released to the MIT community for public comment in September 2017.

Lunch and Learns

In the spring of 2017, MITOS and the Department of Facilities continued with a four-part Sustainability at MIT Lunch and Learn series. This year's lunch and learns cut across programmatic areas, providing staff with deeper dives into ACCESS MIT, greenhouse gas mitigation and reduction strategies, energy reduction, and climate resiliency. The Lunch and Learn sessions were at capacity and effective in building alignment across campus efforts and increasing engagement on sustainability and climate action planning.

Sustainability Connect

MITOS hosted the third annual "Sustainability Connect" conference on May 8, 2017, which brought together over 100 MIT staff, faculty, and students. The event is designed to spark connections and ideas between the broad array of passionate people at MIT working to advance sustainability across departments and topic areas. The 2017 conference was organized around the theme, "Cultivating the Test Bed: Harvesting a Better Future for All." The panels and workshops throughout the day explored how to integrate innovation and social justice into future solutions, and how to create new venues for faculty, students, and staff to use the campus as a test bed.



Figure 2: Sustainability Connect participants, May 8th, 2017

For the third year in a row, MITOS led a team of departments and offices to establish a grant program in conjunction with Earth Day at MIT. The 2017 MIT Earth Day Collective funded nine projects to promote sustainable action on campus. Members of this year's collective included: the Sloan Sustainability Initiative, MindHandHeart, MIT Recycling and Materials Management, MIT Medical, the Environmental Solutions Initiative, MIT Department of Urban Studies and Planning, the Campus Activities Complex, the Environment, Health & Safety Office, and the MIT Office of Sustainability. Projects were selected based on their ability to promote climate action, resource-efficiency, and sustainable behavior both on campus and in the community. Showcasing the creativity of the MIT community, projects ranged from an annual furniture refurbishment workshop to a waste research and innovation night to an anti-idling solution for the MIT ambulance.

Transforming the Campus into an Urban Living Lab

A living laboratory exemplifies learning-through-practice – a tenet of MIT – by opening the doors of the campus to students and faculty to explore, experiment, and develop solutions in a real-world laboratory. MITOS supports living lab projects that bring staff, faculty, and students together around sustainability issues ranging from traffic congestion in Kendall Square to the purchasing behavior of MIT workplaces.

MITOS serves as an active internal research partner by facilitating the exchange of campus data and information between students, faculty, and staff. The Office works across MIT with administrative partners such as Facilities, Campus Planning, Procurement, Parking and Transportation; academic departments and groups such as the Sloan School of Management's Sustainability Initiative, the Department of Architecture, and the Transit Lab; as well as city collaborations such as the Kendall Square Ecodistrict. In order to facilitate each data exchange, MITOS acted as an intermediary between the data seekers and data providers, facilitated negotiations on the terms of usage, and removed sensitive data elements when necessary. In 2016-2017, MITOS supported living lab experiences in the following ways:

Course support

MITOS provided academic support for instructors in the D-Lab Waste Course (EC.S07, EC.S12) in the fall of 2016. The Office created a menu of “Lablets” (prototype living lab projects) related to three specific areas of inquiry (Process and Systems, Quality of Life, Materials Streams). Students conducted micro-research projects with guidance from instructors and MITOS staff. One robust micro research study on the Reusable Mug Program (“How to Increase Use of Reusable Mugs at MIT” by student Ronja Haase) at the Sloan School inspired students in the Undergraduate Association Sustainability Committee to continue to collect data and analyze findings during the spring and fall 2017 semesters.

Community engagement

In an effort to tell the stories of living lab research, and to connect operational and academic partners, MITOS launched Laborama; a new, interactive “poster jam” event that featured the work of the Urban Risk Lab, the Central Utilities Plant, Wang Lab, IS&T, the Varanasi Lab, the Office of Digital Learning, the ChemE Department, Senseable Cities Lab, MIT Center for Energy and Environmental Policy Research, the Buonassisi Lab, and the Building Technologies Group. The event featured live demos of new inventions and brainstorming activities for new research ideas (Lablets) and the introduction of the “Adventure Card” pilot program that collects information on living lab research in a baseball-card-like format.

Campus as test bed research

Solar Test Bed (STB) will provide a centralized physical anchor for large-scale solar research to come together. Linking the operation of the Summit Farms solar plant with academic research leverages the MIT campus as a test bed to study real-time energy data, long term capacity markets, candidate energy storage systems, experimental solar cells, and the impacts of large-scale solar plants on neighboring communities.

The STB seeks to reduce time to adoption of emerging technologies, to accelerate change with balance of systems innovations and to provide a real-world case study of how aggregated partnerships can accelerate contributions toward global climate change and generate new game-changing academic and operation knowledge.

As MITOS moves forward, it intends to develop a strategic framework for maximizing the potential of MIT to serve as a living lab and test bed for sustainability.

Campus Sustainability Incubator Fund

The Campus Sustainability Incubator Fund, launched by MITOS in spring 2017, provides seed funds to select teams of students, faculty, and researchers to explore the physical facility and social context in which they are working, living and learning at MIT. The fund was made possible through a generous gift from Malcom M. Strandberg. The first round of funding was awarded in summer 2017 to four project teams led by Kripa Varanasi of the Department of Mechanical Engineering, Randy Kirchain and Jeremy Gregory of the Concrete Sustainability Hub, Lisa Anderson of the Department of Chemical Engineering, and Danielle Dahan of the Center for Energy and Environmental Policy Research.

Forging Collaborative Partnerships

MITOS works strategically to build collaborative partnerships within and outside of MIT to harness the collective intelligence of communities to solve shared problems. To highlight this work, below are a number of accomplishments from 2016-2017 that demonstrate MITOS' collaborative partnerships with the cities of Cambridge, Boston, and networks of peer institutions.

[In Cambridge](#)

Cambridge Compact for a Sustainable Future

FY2017 marked a turning point for the Cambridge Compact for a Sustainable Future, which now has 20 signatory members (MIT was a founding member). In June 2016, the Compact cemented unanimous member support for the adoption of a comprehensive three-year work plan that lays a path for implementing the priority actions identified by the members. MIT continues to play a leadership role in the governance and implementation of the Compact through its roles as Board members, Executive Committee members, and working group chairs. In FY2017 MIT was host to two workshops: Sustainable Transportation featuring ACCESS MIT and Planning for a Climate Resilient Campus and City. MIT will extend its participation and leadership in FY2018.

Cambridge Recycling Advisory Committee

MITOS also sits on the Cambridge Recycling Advisory Committee, which provides advice, assistance and recommendations regarding the City's recycling, toxics reduction and waste prevention programs as well as the implementation of strategies to meet the goals in the City's climate and waste plans, including an aggressive goal to reduce trash by 80% by 2050.

Climate Protection Action Committee

MIT serves on the City of Cambridge Climate Protection Action Committee (CPAC), a key avenue for ensuring continued alignment of campus climate activities with City-wide initiatives. CPAC is comprised of community members and institutional representatives from across Cambridge. CPAC serves as the advisory body for the City's implementation of the Net Zero Action Plan for eliminating greenhouse gas emissions from buildings. In May and June 2017, CPAC also began informing the scope of the City's Climate Action Plan which will be developed in the fall 2017.

Ecodistrict

MITOS continues to participate on Kendall Square's Ecodistrict Committee. This committee continues to seek the integration of EcoDistrict principles in current and future development. Ecodistricts are guided by a community-based planning process to become a place that fosters local sustainability initiatives and provides opportunities for large-scale, district-wide collaborative implementation.

Low Carbon Energy Supply (LCES) Advisory Committee

A MITOS representative participates on the LCES Advisory Committee. This committee grew out of the Cambridge Net Zero Action Plan which seeks to drastically reduce GHG emissions from the built environment in the City. Committee members seek to explore how Cambridge develop an urban energy system supply transformation strategy to meet the goals set out in the Net Zero Action Plan.

[In Boston](#)

Boston Green Ribbon Commission

MIT continued to participate as a member in the City of Boston's Green Ribbon Commission that seeks to accelerate implementation of Boston's Climate Action Plan and amplify regional strategies to promote GHG mitigation, climate resiliency planning, and renewable energy adoption. EVPT Israel Ruiz serves as a member, and MITOS staffs MIT's engagement. In 2017, the Commission's Higher Education Working Group completed a laboratory building energy use benchmarking study that created one of the largest and most robust regional data sets on this building type in the country. The study is intended to enhance energy efficiency investments through identifying effective strategies and potential performance goals. The HEWG also reviewed and provided feedback on the Climate Change Preparedness and Resiliency Checklist of Boston's Climate Change Preparedness and Resiliency Policy; is in the process of developing a pilot project to test energy consumption behavior based on real-time carbon intensity information; and completed the report "Institutional Renewable Energy Procurement: Guidance for Purchasing and Making Associated Environmental Impact Claims".

[In the region](#)

Ivy Plus Sustainability Consortium

MIT is actively engaged in the Ivy Plus Sustainability Consortium and its Working Groups. Steve Lanou, MITOS Project Manager, serves as chair of a working group that is charged with advancing alignment across our member schools for measuring and reporting sustainability progress

and impacts through collective metrics definition, data collection, and reporting. These efforts are designed to provide essential performance information to Consortium school leadership, and accelerate adoption of best practices.

Northeast Campus Sustainability Consortium

MITOS staff participates in the Northeast Campus Sustainability Consortium (NECSC) and attended the annual meeting hosted by Dartmouth College in June 2017, which brought together campuses from around the Northeast and Canada to share best practices. During the year, MITOS and its peer offices host monthly calls to explore shared challenges, such as measuring greenhouse gas emissions, diverting organic waste, and integrating social justice and diversity into sustainability programs.

[In the world](#)

International Sustainable Campus Network

MITOS director, Julie Newman is a founding member of the International Sustainable Campus Network [ISCN]. The ISCN, in its eleventh year and provides a global forum to support leading colleges, universities, and corporate campuses in the exchange of information, ideas, and best practices for achieving sustainable campus operations and integrating sustainability in research and teaching. MIT is now represented on the Advisory Committee and holds a chair position for Working Group 3: Integration of Teaching, Research and Facilities.

World Summit on Sustainable Development Higher Education Forum

MITOS is actively engaged with the World Summit on Sustainable Development Higher Education forum. In September 2017, MITOS co-hosted the WSSD forum. The theme “Designing Tomorrow’s Campus: Resiliency, Vulnerability, and Adaptation” united leading academics from around the globe to share research and practices on how to scale solutions that have the power to transform communities into more livable and sustainable places, given the urgent challenges of a changing climate. MIT served as the backdrop for three days of interactive sessions and workshops. Over a dozen MIT faculty presented their research throughout the three days.

Conclusion

Given MIT's mission to best serve the nation and the world, the work of the Office is meant to impact people and systems at all levels, from individual, to campus, to city, to globe. We found great excitement and uptake of our unique framing to solve for sustainability across scales.

In FY2018, MITOS is forging ahead with ensuring continued success with the work that was seeded in FY2017 and also looking ahead to new project development. MITOS will continue to seek collective engagement and action on priority areas that include:

Climate change, forging ahead with strategies for mitigation, adaptation and resiliency;

Sustainable transportation, broadening and deepening MIT's commitment and robust participation in ACCESS MIT;

Data collection and analysis, launching the centralized sustainability data hub to inform and learn from our decision-making processes and institutional impacts;

Food and culture, exploring ways to connect food choices to community health, sustainable agriculture and climate change; sustainable design & construction, continuing to ensure that we have access to the knowledge and processes needed to enable our campus growth while minimizing our impacts;

Stormwater and ecological land management, seeking an understanding as to how the ecological systems of our urban campus perform and how we prepare for a changing climate;

Water, seeking a comprehensive understanding of our use patterns in an efforts to reduce overall demand and consumption across campus and thus contributing to the affiliated risks for the watershed.

Leveraging the Campus as a Test Bed for research, innovation and teaching that lead to improve understanding of the systems at hand and deeply informed decision making.

MIT Sustainability in the news

New Access MIT program offers free public transit to MIT employees

<http://news.mit.edu/2016/access-mit-program-offers-free-public-transit-to-mit-employees-0614>

Campus greenhouse gas emissions down 7 percent since 2014

<http://news.mit.edu/2017/campus-greenhouse-gas-emissions-down-7-percent-0111>

World Symposium on Sustainable Development at Universities

<http://news.mit.edu/2016/education-leaders-sustainability-universities-0922>

Energize MIT

<http://news.mit.edu/2017/campus-energy-data-dashboard-0508>

Sustainability Connect 2017

<http://news.mit.edu/2017/sustainability-connect-brings-mit-together-to-balance-present-future-needs-0526>

Sustainability Incubator Fund

<http://news.mit.edu/2017/mit-new-fund-allows-sustainability-researchers-use-campus-living-lab-0721>

MIT Power Purchase Agreement (PPA)

October Announcement

<http://news.mit.edu/2016/mit-neutralize-17-percent-carbon-emissions-through-purchase-solar-energy-1019>

March Update

<http://news.mit.edu/2017/solar-plant-delivering-promises-carbon-emissions-0323>